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, zootherapy, 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 zootherapy based on local fauna and identified therapeutics prepared using local birds. This study aims to build on this scholarship by further documenting quilombo 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
Quilombo 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,
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 Seedeeater (Sporophila lineola) migrates during the dry season and may go as far as the llanos of Venezuela.

Figure 1 Location of the Refúgio da Vida Silvestre Serra do Giz, where we conducted the study.
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**   |                                  |             |          |
| *Crypturellus noctivagus zabele*<sup>1,2</sup> | Zabelê | On the ground | Grass and legume seeds |
| *Crypturellus parvirostris*<sup>3,4,6</sup> | Lambú-de-capoeira, lambú-do-pé-vermelho | On the ground | Grass and legume seeds |
| *Crypturellus tataupa*<sup>3,4,6</sup> | Lambú-do-pé-roxo | On the ground | Grass and legume seeds |
| *Rhynochotus rufescens catingae*<sup>1</sup> | Perdiz | On the ground | Euphorbiaceae, Anacardiaceae, Burseraceae and Poaceae seeds |
| *Nothura boraquirai*<sup>6</sup> | Codorniz | On the ground |          |
| *Nothura maculosa*<sup>6</sup> | Codorna | On the ground |          |
| **Anseriformes**|                                  |             |          |
| **Anatidae**    |                                  |             |          |
| *Dendrocygna viduata* | Marreco |             |          |
| **Galliformes** |                                  |             |          |
| **Cracidae**    |                                  |             |          |
| *Penelope supercilialis alagoensis*<sup>2</sup> | Jacupemba |             | Fruits (Rhamnaceae, Bignoniaceae, Myrtaceae), seeds (Poaceae), liana flower |
| *Penelope jacucaca*<sup>1,2,3,6</sup> | Jacu |             | Fruits (Rhamnaceae, Bignoniaceae, Myrtaceae), seeds (Poaceae), liana flower |
| **Podicipediformes**|                                  |             |          |
| **Podicipedidae**|                                  |             |          |
| **Columbiformes**|                                  |             |          |
| **Columbidae**  |                                  |             |          |
| *Patagioenas picazuro*<sup>3,7</sup> | Asa-branca |             | Grass seed |
| *Columbina minuta*<sup>3,4,6,7</sup> | Rolinha-cafofa |             | Seeds |
| *Columbina talpaci*<sup>3,4,6</sup> | Rolinha-roxa, rolinha-calde-de-feijão, rolinha-vermelha | Branches and grass | Poaceae, Fabaceae, Euphorbiaceae and Convolvulaceae seeds and insects |
| *Columbina squamata*<sup>3,4,6</sup> | Rolinha-fogo-pagó, rolinha-cascavel |             |          |
| *Columbina picui*<sup>3,6</sup> | Rolinha-branca |             | Euphorbiaceae and Fabaceae seeds |
| *Columbina squamata*<sup>3,4,6</sup> | Rolinha-azul |             |          |
| *Claravis pretiosa*<sup>3,4,6,7</sup> | Juriti | On the ground | Fabaceae, Euphorbiaceae, Convolvulaceae, Anacardiaceae, Burseraceae and Poaceae seeds |
| *Zenaida auriculata*<sup>3,7</sup> | Ribaça, rebaça, arribaça | On the ground | Fabaceae and Euphorbiaceae seeds and Cactaceae fruits |

<sup>1</sup>Endemic to the Caatinga  
<sup>2</sup>Threatened with extinction  
<sup>3</sup>Forms flocks  
<sup>4</sup>In pairs  
<sup>5</sup>Solitary  
<sup>6</sup>Attract attention for appearance or song  
<sup>7</sup>Migratory

(continued on next page)
| Scientific Name | Common Name in Serra do Giz | Diet | Nesting |
|-----------------|-----------------------------|------|---------|
| Cuculiformes    |                             |      |         |
| Cuculidae       | Anum-branco                 | Twigs, thorns, pieces of fabric and green eggs. | Coccyxus melanopygus |
| Ceyxornis       | Anum-preto, anum-de-enxurrada | Pegada, Pea-camia | Nyctopolus hirundinaceus |
| Caprimulgiformes|                             |      |         |
| Caprimulgidae   | Bacurau                     | On the ground and under rocks | Nyctidromus albicollis |
| Nyctidromus     | Bacurau                     | On the ground and under rocks | Hydropsalis torquata |
| Nyctibiidae     | Bacurau, Bacurau-tesoura    | On the ground and under rocks | Nyctibius griseus |
| Apodiformes     |                             |      |         |
| Apodidae        | Beija-flor                  | Plant fibres, animal fur/hair (cattle, goats, and sheep) | Apodura ruber |
| Nyctidromus     | Beija-flor                  | Insects | Eupetomena macroura |
| Gruiformes      |                             |      |         |
| Rallidae        | Saracura, siricora, três-coco, patangu | Insects, tadpoles, and frogs | Aramides cajaneus |
| Gallinula       | Galihna-d’água              |      |         |
| Phorphyrio      | Galihna-d’água              |      |         |
| Carpodacus      | Carão                       |      |         |
| Jacanidae       | Carão                       |      |         |
| Charadriiformes |                             |      |         |
| Charadriidae    | Saracura, siricora, três-coco, patangu | Insects, tadpoles, and frogs | Aramides cajaneus |
| Varelaeus chilensis | Jacana-guarauna          |      |         |

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| Scientific Name | Common Name in Serra do Giz | Nesting | Diet |
|-----------------|----------------------------|---------|------|
| Pelecaniformes  |                            |         |      |
| Ardeidae        |                            |         |      |
| *Ardea alba*    | Garça                      |         |      |
| *Bubulcus ibis* | Garça                      |         |      |
| Cathartiformes  |                            |         |      |
| Cathartidae     |                            |         |      |
| *Sarcoramphus papa* | Urubu-rei       | Rock cavities | Chicken and rooster |
| *Coragyps atratus* | Urubu-de-cabeça-preta | Rock cavities | Dead animals |
| *Cathartes aura* | Urubu-de-cabeça-vermelha | Rock cavities | |
| *Cathartes burrovianus* | Urubu-de-cabeça-amarela | Rock cavities | |
| Accipitriformes  |                            |         |      |
| Accipitridae    |                            |         |      |
| *Elanus leucurus* | Gavião-penêra, gavião-peneira | Small rodents and lizards |
| *Buteogallus meridionalis* | Gavião-caboclo | Small rodents and lizards |
| *Rupornis magnirostris* | Gavião- pega-pinto, gavião-ripino, gavião-múdo, gavião-chama- visita | Pinto, chicken, mouse, and small lizards |
| Strigiformes    |                            |         |      |
| Tytonidae       |                            |         |      |
| *Tyto alba*     | Rasga-mortalha             | On the ground | |
| Strigidae       |                            |         |      |
| *Megasaccops choliba* | Corujão, coruja-boi | Beetle, butterfly, mouse, and small lizards |
| *Glaucidium brasilianum* | Caboré, coruja-caboré | Insects |
| *Atena cunicularia* | Coruja-buraqueira | On the ground | Beetle, butterfly, mouse, and small lizards |
| Coraciiformes   |                            |         |      |
| Alcedinidae     |                            |         |      |
| *Chloroceryle americana* | Pescador | |
| Galbuliformes   |                            |         |      |
| *Nystalus maculatus* | Fura-barreira, cololô, cochilão | Cliffs. |
| Galbulidae      |                            |         |      |
| *Galbula ruficauda* | Pavãozinha-do-mato | |
| Piciformes      |                            |         |      |
| Picidae         |                            |         |      |
| *Dryobates passerinus* | Pica-pau, pinica-pau | Tree cavities |
| *Piculus chrysochloros* | Pica-pau, pinica-pau | Tree cavities |
| *Colaptes melanochloros* | Pica-pau, pinica-pau, furiba | Tree cavities |
| Scientific Name | Common Name in Serra do Giz | Nesting | Diet |
|-----------------|----------------------------|---------|------|
| Cariamiformes   |                            |         |      |
| Cariamidae      |                            |         |      |
| Cariama cristata| Sariema, siriema            |         |      |
| Falconiformes   |                            |         |      |
| Falconidae      |                            |         |      |
| Caracara plancus| Carcará                    |         | Chickens |
| Herpetotheres cachinnan | Cauã, acauã   | Termite mounds and other nests | Small mammals and reptiles |
| Psittaciformes  |                            |         |      |
| Psittacidae     |                            |         |      |
| Amazona aestiva | Papagaio                  | Termite mounds and tree cavities | Poaceae seeds |
| Forpus xanthopterygius | Pacu, periquito | Termite mounds and other nests | Poaceae and Asteraceae seeds and fruits |
| Eupsittula cactorum | Gangarra, maritaca, griguilim, jandaia | Termite mounds and tree cavities | Poaceae and Euphorbiaceae, pitomba and guava seeds. In captivity, meat |
| Primolius maracana | Maracanã                 |         |      |
| Passeriformes   |                            |         |      |
| Thamnophilidae  |                            |         |      |
| Taraba major    |                            |         |      |
| Myrmochilus strigilatus strigilatus | Chorró, chorró-vermelho | Twigs and cotton |
| Herpsilochmus sp. |                            |         |      |
| Formicivora grisea |                            |         |      |
| Formicivora melanogaster bahiae | Gatinha-preta, fura-estrela |         |      |
| Thamnophilus capistratus | Choca           |         |      |
| Grallariidae    |                            |         |      |
| Hyllopezus ochroleucus |                            |         |      |
| Furnariidae     |                            |         |      |
| Campylorhamphus trochilidromus |        |         |      |
| Furnarius leucopus |                            |         |      |
| Pseudoseisura cristata |                |         |      |
| Synallaxis hellmayri |                  |         |      |
| Synallaxis frontalis |                        |         |      |

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| Scientific Name                  | Common Name in Serra do Giz                        | Nesting                                    | Diet                                      |
|---------------------------------|---------------------------------------------------|--------------------------------------------|-------------------------------------------|
| *Hemitriccus margaritaceinventer* | Lelé, ceguinho, ceguinho-de-capoeira               |                                            |                                            |
| *Todirostrum cinereum*          | Sibito, ferreirinho, manteiguinha, patinha, coquinho |                                            |                                            |
| *Tolmomyias flaviventris*       | Canário-da-mata                                    |                                            |                                            |
| *Eleenia flavogaster*           | Tontinha, maria-tonta, joana-tonta                 |                                            |                                            |
| *Stigmatura napensis bahiae*     | Trinta-e-cinco, sibito, papa-mosca                 |                                            |                                            |
| *Fluvicola nengeta*             | Lavandeira                                         | Branches, grass, leaves, bird feathers, cotton, animal hair (tail, mane) | Butterfly                                 |
| *Myiarchus tyrannulus*          | Bem-te-vi-boi, bem-te-vi-pequeno                   |                                            |                                            |
| *Machetornis rixosa*            | Bem-te-vi-de-remela                                |                                            |                                            |
| *Pitangus sulphuratus*          | Bem-te-vi                                          |                                            | Beans on the farm and insects             |
| *Empidoncus varius*             | Bem-te-vi-da-mata                                   |                                            |                                            |
| *Tyrannus melancholicus*        | Suiriri, marica                                    |                                            |                                            |
| *Vireonidae*                    |                                                    |                                            |                                            |
| *Cyclarhis gujanensis*          | Bico-duro                                          |                                            |                                            |
| *Corvidae*                      |                                                    |                                            |                                            |
| *Cyanocorax cyanopogon*         | Cancão                                             | Hard to find. The female lays eggs hidden from the male, which may drink the eggs. It can occupy other nests. |                                            |
| *Hirundinidae*                  |                                                    |                                            |                                            |
| *Stelgidopteryx ruficollis*     | Andorinha-do-cerrado                               |                                            |                                            |
| *Polioptilidae*                 |                                                    |                                            |                                            |
| *Polioptila plumbea*            | Sibito, manteiguinha, sibito-magro, tinha, caga-sebo, gatinha |                                            | Fruits                                    |
| *Troglydytidae*                 |                                                    |                                            |                                            |
| *Troglydotes musculus*          | Garrincha, richinó                                 | On roofs and satellite dishes              |                                            |
| *Mimidae*                       |                                                    |                                            |                                            |
| *Mimus saturninus arenaceus*    | Sabiá-caga-sebo, sebeiro, sabiá-sebeiro            |                                            | Fruits and insects                        |
| *Turdidae*                      |                                                    |                                            |                                            |
| *Turdus leucomelas*             | Sabiá-branco, sabiá-da-mata, sabiá-do-campo, sabiá-bico-de-prata |                                            | Pinecone and butterfly                    |
| *Turdus rufiventris*            | Sabiá-laranjeira, sabiá-gonga, sabiá-de-papo-amarelo, sabiá-de-inverno, sabiá-Jamaica | Leaves and pieces of fabric               | Pinecone and butterfly                    |
| *Turdus amaurochalinus*         | Sabiá-bico-de-osso                                  |                                            |                                            |
| Scientific Name                          | Common Name in Serra do Giz                  | Nesting                                                                 | Diet                                                                 |
|----------------------------------------|---------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------|
| **Estrildidae**                        |                                             |                                                                         |                                                                       |
| *Estrilda astrild*                     | Bico-de-lacre                               | Bird feathers                                                           | Seeds                                                                 |
| **Passeridae**                         |                                             |                                                                         |                                                                       |
| *Passer domesticus*                    | Pardal                                      | Bird feathers                                                           | Fabaceae seeds and Loranthaceae herbs                                |
| **Fringillidae**                       |                                             |                                                                         |                                                                       |
| *Euphonia chlorotica*                  | Vim-vim                                     | Branches, grass, grass roots and cotton. Nest made in a catholic coconut tree. | Poaceae seeds and fruits                                              |
| *Spinus yarrellii*                     | Pintassilgo                                 |                                                                         |                                                                       |
| **Passerellidae**                      |                                             |                                                                         |                                                                       |
| *Zonotrichia capensis*                 | Salta-caminho, Jesus-meu-deus, tico-tico, chiquin |                                                                         | Poaceae seeds                                                        |
| **Icteridae**                          |                                             |                                                                         |                                                                       |
| *Icterus pyrrhopterus*                 | Xexéu-de-bananeira, pêga                   | Banana plant fibers                                                    | Banana, mango, cashew, pinecone, baby bees in hives and Arecaceae fruits |
| *Icterus jamacaii*                     | Chofréu, concriz                            | Pieces of fabric, little strings, and fiber                            | Cactaceae fruits, pulp and seed of guava, pinecone, and banana        |
| **Molothrus bonariensis**              | Passarinho-preto                            |                                                                         |                                                                       |
| **Gnorimopsar chopi**                  | Craúna, graúna                              |                                                                         |                                                                       |
| **Chrysomus ruficapillus**             | Papa-arroz, acorda-nêgo                     |                                                                         |                                                                       |
| **Cardinalidae**                       |                                             |                                                                         |                                                                       |
| *Cyanoloxia brissonii*                 | Azulão, azulão-de-urtiga, azulão-de-favela |                                                                         | Seeds                                                                |
| **Thraupidae**                         |                                             |                                                                         |                                                                       |
| *Paroaria dominicana*                   | Galo-de-campina, cabeça-vermelha           | Branches, grass, grass roots and cotton                                 | Fabaceae, Euphorbiaceae and Convolvulaceae seeds, Cactaceae, cashew and pinecone fruits |
| **Compsothraupis loricata**            | Sangue-de-boi, passarinho-da-mata           |                                                                         |                                                                       |
| *Tachyphonus rufus*                    | Sabino                                      |                                                                         |                                                                       |
| *Thraupis sayaca*                      | Sanhaçu, sanhaçu-azul                       |                                                                         | Fruits                                                               |
| *Tangara sayaca*                       | Sanhaçu-de-macaco, sanhaçu-de-goiabeira    |                                                                         |                                                                       |
| **Sicalis luteola**                    | Mané-magro, canário-vagabundo, canário-fulheiro, canário-pírrita |                                                                         |                                                                       |
| **Sicalis flaveola**                   | Canário-da-terra                            |                                                                         |                                                                       |
| **Volatinia jacarina**                 | Nêgo-tziu, tziu, pâssaro-de-aração          |                                                                         | Seeds                                                                |
| **Sporophila lineola**                 | Bigodinho                                   |                                                                         | Poaceae seeds                                                        |
| **Sporophila angolensis**              | Curió                                       |                                                                         |                                                                       |
| **Sporophila nigricollis**             | Papa-capim                                  |                                                                         |                                                                       |
| **Sporophila albogularis**             | Golinha                                     | Twigs, cotton, grass roots, pieces of fabric and nylon thread          | Poaceae seeds and fruits                                              |
| *Coryphospingus pileatus*              | Maria-fita, cravina, tico-tico-da-caatinga |                                                                         | Fruits                                                               |
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 interviewees 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 supercilialis 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 jacuaca), Yellow-legged Tinamou (Crypturellus noctivagans), and Forbe’s Blackbird (Anumara forbesi). Three other species are seldom seen by the interviewees. Of these, two are NT, the King Vulture (Sarcoramphus 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 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. That is why, the 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

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