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Authors: do Nascimento, Carlos Augusto Rodrigues , Czaban, Robson Esteves , and Alves, Rômulo Romeu Nóbrega

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Research Article

Trends in illegal trade of wild birds in Amazonas state, Brazil

Carlos Augusto Rodrigues do Nascimento[1], Robson Esteves Czaban[2], Rômulo Romeu Nóbrega Alves[*3,4]

[1]Programa de Pós-Graduação em Ciências do Ambiente e Sustentabilidade na Amazônia - PPG-CASA, Centro de Ciências do Ambiente - CCA/Universidade Federal do Amazonas – UFAM, Av. Gen. Rodrigo Octávio Jordão Ramos, 3000 - Mini Campus - Bloco T Setor Sul, Coroado CEP 69077-000, Manaus, Amazonas, Brazil

[2] Núcleo de Fauna – NUFAS Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis – IBAMA, Rua Ministro João Gonçalves de Souza, s/nº - Km 01- BR 319, Distrito Industrial, CEP 69075-830, Manaus, Amazonas, Brazil

[3] Departamento de Biologia, Universidade Estadual da Paraíba, Av. das Baraúnas, 351/Campus Universitário, Bodocongó, 58109-753, Campina Grande, Paraíba, Brazil.

[4]Doutorado em Etnobiologia e Conservação da Natureza, Universidade Federal Rural de Pernambuco, Rua Dom Manoel de Medeiros, s/n, Dois Irmãos, 52171-900, Recife, PE, Brazil

*Correspondence author: romulo_nobrega@yahoo.com.br

Abstract

This study evaluates the seizure of birds in the state of Amazonas during twenty years (1992- 2011), providing information on the sale of birds in a state recognized for its significant biodiversity. We compiled a total of 2,698 seizure records of illegal wildlife trade, which were drawn up and issued by the Brazilian Institute of Environment and Renewable Natural Resources - IBAMA (the Brazilian official agency for environmental license and patrol) in the state of Amazonas, during 240 months. Reports of birds seized were found in only 297 (11%) of the seizure records analyzed. The number of bird specimens ranged from 3 to 710 per year, and the taxonomic richness ranged from 1 to 24 species. Considering all seizures, there was a richness of 40 bird species, distributed in 16 families and 10 orders. Among the families analyzed, Thraupidae was the richest, with 17 species, followed by Psittacidae, with eight species. The order Passeriformes was the most represented, with 12 genera, where *Sporophila* was the richest, with nine species (22.5% of total species). The Saffron Finch (*Sicalis flaveola* – Linnaeus, 1766), Muscovy Duck *(Cairina moschata* - Linnaeus, 1758) and Chestnut-bellied Seed-Finch *(Sporophila angolensis* - Linnaeus, 1766) together accounted for more than half (56.9%) of the total birds seized for the period. Of the species recorded in this study, five (12.5%) were listed as Endangered. Our results suggest that the illegal trade of animals in Amazonas shows a pattern different from that which has been reported in other Brazilian states. Birds were little represented in the Amazon, and the main reason for their illegal trade was related to their use as food. In addition to the cultural aspects, the richness of vertebrates in the Amazon certainly influences the choice of animals used and marketed in the Amazon region.

Key words: Conservation, Ethnozoology, Hunting, Wildlife trade.

Resumo

Este estudo objetivou avaliar a apreensão de aves no Estado do Amazonas, Brasil, durante vinte anos (1992-2011), buscando fornecer informações sobre a comercialização de aves em um estado reconhecido pela sua expressiva biodiversidade. Foram compilados um total de 2.698 autos de apreensão do comércio ilegal de fauna, os quais foram lavrados e expedidos pelo Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis no Estado do Amazonas - IBAMA, totalizando 240 meses. Constatou-se registro de aves apreendidas em apenas 297 (11%) dos autos de apreensão analisados. As aves corresponderam apenas a 1,2% dos animais apreendidos durante o período amostrado, o que corresponde a um total de 1.872 espécimes. O número de espécimes de aves variou de 3 a 710 por ano, e a riqueza taxonômica variou de 1 a 24 espécies. Considerando-se todas as apreensões, houve uma diversidade de 40 espécies de aves, distribuídas em 16 famílias e 10 ordens. Entre as famílias analisadas, Thraupidae foi a mais abundante, com 17 espécies, seguido de Psittacidae, com oito espécies. A ordem Passeriformes foi a mais representada, com 12 gêneros, sendo *Sporophila* o mais registrado, com nove espécies (22,5% de espécies total). Três espécies (canário-da-terra-verdadeiro - *Sicalis flaveola*, pato-do-mato - *Cairina moschata* e curió - *Sporophila angolensis*), representaram mais da metade (56,9%) do total de aves apreendidas para o período. Das espécies registradas neste estudo, cinco (12,5%) foram listadas como ameaçadas de extinção. Nossos resultados sugerem que o comércio ilegal de animais no Amazonas mostra um padrão diferente do que tem sido relatado em outros estados brasileiros. As aves foram pouco representadas, e a principal razão para o seu comércio ilegal estava relacionado com a utilização de aves como fonte de alimento. Além dos aspectos culturais, a riqueza de vertebrados da Amazônia certamente influencia a escolha de animais utilizados e comercializados na região amazônica.

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Introduction

Wildlife has been used by humans since the dawn of their existence [1], representing an important resource for survival, especially in countries rich in biodiversity [2]. In Brazil, throughout history, wild animals have been used for various purposes, including food, cultural activities, trade in live animals, their parts or products, clothing, tools, medicine, and magic-religious beliefs [3-7]. Such uses occur in both rural and urban areas, as game and fish are useful resources in many localities in all regions of the country [8-11].

Because of their importance as a source of resources for human use, the exploitation of many wild species has stimulated the trade in animal products [12-14]. The regulation of trade in wild animals and their by-products is governed primarily by the Convention on International Trade in Endangered Species of Wild Fauna and Flora - CITES - of which Brazil has been a signatory since 1973. Despite international and national laws, wildlife trade has increased in recent decades throughout the world [14, 15] and illegal animal trafficking is a serious problem that has impacted populations of various exploited animal species [12-14, 16].

Since it is a clandestine activity, information on the illegal wildlife trade is difficult to obtain [17]. In Brazil, a study published in 2001 recorded 36,573 specimens of birds seized throughout the country between 1992 and 2000. However, important geographical gaps show that these data are underestimated. Brazilian states rich in biodiversity, such as Amazonas, were not included in that survey [18]. The information obtained to date on the illegal trade in animals reveals that birds are the taxon most frequently involved in these activities. A recent review by Alves *et al.* [14] showed that at least 295 species of birds are sold illegally in the country. It is known that species from the north (except the state of Amazonas), northeast and central-west regions of Brazil are destined for locations in the south and southeast, where they are sold on roads and highways [18]. In the trade, caged birds (used as pets) are the majority (82%) of the marketed wildlife [14, 18].

In the Amazon, the hunting of wild animals is a seasonal activity, a source of animal protein for subsistence or for complementing fish consumption [19-22]. In the Amazonian states, rivers are true "roads" [23] and important routes where trafficked wild animals are sold, and the reality may be different from that described for other Brazilian regions, where birds dominate the

illegal trade, as suggested by previous studies. In the state of Amapá, for example, birds did not make up the majority of animals seized [24]. In the state of Acre, between 1989 and 1997, information extracted from 133 seizure notices issued by IBAMA inspectors of that state, revealed that fewer than 1% of the animals seized were birds [25]. In a survey conducted by IBAMA in Mantenedouro de Fauna Silvestre do Batalhão de Infantaria de Selva (MFS/7th BIS) from 2004 to 2011, in Boa Vista, state of Roraima, birds were not the majority of the taxa seized in that state [26].

Although the use of wild animals is a common practice in the Amazon region, studies on the subject are scarce [27]. The removal of wildlife from their natural environments for illegal trade or to be kept in captivity is a serious problem that still needs to be solved by the agencies responsible for wildlife protection. Because the clandestine illegal trade in wildlife is difficult to monitor, seizure records available from environmental agencies are an important tool for obtaining information on the richness of traded taxa and the most frequently exploited species. Our study evaluates the seizure of birds in the state of Amazonas in the period between 1992 and 2011, seeking information on the sale of birds in a state recognized for its significant biodiversity. Such information is important for environmental education programs and is essential to management plans for the region, also allowing a comparison with the richness of animals trafficked in other locations in Brazil.

Methods

Data collection was carried out by consulting the files of the Control and Supervision Division (DICOF) of the Brazilian Institute of Environment (IBAMA), located in the city of Manaus, state of Amazonas. The information used in the study was obtained from non-computerized seizure records, issued by IBAMA officials between 1992 and 2011. In 2012, IBAMA's inspection service was transferred to the Amazonas State Institute for Environmental Protection - IPAAM. In the consultation, on-site data were collected, including locality, municipality and/or river for which the seizure records were issued and seizure date, plus the species and number of individuals seized. Regarding the data on seizure location, besides the capital Manaus, seizure records for operations carried out by IBAMA on the main rivers of the state of Amazonas were also included. For the identification of birds to the species level, we used the scientific nomenclature recommended by the Brazilian Committee of Ornithological Records - CBRO [28]. For the conservation status of the species, we considered both Decree Nº. 444/2014, at the national level, and red lists of the IUCN [29].

Results

We compiled a total of 2,698 seizure records of illegal trade in wildlife, which were drawn up and issued by IBAMA in the state of Amazonas during twenty years (1992- 2011). Birds were found in only 297 (11%) of the seizure records analyzed. It should be noted that it was not possible to access 80 months (distributed in the sampling period), for which, according to local information, either there were no seizures, or the seizure records were lost (loss or deterioration of file boxes where they were stored). Excluding these cases, the annual number of seizure records ranged from 5 to 437, the number of bird specimens ranged from 3 to 710 per year, and the taxonomic richness ranged from 1 to 24 species per year (Fig. 1). For all bird seizures, there was a richness of 40 bird species, distributed in 16 families and 10 orders (Appendix 1). Among the families analyzed, Thraupidae was the richest, with 17 species, followed by Psittacidae, with eight species.

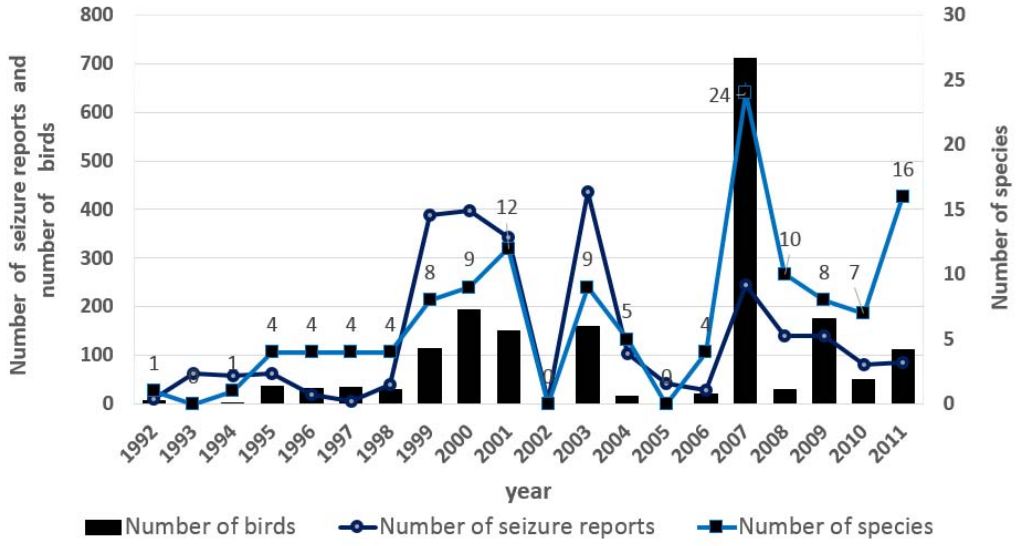


Fig. 1. Number of seizure reports, number of specimens and number of bird species seized by IBAMA between 1992 and 2011 in the state of Amazonas.

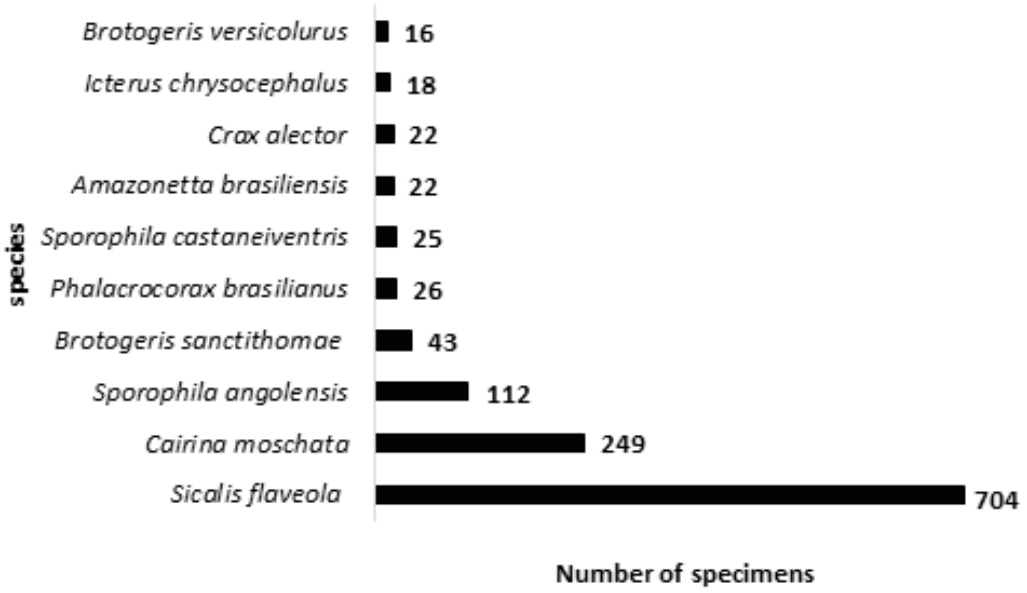


Fig. 2. Number of specimens of the 10 most abundant bird species seized by IBAMA between 1992 and 2011 in the state of Amazonas.

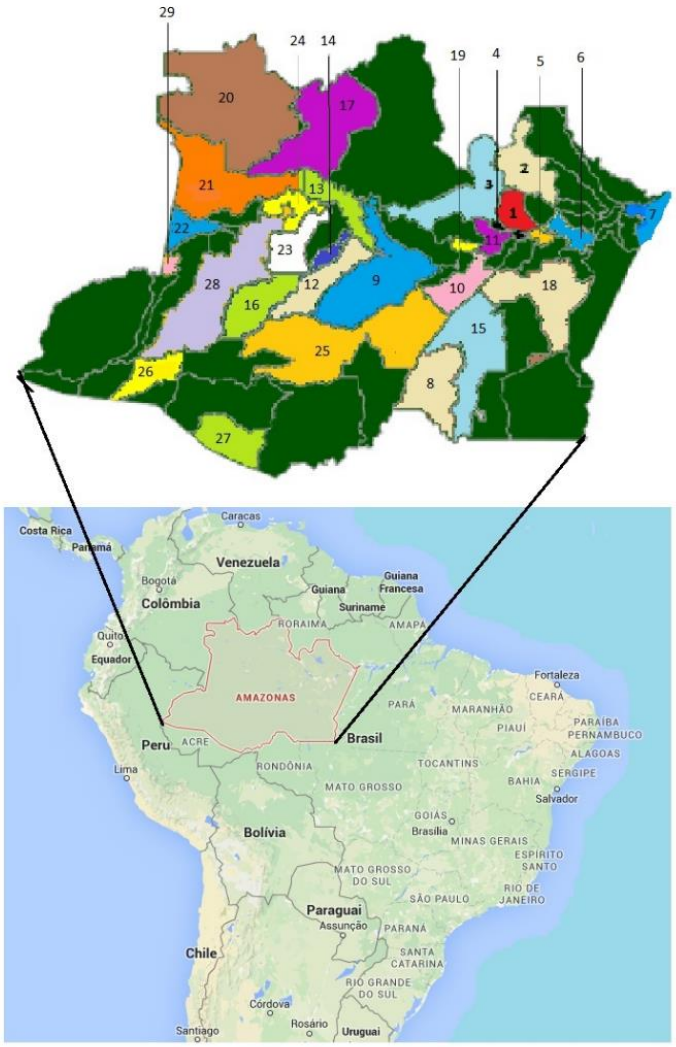
The order Passeriformes was the most represented, with 12 genera, where Sporophila was the richest, with nine species (22.5% of total species). The Saffron Finch (*Sicalis flaveola* - Linnaeus, 1766) was the most frequently seized species, accounting for a total of 704 specimens, followed by the Muscovy Duck (*Cairina moschata* - Linnaeus, 1758), with 249 specimens, and the Chestnut-bellied Seed-Finch (*Sporophila angolensis* - Linnaeus, 1766), with 112 individuals (Fig. 2). These three species together accounted for more than half (56.9%) of the total birds seized for the period (Appendix 1).

Of the birds seized, 203 individuals were recorded in the seizure records as “caged bird” (a reference to their use as pets), where most were in the order Passeriformes. Similarly, another 132 individuals, described in the seizure records as "game birds" (probably because they were destined for food), were grouped in the order Galliformes. Among the remaining specimens, 184 were identified only to the genus level in the records, where there were 85 parakeets (*Brotogeris* spp.), 65 parrots (*Amazona* spp.), 33 macaws (*Ara* spp.) and one toucan (*Ramphastos* spp.). Of all the birds seized, 575 (30.7%) specimens were slaughtered and ready for food. Among those used as a source of animal protein, the Muscovy Duck was the most common (43.3% of specimens) followed by parrots (*Amazona* spp. - 11.3%), macaws (*Ara* spp - 5.7%), Neotropic Cormorants (*Phalacrocorax brasilianus* - Gmelin, 1789 - 3.8%), Brazilian Teals (*Amazonetta brasiliensis* - Gmelin, 1789 - 3.8%), Black Curassows (*Crax alector* Linnaeus, 1766 - 3.8%) and Cinereous Tinamous (*Crypturellus cinereus* - Gmelin, 1789 - 2.3%) (Appendix 1).

Of the 1,297 specimens used for trade as pets, the most representative species were the Saffron Finch – 54.3%, followed by the Chestnut-bellied Seed-Finch - 8.6%, the Tui Parakeet - *Brotogeris sanctithomae* Statius Muller, 1776 - 3.3%, the Chestnut-bellied Seedeater (*Sporophila castaneiventris* Cabanis, 1849 - 1.9%) and the Moriche Oriole (*Icterus chrysocephalus* Linnaeus, 1766 - 1.3%) (Appendix 1). Most species were local, and nine (22.5%) were from other regions. Five of these species belonged to the genus *Sporophila* and one to the genus *Cyanoloxia*. Another very important bird with a large amount of seized animals was the Chestnut-bellied Seed-Finch. This species was found in only two different locations and three seizure records, two of them in the Eduardo Gomes International Airport/Manaus and one at km 42 of the BR-174, still in the municipality of Manaus.

Annual seizure records with more than 100 birds were obtained in 1999, 2000, 2001, 2003, 2007, 2009 and 2011. In these seven years, 86% of birds seized were recorded and there was little variation in the number of birds seized except for the year 2007, when there was a peak of seizures (710 specimens), 37.9% of the birds seized during the study period (Fig 1). As for taxonomic richness, the largest seizures in number of species were obtained in 2001, 2007 and 2011. In terms of abundance, the 10 species most seized totaled more than 66.1% of all specimens in seizure records during the study period, highlighting two species: the Chestnut-bellied Seed-Finch and the Muscovy Duck. Together, they accounted for more than half (50.91%) of the total birds seized (Fig 2).

Regarding the spatial distribution of seizures, IBAMA inspectors in the city of Manaus seized 70.35% of bird specimens (Fig 3). Of the species recorded in this study, five (12.5%) were listed as Endangered (EN), two as Vulnerable (VU) and three as Near Threatened (NT), one Not Recognized (NR) and the others in the Least Concern (LC) category [29] (Appendix 1). Only the Great-billed Seed-Finch *(Sporophila maximiliani* Cabanis, 1851) was included in the Critically Endangered (CE) category of the red list of Brazil.



Amazonas State municipality

1	Manaus	1317
2	P. Figueiredo	22
3	Novo Airão	7
4	Iranduba	7
5	Careiro da Varzea	8
6	Itacuatiara	9
7	Parintins	17
8	Humaitá	33
9	Coari	75
10	Beruri	44
11	Manacapuru	30
12	Tefé	80
13	Maraã	8
14	Alvarães	34
15	Manicoré	1
16	Carauari	11
17	Santa Izabel do Rio Negro	1
18	Borba	2
19	Anamã	3
20	São gabriel da cachoeira	2
21	Japurá	1
22	Santo antonio do Içá	4
23	JURUÁ	6
24	Fonte Boa	2
25	Tapauá	5
26	Eiunepé	3
27	Boca do Acre	4
28	Jutaí	1
29	Tabatinga	84
*	Negro River	52
**	Solimões River	2

Fig. 3. Number of specimens of bird seized by IBAMA per municipality. between 1992 and 2011 in the state of Amazonas.

Discussion

This is the first study to show that, in the state of Amazonas, birds have little representation among wild vertebrates trafficked and seized. This situation differs from several other locations in Brazil, where birds make up much of the fauna seized by environmental agencies [14, 30-33], reflecting the popularity of this taxon mainly as pets in Brazil [3, 14, 34, 35].

Some of the birds seized were used as pets and, considering the birds seized for this purpose, we found a pattern similar to that observed in other studies in Brazil, which showed that Passeriformes are the species most commonly seized and recorded in illegal trade [14, 32, 33, 36-38]. Of the species seized at the family level, Thraupidae was the most representative in number of species in this study area, following a trend found in other regions of Brazil [14], where species of this family are illegally traded for use as pets. However, we found a good representation of the family Anatidae among the birds seized in the state of Amazonas, which were certainly used as a source of food, perhaps because of their abundance in the region and/or their large size [39-41]. The consumption of species of this family has also been reported

elsewhere in Brazil [3, 35, 42, 43], but they are generally less represented in illegal trade than capturing birds for pets [14].

The literature on illegal wildlife trade in Brazil shows a trend suggesting that birds from the north and northeast are targeted for the southeast and/or south of the country [18, 37, 44]. However, some of our results suggest the contrary; for example, 41.2% of the species seized from the family Thraupidae were from other regions [14, 28]. Our findings reveal that the species the Great-billed Seed-Finch, Cooper Seedeater *Sporophila bouvreuil* (Statius Muller, 1776), Rusty-collared Seedeater *Sporophila collaris* (Boddaert, 1783), Slate-colored Seedeater *Sporophila schistacea* (Lawrence, 1862) and Ultramarine Grosbeak *Cyanoloxia brissonii* (Lichtenstein, 1823) were from the northeast and/or southeastern regions of Brazil.

The size of the birds intended for human consumption indicated more seizures of larger species for food use, particularly species of the families Anatidae, Cracidae and Psittacidae. The preference for birds of these families as a protein source seems to be a pattern in the Amazon region [39-41], while in other regions of the country, smaller species such as those of the family Columbidae appear among the most frequently consumed [3, 35, 42, 45], probably because they are more abundant and have gregarious habits [46].

The finding that birds of the genus *Sporophila* were the most seized in the period sampled matches seizure data in other regions of the country [32, 47]. The high demand for birds of this kind may be due to their beautiful songs, or the ease of their maintenance in cages [14]. We also emphasize the seizures of the Paramo Seedeater *(Catamenia homochroa* - Sclater, 1859), and the Hooded Siskin *(Sporagra magellanica* - Vieillot, 1805). The first is endemic to Tepuis in the state of Roraima and to Venezuela and/or Colombia [48-51]. However, the Hooded Siskin may come from Venezuela or southeastern Brazil.

The fauna in seizure data from the Amazonian states [24-26, 52], including this study, differ from data collected in other regions of Brazil, where the class Aves represents the vast majority of species seized [14] (Appendix 2). Importantly, of the 40 bird species seized in our study, 22.5% did not occur in the state of Amazonas. In other states, it has also been observed that some seized birds do not occur in the region where the seizure was made. In São Paulo, for example, from 1999 to 2003, 263 species of birds were seized, and 13% did not occur in that state [53]; in Rio Grande do Sul between 1999 and 2000, of the 93 species of birds seized, 19.35% did not appear in the records of that state [33], and in Minas Gerais between 1992 and 2012, of the 35 species of birds referred to CETAS (wildlife rescue center), 14.70% did not naturally occur in that state [54]. The seizure of birds from other regions is expected, since the trafficking of wild animals and their products involves different cities and regions of Brazil [6, 7, 14, 15, 55- 58].

Excluding specimens of birds which did not occur in the Amazon, 49.78% of the 1,155 other birds were slaughtered and ready for consumption. These data suggest that the families Anatidae, Cracidae and Psittacidae have an important role as a source of animal protein in the state of Amazonas, which corroborates previous studies finding that birds of these families are preferred for animal protein [39-41].

A

B

C

D

E

F

Fig. 4. Some examples of the bird species traded trade in Amazonas State, Brazil. A - Muscovy Duck (*Cairina moschata*), B - Brazilian Teal (*Amazonetta brasiliensis*), C- Marail Guan (*Penelope marail*), D - Black Curassow (*Crax alector*), E - Great-billed Seed-Finch (*Sporophila maximiliani*), and F - Tui Parakeet (*Brotogeris sanctithomae*). Photo credits: Robson Esteves Czaban.

Implications for conservation

There are 1,901 birds species in Brazil, according to the latest data of the Brazilian Ornithological Records Committee [28], many of which are threatened (n= 164 species – 24 being listed as critically endangered, 45 as endangered and 95 as vulnerable), according to the IUCN [29]. Although many factors may be related to the depletion of wild avifauna, a major threat to this animal group is illegal trade, which involves around 295 species in Brazil [14], indicating that birds are prominent among wild animals exploited by illegal trade in the country. However, data on seizures analyzed in this study suggest that the pattern of the illegal bird trade in the state of Amazonas is different from that reported in other Brazilian states, where birds are the main group seized by environmental agencies (Fig 4). In the period sampled in this study, birds were little represented, the main reasons for their illegal trade being for food and pets, while most birds seized in other regions of the country are used as pets. In addition to cultural aspects, the richness of vertebrates in the Amazon certainly influences the choice of the wild animals used and marketed in the Amazon region.

While birds do not represent the group with the highest number of species seized, our results show that the use and trade of wild birds are common throughout the state of Amazonas. Due to the clandestine nature of these activities, and the lack of basic biological data for many of the species traded, determining the impact of trade on bird wild populations is difficult. However, exploitation of wild birds can have serious ecological consequences, both directly through the decline and local extinction of the exploited species and, indirectly, by influencing important ecological processes such as seed dispersion and pollination. Moreover, changes in food chains can be a threat to other biological groups and enable the increase of pest species.

In Amazonia, the use of wild birds is a widespread and important cultural activity, occurring in both rural and urban areas and across social classes. Special attention should be given to the families Anatidae, Cracidae and Psittacidae, which are heavily exploited in illegal trade, as found in our study. Psittacidae and Cracidae comprise two of the most endangered groups of birds in the world and include several species that have gone extinct in recent centuries. We believe that the adoption of educational programs in schools and in the media, as well as the intensification of inspections to prevent illegal bird trade, are key in the control of this activity. These actions should have a positive impact on conservation of bird species and other animal groups affected by the same illegal activities in the region.

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Appendix 1. Order, family, genus, species, common name and conservation status of the animals seized by IBAMA between 1992 and 2011 in the state of Amazonas. Considering all seizures, there was a richness of 40 bird species, distributed in 16 families and 10 orders.

				Conservation Status			
Order, family, genus & Species	**Local name**	**English name**	**N**	**IUCN, 2014**	**Decree Nº - 444**	D	L
Tinamiformes / Tinamidae							
Crypturellus cinereus (Gmelin, 1789)	inhambu-preto	Cinereous Tinamou	13	LC		x	
Anseriformes / Anatidae							
Cairina moschata (Linnaeus, 1758)	pato-do-mato	Muscovy Duck	249	LC		x	
Amazonetta brasiliensis (Gmelin, 1789)	marreca-pé-vermelho	Brazilian Teal	22	LC		x	
Galliformes / Cracidae	aves-de-caça		132			x	
Crax alector (Linnaeus, 1766)**	mutum-poranga	Black Curassow	22	VU		x	
Penelope marail (Statius Muller, 1776)	jacumirim	Marail Guan	1	LC		x	
Suliformes / Anhingidae							
Anhinga anhinga (Linnaeus, 1766)	biguatinga	Anhinga	6	LC		x	
Phalacrocoracidae							
Phalacrocorax brasilianus (Gmelin, 1789)	biguá	Neotropic Cormorant	26	LC		x	
Pelecaniformes / Ardeidae							
Ardea cocoi (Linnaeus, 1766)	garça-moura	Cocoi Heron	3	LC		x	
Columbiformes / Columbidae							
Columbina passerina (Linnaeus, 1758)	rolinha-cinzenta	Common Ground-Dove	12	LC			X
Opisthocomiformes / Opisthocomidae							
Opisthocomus hoazin (Statius Muller, 1776)	cigana	Hoatzin	3	LC		x	
Psittaciformes / Psittacidae							
Ara. spp.	arara	Macaw	33			x	
Brotogeris spp	periquito	Parakeet	85				X
Amazona spp.	papagaio	Parrot	65			x	
Amazona festiva (Linnaeus, 1758) *	papagaio-da-várzea	Festive Parrot	11	NT			X
Ara ararauna (Linnaeus, 1758)	arara-canindé	Blue-and-yellow Macaw	5	LC			X

Ara macao (Linnaeus, 1758)	araracanga	Scarlet Macaw	2	LC			X
Brotogeris versicolurus (Statius Muller, 1776)	periquito-de-asa-branca	Canary-winged Parakeet	16	LC			X
Pyrilia caica (Latham, 1790)*	curica-caica	Caica Parrot	4	NT			X
Amazona farinosa (Boddaert, 1783)*	papagaio-moleiro	Mealy Parrot	1	NT			X
Brotogeris sanctithomae (Statius Muller, 1776)	periquito-testinha	Tui Parakeet	43	LC			X
Passeriformes / Cotingidae	passarinho-de-gaiola		203				X
Rupicola rupicola (Linnaeus, 1766)	galo-da-serra	Guianan Cock-of-the-rock	5	LC			X
Turdidae							
Turdus leucomelas (Vieillot, 1818)	sabiá-barranco	Pale-breasted Thrush	6	LC			X
Icteridae							
Icterus croconotus (Wagler, 1829)	joão-pinto	Orange-backed Troupial	1	LC			X
Icterus chrysocephalus (Linnaeus, 1766)	rouxinol-do-rio-negro	Moriche Oriole	18	NR			X
Thraupidae							
Sporophila angolensis (Linnaeus, 1766)	curió	Chestnut-bellied Seed-Finch	112	LC			X
Sporophila maximiliani (Cabanis, 1851)**/ ***	bicudo	Great-billed Seed-Finch	2	VU	CE		X
Sporophila bouvreuil (Statius Muller, 1776)	caboclinho	Cooper Seedeater	1	LC			X
Sporophila americana (Gmelin, 1789)	coleiro-do-norte	Wing-barred Seedeater	7	LC			X
Sporophila collaris (Boddaert, 1783)	coleiro-do-brejo	Rusty-collared Seedeater	1	LC			X
Sporophila albogularis (Spix, 1825)	golinho	White-throated Seedeater	1	LC			X
Sporophila schistacea (Lawrence, 1862)	cigarrinha-do-norte	Slate-colored Seedeater	1	LC			X
Sporophila castaneiventris (Cabanis, 1849)	caboclinho-de-peito-castanho	Chestnut-bellied Seedeater	25	LC			X
Sporophila lineola (Linnaeus, 1758)	bigodinho	Lined Seedeater	1	LC			X
Sicalis columbiana (Cabanis, 1851)	canário-do-amazonas	Orange-fronted Yellow-Finch	7	LC			X
Sicalis flaveola (Linnaeus, 1766)	canário-da-terra-verdadeiro	Saffron Finch	704	LC			X
Tangara episcopus (Linnaeus, 1766)	sanhaçu-da-amazônia	Blue-gray Tanager	6	LC			X
*Saltator azarae (*d'Orbigny, 1839)	sabiá-gongá-da-amazônia	Amazonian Grayish Saltator	5	LC			X

Catamenia homochroa (Sclater, 1859)	patativa-da-amazônia	Paramo Seedeater	2	LC			X
Ramphocelus nigrogularis (Spix, 1825)	pipira-de-máscara	Masked Crimson Tanager	1	LC			X
Ramphocelus carbo (Pallas, 1764)	pipira-vermelha	Silver-beaked Tanager	1	LC			X
Paroaria gularis (Linnaeus, 1766)	cardeal-da-amazônia	Red-capped Cardinal	2	LC			X
Cardinalidae							
Cyanoloxia brissonii (Lichtenstein, 1823)	Azulão	Ultramarine Grosbeak	2	LC			X
Fringillidae							
Sporagra magellanica (Vieillot, 1805)	pintassilgo	Hooded Siskin	3	LC			X
Piciformes / Ramphastidae							
Ramphastos spp.	tucano	Toucan	1				x
Total			**1872**				

*** Critically Endangered; ** Vulnerable; * Near Threatened, D = Dead, L = Live.

Appendix 2. Percentage of birds seized by Brazilian location, between 1989 and 2012 according to the literature.

City /State	Region	Percentage of birds	Source	Period
National	national	82.00%	Renctas, (2001)	1992 - 2001
Rio Grade do Sul - RS	south	100%	Ferreira & Glock, (2004)	1998 - 2000
Rio Grade do Sul - RS	south	96.3%	Zardo, et.al. (2009)	2006 -2008
Sul de Santa Catarina - SC	south	100%	Viana & Zocche, (2013)	2004 – 2011
Juiz de Fora - MG	southeast	53.3%	Borges et al. (2006)	1998 – 1999
São Paulo - SP	southeast	92%	Figueira, (2007)	1999 – 2003
Juiz de Fora - MG	southeast	100%	Gogliath et al. (2010)	2002 – 2004
Montes Claro - MG	southeast	93.02%	Franco et al. 2012)	2002 – 2007
Belorizonte - MG	southeast	100%	Souza & Vilela, (2013)	1992 – 2012
Belorizonte - MG	southeast	95.60%	Freitas, (2014)	2003 – 2012
Goiania - GO	Midwest	94.2%	Bastos et al. (2008)	1997 – 2005
Recife - PE	northeast	100%	Pereira & Brito, (2005)	2000 – 2005
João Pessoa - PB	northeast	88.0%	Pagano et al. (2009)	2006 – 2007
Salvador - BA	northeast	83,9%	Pimentel & Santos, (2009)	2009 – 2010
João Pessoa - PB	northeast	81.2%	Marques et al. (2012)	2009 – 2010
Rio Branco - AC	north	0,50%	Fuccio et al. (2003)	1989 – 1997
Abaitetuba - PA	north	0.03%	Baía Júnior et al. (2010)	2005
Macapa - AP	north	40.7%	Santos et al. (2011)	2008
Boa Vista - RR	north	40.0%	Farias, (2013)	2004 - 2011
Manaus - AM	north	1.2%	this study	1992 - 2011