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Trends in local wildlife hunting, trade and Control in the Tropical Andes Biodiversity Hotspot, northeastern Peru

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ABSTRACT:

The Amazonas and San Martin regions in northeastern Peru compose a central part of the Tropical Andes Biodiversity Hotspot, considered one of the highest conservation priorities worldwide. Many of the area's species have been identified as requiring urgent conservation measures by the International Union for Conservation of Nature, the Convention on International Trade in Endangered Species and International Primatological Society, as well as being protected under Peruvian law. In this study I present data about wildlife traffic and local wildlife use in Amazonas and San Martin, collected between April 2007 and December 2011. I highlight the trends in, and causes of, illegal trade. I examine the limitations on, and opportunities for, the authorities controlling these practices in the context of national and international pressures and the process of governmental decentralization. The most hunted orders were Psittaciformes ($n = 1497$) and Primates ($n = 279$). Animals were mainly found in the hands of traffickers (57%), usually on the way from the neighbouring region of Loreto to the coast. Endangered species were mainly kept as tourist attractions in recreation centres, hotels, or restaurants. Wildlife authorities suffer from a severe lack of specialized personnel, resources and rescue centres, and an often contradictory and inadequate legal framework. I also found a great difference in operation and efficiency between the 2 regions, suggesting that local and regional politics, rather than international pressures and agreements, influence control of species extraction, making fauna in San Martin and Amazonas vulnerable to frequent political changes.

INTRODUCTION:

Peru is considered one of the world's mega diverse countries (Rodríguez & Young 2000). Its northeastern regions, Amazonas and San Martin, lie within the Tropical Andes Biodiversity Hotspot, the most biologically diverse region on earth (Myers et al. 2000). These regions are home to Peru's 3 endemic primates: the 'Vulnerable' Andean night monkey *Aotus miconax*, the 'Critically Endangered' Andean titi monkey *Calicebus oenanthe*, and the 'Critically Endangered' yellow-tailed woolly monkey *Oreonax flavicauda* (classification according to the International Union for Conservation of Nature [IUCN]). The latter has been listed by the International

Primatological Society (IPS) as one of the world's 25 most threatened primate species 3 times since 2006 (Mittermeier et al. 2006, 2007, 2009). Primates are especially sensitive to hunting pressures (Peres 2001) and are often used as indicators or flagship species for conservation efforts (Marsh & Mittermeier 1987, Dietz et al. 1994, Harcourt 2000) and were thus the main focus of this study.

The regions of San Martin and Amazonas suffer from the highest rates of deforestation in Peru, fuelled by immigration and lack of government intervention (INEI 2007, Reategui & Martinez 2007, Shanee 2012). The highway 'Fernando Belaunde Terry' was constructed in the 1980s. It passes through both Amazonas and San Martin, connecting these regions to the coast. This highway, together with other development operations, has created access to new areas for human settlement and facilitated uncontrolled hunting (Shanee et al. 2007, Shanee 2011). The human populations in Amazonas and San Martin mainly consist of campesinos¹ and indigenous people. Hunting in the neotropics is a major threat to biodiversity, in particular for large-bodied mammals such as primates, cats, deer and bears (Alvard et al. 1997). Historically, subsistence hunting was practiced by indigenous peoples in Peru's rain forests; however, with the continuing expansion of migrant populations into new areas of Peru's northern cloud forests this process is accelerating (Reategui & Martinez 2007, Shanee 2011).

In this paper I present results of a survey of wildlife found illegally in captivity, killed, or sold in Amazonas and San Martin. I used participant observations, interviews and a review of the Peruvian laws to understand the challenges that wildlife authorities face in confronting these phenomena. I do not attempt to give absolute figures, only estimates of the minimum number of animals extracted from the wild, motives for extraction and assessments of the threats to wildlife and the opportunities to mitigate these threats.

MATERIELS AND METHODS:

Data collection

I collected data between April 2007 and December 2011 through visits to local markets, illegal zoos, tourist centres and ad libitum observations in streets, houses, cars and public areas such as bus stations. For each sighting I recorded: date, species, use (e.g. pet, adornment, bushmeat), state (e.g. alive, dead, body parts, husbandry conditions and health conditions), as well as other relevant information about the animal/part's antecedence, use and destination I was always extremely cautious that the investigation and my presence in the area would not encourage wildlife capture, and I never paid for animals or information.

Questionnaires in Spanish were given to 169 residents of the community of Yambrasbamba in Amazonas and the villages of La Primavera and Libano in San Martin to assess local extraction and use of wildlife. The questionnaires included questions about hunting habits, wildlife crop raiding, as well as attitudes towards

¹ South American peasants, Spanish-speaking populations, usually of mixed, Spanish and native origin, the majority of them migrants from the highland regions

forests, wildlife and conservation. Questionnaires were also completed by 245 rural community authorities, such as local mayors, vigilance committee heads and priests, throughout rural Amazonas and San Martin. These questionnaires asked for their opinions on wildlife as pets, hunting and how/if they intervene to promote conservation. Through direct contact with the wildlife authorities and police of both regions, I gathered information about the specimens confiscated, the attitudes of the authorities and the challenges that they face. I also reviewed relevant national and international laws.

Indigenous populations in northeastern Peru live mainly in closed communities and have special legal status in relation to resource use (Forestry and Wildlife Law No. 27308). To obtain reliable information about indigenous wildlife use, different methodologies would have to be applied, taking into account the different languages, culture and legal realities of indigenous communities in Peru. Therefore, wildlife use inside indigenous communities is not included in this study.

Legal and institutional framework

Peru has ratified the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention of Biological Diversity (CBD). Table 1 details national laws relevant to wildlife trafficking regulation. The National Institute of Natural Resources (INRENA) was created in 1992 as an autonomous branch of the Ministry of Agriculture (MINAG). In 2008 Peru created its first Ministry of Environment, a requirement of the Free Trade Treaty with the United States (Schmall 2011). However, responsibility for fauna and forestry resources was not included within the functions of the ministry and remained with the MINAG under the Technical Administration of Forestry and Wildlife (ATFFS). At the end of 2009 Peru began assimilating the ATFFS into the different regional governments. The transfer was made in January 2010 in San Martin and in November 2010 in Amazonas. The environmental public prosecutors office is another relatively new institution in charge of prosecution of environmental crimes.

Table 1. Main national laws relevant to wildlife trafficking

Name of law	Year	Relevance
Forestry and wildlife Law (27308)	2000	Promote sustainable management of wild fauna, making the protection of wildlife, especially endemic and endangered species, a national priority
Supreme Decree No. 034-2004-AG	2004	Approves categorization of threatened species of wild fauna ²
General Environmental Law	2005	Promote sustainable management of wild fauna, making the protection of wildlife, especially endemic and endangered species, a national priority
Penal Code No. 29263	2008	Sets the punishment for environmental crimes such as hunting, commerce, or transport of products or specimens of species protected by Peruvian laws to a jail term of between 3 and 10 yr

² By law this list is supposed to be updated biannually but, as the name of the decree suggests, the list of endangered fauna has not been updated since 2004

The transfer of responsibilities has resulted in great differences in the functionality of the control of wildlife traffic in Amazonas and San Martin. Since 2006 the regional government of San Martin has been held by a local, left-wing party, the ‘Regional Movement of New Amazonia’. Many of the party leaders came from an environmental organisation and give high priority to environmental issues in their discourse, demonstrated by the region’s slogan ‘San Martin– Green Region’ (GORSAM 2012, available at www.regionsanmartin.gob.pe; Shanee 2012). In Amazonas, Jose Arista became the regional president shortly after the transfer of the environmental authorities. Arista is an economist from the local party ‘Together for Amazonas’, is suspected of election fraud and gives much less emphasis to environmental issues (Seminario Nor Oriente 2010, Shanee 2012).

RESULTS:

Wildlife registered

During 722 encounters I recorded 2643 animals: 707 (27%) mammals, 1647 (62%) birds and 289 (11%) reptiles (Table 2). Of the individual animals recorded, 315 (12%) are categorized as Threatened by the IUCN (254 as Vulnerable, 20 as Endangered, 41 as Critically Endangered), 39 (1.5%) as Near Threatened, and 69 (2.6%), as Data Deficient. A total of 991 (37%) are protected under Peruvian law by Supreme Decree No. 034-2004-AG (NT-43, VU-854, EN-96); 143 individuals (5%) of 13 species are listed in Appendix I of CITES (Table 3), as well as 2061 (78%) of 59 species listed in Appendix II. Fifty-six individuals (2%) of 4 different species are endemic to Amazonas and San Martin (the primates *Aotus miconax*, *Calicebus oenanthe*, and *Oreonax flavicauda* and the hairy long-nosed armadillo *Dasypus pilosus*). The San Martin region had the most records 1800 (68%); in addition, 96 (19%) of the animals found in Amazonas of known origin came from markets in San Martin. Animals of known origin found in San Martin were caught in the same region or in neighbouring Loreto. The majority of birds, 1549 (94%), were found alive, as pets. Mammals were mainly found dead (376, 53%); the most common uses for these were as adornment, bushmeat, or ‘witchcraft’ medicines. Primates, however, were mainly found alive (236, 85%) as pets or as tourist attractions. The 2 most trafficked primate genera were *Saimiri*, with 85 individuals registered (32%), and *Cebus*, with 65 (25%). Of the reptiles recorded, 202 (69%) were found alive being transferred by traffickers; these were mainly river turtles. Snakes and lizards were mainly found dead used as adornment or for witchcraft.

The spectacled bear *Tremarctos ornatus* suffers from high hunting pressure—19 individuals were registered in this study as hunted because they are believed to endanger humans and cattle, or to raid cornfields, or they were taken as pets or trophies. Additionally, a man in Amazonas was found to have 21 bear skulls that he hunted and kept as trophies (W. Guzman pers. comm.). The most worrying reason given for hunting this species is for medicinal purposes; belief in its medicinal properties is widespread locally. Some ointment brands in Peru claim to have bear oil components in them; however, I did not encounter any proof of this.

Table 2. Number of species and individual animals found per order and their common uses. a: pet trade; b: adornment; c: jewellery; d: privately owned pet; e: bushmeat for local consumption; f: tourist attraction g: witchcraft/traditional medicine; h: crop raiding

	Order	No. of species	No. of individuals	Main use
Mammals	Carnivora	15	138	a, b, c, f, g, h
	Cetartiodactyla	6	182	b, c, e, g
	Cingulata	4	36	a, b, c, e
	Lagomorpha	1	2	b
	Marsupialia	5	6	e, h
	Perissodactyla	1	5	e, g
	Pilosa	3	9	b, e, d
	Primate	12	279	a, d, e, f, h
	Rodentia	7	45	e, f, h
	Xenarthra	1	5	d, e, f
	Total	55	707	
Birds	Anseriformes	1	2	b
	Ciconiiformes	3	4	h, b
	Columbiformes	1	6	f
	Falconiformes	11	24	b, h, g, a
	Galliformes	6	26	e, f
	Gruiformes	4	6	b, f
	Passeriformes	11	30	b
	Piciformes	12	42	a, b, g
	Psittaciformes	22	1497	a, d, f, h
	Strigiformes	4	6	b, f
	Tinamiformes	2	2	e
Trogoniformes	1	2	b	
	Total	78	1647	
Reptiles	Chelonia	1	63	a, b, e, f, g
	Crocodylia	2	46	a, b, c, f, g
	Sauria	1	5	a, c, d, g
	Serpentes	4	58	a, b, c, f, g, h
	Squamata	1	3	g
	Testudines	4	114	a, b, d,
	Total	13	289	
	Total	145	2643	

The condition of animals kept in captivity in the area was poor. Many animals suffered from broken bones, malnutrition, emaciation and were kept in small cages or on chains. Most pet primates (133, 66%) were infants, juveniles, or sub-adults, suggesting a high turnover due to death soon after capture.

During the first 2 yr of the study, I was notified by the authorities about only 83 (17%) of the cases registered, the rest were detected directly (seen from the street, in

markets and zoo checks or from information given by owners or neighbours which was later confirmed by observation). In 2010 and 2011, the percentage of cases reported by the authorities rose to 87 (42%), of these 77 (89%) were reported by the San Martin authorities.

The majority of individual animals were found in the hands of wildlife traffickers (1507, 57%); these were usually smaller species, which are easy to transfer in high quantities such as parakeets, river turtles, or in one case 55 squirrel monkeys *Saimiri sciureus*. Most of these animals were found by the police or the wildlife authorities during occasional road blocks on the highway 'Fernando Belaunde Terry' while being smuggled from the Loreto region to the coast, suggesting that much larger numbers of animals could be passing in this direction clandestinely. Of the individuals detected, 502 (19%) were found in tourist centres, restaurants and hotels. These were generally larger, more threatened animals, such as primates and macaws, which attract visitors. Animals in tourist centres were either found dead being used as adornment or alive, usually in unauthorised 'mini zoos' that were part of a restaurant or recreation centre. Private owners and non-tourist shops were in possession of 343 (13%) of the animals found as both pets and adornment. The other 291 (11%) animals were found in the hands of street vendors and in markets as pets, bushmeat, jewellery, or adornment.

Table 3. List of threatened species according to the International Union for Conservation of Nature's (IUCN) Red List, Peruvian law Supreme Decree No. 034-2004-AG (S.D. 034), and classification of the species by the Convention on International Trade in Endangered Species (CITES) as Annex I. VU: Vulnerable; NT: Near-Threatened; EN: Endangered; CR: Critically Endangered; DD: Data Deficient; -: not listed as threatened

Species Name	Common name	Red list category	S.D. 034 category	CITES Annex I	Number of individuals hunted
<i>Amazona festiva</i>	Festive Amazon	-	NT		13
<i>Andigena hypoglauca</i>	Grey-breasted mountain-toucan	NT	NT		2
<i>Aotus miconax</i>	Andean night monkey	VU	EN		8
<i>Ara ambiguus</i>	Great green macaw	EN	-	Yes	1
<i>Ara chloropterus</i>	Red-and-green macaw	-	VU		5
<i>Ara macao</i>	Scarlet macaw	-	VU	Yes	33
<i>Ara militaris</i>	Military macaw	VU	VU	Yes	5
<i>Ateles belzebuth</i>	White-bellied spider monkey	EN	EN		14
<i>Ateles chamek</i>	Black-faced black spider monkey	EN	VU		3
<i>Callicebus oenanthe</i>	San Martin titi monkey	CR	VU		18
<i>Cuniculus taczanowskii</i>	Mountain paca	NT	VU		4
<i>Dasybus pilosus</i>	Hairy long-nosed armadillo	VU	VU		7
<i>Dinomys branickii</i>	Pacarana	VU	EN		11
<i>Falco peregrinus</i>	Peregrine Falcon	-	NT		2
<i>Forpus xanthopterygius</i>	Blue-winged parrotlet	-	VU		652

<i>Geochelone denticulata</i>	Yellow-footed tortoise	VU	-		63
<i>Harpia harpyja</i>	Harpy eagle	NT	VU	Yes	4
<i>Harpyhaliaetus solitarius</i>	Solitary eagle	NT	-		2
<i>Lagothrix poeppigii</i>	Poeppig's woolly monkey	VU	VU		18
<i>Leopardus pardalis</i>	Ocelot	-	-	Yes	33
<i>Leopardus wiedii</i>	Margay	NT	-	Yes	4
<i>Lontra longicaudis</i>	Neotropical otter	DD	-	Yes	2
<i>Mazama americana</i>	Red brocket deer	DD	-		67
<i>Melanosuchus niger</i>	Black caiman	-	VU	Yes	4
<i>Mitu salvini</i>	Salvin's curassow	-	VU		1
<i>Mitu tuberosum</i>	Razor-billed curassow	-	NT		6
<i>Myrmecophaga tridactyla</i>	Giant anteater	VU	VU		2
<i>Oreonax flavicauda</i>	Yellow-tailed woolly monkey	CR	EN	Yes	23
<i>Panthera onca</i>	Jaguar	NT	NT	Yes	11
<i>Podocnemis expansa</i>	South American river turtle	VU	EN		16
<i>Podocnemis unifilis</i>	Yellow-spotted river turtle	VU	VU		92
<i>Priodontes maximus</i>	Giant armadillo	VU	VU	Yes	2
<i>Pteronutra brasiliensis</i>	Giant otter	EN	EN	Yes	2
<i>Pudu mephistophiles</i>	Northern pudu	VU	EN		3
<i>Puma concolor</i>	Puma	-	NT		5
<i>Ramphastos ambiguus</i>	Black-mandibled toucan	VU	NT		4
<i>Tapirus terrestris</i>	Lowland tapir	VU	VU		4
<i>Tayassu pecari</i>	White-lipped peccary	NT	-		12
<i>Tremarctos ornatus</i>	Spectacle bear	VU	EN	Yes	19

Local hunting and wildlife use

According to the results of 169 questionnaires given to Yambrasbamba, La Primavera and Libano residents, most hunting in these campesino communities is opportunistic. To reduce possible bias that could result from the people's reluctance to point out their illegal activities, interviewees were asked if any of their close neighbours hunt rather than themselves. Even so my findings are still likely to be a significant underestimate of the true figure as often close neighbours are friends or extended family, and it is to be expected that people may be reluctant to report them.

One hundred and fifteen (68%) local residents answered that none of their close neighbours hunt. They indicated that the most hunted mammals were: black agoutis *Dasyprocta fuliginosa* (n = 51); lowland pacas *Cuniculus paca* (n = 37); brocket deer *Mazama* spp. (n = 18); collared peccarys *Pecari tajacu* (n = 11); armadillos *Dasyopus* spp. (n = 6); primate species (n = 5); spectacled bears *Tremarctos ornatus* (n = 2); and white-lipped peccary *Tayassu pecari* (n = 1). The most hunted bird species include guans *Penelope* spp. (n = 15), parrots Psittacidae (n = 7) and raptors Accipitridae (n = 2).

Protection of fields from crop raiding was one of the most common reasons given for hunting. This is mainly true in the cases of: rodents such as agouti and paca, which reproduce rapidly and consume yucca; bears, which damage corn fields and, according to local people, kill cattle; big cats, which are a risk to cattle herds; and smaller carnivores and raptors, which are known to kill domestic animals and parrots which flock on corn fields. Snakes, big cats and spectacle bears were also killed as they are seen as a risk to humans.

Bushmeat consumption is relatively low in migrant campesino populations compared to stable, more traditional campesino populations. The main species consumed are black agoutis, brocket deer and guans. Other species such as large primates, peccaries, armadillos and sloths are also consumed, but to a lesser degree. Some campesino communities contend that they avoid primate meat consumption completely because of local taboos or because they do not regard it as tasty meat. Other communities have decided to control the hunting of threatened species internally within their lands after receiving environmental education training by national governmental (NGO) or grassroots organisations.

Rural families usually have between 3 and 8 domestic dogs and commonly report high rates of killing of coatis, squirrels, anteaters, armadillos and small monkeys by dogs. Sportive hunting is popular with children and young men, mainly with slingshots. Small birds are most vulnerable to this type of hunting, but I registered 2 primates (*Aotus miconax* and *Oreonax flavicauda*) that were caught by slingshot and then kept as pets. Pet owning in rural populations is often a symbol of status; therefore, species that are threatened and endemic, such as *O. flavicauda*, and therefore mentioned in environmental discourses given by NGOs and state agents, are sometimes chosen as pets. Talking parrots such as the Psittaciformes *Amazona* spp. and macaws *Ara* spp. are also popular pets.

As for moral justification, 196 (80%) of the 245 rural leaders in the region maintained that keeping wild animals such as monkeys is bad because they deserve to live freely, 25 (10%) said that it is acceptable but dangerous for the families that keep them and another 24 (10%) maintained that it is good to have wildlife as pets as they make good pets and people have the right to use them.

According to my observations, after conservation education programs given by NGOs or grassroots organisations, many rural villages decided to control extraction of endangered species through their local institutions, while criticizing the wildlife authorities for their failure to stop illegal hunting.

Wildlife trade

As seen above, with the exception of the wildlife traffic that passes through the marginal highway Fernando Belaunde Terry, the main places where captured wildlife is found are tourist centres and tourist restaurants. Tourism is a rapidly growing sector in both Amazonas and San Martin, largely promoted by environmental NGOs as a sustainable economic alternative. However, tourist centres and restaurants, especially in San Martin, often take pride in serving Bushmeat, adorning their walls with skins and presenting caged birds and primates as ‘traditional/ jungle’ decor. The Royal Pool in Lamas, San Martin, is a resort and can be used as a representative case study for the poor conditions I have witnessed in many resorts. Until the wildlife authorities’ intervention at the end of 2011, animals were housed in small, dirty cages with no enrichment or water supply. As a result of the bad living conditions, most of the animals were emaciated and sickly. In 4 different visits between 2008 and 2011, 0 to 30% of the original animals and the rest had been replaced. An informal interview with one of the caretakers revealed that animals are regularly bought in the market at Tarapoto each time one of the collection dies or escapes. Although hundreds of national and international tourists visit the centre, no complaint was ever registered with the wildlife authorities.

Many species are considered to have spiritual or medicinal healing properties. For example, wrapping the skin of an anaconda around a pregnant woman’s abdomen is supposed to help with safe childbirth, deer legs are said to help children that have difficulty walking, a toucan’s beak is said to induce love, drinking opossum’s blood is said to cure asthma and a coati’s baculum is used as an aphrodisiac. In some of the local markets such as in Tarapoto, Bagua Grande and Nueva Cajamarca special stands sell animal parts for these purposes. Sometimes, parts of hundreds of animals are found at the same stand. It seems that most of this kind of wildlife use happens clandestinely inside the villages.

During the course of the research, pet markets such as ‘El Huequito’ in Tarapoto, where many animals used to be openly sold, have now been officially closed, and although it is known to still be operating at the weekends before dawn, fewer animals are traded. In ad lib conversations I have been told by local people that prior to 2000, wildlife was seen for sale everywhere, in the streets and markets, a situation that has drastically been changed in the last few years. Many people also say they used to own or sell wildlife, but that it is now impossible because of the authorities’ regular interference.

Laws and wildlife authorities

Calculations made using the information received from wildlife authorities show that the average number of confiscation operations per year before the transfer of responsibility to the regional governments was 6 in San Martin (average over 2 yr) and in 11.25 in Amazonas (average over 4 yr). Since the transfer San Martin increased their operations to ~36.5 yr⁻¹ (January 2010 to December 2011), whereas over the same approximate time period operations in Amazonas fell to just ~5 yr⁻¹ (November 2010 to December 2011).

In repeated interviews with the wildlife authorities and other key informants from both regions, the following issues were identified as the main impediments to their work. Supreme Decree No. 034-2004-AG has not been updated and gives an insufficient list of threatened species. The penal code specifies that species are protected only if they are listed under this law. Since many species are still not listed, hunters cannot be penalized, although these species may be under severe hunting pressure.

There is a severe lack of personnel, particularly permanent staff in each region, with usually between 10 and 20 people occupying various positions (San Martin and Amazonas cover areas of 51 253 and 39 249 km², respectively). Within these, only 2 to 5 agents are formally in charge of wildlife confiscations and the related paperwork; the rest are usually in charge of forestry product controls and can only confiscate animals under direct orders from their superiors. The majority of agents are forestry engineers, having no education or experience in wildlife identification or handling. At any one time, there is a maximum of 2 Environmental Public Prosecutors in each region. They are essential for confiscation activities as their physical presence is required to legalize entry of private properties. The Public Prosecutors are also in charge of investigation and prosecutions of wildlife crimes using reports produced by the confiscating agents. However, lack of communication between the 2 institutions and the low efficiency of the Public Prosecutors means that, to date, not a single wildlife trafficker has been jailed in either region. Agents are often employed on a temporary basis ranging from hourly payment to 3 mo contracts. Changes in staff are often made on a political rather than professional basis. Paperwork was identified as the most time-consuming requirement, and every enforcement action increases the amount of paperwork. Law enforcement also exposes staff workers to threats and an increasing number of personal lawsuits.

Wildlife offices work with extremely small budgets; agents have often gone unpaid for several months, especially in Amazonas since the transfer of responsibility to the regional government. Mobility is also a problem, as agents often use their own vehicles for confiscations. In Amazonas, during 2011, only 1 vehicle was available to the forestry and wildlife authorities and needed to be applied for 15 d in advance. A lack of carrying cages, gloves, nets and wildlife identification guides further complicate the handling and identifying animals. Another problem hindering wildlife confiscations is the lack of rescue centres to receive the animals. There are no rescue centres in Amazonas. In San Martin, only 4 have been approved by the authorities, 2 of which have been accused of providing inadequate care, making their future uncertain. On many occasions confiscated animals stay with the authorities in transport cages without adequate care until a rescue centre or zoo agrees to take them. This makes the authorities reluctant to act before arrangements have been made for the individual animals, leading to many missed opportunities.

NGOs that work in the area rarely support or get involved with law enforcement or in educating rural populations on anti-hunting issues; therefore, they do not fill the void left by the authorities' lack of resources.

DISCUSSION:

While this project was small scale, the findings nonetheless highlight the concerns within both regions and offer explanations for their causes. Many of the species identified in this study that suffer from high hunting pressure are categorised as ‘Threatened’ both internationally and nationally.

It has been shown that, because of low reproductive rates and low population densities, the hunting of primates is usually unsustainable and can bring about local extinctions (Bodmer et al. 1997, Robinson & Bennett 2000, Peres 2001, Jerozolinski & Peres 2003). As shown in this study, 85% of primates were captured alive for the pet trade. The most common method is to shoot the mother in order to take the infant. In effect this doubles the off-take rate, as for every infant sold, another animal has been killed.

For a rare species such as the Critically Endangered *Oreonax flavicauda* even low levels of local trade could be disastrous. *O. flavicauda*'s inherent curiosity and conspicuous nature makes it particularly easy to hunt (Buckingham & Shanee 2009). Twenty-three individuals of this species were found to have been extracted from the wild during this study to stop them from raiding crops, for use as bushmeat, or for the pet trade. These data do not include indigenous communities that have been reported to hunt this species heavily for bushmeat, especially during festivals (De Luycker 2007, Shanee et al. 2007). Leo Luna (1987) estimates that approximately 600 yellow-tailed woolly monkeys were hunted between the mid-1970s and the mid-1980s, causing the local extinction of several populations. *Callicebus oenanthe* and *Aotus miconax* are smaller species and are, therefore, hunted less often for bushmeat. They do not damage crops, but they are hunted for the local pet trade. For all 3 endemic primate species, hunting is a direct threat on top of the high rates of habitat loss.

Although the results of this study show that hunting in campesino communities is relatively low and can be internally controlled, opportunistic hunting due to lack of awareness or indifference still endangers many small fragmented populations. Hunting by campesinos is also a threat as it occurs in addition to the more intensive hunting practices of the Aguaruna people, the predominant indigenous group in Amazonas and San Martin (Brown 1984, DeLuycker 2007, Shanee et al. 2007).

Most of the sightings in the first 2 yr of this study were ad libitum (seen from the street, or reported by neighbours or the pet owners themselves), suggesting a lack of public awareness and of law enforcement. This situation changed in 2010 to 2011, especially in San Martin, where the wildlife authorities became more active and involved in combating the illegal trade. In Amazonas, the situation is reversed, the transfer of responsibility to the regional government has drastically limited the wildlife authorities' ability to act. The fact that the transfer improved law enforcement in San Martin, but worsened it in Amazonas highlights the role that local politics has on wildlife traffic, rather than international influences and agreements, and makes fauna vulnerable to frequent political changes. This is an especially important finding as it is suggested that to attract larger amounts of funding, contemporary international conservation organisations tend to increase the scale of their planning and operations rather than to focus on local awareness and politics (Chapin 2004, Adams & Hutton 2007, Brockington et al. 2008). Indeed, it was observed during this study that NGOs,

especially international ones, were practically absent in rural Amazonas and San Martin, although these are part of their priority areas.

During the transfer of authority from INRENA to ATFFS and the regional governments, many operational changes were also made. However, a severe lack of staff and resources has been obvious throughout this research. Interviewees often pointed to the system they work for as a source of growing frustration, attributing their low level of achievements to it. According to Gustavo Suarez, a consultant working for the Ministry of Agriculture, the systems' ineffectiveness and corruption not only allows, but also encourages, black markets: 'The government encourages illegality because there is not enough enforcement and punishments are not strong enough...The criminals are happy that there are only 800 people in the forestry administration all over Peru'³. This absence of staff, resources and equipment is not filled by the NGOs that are active in the area. Very few of these regard hunting or wildlife trade to be under their jurisdiction. Therefore, there is no large-scale/long-term program to deal with wildlife extraction.

The situation in both regions has somewhat improved during course of this research. The results of this study show that, although the operations of wildlife authorities are sometimes few and far between, they do have a strong, positive impact, as people have referred to such interventions as the reason why they avoid owning or trading wildlife. However, the reduced numbers of wildlife animals for sale, especially in Amazonas, could also suggest a decline in wild populations due to high deforestation levels in both regions and continuous hunting. Also, of major concern is the substantial, continuous trade coming from Yurimaguas (Loreto), which often passes clandestinely through San Martin and Amazonas on the way to coastal cities and onto the international market. This trade has been exposed in this study and was also suggested by Pautrat (2002), but further investigation is needed to estimate its magnitude and trends over time.

National laws offer high protection to threatened species, but legal loopholes, such as a partial, out-of-date list of protected species, as well as impoverished, untrained authorities, drastically reduce the laws' real impact. Another major concern for wildlife in Peru is the new Forestry and Wildlife Law (29763) that is due to be enacted. This law encourages exploitation of natural resources, including wildlife, by simplifying the processes needed to obtain permits for the maintenance of wildlife as pets, in private zoos, in commercial breeding centres and for sportive hunting. Many of the illegal zoos and private pet owners know about these changes in the law and are already soliciting permits to keep their animals, which, in many cases, are maintained under inadequate conditions. These practices are supposed to be authorised by the same regional wildlife authorities, who, as this study suggests, have no resources, expertise, or approved protocols to allow them to handle this new responsibility. Moreover, the wildlife in the area (in Amazonas and San Martin) has been studied very little and suffers from many different anthropogenic pressures, mainly deforestation and habitat fragmentation, which suggest that sustainable extraction of species from the wild might be impossible (Peres 2001).

³ In a participative meeting in Chachapoyas in March 2010

RECOMMENDATIONS AND CONCLUSIONS:

Capuchin *Cebus* spp. and squirrel monkeys *Saimiri* spp. are the most broadly trafficked of all primate species, as they seem most able to survive in captivity. The different species of both genera should be studied in the wild in order to evaluate a possible upgrade of their conservation status, at least on a national level. I recommend re-valuation of the conservation status of some of the Psittaciformes (*Amazona* spp. and *Ara* spp.) and the 3 deer species *Mazama americana*, *M. gouazoubira* and *Odocoileus virginianus*, as they are used in great quantities locally and for wildlife trade. Many local people in Amazonas and San Martin have reported a dramatic reduction in their numbers or extinction from local forests where they used to be abundant. I also recommend urgent research into the spectacle bear's presence/absence and threats in Amazonas and San Martin, as well as long-term education campaigns and the development of programmes to reduce conflicts between bears and humans.

Primate species, because of their sensitivity to hunting and charismatic traits, particularly Peru's endemic species, should be used more broadly as flagship species for local conservation initiatives. The Aguaruna people hunt more systematically and extensively than the campesinos. The rationale for this hunting and its implications for wildlife should be studied in detail to facilitate adequate conservation planning. In campesino communities, crop raiding was identified as the main conflict with wildlife. A detailed study of crop-raiding patterns and methodologies to reduce this phenomenon, especially for emblematic species such as the yellow tailed woolly monkey and the Andean bear, could help in reducing the hunting of these and many other species. On an international level, tourists should be made aware of their impact on local fauna in order to reduce the demand for attractions involving wildlife capture and exhibition. Committed individuals working within the wildlife authorities and acting against wildlife traffic should be identified and supported. This support should probably not be monetary, to avoid corruption and dependency, but should ensure that these individuals have equipment, information and encouragement to be able to function within extremely suppressive systems.

Most importantly, it must be understood that global initiatives such as the IUCN Red List, CITES, the Biodiversity Hotspots, and even the national legal framework, do not offer sufficient protection to the habitats or species they are intended to protect. The actual impact of such initiatives is either facilitated or blocked by local politics and actors. NGOs and other conservation institutions should aspire to more efficient work, which requires their constant presence in rural areas. Small-scale projects which are community based and offer support of local initiatives show promising results locally, with many villages successfully controlling hunting and trade in wildlife in their region (Shanee 2012, N. Shanee & R. Horwich unpubl. data). Empowering local communities to protect their forests and wildlife can potentially influence local politics to be more environmentally focused.

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