

# HUNTING AND HUNTERS IN LOWLAND COMMUNITIES IN THE REGION OF THE MIDDLE SOLIMÕES, AMAZONAS, BRAZIL.

## A CAÇA E OS CAÇADORES EM COMUNIDADES DE VÁRZEA NA REGIÃO DO MÉDIO SOLIMÕES, AMAZONAS, BRASIL.

Gerson Paulino Lopes <sup>1,2</sup>; João Valsecchi <sup>1</sup>;

Tatiana Martins Vieira;

Paulo Valsecchi do Amaral; Everton Wiliam Martins da Costa.

<sup>1</sup> Instituto de Desenvolvimento Sustentável Mamirauá, Tefé, Amazonas - IDSM. E.mail: gersonlps@hotmail.com

<sup>2</sup> Programa de Pós-graduação em Ciência Animal, Universidade Federal do Pará / EMBRAPA - Amazônia Oriental / Universidade Federal Rural da Amazônia - UFRA.

### KEY WORDS:

Subsistence hunting;  
Susceptibility of species;  
Mamirauá.

### ABSTRACT

The uniqueness of the Mamirauá Sustainable Development Reserve (MSDR), a continuous area of floodplain and 1.124.000 ha bounded by large rivers (Solimões, Japurá and Auati-Paraná), allows only the survival of aquatic, arboreal or scansorial animals in the area throughout the seasonal cycle. Thus the profile of hunting in RDSM should be distinct from those reported in other studies. The aim of this study was to describe the hunting activity conducted in five communities in a flooded forest area, characterizing the wildlife killed and the profile of hunters in these communities. Between January and December of 2005, 238 hunting events were held and 459 animals were slaughtered, totalizing 1850.5 Kg. Reptiles are the main group hunted and accounted for 92.12% of those killed and 64.27% of the total weight obtained. The most susceptible species are those hunted (*Podocnemis unifilis*, *Podocnemis sextuberculata*, *Podocnemis expansa*, *Hydrochaeris hydrochaeris*, *Crax globulosa*, *Alouatta seniculus*, *Cairina moschata* and *Pauxi tuberosa*). Despite the frequency of hunting events, the activity did not contribute much to the income of the families. Hunting is a predominantly male activity and starts at early ages in the monitored communities.

### PALAVRAS-CHAVE:

Caça de subsistência;  
Susceptibilidade;  
Mamirauá.

### RESUMO

A singularidade da Reserva de Desenvolvimento Sustentável Mamirauá (RDSM), uma área contínua de várzea de 1.124.000ha e limitada por grandes rios (Solimões, Japurá e Auati-Paraná), permite que somente animais aquáticos, arborícolas ou escansoriais sobrevivam durante todo o ciclo sazonal na área. Dessa forma o perfil da caça na RDSM deve ser distinto daqueles registrados em outros estudos. O objetivo desse estudo foi descrever a atividade de caça realizada em cinco comunidades de várzea, caracterizando a fauna abatida e o perfil dos caçadores dessas comunidades. Entre os meses de janeiro e dezembro de 2005 foram realizados 238 eventos de caça, e foram abatidos 459 animais que totalizaram 1.850,5 Kg. Os répteis constituem o principal grupo caçado, e representaram 92,12% dos indivíduos abatidos e 64,27% do peso total obtido. As espécies mais susceptíveis à caça são as principais abatidas (*Podocnemis unifilis*, *P. sextuberculata*, *P. expansa*, *H. hydrochaeris*, *Crax globulosa*, *Alouatta seniculus*, *Cairina moschata* e *Pauxi tuberosa*). Apesar da caça ser realizada com frequência, a atividade tem pouca contribuição na renda das famílias estudadas. A caça é uma atividade predominantemente masculina e é iniciada precocemente nas comunidades monitoradas.

## INTRODUCTION

Different studies have stressed the importance of wildlife as a source of protein for the traditional population and indigenous people of the Amazon, for both subsistence and trade (e.g. AYRES, 1979; REDFORD; ROBINSON, 1991; BODMER; PEZO, 1999; NOVARO; REDFORD; BODMER, 2000; VALSECCHI; AMARAL, 2009). However, few studies have described hunting in floodplain environment (e.g. BODMER; PEZO, 1999; PERES, 1999; VALSECCHI, 2005).

In floodplain areas, the richness of terrestrial fauna is smaller, not the terrestrial fauna, mainly due to restrictions imposed by long periods of flooding on this ecosystem. The large ungulates and caviomorph rodents are rare in these areas, however they are the most coveted species by Amazon hunters, who also prize primates and large birds (REDFORD; ROBINSON, 1987; PERES, 2000; VALSECCHI, 2005; CONSTANTINO, et al. 2008).

However, animals found mainly in the uplands, such as paca (*Cuniculus paca*), agutis (*Dasyprocta* spp.), tapir (*Tapirus terrestris*) and peccary (*Tayassu tajacu*) are commonly reported in floodplain areas bordering uplands during the dry season, thus available to the human population which live in the areas. Other species such as the white-lipped peccaries (*Tayassu pecari*) and capybaras (*Hydrochaeris hydrochaeris*) can swim large bodies of water like the Solimões River, occupying floodplain areas that cannot be reached otherwise.

Turtles, crocodiles, manatees (*Trichechus inunguis*) and other aquatic animals may become an important source of protein in the region.

Chelonians, for example, have been and continue to be on the main sources of protein for the rural population throughout the Amazon (FACHÍN-TERÁN; VOGT; THORBJAMARSON, 2000; REBÊLO; PEZZUTI, 2000).

The uniqueness of Mamirauá Sustainable Development Reserve – MSDR, a continuous area of floodplain of 1,124,000 ha and bounded by large rivers (Solimões, Japurá and Auatí-paraná), permits that only aquatic, arboreal or scansorial animals survive during the entire seasonal cycle of the area (VALSECCHI, 2005). As a result, hunting profile in MSDR must be different from those recorded in other studies. The objective of this study is to describe hunting activity in five floodplain communities, characterizing the hunted fauna and the hunters' profile of these communities.

## MATERIAL AND METHODS

### Area of Study

MSDR (Figure 1) was the first conservation unit of this category implemented in Brazil. It is located in the Mid-Solimões Region, on the confluences of Solimões and Japurá Rivers; the reserve is completely inserted in the floodplain ecosystem (MSDI, 2010). The dynamics of the floodplain ecosystem is influenced by the rise/high and recede/dry water cycles of the Amazon rivers. It not only alters the landscape, but also causes sudden changes in the biotic components of this ecosystem (MSDI, 2010).

The study was conducted from February to July of 2005 in five communities of MSDR (Figure 1): Barroso (65°20'04''S 02°28'37''W), Boca do Mamirauá (64°47'36''S

03°06'59"W), São Francisco do Aiucá (65°0'57"S 02°47'52"W), São Raimundo do Jarauá (65°55'39"S 02°51'53"W) and Sítio Fortaleza (65°04'30"S 02°56'41"W).

The five selected communities form part of the Fauna Use Monitoring System (FUMS) of Mamirauá Sustainable Development Institute. In these communities, hunting monitoring was done on a daily basis by community data collectors. Each collector lives in one of the communities, and has participated in numerous training processes. The data collection were done using appropriate forms for each species or group being monitored. When it was not possible to collect the weight of the killed animal, the value attributed was the average weight of other similar animals killed

in the communities being monitored. Only two manatees had their weight estimated by the hunters and data collectors. Besides using those data from FUMS, further information was also collected from the community. The interviews aimed to gather data on main income generating activities as well as hunting, number of hunters involved, ideal age for hunting, monthly frequency, best time of the year for hunting, destination of the killed animal, food preference of the interviewed people and their perception on the abundance of the fauna after MSDR was created. For food preference, the study considered the first three responses given by the residents. A second questionnaire permitted to evaluate the killing probability for each hunted species (killing susceptibility index).

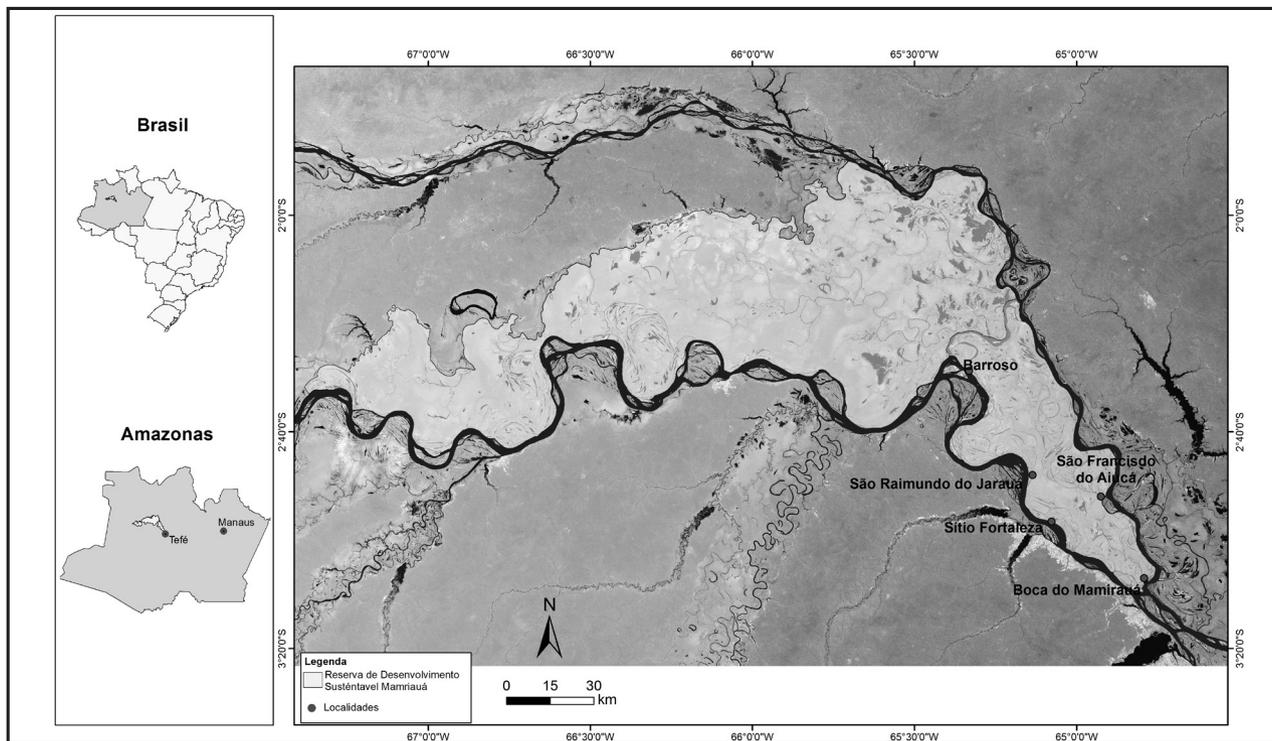


Figure 1 - Location of Mamirauá Sustainable Development Reserve and the communities studied.

## Killing Susceptibility Index

To evaluate the probability of killing wildlife hunting, a questionnaire was used where each hunter informed how often he attempted to slaughter a animal in situations where the conditions were appropriate for such (FLECK, 2003; 2005; VALSECCHI; AMARAL, 2009). Therefore, it is assumed that the index is greater as much as the chance of killing the animal. However, this index does not have any relation to biological and/or ecological characteristics of the species, such as ecological density, reproductive capacity and behavior, and is not related to the ability of the species in dealing with hunting pressure, neither with the hunters' ability to find and slaughter the animal. This index works as an indicative of selectivity where the respective species are exposed.

To calculate the susceptibility index, the hunters' answers were transformed in percentages and eventually multiplied by a weight factor. Thus, the species that the hunters affirmed they "always try to kill when conditions are right" obtained an index equal to ten (10), while for species with negative answers ("they would never try to kill"), the indices were equal to zero.

## RESULTS

### Profile of hunted fauna

Between January to December, 2005, 238 hunting events occurred, resulting in 459 dead animals weighing 1,850.5 Kg (Table 1). During that period, fourteen species were

hunted: four mammals, three birds and seven reptiles. However, two crocodiles, probably a *Melanosuchus niger* and a *Caiman crocodilus*, are not listed on Table 01, due to lack of information on the hunting event, and the animals slaughtered.

The hunting event that yielded the largest number of animals killed occurred in Aiucá community on 11/01/2005, when 70 six-tuberculed river turtles (*Podocnemis sextuberculata*) were killed. This event was carried out opportunistically by a single hunter during in a hunting event (MSDR community residents do not consider turtle collection with fishing nets as hunting, but

Table 1 - Number of individuals killed, total weight and type of species in each studied community (BAR= Barroso; BM= Boca do Mamiarauá; AIU= São Francisco do Aiucá; JAR= São Raimundo do Jarauá; SF= Sítio Fortaleza).

Mammals	Nº of killed animals					Total weight (Kg)				
	AIU	BAR	BM	JAR	Total	AIU	BAR	BM	JAR	Total
<i>Alouatta seniculus</i>	01	03	06	0	10	07	14.95	20.5	0	42.45
<i>Hydrochaeris</i>	01	02	0	0	03	36.4	74	0	0	110.4
<i>Sotalia fluviatilis</i>	0	01	0	0	01	0	15	0	0	15
<i>Trichechus inunguis</i>	0	01	0	02	03	0	170	0	245	415
<b>Subtotal</b>	<b>02</b>	<b>07</b>	<b>06</b>	<b>02</b>	<b>17</b>	<b>43.4</b>	<b>273.95</b>	<b>20.5</b>	<b>245</b>	<b>582.85</b>
Birds	Nº of killed animals					Total weight (Kg)				
	AIU	BAR	BM	JAR	Total	AIU	BAR	BM	JAR	Total
<i>Cairina moschata</i>	0	01	01	05	07	0	4.4	02	25.5	31,9
<i>Crax globulosa</i>	03	0	0	0	03	6.5	0	0	0	6.5
<i>Pauxi tuberosa</i>	02	06	0	01	09	07	27.85	0	05	39.85
<b>Subtotal</b>	<b>05</b>	<b>07</b>	<b>01</b>	<b>06</b>	<b>19</b>	<b>13.5</b>	<b>32.25</b>	<b>02</b>	<b>30.5</b>	<b>78.25</b>
Reptiles	Nº of killed animals					Total weight (Kg)				
	AIU	BAR	BM	JAR	Total	AIU	BAR	BM	JAR	Total
<i>Chelus fimbriatus</i>	01	0	0	0	01	5.7	0	0		5.7
<i>Geochelone denticulata</i>	14	01	0	04	19	155	12	0	43.5	210.5
<i>Podocnemis expansa</i>	03	0	0	01	04	08	0	0	05	13
<i>Podocnemis sextuberculata</i>	95	184	0	22	301	102.7	233.15	0	23.5	359.35
<i>Podocnemis unifilis</i>	10	28	0	58	96	44.7	153.7	0	402.4	600.8
<b>Subtotal</b>	<b>123</b>	<b>213</b>	<b>0</b>	<b>85</b>	<b>421</b>	<b>316.1</b>	<b>398.85</b>	<b>0</b>	<b>474.4</b>	<b>1189.4</b>
<b>Total</b>	<b>130</b>	<b>227</b>	<b>07</b>	<b>93</b>	<b>457</b>	<b>373</b>	<b>705.05</b>	<b>22.5</b>	<b>749.9</b>	<b>1850.5</b>

as fishing). Most hunting events (52.52%) were conducted by a single hunter, however hunting events with the presence of six people have also been recorded.

Reptiles formed the main group of hunted animals and represented 92.12% of all killed animals and 64.27% of total weight obtained. However, in Barroso and Jarauá communities the mammals contributed significantly to the total weight (273.95 Kg or 38.86% and 245 Kg or 32.67%, respectively), mainly due to the killing of three manatees.

Chelonian hunting distinguished itself, not only for the number of animals killed (92.12% of the total), but also for the weight obtained (64.27%), with emphasis on two species, the yellow-spotted Amazon River turtle (*Podocnemis unifilis*) and the six-tubercled river turtle (*Podocnemis sextuberculata*). Sítio Fortaleza community did not kill any animal during the monitoring period.

### Killing susceptibility index

The killing susceptibility index was calculated only for the species found in those areas used by the communities being studied. However, other species from upland habitats such as tapir, paca and deer (*Mazama americana* and *Mazama gouazoubira*) were mentioned as food species preferred by the community residents. The meat from these animals is found for sale in nearby towns markets (Tefé, Alvarães and Uarini) or from river merchants known as regatões (Small trading boats travelling the Amazon, selling and buying goods from small communities, along the river) in the monitored

communities. Only one hunting event was recorded in the uplands for the period (a tortoise by the community of S. F. do Aiucá). Table 2 shows the indices obtained from interviews done with hunters from the five monitored communities. (n = 41).

Table 2 - Killing susceptibility index by species in the five communities (BAR = Barroso; BM = Boca do Mamirauá; AIU = São Francisco do Aiucá; JAR = São Raimundo do Jarauá; SF = Sítio Fortaleza).

Species	BAR	BM	AIU	JAR	SF
<i>Podocnemis unifilis</i>	10.0	10.0	9.3	10.0	9.4
<i>Podocnemis sexuberculata</i>	10.0	9.2	9.1	10.0	10.0
<i>Tayassu pecari</i>	10.0	10.0	9.6	10.0	7,5
<i>Hydrochaeris hydrochaeris</i>	9.0	10.0	8.6	8.6	10.0
<i>Crax globulosa</i>	10.0	10.0	9.6	10.0	6.3
<i>Podocnemis expansa</i>	9.0	10.0	9.6	7.9	7.5
<i>Alouatta seniculus</i>	9.0	9.2	7.3	10.0	8.1
<i>Cairina moschata</i>	9.0	10.0	9.3	10.0	5.0
<i>Pauxi tuberosa</i>	10.0	10.0	8.9	10.0	2.5
<i>Geochelone denticulata</i>	9.0	7.5	8.2	7.1	8.8
<i>Trichechus inunguis</i>	10.0	8.3	6.8	8.6	5.0
Cobras	8.0	9.2	7.9	0.0	8.8
<i>Panthera onca</i>	7.5	7.9	6.1	2.5	7.5
<i>Dendrocygna autumalis</i>	8.5	6.3	4,8	7.9	3,8
<i>Puma concolor</i>	7.5	7.9	5.9	1.4	7.5
<i>Cebus macrocephalus</i>	4.5	5.4	5.2	7.1	5.0
<i>Phalacrocorax brasilianus</i>	8.0	1.7	1.4	9.3	3.8
<i>Ardea cocoi</i>	7.5	3.3	3.0	8.6	1.3
<i>Chelus fimbriatus</i>	5.5	6.7	1.3	5.0	4.4
<i>Ateles chameck</i>	9.0	1.7	1.1	5.4	5.0
<i>Dasybus kappleri</i>	4.0	5.0	5.4	2.9	2.5
<i>Tinamus sp.</i>	3.0	5.8	4,6	3.9	2.5
<i>Coendu prehensilis</i>	3.0	6.3	1.3	2.1	4.4
<i>Melanosuchus niger</i>	5.5	3.8	3.4	1.1	3.1
<i>Didelphis marsupialis</i>	4.0	3.3	2.1	0.0	7.5
<i>Caiman crocodilus</i>	4.5	4.6	2.7	1.1	3.8
<i>Penelope jacquacu</i>	2.0	5.0	2.7	4.3	2.5
<i>Trigossoma lineatum</i>	4.5	2.5	2.1	3.9	1.3
Perema	4.0	3.3	0.7	2.9	2.5
<i>Anhinga anhinga</i>	3.0	0.0	2.5	3.9	3.8
<i>Cochlearius cochlearius</i>	2.5	2.9	2.0	5.4	0,0

Continua

Continuação

Species	BAR	BM	AIU	JAR	SF
<i>Ara macao</i>	2.5	2.1	2.5	2.5	2.5
<i>Psophia creptans</i>	4.0	0.0	0.5	3.6	2.5
<i>Ara ararauna</i>	2.5	2.1	1.8	1.4	1.9
<i>Leopardus spp.</i>	3.0	0.8	2.0	0.7	2.5
<i>Amazona festiva</i>	1.0	0.0	1.8	1.1	3.8
<i>Mycteria americana</i>	0.0	0.0	1.3	6.1	0.0
<i>Aramus guarana</i>	1.0	0.0	2.3	1.1	1.9
Gavião tauató	0.0	0.0	1.3	0.0	5.0
<i>Phrynops raniceps</i>	0.0	0.8	2.0	0.0	2.5
<i>Nasua nasua</i>	0.0	2.1	0.0	0.0	2.5
<i>Pteronura brasiliensis</i>	1,5	2,1	0,7	0,0	0,0
<i>Agamia agami</i>	0.0	1,7	1,1	1,4	0,0
<i>Saimiri spp.</i>	0.0	1,3	0,9	0,0	1,3
<i>Anhima cornuta</i>	0.0	1.3	1.4	0.7	0.0
<i>Potos flavus</i>	0.0	0.0	0.0	0.0	2.5
<i>Pithecia monachus</i>	0.0	0.0	0.0	0.0	2.5
<i>Mesembrinibis cayennensis</i>	0.0	0.0	0.4	0.0	1.9
<i>Nycticorax nycticorax</i>	0.0	0.8	0.0	1.4	0.0
<i>Lontra longicaudis</i>	1.0	0.0	1.1	0.0	0.0
<i>Ardea alba</i>	0.0	0.8	0.4	0.7	0.0
<i>Leptotila rufaxilla</i>	0.0	0.0	1.8	0.0	0.0
<i>Cacajao calvus</i>	0.0	0.0	0.5	0.0	1.3
<i>Harpia harpia</i>	0.0	0.0	0.4	0.0	1.3
<i>Opisthocomus hoazin</i>	0.0	0.0	1.1	0.0	0.0
<i>Sciurus igniventris</i>	0,0	0,0	0,0	1,1	0,0
<i>Ramphastos spp.</i>	0.0	0.0	1.1	0.0	0.0
Other species <sup>1</sup>	≤ 1,0 in all communities				

<sup>1</sup>Pink- dolphin, Mini-macaws, Araçari, Short tailed parrots, Tayra, Jaçanã, Sandpiper, Collared anteater, Pale-vented pigeon, Pale-throated three- toed sloth , Two- toed sloth, Cooi heron,, Surucuá, Uru.

### Profile of the communities studied

In the five communities, 111 interviews were made (Table 3). Most of the people interviewed did not consider themselves as hunters. To them, a “hunter” is someone who uses a gun to kill an animal. However, we consider as hunters any person who has declared that he/she has killed an wild animal or collected a river turtle at any moment during the year. We considered 41 people as hunters.

### BARROSO

Eighteen people were interviewed in the community. Hunting activity is done by nine residents; all hunters are male, and the practice of hunting is for both food and trade. Five hunters stated that they sell or have sold the games in their own community or in markets in the towns of Fonte Boa and Uarini. Fishing was declared the main trading activity (Figure 2), but agriculture and logging have also been mentioned, as well as wages and pensions, the later ones considered less important.

Table 3 - Communities studied and sample by community.

Community	Home Units <sup>1</sup>	Residents <sup>1</sup>	% of interviewed homes	Nº of interviewed people	Nº of interviewed hunters
Barroso	15	94	73.33	18	09
Boca do Mamirauá	11	57	100	21	08
São Francisco do Aiuçá	26	157	88.46	39	13
São Raimundo do Jarauá	34	170	26.47	15	08
Sítio Fortaleza	12	87	58.33	18	03

<sup>1</sup>MSDR Demographic Data 2006 – MSDI

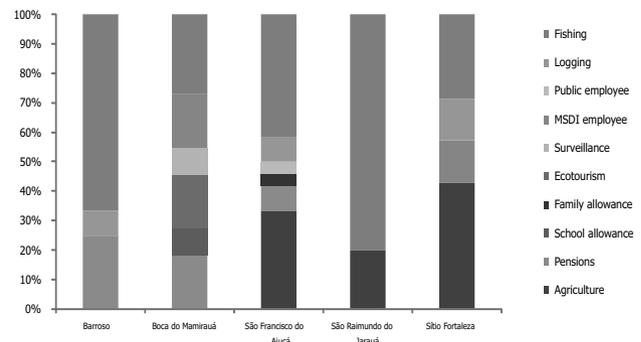


Figure 2 - Activities mentioned as main sources of income in the monitored Communities.

In this community a hunter informed that he had been hunting since he was seven years old, and differently from other localities where interviews were done, most hunters started hunting after 15 years of age, and only one hunter started hunting when he was 30 (Figure 3). Some hunters stated that they hunt more than 20 times a month; however most of them informed that they hunt between one and five times a month.

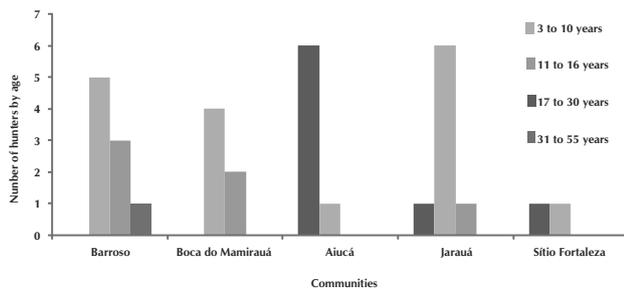


Figure 3 - Age when the hunters interviewed started their hunting activities, per community. (n = 41).

The community registered the largest number of animals killed among the five monitored communities. The number of animals killed was 227, from nine species weighting 705.05 Kg. Even though the reptiles were the majority (93.83%), with emphasis on the six-tubercled river turtle, locally known as *iaçá* (n=184) the number of mammals were also high and their weight contributed significantly to the total weight obtained (38.86%). The species killed during the study period are those more susceptible to be hunted, as were most of the species mentioned as food preferences (Tables 2 and 4).

## BOCA DO MAMIRAUÁ

Twenty-one people were interviewed in the community. Eight residents (seven men and a woman) stated that they were engaged in hunting activities). Agriculture, fishing and ecotourism were also declared as their main income-producing activities, respectively. Hunting is destined mainly for consumption; however, the sale of hunted animals has been reported in the towns of Alvarães and Tefé. The results from hunting are usually shared with other members of the communities, especially relatives. Most interviewed hunters (28.57%) stated that they have hunted since they were 12 years old joining their parents and other family members during their first hunting activities. One Hunter stated that he only started hunting at the age of 20.

According to most hunters (57.14%) the best time of the year to hunt is when the river waters are high. However to capture turtles, the dry season, and the period when the waters begin to rise, are considered the best period. Only two species (*Alouatta seniculus* and *Cairina moschata*) were killed while we were doing the study, and these species are among those with the best killing susceptibility indices. In that community, the most susceptible species to killing are listed among the ones preferred by the community residents. However, the jaguar (*Panthera onca*) was recorded as one of the preferred species by one resident when he was interviewed. Besides, the killing susceptibility index of this species in this community was the greatest among all monitored communities. Domestic animals, such as, chicken and cattle are also among their preferred species

(Table 4), both raised in the community, even though they often buy these items in the nearby urban areas.

Tabela 4 - Food preferences in the communities under study

Espécie	Frequência de indicações				1ª indicação				
	BAR	BM	AIU	JAR	SF	BAR	BM	AIU	JAR
					n = 42	n = 19	n = 37	n = 14	
<i>P. unifilis</i>	46,67	57,89	32,43	71,42	37,50	14,29	35,30	22,86	21,43
<i>Pauxi tuberosa</i>	33,33	36,84	54,05	71,42	50,00	14,29	29,40	34,29	35,71
<i>Cairina moschata</i>	20,00	47,36	27,02	85,71	25,00	7,14	5,90	2,86	28,57
<i>Alouatta seniculus</i>	20,00	21,05	16,21	21,42	31,25	7,14	5,90	5,71	-
<i>Trichechus inunguis</i>	40,00	21,05	13,51	14,28	6,25	14,29	5,90	8,57	-
<i>Tayassu pecari</i>	40,00	5,26	10,81	7,14	18,75	7,14	5,90	2,86	-
Boi	6,67	21,05	32,43	-	12,5	7,14	5,90	11,43	-
<i>P. sextuberculata</i>	6,67	10,52	16,21	14,29	18,75	7,14	-	2,86	7,14
<i>Geochelone denticulata</i>	6,67	5,26	16,21	7,14	18,75	-	-	-	-
<i>Tapirus terrestris</i>	13,33	5,26	10,81	-	12,5	7,14	-	2,86	-
<i>Cuniculus paca</i>	6,67	5,26	2,70	-	18,75	-	-	-	-
<i>Hydrochaeris hydrochaeris</i>	13,33	-	8,11	-	6,25	7,14	-	2,86	-
<i>P. expansa</i>	6,67	-	10,81	7,14	-	-	-	-	7,14
<i>Mazama spp.</i>	20,00	-	-	-	-	7,14	-	-	-
Galinha	-	5,26	8,10	-	6,25	-	-	2,86	-
<i>Dasyprocta fuliginosa</i>	-	5,26	2,70	-	6,25	-	5,90	-	-
<i>Coendu prehensilis</i>	-	10,52	-	-	-	-	-	-	-
<i>Ara sp.</i>	-	-	2,70	-	6,25	-	-	-	-
<i>Dasyprocta spp.</i>	-	-	5,40	-	-	-	-	-	-
<i>Panthera onca</i>	-	5,26	-	-	-	-	-	-	-
<i>Pipile cumanensis</i>	-	-	2,70	-	-	-	-	-	-
<b>Total</b>	-	-	-	-	-	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Most interviewed people, five of the eight hunters, stated that some species have become more abundant after the sector increased its surveillance activities. However, there were some reports on “the almost disappearance of the capybara from the sector (The Mamirauá Sector area covers the entire area used by the Boca do Mamirauá community and 10 other communities, three of

them outside the MSDR sector and an Indian village, all of them near the confluence of the Solimões and Japurá Rivers), which according to some residents is caused by over hunting of this animal.

### SÃO FRANCISCO DO AIUCÁ

This community had the highest number of interviewed people (n=39). Their main livelihood activities are fishing and agriculture (Figure 2). Hunting is done by 13 residents, and has been a predominant male activity, done mainly for subsistence, although some hunting surpluses are also sold at markets in Uarini, nearby communities, and to other members of the community. The largest number of turtles sold was recorded in this community, even though no resident confirmed that he/she had sold hunting products.

To most hunters, the best time of year for hunting is the dry season. Hunting events average as much as 5 times a month, although some residents stated having hunted more than 25 times a month. Six of the 13 hunters who were interviewed started hunting before they were 10, and one of them stated that he has collected turtles since he was three, certainly the youngest hunter among all those who had been interviewed. For the hunters of this community, the creation of MSDR made it possible an increase in the abundance of some animals that are hunted.

Along with Barroso community, in Aiucá it was registered the greatest diversity of hunted species (n=9). In 2005, 130 animals were killed (373 Kg). Once again, turtles were the major species hunted, totaling more than 94% of all animals

killed. Among chelonians, tortoises stand out as the ones that contributed most to weight (41.55%) even though only 14 of them were killed. The species that were killed while the study was being conducted are among those most susceptible to killing, as are most species mentioned as food preference (Tables 2 and 4); It was in Aiucá, that the highest number of species mentioned as food preference was recorded (n = 18).

#### SÃO RAIMUNDO DO JARAUA

Fishing was the main activity to earn a livelihood, especially during the dry season and pirarucu (*Arapaima gigas*) management. Hunting activity is done by 8.82% (N=8) of residents and destined mostly for subsistence. Hunters state that they go hunting between five and ten times a month and usually joined by friends and relatives. Only one Hunter said that he has sold his products in his own community.

The community registered the highest total weight from killed animals in all five communities being monitored. While the study was being done, 93 animals from seven species were killed totaling 749.9 Kg. As in the other communities, the reptiles stood out both in the number of animals killed and total weight. However, two manatees were killed meaning approximately 32% of the entire weight obtained.

The main species killed are those with the highest killing susceptibility index. There is also a similarity between susceptibility and food preference of community residents. Most species listed as preferred by the community obtained 10.0 indices (Table 04), despite the smallest number of species reported as food preference by the resident.

#### SÍTIO FORTALEZA

Twenty-one people were interviewed in this community even though, only seven heads of family participated in the interviews. The other interviewed people were the wives and children in the house. Only three residents, all male, declared that they were hunters saying that they rarely went hunting, and when done it was for the family consumption only. Two or three hunters started hunting when they were 15, always joining their parents when they went hunting. Only three of the 15 preferred species by the residents obtained a susceptibility greater than 9,0. No killing was done in 2005 in the community. The main livelihood activity is fishing, especially catfish.

#### DISCUSSION

The lack of some terrestrial mammal species was determinant by the hunting profile found in MSDR. In the monitored communities, chelonians, primates, capybaras and manatees, besides some birds of the Cracidae and Anatidae families formed the most hunted species.

Chelonians stood out as the main hunted group, both for the number of species, and its abundance and biomass. *Geochelone denticulata* (turtoise), usually found in upland environment, had 18 of the 19 individuals killed in three flooded areas. Consumption of chelonians was similar to those of other studies in areas of the Amazon where they were responsible for most reports of among reptiles. (EMÍDIO-SILVA, 1998; TOWNSEND, 1999; VALSECCHI; AMARAL, 2009). Chelonians, especially those of the *Podocnemis* genus considered an important source of animal protein to the traditional Amazon population (MITTERMEIER,

1975; 1978; BALÉE, 1985; EMÍDIO-SILVA, 1998; MEDEIROS, 1998; FACHÍN-TERÁN; VOGT; THORBJAMARSON, 2000; PEZZUTI, 2003;) are among the ten most susceptible to killing species in this study, and should be investigated further.

Even though the manatees were important for their contribution to the mammal weight, only three individuals were killed. That makes smaller species such as the red howler to be recognized as more important as human food. Killings of *A. seniculus* happen all year around and are distributed through a larger number of localities. *A. seniculus* was also the only primate specie hunted at the time. However, it is known that three other primate species are killed for food in the Reserve (*Cebus macrocephalus*, *Ateles chameck* and *Cacajao calvus rubicundus*) (VALSECCHI, 2005). Some killing of *Cacajao calvus calvus* have also been reported, however those killings aimed only the capture of the baby monkeys to keep them as pets, or to be sold.

Capybaras, which had been declared “almost extinct” by Boca do Mamirauá residents, at the mouth of the Japurá River, were killed in two other communities, São Francisco do Aiucá and Barroso, both on the margins of the Solimões River.

The results from this study indicate that the most susceptible species to hunting are *Podocnemis unifilis*, *P. sextuberculata*, *P. expansa*, *H. hydrochaeris*, *Crax globulosa*, *Alouatta seniculus*, *Cairina moschata* and *Pauxi tuberosa*. *Tayassu pecari* listed among those most susceptible species to hunting and also listed as a food preference for all communities did not report a single killing in the period. The

species is known for its presence during the dry season only, and its killing is rare in Mamirauá.

Hunting is a predominant male activity and starts at an early age among in the reserve young. The young hunter usually goes hunting with his father before he is fifteen.

Although hunting is frequent, the activity makes a very small contribution to the income of the families we studied. However, this characteristic tends to be different in other MSDR localities with buyers for some specific products, such as crocodiles. Recently, reports were made on the use of black caiman (*Melanosuchus niger*), white caiman (*Caiman crocodilus*) and pink dolphin (*Inia geoffrensis*) meat as bait to catch piracatinga (*Calophysus macropterus*) (ESTUPIÑÁN, et al., 2003). Thus, a trade of the carcasses of these animals started in some localities (personal observation), however none of these localities were monitored by this study.

We observed during this study that the hunting patterns in Mamirauá floodplains are very different from those described in the literature for the upland environment. This means the adoption of different strategies of conservation and management directed toward the most important species targeted by hunting in the region. Even considering that, according to local perception, the creation of MSDR has begun to show positive results over the population of some cinegetic species, reports on over hunting were gathered in one of the monitored areas. This information from the community residents strengthen the importance of studies over hunting activity and their use to plan the unit management, as well as conservation of biodiversity and local development.

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