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Abstract: As part of a study on the ecology of a community of middle-sized and larger mammals in a seasonally dry forest in the far north of the Brazilian Amazonia, peccaries (the white-lipped peccary *Tayassu pecari* and the collared peccary *Tayassu tajacu*) and large cats (the jaguar *Panthera onca* and the puma *Puma concolor*) were regularly surveyed for 1 year. Diurnal and nocturnal surveys were carried out by the line-transect method, in five different forest types along a 10 km transect, and data were collected on their use of the forest types. The peccary herds and the large cats were sighted regularly throughout the study period, but more frequently over the dry season in the high-ground forests in eastern Maracá. Over the dry season, when food was scarce except in the Buritizal, *T. pecari*, closely followed by a *P. onca*, monopolized the Buritizal forests, whereas *T. tajacu*, followed by a *P. concolor*, exploited the other available high-ground forest types. Fluctuations in food supply regulated the dynamics of the two species of peccaries, which ultimately determined the whereabouts of the large cat predators. This may be a counter-strategy to survive in an extremely seasonal environment where food, more than any other variable, is the key determinant of the survival of both peccaries and large cats.

Peccary movements as determinants of the movements of large cats in Brazilian Amazonia

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Tayassu pecari; *Tayassu tajacu*; *Panthera onca*; *Puma concolor*; niche separation; predator–prey relationships; movements; Brazilian Amazonia.

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Abstract

As part of a study on the ecology of a community of middle-sized and larger mammals in a seasonally dry forest in the far north of the Brazilian Amazonia, peccaries (the white-lipped peccary *Tayassu pecari* and the collared peccary *Tayassu tajacu*) and large cats (the jaguar *Panthera onca* and the puma *Puma concolor*) were regularly surveyed for 1 year. Diurnal and nocturnal surveys were carried out by the line-transect method, in five different forest types along a 10 km transect, and data were collected on their use of the forest types. The peccary herds and the large cats were sighted regularly throughout the study period, but more frequently over the dry season in the high-ground forests in eastern Maracá. Over the dry season, when food was scarce except in the Buritizals, *T. pecari*, closely followed by a *P. onca*, monopolized the Buritizal forests, whereas *T. tajacu*, followed by a *P. concolor*, exploited the other available high-ground forest types. Fluctuations in food supply regulated the dynamics of the two species of peccaries, which ultimately determined the whereabouts of the large cat predators. This may be a counter-strategy to survive in an extremely seasonal environment where food, more than any other variable, is the key determinant of the survival of both peccaries and large cats.

Introduction

Very little information is available on niche separation and predator–prey relationships of free-ranging large cats and peccaries, which derive from direct observations due mainly to their cryptic behaviour and very large home ranges.

It is thought that white-lipped peccaries have very large home ranges of up to 20 000 ha, that they are migratory or even nomadic (Kiltie & Terborgh, 1983; Solws, 1984; Bodmer, 1990), although Fragoso (1994), studying the same groups as in this study, found a home range of *c.* 10 000 ha, and Keuroghlian, Eaton & Longland (2004) doubt that they really need vast home ranges in undisturbed forests.

Collared peccaries, to the contrary, have much smaller home ranges, between 50 and 2000 ha, which varied little over time (McCoy *et al.*, 1990; Taber *et al.*, 1994; Judas & Henry, 1999). In eastern Maracá, Fragoso (1998) recorded a home range of 1580 ha for the same groups. For both species, changes in their movements within their home range and fruit consumption, especially over the seasons, ap-

peared to be a function of resource availability (Bodmer, 1990; Altrichter *et al.*, 2001).

Related species often differ in the use of the habitat in order to avoid competition, which leads to segregation and is mainly determined by resource acquisition (MacArthur & Levins, 1967; Diamond, 1975). It has been shown that white-lipped prefer the border of rivers and ponds of primary forests, and are highly selective (Bodmer, 1990; Fragoso, 1991, 1994; Sowls, 1997; Altrichter *et al.*, 2002; Carillo, Saenz & Fuller, 2002; Altrichter & Boaglio, 2004; Reyna-Hurtado & Tanner, 2005). Collared peccaries are instead more habitat generalists, using a myriad of forest types in undisturbed as much as disturbed, and secondary forests (Sowls, 1997; Reyna-Hurtado & Tanner, 2005).

We expect that in extreme resource scarcity, interference competition and ultimately competitive exclusion may occur between the two species (Connell, 1980; Hairston, 1980; Chesson & Huntly, 1988), when the stronger competitor, the white-lipped, takes over the favourite areas (Dickman, 1986), such as the Buriti clusters that occur exclusively in the lowlands and have abundant food resources. Habitat

heterogeneity, however, should greatly enhance the opportunities for the different, closely related, competitive species, to coexist (Chesson & Rosenzweig, 1991), in this case, allowing collared peccaries to use the other forest types.

Jaguars have a home range of *c.* 142 km², although it varies widely between seasons, with the dry season presenting a much larger HR, and may travel up to 10 km between consecutive days (Crawshaw & Quigley, 1991). Pumas, despite being smaller than jaguars, have a larger home range of 155 km².

Jaguars are thought to be opportunistic predators, who catch their prey according to numerical abundance (Rabinowitz & Nottingham, 1986; Aranda & Sanchez-Cordero, 1996; Garla, Setz & Gobbi, 2001; Weckel, Giuliano & Silver, 2006). They increase their trophic prey diversity (Chinchilla, 1997) and also travel longer distances in the dry season (Crawshaw & Quigley, 1991), when prey may be less abundant (Mendes Pontes, 2004).

There may be a high degree of spatial and dietary overlap between jaguars and pumas, but on a finer-scale analysis pumas have a broader food niche and present major segregations in feeding habits, which allow coexistence (Schaller & Vasconcelos, 1978; Iriarte *et al.*, 1990; Farrell, Roman & Sunquist, 2000; Nunez, Miller & Lindzey, 2000; Scognamillo *et al.*, 2003; Novack *et al.*, 2005; Weckel *et al.*, 2006).

Theoretical models assume that clumping decreases the chances of the predator finding the prey (Brock & Riffenburgh, 1960), and that prey are randomly distributed in the environment (Schoener, 1969; Taylor, 1976). Although the ecological importance of prey clumping is unquestionable (Timbergen, Impekoven & Frank, 1967), we assume that, in tropical forests such as in this study, it should facilitate the location of the prey by their predators, thereby determining the movements of their predators.

In this study, we evaluate the impact of the movements of the two peccary species in the study area, the white-lipped peccary *Tayassu pecari* and the collared peccary *Tayassu tajacu*, their determinants and the resulting impact upon the movements of their predators, the two large cats: the jaguar *Panthera onca* and the puma *Puma concolor*.

Methods

Subjects

Tayassu pecari, the white-lipped peccary, has a home range of around 110 km² (Fragoso, 1994). They are diurnal and crepuscular, and live in groups that could be from four up to 85 individuals (Mendes Pontes, 2000, 2004).

Tayassu tajacu, the collared peccary, has a home range of 118–126 ha (McCoy *et al.*, 1990). They are diurnal, crepuscular and also nocturnal whenever there is moonlight, and live in groups that could be from four up to 30 individuals (Mendes Pontes, 2000, 2004).

There were 33 medium-sized and large mammals present in these forests, of which the two peccaries had the highest individual densities at Terra Firme forest (66.5 ind km⁻² in

the case of *T. pecari* and 26 ind km⁻² in the case of *T. tajacu*), and in Mixed forest (21 ind km⁻² for *T. pecari* and 18.9 ind km⁻² for *T. tajacu*) (the densities were obtained only for the two main forest types) (Mendes Pontes, 2000, 2004).

Panthera onca, the jaguar, has a home range of 142 km² (Quigley & Crawshaw, 1992). They are diurnal and nocturnal, and solitary (Mendes Pontes, 2000, 2004).

Puma concolor, the puma, has a home range of 155 km² (Crawshaw & Quigley, 1984; Oliveira, 1994). They are diurnal and nocturnal, and solitary (although a cluster of four sub-adults were registered in Terra Firme forest) (Mendes Pontes, 2000, 2004).

Large cats were found at very low individual densities in both Terra Firme (0.2 ind km⁻² for *P. onca* and 0.4 ind km⁻² for *P. concolor*) and Mixed forest (0.1 ind km⁻² for *P. onca* and 0.1 ind km⁻² for *P. concolor*) (Mendes Pontes, 2004).

Study area

Maracá is located at latitude 3°15'–3°35'N and longitude 61°22'–61°58'W, and is a 1013 km² island of seasonally dry forests, with some areas comprising tropical dry forests. It is a fluvial island formed by the bifurcation of the Uraricoera river into the Maracá channel in the south and Santa Rosa channel in the north (Fig. 1). At least 95% of the island is forested (Milliken & Ratter, 1990). The mean annual temperature during the study period, 1997/1998, was 31.6°C, and rainfall was 1577.3 mm, with a sharp decline in the dry season (Fig. 2).

Forest types

The two main habitat types

Terra Firme forest

Normally about 25–35 m in height, emergents reaching 40 m. During the dry season, some trees lose their leaves, including some emergents. Milliken & Ratter (1990), with the addition of some new records (Nunes, 1992), recorded 160 species (of 115 genera and 41 families) of emergent, canopy and larger understorey trees in this forest type. The number of species was increased to 252 (of 161 genera, and 54 families) in this study. Total basal area recorded by Milliken & Ratter (1990): 182.7 m² ha⁻¹. Total area surveyed in this study: 46.5 ha (Fig. 3).

Mixed forest

Has a similar floristic composition and height, but with a higher species diversity compared with Terra Firme. The main feature that distinguishes this forest from the previous one is that there is one particular species, which does not occur in Terra Firme forest: *Peltogyne gracilipes* (Leg. Caesalp.), the Pau-Roxo, which is particularly important due to its high density in some places, the unusually high

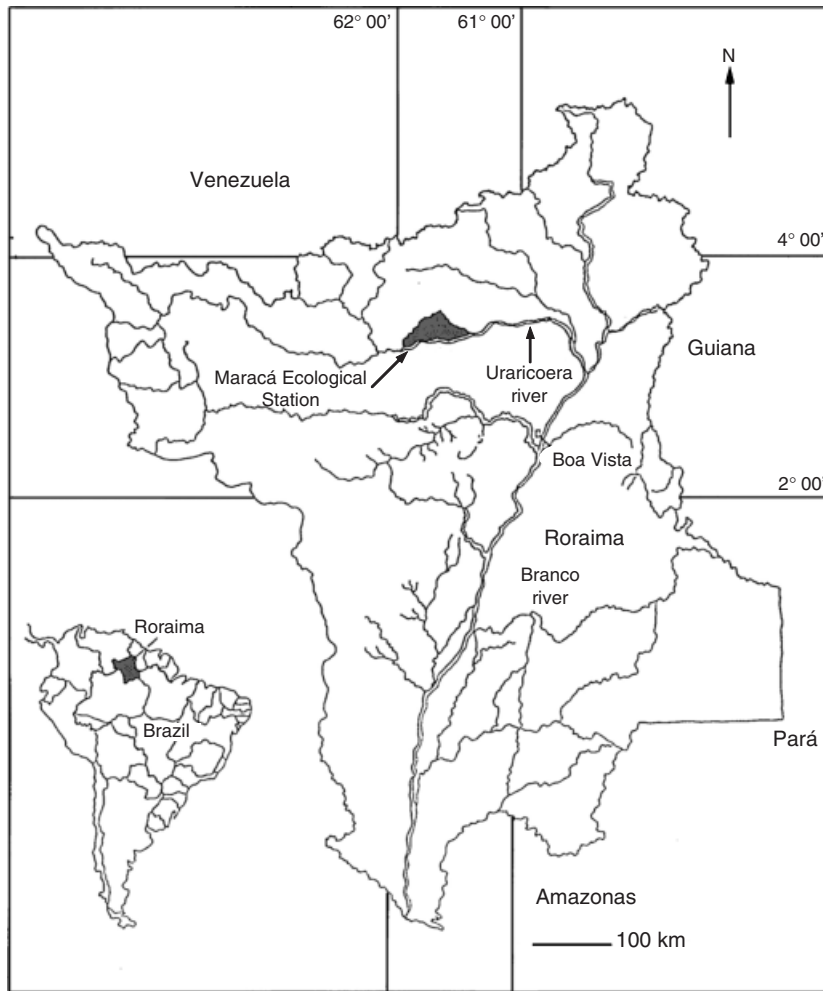


Figure 1 Location of the study area, Maracá Ecological Station, in the State of Roraima, Brazilian Amazonia.

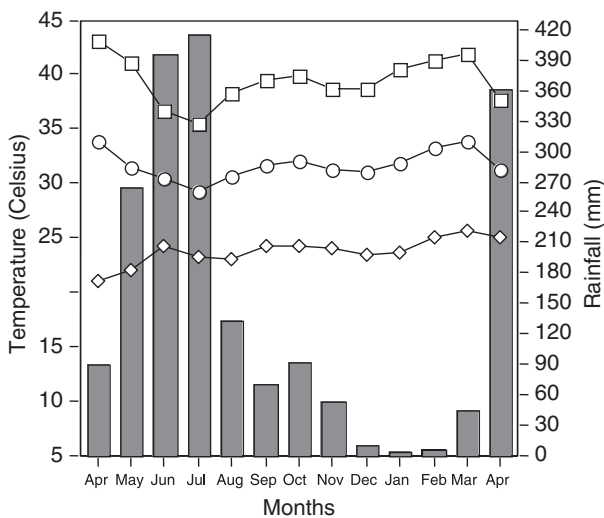


Figure 2 Minimum, mean and maximum temperature (lines) and rainfall (bars) in Maracá during the study period (1997–1998).

proportion of the palm *Oenocarpus bacaba* and abundance of *Phenakospermum guyanense* in the ground layer. Indeed, Nascimento & Proctor (1996) and Nascimento, Proctor & Vilella (1997) call this forest just *Peltogyne*-poor forest (whereas the former is called forest without *Peltogyne*). For Mixed forest, the recorded species include 160 from Terra Firme forest, plus 51 further species (totalling 201 species, of 131 genera and 43 families). The number of species was increased to 270 (of 174 genera and 49 families) in this study. Total basal area recorded by Milliken & Ratter (1990): 109.7 m² ha⁻¹. Total area surveyed in this study: 53.5 ha. (Fig. 3).

The other three habitat types

Pau-Roxo forest

Occurs in two small patches, surrounded by Mixed forest. It is characterized by a predominance of Pau-Roxo tree (*P. gracilipes*, Leg. Caesalp.), with very few other plant species, even being called *Peltogyne*-rich forest by

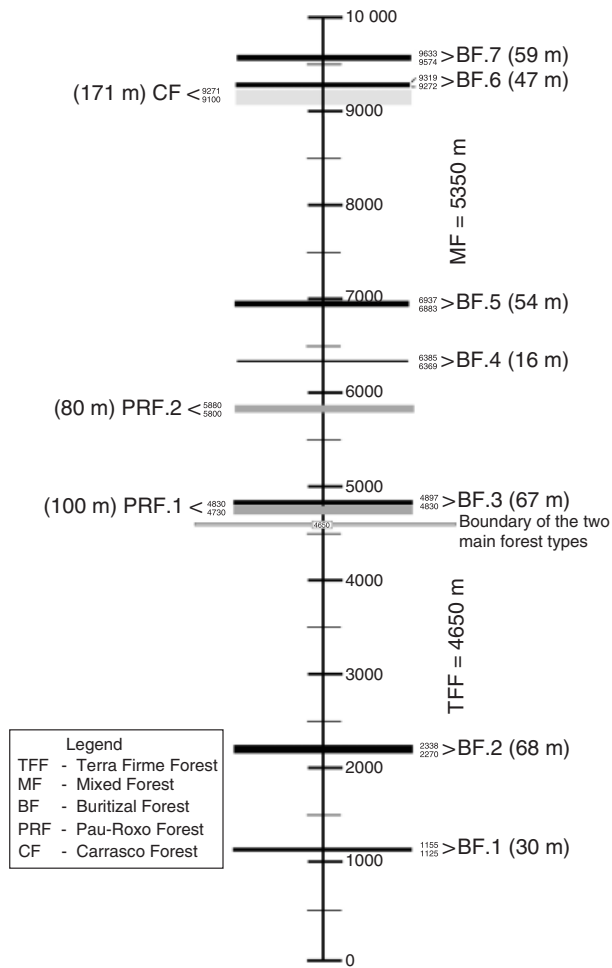


Figure 3 Location of the two main forest types, Terra Firme and Mixed forest, and the other three minor habitats: Buritizal, Pau-Roxo and Carrasco, along the 10-km study transect, Roraima, Brazilian Amazonia.

Nascimento & Proctor (1996) and Nascimento *et al.* (1997). It is considered to be almost a monodominant forest, and is one of the highest forest types, reaching 40 m (Milliken & Ratter, 1990). It is possible to identify Pau-Roxo forest from the air, during the dry season when leaves are lost. This forest is usually open because of its frequent canopy discontinuity. For this forest type, 26 species (of 23 genera and 14 families) were recorded, excluding understory species. The number of species was increased to 47 (of 40 genera and 26 families) in this study. Total basal area recorded by Milliken & Ratter (1990): $52.2 \text{ m}^2 \text{ ha}^{-1}$. Total area surveyed in this study: 1.8 ha.

Buritizal forest

Occurs along the streams that flood during the wet season. The most common plant species is *Mauritia flexuosa* (Palmae) and the trees may reach 23 m in height, forming a

rather discontinuous canopy. For this forest type, 19 species (of 19 genera and 16 families) were recorded (Milliken & Ratter, 1990), excluding herbs, shrubs, treelets and vines. The number of species was increased to 46 (of 44 genera and 29 families) in this study. Total basal area recorded by Milliken & Ratter (1990): $9 \text{ m}^2 \text{ ha}^{-1}$. Total area surveyed in this study: 3.4 ha (Fig. 3).

Carrasco forest

Comprises very small trees (at about 4–5 m height, according to Milliken & Ratter (1990), but not exceeding 1.5 m in this study) of a very shrubby, multi-trunked form, which makes it almost impossible to penetrate. Some of the characteristic plant species are *Desmoncus polycanthos* and *Bactris maraja* (Palmae). According to the same authors, the number of trees exceeds 4882 ha^{-1} , but even this does not give a true idea of the thicket, as the spaces between the trees from 3 cm DBH are filled with more slender individuals that were not scored.

In this forest type, the above-mentioned authors found 34 species (23 genera and 22 families). The number of species was increased to 43 (of 37 genera and 27 families) during this study. Total basal area: $0.23 \text{ m}^2 \text{ ha}^{-1}$. Total area surveyed in this study: 1.7 ha. It is important to mention, however, that in this study, only 10 individuals (only 6 of 10 cm DBH or more) taller than 1.5 m were found, which were the specimens studied. Thus, the species numbers given above assume that those species recorded by Milliken & Ratter (1990) may occur beyond the limits of the study area, and that the ones recorded in this Carrasco variety comprise additions to the list of species (Fig. 3).

Other vegetation types surrounding the study area

South and south-east of the study area, where the forest finishes abruptly, there are the lowlands that become flooded with shallow waters during the wet season. In these lowlands, there is an emergent shrub vegetation and a lake with associated surrounding palm trees. Further south is a narrow strip of riverine forest that is located along the Branco river that forms Maracá island.

Fruit productivity in the forests

Mendes Pontes (2000) sampled tree species using the point-centred quarter (PCQ) transect method described by Muller-Dombois & Ellenberg (1974), where, at each pre-established interval of 40 m, the four nearest trees with at least 10 cm DBH were marked ($n = 503$). The sampling transects were cut in all the major forest types, as already described by Milliken & Ratter (1990).

Trees were marked with aluminium tags and vinyl flagging, and monitored monthly for the presence or absence of buds, young and mature leaves, buds, young and mature flowers and unripe, ripe and over-ripe fruit. Fruit quantities were also visually assessed in the forest canopy by means of

counting the number of fruit on an entire branch, or section of the crown, with the help of a 10 × 42 Leica binoculars, and extrapolating to the number of units of the same size in the whole tree crown. In the case of bunches, such as with palms, I averaged the number of fruit obtained from fallen bunches, which were counted more accurately. Flowers were deposited in the Herbarium collection of the Museum of the State of Roraima.

Residual fruit production was monitored by the raked-ground fruit survey (Sabatier, 1985; Guillotin, Dubost & Sabatier, 1994; Zhang & Wang, 1995), which consisted in surveying fallen fruit along a pre-established transect, at regular intervals, in this case every week, and removing the checked fruits from the sampled area after each census. In the major forest types, Terra Firme and Mixed forest, 1000 m was established in each forest, within the same transect also used for phenology, and in the minor habitats, Buritizal and Pau-Roxo forest, the same transects of 40 m were used. Identifications by the author in all cases were checked by the following experts: M. Van Roosmalen, L. Lohman, G. Lewis, T. Pennington and J. Ratter. I also had help from locals to identify the trees by their vernacular names.

Fruit were collected weekly for an entire year, identified, weighed and samples of each new collection were preserved, and were later deposited in the first fruit collection of the State of Roraima, in the Museum of the State of Roraima, built by the author. Fruit productivity of every species was calculated by multiplying fruit number by the mean individual fruit weight of each species. They were also checked for dispersion (i.e. defaecated), predation (when the seed was destroyed by teeth, or some identifiable mark of predation) or scatter-hoarding (if buried). Total fruit production was obtained by adding the production of all plant species sampled. This method was selected, instead of fruit-traps (Smythe, 1970; Terborgh, 1983), because it is more practical, and because fruit-traps, as shown by Zhang & Wang (1995), require a very large number of traps to catch a significant number of fruiting species.

Transect survey

The trail was numerically marked at 50-m intervals, and was completely cleaned monthly in order to minimize disturbance. Diurnal censuses were carried out for 12 months, from the beginning of the wet season (April 1997) to the end of the dry season (March 1998). Walks were carried out four times a week, from 06:00 to 12:00 h when surveying in Terra Firme forest (4650 m), and from 07:00 to 13:00 h [much further from the station, in Mixed forest (5350 m)]. The average speed was 1 km h⁻¹, with random stops of a few seconds to scan the habitat. When an animal was smelt or heard, the location and date were recorded. After identification, footprints were destroyed to avoid being recorded more than once.

The total length of the transect of the diurnal surveys was the summation of all the single diurnal walks, and the nocturnal censuses, the total length of the nocturnal walks. For those species that were active during the day and night,

the total trail length was the summation of both diurnal and nocturnal surveys.

Results

General considerations

During this 12-month study, a total of 638 h of surveys were carried out along 1180.2 km in the five habitat types (1115.4 diurnal and 64.8 nocturnal surveys). There was no significant difference between the number of kilometre walked in the two main habitats: Terra Firme forest and Mixed forest ($\chi^2 = 0.18$, d.f. = 1 NS).

Fruit productivity in the forests

In Terra Firme forest, the highest overall number of fruiting tree species was recorded ($n = 137$), and, in all months, had more tree species fruiting than in Mixed forest. The highest number of fruiting species was recorded in June, in the middle of the rainy season, when 45 different fruit species (19%) were collected. In the 7 months of the dry season, however, fruit availability decreased sharply, when only five fruit types (6%) were available.

The same trend was observed in Mixed forest ($n = 97$), in that more fruits were available at the onset of the wet season. At the beginning of the wet season, 24 (9%) fruit species were collected. A sharp decline was recorded in the seventh month of the dry season, when only four fruit species (2%) were collected. Total month availability of fruit in Terra Firme forest was 1309.8 kg year⁻¹ in the canopy and 284 kg ha⁻¹ year⁻¹ on the forest floor, and, 1143.7 kg year⁻¹ (canopy) and 2295 kg ha⁻¹ year⁻¹ (forest floor) in Mixed forest.

Buritizal had the highest number of fruiting trees at the beginning of the wet season ($n = 32$), and did not show a decline in availability during the last months of the dry season, such as in Terra Firme forest and Mixed forest. It results mainly from the great availability of the Buriti fruit, *M. flexuosa* (Palmae), which was the main source of food during scarcity periods of the dry season. It had five fruiting trees (16%) in February and March.

Pau-Roxo forest ($n = 28$) produced the least amount of fruit among the tall forest types (excluding Carrasco forest), and three periods of decreases in fruit availability were recorded: one during the peak of the rainy season, one at the beginning of the dry season, and the third, which persisted for the last 3 months of the dry season, when only one tree species (4%) was fruiting.

In Carrasco forest, there was one peak of fruiting in the middle of the wet season, when five tree species (46%) were producing fruit, and no tree species were recorded producing fruit in the sixth and seventh months of the dry season.

The total fruit productivity in Buritizal was 874.8 kg year⁻¹ in the canopy and 5274.7 kg ha⁻¹ year⁻¹ on the forest floor; in Pau-Roxo it was 363.9 kg year⁻¹ (canopy) and 829.9 kg ha⁻¹ year⁻¹ (forest floor). Carrasco forest was not assessed due to its impenetrability.

Accordingly, both peccaries had higher densities in Terra Firme forest, where more tree species were fruiting, and more fruit were present in the canopy and on the forest floor. Over the dry season, the larger *T. pecari* monopolized the Buritizals, the only forest with considerable amounts of fruit on the forest floor (Mendes Pontes, 2000, 2004).

An overview of habitat use

The peccary herds were sighted regularly throughout the study period and more frequently over the dry season in the forest types studied.

In the wet season, *T. pecari* used three out of the five forest types studied (i.e. Terra Firme, Mixed forest and Buritizal), but most frequently used the non-Buritizal forest types. During the lean food periods, during the dry season, they used the Buritizals more than the non-Buritizals (although these differences were not significant, $\chi^2 = 0.78$, d.f. = 1 NS), and visited four of the five forest types (i.e. Terra Firme, Mixed forest, Pau-Roxo and Buritizal).

For 6 months, from September to February, the sightings of *T. pecari* herds between 6000 and 10000 m along the study transect were recorded exclusively in Buritizal forest ($n = 11$). During these sightings, they were recorded, being closely followed by a *P. onca* at least five times (45% of the records). Once they stayed in one Buritizal, and the next day moved to the next one along the transect, and the jaguar was also recorded on both occasions (see Supplementary Material Appendix S1).

In 37% ($n = 7$) of all sightings in Buritizal forest ($n = 19$), *T. pecari* were closely followed by a *P. onca*. Thus, *T. pecari* were equally likely to be found, either being followed by a large predator or not ($\chi^2 = 0.8$, d.f. = 1 NS) in this forest (see Supplementary Material Appendix S1), which is reinforced by the strong correlation between the number of sightings of both in the different forest types ($r = 0.95$, $P < 0.05$, $n = 5$).

Although the herds of *T. tajacu* were sighted regularly throughout the study, they were seen less frequently than *T. pecari*. They used only one of the forest types (Terra Firme) during the wet season (when they were not seen in the Buritizals) and three (Terra Firme, Mixed forest and Buritizal) over the dry season. In the latter, they used the Buritizals forests significantly less than the non-Buritizal forests ($\chi^2 = 2.2$, d.f. = 1, $P < 0.02$).

Habitat use in Terra Firme forest

Tayassu pecari were equally likely to be found in a Buritizal forest ($n = 11$) or in a non-Buritizal forest ($n = 8$) within Terra Firme forest ($\chi^2 = 0.4$, d.f. = 1 NS), and in the latter *P. concolor* was recorded in close proximity to *T. pecari* once during the 11 recorded sightings.

In Terra Firme, *T. tajacu* were followed by a *P. onca* in 15% ($n = 2$) of the records. In the Buritizals within this forest ($n = 3$), however, these peccaries were sighted being followed by large cats two out of three times, although once ARMP was unable to identify the species of the large cat.

The highest number of sightings of *P. concolor* ($n = 4$) and of *T. tajacu* ($n = 13$) was in Terra Firme, although too few sightings were available to allow any conclusions (Supplementary Material Appendix S1).

Habitat use in Mixed forest

Tayassu pecari were more likely to be recorded in Buritizal ($n = 12$) than in a non-Buritizal forest ($n = 3$) within Mixed forest ($\chi^2 = 6.1$, d.f. = 1, $P < 0.02$), but in the latter and Pau-Roxo forest large predators were not recorded following white lips (Supplementary Material Appendix S1).

Discussion

Fluctuations in food supply regulated the dynamics of the two species of peccaries that ultimately determined the whereabouts of their large cat predators.

During the wet season, when food resources were plentiful everywhere, the species studied were sighted less frequently within the forests, and appeared to be more widely distributed in the region, using the lowlands and a connected lake and its associated vegetation south and south-east of the study area. At the onset of the dry season, both peccary species shifted completely to the high-ground forests and, consequently, their predators, the two larger cats, also shifted.

Tayassu pecari shifted completely to Buritizal forests. They stayed there for at least six months, determining the movements of their large predator, *P. onca*, which was recorded as following them regularly. They were found there until the end of the study, in March, when very few buriti fruit were available. Additionally, this shows that *T. pecari* did not migrate during this study, as mentioned in the literature (Kiltie & Terborgh, 1983; Caldecott, 1988; Peres, 1996), possibly because these migrations may be supra-annual.

Tayassu tajacu, instead, stayed almost completely confined to high-ground forests, as the Buritizals were monopolized by *T. pecari*, and were closely followed by their predator, *P. concolor*. *Tayassu tajacu* in Maracá have lower densities than their competitor (Mendes Pontes, 2004), smaller home ranges and are more flexible concerning food parts to be eaten (Kiltie, 1982; Bodmer, 1990), which makes them able to exploit these habitats more efficiently and, thereby, avoid competition with *T. pecari* (as discussed by MacArthur & Levins, 1967).

This highlighted an ongoing process of enhanced interference competition that resulted in the competitive exclusion of the smaller *T. tajacu* from the most favourable habitat, Buritizal forest. This process appeared to be a normal feature of this highly dynamic metapopulation, made possible by its great habitat heterogeneity (as discussed in MacNally, 1983; Chesson & Huntly, 1988; Chesson & Rosenzweig, 1991). Peccary movement patterns, however, resulted in a highly clumped and predictable distribution, which allowed their predators to locate them easily, and even follow them throughout the study area.

Thus, clumping was as advantageous to predators as to preys (per Timbergen *et al.*, 1967), largely determining their daily movements, and ultimately resulting in their habitat segregation. This could be a counter-strategy to survive in an extremely seasonal environment where food, more than any other variable, is the key determinant of the survival of the mammal community.

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Supplementary material

The following material is available for this article online:

Mendes Pontes & Chivers: Peccary movements determine those of large cats.

Appendix S1. The influence of the movements of peccaries upon the large cats in Maracá, Roraima, Brazilian Amazonia (when predator confirmedly accompanying prey sightings in bold).

This material is available as part of the online article from: <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1469-7998.2007.00323.x> (This link will take you to the article abstract).

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