

## PP263 A comparison of large mammal and primate fauna in various habitat types

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The forest located in the Amazon basin can be characterized into two distinct habitat types: Terra firma (unflooded forest) and varzea (seasonally flooded forest). Terra firma forests generally have high canopies (>30m), high diversity of tree species, and the forests lie on well-drained terrains that tend to be heavily leached and nutrient poor (Haugaasen & Peres, 2005a). Solar radiation and rainfall are the major determinants of food availability in terra firma with pulses of new leaves occurring primarily in the dry season, flowering strongly correlated with the decrease in rainfall and a fruiting peak at the end of the dry season leading into the onset of the wet season (Haugaasen & Peres, 2005a). Varzea forest generally has a lower canopy than terra firma and lower diversity of tree species (Haugaasen & Peres, 2005a). Food availability in varzea forest is determined by the seasonal flood. Fruiting starts at the onset of the wet season, but continues well into the rainy season and the availability of fruit during this time is considerably higher than during the fruiting peak in terra firma (Haugaasen & Peres, 2007). However, when the water levels reach their peak, food production in varzea forest is minimal as the majority of trees shed their leaves, and fruit and flowers are absent (Haugaasen & Peres, 2005a). In addition, these two forest types are interspersed with palm swamp (aguajale). Aguajale palm swamp is often dominated by the *Mauritia* palm, which produces lots of fruit, eaten by a wide diversity of wildlife. This mosaic of food resources provided by the different forest types has important implications for the conservation and maintenance of wide-ranging frugivore populations in Amazonian forests.

Forest mammal densities are affected by the availability of fruit, or fruit bearing plant species because these are the major food sources in a forest environment. For example, increased food production is reportedly associated with higher abundance of primary consumers such as primates (Stevenson, 2000). The diversity of tree species in terra firma is able to support a larger number of different primate species than varzea, but the abundance of primates is considerably higher in varzea than terra firma (Peres, 1993; Haugaasen & Peres, 2005b; 2007). The abundance and distribution patterns of other forest frugivores such as peccary, tapir and deer also vary between the two forest types. These terrestrial mammals move into the varzea forest to take advantage of the high fruit production as soon as the first sections of dry land appear and remain in the varzea until the rising water levels force them to return to terra firma forest (Haugaasen & Peres, 2005c; 2007). However, overall diversity of mammal species remains highest in terra firma (Haugaasen & Peres, 2005c).

Forest ungulates (e.g. peccary, deer and tapir) are a major food source for indigenous human populations as are many species of primates. Some species such as tapir cannot be hunted sustainably due to their low density and slow reproduction (Navarro *et al.*, 2000), but other fast producing mammals that live at higher densities (e.g. red brocket deer) can be hunted sustainably if species population density is known and is used to calculate sustainable hunting quotas (Hurtado-Gonzales & Bodmer, 2004). When creating sustainable hunting quotas based on population density models it is extremely important to take into account the variation in mammal density across different habitat types, but also the source-sink dynamics of the

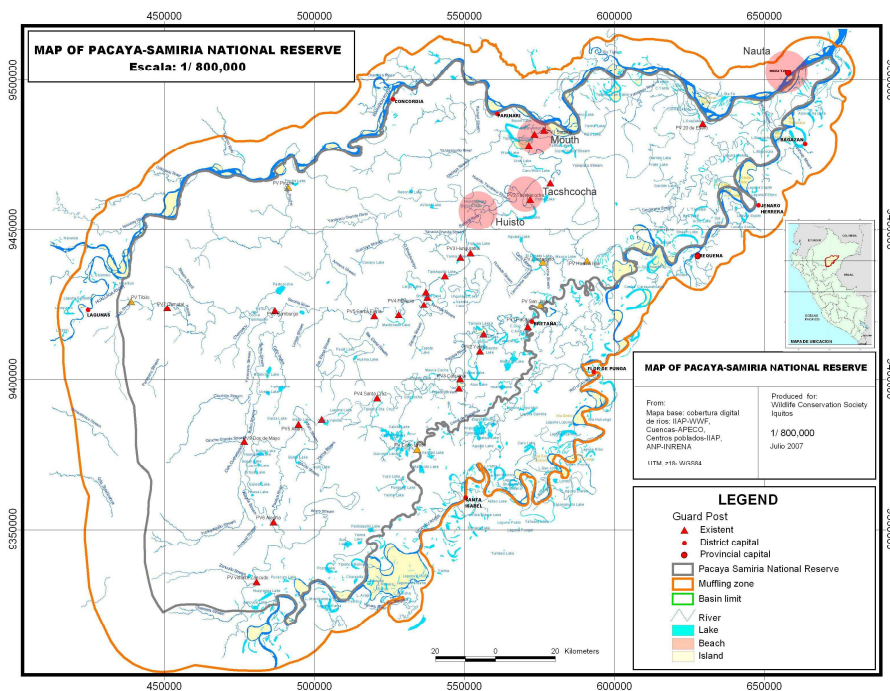
population (i.e. the habitat from which the population originates and the areas that the population occupies at different times of the year: Navarro *et al.*, 2000).

The Pacaya Samiria National Reserve in Peru is situated deep in the rainforests of the western Amazon basin, teems with aquatic and terrestrial wildlife. Towards the edge of the reserve are communities of Cocama Indians who are involved in reserve management and managing resources in non-core zone areas sustainably. Whilst their dress has changed, the Cocama Indians still live as they did centuries ago. They fish and hunt for meat, collect forest fruits and have small slash and burn gardens. Consequently, obtaining accurate estimates of large mammal densities to calculate sustainable hunting quotas is an important part of the forest conservation strategy. The aim of this project is to investigate the distribution patterns of large mammals and primates across the different forest habitat types and create reliable estimates of population density. The long-term data set may also be used to monitor seasonal changes to mammal abundance in different habitat types or changes to mammal abundance over time.

## Methods

### Study Site

The Pacaya-Samiria National Reserve is the largest protected area in Peru spanning over 20,000 km<sup>2</sup> of tropical rainforest and is a truly exceptional wilderness area. The two major rivers that bound the reserve are the Ucayali and Marañon, and they join to form the Amazon River, right at the point where the reserve begins. The major habitat type in this forest is the low-lying flooded forests (varzea), but this seasonally flooded forest is interspersed with upland forest (terra firma) and palm swamp (aguajale). Dissertation projects running between June and July are in the middle of the low water season, during which three sites will be used on the Samiria River – the mouth, Tacshcocha and Huisto (Figure 1). The varzea, terra firma and aguajale habitats are all accessible on foot at this time of



year.

Figure 1 Location of the 2010 survey sites

## Data Collection

Line censuses along transect trails are being used to conduct terrestrial mammal and primate censuses. Census trails 2 to 5 km in length will be surveyed repeatedly at each of the three sites. Censuses are done using small groups of three or four observers walking slowly and quietly (500-1,000 m/hr) between 7am and 3pm. Trails are not placed with any pre-determined knowledge of the distribution of the animals (Peres, 1999). Information registered on a census includes: day, site, species, number of individuals, and perpendicular distance from the individual to the transect line (Figure 2), habitat, time, distance travelled and weather conditions. The equipment used for line transects includes: a map of the area, a compass, data sheets, pens and binoculars.

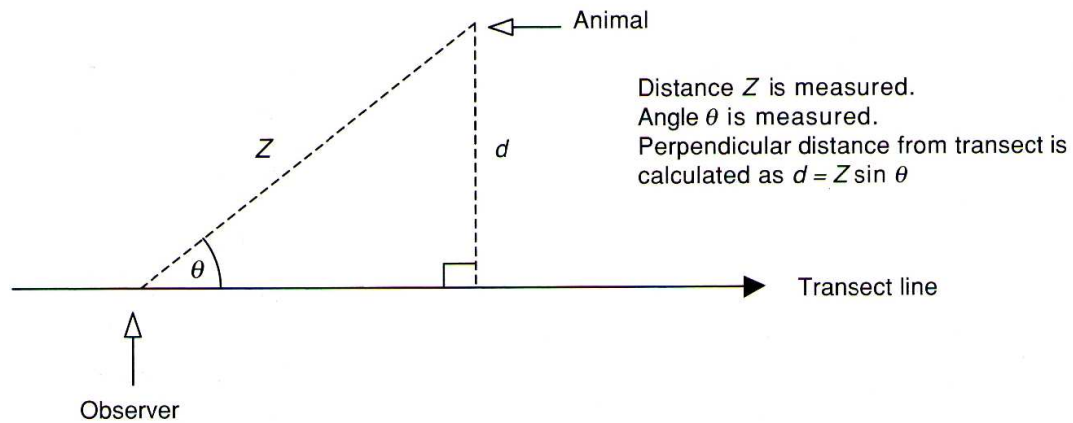


Figure 2: Calculating perpendicular distance of animals from line transect surveys

The distance sampling method can be used to calculate population density of animals in each designated habitat type or in the reserve in general when used in conjunction with the computer software package DISTANCE (Buckland et al 2001). DISTANCE assumes that all the animals that are on the centre of the line transect (0 m perpendicular distance) will be observed. The technique is based on the notion that observers do not see all the animals that are off the center of the line, and that the probability of sighting an animal depends on the distance of the animal from the line. Animals closer to the line have a higher probability of being seen than animals further from the line. The perpendicular distance of all solitary animals sighted, or the first animal sighted in a social species are recorded. The method relies on measuring the perpendicular distance of animals before they move as a consequence of seeing the observer. Using this method, the DISTANCE software can estimate densities if the distribution of sightings within a transect line forms a clear probability function. When the number of sightings is deemed insufficient to determine a probability function, the method known as 'fixed width' will be used to estimate the densities.

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