Population monitoring and habitat preferences of mammals in the flooded, transitional and upland forests of the Yarapa-Tahuayo landscape

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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 that 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 and 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.

Movements of frugivorous primates, rodents and ungulates 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; Haugaasen & Peres, 2005b). The diversity of tree species in terra firma is able to support a larger number of frugivorous species than varzea, but the abundance of frugivores is considerably higher in varzea than terra firma throughout the rainy season due to abundant fruit supply (Haugaasen & Peres, 2007). Abundance and ranging of frugivores in relation to fruiting patterns in turn impacts of the distribution of felids (Haugaasen & Peres, 2005c; Alvarenga et al., 2018).

The Loreto region of Peru is situated deep in the rainforests of the western Amazon basin, teems with aquatic and terrestrial wildlife. As a result of seasonal variation in rainfall in the Andean headwaters, the rivers of the Amazon basin are subject to large fluctuations in water levels throughout the year that flood the surrounding forest. The Loreto is no exception, with as little as 2% of land in the reserve above water at the height of the flooded season. In recent years these normal seasonal changes in rainfall patterns have become more intense, which has been tentatively attributed to climate change. Consequently, dry and rainy seasons are more pronounced resulting in unpredictable food supply and evaluation of the extent to which mammal populations can adapt to these changes suggests that terrestrial mammals are severely impacted by periods of intense flooding (Bodmer et al., 2017).

The aim of this project is therefore to investigate the distribution patterns of primates across the different forest habitat types and create reliable estimates of population density. Dissertation topics could examine the differences in terrestrial and arboreal mammals between the three forest types to examine vulnerability and resilience to climate change. Differences in predators, such as jaguars, pumas and ocelots could be used to look at predator-prey relationships between upland, transitional, and flooded forests.

Methods

Study Site

Research will be conducted in the Lower Yarapa River in the buffer zones of the Pacaya-Samiria National Reserve and the Tamshiyacu-Tahuayo Regional Community Reserve. Community-based conservation dominates the landscape of Loreto with large community-based reserves, community co-managed reserves and indigenous territories covering 98,800 km2. The project will provide research to support the positive community-based conservation trajectory that we currently see in Loreto and study how threats can be minimized and monitored. Research on sustainable use will be important for providing the science for community-based conservation. Climate change research will study how wildlife and people have been impacted, especially in the flooded forests where effects have been devasting.

Primates, felids and ungulates and large rodents will be surveyed across the flooded, transitional and upland forests of the Yarapa-Tahuayo landscape. The majority of forest in the region is classed as transitional forest which the low-lying flooded forests (varzea), which can be further divided into different subcategories based on how close the forest is to the river banks and therefore the extent to which it floods. Flooded forests (palm swamp) are generally located closest to the rivers and vitally important terra firma forest that does not flood and provides a constant supply of fruit year-round is generally located furthest from the river banks. The extent of flooding has an impact on forest structure, tree species composition and fruit availability.

Data Collection

Line censuses along transect trails will be used to survey primate, ungulate and large rodents across the three major forest types in the region: terra firma, varzea and aguajale. Census trails 2 to 5 km in length will be surveyed repeatedly at each of the three sites. Surveys will be completed by small groups of three or four observers walking slowly and quietly (500-1,000 m/hr) between 7am and 3pm. Weather conditions, date, start and finish time of the survey will be recorded. Trails are not placed with any pre-determined knowledge of the distribution of the animals (Peres, 1999). Each time a primate is encountered, the distance along the transect, time, species, number of individuals, perpendicular distance from the primates to the transect line, and forest type (Table 1) will be recorded. Transect data may then be uploaded into DISTANCE (Buckland et al., 2001) software to calculate densities of primate species. For more elusive species such as felids, camera traps will be set along transects on 14-day rotations and can be analysed by capture rates or occupancy.

Forest structure and fruit availability data may be collected from a series of habitat plots spaced equidistantly along each transect. Each mammal encounter can then be linked to the nearest habitat plot along the transect providing a corresponding set of habitat variables for primate record. From this, habitat preferences of each species may be calculated and the habitat variables effecting primate abundance and diversity at each plot can also be investigated.

Suggested Reading

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