

Final Report for PSGB

To what extent do Geoffroy's woolly monkeys (*Lagothrix cana*) in Manú National Park, Peru use secondary forest?

Lucy Millington, student at Oxford Brookes University 2012-2013



ABSTRACT

The woolly monkey (*Lagothrix*) is perhaps the least studied species of all the Neotropical primates, and of the few studies conducted on the genus (*Lagothrix*), few refer to their use of different forest types. There are even fewer studies on the Geoffroy's woolly monkey (*Lagothrix cana*) than on other species of the same genus, despite the fact that this species is Endangered (IUCN, 2013). It is important to know what kind of forests such an imperiled primate is able to use, in order to be able to create effective management plans, involving the protection and management of secondary forests as well as primary. This study aimed to determine whether the large-bodied frugivorous Geoffroy's woolly monkey are able to use secondary forests, and to what extent. This was achieved using the line transect method and recording the position of monkeys alongside which forest type they were using at that time. We found that woolly monkeys can use regenerating forest, they were observed feeding in a disturbed area of forest on a number of occasions. There was not enough data to calculate population densities, however encounter rates were calculated using transect data for Geoffroy's woolly monkeys (*Lagothrix cana*), Peruvian

spider monkeys (*Ateles chamek*), brown titi monkeys (*Callicebus brunneus*), brown capuchin monkeys (*Cebus apella*) and Peruvian squirrel monkeys (*Saimiri boliviensis*). All of the species studied were observed in regenerating forest. Woolly monkeys were found to occur in even heavily disturbed forest, whereas the spider monkeys were only found in older regenerating forest. The appearance of woolly monkeys in such an area coincided with the fruiting of *Byrsonima* trees. It is very encouraging to find that the larger, threatened species of monkeys can occur in regenerating forest, although this seems to be dependent on the resources available and the proximity of mature continuous forest.

INTRODUCTION AND BACKGROUND

The focal species, Geoffroy's woolly monkey (*Lagothrix cana*), is listed as Endangered by the IUCN (Boubli *et al.*, 2008). It is especially important to know how any species, especially endangered ones cope with habitat modification, as it is one of the primary threats to primate species (Chapman and Peres, 2001). If a species cannot survive in patches of secondary forest, then there is even more reason to prevent primary forest from being altered in the first place. However, if a species can utilize secondary forest then there is an incentive to allow deforested patches time to recuperate rather than treating the land as a lost cause for biodiversity conservation. The data collected during this study provides an insight into the future of woolly monkeys in degraded areas, as it is an example of their ability to cope with deforestation twenty five years after the deforestation event, it can be used to predict the future survival in recently deforested areas. If behaviour is different within the different forest patches then it is important to recognize it; if members of a group are spending less time foraging and more time being vigilant (Johns, 1986), in an area that is less productive, could lead to a decline in population numbers, unless the groups can evolve effective coping strategies (Donati *et al.*, 2011).

Project Aims:

- To explore to what extent Geoffroy's woolly monkeys use areas of secondary forest, compared to primary forest by recording their densities in each forest type.
- To note any fruiting trees in the vicinity in order to investigate the relationship between the availability of fruit and habitat choice.
- To follow woolly monkey groups and record their behaviour in different forest types, investigating any changes in behaviour patterns and duration, such as vigilance or foraging bouts, this serving as a preliminary data set for future behavioural studies

METHODS

STUDY SITE

Manú National Park

Manú National Park is situated in Southeastern Peru. It is 1.5 million ha, and is the largest protected rainforest park in the world (MacFarland Symington, 1988; UNESCO, 2009; Terborgh, 1993). Due to its large size, it incorporates many different ecosystems, including lowland tropical rainforest, montane forest, riparian habitat and puna grasslands (UNESCO, 2009). It is situated in the Amazon basin, as well as comprising Andean slopes, resulting in the highest level of biodiversity of any area on Earth (UNESCO, 2009). It is an important refuge for many species, as it is for the most part pristine forest, due to its geographic isolation, reducing the human influence, although some areas are inhabited by indigenous groups (MacFarland Symington, 1988).

Manú Learning Centre Reserve (MLC)

This site has been subjected to varying degrees of disturbance over the last century, with areas of selectively logged forest, hereafter referred to as primary forest. This area is characterized by large, slow-growing species, and in the MLC reserve the canopy is more open than in other areas, as the larger, upper canopy trees were removed during selective logging in the 1950's. The steeper regions of the reserve are pristine forest, owing to being difficult to reach. There is a patch of secondary forest which is in the later stages of regeneration; this area is characterized by new growth of fast growing successional light-requiring plants, as well as thin young saplings and trees. The other forest type found is disturbed forest, in the earlier stages of regeneration, and is much like secondary forest, but with fewer trees and more ground vegetation. Both of these areas were once clear felled for agriculture and cattle ranching. Behind the reserve the land is pristine rainforest, and on the other side is a heavily degraded area, used by people. It has been a protected reserve since 2002 and is managed by an NGO called CREES (Conservation, Research & Education towards Environmental Sustainability).

Woolly monkey density estimates:

Ten trails were already in place at the study site (Figure 1), and covered the different forest types: primary, secondary and disturbed (Figure 2), at varying altitudes. These were walked to estimate primate distribution in each area. The ten existing trails have been condensed to form 6 transects that were walked during this study (total distance walked 118.08 km). The transects were walked at specific times; morning transects were started at approximately 8.00, and we aimed to end them by 11.00, as primates are less active outside of this period (Peres, 1999). The afternoon transects were started at approximately 14.30 and ended before dark, at approximately 17.30. This is in accordance with the literature (Peres, 1999). However according to the incidental data collected

before my arrival, primates are frequently observed being active during these times. Both of these time periods allow time for observations of primates when they are found, whereas outside of these hours, primates are often resting, making them difficult to spot on transects. Each transect was surveyed three times during the morning period and three times in the afternoon period. In order to standardise the data collection, the transects were paired to avoid surveying adjacent areas twice in one day, thus preserving the independence of the samples. Over seven working days all transects were walked. The times taken for each transect were recorded in order to attempt to maintain a similar speed for each one, we maintained a speed of approximately 2km/hour, in accordance with Peres (1999). Whilst walking the transects, my assistant walked approximately 5m behind me at all times to ensure that we were simultaneously surveying the largest area possible. To detect the primates, as we were walking the transects we looked up into the canopy for movement and listened for audio cues such as tree rustling, branches crashing and vocalisations.

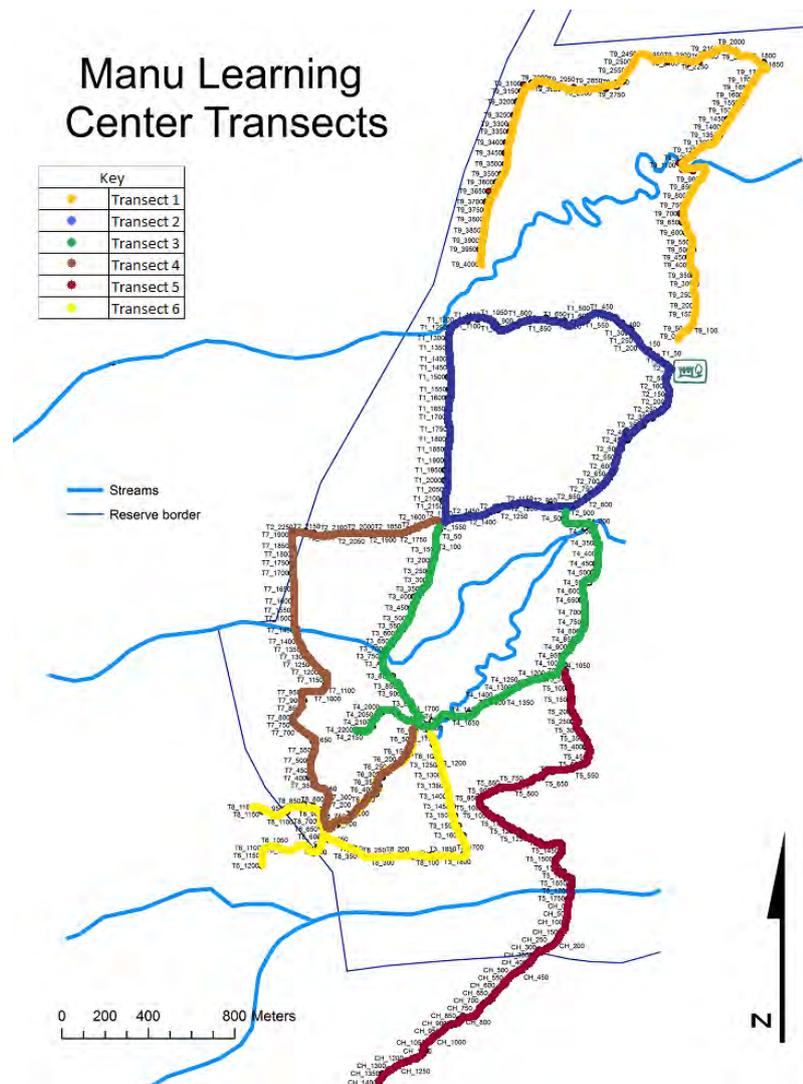


Figure 1. Transects in place at the MLC reserve.

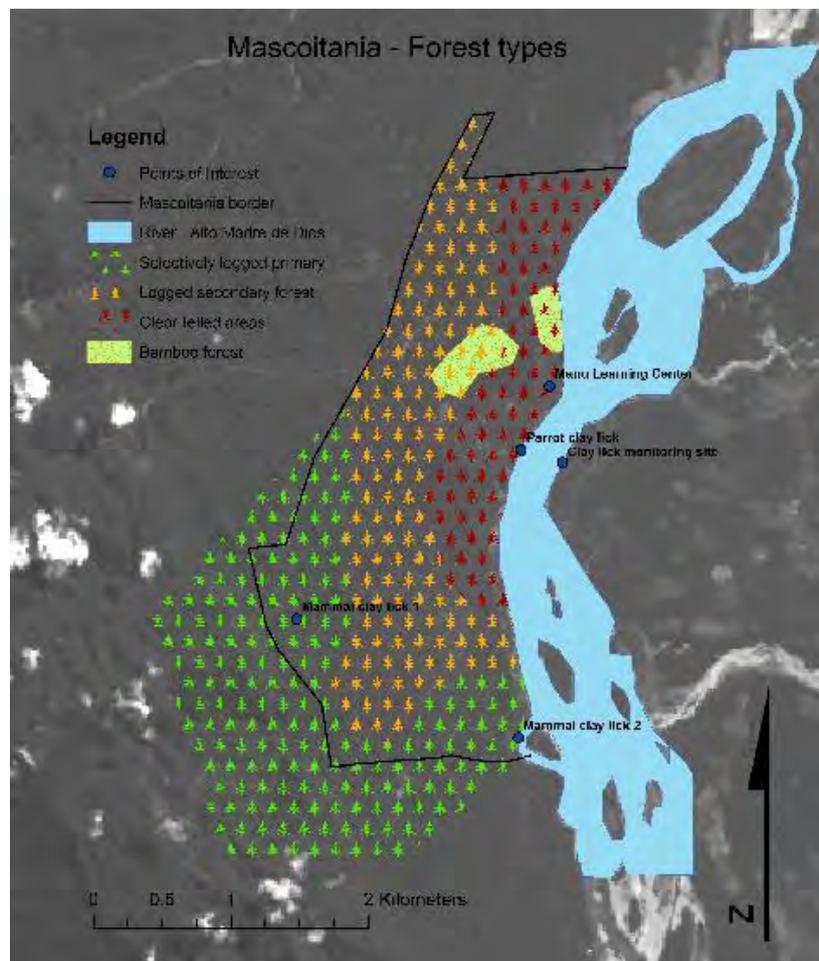


Figure 2. The forest bands represented within the MLC reserve

On discovering a primate group, the GPS point was recorded, as well as the distance from the transect using a rangefinder and the bearing from the line using a compass. The number of individuals was recorded; this was achieved by going off trail in order to be able to estimate the number individuals that were not observable from the transect. When possible the group composition was recorded, such as the size of individuals and if possible the sex. When foraging, the food item and tree was identified where possible. The canopy height was also recorded, using a rangefinder. The behaviours displayed by the group were recorded, and when they were moving away the direction was also recorded. All of this information was recorded during the fifteen minutes following contact with a group. No more than fifteen minutes was allocated for collecting this data as it compromises the transect. However, upon contacting a woolly monkey group, 30 minutes was allowed for data collection as they are the focal species of this study and, as such, we endeavored to record the behaviour of each and every individual, rather than just a few individuals.

Habitat assessment

Data was collected on tree density using point-quarter sampling, by placing a cross upon the ground and recording the closest tree to the centre for each of the quarters (Ganzhorn *et al.*,

2011). This was repeated every 100m along the transects, to ensure that all points were independent samples, totalling 50 points per forest type (primary, secondary and disturbed). DBH (diameter at breast height) was calculated by recording the circumference at breast height of a tree and entering that into an equation ($D=C/\pi$). Only trees over the 10cm dbh were recorded and used to calculate tree density. The tree density was then calculated using the equation: $1/(D)_2$ (where D is mean distance for all points). Upon encountering fruit on the transect that was suspected to have been eaten by monkeys (obvious teeth marks), or a fruit that was known to be eaten by monkeys its location was recorded using the GPS and the fruit was brought back to the camp to be identified.

FINAL REPORT

Changes to initial proposal

The dataset was not large enough to be able to use DISTANCE software to obtain density estimates instead linear encounter rates were calculated. Continuous behavioural observations of woolly monkeys were also not feasible due to the terrain, as well as time constraints. Distribution data was collected for five species of primate that are found within the reserve (*Ateles paniscus*, *Callicebus brunneus*, *Cebus apella*, *Lagothrix cana*, *Saimiri boliviensis*).

RESULTS

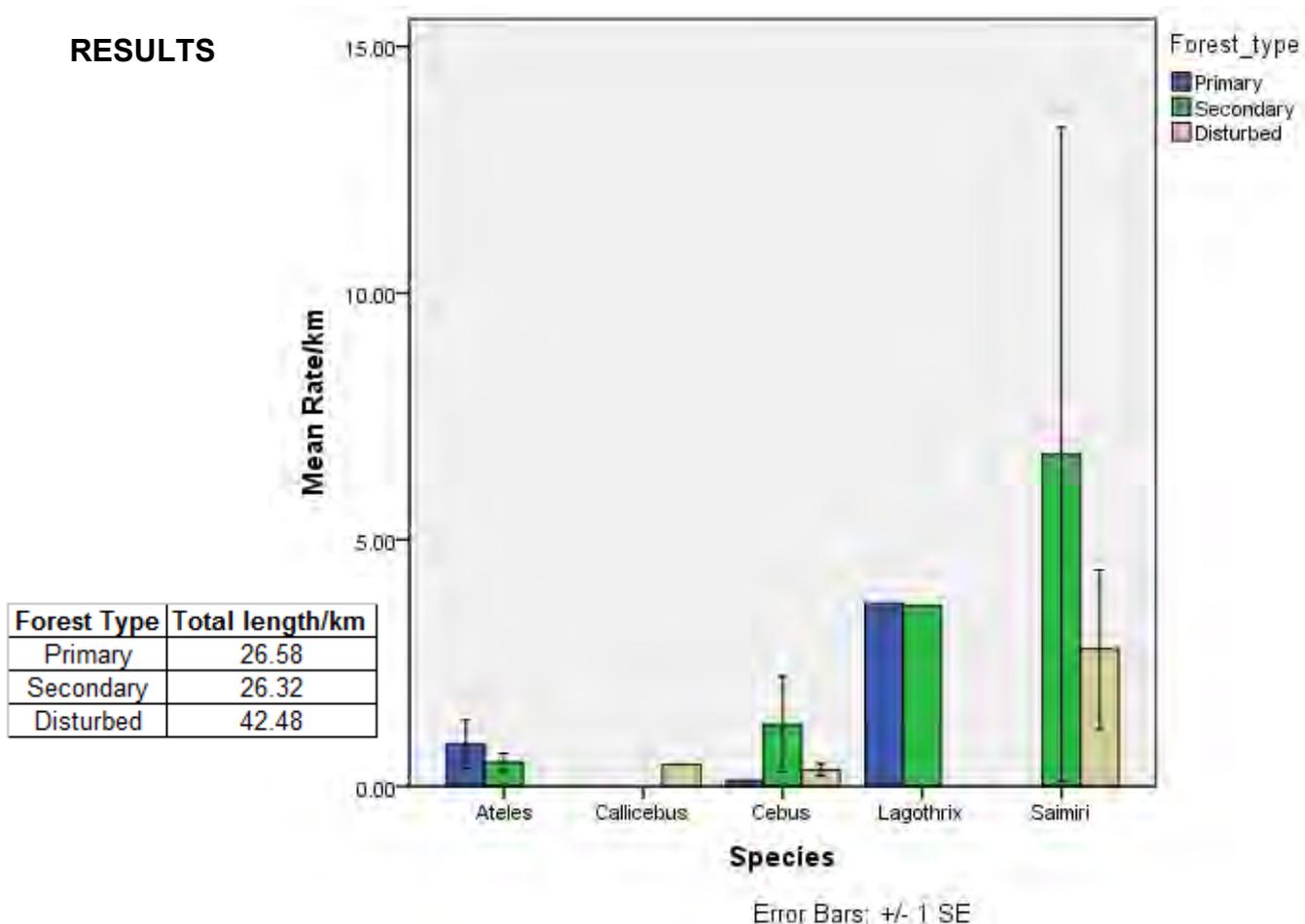


Figure 3. Mean linear encounter rates for each species found in the three forest types during transects

Ateles had a higher linear encounter rate in primary forest (0.85/km) than in secondary (0.49/km). *Callicebus* was only encountered in disturbed forest (0.39/km). *Cebus* had the highest linear encounter rate in secondary forest (1.26/km), the next highest rate in disturbed forest (0.26/km) and the smallest linear encounter rate in primary forest (0.12/km). *Lagothrix* had very similar linear encounter rates in both primary (3.71/km) and secondary forest (3.67/km). *Saimiri* had the highest linear encounter rate in secondary forest (6.73/km) and a lower rate in disturbed forest (1.56/km).

Despite the small sample size, and the fact that statistical analyses could not be run on woolly monkey distribution to detect significant differences between the forest types used, it has been confirmed that this species can use regenerating forest. In the case of these woolly monkeys they were using the area for feeding, where a large quantity of fruits had recently become available. It appears that the presence of fruiting trees is one of the important factors determining whether monkeys will use an area. There are, however, many other factors that influence this, and as such it is highly site specific, so caution must be used when making comparisons across sites and species.

By using incidental data in addition to transect data, when the data collected by transect is of a small size, the incidental data can help to provide an indication of the distribution of each species. During transects woolly monkeys were observed as many times in regenerating forest as in primary forest. Spider monkeys on the other hand were observed more in primary forest than in regenerating forest. These species were not observed enough times to perform parametric statistical tests. Both spider monkeys and woolly monkeys were observed on a regular basis within the reserve, which is promising, as they are both classed as Endangered (IUCN, 2013).

Results outside of line transect

During incidental data collection woolly monkeys were observed more often in regenerating forest than in primary forest. They used this area for a week before moving on to another area, outside of the reserve. Thus, although they were observed in regenerating first more than a dozen times, this was not during transect walks, and so could not be statistically analysed with the other data. This demonstrates that although they were not observed many times during transects, it certainly does not mean that they do not use this type of forest. This project would need to be extended in order to say conclusively to what extent woolly monkeys can use degraded forest. It would also be productive to follow a group and record their home ranges as well as conduct a comprehensive study of their diet, as this will demonstrate which environmental factors affect their use of regenerating forest. This project can serve as a preliminary study that shows that woolly monkeys as well as spider monkeys can use regenerating forests within this area of Peru.

Bibliography

- Boubli, J.-P., Di Fiore, A., Rylands, A.B. & Wallace, R.B. 2008. *Lagothrix cana*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 02 February 2013.
- Buckland, S., Anderson, D., Burnham, K., Leake, J., Borchers, D. and Thomas, L., 2001. *Introduction to Distance Sampling: Estimating Abundance of Biological Populations*. Oxford University Press: Oxford.
- Chapman, C. A., Peres, C. A. 2001. Primate Conservation in the New Millennium: The Role of Scientists. *Evolutionary Anthropology*. Vol 10. Pp 16-33
- Donati, G., Kesch, K., Ndremifidy, K., Schmidt, S. L., Ramanamanjato, J-B., Borgognini-Tarli, S. M., Ganzhorn, J. U. 2011. Better Few than Hungry: Flexible Feeding Ecology of Collared Lemurs *Eulemur collaris* in Littoral Forest Fragments. *PloS one*. Vol 11. (6)
- Ganzhorn, J. U., Rakotondranary, S.J., Ratvonamana, Y. R. 2011. Habitat description and phenology. In: J. M. Setchell and D. J. Curtis, ed. 2011. *Field and Laboratory Methods in Primatology: A Practical Guide*. Cambridge University Press: UK.
- Heiduck, S. 2002. The Use of Disturbed and Undisturbed Forest by Masked Titi Monkeys (*Callicebus personatus melanochir*) is Proportional to Food Availability. *Oryx*. Vol 36. (2). Pp 133-139
- IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. <www.iucnredlist.org>. Downloaded on 18 August 2013.
- Johns, D. 1986. Effects of Selective Logging on the Behavioural Ecology of West Malaysian Primates. *Ecology*. Vol 67. (3). Pp 684-694
- McFarland Symington, M. 1988. Demography, Ranging Patterns, and Activity Budgets of Black Spider Monkeys (*Ateles paniscus chamek*) in the Manu National Park, Peru. *American Journal of Primatology*. Vol 15. Pp 45-67
- Peres, C. A. 1999. General Guidelines for Standardizing Line Transect Surveys of Tropical Forest Primates. *Neotropical Primates*. Vol 7. (1). Pp 11-16
- Plumptre, A. J. 2000. Monitoring Mammal Populations with Line Transect Techniques in African Forests. *The Journal of Applied Ecology*. Vol 37. Pp 356-368
- Terborgh, J. 1993. An Overview of Research at Cocha Cashu Biological Station. In: Gentry, A. H. ed. *Four Neotropical Rainforests*. Pp 48-74
- Thomas, S. C. 1991. Population Densities and Patterns of Habitat Use Among Anthropoid Primates of the Ituri Forest, Zaire. *Biotropica*. Vol 23. (1). Pp 68-93
- UNESCO, 2009. 2009. *Manú National Park*. [online] Available at: <<http://whc.unesco.org/en/list/402/>> [Accessed 16 August 2013].

Financial report- funded by PSGB and Wild Futures

Service	Details	Cost	Total cost	Provided by PSGB
Accommodation	10 weeks at MLC research centre (run by the NGO CREES)	£10/day	£739	£700

Funding was also obtained from Mohammed Bin Zayed for travel in situ and wages for my field assistant.