

Characterization of Neotropical Primate Communities at Finca Las Piedras

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Abstract

The Madre de Dios region of Peru is incredibly biodiverse, and inhabits many animal species, including a number of New World, Neotropical primate species. New World primates are arboreal, forest animals who populate several ecological roles in Neotropical forests. Primates in these forests are endangered by anthropogenic activities, such as deforestation and hunting. For this reason, it is of primary importance to study the presence and composition of primate communities in habitats that are being degraded or are in proximity of degraded areas. Here, I report on the results of a study on the description of Neotropical primate communities present at Finca Las Piedras Biological Station in the Madre de Dios region of Peru. Finca Las Piedras is an area consisting of half forest habitat and the other half was reduced to ash. Four distinct Neotropical primate species were identified, including Titi monkeys (*Callicebus brunneus*), Squirrel monkeys (*Saimiri sciureus*), Capuchins (*Cebus albifrons*, *Cebus apella*), and Tamarins (*Saguinus fuscicollis*) and data was collected over a 7-day period. The data provide information on these species' activity patterns, behaviors, and interspecific social interactions. The data suggest that these species also occupy forest edge habitats and that their activity patterns and behaviors are directly affected by temperature fluctuations. Future studies should focus on the presence and abundance of these and other Neotropical primate species at Finca Las Piedras and include more detailed information on their specific behaviors and time budgets here and at other sites affected by deforestation and habitat fragmentation.

Introduction

The Madre de Dios region of Peru is an incredibly diverse area, and home to a plethora of animal species, including numerous New World, Neotropical primate species. New World primates, from the group Platyrrhines, are arboreal, forest animals who inhabit many ecological niches in a diverse array of Neotropical forests (Kricher 1997). According to Peres (1999), Neotropical forests can contain up to fourteen sympatric species of primates at a given time. While Central and South America are home to more primate species than any other region, primates in these areas face a high risk of extinction due to human activities, such as deforestation and hunting (Shanee and Shanee

2009). In more recent years, the Madre de Dios region has been subjected to extensive natural resource extraction and the growth of significant infrastructure projects, including the development of roads such as the Interoceanic Highway (Hendus 2018). Finca Las Piedras, a biological station within the Madre de Dios region, contains some of these affected primate species, and is only approximately 2km from this major highway. This study, therefore, provides an opportunity to begin to understand the impacts of deforestation and habitat degradation on Neotropical primate behavior, as a result of infrastructure development and resource extraction.

Some of the affected primate species found at Finca Las Piedras include the Brown Titi monkey (*Callicebus brunneus*.), Common Squirrel

monkey (*Saimiri sciureus*), Capuchin (*Cebus albifrons*, *Cebus apella*), and Tamarin (*Saguinus fuscicollis*).

The Titi monkey (*Callicebus brunneus*) is an elusive primate who lives exclusively in groups consisting of two bonded heterosexual adults and their offspring (Spence-Aizenberg et al. 2015; Ragen et al. 2012). *Callicebus* are extremely territorial, often producing loud morning vocalizations at the boundaries of their habitats (Vermeer and Tello-Alvarado 2015). They are discreet animals, making them difficult to study (Vermeer and Tello-Alvarado 2015). As a result, not much is known about this species and there is an overarching lack of studies on them. Thus, it is of high importance to study the behavior and social dynamics of Brown Titi monkeys (*Callicebus brunneus*) at Finca Las Piedras.

Squirrel monkeys (*Saimiri sciureus*) reside in a wide variety of habitats, including gallery forests, lowland rainforest, and successional areas (Kricher 1997). Their groups are quite large, consisting of approximately 20-100 individuals, making them much more conspicuous. Additionally, they tend to be active on outer branches and are quite abundant in comparison to other neotropical primate species (Kricher 1997).

Capuchins (*Cebus albifrons*, *Cebus apella*) are also found in a wide range of forest habitats and travel in groups of 5-30 individuals, moving very quickly through the forest (Kricher 2017). Capuchins are significant seed dispersers of a high number of tree species and according to Valenta and Fedigan (2008), 74% of seed-containing fruits consumed by Capuchins pass through their digestive systems fully intact.

Tamarins (*Saguinus fuscicollis*) live in groups of 4-6 adults and are found in inner forest areas as well as gaps and disturbed areas (Kricher 2017). They often feed in the lower story of the forest and along the forest edge (Kricher 2017). According to Kricher (2017), they resemble hyperactive squirrels, scurrying and scattering through branches, and jumping from one branch to another.

Two other Neotropical primate species include Spider monkeys (*Ateles spp.*) and Howler monkeys (*Alouatta spp.*). However, Spider monkeys are locally extinct and Howler monkeys are low in density and are rarely seen.

Previous studies have shown that some species of primates, including *Callicebus*, *Saimiri*, and *Saguinus*, may prefer forest edges, which are typically avoided by most animals (Van Kuijk 2013). Similar studies have shown that primates are capable of successfully adapting to deforestation and fragmentation, and their activity budgets are not significantly affected by living along forest edges (Kulp and Heymann 2015). This study may provide additional information on the activity patterns of monkeys affected by deforestation and those residing in forest edge habitats. This information can then be compared to other locations, including those with enhanced habitat quality, which could be used to improve conservation strategies for the species. It can also be used to compare the presence, abundance, and behavior of primate species at Finca Las Piedras over time, possibly measuring the effects of reforestation efforts on monkeys at this site.

Given the limited data on Neotropical primates at Finca Las Piedras and the unique characteristics of this research site, this study will provide more information on relatively unresearched primate species in a relatively unresearched location. This study aims to describe, and ultimately, gain a better understanding of the biology of Neotropical primate species, including habitat requirements, daily routines, and time budgets at Finca Las Piedras, thus increasing the limited knowledge we have on them and using that information to mitigate the impacts of deforestation and improve future conservation efforts in this region.

Methods

This study was carried out on the property of Finca Las Piedras in the Madre de Dios region of Peru. Groups of primate species were

monitored and surveyed throughout the course of the study. Data collection occurred over seven days. During each day of data collection, observations were made two or three times per day, at approximately 6-7am, 8am-12pm, and 4-6pm. The duration of each observation time was typically at least 2 hours, except for the 6-7am timeslot, which was only an hour. Observations mainly took place on the trails, but when necessary, going off-trail did occur.

Titi monkeys typically produce early morning vocalizations, so this was common approach to attempt to spot them. If none were heard, I still went into the forest to look for them. After a group was heard, I tried to walk toward the noise to increase my chances of spotting them. The strategy for finding other primate species was to walk very slowly and quietly through the forest and listen for sounds and look for movements in the trees. Binoculars were also used to view areas in the distance. If a group could be seen or heard in the distance, I tried to get as close as I could to them, sometimes going off-trail for five to ten meters.

Once a group or individual was found, distinguishing features of the group or individual, as well as the number of individuals in the group were recorded. Additionally, their GPS location

and the time they were encountered were recorded. While observing the group, details of their behavior and social dynamics, specifically including how they spend their time, were recorded. Their time budgets were documented, and data included the activities each monkey performs, such as mating, grooming, playing, and sleeping, and the amount of time they performed each activity.

There were some cases in which no monkeys were heard or found. It was necessary to go out into the field consistently and frequently to maximize encounters and offset these scenarios. Another issue that occurred is that monkeys were found but were then quickly scared off and disappeared. To limit this from occurring, it was critical to travel alone or with only one other person. All movements needed to be as slow and quiet as possible, to decrease the chances of being seen or heard by the monkeys. Furthermore, wearing bright colors was avoided to camouflage as best as possible.

Daily temperatures were taken every morning at 8am in the forest and the maximum, minimum, and actual temperatures were recorded.



Figure 1. Map of Finca Las Piedras with locations of monkey observations and calls. Purple boundary designates property boundary. White boundaries signify Castana, Lindero, and Tapir trails. Circles indicate the position of an observation of a monkey group, while diamonds indicate the position from where a call was heard. Specifically, green (SM) signifies Squirrel monkeys, yellow (BT) signifies Tamarins, orange (C) signifies Capuchins, and blue signifies Titi monkeys.

Results

Over the course of data collection, four species of primates were observed and/or heard at Finca Las Piedras. Squirrel monkeys were seen on five occasions, Tamarins were seen on two occasions, Capuchins were seen on one occasion, and Titi monkeys were heard on five occasions (see **Figure 1**). The majority of observations occurred on June 19 and 20 (see **Table 1**). The lowest temperature occurred on Tuesday, June 14 and was 11 degrees Celsius. The temperature increased as the week went on and the highest recorded temperature occurred on Sunday, June 19, at 26.5 degrees Celsius (see **Figure 2**).

Titi Monkeys (Callicebus brunneus)

Titi monkeys were never seen; however, their calls were heard on five separate occasions during four of the seven days of data collection. They were first heard on June 14 at 6:25am. They were again heard on the same morning at 6:52am from the beginning of Lindero trail. At 6:55am the calls began to slow down and cease. On June 17 at 11:57am, Titi calls were heard from the main camp and lasted one minute. Three minutes later, at 12:00pm, calls were again heard from the same location and lasted five minutes. On June 20 at 5:58am, Titi calls were heard near the beginning of Castana trail and lasted two minutes. At 6:56am, Titi calls were heard near the beginning of Lindero trail and lasted four minutes. Later on

Species	Time	14-Jun	15-Jun	16-Jun	17-Jun	19-Jun	20-Jun	21-Jun
Squirrel Monkey	6-7am			X			X	
	8am-12pm		X				X	
	4-6pm					X		
Black Tamarin	6-7am						X	
	8am-12pm					X		
	4-6pm							
Capuchin	6-7am							
	8am-12pm						X	
	4-6pm							
Titi Monkey	6-7am	+		+	+		+	
	8am-12pm						+	
	4-6pm							

Table 1. Survey Results

Observations of four primate species at Finca Las Piedras over a seven-day period. X indicates a monkey sighting and + indicates a monkey call.

June 20, at 12:55pm, Titi calls were heard in the distance from the Comedor and lasted two minutes.

Squirrel Monkeys (Saimiri sciureus)

Squirrel monkeys were seen on four of the seven days, during five separate observation times. They were first observed on June 15 at 8:20am on Lindero trail. There was a large group of them. Eleven individuals were counted, but there were likely more present. They jumped around from tree to tree in the same area for approximately thirty minutes. One individual was observed urinating from a tall branch. One was observed laying on a branch and sleeping for four minutes. It then woke up and started jumping from tree to tree. On June 16 at 6:03am, a large group of Squirrel monkeys was observed beginning in the Native Food Forest and traveling northwest. They were jumping from tree to tree and moving quite fast, so were only observed for three minutes. On June 19 at 4:25pm, a large group of squirrel monkeys were again observed on the trail leading from camp to Lindero. Eight individuals were counted, but there were likely more. The group was seen jumping around from tree to tree. Many

individuals appeared to be babies, as they were much smaller than other individuals. This group was moving quite fast and traveled southeast along the southern forest edge. The next observation of squirrel monkeys occurred on June 20 at 6:05am near the entrance of Castana trail. A large group was seen traveling northwest from the southern forest edge. Four individuals were counted; however, more were heard moving through the trees. Later, on June 20, at 10:05am, a group of squirrel monkeys was observed and followed for 59 minutes. They were climbing trees and jumping from tree to tree. They moved west along Lindero at a fairly slow pace. Many individuals were observed scratching themselves. They were quite vocal and made many squeaking and squealing noises, especially when jumping to a new tree. There appeared to be many babies in the group. Around 10:37am, as the group moved toward the west/southwest, the group seemed to disperse and less individuals were observed. They began to spend more time in each tree before jumping to a new one. They also spent more time in higher parts of the trees than before. A small baby was observed wrapping its entire body around a small tree trunk and staying there for 30

seconds before jumping to a nearby branch. At 10:48am, the group began to slowly travel back toward the southeast along the southern forest edge. They were observed jumping around and slowly climbing trees until 11:04am, at which time they had moved further southeast and could no longer be seen.

Tamarins (Saguinus fuscicollis)

Tamarins were seen on two of the seven days, during two separate observation times. They were first observed on June 19 at 9:27am on Lindero trail. Two individuals were observed, and more individuals were heard traveling through the trees. One of the individuals stretched and scratched its armpit, then laid down on a branch to rest. The other individual approached and laid on top of the other. It appeared as though it was either trying to play or mate. The Tamarin laying on the branch ran away soon after it was touched. Both

individuals then jumped around and climbed trees. They were observed doing this for 10 minutes before disappearing into the forest. The second observation of Tamarins occurred on June 20 at 6:26am on Lindero trail. One individual was seen and at least one other was heard. They moved quickly toward the northwest.

Capuchins (Cebus albifrons, Cebus apella)

Capuchins were seen on one of the seven days, during one observation time. They were seen on June 20 at 10:23am on Lindero trail. They were seen at the same time and in the same area as a large group of squirrel monkeys and were moving in the same direction (west along Lindero). Two adults and one baby were seen. They were much more skittish and moved faster than the squirrel monkeys. They quickly retreated after seeing me and were only observed for three minutes.

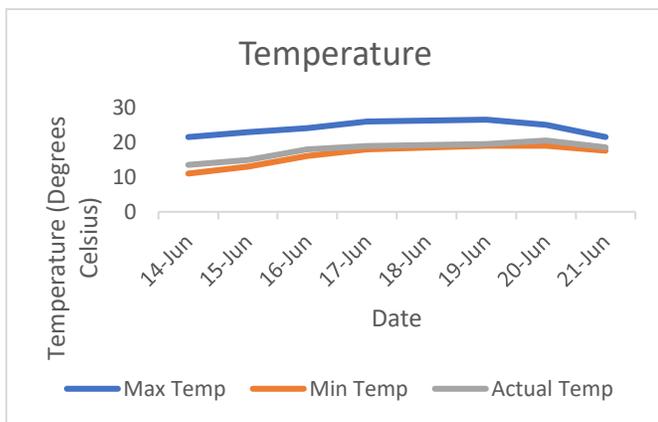


Figure 2. Daily maximum, minimum, and actual temperature at Finca Las Piedras over an eight-day period.

Discussion

The data of this study provides a description of four different primate species present at Finca Las Piedras, including information on these primate communities, where they spend their time throughout the day,

and their specific traveling patterns. More information on the behaviors and interactions between species were also collected.

The results offer further information on the behaviors of these species of monkeys and suggests that the biology and behavior of each species is similar to those in other areas. Titi monkeys are described as an elusive species, so the fact that they were not seen at all during the study is congruent with their normal behavioral patterns. Squirrel monkeys were seen more than any other species, and in larger numbers. This suggests that there may be a higher abundance of this species at Finca Las Piedras. Additionally, they were often spotted on the forest edge and among the outer branches of trees, which is a common behavior of the species. Tamarins were only seen on two separate occasions, and when they were observed, they moved and disappeared quickly, which is consistent with their rapid and hyperactive nature. In comparison with Squirrel monkeys, Tamarins were observed further away

from the forest edge, indicating they prefer a more intact habitat.

The results of this study also offer information on the social dynamics of Capuchins and Squirrel Monkeys. There is evidence that these species travel and associate with each other (Levi et al. 2013). The reason for their interspecific associations is not fully understood, however, their relationship may result in foraging benefits and decreased predation (Leonardi et al. 2009). While Capuchins were only observed once during the entire study, they were observed traveling among a large group of Squirrel monkeys. Thus, this information is congruent with previous studies and adds additional evidence for this specific association.

Significant temperature fluctuations occurred during the data collection due to Frijoles. This may have played a role in the amount of primate observations. It might be why no Titi monkeys were seen at all. Previous studies have shown that Neotropical primates modify their behaviors to adapt to differences in temperatures (De la Fuente et al. 2014). Furthermore, during colder periods, primates spend less time traveling, more time resting, and sleep in denser and more confined areas (De la Fuente et al. 2014). The results of this study are consistent with this evidence. There was a direct relationship between temperature and monkey sightings. On June 14, 17, and 21, no monkeys were seen. Each of these days had lower temperatures compared to the other four days. June 19 and 20 had the highest temperatures during the seven days of data collection and similarly, had the most monkey observations.

This study additionally offers data on the location and direction primate groups travel at Finca Las Piedras. Squirrel monkeys were seen multiple times around 6am near the Native Food Forest and the start of Castana trail. Each time they were seen near this location in the early morning, they were also moving in the same direction. In the evening, they were seen on the opposite side of the property and moving in the

opposite direction, back toward where they were seen in the morning. This data suggests that this group of squirrel monkeys may travel to the same locations at similar times each day. Furthermore, most monkey observations took place on or near Lindero trail. Lindero is along the forest edge and indicates that these species may prefer forest edge habitats, which is consistent with the findings of previous studies.

It's important to note that some species occurred in degraded, or close to degraded habitat areas, while others were found further from these areas, or not at all. Squirrel monkeys and Capuchins were found near degraded areas, suggesting they are not as affected by anthropogenic impacts. Spider monkeys were not found at all because they are locally extinct due to hunting. Howler monkeys were not observed either and have suffered greatly from hunting, resulting in adaptations to no longer produce vocalizations. This suggests that Spider monkeys and Howler monkeys have been more significantly impacted by human activities.

There may have additionally been some potential sources of bias in this study. A key source of bias is the very specific location. Finca Las Piedras is a relatively small property. Monkeys living near the edge may exhibit different behaviors than those in denser, more remote areas. Due to these distinct characteristics of the study site, the data collected in this study may not be applicable to all areas in which these primate species inhabit. Another source of bias may be the amount of people in and around Finca Las Piedras. There are several people who live and work at the site, including on the trails within the rainforest and around the edges of the forest. This might affect the behaviors and social dynamics of the monkeys and may not be representative of the species as a whole.

Due to the limited duration of this study, the results are not conclusive, however they offer important information that can be used in future studies. Given the limited data available on Neotropical primates at Finca Las Piedras,

this study offers more information on the biology, behaviors, and social interactions of Neotropical primate species inhabiting a forest edge habitat affected by deforestation and habitat degradation. The results of this study provide a basis for future comparisons at this site and others, which can be used to improve conservation strategies and measure the effects of reforestation efforts on primate species in this region. Future studies should focus on the presence and abundance of these, and other Neotropical primate species at Finca Las Piedras and include more detailed information on their specific behaviors and social dynamics.

References

De la Fuente, M. F., Souto, A., Sampaio, M. B., and Schiel, N. (2014). Behavioral adjustments by a small neotropical primate (*Callithrix jacchus*) in a semiarid Caatinga environment. *TheScientificWorldJournal*, 326524.

Kricher, J. C. (1997). A neotropical companion. *Princeton University Press*, Princeton, New Jersey.

Kricher, J. C. (2017). The new neotropical companion. *Princeton University Press*, Princeton, New Jersey.

Leonardi, R., Buchanan-Smith, H., Dufour, V., Macdonald, C., and Whiten, A. (2009). Living together: behavior and welfare in single and mixed species groups of Capuchin (*Cebus apella*) and Squirrel Monkeys (*Saimiri sciureus*). *American journal of primatology*, 72: 33-47.

Levi, T., Silviu, K. M., Oliveira, L. F. B., Cummings, A. R., and Fragoso, J. M. V. (2013). Competition and facilitation in the Capuchin-Squirrel monkey relationship. *Biotropica*, 45(5): 636-643.

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Peres, Carlos. (1999). General Guidelines for standardizing line-transect surveys of tropical forest primates. *Neotrop Primates*. 7

Ragen, B. J., Mendoza, S. P., Mason, W. A., & Bales, K. L. (2012). Differences in Titi Monkey (*Callicebus cupreus*) social bonds affect arousal, affiliation, and response to reward. *American Journal of Primatology*, 74(8), 758-769.

Shanee, S. and Shanee, N. (2009). A new conservation NGO, neotropical primate conservation: *Project experiences in Peru*. 4: 329-332.

Spence-Aizenberg, A., Di Fiore, A., & Fernandez-Duque, E. (2015). Social monogamy, male-female relationships, and biparental care in Wild Titi Monkeys (*Callicebus discolor*). *Primates*, 57(1), 103-112.

Valenta, K., Fedigan, L. M. How much is a lot? Seed dispersal by white-faced capuchins and implications for disperser-based studies of seed dispersal systems. *Primates*. 2008. 49(3): 169-75.

Vermeer, J., & Tello-Alvarado, J. C. (2015). The distribution and taxonomy of Titi Monkeys (*Callicebus*) in central and southern Peru, with

the description of a new species. *Primate Conservation*, 29(1), 9-29.