

## Progress Report

### **Conflict mitigation of primates damaging tree plantations: the case of black capuchin monkeys, *Sapajus nigritus*, in the Atlantic Forest of Argentina (ID 31343-1)**

Valentín Zárate

Ph. D. Student, Instituto de Biología Subtropical (IBS)

CONICET – UnaM

Our project aims to understand the ecological causes of bark stripping behavior of primates living in tree plantation landscapes. In addition, we will try to test a technique that mitigates the conflict between the timber companies and primates. For this, we are studying the case of black capuchin monkeys (*Sapajus nigritus*) that bark strip pine trees (*Pinus taeda*) in northeastern Argentina. From February 2021 we began to study the spatial and trophic ecology of six groups of capuchins. We began to study the use of space and the movements of these groups by capturing individuals and fitting GPS-VHF collars on them. At the moment we have captured 10 capuchins, all captures were successful and we did not detect any risk or irregularity during the procedure. The anesthesia was deep and the recovery of the individuals was fast (mean time elapsed between capture and final release of the cappuccino was 1 h 34 min; range= 1 h 15 min – 2 h 17 min).

We use kernel density estimation method to estimate the size of the home ranges (areas that concentrate 95% of the localities) and core areas (50% of the localities, which represent the area that concentrates the greatest activity of the group). Core areas usually contain key resources for the group (food, trees to rest on, etc.) and often defend aggressively when approached by neighboring groups. At the moment, the estimated mean size for home ranges is  $431.92 \pm 82.36$  ha (range = 332.6 – 539.86 ha). This estimate is 2.68 times higher than that made for black capuchins living in the nearby Iguazú National Park (Di Bitetti 2001, <https://doi.org/10.1017/S0952836901000048>). Approximately 36% of the home range areas correspond to portions of native forest and 64% to plantations. The mean size of the core areas of the capuchin groups is  $24.70 \pm 5.24$  ha (range = 17.47–31.37 ha), 94.9% of which overlap with native forest areas. Although these results are preliminary, they suggest that capuchins living in plantations rely heavily on the small remnants of forest in these landscapes. I will present these results at the XXXIII Argentine Meeting of Mammology in November of this year.

Also, we are studying the intensity of capuchins bark stripping of pine trees. On a monthly basis we are monitoring 2000 pine trees of 20 different stands located in the home range of four capuchin groups. At the moment we detected an increase in bark stripping intensity at the end of winter and beginning of spring (July – September). Also, we are monitoring the seasonal variation on the thickness of phloem and the force needed to strip bark of 70 pine trees. Preliminary results indicate that phloem is thicker on the ends of winter and beginning of spring, also its bark is easier to remove (less force is needed to remove larger portions of bark). This pattern partially agrees with our hypothesis (Di Bitetti 2019, <https://doi.org/10.1016/j.foreco.2019.117482>), which states that pine phloem increase its relative profitability during the spring.

To evaluate the nutrient contribution of different foods, we have been collecting native fruits consumed by capuchins (we already have samples of 32 species of native fruits) and monthly we collect samples of pine phloem (at the moment we have samples of nine months in a row). Nutritional analyzes will be done in collaboration with the Institute of Food Science and Technology (ICTA) once we finish all food collections.

To estimate the availability of native food within the home range of capuchin groups, we are studying the phenology of 410 native trees and lianas of 56 species. For this, we record the phenophases of each individual twice a month (so far, we have carried out 27 surveys). Similar to the pattern detected in the nearby Iguazú National Park, fruiting has a peak during spring (September, October and November) and a second and lower peak during autumn (April and May). However, many species have ripe fruit throughout the year, such as *Cecropia pachystachya*. This information will be combined with that obtained from the forest structure study (to estimate a bimonthly index of food availability within the area of the capuchin groups), which we plan to start once we have a more detailed estimate of the distribution areas of all the groups (in November of this year).

Finally, in August 2022 we started the diversionary feeding experiment, with which we expect to reduce bark stripping by capuchins, mitigate conflict with timber companies and thus protect capuchin populations. In the area of two groups with GPS tagged capuchins, we placed 5 groups (500m distance) of 3 feeding platforms each. These platforms are baited daily with bananas. Two other groups, also with GPS-tagged capuchins, act as “control” (without feeding platforms). This scheme will be maintained for 21 days in a row (until September 15). After this period, we will change the role of the groups (experimental will be control and vice versa), and we will maintain this new scheme for another 21 days. We expect the experimental groups to establish their daily route based on the location of the platforms and away from susceptible pine forests. This is verified by monitoring the intensity of debarking of the pine trees and recording the visits of capuchins to the platforms. In the 10 days that we have been carrying out the experiment, the experimental groups have visited all the platforms every day. However, the most important indicator of the success of the experiment will be the movement data of the capuchins, which will be obtained once we recover the GPS collars (the collars are of the Store on Board type).

The support of the Rufford foundation has been crucial to the development of this project, allowing us to buy GPS-VHF collars and related accessories (antenna, receiver, TDC-GPS Software and smart cables), cover travel costs, pay stipends for specialized field assistants for opening trails, buy supplies to preserve plant samples for later nutritional analyses, material for feeding platforms, and supplies for capuchin sedation during captures.



- Columba group (GPS locations)
- Segundo group
- Gualicho group
- Pandemia group
- Triángulo group
- Limón group
- Native forest
- Pine plantations



Locations of six groups of black capuchin monkeys (*Sapajus nigritus*) in northeastern Argentina (our study area). Only one group (Columba) presents GPS locations, the other five present data obtained by VHF signal, using a combination of two methods: triangulation and homing in. Locations were obtained over a 4-month period. The total period will last approximately 8 months.