

[Figure 1: Conservation Concession]



[Figure 2: *Ateles chamek*]

Module: Regional and Applied Nature Conservation
by Prof. Dr. Florian Jeltsch
Internship Resume (February-March 2020)

Kawsay Biological Station-Puerto Maldonado, Peru
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1 Introduction

[KAWSAY (Quechua) = life_living]

The present report introduces my internship at Kawsay Biological Station. I participated to the specific internship in the framework of the module, Regional and Applied Nature Conservation. The objective of the module is the work on the implementation of conservation measures and tools in tangible, regional projects as well as the assessment of the concepts and methods applied. My personal objective derives from the alertness about the current state of the rainforest and it sheltering a high number of biodiversity. More accurate the damage it is undergoing by the means of human activities. The policies in place to prevent, reverse and hinder the alteration and destruction of that biotope.

The Amazon rainforest is located in the river basin of the Amazon river, with a coverage of about 6.000.000 km². It is spreading between the Atlantic ocean until the Andes over the South American Continent¹. The area of interest comprises of eight countries: Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname and French Guiana, which insinuates some challenges in conservation efforts. Firstly rainforests stand under high pressure arising from the current state of rapidly changing climatic conditions. Flora and fauna are not able to adapt in the same paste to the new regimes or can not shift in their distribution to an alternative suitable area. The other driving factor is the anthropogenic activity, altering the ecosystem in numerous dimensions. Rainforests hold a high number of ecosystem services from all four categories. Water regulation, carbon sequestration, soil retention, to name just some of them. Retention of biodiversity is in major focus of interest for nature conservation. The project I participated to in Puerto Maldonado is aligned towards species conservation by the means of a reintroductionprogram. The focal species is *Ateles chamek*, the (Peruvian) black-faced spider monkey. The International Union for the Conservation of Nature (IUCN) ranked *A. chamek* as endangered by the Red List in the year 2008². A population decline by 50% over the time span of 45 years is considered to represent the current state. In the area of interest, the Amazon rainforest of Peru, Tambopata Region Madre De Dios, the species has been locally extinct until the reintroduction program started (2011). The pressing

1 www.britannica.com

2 www.iucnredlist.org

factors affecting their occurrence in the area are habitat degradation, fragmentation and destruction. Timber extraction, which affects mainly older, large trees, their main activity areas (chapter 1.1). Through deforestation for the expansion of residential areas, cattle farming, mining and logging the animals are displaced from their home range and disconnected from their food resources. Additionally hunting for alimentation (bushmeat) is a direct threat to the large-bodied and vocal *A. chamek*³. Moreover the hunters and wildlife traffickers get a hold of younger individuals and sell or keep them to be pets⁴.

1. 1 Reintroduction and special features of *Ateles chamek*

An ecological environmental equilibrium is the overreaching goal of conservation efforts and programs. The restoration of native species promotes the restoration of the entirety of ecosystems. To address extinction, reintroduction has been in place as a conservation tool. The aim of reintroductions is to “re-establish a viable population of the focal species within its indigenous range.”⁵ A population is viable if it is able to self-sustaining reproduction. In case the original habitat is the place of release, the cause of the primary extinction requires special attention.

A. chamek are particularly vulnerable to extinction compared to other Neotropical primates. Three life history traits, slow reproduction rates, small populations and a large home range are explicable. Females leave their natural group when they reach sexual maturity, age of 4-5 years. One single offspring is born after a 230 days long carriage period. Mating occurs with a time interval of 3-4 years. The diet consists predominantly of ripe and fleshy fruits. The feeding preferences makes *A. chamek* essential in seed dispersal⁶. Thus linking the species to maintenance and enabling the recovery of the formerly highly disturbed area. They are estimated to be a keystone species responsible for the dispersal of more than 120 plant species of the respective area⁷. As introduced above, older and more robust trees, especially tree canopies are the base of the activities of the *A. chamek*, thus being strong enough to hold their weight. There is sexual dimorphism in

3 Pro Wildlife & Care for the Wild International. (2007). Going to Pot. The Neotropical Bushmeat Crisis and its Impact on Primate Populations.

4 lifetime-projects.com

5 IUCN/SSC (2013). Guidelines for Reintroductions and Other Conservation Translocations. Version 1.0. Gland, Switzerland: IUCN Species Survival Commission

6 Lawrence, J.D., (2008). Spider Monkeys as Seed Dispersers.

7 www.neprimateconservancy.org

size, females being 5 kg on average and adult males growing up to 10 kg⁸. Due to the small population sizes the extinction risk is elevated by environmental, demographic and genetic stochasticity⁹

1. 2 Kawsay Biological Station: the Insides

The Kawsay Biological Station is located in the Buffer Zone of the Tambopata National Reserve which is a Natural Protected Area (TNR). The predominant vegetation type is subtropical wet forest (bh-S, Holdridge). In the structure secondary forest, recovering from deforestation, transects into primary forest. The mean annual precipitation is 2387 mm and the relative humidity accounts 83%. The annual mean temperature is 26.5 C. The climate is characterized by strong seasonality with a rain (November-April) and a dry (May-October) seasons.

The project is a Conservation Concession with the dimensions of 177.33 ha. The total area of the concession is mapped and traileed, to avoid unnecessary perturbations by the investigators. The main objectives include the maintenance of the essential ecological processes, preservation of biodiversity as well as the sustainable use of the species and ecosystem services.

More detailed and accordingly to the *Ley Forestal y de la Fauna Silvestre* (LFFS)¹⁰ the following objectives are bounding in the testimony of administration.

- 1) Administration of the concession accordingly to the LFFS.
- 2) Protection of the forest cover and recuperation of the degraded areas. Allowing to sustain the natural ecological processes.
- 3) Protect and guard the area from anthropogenic activities.
- 4) Amplify the basic studies of the flora and fauna to implement programs of monitoring and conservation with inclusion of the local community.
- 5) Establish and realize educational and trainee programs.
- 6) Promote and realize scientific investigations inside the concession area.

8 Xia, F. et al. (2018). Spider Monkey in Taricaya. *Journal of Animal Science and Veterinary*.

9 Marschall, A. J., Wich, S.A. (2016). Why Conserve Primates? OUP-First Unrecorded Proof. *An Introduction into Primate Conservation*.

10 www.minam.gob.pe

- 7) Order strategic settlements and alliances with investigators, NGOs, private and public entities to form technical, scientific and socio-economic investigative projects.
- 8) In case of necessity, the appropriation of naturally fallen trees for the maintenance of the infrastructure of the concession without commercial benefits.¹¹

For further discussions it is vital to view the socio-economic background of the Madre de Dios Province of Peru. The acceptance and collaboration of the community of the reintroduction area play a central role for the success of the program. Madre De Dios is the most scarce populated area in Peru (0.5 % of the total population of Peru)¹². The major economic activities are agriculture and fishing. Grains and fruits belong predominantly to the cultivated crops. Furthermore a vast variety of extraction activities take place. Selective extraction of hard wood for commercial reasons as well as medicinal plants, chestnuts etc. for self consume. Some touristic lodges, generating income are located in the immediate neighbourhood of the concession. Moreover mining and hunting are practised illegally¹³.

1. 3 Project Details

The individual animals we will be talking about on the following pages jointly originate from a life in captivity. Most commonly they have been confiscated by the Peruvian authorities and brought to the Taricaya Rescue Center. Taricaya is operating in order to give rescued animals a first refuge and provide the essential care. During their residence at the Center the spider monkeys are overseen by specialized veterinarians assisted by a team of trainees from a wide palette of ecological, biological and environmental careers¹⁴.

The monitored group consists of rehabilitated spider monkeys reintroduced in four release events. The releases usually take place in November, to ensure a good food availability in the first adaptation time span. It is essential that the released individuals are free from human transmitted diseases, to prevent it from spreading into the ecosystem. Furthermore the group has been living and training to persist together. In natural conditions the animals

11 Bello Santa Cruz, R. (2017). Declaracion de manejo concesion de conservacion Kawsay biological station.

12 INEI: Instituto Nacional De Estadistica E Informatica.

13 Bello, R. (2017).

14 www.taricayaecoreserve.org

live as a unit of 20 to 30 individuals¹⁵. The development and adaptation of comprehensive social norms, like hierarchy relations and feeding order is essential for a harmonic cohabitation.

The post-release monitoring is structured by the time span relative to the release. In the first three months daily, in the first year 2-3 times per week, subsequently two times per month, monitoring sequences are customary. The habituation to human presence through the preparation at Taricaya makes it possible to encounter the animals on a regular basis in the first time after the release. In respect to the time intercept, different parameters are investigated. During the first time after release the focus lies on the activities pattern. In the third intercept solely the remain in the group is accounted for. Furthermore the life-stage parameter are included in the investigation parameters. Thus to perform a population viability analysis.

Following I will present the results of the study led by the investigative efforts of Raul Bello in collaboration with Farah Carrasco-Rueda¹⁶.

The data collection took place from 2011, first release, to 2017. In that timespan 22 individuals have been reintroduced into the study area. 16 individuals out of that group have not been taken into consideration for further analysis. Four individuals have diseased and the remaining twelve have not been encountered again. Between 2013 (second release) and 2016 (fourth release) 6 individuals have been born into the wild. Resuming in a group of 12 individuals to be further investigated. It has to be pointed out that inbreeding problems due to the composition of the group are of concern. The sex ratio is 9 females to 3 males which reflects natural conditions.

The individual life histories have been pooled into two categories. Firstly infants (0-12 months) and juveniles (12-60 months) as “young” and adults (>96 months) with sub-adults (60-96 months) as “reproductive mature”. In the focus of interest lies the probability to primarily survive and additionally reach the reproductive age. The results of the performed models indicate that the presence of male individuals of age is essential to allow for breeding and to rule out extinction. Direct estimations from the data show a 100% survival of males in the young life stages (n=1) and 20% for adults (n=5). Furthermore the data shows a 100% survival rate for females in the first years of life, 83% for the young stage and 45% for adults.

15 www.primatespark.com

16 Carrasco-Rueda, F., Bello, R. (2019). Demographical Dynamics of Peruvian Black-faced Spider Monkeys (*Ateles chamek*) Reintroduced in the Peruvian Amazon. *Neotropical Primates. A Journal of the Neotropical section of the IUCN/SSC Primate Specialist Group.*

Three models to estimate a general probability of survival have been calculated. Including the parameters, 1. age and sex 2. age 3. just females and age. Additionally a Matrix Model combining the survival rates and the fertility rates for the estimation of the population growth has been developed. The projections of the models have been set to 25 years, which resembles the individual life span of a spider monkey. The outcome has been two possible scenarios A and B. In scenario A, with a static number of individuals in the group the estimation is that the population will decrease. Scenario B estimates a potential increase of the population if additional wild animals will join the group, which lies within the realm of possibility¹⁷.

Concluding the study shows that even with quite a small sample of survived reintroduced individuals an establishment and persistence of the group is possible.

2 Activities and Methods

In March 2018 Raul Bello launched the Kawsay Biological Station. The main objective is to have a larger amount of people primarily dedicated to the monitoring and assessment of the reintroduction of the group of *A. Chamek*.

The itinerary is structured accordingly to the time spans of each investigative task. The basis is a two-weeks timed schedule. Depending on the assigned activity for the day, the teams leave the station between 6:30 and 7:30. If the covered distance makes the return for lunch unreasonable, the break takes place in the forest. Otherwise a return to the station around noontime (12:00-13:00) is an inherent part of the daily schedule. After the break a resumption of the activities takes place, the start-time is conditioned by the task. Before leaving for the concession it is obligatory to annotate the path, intended to take, as well as the time leaving and estimated time of return in the Kawsay logbook. The teams consist of at least two people, usually including at least one more experienced person. A GPS device (Garmin, GPSMAP 64sc), a machete and a first aid kit are mandatory companions in the fieldwork.

Additionally to the fieldwork, data entry is indispensable for the persistence of the scientific targets. Some afternoons are dedicated to computerwork. Entering, chronographing and analysing the impressions from the field, which can be done by oneself.

¹⁷ Carrasco-Rueda, F., Bello, R. (2019).

2. 1 Spider Monkeys Monitoring

The direct observations take place in the conservation concession area. A team of researchers makes its way to specified places and tries to gain the attention of the monkeys by two distinct “call-outs”. The vocalisation is to resemble the sound of the monkeys as much as possible. The specified locations are GPS marked and positioned around sleeping (37) and resting (31) trees of the primates. The target is to evaluate the 1. behaviour, 2. diet as well as 3. habitat use. 1. behaviour is sectioned into: feeding, travelling, resting, socializing, others or out of Sight. 2. diet, identification of the item, furthermore collection of remains and the excrements to analyse the discarded seeds. The time span and the position in the tree (canopy, understory) are to be identified.

Data: sighting record, photograph, excrements, food items

Materials: GPS, binoculars, bags

2. 2 Camera Traps

In the study area three camera traps are placed. The locations have been selected close to disturbances of the soil surface. Facing an open, elevated soil spot, which is used as a Mineral Lick by the animals. The soil is enriched with minerals and antioxidants. The camera activates through the combined appearance of two independent stimuli. The infrared sensor detects corporal heat and the radar sensor movement. Resulting materials are two pictures, followed by a 10 seconds long video. Subsequently the camera remains inactive for 5 seconds. The data is collected in a two-weeks rotation.

Data: photograph, video

Materials: GPS, Bushnell 119874C – Trophy Cam HD

2. 3 Mammal Transect

The mammal transect is a daily activity including 4 km, 4 parallel lines of the length of 1 km. The transect is always the same GPS marked line including as much diversity as possible, primary and secondary forest formations, swamps and dry elevations. A team of two goes once by dusk (6:30) and once by dawn (17:30-18:00) to capture the diurnal as well as the nocturnal species. If an animal is sighted the behaviour is being annotated. Mostly the imprints are measured and recorded.

Data: sighting/imprint record, photograph

Materials: GPS, Camera, ruler, binoculars

2. 4 Pitfall Transect Traps

During my work at the Station a new project the Pitfall Transect Traps by Yoko Alvarez, a biology student from Iquitos (Peru), have been initiated. The aim of the study is to make an inventory of the arthropods, amphibians and reptiles in the concession. To begin with two transects, each 100 m long have been selected. Each transect harbours 10 pitfall traps. The traps consist of plastic buckets (20 l), buried in the soil. Trough the whole length of 100 m above the middle of the bucket opening a plastic canvas of ca. 80 cm height have been clamped. The purpose is to provide a barrier for the jumping animals. The buckets are opened by night (18:00-20:00) and revisited and closed by the next morning (9:00-10:00). The activity took place three times per week. The trapped animal of interest is to be identified, measured, photographed and released.

Data: species, measurements, photograph

Materials: GPS, camera, caliper gauge

2. 5 Vegetation Study

The study consists of 10 plots 20×50 m². The plots are located in a raster throughout the concession, including the most possible variability of habitat diversity. The purpose is the survey of the volume increase. Continuation labelling of trees > 10 cm of diameter. The circumference and the height of the trees are the parameters of interest. The circumference is measured at a height of 1.3 m or at the roots ending, if possible. In some occasions the measuring tape has been strapped onto sticks to be able to measure above the roots, exceeding the human height abilities. The height is measured by the Tangent Height Gauge, based on the tangent relationship between the distance to the measuring person and the tree. The challenge of that task is to find the most rectangular line while not loosing the tree canopy in a highly dense vegetation cover. A machete to find the way has been of assistance. Some of the plots have been barely accessible, due to the time being the rain season. The water has been standing to high to be able to evaluate the beginning of the roots.

Data: circumference, height

Materials: GPS, measuring tape, tangent height gauge, plaques, nails, hammer

3 Discussion

To enter the discussion is it beneficial to recall the objectives of the testimony of administration of the concession from chapter 1.1. The targets can be summed up into three broader categories. 1. Conservation of the Forest as an Entity 2. Education and Information 3. Research. All of the objectives together provide the required foundation, a secure and unhindered area, for the reintroduction program of *Ateles chamek*.

Taking a closer look at the Entity Conservation goal it can be said that the team around the Kawsay project contributes significantly to inhibit anthropogenic activities in the area of the concession¹⁸. Due to the continuous presence of researches in the field the illegal extraction activities of all the commodities the forest has to offer, have basically disappeared. As for the hunting, there is great need for clarifications respective the legal framework of the state of Peru (LFFS), to fully eliminate that threat.

The station enormously benefits from the mixture of people with different scientific backgrounds. The possibility to work and learn from experts in their fields is given by the carefully selected team. On a weekly basis new people join but also leave the station. During my residence the group consisted mainly of biologists, affiliated by one veterinarian and two ecologists. Raul Bello gives classes on a weekly basis. Mr. Bello is a highly experienced specialist in conservation biology, primatology and wildlife management, specializing of the rainforest of Madre de Dios. Furthermore educational tours for people from Puerto Maldonado are organized frequently. As for the second target (Education and Information) it can be said it is met satisfactory considering the size and the short existence time of the station.

The evaluation of the third target (Research) needs to be discussed in more detail. On the one hand there are the research activities targeting the fauna. Monitoring the occurrence of all the mammalian species by the two the two transects and the camera traps. Joined by the Pitfall Traps. In the two years since the inauguration of the station a respectable database (mammals) have come together. Admittedly the work done so far is merely an inventory to determine the present diversity. People with with a concrete research and investigative targets are required to continue analytical tasks. The extent of the respective evaluated areas, 4km of mammal transect, 200 m of pitfall transect and three camera traps for the fauna research is respectively big to the area of the concession.

18 Bello, R. (2017).

For the vegetation study the total of 10 km² covered by the investigation plots gives a good representation for the whole concession and beyond its edges of the adjacent territory. When I joined, the project was in the initial phase, we were continuing labelling trees. Data for a volume increase analysis needs to be taken continuously over the following years.

During my involvement in the project a team was searching daily for the spider monkeys group. Nevertheless they have been encountered solemnly four times. During those encounters the number of individuals and their behaviour have been annotated. The encounters have been rather brief (< 10 minutes). Subsequent somewhat little data was collected on the main research objects. The relatively long time span of living independently is considered to be accountable for the more scares encounters with the group¹⁹, contrasting to the first initial time after the release. It is interestingly enough to mention that in case of vocalizations by Raul Bello the detection success of the spider monkeys increases drastically. The individuals are highly accustomed to be with Mr. Bello, as he has been at their site throughout the whole journey from 2011 until the present day.

Nevertheless before the reintroduction program started *Ateles chamek* have been locally extinct in Madre De Dios. The region now accounts for a group of 12 individuals. From that point of view the conservation efforts are to be evaluated as a success. In chapter 1.3 I have presented the outcome of previously collected data and the population viability analysis performed. The calculations indicate that the key aspect is to ensure the survival of the mail members of the group throughout their maturing process so that a future reproduction is possible.

4 Personal Gains and Conclusions

The time spend at Kawsay Biological Station has been an immense and intense intake opportunity for me. Species conservation has been a theoretical concept, presented by literature and lecturers. As the focal point of the program lies with the reintroduction efforts, I was expecting to concentrate on the monitoring of the spider monkeys. As described above the time in the field dedicated to that task is rewarded with rather small data outcomes. Fortunately, after a reevaluation of my interests and supporting advise from Mr. Bello, I was able to refocus on the vegetation study. Comprising a more or less

¹⁹ Xia, F. et al. (2018).

permanent team with Dorian Cani Paco, a biology student from Cusco (Peru), we took the responsibility to continue with the labelling of the trees in the plots, upon us. Nonetheless I participated in the remaining activities, as for the continuation of data gathering. All of the field methods, introduced in chapter 2 have been a novum for me.

The second component, the data entry had a different kind of learning objective. Especially the examination of the frottage from the camera traps, by means of *Neotropical rainforest mammals a field guide*, by Louise H. Emmons and *Manual para el censo de los vertebrados terrestres* by Jose Luis Tellería Jorge, has been highly informative. All the collected information is entered in excel sheets.

It has to be contemplated that the climate and the season have been obstacles in the field work. It has been an enormous expenditure of time to get to the location of interest. The trails lead through seasonally appearing and disappearing lakes and swamps. Furthermore the relatively dry intercepts have been bloated, slowing down the translocation pace. In some cases the swamps could be crossed via fallen tree trunks. A development and reorganisation towards more fixed structures in the infrastructure of the concession would lead to an increase in the speed of the advance through the forest. Hence leaving more time for the investigations. Aside from the accessibility difficulties it has been only a few times possible to take a camera device into the field. The high humidity and the necessity to swim to reach some of the sites has devastated a number of not specialized equipment (camera-phones, cameras, computers).

Concluding the project and the internship are and have been of great value. Despite the fact, that the Station only exists since two years, it is well known beyond the neighbours circle in the city of Puerto Maldonado. Without the dedication of Raul Bello, towards the re-establishment of *Ateles chamek* in the Tambopata National Reserve, the reintroduction program would be uncompleted and could not persist. It is of significant importance to continue with the educational efforts as conservation is only as successful as the elimination of its cause.

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Figure 2: Raul Bello, 23.01.2019

6 Annex



PROGRAM ACTIVITIES (Every 2 weeks)

	MONDAY	TUESDAY	WEDNESDAY	THURSDAYS	FRIDAY	SATURDAY	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAYS	FRIDAY	SATURDAY	SUNDAY
MORNING	Vegetation plots	Phenology	Vegetation plots	Monitoring Spider Monkey	Monitoring Spider Monkey	Data entry	Cleaning house	Day mammal transects	Phenology	Vegetation plots	Monitoring Spider Monkey	Collecting cameras	<i>Optional free weekend in Puerto Maldonado</i>	
AFTERNOON	Installing cameras	Phenology determin.	Data entry	Monitoring Spider Monkey	Sports Games	Laundry + Cleaning house	Laundry	Vegetation plots	Phenology determin.	Data entry	Monitoring Spider Monkey	Sports Games		
NIGHT	Theoretical classes	Night mammal transects	Free	Free	Campfire Social Night	Free	Free	Theoretical classes	Free	Free	Free	Campfire Social Night		

■ Fauna activity, ■ Flora activity, ■ Theoretical activity, ■ Cleaning activity, ■ Free time → The combination of the activities depends on the number of people in the station, weather, etc.

Figure 3: Kawsay Biological Station Schedule.
[www.kawsaycenterperu.org]



Figure 4: Kawsay Biological Station.
[Own Photograph, 25.02.2020]

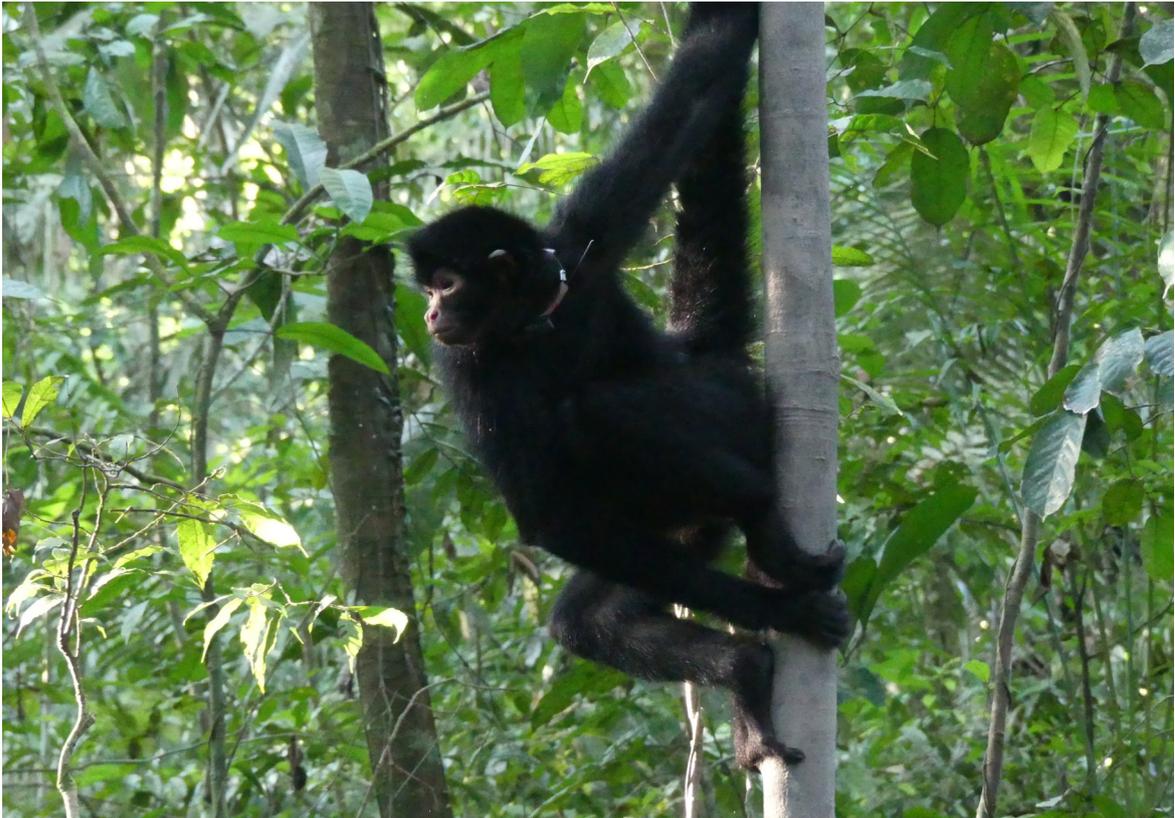


Figure 5: Female *Ateles chamek* individual with tracking collar.
[Raul Bello, 23.01.2019]

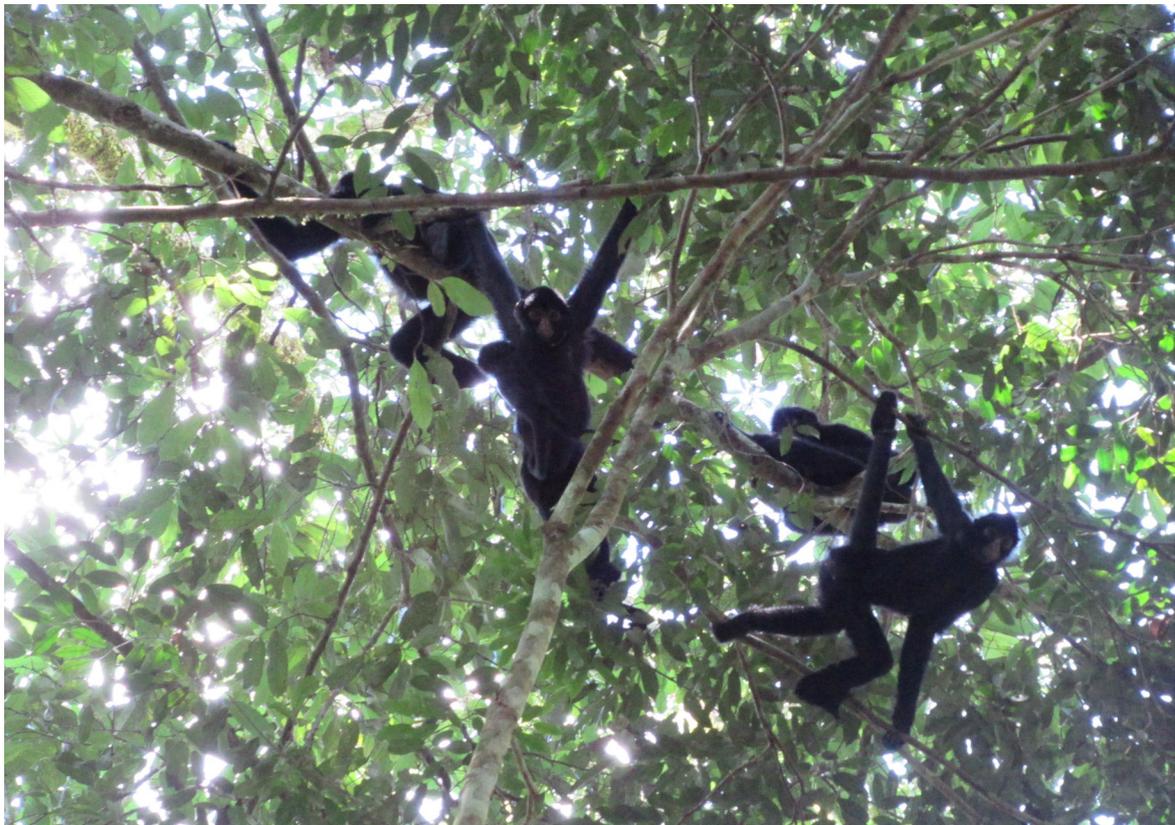


Figure 6: Group of juvenile *Ateles chamek* individuals.
[Alejandra Chumbimune, 06.02.2019]