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ANIMAL SCIENCE

Guidelines and considerations for capturing and collaring wild primates: a case study with capuchin monkeys (*Sapajus nigritus cucullatus*)

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Abstract: Many aspects of the ecology, evolution and social behavior of wild-living primates remain un-explored and require further investigation. While long-term field studies are crucial for addressing conservation concerns for many primates' species, acquiring the necessary data is often challenging, often due to difficulties in locating study groups. Radio-telemetry has significantly facilitated the study of primates and other animals living in tropical forests. However, there are important practical challenges in the process of capturing and releasing animals after placement of telemetry collars. In this study, we report guidelines and considerations for capturing and collaring wild capuchin monkeys, *Sapajus nigritus cucullatus,* in the Atlantic Forest of Argentina. Our ultimate goal is to contribute to making captures safer, preventing harm and stress to animals when using radio-telemetry in monitoring strategies for conservation of this primate species. These methods can be useful for researchers using field capture and radio-telemetry for monitoring groups or populations of wild primates, specifically wild *Sapajus.*

Key words: Platyrrhini, radio-collars, telemetry, Atlantic Forest, conservation management.

INTRODUCTION

Long-term field studies are essential for addressing conservation concerns, especially for endangered species (Wrangham 2000). However, obtaining field data is a challenge when difficulties arise in locating animals due to geographical characteristics, weather or field conditions. The use of radio transmitters and receivers to record information about the location of animals is usually known as radio-tracking or radio telemetry (Honess & MacDonald 2011) and is useful for field studies by decreasing search times and increasing contact time with collared individuals, facilitating continuous data collection (Campbell & Sussman 1994). Radio telemetry has allowed researchers working in the field to acquire large amounts of data describing the geographic location of wild animals (Fernandez-Duque et al. 2023). This technology has enabled detailed descriptions and sophisticated testing of hypotheses about movements ecology, social behavior, migration patterns and habitat selection on hundreds of species (Christin et al. 2015). Thus, radio-telemetry has promoted the study of mammals, particularly those that are difficult to detect, allowing researchers to locate and follow them (Craighead & Craighead 1972).

The use of radio-collars for finding and tracking animal species requires the capture of wild individuals (Fernandez-Duque et al. 2023). Capture is one of the top ethical concerns for field primatologists (Fedigan 2010). For many years, darting has been a common method used for capturing primates. The results of this method showed that small- and medium-sized arboreal primates, such as capuchin monkeys, are more likely to be injured than larger mammals, since darts may cause trauma at the injection site and/or injury from a fall (Cunningham et al. 2015). Moreover, although severe detrimental effects of darting are uncommon, darted and unconscious individuals are exposed to forced copulations, death from allergic reactions, fatal falls, or fatal attacks (Cunningham et al. 2015). In addition, veterinarians caution that anesthetizing wild animals is risky because pre-anesthetic assessment of individual medical conditions is very limited (Mosley & Gunkel 2007). Alternatively, primates can be chemically immobilized by injection after trapping. Capturing primates followed by anesthesia requires extensive infrastructure, including traps set up on platforms, to which animals should become habituated. However, information about other methods that could improve primate safety on field captures is lacking (Carvalho et al. 2018).

We began a research program to study the effects of habitat fragmentation on *Sapajus nigritus cucullatus*, inhabiting the Atlantic Forest of Misiones province, Argentina, in 2019. However, following these monkeys was difficult as they move quickly and over long distances (> 3 km/day) through densely forested and sloping areas (Di Bitetti 2001, Kierulff et al. 2005). Even though we censused habituated groups of capuchins six days per month, we were still unable to locate them for a complete day. Therefore, radio-telemetry became an alternative method to get GPS locations of the groups with 40-minute intervals for home range studies. Because our study species uses the upper canopy (30 meters), thus increasing the risks associated with darting, we decided to capture the individuals with traps. Unlike darting, primate capture using traps is a safe, efficient, and less invasive method (Aguiar et al. 2007).

Any serious initiative to capture and collar primates should be the result of a thorough cost/benefit analysis (Juarez et al. 2011). Once researchers decide to use radio-telemetry, employing the appropriate techniques for capturing and collaring the animals is a matter of extreme importance. In this paper, we share our successful experiences in capturing and collaring wild *S. n. cucullatus* using platforms, traps, and post-capture anesthesia. This article aims to present the main considerations for using radiotelemetry in wild primates. Field researchers who, after conscientiously weighing the pros and cons, decide to use radio-telemetry for monitoring wild primate species, specifically wild *Sapajus*, may benefit from our experience and apply the step-by-step methodological guideline of procedures proposed here.

MATERIALS AND METHODS

Study species

The southern black-horned capuchin (*Sapajus nigritus cucullatus*) is endemic to the Atlantic Forest, a unique ecosystem and biodiversity hotspot with only about 7% of its original forest cover intact, mostly in Brazil, but also in eastern Paraguay and northeastern Argentina (Tabarelli et al. 2005). This species is categorized as Near Threatened on the IUCN Red List of Threatened Species (Ludwig et al. 2022), and as Vulnerable under Argentinian law (Tujague et al. 2019), due to a decrease in the number of individuals of the species by approximately 30% over the last three generations [48 years] (Tujague et al. 2019). Previous studies of *S. n. cucullatus* have only been carried out in the Iguazú National Park (Di Bitetti 2001) and no recent population survey has been conducted (Agostini et al. 2015).

Sapajus nigritus cucullatus live in multi-male, multi-female polygamous groups (ranging 6-30 individuals of all age classes), in which the number of females exceeds the number of males (Di Bitetti 2001, Izar 2004). Births in this species are highly seasonal and primarily coincide with the period of highest food availability during the spring and summer (i.e., from October to February; Di Bitetti & Janson 2000). The diet of this species is mainly composed of fruits and invertebrates (Tujague & Janson 2017), but it changes according to the seasonal pattern of food availability (Di Bitetti 2001)

Study sites

Captures were conducted at two sites in the Atlantic Forest of Northeastern Argentina. The sites are located 25 km apart. One, the Urugua-í-Foester Biological Corridor (Karadya Bio-reserve, 25° 51'S 53° 57'W) is a continuous forest (CF) of 2,724 ha area of Atlantic Forest, surrounded by two provincial parks (Urugua-í-Provincial Park of 84,000 ha and Horacio Foerster Provincial Park of 4309 ha) and composed of several public and private reserves. The other, is a fragmented forest area (FF) (Yacutinga Private Reserve, 25°35'S 53°04'W), with 590 ha of remnant forest, located in Península de Andresito in Misiones province, Argentina (Figure 1). Both areas share similar geographic characteristics, with height above sea level of approximately 260 m with a rolling relief and a humid subtropical climate. The average temperature ranges from 22° C during

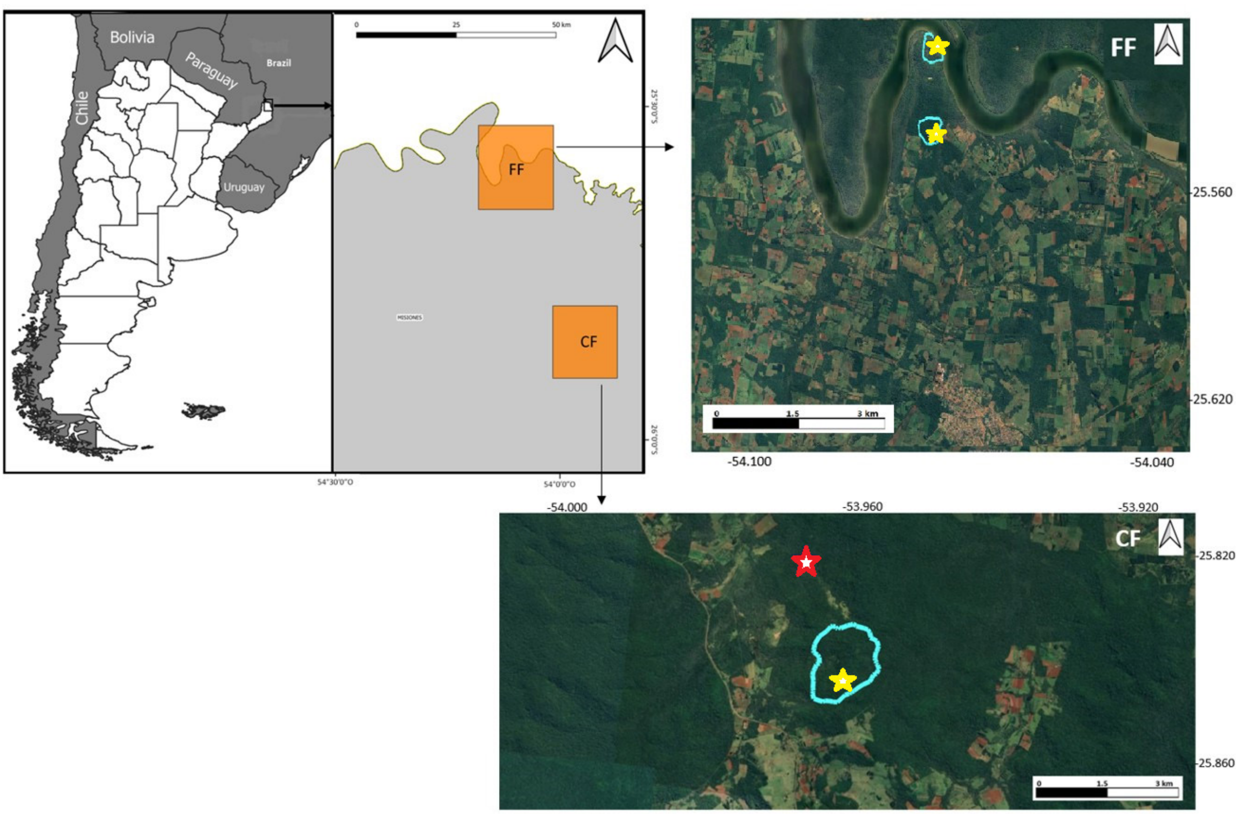

Figure 1. Location map of Misiones province and the two study areas in the Atlantic Forest of Argentina (in orange). On the right, the Yacutinga Private Reserve (fragmented forest area) [top figure] and the Urugua-í-Foerster Biological Corridor site (continuous forest area) [bottom figure]. In light blue, the home range area of the groups of *S. n. cucullatus* followed up by radio telemetry. The yellow star figures indicate the location where the captures were realized successfully. The red star figure indicates the location of the trap without successful capture. Source: ArcGIS 10.3.1 (Esri 2018).

the hottest months to 18° C during the coldest, and annual precipitation varies between ~1,500 and ~2,500 mm (Albarracín Franco et al. 2014).

Study groups

Beginning in 2019, we have conducted ecological, genetic, and behavioral studies at the two study sites. Two groups of *S. n. cucullatus* were studied in each study site named “Karadya” and “Foletto” in the CF, “Northern” and “Southern” in the FF. Groups in the FF were already accustomed to human presence due to tourism in the area; however, we reinforced their habituation for 3 months. Habituation of groups in the CF was carried out for 6 months. Group sizes were smaller in the CF, with 12 and 23 individuals (mean = 16.4 individuals; CI 95% = 14.38–18.42 individuals), and larger in the FF, with 32 and 36 individuals each (mean = 35.4 individuals; CI 95% = 31.76–39.04 individuals). The mean group home range area was 125 ha (range: 111–140 ha) in the CF and 55 ha (range: 51–57 ha) in the FF. In the FF, groups were composed of 1 dominant male, 2-3 adult males, 1 subadult male, 4 - 6 adult females and their dependent offspring, 5-7 juveniles, and 15 or more individuals whose sex could not be determined. In the CF, groups were composed of 1 dominant adult male, 3 adult males, 4 adult females, and 1 - 2 juveniles (Martínez de Zorzi et al. 2024).

Before starting the field study, we obtained permissions from the Biodiversity Institute of Misiones province (IMiBio) and from the Province of Misiones by the Ministry of Ecology and Natural and Renewable Resources [MEyRNR], (date of approval: 20th April 2021), num. 021 (https://imibio.misiones.gob.ar/es/autorizaciones) for conducting field activities with wild *S. n. cucullatus*, including capturing and collaring of individuals for field research. In our case, activities related to research also required training in the use of animals in experimentation (CCUAE) from the Faculty of Exact and Natural Sciences of the University of Buenos Aires (Resolution 3141, December 2011).

Step-by-step guide for capturing *Sapajus*

In the following section, we describe our step-by-step methodological guideline for capturing and collaring *S. n. cucullatus*.

Selecting platforms sites

The first step was to identify an adequate forest location for setting up the baiting platforms and traps (Figure 2). An important consideration in site selection was that the animals should visit the chosen site frequently. Additionally, we considered whether the site was close to a sleeping site, it was a safe place, away from hunters or other threats to the capuchins (Jolly et al. 2011). Given the requirement of placing large amounts of food and other equipment, including traps and veterinarian supplies for catching the animals, we built the platforms approximately 2.5 m above the ground and in places easily accessible with a ladder for both the researchers and the capture team.

Selecting radio-collars

We used nylon collars from Advanced Telemetry Systems Inc., Isanti, MN, USA, <www.atstrack.com>, model M2900 (weight 35 g) with battery duration of approximately 765 days. The choice of this model of radio-collar was guided by previous tests conducted with *S. xanthosternos* in Brazil (Kierulff et al. 2005). In addition, radio-collars were reinforced with tape to prevent breakage due to bites by infants carried on the adult female’s back in cases of possible future births.

Selecting females

We only placed radio-collars on adult females since groups are philopatric, so they remain

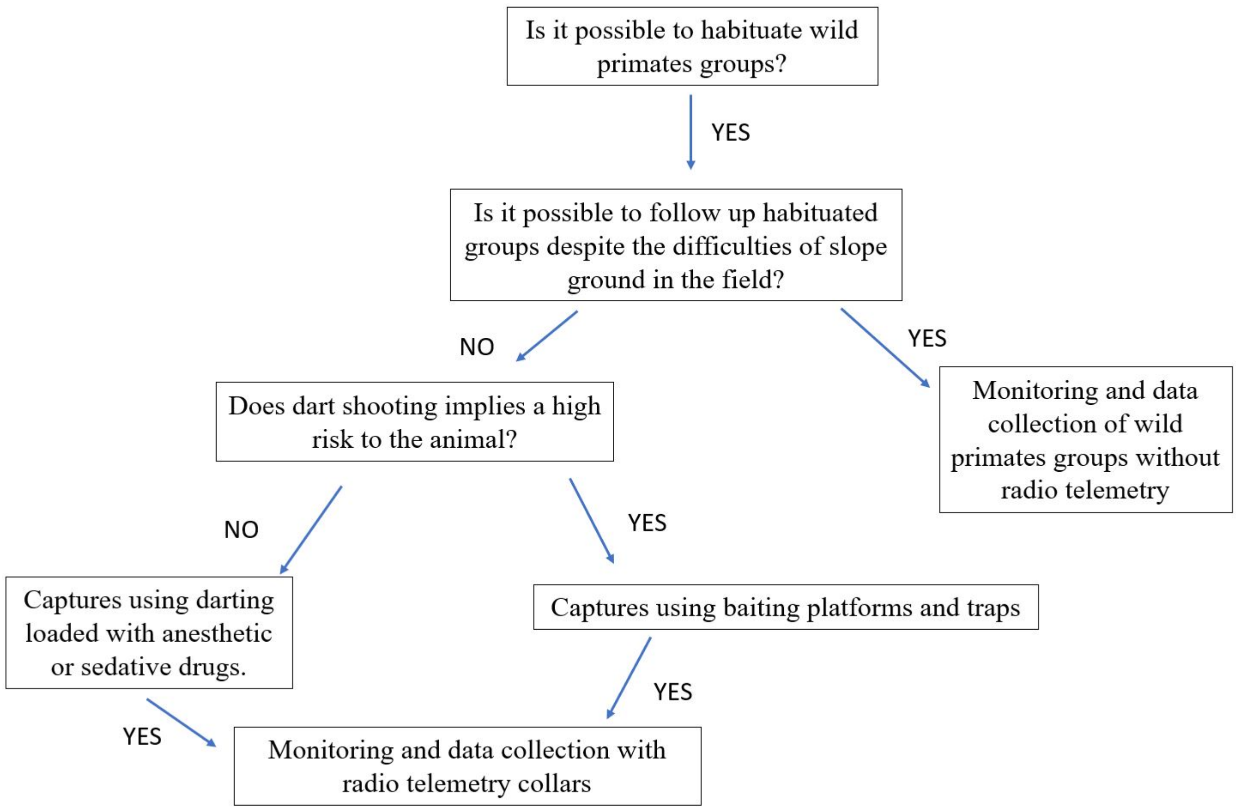

Figure 2. Decision tree explaining the decision-making process for capture methods.

in the group and do not disperse. The traps were activated manually (closing the door that left the individual locked in) while observing from a hide. When the group approached the trap, many individuals entered to feed (males, juveniles, females carrying offspring). However, the door was not closed until we observed the pre-selected target adult female (i.e., not pregnant, not lactating), avoiding the capture of curious juveniles and adult males, these last were identified by the presence of fold of skin in the region above the throat (Montenegro 2011).

Preparatory baiting and traps

Following the construction of the platforms, our next step was to bait them. Initially, we baited only with fruit, especially papaya, bananas, and oranges, but this was not effective in attracting the group to the platforms. Subsequently, we modified our baiting strategy by using ground corn, with no results. The most effective choice was to combine corn grains with ground corn and slices of orange and bananas which produced the smell of fruit fermentation. To ensure consistent visits to the platforms, we changed the banana bait twice a week, putting green, almost ripe, and ripe bananas each time. We avoided using only ripe bananas since the monkeys might consume them all at once, causing them to stop visiting the platforms. Bananas were chosen as bait for their striking color, strong smell, and limited probability of seed dispersal, in addition to the fact that they were efficient for attracting *S. xantosthernos* in previous research (Kierulff et al. 2004). We placed the bait at the center of the trap and left the door closed when we were not present. In this way, we prevented other animals from entering and eating the bait, with only the capuchin monkeys being able to grab the food by extending their arms (Figure 3).

We built four (one for each group) Tomahawk traps from 1.25m X 0.50m x 0.50m. We covered them with an aluminum sheet to keep the bait dry on rainy days. Once we confirmed the monkeys were visiting the platforms (Figure 4), in the third week, we placed the traps unlocked (with the trigger deactivated), in an open position with bait at the platform's base, at the top, and inside the traps. The traps were wired to the platforms so that no animal could push or move them. We paid special attention to ensure that the tips of the wires used on the traps could not injure or scratch the capuchins.

We constructed a hide (2.0m x 2.0m x 1.7m) covered with leaves, on a small hill in front of the platform, from which we could observe the animals and activate the traps with the fishing line pulley system. This was constructed as soon as we realized the monkeys were visiting and eating the bait since they also needed to become habituated to the hide.

Pre-capture

Prior to capture, the radio-collars and receivers were tested through search simulations for approximately 10 days preceding the predetermined placement date. The radio-collars, operating at frequencies between 148,000 – 159,999 MHz, were located using a R4000 ATS receiver and a 3-element Yagi directional antenna.

Pre-capture meetings, involving planning and training, were conducted with all team members. Ethical and legal considerations, as well as animal welfare, were discussed to minimize risks and stress for both animals and researchers. Precautions were taken following SARS-CoV-2 transmission prevention in wild animals following the Ministry of

Figure 3. **Individuals of *Sapajus nigritus cucullatus* eating the bait on the platform before the capture of the Urugua-í-Foester Biological Corridor.**

Science, Technology and Innovation and other institutions of health and environment in Argentina (COVID-19 Manejo de fauna silvestre 2021 https://www.argentina.gob.ar/sites/default/files/202103_fauna_silvestre_covid-19.pdf).).

Captures

Captures were conducted during the winter before mating and gestation, with no infant offspring in groups within each study area (a total of 5 days for the "Karadya" group and 20 days for the "Foletto" group in the CF, and 2 days per group in the FF). The first capture took place in the CF on June 20th, 2021 for the "Karadya" group". We conducted two other successful capture events on July 3rd, 2021 for the "Southern" group and on July 9th, 2021 for the "Northern" group in the FF. While capture attempts were made for the 2nd group ("Foletto") in CF, obtaining a female for radio collar placement was not possible. Only two people (the researcher and a field assistant) used the hide, waiting for target animals to enter the traps. To capture only adult females who were not nursing newborns, we decided to manually activate the traps with a fishing line. When the chosen individual (i.e., an adult female without an infant) entered the trap, we pulled the line to close the trap.

Once the animals were trapped, the researcher and field assistant covered the traps with dark cardboard. We removed the bait from the traps in order to reduce the risk of vomiting and aspiration due to glottic relaxation before injecting the anesthetic ~4 h latter. Then, the traps were taken to preprepared and cleaned areas rooms each of the reserves (Karadya Bio-reserve and Yacutinga Private Reserve) located

Figure 4. Individuals of *Sapajus nigritus cucullatus* eating the bait on the platform before the capture of the Yacutinga Private Reserve.

close to the capture sites (maximum 300m), paying special attention to minimizing animals' stress. Personal protective equipment was used including disposable gloves, and masks with a PFF2 (N95) filter, leather gloves and closed-toed shoes. Before handling the monkeys, we washed our hands with water, soap, and hand sanitizer (>70% alcohol).

Veterinary protocols

Since the captures were made at the beginning of winter, the room was brought to 25°C. We prepared hot and cold water in case the individual presented any symptoms of hypo- or hyperthermia. Before performing the animals' chemical containment, veterinarians performed a preliminary assessment of the animals' apparent health conditions.

Anesthesia was applied with the individuals inside the traps. Drugs were administered via blowpipe (11 mm i.d. x 1.5 meter) with 3-ml syringes and 18-ga, 1.5 needles (Mexcapture, Mexico). Subjects were darted in the shoulder or thigh. The anesthetic used was ketamine 10 mg/kg (Ketonal 100 - Richmond Vet Pharma, Bs.As, Argentina) + xylazine 0.8 – 0.5 mg/kg (Xilacina 100 - Richmond Vet Pharma, Bs.As, Argentina) + midazolam 0.3 – 0.5 mg/kg (Midazolam - Richmond Vet Pharma, Bs.As, Argentina and incomplete reverse with yohimbine 0.125 mg/kg i.m. (Yohimbine Vet Up, - Richmond Vet Pharma, Bs.As, Argentina). If it was necessary, a supplementary dosage of ketamine 2 - 4 mg/kg i.v. or i.m. was administered.

Once anesthesia had been applied, the individuals were handled using biosafety protocols and the veterinarians monitored the animals at 5–10-minute intervals, measuring physiological parameters such as heart rate, respiratory rate, rectal temperature, noninvasive hemoglobin-oxygen saturation (SpO_2) (Monitor de Sinais Vitais RM1200 Vet, RZ Equipamentos Veterinário Ltda, São Paulo, Brazil), palpebral and corneal reflex inhibition, capillary refill time, and mucosa color. Subsequently, the team weighed the animal with a digital scale (0~5 kg: d = 5 g), and re-calculated the anesthetic dose if needed. Other biometrics such as blood samples (from the saphenous or femoral vein), ectoparasites, scraping, and hair collection were performed at this moment.

Collaring

Following the initial health assessment and the collection of biometrics, the radio-collar transmitter was placed on the animal. The collar should not be too loose to avoid it getting stuck in the vegetation and disturbing the animal during its regular activities. The team checked that the head did not pass through the collar (Figure 5) and the animal could not place its limbs between the collar and the neck. Also, we ensured the collar was not too tight, leaving a space measuring two fingers between the neck and the diameter of the collar, considering possible growth of the animal, although they were always adult females. This sequence of procedures ensured that the most uncomfortable steps were performed at the beginning of the anesthesia period when the animals were less stimulated and the drug effect was still active.

Release

Following the collaring procedure, the animals were returned to the traps covered again and kept in a quiet and warm environment. Due to safety concerns associated with releasing a diurnal social primate during the night, potentially exposing them to unknown predation risks, the animals were released at the capture site the following morning. Animals were released once the group returned to the platform site. We waited for the onset of vocalizations among group members and the captured individual

Figure 5. Wild dominant female with radio-collar of the "Karadya" group in the Urugua-í-Foester Biological Corridor.

before releasing. In all instances, the groups consistently returned the next day to the capture site. As the groups returned to the platform, we decided to place the traps on the ground, in a sufficiently open area in order to avoid stressing the group and to give the animals a clear runway to find a nearby tree to climb after release. Additionally, this was done to avoid the risk of falling if the cages were placed on the platforms. We immediately followed the animals for 5 consecutive days to confirm good health.

The total costs expended were approximately U$S3,170: 250 per radio collar, 750 for the receiver, 150 antenna, ~800 fuel, ~550 food for the field, ~25 per trap, ~20 for the baiting food, 21 ketamine, 16 midazolam, 15 xilancina).

RESULTS

In total, we successfully captured three adult females in each group: one individual in the Karadya Bio-reserve and two others in the Yacutinga Private Reserve (5 days in CF and 2 days per trap in FF). We did not have a successful capture in the "Foletto" group of the CF. The complete processing of the captured individual took an average of 74 minutes. Adult females had an average weight of 2.0 kg and an average length of 74.75 cm, including the tail (Table I). Therefore, the percentage of weight of the radio-collar (35g) to bodyweight was 1.75%.

Notably, in the CF (Karadya Bio-reserve), it took the group six months, from the first pilot placement of the trap to the day of actual capture, to become familiar with the trap. In contrast, in the FF (Yacutinga Private Reserve), it only took one month for the monkeys to habituate to the presence of the traps. Another factor facilitating the attraction of individuals to the platforms was local variation in fruit availability. The typical low availability of fruit during the winter, along with the odor of fermentation generated by the citrus fruit, helped to attract animals to the platforms.

Despite the presence of the external antenna on the radio-collars, field observations showed that the monkeys did not chew or break them and other individuals did not interfere with them. The adult females with radio-collars were well accepted by the social group after their release. After the captures, the behavior of the study groups (i.e.: feeding time, grooming, traveling, and proximity to other individuals) did not vary from that observed previously. Researchers were able to closely observe these individuals, within a week of collar placement. Furthermore, more than a year and a half have passed since we initiated the radio-telemetry follow ups of the three groups, with observations conducted five days per month. During this time, radio-collars appeared to be well accepted by the collared females, whose behavior was normal, and they remained in their social groups, showcasing the effectiveness and non-intrusive nature of this monitoring approach.

DISCUSSION

This study reports three successful instances of capture in wild *S. n. cucullatus* living in the Atlantic Forest of Argentina and radio-collar placement for improving field data collection, such as ecological, behavioral or biological sampling. In this article, we provided a useful guide for researchers aiming to use telemetry for monitoring their study groups or populations of wild primates, providing important information for future captures. The placement of radio-collar transmitters enabled more efficient tracking of individuals and facilitated in-depth studies on the ecology and behavior of *S. n. cucullatus.* We are continuing our data collection, using radio-telemetry to further our studies of these groups.

In our experience, the radio-collars were well accepted by the individuals, who maintained

Table I. Weight and measurements of the adult females that were captured in each study area.

Captured adult female	Continuous Forest	Fragmented Forest	
Name	Karadya	Southern	Northern
Date of capture	20/6/2021	3/7/2021	28/12/2021
Hour of capture (hs)	2:45 p.m.	8:51 a.m.	6.08 a.m.
Weight (kg)	2.1	1.9	1.9
Height (cm)	78.5	71	67
Tail length (cm)	45	32	32
Leg length (cm)	25.8	24	22
Arms length (cm)	26.8	20	20
Body temperature (C°)	36.6	36.7	36.9
Presence of ectoparasites	No	No	No

the same behavioral patterns as before capture. No alteration was observed in their normal behavior or in the physical well-being of the animals. Nevertheless, because the receivers are not waterproof, one of the limitations of radio-telemetry monitoring is that it is less accurate in rainy weather. In the same way, it does not guarantee the sighting of individuals if they are in inaccessible places due to vegetation, or if they are immobile or camouflaged in high strata due to other causes (e.g., escape due to predation, gestation, etc.).

The time for baiting will vary depending on the habituation level of the group being handled (Catenacci et al. 2022). The larger home range and greater resource availability in less degraded habitat in the CF may explain the longer habituation time to the baited traps. Thus, it was not possible to place a radio collar in the second CF group, although capture attempts were made. The increased time, effort, and expense required by this method is compensated for by the safety of the animals. The most likely cues these primates detect are visual and olfactory cues (Janson 1998). Thus, the odor of fermentation from the use of citrus together with corn may have helped to attract the groups to the platforms. Given the greater fruit availability in the forest during the summer (Janson & Di Bitetti 1997, Tujague et al. 2016), the captures were conducted during the winter, when resource scarcity makes the captures more effective, also avoiding the detrimental effects of anesthesia in pregnant females.

These techniques for capturing and collaring were used in *S. xanthosternos* in the Atlantic Forest of Southern Bahia in Brazil. The use of radio-collaring in this population promoted the development of long-term studies about predation risk or sexual behavior of this endangered species (e.g., Delval et al. 2020, 2023, Fernández-Bolaños et al. 2020, Suscke et al. 2017). Our study illustrates the costs and benefits of using radio-collars with primates that are difficult to follow and gives a precedent in the Argentinean Atlantic Forest that can be replicated in other groups or species when encountering similar difficulties.

This research is a valuable step-by-step guide for other investigators who decide to capture and collar wild *Sapajus*. We systematically described the following process. Moreover, some general remarks and key considerations should be addressed for future captures of similar species:

1) **Select Adult Females:** We recommend placing radio-collars exclusively on adult females as they were philopatric (i.e., do not usually disperse).
2) **Avoid Sub-Adults and Infants:** Never place radio-collar transmitters on sub-adults, juveniles, or infants, because they will grow and, as collars may stay in place for more than two years, it could cause injury.
3) **Gradual Baiting Process:** Take your time with the baiting and trap-setting process. Gradually accustom hesitant animals to help reduce anxiety in response to the novel situation.
4) **Choose the Best Radio-collar:** Review literature or consult other researchers for choosing the most appropriate radio-collar for the species. Material, size, weight of the radio collar, and quality of the signal are factors to take into account in selection.
5) **Adapt Baiting Duration:** The duration of baiting should be adjusted based on the success of the species' visits to the platform. If, after two weeks, the animals only sporadically visit the platform, consider relocating it to a more suitable location or changing the bait.
6) **Use Multiple Platforms:** For groups whose home ranges are unknown, consider setting

up two platforms and abandon one when the group starts using the other.

7) **Manual Trap Activation:** Activate the traps manually to capture only the dominant female of the group, avoid the capture of curious juveniles, lactating females attracted by the bait, and adult males.
8) **Timing of Captures:** Conduct captures during the winter, before mating and gestation, as resource scarcity makes the captures more effective, and avoids detrimental effects of anesthesia on pregnant females.
9) **Minimize Stress:** Cover the traps with cardboard, cloth, or plastic before returning animals to the field to minimize animal during the procedure. Stay quiet when around the trapped animal.
10) **Prioritize Animal Well-Being:** Throughout the capture procedure, prioritize the well-being of the animals.

These recommendations should assist researchers and conservationists in conducting successful and ethical captures of similar primate species while minimizing stress and ensuring the collection of valuable data for research, management, and conservation efforts.

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VICTORIA MARTÍNEZ DE ZORZI: realized the field study, led the writing of the original article draft, wrote the manuscript and acquired the funds; IRENE DEVAL: wrote the manuscript; DANTE L. DI NUCCI: realized the veterinary protocols; LUCIANA I. OKLANDER: acquired the funds and supervised the investigation. All authors contributed critically to the drafts and gave final approval for publication.