

PRELIMINARY REPORT

PROJECT: “CONTRIBUTION TO THE MANAGEMENT OF THE ANDEAN BEAR-HUMAN INTERACTIONS IN THE INFLUENCE AREA OF PURACÉ NATIONAL NATURAL PARK, SOUTHWESTERN COLOMBIA”

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Work with local community:

We have been working with two local communities so far. Initially, we partnered with the Merenberg Civil Society Reserve since February 2021, with whom we began to identify the need for conservation of an azonal moor with an area of approximately 180 hectares located in the northeastern zone of influence of the PNN Puracé at an altitude of 2400 a.s.l. and in areas surrounding this private reserve. This páramo was visited to drive away the Andean bear due to cattle predation in the surrounding areas together with the CRC (environmental authority), where the presence of this species was evidenced. During the months of July to September 2021, we installed camera traps with the research group BIVET and the administrators of the RNSC Merenberg, where we obtained records of *Puma concolor*, *Leopardus tigrinus*, *Dasyprocta cf. punctata*, *Dasytus novemcinctus*, *Notosciurus granatensis*, among other small rodents and bats that have not been identified. These preliminary results were presented at the IV Colombian Congress of Mastozoology with the project "RNSC Merenberg: A strategy for the conservation of mammals in the Colombian Massif" in the Symposium of community experiences in knowledge management and conservation of mammals.

On the other hand, we have trained and carried out the installation of 4 camera traps with the community monitoring group "origenes" of the municipality of Isnos-Huila, located east of PNN Puracé, where 8 people participated. This activity was carried out between June and August 2021, where records were obtained of *Tremarctos ornatus*, *Tapirus pinchaque*, *Mazama rufina*, which are endangered species. We are planning to conduct research on the density and use of the Paletará-Isnos road by mountain tapir and Andean bear, due to the recent interactions that have occurred mainly with the first species. It is important to mention that between 2020 and 2021, the presence of one adult and one juvenile Andean bear individual has been reported in this area, in addition to the almost permanent presence of a mountain tapir individual on the road. These results were compiled in a video made by one of the members of the origenes monitoring group and the audiovisual equipment (gopro 7 camera) was provided by us. (Link: <https://www.youtube.com/watch?v=FZD9xqRmSwk>). On the other hand, we supported the Puracé National Natural Park with a photograph of the mountain tapir and the printing of flyers to inform passers-by about the behavior they should assume in case of sighting this individual.

Camera traps were also installed in two saladeros in the northern zone of Puracé NP, where the presence of the Andean bear was identified in one of them due to the remains of vegetation and feces present there. During the month of June, a camera trap was installed in one of the saladeros, and 2 cameras were installed in the saladero with the presence of the Andean bear. Both locations

were checked during the months of August and October, where *Tapirus pinchaque*, an endangered species, and *Mazama rufina*, a species vulnerable to extinction, were recorded. During this activity, a park ranger was trained in the handling and installation of camera traps, with the support of the researcher from the RNSC Merenberg.

Was carried to training and camera trap management activities with the Papallaqta indigenous community between November 2021 and January 2022, and with the rural community of Sotará between December 2021 and January 2022.

Distribution and Natural History:

During late 2020 and early 2021, we joined efforts between Puracé NP, WCS and ourselves to monitor Andean bear occupancy in Puracé NP and area of influence where we opted to implement the occupancy assessment design developed by WCS to obtain reliable results.

The zone selected for monitoring Andean bear occupancy was generated from habitat quality analyses with more than 50% probability of occurrence for the Andean bear in Puracé NNP and its area of influence with a buffer of 10 km. This area was divided into 4 x 4 km quadrants (16 km²) corresponding approximately to the minimum action area of a female Andean bear (Márquez et al. 2017) and 30 quadrants were randomly selected. Subsequently, together with the PNN Puracé and WCS team, they evaluated which of these quadrants would not be possible to sample due to logistical impossibilities, public order, and other factors that make it difficult to enter; making a new selection until the 30 viable quadrants to sample were completed.

Each of the 4x4 km quadrants was divided into 16 subquadrants of 1*1 km, of which four were selected based on criteria of logistics, accessibility and probability of detecting the species. Within the four 1*1 km² subquadrants finally selected, three 600m transects were established (recommended transect distance to obtain Andean bear and mountain tapir records with a 77.7% probability) which were walked for data collection. In each transect, an exhaustive search was carried out until the species was detected, or until there was enough confidence that, if the species was not detected, it was probably because they were not there. The three transects were located trying to cover as much area as possible within the quadrant and seeking to be separated one from the other by about 500 m. In these transects, records of Andean bear presence/absence, site and sampling covariate data such as presence/absence of livestock, logging, people, fires and agriculture, vegetation height, presence of slope, valley or mountain, and presence/absence of food were collected.

Of the 30 quadrants evaluated for the Andean bear occupation, records of presence of the species were obtained in 29 quadrants, 61 subquadrants out of 115 evaluated (5 subquadrants could not be accessed), and 92 transects out of 345 routes. For the mountain tapir, out of the 60 quadrants evaluated, records were obtained in 32 quadrants, 49 subquadrants out of 115 evaluated, and 78 transects out of 345. During the surveys, 2 Andean bears were sighted in the Alto Vedon La Plata

and Alto Cauca sectors. The species presented a probability of occupancy of 98.95% (standard error = 0.0349) and a probability of detection of 26.96% (standard error = 0.0255, AIC = 394.80). Within the models generated with the sampling covariates, the presence of food was related to species detection (AIC = 375.17; $\beta = 24.493181$, Standard error = 0.874240). Within site covariates, livestock ($\beta = -3.274000$, Standard Error = 1.250397) and crops ($\beta = -6.143312$, Standard Error = 3.906361) were the site covariates that most influenced Andean bear occupancy ($\psi = 53.04$). It was also observed that the covariates of presence of people and cattle showed a high correlation ($c = 0.7152$). It is important to mention that it is necessary to evaluate the occupation models with other covariates such as distance to roads, bodies of water, disturbed areas, slopes, which will be obtained by means of GIS.

We also published a communication on a possible attack of the Andean bear (*Tremarctos ornatus*) on the mountain tapir (*Tapirus pinchaque*), in order to provide information on the trophic ecology of both endangered species. This manuscript was entitled "What's on the menu? A presumed attack of Andean bear on a Mountain tapir at the Puracé National Natural Park, Colombia", which was published by Gustavo Pisso (researcher of this project The Rufford Foundation), Ignacio Lora (researcher of the Cali Zoo), Mauricio Vela (WCS researcher), Hector Pizo (PNN Puracé park ranger), Isaac Bedoya (head of PNN Puracé) and Hector Ramirez (researcher at the University of Caldas and The Rufford Foudantion grantee), in the journal Neotropical Biology and Conservation 16(1): 19-25 (2021)

(<https://www.researchgate.net/deref/https%3A%2F%2Fdoi.org%2F10.3897%2Fneotropical.16.e57140>, DOI: <https://neotropical.pensoft.net/article/57140/>). In this manuscript acknowledgments were given to The Rufford Foundation for financial support of this project.

Aspects of conservation:

For the identification of areas with presence of negative interactions between Andean bear and rural communities, we developed an information matrix based on data requests to the Cauca environmental authority (CRC), the PNN Puracé team and CAM. Information was obtained from the CRC and the CAM affirmed that there have been no Andean bear attacks in their jurisdiction. The requested records were made since 2010, however, they were shared from 2016 to 2019. During the year 2019 to 2021, we have been requesting support from the CRC to carry out sound deterrent scares in conjunction with the PNN Puracé team, which have been systematized within the data matrix to date.

Forty-two reports have been obtained, which include geographic and temporal information, as well as information related to the attack, such as the description of the event and the names of the people affected. With these results, we observed that most of the area of influence of Puracé NP has presented negative interactions between the Andean bear and rural communities, highlighting Sotará and Puracé among the municipalities with more attacks on cattle. Of these, we selected two farms whose owners presented more than one attack on their cattle; they were interviewed during visits by us and the PNN Puracé team and were the closest farms to the natural cover of the protected area's zone of influence within the municipality of Sotará.

These farms correspond to La Palma of Mr. Libardo Muñoz in the town of San Roque (2° 9'12.65 "N - 76°37'0.84 "W, 3225 a.s.l), which has an extension of 8.66 hectares in the productive area and 8.33 hectares in the conservation zone. The second farm, owned by Mr. Mario Mosca, is located in the town of Piedra León (2°11'44.31 "N - 76°33'37.43 "W, 3351 a.s.l), with a productive area of 32 hectares and 43.4 hectares in the conservation zone. Both farms were equipped during the month of September, with a solar panel system to obtain electricity and to implement electric fences, seeking to isolate the forest edges of the paddock and providing this service to the two people. Each solar panel consisted of a solar panel 190w 12v monocristallini, 12v 100a sealed deep cycle battery, charge controller 30a kld, solar cabinet, lightning diverter, electric blade, 12V impeller, 3 rods of 12", wiring and connectors. For Mr. Mario Mosca's farm, a conservation agreement was signed, where he committed himself to avoid the expansion of the agricultural frontier around his property, to provide the isolation wire and labor and to make available a 13 ha plot of land for ecological restoration. 32 ha for passive ecological restoration, while with Mr. Libardo Muñoz it was agreed to maintain the 8.3 ha of native forests, isolate the banks of the water bodies, and 2000 meters of wire were delivered to isolate the pastures, which were donated by the CRC. This initial strategy seeks to prevent cattle from entering the forested areas and reduce encounters with the Andean bear by installing camera traps on the trails that have been used by the Andean bear in preliminary attacks, in order to show the presence of the species and the date of the sighting, and to determine whether or not new attacks have occurred. It is important to mention that these conservation agreements were endorsed by each of the landowners, the head of PNN Puracé and the director of the Ecohabitats Foundation, where the support obtained by The Rufford Foundation was described.

On the other hand, the project "conservamos la vida" (WCS) will establish 6 land management experiences focused on the conservation of the Andean bear, 4 of which have been proposed for the municipality of Puracé and 2 for the municipality of Sotará, where we provided the information from the database of our project in order to define the potential areas for intervention. It is worth noting that WCS conducted a socioeconomic characterization with those affected by Andean bear attacks on their livestock and crops in a locality for the municipalities of Puracé and Sotará.

A XENYX Q1202USB sound console was also provided to the radio station "Jukumari (Quechua name for the Andean bear) stereo", which is managed by one of the park rangers of PNN Puracé in the southwestern part of the protected area. The radio station committed to publish radio spots alluding to the conservation of the Andean bear and generate radio programs related to the Andean bear. It should be noted that several Andean bear individuals have been sighted in this area within Puracé NP.

Finally, we would like to conclude that the different activities mentioned above and proposed for the development of the project would not have been possible without the financing of the Rufford Foundation, for which we are very grateful for this support.