

## Project Update: July 2023

Our project "Ecological connectivity and seasonal habitat use: understanding hummingbird altitudinal movement to guide conservation of high Andean ecosystems in Colombia" supported in part by a Rufford Small Grant has now been running for over a year, in which we have collected data in the field, started analyses, set up an animal tracking system in collaboration with a local official environmental authority, developed workshops and engaged a variety of stakeholders in the project.

More specifically, we monitored hummingbird occurrence and abundance in Chingaza National Natural Park and surrounding private reserves in its area of influence so that we covered both paramo and high Andean forest ecosystems. In our main site within the park, we also monitored flower phenology throughout the year. In addition, when capturing hummingbirds, we collected pollen from their bodies (294 individuals from 16 species) and directly from plants to construct an atlas (53 species) that will allow us to morphologically identify plant species using a microscope. From the birds, we also collected blood samples (169 samples from 16 species) and extracted DNA to send off for RADseq (95 samples initially). With individual sequences we will calculate genetic diversity and gene flow between populations.

To track patterns of local hummingbird movement, we set up an automated telemetry grid (Cellular Tracking Technologies - CTT) in our main study site (covers ~1 km<sup>2</sup>) and calibrated the system to estimate the position of animals within the grid. We have now attached radio tags to 10 hummingbirds of two species (great sapphirewing - *Pterophanes cyanopterus* and bronze-tailed thornbill - *Chalcostigma heteropogon*), generating millions of data points (intervals of 2 or 60 seconds depending on the tag). Given that this system has been installed within the protected area, it provides the opportunity to generate animal movement data for other species and is now being incorporated into the park's plans to study other small animal species too (rodents, reptiles, amphibians, other birds).

The National Parks of Colombia have been closely involved in the project, and we have worked on capacity building with the park rangers and shared the information generated until now so it may be used in their management strategies. We held a workshop to train park rangers in using the automated telemetry system and analysing radio signal data. We also organised a 4-day workshop on pollination in high mountain ecosystems in the area. This workshop involved the park rangers, owners of external private reserves and 23 researchers from national and international institutions. In addition, we have engaged nine natural sciences students in the project who have been trained for and have actively participated in fieldwork.

Upcoming project tasks include the analyses of collected data, development of ecological connectivity models and publications, outreach activities and further integration of stakeholders (national park, private reserves and local communities) to share major findings. We emphasise that one of the most significant triumphs of this project until now is that it has grown to become a more long-term monitoring effort that will be continued by researchers, Chingaza National Natural Park and private reserve owners.



