

Don Oso Program Develops Participatory Monitoring Protocol for Andean Bears in Southern Sangay National Park, Ecuador

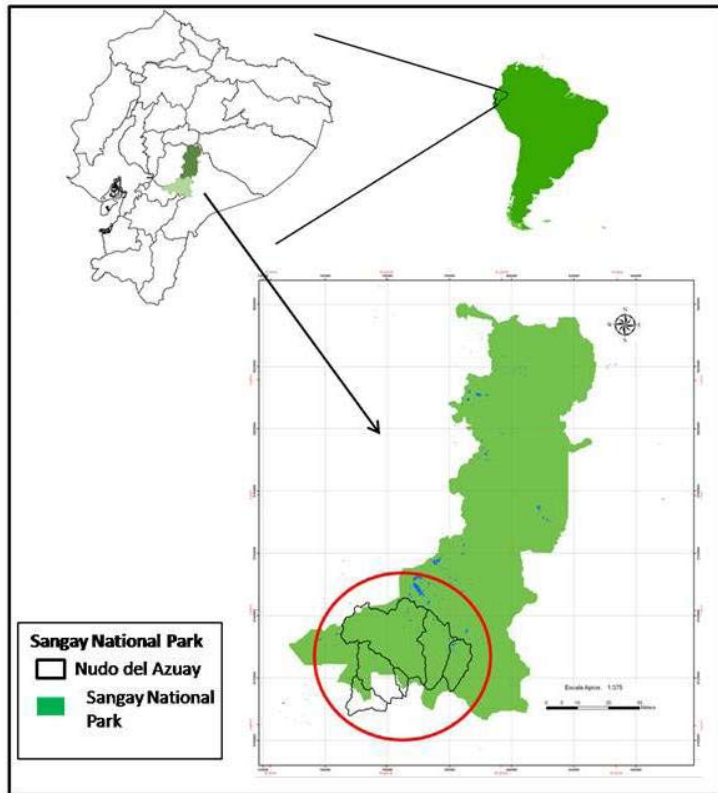
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The 96,000 ha study area, locally referred to as the "Nudo del Azuay" range, includes public lands as well as private in holdings that are within and adjacent to southern Sangay National Park, Ecuador

The Don Oso Program is a holistic, long-term approach to conserving the Andean bear within and near the southern boundary of Sangay National Park, Ecuador. The bear is our flagship species for conservation of montane forests and tropical páramos due to its vulnerable conservation status (Goldstein et al. 2008), large habitat requirements (Peyton 1999), symbolic role in Andean culture, as well as its damage to crops and livestock, all of which make it controversial and important to communities and park officials alike.

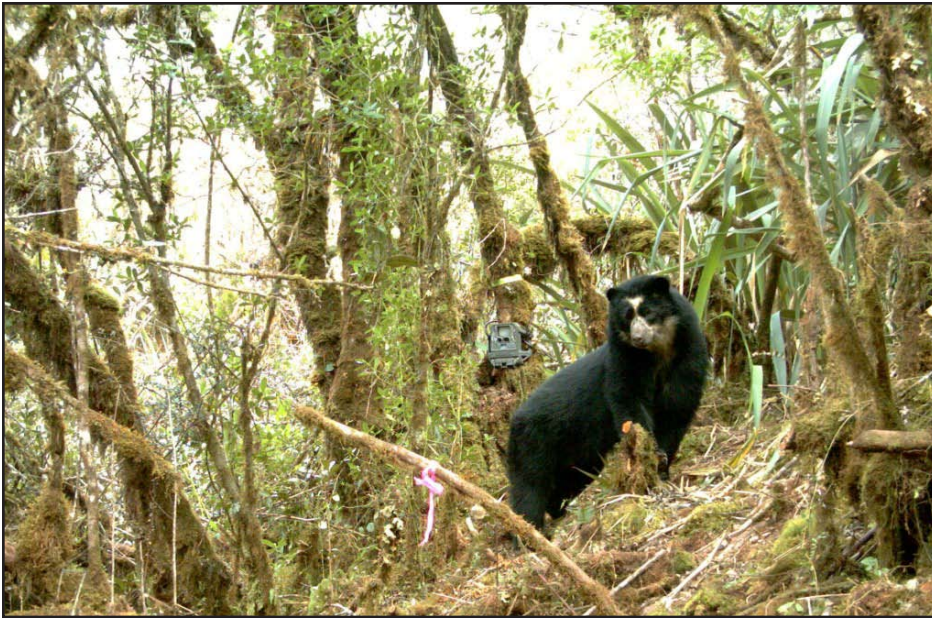
The program forms part of a long-term and ongoing collaboration between an Ecuadorian non-profit organization (Fundación Cordillera Tropical (FCT)), a U.S. university research group (Carnivore Coexistence Lab (CCL)) at the University of Wisconsin-Madison, officials of Sangay National Park (SNP), and communities within and adjacent to the park. Created in 2002, the Don Oso Program includes 4 principal initiatives to engage local landowners and communities in efforts to study and protect the bear: (i) environmental education and bear awareness; (ii) scientific research on bear biology; (iii) capacity building for locals as para-biologists; and (iv) interventions to reduce human/wildlife conflicts.

SNP may be one of the best remaining habitats for the endangered Andean bear in Ecuador: it is the 4th largest terrestrial protected area in the country and believed to contain a significant resident bear population (Suárez 1999, Kattan et al. 2004). However, throughout the bears' range a mere 18% of their habitat is within protected areas (Castellaños et al. 2010). It is clear that the conservation of Andean bears cannot be guaranteed within protected areas alone. In SNP, Andean bears frequently encounter people from local communities and private lands as human incursions reach further into their habitat. Consequently, successful conservation must assure their survival within a complex matrix of public and private lands and heterogeneous land uses.

Since mid-2007, FCT has worked to develop a program of economic incentives for conservation on private lands. The Foundation is the principal architect of a novel 2009 Conservation Agreement between a local indigenous community and a downstream hydroelectric company. In exchange for the conservation of hydrological resources as well as the exceptional

Bear Specialist Group

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Andean bear photo-captured in camera trap

biodiversity on 1,935 ha of communally-owned montane forest, the company will construct and equip a new cheese factory in the community. Concurrent with these efforts, FCT partnered with a national initiative led by Ecuador's Ministry of Environment called Socio Bosque, aimed at providing private landowners and indigenous communities with direct remuneration in return for the conservation of native habitats. These programs are conserving ~2,500 ha of tropical montane evergreen forest and páramo landscapes throughout the southern region of Sangay National Park.

The continuing credibility of these incentives depends on showing a causal link between the economic incentive and improvements in the status of bears on participating

private lands. Our community-based monitoring program pairs scientific monitoring with community capacity building. Scientifically robust indicators of conservation impact usually require comparing a participating property with a non-participating control that is similar in all other aspects (Ferraro & Pattanayak 2006). Achieving this level of rigor, however, is often difficult in practice due to economic and time constraints.

We initially aimed to use photo-captures to compare the status of bears on participating and non-participating properties; however, limited participation in the conservation programs hampered our ability to draw inferences about the effectiveness of economic incentives for conservation. Our current work aims to show the effectiveness of camera-trapping to ascertain bear use of multiple private properties.

Individual Identification of Andean Bears

Monitoring individually identifiable bears over time confirms individual persistence and may enable estimation of density and range size. More detailed knowledge of factors affecting the detection probability of this elusive animal would help conservationists determine the best sites for monitoring.

Monitoring sites were located on private and communally-owned properties that include both participants and non-participants in the conservation programs. Property sizes ranged from 100 to 5,000 ha with <20% of each participating property dedicated to agricultural or pastoral uses. Participating properties bordered adjacent private properties with varying degrees of conservation as well as untitled lands of SNP. We selected camera trap sites that had bear sign in the vicinity: food remains, claw marks, scat and/or footprints. All sites were located along well-used wildlife trails within montane forest.

In 2008, Zug (2009) deployed 17 camera-trap stations for 2,472 trap-nights, yielding 28 individual bear visits. Five individuals were identified, but many photo-captures were partial shots of bear feet, paws, or chest that did not enable individual identification. In 2009, Jones (2010) monitored the area for 899 trap-nights



CCL staff teach community park guards to arm cameras at trap site. Left to right: Fabian Tamay (park guard), Marco Pesantez (park guard), Becky Zug (CCL)

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and photographed bears during 11 visits and identified seven individuals, two of which had been detected in 2008. In 2008, when one camera was deployed at each station, only 25% of bear visits resulted in individual identification. However, when two cameras were deployed at each station, we increased individual identification to 87%. In 2010–2011, we photographed bears during 182 visits at 10 stations (100%) during 1,321 trap nights. Cameras photo-captured bears during 0600–1700 h, supporting previous findings that Andean bears are diurnal in at least two populations (Paisley and Garshelis 2006, Zug 2009, Jones 2010).

Replicable individual identification has served as a cornerstone of this project. We began by constructing a composite sketch of each bear that visited a trap station and later created a written list of *key* identification features. Secondly, we developed a systematic method for comparison whereby multiple photos were considered the same bear if at least three characteristics matched. Finally, to alleviate observer bias, we asked independent reviewers to repeat the first two steps without fore-knowledge of our team's identifications.

Training Para-biologists

The methods pioneered by our team during 2008–2009 enabled us to expand the project to include new private properties across a larger landscape in 2010. Concurrent with our project expansion, we focused on camera-trap training for local community para-biologists, FCT staff, and local university students. We believe that training local conservation stewards may be one way to assure the long-term conservation of Andean bears. Since September 2010, we have invested >100 hours per month in training. In turn, locals have trained FCT and CCL staff in the identification of bear signs in the forest. The initial results demonstrate a viable method for structuring bi-national conservation partnerships.

Rainforest Alliance recognized the USFWS-funded Don Oso program as the Eco-Initiative of the month in December 2010. This recognition along with our initial successes suggest that training locals in field science may be a model for ensuring long-term conservation of threatened species. The program has a firm grounding in science, conducted by both foreign and national wildlife conservation experts, and also makes a long-term commitment to local capacity building and environmental education. We perceive that training local people as scientists builds both acceptance and support of conservation, and sets up these local scientists to become the primary interlocutors between researchers and their communities.

For more information about Fundación Cordillera Tropical, please visit www.cordilleratropical.org. For more information about the Carnivore Coexistence Lab at the University of Wisconsin-Madison, please visit <http://www.nelson.wisc.edu/people/treves/>.

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