



Using Camera Traps to Study Andean Bears (*Tremarctos ornatus*) on Private Lands within Sangay National Park, Ecuador

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Background

Retailer killing of Andean bears (*Tremarctos ornatus*) due to livestock predation and crop raiding is one of the greatest threats to the long-term viability of its populations. Human tolerance for Andean bear presence on private lands is critical to protect protected areas and ensure the long-term survival of the species. In order to conserve viable populations of Andean bears and ensure their well-being, the conservation community to protect property and livelihoods non-violently while gaining a sense of ownership of the bears and their habitat.

To achieve this we are conducting a seven-month camera-trapping study of Andean bear presence within the contiguous cloud forest on two types of property on the southern edge of Sangay National Park (see map below). These properties include a single-owner estate ranch and indigenous, community-owned and managed lands (Comunidad).

Camera traps were originally developed for hunters but have been adapted for use by wildlife biologists throughout the world [2]. As Andean populations are known for their ornate facial markings we will use these markings along with other distinct features captured on film to identify individual bears [3] and develop a capture history for each animal. We have adopted methods for positioning camera traps and analyzing photos and logs after those used by wildlife biologists for similar cryptic species throughout the world [4].

This research is a first step toward conserving Andean bears on private lands encompassed within the boundaries of Sangay National Park (Ecuador) in 1992. This study aims to determine what portion of these lands are occupied by bears and ultimately how this may contribute to human-bear conflicts in this area.

Methods

Beginning in June 2008, 17 camera traps were placed within an eight square kilometer sampling grid. Camera trap locations were selected based on evidence of bear activity and within a representative sample of habitat in the area, including open plains due to access to bear triggers. Camera trap sites were surveyed for major topographic and vegetation characteristics along with proximity to human activity. This data will later be used to help identify patterns of occupancy and potential for conflict.

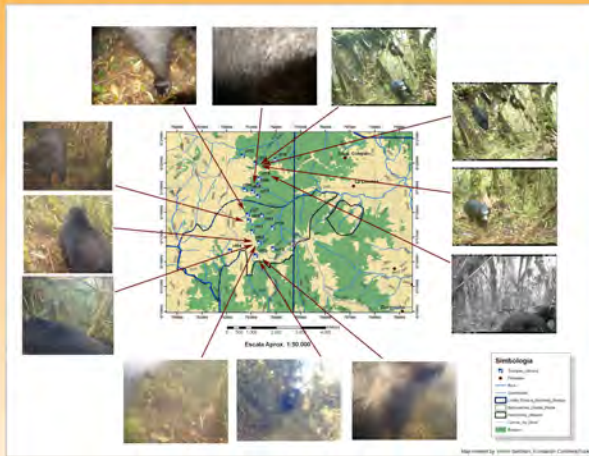
Two camera trap models were used: 10 CamTraker Digital Rangers and seven Reconyx PC35. Each camera trap station consists of one camera trap with a solar attendant ("sun") to increase the probability of a clear picture of the individual bear's ornate facial patterns. These patterns can be used to help identify individuals and to develop capture histories for the bears in the area. Each station is visited once a month to download pictures, change batteries and adjust the sun.

This study is scheduled to continue until December 2008.



Location

Sangay National Park (SNP), the largest wild area in Ecuador's eastern Andean mountain range [5] is one of only seven protected areas in Ecuador large enough to sustain a viable population of Andean bears [6]. In 1992, the park boundaries were almost doubled and extended over pre-existing forest lands. Our area of research includes a number of these private and communal forest lands.



Biogeology

Campesino (private)
 Comunidad (indigenous)
 SNP (Sangay National Park)
 SNP (Sangay National Park)
 SNP (Sangay National Park)
 SNP (Sangay National Park)
 SNP (Sangay National Park)
 SNP (Sangay National Park)
 SNP (Sangay National Park)

Identifying Individual Bears

Identifying individual bears will help in assembling several pictures of the animal's face, head and chest to collect significant markings. Based on our initial results, it appears it will be easier to identify bears as "different bears" rather than as "the same bear." If resources permit, using two or three camera traps at each camera trap station would make identifying individual bears easier.



We use hair patterns on the following key areas to help differentiate individuals:

- T-shaped pattern between and around the eyes
- Backs or on front of the ears
- Sides of muzzle
- Under chin
- Chest

The photos on the left are from two different triggers at the same camera trap site (CT14). We suspect the bears in the pictures are the same but the photos on the far left is too blurry to make a positive ID.

The center picture (CC5) and the pictures on the right (CT15) will help us build a database of characteristics for individual bears.



Camera Trap Model Comparison

| Model | Resolution | Image Size | File Format | Storage Capacity | Battery Life | Trigger Speed | Photo Quality | Video Quality | Price |
|--------------------------|------------|------------|-------------|------------------|--------------|---------------|---------------|---------------|--------|
| CamTraker Digital Ranger | 640x480 | 1280x1024 | JPG | 16GB | 1-2 months | 0.5 sec | Good | None | ~\$150 |
| Reconyx PC35 | 640x480 | 1280x1024 | JPG | 16GB | 1-2 months | 0.5 sec | Good | None | ~\$150 |

Preliminary results

Since August 2008, bears have visited seven camera trap stations on a total of twelve occasions. Individual identification of bears has been difficult due to partial face and/or chest white, blurred images or pictures of the body without any identifiable markings. One of the most exciting features of pictures include what appears to be a female bear and a cub (see below).

The bears seem to be very curious about the camera traps and have checked on the cameras on several occasions. To date, only one camera trap has been destroyed by the bears.

In addition to providing a non-invasive method to identify individual bears, camera trapping has the added benefit of providing photographs of other animals. One other species of mammal has been identified at various camera trap stations throughout the study area (see below).

Data collection is scheduled to finish in December 2008. We'll begin full analysis of the results in January 2009.



Additional species identified by camera traps

| Species | Location | Photo ID | Date |
|-------------|----------|----------|----------|
| Andean Bear | CT14 | CC5 | 10/10/08 |
| Andean Bear | CT15 | CT15-1 | 10/10/08 |
| Andean Bear | CT15 | CT15-2 | 10/10/08 |
| Andean Bear | CT15 | CT15-3 | 10/10/08 |
| Andean Bear | CT15 | CT15-4 | 10/10/08 |
| Andean Bear | CT15 | CT15-5 | 10/10/08 |
| Andean Bear | CT15 | CT15-6 | 10/10/08 |
| Andean Bear | CT15 | CT15-7 | 10/10/08 |
| Andean Bear | CT15 | CT15-8 | 10/10/08 |
| Andean Bear | CT15 | CT15-9 | 10/10/08 |
| Andean Bear | CT15 | CT15-10 | 10/10/08 |
| Andean Bear | CT15 | CT15-11 | 10/10/08 |
| Andean Bear | CT15 | CT15-12 | 10/10/08 |
| Andean Bear | CT15 | CT15-13 | 10/10/08 |
| Andean Bear | CT15 | CT15-14 | 10/10/08 |
| Andean Bear | CT15 | CT15-15 | 10/10/08 |
| Andean Bear | CT15 | CT15-16 | 10/10/08 |
| Andean Bear | CT15 | CT15-17 | 10/10/08 |
| Andean Bear | CT15 | CT15-18 | 10/10/08 |
| Andean Bear | CT15 | CT15-19 | 10/10/08 |
| Andean Bear | CT15 | CT15-20 | 10/10/08 |
| Andean Bear | CT15 | CT15-21 | 10/10/08 |
| Andean Bear | CT15 | CT15-22 | 10/10/08 |
| Andean Bear | CT15 | CT15-23 | 10/10/08 |
| Andean Bear | CT15 | CT15-24 | 10/10/08 |
| Andean Bear | CT15 | CT15-25 | 10/10/08 |
| Andean Bear | CT15 | CT15-26 | 10/10/08 |
| Andean Bear | CT15 | CT15-27 | 10/10/08 |
| Andean Bear | CT15 | CT15-28 | 10/10/08 |
| Andean Bear | CT15 | CT15-29 | 10/10/08 |
| Andean Bear | CT15 | CT15-30 | 10/10/08 |
| Andean Bear | CT15 | CT15-31 | 10/10/08 |
| Andean Bear | CT15 | CT15-32 | 10/10/08 |
| Andean Bear | CT15 | CT15-33 | 10/10/08 |
| Andean Bear | CT15 | CT15-34 | 10/10/08 |
| Andean Bear | CT15 | CT15-35 | 10/10/08 |
| Andean Bear | CT15 | CT15-36 | 10/10/08 |
| Andean Bear | CT15 | CT15-37 | 10/10/08 |
| Andean Bear | CT15 | CT15-38 | 10/10/08 |
| Andean Bear | CT15 | CT15-39 | 10/10/08 |
| Andean Bear | CT15 | CT15-40 | 10/10/08 |
| Andean Bear | CT15 | CT15-41 | 10/10/08 |
| Andean Bear | CT15 | CT15-42 | 10/10/08 |
| Andean Bear | CT15 | CT15-43 | 10/10/08 |
| Andean Bear | CT15 | CT15-44 | 10/10/08 |
| Andean Bear | CT15 | CT15-45 | 10/10/08 |
| Andean Bear | CT15 | CT15-46 | 10/10/08 |
| Andean Bear | CT15 | CT15-47 | 10/10/08 |
| Andean Bear | CT15 | CT15-48 | 10/10/08 |
| Andean Bear | CT15 | CT15-49 | 10/10/08 |
| Andean Bear | CT15 | CT15-50 | 10/10/08 |
| Andean Bear | CT15 | CT15-51 | 10/10/08 |
| Andean Bear | CT15 | CT15-52 | 10/10/08 |
| Andean Bear | CT15 | CT15-53 | 10/10/08 |
| Andean Bear | CT15 | CT15-54 | 10/10/08 |
| Andean Bear | CT15 | CT15-55 | 10/10/08 |
| Andean Bear | CT15 | CT15-56 | 10/10/08 |
| Andean Bear | CT15 | CT15-57 | 10/10/08 |
| Andean Bear | CT15 | CT15-58 | 10/10/08 |
| Andean Bear | CT15 | CT15-59 | 10/10/08 |
| Andean Bear | CT15 | CT15-60 | 10/10/08 |
| Andean Bear | CT15 | CT15-61 | 10/10/08 |
| Andean Bear | CT15 | CT15-62 | 10/10/08 |
| Andean Bear | CT15 | CT15-63 | 10/10/08 |
| Andean Bear | CT15 | CT15-64 | 10/10/08 |
| Andean Bear | CT15 | CT15-65 | 10/10/08 |
| Andean Bear | CT15 | CT15-66 | 10/10/08 |
| Andean Bear | CT15 | CT15-67 | 10/10/08 |
| Andean Bear | CT15 | CT15-68 | 10/10/08 |
| Andean Bear | CT15 | CT15-69 | 10/10/08 |
| Andean Bear | CT15 | CT15-70 | 10/10/08 |
| Andean Bear | CT15 | CT15-71 | 10/10/08 |
| Andean Bear | CT15 | CT15-72 | 10/10/08 |
| Andean Bear | CT15 | CT15-73 | 10/10/08 |
| Andean Bear | CT15 | CT15-74 | 10/10/08 |
| Andean Bear | CT15 | CT15-75 | 10/10/08 |
| Andean Bear | CT15 | CT15-76 | 10/10/08 |
| Andean Bear | CT15 | CT15-77 | 10/10/08 |
| Andean Bear | CT15 | CT15-78 | 10/10/08 |
| Andean Bear | CT15 | CT15-79 | 10/10/08 |
| Andean Bear | CT15 | CT15-80 | 10/10/08 |
| Andean Bear | CT15 | CT15-81 | 10/10/08 |
| Andean Bear | CT15 | CT15-82 | 10/10/08 |
| Andean Bear | CT15 | CT15-83 | 10/10/08 |
| Andean Bear | CT15 | CT15-84 | 10/10/08 |
| Andean Bear | CT15 | CT15-85 | 10/10/08 |
| Andean Bear | CT15 | CT15-86 | 10/10/08 |
| Andean Bear | CT15 | CT15-87 | 10/10/08 |
| Andean Bear | CT15 | CT15-88 | 10/10/08 |
| Andean Bear | CT15 | CT15-89 | 10/10/08 |
| Andean Bear | CT15 | CT15-90 | 10/10/08 |
| Andean Bear | CT15 | CT15-91 | 10/10/08 |
| Andean Bear | CT15 | CT15-92 | 10/10/08 |
| Andean Bear | CT15 | CT15-93 | 10/10/08 |
| Andean Bear | CT15 | CT15-94 | 10/10/08 |
| Andean Bear | CT15 | CT15-95 | 10/10/08 |
| Andean Bear | CT15 | CT15-96 | 10/10/08 |
| Andean Bear | CT15 | CT15-97 | 10/10/08 |
| Andean Bear | CT15 | CT15-98 | 10/10/08 |
| Andean Bear | CT15 | CT15-99 | 10/10/08 |
| Andean Bear | CT15 | CT15-100 | 10/10/08 |

Literature cited

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