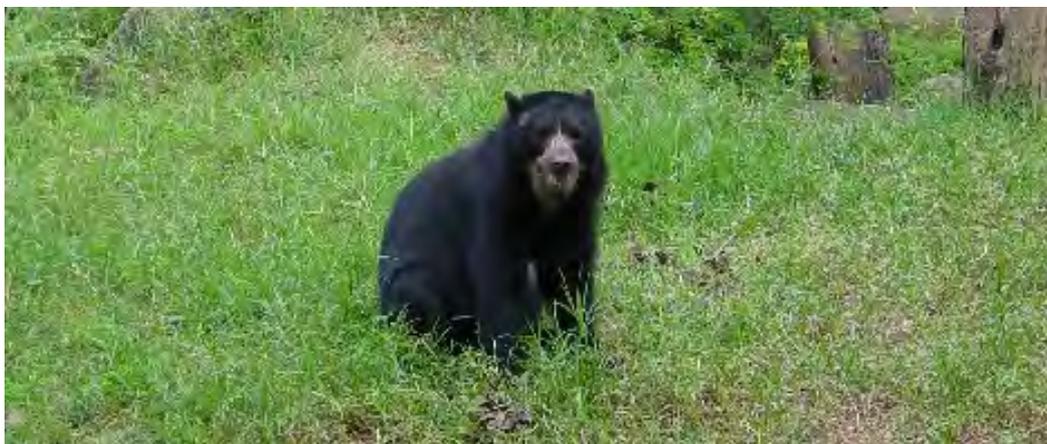




**APPLIED RESEARCH AND CONSERVATION FOR
ANDEAN BEARS: BUILDING CAPACITY
TO SURVEY AND MONITOR ANDEAN BEARS
IN COLOMBIA**

**FINAL REPORT
TO THE
INTERNATIONAL ASSOCIATION FOR BEAR RESEARCH AND MANAGEMENT
FROM THE
WILDLIFE CONSERVATION SOCIETY (WCS)**

JULY 2009



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Principal Investigator: Robert Márquez

Grant Award: \$4,970

Award Start Date: April 2008

Award End Date: May 2009

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EXECUTIVE SUMMARY

The Andean, or spectacled, bear (*Tremarctos ornatus*) is Latin America's only bear species. Over the past several decades, deforestation, forest fragmentation, and poaching have threatened Andean bear populations; recent estimates suggest that less than 18,000 bears survive in the wild today, many surviving in patches that may be too small to sustain them in the long-term. Local and regional management activities are undoubtedly needed to conserve the species. However, the specific distribution of Andean bear populations is largely unknown, as are the effects of major threats affecting these populations. In Colombia, governmental organizations are already committed to initiating a long-term program to study and monitor Andean bear populations in some of the largest protected areas, but do not have highly-trained personnel to collect the required information.

In order to more accurately determine the location and number of Andean bear populations and guide conservation efforts accordingly, the Wildlife Conservation Society (WCS) leads a bear conservation program in Colombia, the first phase of which focuses on building local capacity to survey and monitor the Andean bear in the Colombian Andes. Therefore, WCS is carrying out a series of workshops and supervised surveying activities to train personnel from governmental and non-governmental organizations. By training park rangers and other individuals in ecology and bear sign recognition, WCS seeks to enhance the ability of each organization to gather information on Andean bears in different areas across the country. This information will serve as a basis for conservation plans for the species and its habitat in various areas, including some of Colombia's national parks.

With support from the U.S. Fish and Wildlife Service, the International Association for Bear Research and Management (IBA), and the Build-a-Bear Workshop Foundation, WCS conducted four workshops in the National Parks of Chingaza and Tatamá where 72 rangers were trained from various groups: thirteen national parks, two flora and fauna sanctuaries, eight regional environment authorities, four non-governmental organizations, and a public services company. Participants were trained in "Scientific Inquiry," a participatory research methodology, to help them formulate research questions in response to concerns raised by local people, park rangers, and visitors. One advantage of this methodology is that research questions are generated in light of local logistical capacities, environmental characteristics, socio-economic aspects and local threats. After defining a series of research questions, participants applied specific methodologies to successfully answer each question, with WCS staff providing the necessary tools.

Support from IBA also aided three capacity-building expeditions in the National Parks of Chingaza, Las Orquideas, and the Regional Natural Park of El Duende, as well as two short capacity-building explorations in the National Parks of Chingaza and Tatamá. Twenty-four rangers from national parks, regional environment authorities, non-governmental organizations, and a public services company were accompanied by WCS staff on these expeditions, which allowed them to further develop the skills acquired during the workshops, as they developed tailored data collection tables to answer research questions using the “Scientific Inquiry” methodology. In addition to these activities, WCS staff are helping the Colombian National Parks Unit develop a national research and monitoring protocol for the Andean bear in Colombia, as well as specific monitoring plans for each of the National Parks participating in the capacity-building program.

INTRODUCTION

The Andean bear (*Tremarctos ornatus*) is one of the largest mammals (see photo at right), and the only bear in Latin America. Although they inhabit the Andes from Venezuela to Argentina, their specific distribution and natural history remains largely unknown. Andean bears are elusive creatures, inhabiting mostly high altitude *páramo* grasslands and dense cloud forests in steep, remote regions where they are rarely seen (Peyton 1999). Due to their size and habits, bears have some of the largest habitat requirements of all species in this region (Rodríguez *et al.* 2003). The Andean bears’ geographic range overlaps with areas of human settlement, which restricts its current distribution to protected areas and their buffer zones, where intact habitat still remains and human population densities are low (Rodríguez *et al.* 2003).



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An analysis of the northern Andes revealed that, although some large habitat blocks are still available, the current distribution of protected areas is insufficient to sustain viable populations of Andean bears in the long term (Kattan *et al.* 2004). In the Northern Andes, the bear survives in approximately 113 blocks of forest, most of which are too small to sustain a viable population (Kattan *et al.* 2004). In addition, only 50 percent of them are legally protected (Rodríguez *et al.* 2003). Unprotected areas clearly play a vital role in the survival of the species; however, threats such as poaching, habitat loss, and fragmentation are likely to be exacerbated in these locations (Peyton 1999, Rodríguez *et al.* 2003).

In Colombia, 75 percent of the human population is concentrated in the Andes. Consequently, forest available for supporting Andean bear populations is both greatly reduced and divided into less than 45 fragments larger than 10,000 kilometers (Kattan *et al.*

2004). Since few of these fragments are large enough to sustain a population in the long term, isolated populations inhabiting them face higher probabilities of extinction and lower chances of re-colonization, increasing the chance of local extirpations. The two greatest threats to Andean bear survival are the loss of habitat to agriculture and poaching by farmers, who are continuously settling in new *páramo* and cloud forest areas (Jorgenson and Sandoval 2005). The Andean bear is one of the species likely to disappear from the region unless immediate conservation actions are taken; however, baseline knowledge still needs to be gathered to inform any management decision.

Sound local and regional management plans are required. At the regional level, strategies to reconnect habitat patches should be considered, while at the local level, measures to reduce habitat loss and poaching should be instituted. In order to generate these management plans, field data must be gathered: initially, data on bear presence, habitat needs, and prevalent threats, but subsequently on Andean bear abundance, intra- and inter-genetic population structure, population dynamics, distribution of key prey and resource species for the bear, and the effects of climate change on each of these aspects. To initiate the process of data collection and conservation planning, we asked park rangers of the Colombian National Parks Unit (NPU) and Regional Environmental Authorities (REA) to gather data on Andean bear ecology, population status, and prevalent threats. These entities and their staff are the only ones capable of maintaining a long-term monitoring program on the species, inside and outside protected areas, as they are legally charged with ensuring that management plans are implemented, and can easily incorporate these monitoring activities into their daily routines.

The main goal of this project was to train and lead a core group of park rangers in a nationwide effort to collect data on Andean bears in key areas of the Colombian Andes, and set in motion a National Parks Unit of Colombia monitoring program on bear status and conservation. The specific objectives of this proposal were to:

- Conduct workshops to train rangers from governmental or non-governmental organizations in the recognition of bear signs (scratch marks, scats, hairs on tree bark, feeding and nesting sites), gathering of relevant site and landscape environmental information (forest age, patch size, distance to nearest human settlement), identifying threats, and,
- Conduct expeditions in priority areas to reinforce knowledge acquired during workshops.

CAPACITY-BUILDING WORKSHOPS (including Methodology)

WCS staff carried out four workshops (see photo at right) and three expeditions to train park rangers participating in the nationwide effort to determine the presence and status of Andean bears in key areas of the Colombian Andes, and set in motion NPU's monitoring program on bear



status and conservation. (Additional funds to carry out the three additional workshops and two expeditions not originally outlined in the grant proposal came from the U.S. Fish and Wildlife Service and the Build-a-Bear Workshop Foundation.)

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During each five-day workshop, we familiarized rangers with Andean bear natural history, survey and data collection techniques, and methodologies to formulate research questions and design monitoring programs.

The **first two days** of the workshop were divided into three stages:

- explaining Andean bear characteristics, ecology, and behavior, and illustrating the different types of signs left by bears;
- teaching trainees how to use maps and navigation equipment in the field, design routes and transects, and identify geo-position points; and
- teaching rapid survey and monitoring techniques.

The **third day** was dedicated to surveying at least six kilometers of transects in Andean bear habitat (see photo at right, ©R.Marquez-WCS).

To ensure that these surveys would be fruitful teaching exercises, WCS staff explored the workshop's geographical area ahead of time (National Parks of Chingaza and Tatamá; see short survey descriptions in the Explorations section below) to identify wild areas with sufficient Andean bear signs. During the surveys, trainees divided into small groups and practiced searching for Andean bear signs (trails, foot prints, feeding signs, scats, scratch marks, rubbing marks, resting sites, etc.) and differentiating them from signs left by other animals (felines, deer, large rodents, and weasels). WCS staff reviewed with each group the minimum evidence needed to confirm that the sign was made by bears (universal signal). During surveys, trainees gathered environmental data relevant to each site and landscape (e.g., forest age, patch size, distance to nearest human settlement), collected hair samples (for future genetic analyses), applied their navigation knowledge, and designed surveys and transects in the field.



The **two final days** were dedicated to the formulation of suitable research questions and the learning of specific methodologies to answer those questions. Research questions were developed through a participatory research approach known as “Scientific Inquiry,” which is, in short, a “means of asking and answering firsthand, as objectively and precisely as possible, a question about a small piece of one’s surroundings and then reflecting cautiously on the implications of the answer to the larger world” (Feinsenger 2001). This methodology is based on a simplification of the scientific method into a four-step process known as the “Inquiry Cycle”.

The Inquiry Cycle

1. Construct a question based on observations, curiosity, or preconceptions about one's own surroundings.
2. Take action to answer the question through a complete, well-designed study.
3. Analyze findings' implications, see how they can be extended to other circumstances, and assess what changes may be needed in the study's design.
4. Apply results, redefine original questions, construct new questions, and begin the process anew.

The simplicity of this methodology makes scientific thinking accessible to anyone, allowing us to identify and answer questions about our surroundings, based on knowledge acquired in everyday life.

After this methodology was explained, groups were created, with trainees from the same protected area, or areas with similar characteristics, placed together. Each group proceeded to formulate research questions for their respective area. Four criteria were established for these questions: each one must be obvious and direct, comparative, compelling, and possible to answer in a finite amount of time. The most obvious advantage of this approach is that people who are familiar with the areas develop the questions. They know the prevalent threats to the region, and its local conditions and limitations. Finally, questions were grouped and methodologies used to collect the information required to answer each set of questions.

RESULTS

Participants

The first two workshops were led by WCS staff members Robert Márquez, Alejandra Laina, and Isaac Goldstein (with the collaboration of Héctor Restrepo, a local independent Andean bear researcher) and took place in the Chingaza National Park. Robert Márquez and Alejandra Laina led the final workshop in the Tatamá National Park. All workshops were held between February and June 2008, and trained 72 rangers from national parks and other protected areas throughout the Colombian Andes, where Andean bears are expected to live (see Annex 1 for a participant list). Trainees included staff from:

1. The National Parks Unit (NPU) and Regional Autonomous Corporations (Regional Environmental Authorities or REAs)
 - a. Thirteen National Parks (See Figure 1)
 - b. Two Flora and Fauna Sanctuaries
 - c. Eight Regional Autonomous Corporations

2. Other relevant Non-Governmental Organizations (NGOs), companies, and academic institutions
 - a. Four NGOs (including the network of private reserves)
 - b. Aqueduct of Bogotá (public services company)
 - c. Universidad Nacional de Colombia

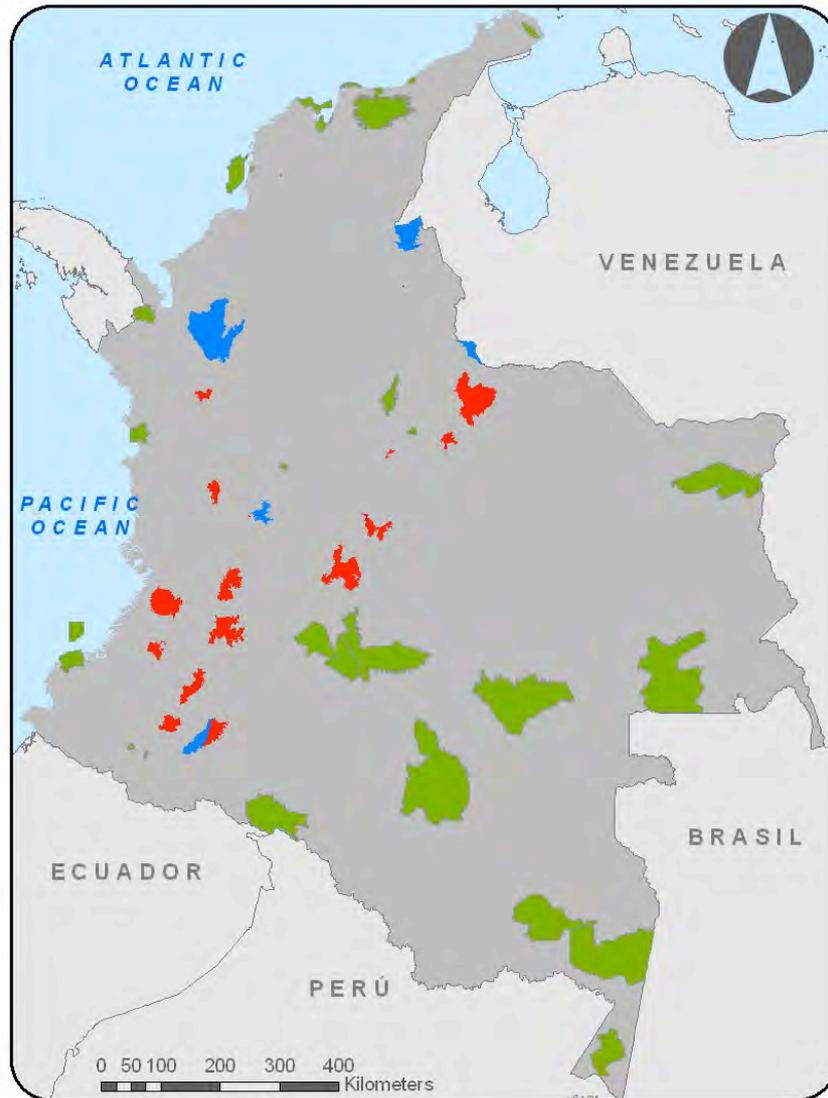


Figure 1. The green, blue, and red areas show the distribution of Colombian National Parks. The blue and red areas represent National Parks with Andean bear presence, and the red areas indicate National Parks whose park rangers were trained in our workshops.

In order to evaluate the immediate effectiveness of the workshops, participants completed a short quiz on field techniques and the natural history of Andean bears before and after each workshop. Correct answers increased by 45 percent after training.

Research Questions

Trainees formulated 21 questions about Andean bear populations for each of their areas. These questions can be grouped into eight themes and three general types:

1. **Conservation questions:** referring to threats created by human activity inside or near protected areas, including human presence, subsistence and conflict hunting, habitat fragmentation, and habitat loss.
2. **Distribution questions:** referring to the detailed distribution of Andean bears in protected and unprotected areas.
3. **Natural history questions:** referring to information about the ecology of the species and populations, including densities, diet, and habitat use.

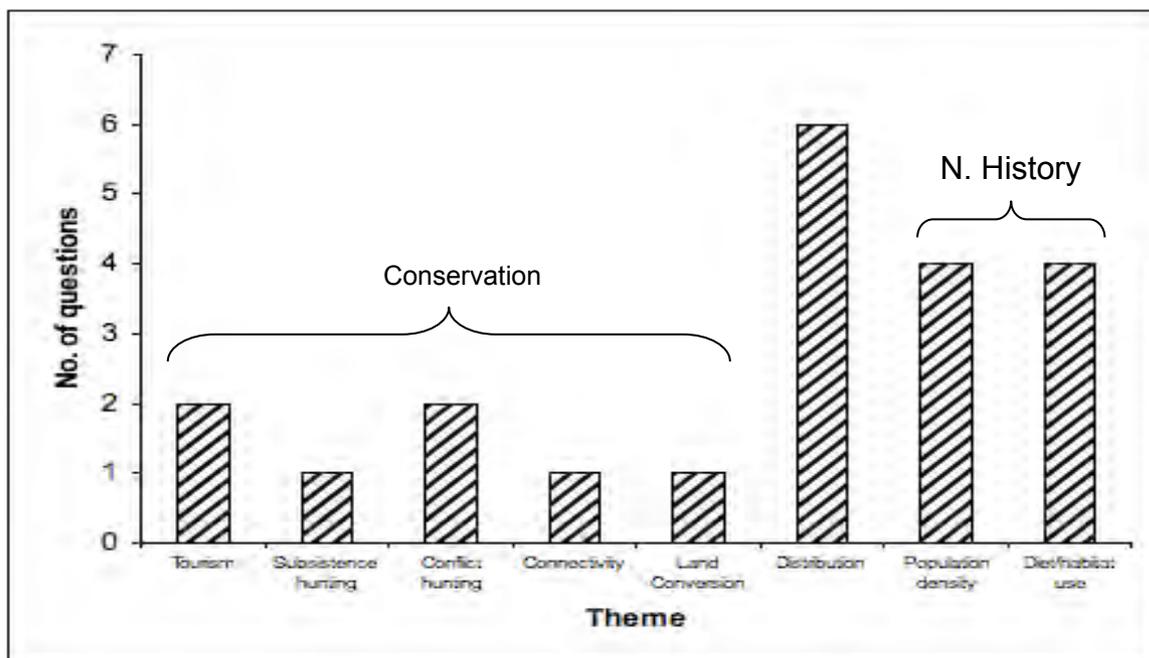


Figure 2. Number of questions formulated for each theme.

EXPLORATIONS (including Methodology)

In addition to the workshops, WCS conducted full-fledged expeditions for trainees to further reinforce the skills acquired during the workshops. Sites within three protected areas were selected based on the presence of potential bear habitat (predicted from vegetation and forest cover maps) and the relative accessibility for personnel who will conduct long-term monitoring activities. During the expeditions, standard methods for assessing bear presence and activity in each area were employed; including standardized transects to collect data about the location of scat, tree marks, nests, food remains, and other signs. Common measurements for describing the general area in which signs are found include vegetation cover, forest age, presence of human signs, and geographic position (determined by GPS or chart plus compass). In sites where human settlements occur in the vicinity of protected areas, farms that are near or inside the parks were visited. Interviews with local villagers were conducted to determine whether they had seen bears, how often (or when last seen), and if there had been any conflicts.

Each exploration had a maximum number of ten participants. In the first days of these expeditions, WCS emphasized the importance of fieldwork preparation, asking trainees to explain the research questions developed during the workshop for the specific area, describe the data required to answer the questions, and explain the methodology they would employ to collect data. Then, WCS staff worked with the trainees to design the data table for information collected during the explorations. Finally, the route for each exploration was selected and marked on maps. Initially, WCS trainers led the surveys, as well as data and hair sample collection. Later, trainees were allowed to guide the explorations. These explorations, which were also an opportunity to gather baseline information on Andean bear populations for each of the protected areas.

RESULTS

Throughout the capacity-building project, a total of five explorations were conducted in key protected areas, two short explorations (these lasted fewer than five days and were carried out just before the workshops) and three large explorations, lasting more than five days (see Table 1 below).

Date	Place	Organizations
December 4-8, 2007	Chingaza National Park (NP)	Chingaza NP University
June 11-13, 2008	Tatama National Park	Tatama NP and community
February 4-12, 2009	Chingaza National Park	Chingaza and Sumapaz NP, Corpoguavio
February 14-21, 2009	El Duende Regional Park	FEDENA, CVC
March 4-11, 2009	Orquídeas National Park	Orquídeas and Tatamá NP

Table 1. Expeditions conducted in national and regional parks.

Short expedition to Chingaza National Park (#1).

This protected area is located on the western slope of the Eastern Cordillera of the Colombian Andes. Robert Márquez led the exploration, with the participation of personnel from Chingaza National Park and an independent Andean bear researcher (see Annex 2 for participant list).

Four sites were explored: Las Ciervas, Troncos Negros, Carpantas, and Quebrada Los Chorros. (See three photos on this page, all ©R.Marquez-WCS.) Diverse Andean bear signs were recorded. The site with the most Andean bear signs was Las Ciervas, followed by Troncos Negros, Los Chorros, and Carpantas (see Table 2 below).



In Carpantas, we interviewed Jairo Garzón, who had recently lost four cows due to predation by an Andean bear. He stated that bears prey on cattle between the jurisdictions of Junín and Carpanta, staff from the Colombian National Parks Unit (NPU) and the Regional Environmental Authorities (REAs) operating in the region have gathered additional reports on conflict from this area. To date, villagers have only tried noise to stop Andean bear predation. The area has a clear need for meetings/workshops to discuss



human-bear conflict.



Area	Las Ciervas	Carpantas	Los Chorros	Troncos Negros
Andean Bear Sign				
Feeding sign	20		7	36
Tree marks	19			8
Scat	6			4
Resting site	5	1		1

Trails	1			6
Ground sign	1			
Total # of signs	52	1	7	55

Table 2. Andean bear signs found in four areas of the Chingaza National Park.



Park rangers standing in front of a claw-marked tree.
©R.Marquez-WCS

Short expedition to Tatama National Park (#2).

The exploration was led by Robert Márquez, with the participation of personnel from Tatama National Park and the local community. Although the park comprises both versants of the Western cordillera of the Colombian Andes, only sites on the eastern slope were explored. We surveyed two areas located in the northeastern side of the Park, near the Risaralda stream and the road to Pueblo Rico. No signs of recent Andean bear activity were found during this survey. Only four Andean bear signs on trees were found, with claw marks being the predominant sign.



Large expedition to Chingaza National Park (#3).

We conducted large surveys in two sub-sectors within the Chingaza National Park and on the eastern boundary of the Park. WCS's Robert Márquez and Isaac Goldstein led the exploration, with the participation of personnel from the Chingaza and Sumapaz National Parks and the REA Corpoguavio. Two preparatory days were used to discuss the Chingaza National Park's monitoring plan and specific research questions. Among other topics, participants discussed the additional species and objects that could be monitored, as well as the data collection for each of these species. Size and relative position of transect within the study area were stratified according to the area represented by each vegetation type and the sub-sector size, as well as the minimum area required to find Andean bear signs along transects, following the methodology used by WCS Andean Bear Program. Data tables were designed to collect information to monitor eight objects (Andean bear, *Agouti takzanousky*, *Odocoileus virginianus*, feral dogs, cattle, human activity, hunters, and fires).



In order to rapidly evaluate the methodology and data tables designed in the first two days, sub-sectors of Los Chorros and Laguna Las Bonitas were explored using ten-meter wide transects located along ridgelines (see above right photo, ©R.Marquez-WCS). Andean bear

presence was detected only in the Los Chorros sub-sector. Nevertheless, several signs from other objects were observed, and data on them was collected. Park rangers approved the methodology and data tables designed, and these will be used as models for other areas. Surveys were conducted over five days. The surveyed area on the eastern border covered an elevation range between 1,000 and 2,800 meters, and can clearly be classified in two covers: native forest in the sector within the National Park, and disturbed areas on the buffer zone outside the Park; these are private areas located on the Boyacá department. All transects were made along mountain ridgelines. During this survey, no signs of recent Andean bear activity were found.

Large expedition to El Duende Regional Park (#4).

This is a protected area unaffected by human disturbance, located in the mid-portion of the Western Cordillera of the Colombian Andes. The area was recently discovered and has been poorly explored. Only two visits are made per year to the area, coordinated by members of the local associations in charge of managing the park (FEDENA and ASODUENDE) and the REA for the Valle del Cauca. The exploration was led by Robert Márquez, who was accompanied by personnel from FEDENA, ASODUENDE, local community members, staff from the REA for the Valle del Cauca, and a WCS team composed of herpetologist Julian Velazco, botanist Yadi Toro, and ornithologists Mario Garces and Fernando Ayerbe (see Annex 2 for full participant list). The objective of this exploration was not only to collect information on Andean bears, but also on birds, frogs, and plants. The first day was dedicated to discussion of the objectives of the monitoring plan that had already been designed by the local associations, reviewing the specific research questions, and defining the methods to be used during these explorations.

Transects (to collect data on Andean Bear signs, birds, plants, and amphibians) were carried out from 9am to 5pm (see field team at right, photo ©R.Marquez-WCS). Although eight kilometers of transects were surveyed, only one sign of recent activity by Andean bears was found. It was scat of an unrecognizable bromeliad. Unfortunately, Robert Marquez had to be evacuated early due to appendicitis.



In contrast to the Andean bear results, much valuable information about birds, amphibians, and plants was gathered during the expedition. Confirming the presence of Andean bears roused everyone’s interest, thus people from local organizations in areas surrounding El Duende Regional Park are now interested in carrying out new expeditions.

Robert’s appendicitis deteriorated into peritonitis and he required additional operations, from which he is now recovering. In the field, WCS and NPU decided that some of the trainees (NPU park rangers from Chingaza) would carry out the next exploration.



Large expedition to Orquideas National Park (#5).

Personnel from the National Park Unit were trained in workshops and expeditions, and conducted surveys in

two sub-sectors of Orquídeas National Park, specifically in the Abriaqui municipality of the Antioquia Department (see photo at left, ©R.Marquez-WCS). The area is located on the western slope of the Western Cordillera of the Colombian Andes. The exploration was led by Adriana Cifuentes and Alirio García from Chingaza National Park (see photo at right ©R.Marquez-WCS), with the participation of personnel from Orquídeas National Park and the REA Corpouraba.

The objective of the exploration was to determine the Andean bear presence and distribution among corn crops. The selection of expedition areas was based on local security concerns (there has been armed conflict in the region), vegetation cover, and reports of bear-human conflicts. The first day was dedicated to designing and discussing research questions raised by staff from Orquídeas National Park and Corpouraba in order to define the methods that would be used to collect data. The next seven days were spent conducting surveys in the sectors of Alto el Junco and Alto Peña, and holding meetings with local communities affected by bear-human conflict.



During these surveys, the data table developed in the Chingaza National Park was modified slightly for use by Orquídeas National Park personnel. Several types of Andean bear signs were recorded, but not in a very high density. This may be due to the fact that most transects had to be conducted along well-established trails or along ridgelines, since other areas might contain land mines. Andean bear presence near corn crops and bear feeding signs on corn were confirmed (see photos at left and below, ©R.Marquez-WCS).

In that park learning The results and WCS of turning



reviewing Table 3, it becomes obvious rangers were able to observe and collect information on various bear signs, thus about their characteristics in the field. from this expedition are both important exciting, because they demonstrate that capacity-building activities are capable trainees into trainers.

Area	Alto Pena	Alto Junco – Lano Cosco	Los Huecos
Andean Bear Sign			
Feeding sign	1	2	5
Tree marks	4		

Scat	1		
Resting site	1		3
Trails			1
Ground sign	1		
Total # of signs	8	2	9

Table 3. Andean bear signs found in three areas at Orquídeas National Park.



In addition, interviews with local communities in the Abriaqui municipality were conducted to assess local feeling regarding Andean bears. In general, people that live in Abriaqui, which is part of the buffer zone of the Orquídeas National Park, accuse Andean bears of feeding on corn crops. Thus, the bear has a negative image in the region, which has resulted in retaliations against individual bears. Traditional subsistence hunting in this area generates additional bear deaths. In the last year, at least six bears were killed, and four have been killed this year (see bear claw at left, photo ©R.Marquez-WCS). Hunting is currently the only tactic for local people to avoid the damage caused by Andean bears, as they do not recognize the authority of national or regional environmental organizations, lack management alternatives to handle the conflict, are not aware of environmental laws, and do not have sufficient knowledge of Andean bear ecology and conservation status. This is another region that would benefit from a meeting/workshop on human-bear conflict.

OTHER RESULTS

The success of the capacity-building project was made evident during the second Andean Bear Symposium, held in Lima, Peru, in November 2008. The National Parks Unit, Chingaza National Park, and the REA CORPOCHIVOR were the only South American governmental organizations participating. During this event, these entities showcased their advances on two specific lines of research and the monitoring program (Table 4).

Table 4. Presentations made during the 2008 Andean Bear Symposium in Lima, Perú.

Organization	Title
Wildlife Conservation Society	Conservación del oso Andino: Generación de capacidades en las organizaciones gubernamentales de Colombia.
National Parks Unit of Colombia	Elaborando una estrategia para la conservación del oso Andino (<i>Tremarctos ornatus</i>) en Parques Nacionales Naturales de Colombia.
National Parks Unit of Colombia	Estrategia de comunicación y educación de parques nacionales naturales de Colombia para la conservación del oso Andino.
Chingaza National Park	Monitoreo de oso Andino y amenazas asociadas en el marco del programa de monitoreo del Parque Nacional Chingaza.

CORPOCHIVOR	Cambios y efectos del conocimiento y actitudes de comunidades educativas en torno al oso Andino a partir de la implementación de la herramienta de educación ambiental - Muestra itinerante, en tres zonas alto Andinas de Boyacá.
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The communications program of the National Parks Unit of Colombia created an educational video about the Andean bear capacity-building workshops. In this 13-minute video, a narrator speaks about the Andean bear project, the workshops, and the interaction between WCS and the NPU. The program also developed an educational comic book on the Andean bear.

Based on the results obtained during the workshops, explorations, and meetings, the National Parks Unit and WCS are currently working on the development of a National Monitoring Plan for Andean bears in protected areas, mainly National Parks. The plan includes a general country-level guide to obtaining information about the conservation status of Andean bear populations, their habitat requirements, and the threats they face. WCS is also helping several protected areas formulate specific monitoring plans which, to a great extent, will address the questions raised during the workshops.

Finally, WSPA, IBA, and WCS will carry out a national workshop on human-bear conflict management, in the Chingaza National Park, to be led by an international team of bear conflict experts, and directed toward all NPs and REAs currently reporting conflicts.

REFERENCES

- Cifuentes, A. 2009. Exploración de oso andino en la zona de amortiguación del Parque Nacional Natural Orquideas. Internal report WCS - National Park Unit. 17 pages.
- Feinsinger, P. 2001. Designing field studies for biodiversity conservation. Island Press, Washington, D.C. USA. 212 pages.
- Jorgenson, J. & S. Sandoval. 2005. Andean bear management needs and interactions with humans in Colombia. *URSUS* 16(1):108-116.
- Kattan, G., O.L. Hernández, I. Goldstein, V. Rojas, O. Murillo, C. Gómez, H. Restrepo and F. Cuesta. 2004. Range Fragmentation of the Spectacled Bear in the Northern Andes. *Oryx* Vol. 32(2):15-24.
- Peyton, B. 1999. Spectacled Bear Conservation Action Plan. Chapter 9 in: Ch. Servheen, S. Herrero and B. Peyton (compilers), *Bears. Status Survey and Conservation Action Plan*, IUCN/SSC Bear and Polar Bear Specialist Groups, Gland, Switzerland and Cambridge, UK, 157-198.

Rodríguez, D., F. Cuesta, I. Goldstein, A. E. Bracho, L. G. Naranjo & O. L. Hernández. 2003. Estrategia eco-regional para la conservación del oso andino en los Andes del norte. WWFColombia, Fundación Wii, EcoCiencia & Wildlife Conservation Society. Cali, Colombia.

Annex 1

Workshop Participant List

Park rangers and other staff trained during the four workshops conducted in the grant period.

Workshop Name	Organization	
1	Marco Pardo	Subdirección Técnica de Parques Nacionales
1	Juan Gaviria	Subdirección Técnica de Parques Nacionales
1	Natalia Florez	Subdirección Técnica de Parques Nacionales
1	Astrid Liliana Mosquera	PNN Puracé
1	Rodrigo Surria	PNN Puracé
1	Guillermo Medina	PNN Nevados del Huila
1	Antonio Andrade	PNN Nevados del Huila
1	Huber Pino	PNN Munchique
1	Eliécer Sánchez	PNN Hermosas
1	Carlos Cortes	PNN Guacharos
1	Rosendo Paramero	PNN Guacharos
1	Stella Sarria	PNN Farallones
1	José Guzmán	PNN Chingaza
1	John Edison Torres	PNN Chingaza
1	Libia Cifuentes	PNN Chingaza
1	Eduardo Niño	PNN Chingaza
1	Víctor Guevara	Acueducto
1	Freddy Saray	Acueducto
1	Oscar Raposo	Acueducto
1	Jhon Hernández	Acueducto
1	Liliana Andrea Martínez	Corporación Autónoma Regional de Guavio
1	Ricardo Rivera	Corporación Autónoma Regional de Guavio
1	Adin Muños	Corporación Autónoma Regional de Guavio
1	Germán Achury	Corporación Autónoma Regional de Guavio
1	Alba Roa Urrego	Corporación Autónoma Regional de Guavio
1	Azucena Gutiérrez	Técnico Forestal
1	Paula Andrea Pérez	Universidad Nacional de Colombia
2	Carlos Sarmiento	Subdirección Técnica de Parques Nacionales
2	Paula Ungar	Subdirección Técnica de Parques Nacionales
2	Luz Dari Acevedo	Subdirección Técnica de Parques Nacionales
2	Melissa Valenzuela	Parques Comunicaciones
2	Alberto Torrijos	PNN Sumapaz
2	Juan Alberto González	PNN Orquídeas
2	Víctor Raúl Buitrago	PNN Cocuy
2	Jorge Raúl Carvajal	PNN Cocuy
2	Cesar Fabián Almarza	PNN Chingaza
2	Juan Carlos Rodríguez	PNN Chingaza
2	José Libardo Rodríguez	PNN Chingaza
2	Andrés Patiño	PNN Chingaza
2	Alirio García	PNN Chingaza
2	Luis Velasco	PNN Pisba
2	Robinson García	PNN Alto Fragua IndiWasi
2	Arlet González	PNN Alto Fragua IndiWasi

2	Álvaro Ríos Díaz	SFF Otun Quimbaya
2	Guido López	SFF Otun Quimbaya
2	Joselito Vargas	ANU Iguaque
2	José Gregorio Velosa	ANU Iguaque
3	Antonio Ramírez	Corporación Autónoma Regional del Norte de Santander
3	Humberto Vargas	Corporación Autónoma Regional del Norte de Santander
3	Fabián Cárdenas	Corporación Autónoma Regional de Boyacá
3	Harold Gómez	Corporación Autónoma Regional de Chivor
3	Alba Lucia Montenegro	Corporación Autónoma Regional de Guavio
3	Ramiro Rozo	Corporación Autónoma Regional de Guavio
3	Adriana Cifuentes	Acueducto de Bogotá – PNN Chingaza
3	Rene Montero	Fundación Humedales
3	Paola Cely	Fundación Humedales
3	Martha Sánchez	Independent Researcher
4	Rafael Gallardo Urbano	PNN Doña Juana
4	Danyeli Cajas	PNN Doña Juana
4	Edgar Gómez	Corporación Autónoma Regional del Cauca
4	José Molina	PNN Doña Juana
4	Yerly Martínez	Fundación las Mellizas
4	William Muños	Fundación Machiramo
4	Eibar Saboni	Fundación Machiramo
4	Joaquín Sánchez	Fundación Machiramo
4	Jairo Gómez	Corporación Autónoma Regional del Valle del Cauca
4	Cesar Ortiz	Corporación Autónoma Regional de Caldas
4	Martha Salazar	Corporación Autónoma Regional del Valle del Cauca
4	José Zambrano	Corporación Autónoma Regional del Alto del Magdalena
4	Fernando López	PNN Tatamá
4	Rosa Restrepo	PNN Tatamá
4	John Eduar	PNN Tatamá

Annex 2

Field Training Participant List

Park rangers and other staff trained during workshop-related explorations during the grant period.

Expedition	Name	Organization
1	John Poveda	Universidad Javeriana (master student)
1	José Guzmán	Chingaza NP
1	Fredy Rodríguez	Chingaza NP
1	Luís Audelo	Chingaza NP
1	Urias Rodrigo Alférez	Chingaza NP
1	Juan Carlos Rodríguez	Chingaza NP
1	Arnulfo Pérez	Chingaza NP
2	John Rojas	Tatama NP
2	Rosa Restrepo	Tatama NP
2	Fernando Lopez	Tatama NP
2	Luis Gallego	Tatama NP
2	Jesus Restrepo	Community
2	Juana Lopez	Community (local teacher)
3	Paola Celis	Humedales Foundation
3	Adriana Cifuentes	Chingaza NP
3	Carlos Lora	Chingaza NP
3	Alirio	Chingaza NP
3	Arnulfo Pérez	Chingaza NP
3	Yanely Rodriguez	Chingaza NP
3	Lepoldo Cifuentes	Sumapaz NP
3	William Garzon	Corpoguavio REA
4	Nelson Enrique Chica	FUNDAVI Venecia
4	Fernando Ayerbe	WCS
4	Martha Sepúlveda	FEDENA
4	Leonardo Valencia	FUNDAVI
4	Willfredo Aranzazu	FEDENA
4	Joaquín Arenas	FEDENA
4	Johany de Jesús Salas	FEDENA
4	Wilson Arias	FEDENA
4	Luis Rodrigo Ceballos	ASOGUADUAS
4	Jairo Corrales	CVC
4	Juan Carlos Gómez	CVC
5	Adriana Cifuentes	Chingaza NP
5	Alirio García	Chingaza NP
5	Juan Gonzáles	Orquídeas NP
5	Julián Guzmán	Orquídeas NP
5	William Brand	Corpouraba REA
5	Lucas Eduardo Pérez	Corpouraba REA
5	Carlos Vargas	Local Community
5	Orlando Lopez	Local Community