



THE SOUL OF THE ANDES

Promoting the long-term conservation
of the
Andean cat

ARGENTINA
2003-2006

FINAL REPORT

Grupo
de
Ecología
Comportamental
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ARGENTINA
November 2006

FINAL REPORT to BP Conservation Programme

by
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www.huellas.org.ar/andes01.html

IMPORTANT NOTE: this document will also report on the results obtained during 2001-2002 through the Bronze Award from BPCP

FOREWORD

It is difficult to measure the short-term success of a project aiming to preserve a species from extinction. The support of the BPC Conservation Programme enabled our project to produce a large amount of novel knowledge and outputs that will be of great help for future conservation actions. However, wildlife conservation is made by people. It is local people who will ultimately decide if they can share the high Andes deserts with healthy populations of Andean cats. And their decision will be influenced by the opinion and support of other people. This is why I think that –perhaps– an important way of measuring our success is looking at the people who became involved in it.

The Soul of the Andes gave unique sharing opportunities to people. Sharing dreams and commitment with the BPCP passionate staff and other award winners. Sharing hard days of fieldwork and long nights of uncomfortable rest in one of the most challenging –and beautiful– environments in the world with other project staff and volunteers. Sharing meals, moments of play and long talks with kids who had never seen blond hair before and with elders grown up in a totally different cultural world. And, at least for me, sharing some minutes of my life with one of the most magical, fascinating, and symbolic wild beings. All these are life-changing experiences. They have the power to make us grow, to make us more conscious of ourselves, our values, and our goals. Hopefully, they will also have the power to make people decide that the Andean cat must be saved, to preserve the most genuine Soul of the Andes.

Mauro Lucherini – 20 November 2006

Chapter 1 - INTRODUCTION

- Project members
- Location map
- Background
 - The Andean Mountain cat
 - The Puna
- Project justification
- Project goals
- Complete list of expeditions



Chapter 2 - RESEARCH

- Map
- Specific objectives and methods
- Results
 - Expeditions
 - Logistics
 - Geographic distribution
 - Carnivore population abundances
 - Habitat and food requirements
 - Conservation threats
- Conclusions
- Final evaluation

Chapter 3 - COMMUNITY PARTICIPATION

- Specific objectives and methods
- Results
 - Educational campaigns
 - Interviews to adults
 - Student questionnaires
 - Education materials
 - Global Conservation Education Strategy
 - Media coverage
 - Evaluation process
- Conclusions

Chapter 4 - NETWORKING

- Networking
 - The Andean Cat Alliance
 - The High Andes Educators Network
- Human resource training
- List of publications and notes reporting on this project
- Acknowledgements
- Bibliography cited

APPENDICES

- Appendix 1 – Lucherini M. 2000. Status Revision for the Andean Mountain Cat. Unpublished report to *Andean Cat Alliance*.
- Appendix 2 – Lucherini M. & Luengos Vidal E. 2003. Intraguild competition as a potential factor affecting the conservation of two endangered cats in Argentina. Scientific paper published in *Endangered Species Updates* 2: 211-220.
- Appendix 3 – Lucherini M., Merino M.J., Soler L., Birochio D. & Luengos Vidal E. 2004. Evaluación del conocimiento y actitud humana hacia el gato andino, un carnívoro amenazado de extinción. Scientific paper published in *Memoria VI Congreso sobre Manejo de Fauna Silvestre en la Amazonía y Latinoamérica* (R. Bodmer Ed.). Wildlife Conservation Society y Durrell Institute of Conservation and Ecology, Iquitos, Peru. Pp. 435-440.
- Appendix 4 – Merino M.J. 2004. La conservación del gato andino en argentina: un enfoque desde la educación ambiental. *Master thesis*.
- Appendix 5 – Merino M.J., Lucherini M. & Luengos Vidal E. 2005. Gato Andino: El Alma de los Andes. Diffusion paper published in the Argentine wildlife magazine *Ecológica*.
- Appendix 6 – Merino M.J., Lucherini M. & Perovic P. 2006. International Workshop on Conservation Education for the Andean Cat. Unpublished Report to *Wildlife Conservation Network* and *AGA*.
- Appendix 7 – Lucherini M. & Merino M.J. 2006. Planning a common educational strategy for Andean cat conservation. Short note published in *Oryx* 40: 137-138.
- Appendix 8 – Merino M.J. & Lucherini M. 2006. 1er Taller Docente para Educadores Alto-andinos. Unpublished final document to participants and *Darwin Initiative*.
- Appendix 9 – Huaranca J.C. 2006. Abundancia relativa y uso de recursos por carnívoros alto-andinos en tres áreas del Noroeste. *Graduation Thesis*.
- Appendix 10 – EduGat Programme. 2006. Questionnaire for a preliminary evaluation of education activities. Carried out and presented at the *IV International Workshop for the Conservation of the Andean cat*, La Paz, Bolivia.
- Appendix 11 – Merino M.J. (Ed.). 2006. Index of: Conservemos el gato andino y su hábitat: Guía para Educadores. *Environmental Education Guide* for educators working in the high Andes, published by *AGA Argentina*.

INTRODUCTION

Pag. 1 – Andean cat portrait.

Pag. 2 – María José Merino with her face painted to resemble a cat.

Pag. 4 – A hand drawing of the Andean cat by Daniel Cossíos (AGA – Peru).

Pag. 5 – Salar (salted lake) de Antofalla, Salta province.

The village of Cusi Cusi, Jujuy prov.

Pag. 7 – A Pampas cat pelt shown by a local herder, Santa Catalina, Jujuy prov.

Schoolchild with our 3D Andean cat model she just finished building, Coranzuli, Jujuy prov.

RESEARCH

Pag. 9 – Juan Reppucci recording data from a GPS, Laguna de Vilama, Jujuy prov.

Pag. 12 – Diego Birochio and Mauro Lucherini interviewing a local herder, Salta prov.

Pag. 13 – D. Birochio, Estela Luengos and Cirilo Arancibia testing a camera trap, Laguna de los Aparejos, Catamarca prov.

Juan Carlos Huaranca climbing a boulder along a line-transect, Campo de los Alisos National Park, Tucumán prov.

Pag. 14 – Simona Savini smelling a scat to identify it, Laguna Blanca Biosphere Reserve, Catamarca prov.

Pag. 15 – Recording our location through a GPS receiver, Laguna Blanca.

Pag. 16 – Lagunas Cordon Bonaventura, Catamarca prov.

Pag. 17 – Expedition team in the cave we used as base camp, Campo de los Alisos N.P.

E. Luengos carrying equipment to reach a new study area, Coranzuli.

Pag. 18 – Pablo Perovic waiting for the rented truck engine to cool down, Jujuy prov.

J. Reppucci fixing the cabin we used as base camp, Laguna de Vilama.

M.J. Merino packing for an expedition, GECM Lab, Universidad Nacional del Sur, Bahía Blanca, Buenos Aires prov.

Pag. 19 – The members of tour staff riding to reach our most remote study site, Campo de los Alisos N.P.

Snowstorm at our base camp at Campo de los Alisos N.P.

J. Reppucci facing lack of oxygene, Laguna de Vilama.

M. Lucherini using the sat phone loaned by the BPCP staff, Laguna Blanca.

Pag. 20 – D. Birochio revising a Pampas cat pelt showed by an informant, Catamarca prov.

Pag. 21 – M. Lucherini extracting cat scats from a rocky shelter, Santa Catalina.

Two pictures of an Andean cat observed on April 2004 at 4300 m of altitude, Coranzuli.

Pag. 23 – Pablo Cuello and J. Reppucci setting a camera trap station, Laguna de Vilama.

Camera trap picture of a Pampas cat, Loma Blanca.

Pag. 24 – Camera trap picture of a culpeo, Laguna de Vilama.

Camera trap picture of an Andean cat smelling the bait, Coranzuli.

A typical small cat defecation site within a rocky shelter and containing a large amount of scats of different ages, Coranzuli.

-
- Pag. 25 – A culpeo sighted at 4100 m of altitude, Campo de los Alisos N.P.
Mountain vizcacha, Loma Blanca.
- Pag. 26 – M. Lucherini counting mountain viscachas, Cusi Cusi.
- Pag. 27 – E. Luengos, J.C. Huaranca and S. Savini counting carnivore signs and recording habitat data along a line transect for, Laguna Blanca.
- Pag. 30 – Two pictures of habitats where we proved the presence of abundant small cat signs of presence: Coranzuli (on the right) and Loma Blanca (on the left), both located at about 4000 m of elevation in Jujuy prov.
M. Lucherini collecting hair from a home-made, scent-baited, hair trap, Campo de los Alisos N.P.
- Pag. 34 – A culpeo in an almost completely vegetation-less habitat, Catamarca prov.
- Pag. 35 – Andean cat picture taken by a camera trap, Laguna Blanca.
Puma picture taken by a camera trap, Loma Blanca.
- Pag. 36 – D. Birochio recording data in the vastness of the Puna.
J. Reppucci climbing a steep cliff to inspect a rocky shelter, Laguna de Vilama.
- Pag. 37 – P. Cuello, M. Lucherini and J. Reppucci puzzled by the performance of a camera trap, Laguna de Vilama.
J. Reppucci looking for cat scats, Laguna de Vilama.
- Pag. 38 – Mountain vizcacha, Loma Blanca.
Pampas cat picture taken by a camera trap, Loma Blanca.
M. Lucherini looking for mountain vizcachas, Vilama.
- Pag. 39 – Mountain vizcacha in an isolated rocky patch, Campo de los Alisos N.P.
Culpeo picture taken by a camera trap in a rocky area, Laguna Blanca.
- Pag. 40 – A local villager showing that Mt. Vizcachas, especially young animals can be trapped by hand, Laguna de Vilama.
A herd of free-ranging lamas, Laguna de Vilama.
- Pag. 41 – Stormy clouds at the horizon, Laguna Blanca.
- Pag. 42 – Andean cat, Coranzuli.

COMMUNITY PARTICIPATION

- Pag. 43 – The Soul of the Andes puppet show and a mural painting, Punta de Balasto, Catamarca prov.
(Photo by M. Guoli).
- Pag. 45 – EduGat Programme logo
- Pag. 46 – I. Amelotti and M.J. Merino leading open-air no formal activities, Loma Blanca, Jujuy prov.
M. Cabarcos and M. Lucherini leading activities at Laguna Blanca school, Catamarca prov.
- Pag. 47 – End of School-year Celebration, Cusi Cusi school, Jujuy prov.
- Pag. 48 – D. Birochio interviewing a local guide (C. Arancibia), Laguna de los Aparejos, Catamarca prov.
Formal education activities at Loma Blanca school.
M.J. Merino and D. Birochio participating in the traditional dance (El Gato), during the Andean Cat Festival that we organized at Punta de Balasto, Catamarca prov. (Photo by M. Guoli).
- Pag. 49 – S. Savini, G. Tavera, J.C. Huaranca and M. Lucherini during a community workshop, Coranzuli, Jujuy prov.
Participants of the conservation education workshop organized by EduGat Programme at Salta.

-
- M.J. Merino showing an education booklet to a teacher at Loma Blanca school.
- Pag. 50 – Welcome sign at Laguna Blanca school, Catamarca prov.
Andean cat festival at Punta de Balasto.
Students having breakfast, Cusi Cusi school.
D. Birochio and M.J. Merino posting an announcement of a community workshop, Casa de Piedra, Catamarca prov.
- Pag. 51 – Community participatory meeting at Laguna Blanca.
M.J. Merino, D. Birochio, M. Cabarcos, and M. Lucherini playing the puppet show, Punta de Balasto (Photo by M. Guoli).
- Pag. 52 – G. Tavera and J.C. Huaranca acting in a rural theatre play with local people and teachers, Laguna Blanca.
J. Merino and students working at a mural painting, Punta de Balasto.
Mural painting with its authors, Punta de Blasato (Photo by M. Guoli).
- Pag. 53 – Two young villagers showing a stuffed puma skin during an interview, Coranzuli.
- Pag. 54 – Culpeo, Salta province.
V. Segura, J. Reppucci and a local boy with an Andean cat pelt decorated for ceremonial purposes, Loma Blanca.
- Pag. 56 – M. Cabarcos with students of El Desmonte school filling a questionnaire, Catamarca prov.
- Pag. 58 – Some education material and schoolchild drawings, Casa de Piedra (Photo by M. Guoli).
- Pag. 59 – M. Lucherini with some education material and handicrafts produced by local villagers during the Third Forum on In Situ Conservation Projects for the European Zoos And Aquaria, Angers, France
Banner showing the Andean cat and its conservation problems.
- Pag. 60 – Students of different ages playing Game of the Goose, Cusi Cusi school.
Kids playing dominoes, Loma Blanca square.
Cover of the Guide for Educators, edited and produced by EduGat Programme.
- Pag. 61 – Education workshop logo
Group work session, International Workshop on Conservation Education for the Andean Cat, city of Salta.
- Pag. 62 – M.J. Merino and Elaine Iverson (WCN) giving the participation certificate to J. Espinoza (AGA Peru), International Workshop on Conservation Education for the Andean Cat.
- Pag. 63 – D. Birochio and M. Lucherini during an interview for a local TV channel, Sta. María, Catamarca prov.
Article on the EduGat Programme activities published by an education magazine (3er Ciclo).
- Pag. 64 – Full-page article on our project published by a newspaper (La Nueva Provincia).
Formal education activities, Casa de Piedra (Photo by M. Guoli).
- Pag. 65 – J. Arellano and students of El Toro school, Jujuy prov.
- Pag. 66 – Young children painting Puna animals, Coranzuli.
- Pag. 67 – M. Lucherini revising student activities at Laguna Blanca school.
M.J. Merino with teachers at Laguna Blanca school.
- Pag. 68 – Mural painting at Laguna Blanca school.
G. Tavera and some teachers acting in our rural theatre drama, Laguna Blanca.
- Pag. 69 – D. Birochio and M. Lucherini during a community workshop, Punta de Balasto.
Local villagers working with lama wool, Santa Catalina, Jujuy prov.

Pag. 70 – Student with her 3D cat model, Punta de Balasto.

Pag. 71 – M. Lucherini with some young schoolchildren, Cusi Cusi.

M.J. Merino and M. Lucherini at Lagunillas del Farallon school, Jujuy prov.

NETWORKING

Pag. 72 – Landscape of the Bolivian region where joint expeditions were carried out by AGA members.

Pag. 73 – Andean Cat Alliance (AGA) logo.

A part of the AGA members during a meeting, San Pedro de Atacama, Chile.

Pag. 74 – Andean Cat Conservation Action Plan cover, AGA.

Pag. 75 – Daniel Cossios (AGA Peru) in its molecular genetic laboratory at Université de Montreal, Canada.

Members of the High Andes Educators Network, Purmamarca, Jujuy.

Attendants of the Workshop for High Andes Educators at work, Purmamarca, Jujuy.

Pag. 76 – Banner featuring the high Andes endemic wildlife.

Pag. 77 – Expedition team, Coranzuli.

S. Savini, G. Tavera, J.C. Huaranca and M. Lucherini, hanging the project flag on the truck at the beginning of an expedition.

Pag. 78 – Expedition team in front of the wooden cabin that served as base camp, Laguna de Vilama.

M. Lucherini and two local villagers participating in a field survey, Coranzuli

Pag. 79 – M Lucherini giving a talk in an international conservation meeting, Angers, France.

Pag. 80 – Cover of M.J. Merino Master thesis in Environmental Education.

Pag. 81 – Landscape from the Granada mountain, Jujuy prov.

Pag. 82 – Robyn Dalzen, Marianne Dunn and Kate Stokes (BPCP staff).

M. Lucherini, M.J. Merino and her parents (M. Cabarcos and L.M. Merino).

Expedition team, Nevado del Acay, Salta prov.

ABSTRACT

The *Soul of the Andes* is a long-term strategy that couples scientific research and community participation for the conservation of the endangered Andean cat in Argentina. It also aims to use this mysterious felid as a focal species for the conservation of the High Andes ecosystems.

From 2001 to 2006, EduGat Programme reached 39 villages of the High Andes and carried out a range of community-based activities, with a strong educational component, to empower local communities for the conservation of Andean cats through a change in their attitude, a growth in ecological understanding and the search for sustainable, conservation-friendly uses of local resources.

Simultaneously, 11 field expeditions used camera trapping and sign counts to collect high-quality scientific knowledge on the ecological requirements, population abundance and the factors affecting distribution and conservation status of the Andean cat.

Finally, the project provided great opportunities for training and formation of a number of young conservationists and contributed to the creation of conservation networks supporting its goal.



The **Soul of the Andes** is a long-term strategy that couples scientific research and community participation for the conservation of the highly threatened Andean cat.

The experience we collected during 9 expeditions to the high Andes of Argentina has enabled us to learn the contribution that each component of our project could offer to our final goal.

The role of the great amount of information that we produced on the distribution, population abundances, habitat and food requirements and factors affecting the status of the Andean cat will undoubtedly be fundamental for designing conservation and management plans for the conservation of this felid, because of the paucity of information available, even about its basic natural history traits.

Nevertheless, Conservation Biology is a discipline of crisis, which has to face the impact of humanity on natural ecosystems and search for practical and applicable solutions. It takes into account the presence of communities as a major factor of the conservation equation.

Carnivores, in particular, can be very powerful focal/flagship species for the conservation of ecosystems, but they use to generate conflicts with human populations and thus we first need to improve their image among local communities. Since human attitude towards carnivores tends to be shaped by understanding and knowledge of a particular species, education is widely recognized as an indispensable strategy.

The creation of a specific community participation component –EduCat Programme–, and the continuous evaluation-based adaptative approach that it has adopted, has put us in the position of carrying out an enormous work with local communities. The education activities in 39 localities of four provinces –including formal education in 18 schools (reaching almost 400 students), no-formal activities with about 500 children, 5 participative community workshops, festivals and 87 interviews to adult–, as well as the number of different educational materials, permitted us to reach a vast and diverse public and obtain a widespread increase in awareness about the Andean cat, empower people to understand the environmental problems of the high Andes and their individual role in them, build capacity in rural teachers to correctly treat these themes.

However, changing stakeholder behaviour is a complex process that is influenced by their knowledge but also by social and economic factors. To address the specific needs of various stakeholders, we need to take a broad-based approach to education but other tools such as incentive-driven conservation and eco-tourism should also be explored, which can also favour a revitalization of the rich background of local culture.

Finally, the great effort that we devoted at building and strengthening networks of researchers, educators and conservationists, as well as at training local people and university students from the range countries has proved an extraordinary successful approach, that greatly improved the efficient use of reduced resources and will gave long-term contributions to the conservation of biodiversity in South America.

Chapter 1

INTRODUCCION



PRESENT MEMBERS

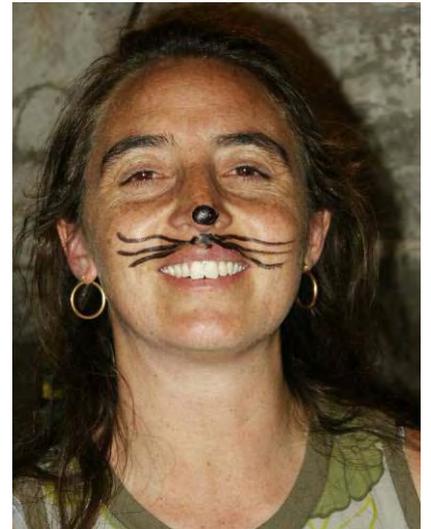
Mauro Lucherini (Project Leader). 44, Italian and Argentine. PhD Zoologist from Siena University, Italy and Joint Researcher of CONICET (Argentinean National Commission for Scientific and Technological Research – www.conicet.gov.ar). He is invited member of both the Cat and the Canid Specialist Groups of the IUCN Species Survival Commission as well as founder and member of the Andean Cat Alliance (AGA). Experienced in field study of mammals, particularly carnivores, as applied to Conservation Biology, Behavioral Ecology and Ethology, he also has experience in project implementation and management, public awareness, environmental education.

María José Merino (EduGat Programme Leader). 37, Argentine. Master in Environmental Education, Spain and Science teacher from La Plata University, Argentina. Experienced in Conservation Education, but also trained in field and laboratory work on carnivores. Strong organisational skills.

Estela Luengos Vidal (Principal Investigator). 34, Argentine. MSc in Biology, full time postgraduate Biology student and Animal Physiology Laboratory Assistant at Bahía Blanca University. She has extensive training in field study of mammals (primates, carnivores and xenartra).

Juan I. Reppucci (field data collection). 28, Argentine. Full time postgraduate Biology student at Bahía Blanca University. He has training in field study of carnivores and Conservation Education.

Julia Arellano (community work). 25, Argentine. Undergraduate Biology student at Bahía Blanca University.



PAST MEMBERS

Diego Birochio, (field data collection and community work), 38, Argentine. Full time postgraduate Biology student at Bahía Blanca University and President of a local conservation NGO. He has training in field surveys on carnivores and birds, and laboratory analyses, and developed good communication skills.

Lucía Soler, 39 (field data collection and community work), Argentine. Part time postgraduate Biology student and President of a local conservation NGO. Wide training in field surveys on carnivores, and laboratory analyses and experienced in project implementation, PR, environmental education.

LOCATION MAP

Map of South America, showing the potential distribution of the Andean cat (shaded area) and the approximate location of study region (orange ellipse), Northwestern Argentina. Elaborated by M. Bennett on the base of a map from S. Walker.



THE ANDEAN MOUNTAIN CAT: A POORLY KNOWN AND HIGHLY THREATENED SPECIES



D. Cossios – AGA Peru

BACKGROUND

The Andean cat, *Oreailurus jacobita*, is one of the world most endangered and less known felids. The IUCN Cat Specialist Group Action Plan (Nowell and Jackson 1996) assigned the following rankings to the Andean cat: global, category 2 (high conservation priority); Regional, category 1 (highest conservation priority). It has also been categorised as Vulnerable by the Argentina Red Book of Mammals (García Fernández et al. 1997). This felid is also listed in Appendix I by the “Convention on Trade in Endangered Species” (CITES), which determines that hunting and commercialization of the species are prohibited. More recently, it has been uplisted from Vulnerable to Endangered by the IUCN Red List (Nowell 2002). Habitat and prey loss, strict habitat association, reduced distribution and rareness have been listed as main threats (Nowell and Jackson 1996). At least in Argentina, a further problem is the lack of protection. Until recently, *O. jacobita*'s presence had been confirmed in only one of the National Parks of Argentina (Campo de Los Alisos N.P., Tucuman province) (Lucherini et al. 1999). More protected areas must clearly be created if have to conserve this felid.

The Andean cat only lives in the high-altitude desert areas of the Andes (the so-called Puna) of Peru, Bolivia, Chile and Argentina (Oliveira 1994, Nowell and Jackson 1996). Until 1998, the remoteness of its range prevented its study. However, since its inclusion in the IUCN Cat Specialist Group Research Priorities (Nowell and Jackson 1996), some projects have been started of the Andean cat in all countries of its distribution.

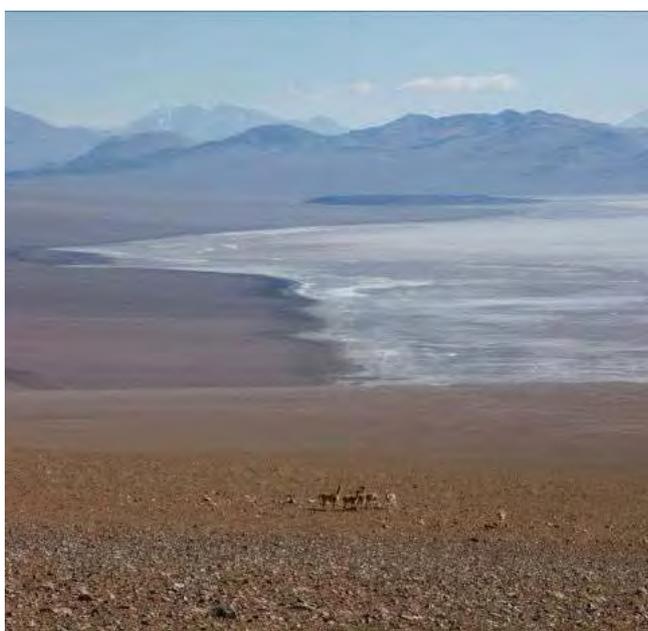
INTRODUCTION

These reports are helping us to fill our gaps in the knowledge of its actual distribution, increasingly adding new presence points.

In 1999, our Team organized (with the support of Cat Action Treasury, USA, and La Torbiera Zoological Society, Italy) the “1st International Workshop on the Andean cat” (Salta, Argentina), which later gave birth to the **Andean Cat Conservation Committee** that later became the **Andean Cat Alliance (AGA)**. This NGO aims to coordinate individual efforts, share knowledge and experiences as a way of to contribute to the growth of knowledge of the Andean cat, and to develop actions for conservation of the species.

Despite these increasing efforts, at the moment we started this project, we were still very far from knowing even the basic information on the Andean cat natural history and habitat requirements. Furthermore, no estimation of total population was available, nor of the relative abundance of any of its confirmed populations.

THE PUNA: A VALUABLE LITTLE STUDIED ECOREGION



The unique habitat of the Andean cat, the Puna, is regionally ranked within the highest conservation priorities, because of its regionally outstanding biological value and vulnerable conservation status (Biodiversity Support Program 1995). Despite its biodiversity is relatively low, in Argentina the Puna is considered a medium-high conservation priority (Bertonatti and Corcuera 2000), because of its high endemism rate. This ecoregion is also one of the least studied wilderness areas of Latin America. Vast regions have only been superficially explored, and their biodiversity is still largely unknown.

The Puna is a high altitude (>3000 m above sea level) cold desert (mean annual temperature: -8°C ; total annual precipitation: 100-200 mm). Huge salted lakes (*salares*) occupy most of the plains at lowest altitudes and are surrounded by high volcanoes and mountain ranges. In Argentina, this region is inhabited by scattered human communities, which mainly live of lama and sheep breeding. Their own survival is bounded to that of their cattle and, consequently, all

The Puna is a high altitude (>3000 m above sea



carnivores are viewed as potential enemies. This is why we realized that conserving the Andean Mountain cat also means a careful work with local communities.

PROJECT JUSTIFICATION

During the first years we spent working with this beautiful predator, we became convinced that this cat might well be identified as the *Soul of the Andes*. Exactly as the lands it moves through, the Andean cat is mysterious, magnificently adapted to the challenging life conditions of its extreme climate, but, notwithstanding, incredibly fragile in the face of human alterations. Its beauty, rarity and the mystery from which it is surrounded make of this cat, as of many other carnivores (Mech 1996, Noss 1996), a potential **Focal Species** for the conservation of the unique wildlife of the Puna, capable of evoking emotional responses in the people who discover its uniqueness. However, the level of public awareness, both nationally and locally, needs to be greatly increased, if we want to adopt this felid as a conservation tool.

Investigation needs

The first investigations carried out on the Andean Mountain cat suggested that this cat *is very rare*, probably rarer than what we expected. They also enabled us to understand that their apparent immensity and natural isolation no longer protect the high Andes. Similarly to other very large ecoregions (i.e. the Amazons, Tibet), men overestimated the resources of the Puna and their capacity of recovering. And the delicate balance that the local populations have been able to maintain for a long time is now breaking. Firewood has to be collected progressively far from villages; mining roads are opening constantly new wounds on fragile grounds and allowing deeper penetration to the most remote areas; wildlife presence is getting scarcer, at least in some regions.

We realized that the long-term survival of the Andean Mountain cat urgently needed a wider **landscape-scale approach** for the conservation of the wildlife in the Puna, with the goal of expanding the value and efficacy of local initiatives and local researches.

Community work needs

Ecological research will undoubtedly be fundamental to save the *Soul of the Andes*, as it is for the conservation of any species (Wilson 2000). But it will not be sufficient. As recently suggested by Ginsberg (2001), extensive species-specific studies, as well as detailed population biology researches are probably not worth the effort, when dealing with small, little-known carnivores. In a real word, where conservation resources are limited, we should adopt more effective, efficient and innovative strategies. And this is particularly true for the Andean cat, which lives in a remote area and with presumably low population densities. Our first data

suggested that human activities (particularly direct persecution) may possibly affect this naturally delicate balance.

Given the remoteness and extension of the Puna, it is obvious that law enforcement agencies are able to exert very little control. We understood the need for a strategy able to recognize the importance of the contribution from local communities and balance conservation and social development. On the other hand, our previous experience also proved that it is important to learn about the attitude of local people towards the Andean cat, and that it is possible to favor their support to conservation, particularly if we can show them that conserving their natural and cultural heritage may produce economic benefits. Equally important was to establish a vast awareness and environmental education programme to inform and empower people.



PROJECT GOALS

1. Improve our understanding of the causes producing the present status of the Andean cat populations
2. Reduce the known/suspected causes of decline of the Andean cat populations.



COMPLETE LIST OF EXPEDITIONS *

| MONTH | PROVINCE | SITE | ACTIVITIES |
|-------------------------|-----------------------|--|---|
| March-May 1998 | Tucumán and Catamarca | Huaca Huasi, Chiquerito, Vecovel, Los Alisos | Field research |
| September-October 1998 | Catamarca | El Cajon | Field research |
| March-April 1999 | Catamarca | Vecovel | Field research |
| April-May 2001 | Jujuy | Coranzuli | Field research and education activities |
| February 2002 | Salta Jujuy | <i>Travelling through a large area</i> | Field research and education activities |
| November-December 2002 | Salta Catamarca | <i>Travelling through a large area</i> | Field research and education activities |
| March-April 2003 | Bolivia | Kasthor | Field research |
| November 2003 | Catamarca | Punta de Balasto | Education activities |
| February-March 2004 | Tucumán | Los Alisos | Field research |
| April 2004 | Jujuy | Coranzuli | Field research and education activities |
| November-December 2004 | Catamarca | Laguna Blanca | Field research and education activities |
| February -March 2005 | Jujuy | Santa Catalina | Field research and education activities |
| September-December 2005 | Jujuy | Loma Blanca, Lagunillas del Farallón, Cusi Cusi, Las Cuevas | Field research and education activities |
| April-June 2006 | Jujuy | Laguna de Vilama, Loma Blanca, Lagunillas del Farallón, Cusi Cusi. | Field research and education activities |

* This list includes 3 expeditions that we carried out from 1998 to 1999 before we received our first BPCP Award

Chapter 2

RESEARCH COMPONENT





ABSTRACT

The Andean cat is one of the least known felids in the world. This lack of information prevented us from planning a proper strategy for its conservation. The **Research Component** of the Soul of the Andes used a community-based approach to produce state-to-the-art knowledge about some of the most important ecological issues of the high Andes carnivores.

From 2001 to 2006, thanks to the BPCP awards, we completed 9 expeditions to the high-altitude deserts of the Argentina's Andes. Using interviews, sign counts, and camera trapping we raised a large amount of novel knowledge that has critical implications for the conservation of the Andean cat in Argentina and throughout its distribution range. The cooperation with other members of the Andean Cat Alliance, which we co-founded, also proved a very effective strategy.

We obtained data on geographic distribution and population abundance of carnivores suggesting that, at present, both the culpeo and the Pampas cat are more common than the Andean cat. We also collected evidences of extensive range overlap between them. The study of diet and habitat use showed that overlap in the ecological niche of these three carnivores and especially between Pampas and Andean cats, is also very wide and that mountain vizcachas and the rocky habitat where they concentrate are the most important resources.

These results support the hypothesis that interspecific competition is affecting the current status of the Andean cat, but they also provided insights into the effects of other threats, like prey reduction, hunting and habitat loss caused by man.

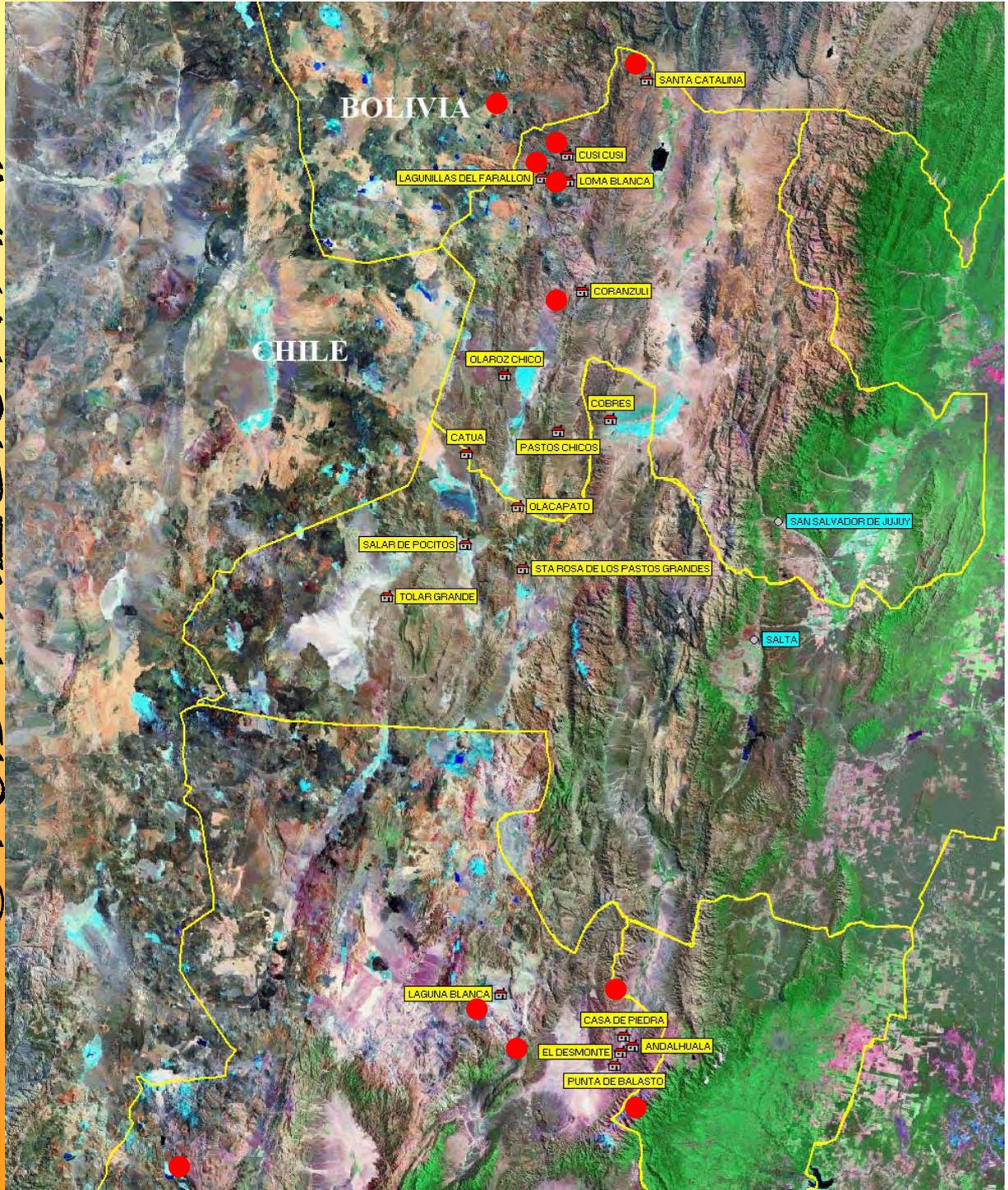
Hunting and habitat loss have been identified by the opinion of experts as the primary reasons of concern for the conservation status of the Andean cat and a country-specific list of priority actions for its long-term survival was elaborated.

Finally, our methodology analysis proved that strong sampling effort is required to collect Andean cat evidences through sign search and suggest that photo trapping should be used for presence/absence surveys and may have a great potential for population density estimates.



STUDY REGION MAP

Map 1. Map of study region, showing the name and location of all the communities visited by the community participation activities of EduCat Programme (yellow tags) and location of main field survey areas (red dots), Northwestern Argentina and Bolivia (one expedition).



SPECIFIC OBJECTIVES and METHODS

Objective 1- To study the geographical extent of interspecific overlap of the Andean cat with the other members of its carnivore guild (or guild) and estimate the respective relative population abundances in a sample of areas.

Rational. The conservation of carnivores has traditionally been a species-by-species effort. However, all carnivores are influenced to some degree by the competition between other species of their same community, and this must contribute to the variation found in density estimates across populations (Palomares and Caro 1999, Creel et al. 2001). Because of the presence of culpeo (*P. culpaeus*) and chilla (*P. griseus*) – two foxes- and the Pampas cat (*Oncifelis colocolo*) populations (the two main potential competitors of the Andean cat) in the areas where the Andean cat (*O. jacobita*) occurs, more data are needed to understand the extent and role of inter-specific competition in the current status of the Andean cat and how human activities may have affected it. It is thus particularly important to compare the abundance of the Andean cat with that of its main potential competitors in a range of conditions/habitats.

Methods. The combination of interviews, field surveys and genetic analysis of feces that we adopted was recommended as the most suitable tool to determine the status of this felid over large geographical areas by a previous study on the Andean cat distribution in Argentina (Perovic et al. 2000) and is a well-experimented combination of techniques by our team. Interviews of adults were always aimed at people who either lived or frequently visited the Puna areas (herders, in the great majority of cases, or guides). Interviews followed a semi-structured procedure (Kapila and Lyon, 1994) and were based on a standard questionnaire that was not used in the presence of the interviewees. Interviews were informally carried out by two-three researchers, who alternated between making specific and more general questions. In the areas where the presence of the Andean cat was reported by informants or previous reports, and where rocky areas were observed, we carried out field sign searches (see below). To these methods we added camera trapping (see below). Two complementary methods for the estimate of the relative abundance of carnivore populations were used (Smallwood and Schoenewald 1998):



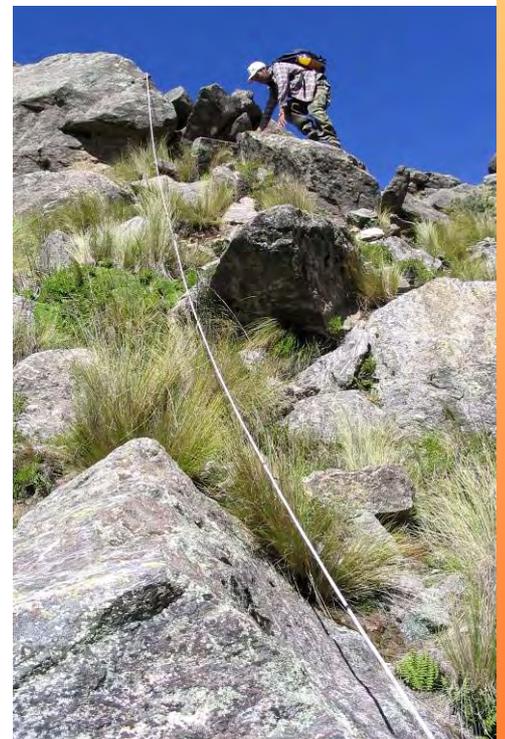


1.1. Photo-trapping. Photo trapping (Kucera and Barrett 1993) is a no-intrusive method for checking the presence of carnivores. Although this technique has been mainly used in forest habitats, some preliminary results suggested that it could be successfully used also in the Puna (Lucherini unpublished

report, Pasini Canedi and Canedi 2002, Villalba 2002). Capture rate (number of photographic captures during the survey / number of days the camera trap was active during the survey) was used as abundance index (Carbone et al. 2001, Jackson et al. 2005). To increase capture probability, this technique was coupled to scent-stations (Roughton and Sweeny 1982), which means that we used an odorous bait to attract carnivore to the camera stations. As scent baits, we utilized Bobcat Urine (BU), Bobcat Gland Lure (BGL) and Calvin Klein Obsession for Men (CK). Trailmaster®, Camtrakker®, Stealthcam® and Buckshot® camera traps were used. All photo trap models had passive infra-red detection systems. Sensors detected movements or changes in temperature from the presence of an animal, and activate the camera trigger. The beam was set at a height of about 30 cm and a lure was placed on the ground in front of it.

1.2. Sign counts. Sign (faeces, urine marks, tracks, skulls/skeletons, sightings) counts have proven to be a very useful and efficient method to carry out surveys over vast geographic areas (Smallwood and Schonewald 1998). Searches for signs were conducted in all habitats. However, to maximize sample size, more effort was devoted to rocky patches, where carnivore signs are more abundant (Lucherini et al. 1999). We defined "latrine" a site where more than two faeces clearly deposited in different moments were found. To avoid overestimating the abundance of the species that tend to defecate in latrines, each latrine was recorded as one sign of presence (or carnivore site).

To clearly relate search effort and encounter rates, sign counts were also conducted along transects crossing all habitats. Transects were walked by 3 researchers simultaneously, who searched a 20 m-wide band of ground.



Sign counting is based on the assumption that the finding success of the signs belonging to different species and in different areas is comparable. In the open, vegetation-poor environment of the Puna this assumption may be acceptable, but an additional objective was to test this assumption with the data we recorded.

Faeces of culpeos, pumas, mustelids and small cats were distinguished based on form, size and smell. Cat scats were specifically identified through molecular genetic analysis of fresh samples (Kohn and Wayne 1997). DNA was isolated from samples with a QIAGEN Stool Kit (Valencia, California, USA), then the 16S rRNA mitochondrial gene was amplified, and the resulting sequences was compared to those of known species and reference samples. Most of these analyses were done by a commercial laboratory (Wildlife Genetics International laboratory, Nelson, Canada). More recently, a colleague from AGA Peru (Daniel Cossios, Université de Montreal, Canada) carried out the identification for free, as part of cooperation agreement. Since this a very expensive procedures, only a subsample of the scats we collected were analyzed.

Objective 2- To study the main habitat/food requirements of the Andean cat in comparison to the other guild members.

Rational. The knowledge of the ecological requirements of a species greatly enhances our chances of understanding the reasons of its status and produce conservation plans (e.g. through the selection of areas to devote to protection). Space, habitat and food are usually the most important dimensions of the animal ecological niches. Any data on species-specific use of food, space and habitat resources provide valuable information on the potential for competition to occur with other members of the same guild.

Methods.

2.1. **fecal analysis** was used to study the food habits of the carnivore guild members, particularly Andean cats, Pampas cats and culpeos. This is by far the most frequently used, efficient, and no intrusive method for this type of study in carnivores (Reynolds and Aebischer 1991). In the case of cats, only specifically identified samples were used (only a small fragment of each scat is necessary for the DNA analysis). Faeces were dried and washed and contents examined to determine food items. Mammalian food items were



identified to species when possible, on the basis of teeth and hairs. Casts of hairs were made, and their medulla and scale patterns were compared to those characters for the mammals occurring in the study areas (Vázquez et al. 2000). Birds and reptiles were identified as such on the basis of feathers, scales, and bones.



The study of food habits was carried out in cooperation with other researchers, most of them forming part of the AGA.

2.2. sign distribution, obtained during sign counts, was used to estimate habitat use of carnivores; habitat availability was estimated recording habitat characteristics along the same transects. The location of all carnivore signs of presence was recorded through a GPS receiver and the habitat in its surroundings (a 25-m-radius circle) was described. Data

recorded were: altitude, steepness and roughness of slope, macrohabitat, microhabitat composition (%), abundance of Mt. vizcacha (the main Andean cat prey item) faecal pellets.

Objective 3: To list and prioritize the main threats to the survival of the Andean cat and the conservation measures to alleviate these threats.

Rational. In these last years, the efforts to investigate the status of the Andean cat have increased throughout its range, but little attempts have been made to summarize and coagulate these efforts in up-dated conservation action guidelines.

Methods.

An interview was designed and sent by e-mail to all the persons working in Andean cat conservation. The participants were asked to list and prioritize threats to the conservation of the Andean cat based on their experience in their respective countries. The interview also included information on the level of experience of each participant in the relevant issues that allowed evaluating the research effort on which the answers were based. The results of this survey were later shared with the other AGA members and used to integrate and guide the selection of conservation actions for the Andean Cat Conservation Action Plan during a specific workshop (3rd International Workshop for the Conservation of the Andean Cat, Arica, Chile).

RESULTS

EXPEDITIONS

With the support of the two BP Conservation Programme Awards, we carried out the following field data collection expeditions (Map 1):

1. DATES: April-May 2001.

LOCATION: Jujuy province.

SPECIFIC OBJECTIVES: survey the presence/absence of the Andean Mountain cat in the northernmost province of our country.

During this first campaign we covered about 800 km by truck and 200 km in a local public bus, in a region of approximately 6,800 Km² mostly at elevations from 3500 to 4100 m.

2. DATES: February 2002.

LOCATION: Salta province.

SPECIFIC OBJECTIVES: survey the presence/absence of the Andean Mountain cat in the least populated part of Salta province.

During this second expeditions, ca. 1500 km were covered by truck, in a region of approximately 12,800 Km² mostly from 3800 to 4300 m (though reaching 4900 m) of altitude.

3. DATES: December 2002.

LOCATION: Kasthor, an area bordering with the Eduardo Avaroa National Reserve (Sud Lípez province, southwestern **Bolivia**).

TEAM: L.S. and Claudia Manfredi, another GECM's member,

SPECIFIC OBJECTIVES: improve international cooperation between teams; test surveying methods; compare areas with different characteristics. The site was selected for these specific aims because the presence of the Andean Mountain cat had been previously confirmed



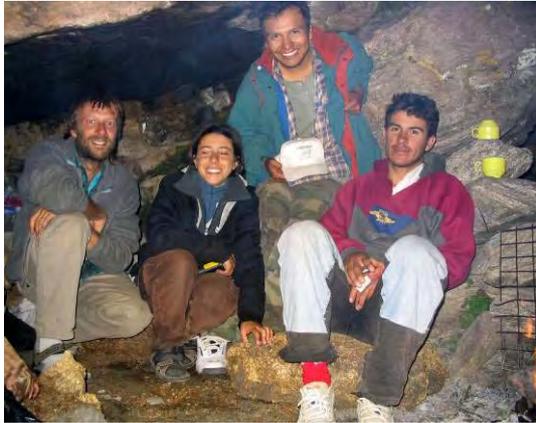
by Lilian Villalba (AGA Bolivia, Colección Boliviana de Fauna, La Paz), who collaborated in the Expedition. Unfortunately, given to a viral sickness that affected one member of this expedition (Claudia Manfredi) from the very first day, the study site had to be abandoned before the completion of the fieldwork.

4. DATES: November-December 2002.

LOCATION: Salta and Catamarca provinces.

SPECIFIC OBJECTIVES: priority was given to survey the presence/absence of the Andean Mountain cat over a large area in one of

the most remote sections of the Argentine Puna. Camera-trapping in the Puna region was tested. We covered almost 2600 km by truck (almost only on dirt roads), in a region of approximately 16,000 Km² ranging from 3000 to 4800 m of altitude. A very experienced local guide (Cirilo Arancibia) helped us during the last 8 days of fieldwork.



Since 2004, we started the new phase of our project (BPCP Follow-up Award), which implied intensive field data collections in specific areas where the presence of the Andean cat had been previously reported.

5. DATES: February-March 2004.

LOCATION: Campo de Los Alisos National Park, Tucumán province.

SPECIFIC OBJECTIVES: Carnivore abundance was estimated through camera-trapping and sign counts in two sub-areas.

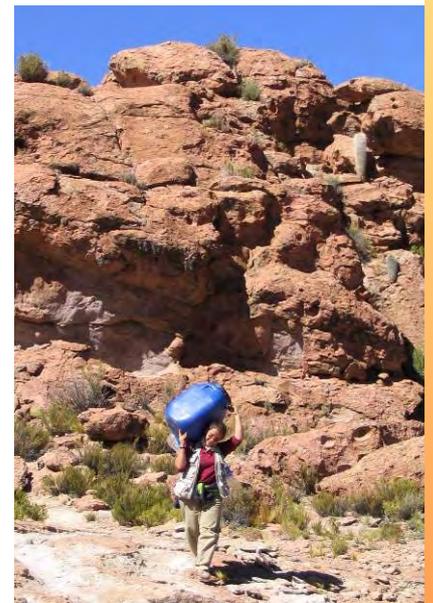
A 2-days-long mule ride was necessary to reach the study site. The knowledge of our local guide (Horacio Escudero) was crucial for the success of the expedition. At the second sampling area, we set up our base camp in a cave.

6. DATES: April 2004.

LOCATION: Coranzuli, Jujuy province.

SPECIFIC OBJECTIVES: Carnivore abundance was estimated through camera-trapping and sign counts. Three sub-areas were sampled, one of those could only be reached on foot, which implied an important physical effort.

This is the only site where Andean cats were directly observed and photographed.



7. DATES: November-December 2004.

LOCATION: Laguna Blanca Biosphere Reserve, Catamarca province.

SPECIFIC OBJECTIVES: Estimating carnivore abundance through camera-trapping and sign counts in two sub-areas.

Study sites had to be reached by mule.

8. DATES: February-March 2005.

LOCATION: Santa Catalina, Jujuy province, at the border with Bolivia.

SPECIFIC OBJECTIVES: We worked with camera-trapping sign counts in only one area.

In this site the presence of Andean cats had been previously reported only based on interviews to local people.

Since August 2005, we started working in strict cooperation with Pablo Perovic (Museo de Ciencias Naturales de Salta, Universidad de Salta, Argentina, AGA Argentina) in the region of Las Chinchillas Provincial Reserve, a huge protected area with a great potential for the long-term conservation of viable populations of the Andean cat and where Pablo had been working for the previous 12 years.



9. DATES: September-December 2005.

LOCATION: Loma Blanca y Las Cuevas, Las Chinchillas Provincial Reserve, Jujuy province.



SPECIFIC OBJECTIVES: We used the same techniques as in the previous expeditions, but with the additional objective of testing the suitability of two sites of this region as a permanent study area for the last phase of this project.

10. DATES: April-June 2006.

LOCATION: Laguna de Vilama, Las Chinchillas Provincial Reserve, Jujuy province.

SPECIFIC OBJECTIVES Similarly to the previous expedition, we counted signs of presence and photo-trapped to test the suitability of this site as a permanent study area for the last phase of this project,

but we also tested sampling protocols for the estimation of Andean cat population density through camera-trapping.

LOGISTICS

The expeditions covered an area of approximately 89,500 km² in the high altitude (2000-5000 m of elevation) portions of four provinces (Catamarca, Jujuy, Salta and Tucumán) in North-western Argentina (plus one expedition to South-western



Bolivia).

Each expedition was preceded by a couple of days dedicated to logistics, packing, equipment checking, etc. at the GECM laboratory (Cát. Fisiología Animal, Universidad Nacional del Sur, Bahía Blanca) and 2-3 days of food, gas and supply purchase and preparation at Salta, the largest city in NW Argentina.



Covering the 1,600 km from Bahía Blanca to Salta takes about 30 hours and we usually travel by bus.

The time necessary to reach the final study sites varied greatly and is always longer when the area is not accessible by vehicle. The longest approaching time was necessary to work at Campo de Los Alisos National Park, Tucuman province: 1 day by car plus 2 days on a horseback

and walking.

We always devoted particular attention to the logistics of expeditions, in order to decrease at the minimum the risks related to fieldwork in remote areas and to high-altitude sickness.

Vehicle problems are by far the most frequent nuisance we had to face. In one occasion, it was



necessary to set up a rapid evacuation of J. Reppucci from Laguna de Vilama, 4200 m, the highest-elevation study site where we worked, because of persistent cough (that finally turned out to be caused by a lung infection and not high altitude). Storms are another frequent trouble. In spite the fact that the Puna is a dry ecoregion, snowstorms or windstorm can occur at any time of the year and last for a few days. When this happens we were forced to stop field data collection and endure very low temperatures.

In all cases of necessity, it was incredibly important to count on the Satellite phone kindly provided by



the BPCP staff.

GEOGRAPHIC DISTRIBUTION

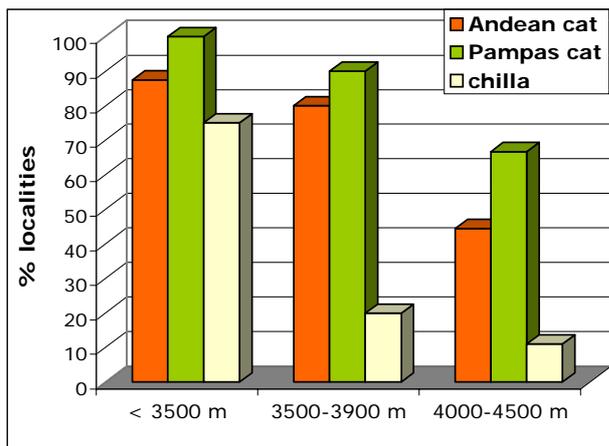
We interviewed 51 adults belonging to different families from 34 settlements. 10 of the informants were not considered reliable and their data were excluded.

Culpeos and pumas were recorded in the great majority (100% and 96.3%, respectively) of 27 sites, whereas chillas were rarer (33.3%) and were reported to occur in open flatlands. Pampas cat presence was recorded in a greater number of sites than Andean cats (85.2% vs. 66.7%).

Interestingly, the occurrence of Pampas cats, Andean cats and in particular chillas decreased with altitude (Fig. 1). In 21.6% of the cases, reports of small cats were confirmed by skins showed by interviewees. 72.7% of these 11 skins belonged to Pampas cat and 27.3% to *O. jacobita*.



Fig. 1. Altitudinal distribution of Andean cats, Pampas cats and Chillas, based on responses to our interviews to local people. Culpeos were reported at all localities.

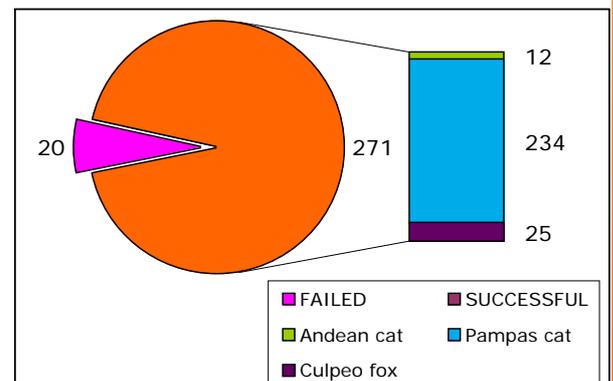


However the Andean cat presence was confirmed by this method in 75% of those areas where at least 10 samples were identified.

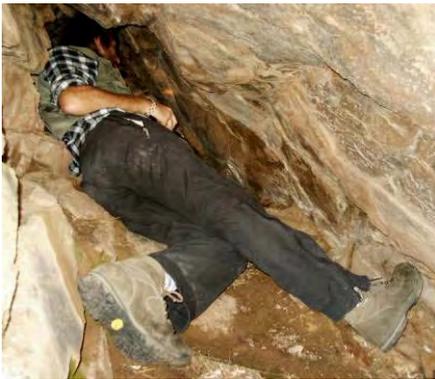
DNA extraction and identification was successful in 93.2% of the 291 samples we sent. Out of 246 small cat faeces, 95.1% were of Pampas cats and only 4.9% of Andean cats (Fig. 2). Molecular genetic analysis confirmed the presence of Andean cats in 7 of the 17 areas where samples for DNA analysis were collected (41.2%), and 57.1% of the areas where this cat's occurrence was proven by at least one of our methods, while the presence of Pampas cats and culpeos was recorded in all areas.

The combination of field surveys, genetic analysis of faecal samples and photo trapping was the most successful procedure and confirmed the presence of Andean cats in all the 7 areas where we used all these techniques simultaneously.

Fig. 2. Results of DNA identification of carnivore faeces.



CARNIVORE POPULATION ABUNDANCES

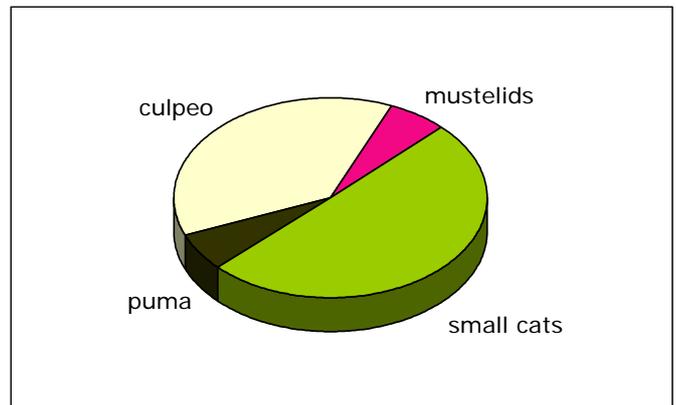


Although we have not completed yet the analyses of all the data collected until now, we already have a quite large sample size.

1560 evidences of wild carnivores were recorded in 27 sampling areas. 97.6% of them were indirect (feces, tracks, dens containing feces, scent marks), while 2.4% were direct signs of presence (sightings and skulls or skeletons).

88 of all signs were not unambiguously identified and were therefore discarded. The percentage of the different types of signs varied between carnivores. 75.1% of all cat signs were latrines, whereas this proportion was only 31.8% for mustelids (grisons and skunks), 6.6% for foxes and 4.6% for pumas.

Fig. 3. Proportions of indirect signs of presence attributed to different carnivores.



Small cat signs made up more than half of the indirect evidences we recorded, those of foxes were found less frequently and signs attributed to mustelids and pumas were very rare (Fig. 3).

14 (87.5%) of the 16 skulls/skeletons found belonged to culpeos, 1 to a Pampas cat and 1 to Andean cat.

We observed 11 culpeos, 3 chillas (all in open plains), 2 Andean cats and 1 Pampas cat.

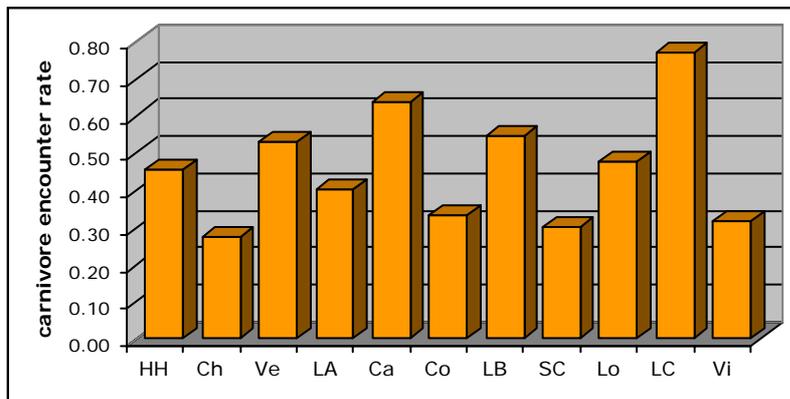


To account for geographical variations in population abundance of high Andes carnivores (Lucherini et al. 1999), we considered each area where intensive surveys (≥ 5 days of sign search) were carried out as sampling unit and averaged across areas. In this subsample, searching effort was estimated in hours (researcher hours) and computed as the time dedicated to search times the number of researchers participating in the search. Encounter rate (number of signs counted during the survey / sampling effort) was used to account for variations in sampling effort between areas.

We completed intensive surveys in 11 areas, where we recorded 1131 wild carnivore signs in 2624.1 researcher hours (mean: 437.3 researcher hours). The proportions of signs recorded for each carnivore in these surveys were very similar to those of the global sample.

Pooling all carnivores, the overall encounter rate ranged from 0.276 signs/hour to 0.769 signs/hour (mean: 0.459 signs/hour) (Fig. 4).

Fig. 4. Geographic variation in the overall finding frequency of signs of presence (number / researcher hours) for all carnivores.



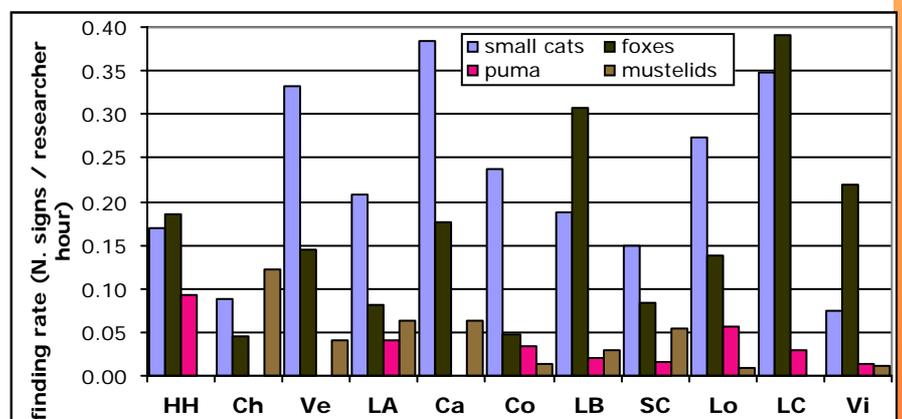
Encounter rates varied between areas for all carnivores (Fig. 5).

Pumas were recorded in all but three of these surveys, but their encounter rates were constantly low (0.028 signs/hour) (Fig. 5).

While in most areas (63.7%) small cat signs were found more frequently than those of foxes,

in 26.3% of the surveys the encounter rate of foxes tended to be higher (Fig. 5).

Fig. 5. Geographic variation in the encounter rate of signs of presence for the different carnivores.



The average encounter rate varied between carnivores and it was clearly greater for small cats (0.223 signs/hour) than mustelids and pumas. The difference with mean encounter rate of foxes was small (0.165 ± 0.104 signs/hour).

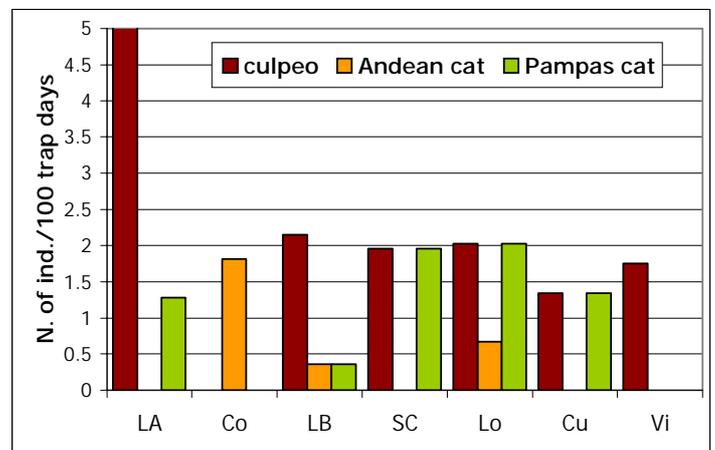
Camera trapping was carried out in 7 survey areas, where cameras were placed in 101 different sites. Total sampling effort was 1385 trap days (mean: 197.9 trap days).

Culpeos were recorded in 85.7% of the areas, Pampas cats in 71.4% and Andean cats in 42.9%. Camera trapping failed to detect the presence of culpeos in one of the areas where we proved them to occur. The same happened for the Andean cat in 3 areas and for the Pampas cat in 2 areas (Fig. 6).



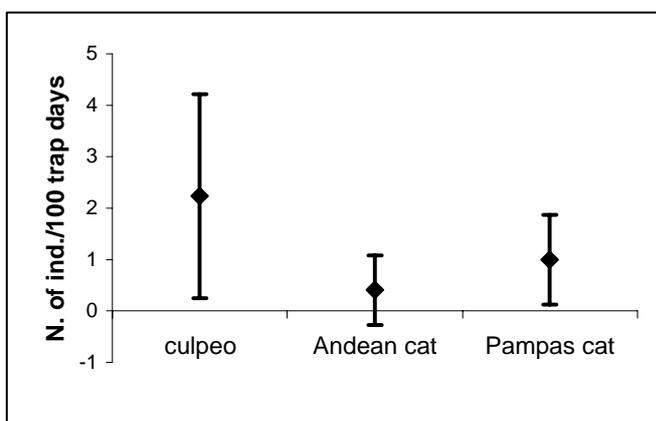
Most (69%) of the 39 carnivore photo captures we obtained belonged to culpeos, and the number of Pampas cat captures was twice that of Andean cats.

Fig. 6. Geographic variation in camera trap capture rates for different carnivore species.



Mean capture rate of culpeos was more than twice that of pampas cats and five times greater than that of Andean cats (Fig. 7).

Fig. 7. Mean camera capture rates (\pm Standard Deviation) for different carnivore species.





Although this information has not been analysed yet, camera trapping provided additional data that will be of great value to understand more these poorly-known species.

The pictures taken can enable us to study the activity patterns of the different species (through the time recorded by cameras) and their habitat use. This can be of particular importance in the case of the Andean cat, whose faeces are especially difficult to find. Finally, when a number of captures of a single individual is obtained and when animals are individually recognized, this

technique can also be used to estimate individual home range size.

When we pooled all direct signs of presence (i.e., skulls/skeletons, sightings and camera trap pictures, $n = 72$), fox evidences were the most abundant (only 5.5% corresponding to chillas), followed by Pampas cats and Andean cats (Fig. 8).

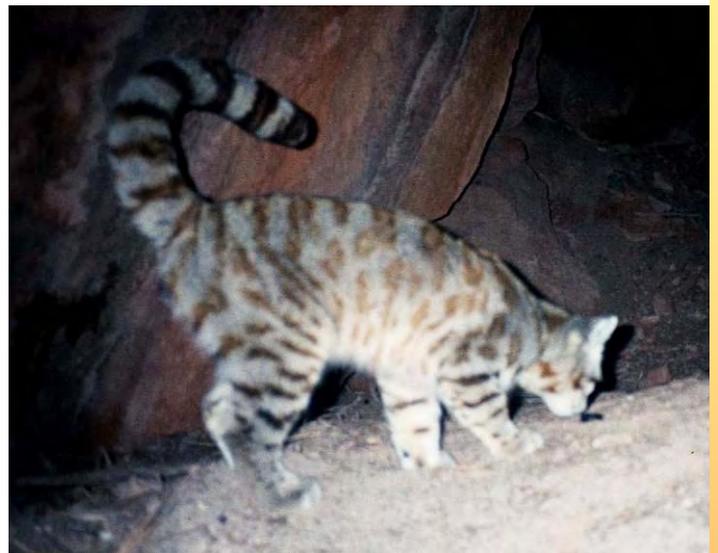
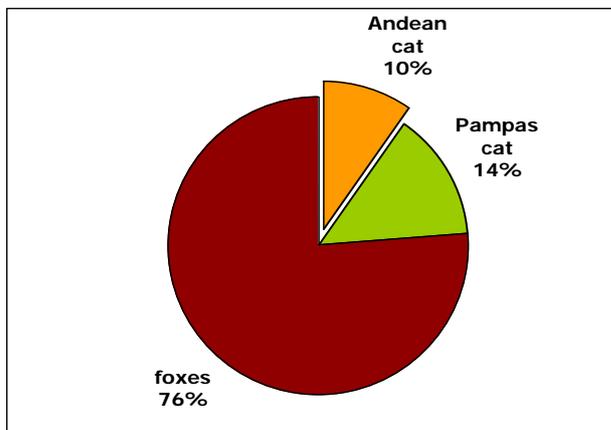


Fig. 8. Proportions of all direct evidences for different carnivores.



The different types of signs of presence gave a different description of the relative abundance of carnivores (Fig. 9).

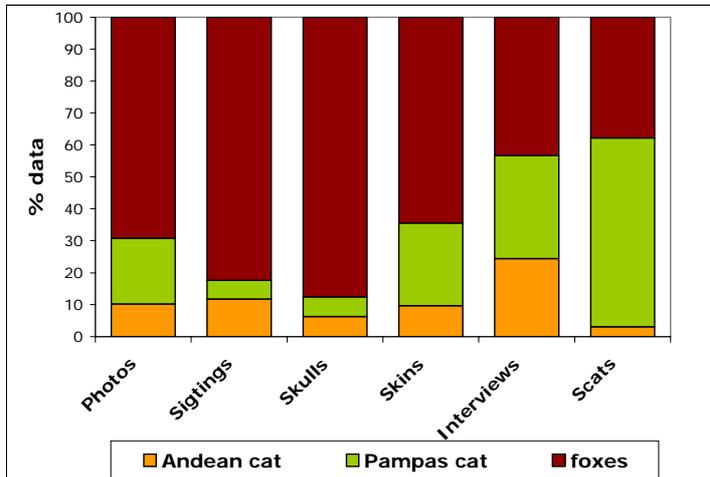
Using the number of defecation sites recorded and the results of DNA analyses (Scats in Fig. 9), we should conclude that Pampas cats are more common than culpeos, but that

Andean cats are extremely rare. Responses to our interviews suggest that there is not a great difference in the frequency of these carnivores, but, if we only look at the skins showed by informants, we could think that Andean cats are less abundant than Pampas cats and much less than culpeos. Camera trap photos, direct sightings and skulls/skeletons found coincide at suggesting that culpeo populations would be more



abundant than those of cats, but they do not indicate marked differences between Andean and Pampas cat's populations.

Fig. 9. Proportions of different types of evidences for different carnivores.



HABITAT AND FOOD REQUIREMENTS

As already mentioned, the study of food habits was a joint effort, which we carried out in cooperation with a number of other Argentine researchers and was led by Susan Walker (WCS and CEAN, Neuquén province and AGA Argentina). The results of this project will be published soon in the world-known Journal of Mammalogy (Walker et al. in press).

Most of the faecal samples used for this study were collected within three areas, Laguna de Vilama, northwestern Jujuy province (n = 47 Andean cat and 15 culpeo samples), northern Catamarca province (n = 276 pampas cat, 1 Andean cat, and 37 culpeo samples), and the San Guillermo-Laguna Brava protected area complex (n = 228 pampas cat and 348 culpeo samples) in San Juan and La Rioja provinces. Additional Andean cat samples were collected from



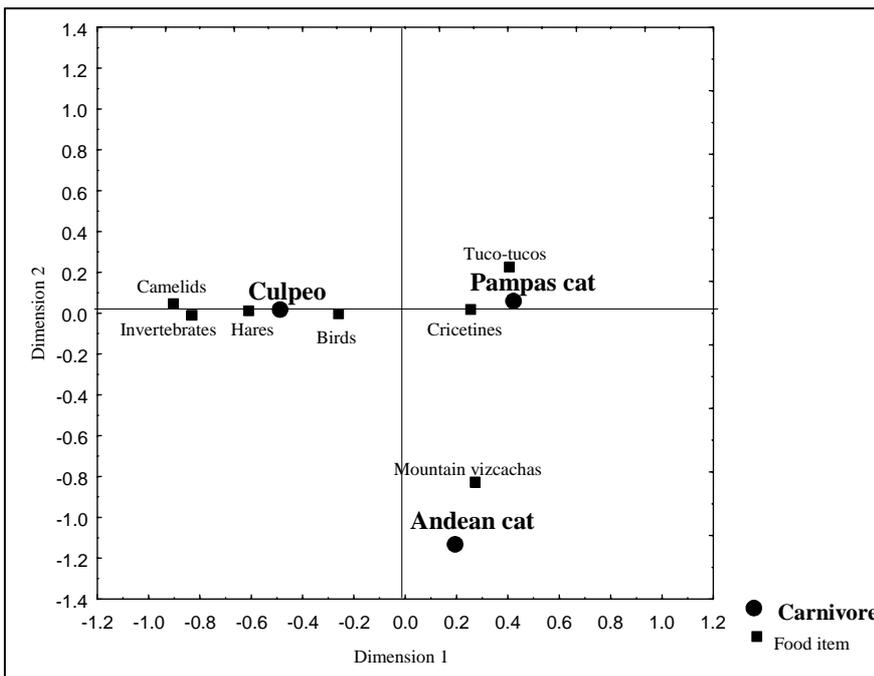
Coranzuli (n = 5) in central Jujuy, Santa Catalina (n = 3) in northern Jujuy, and Campo de Los Alisos National Park in Tucuman province (n = 2).

For all three carnivores, cricetine rodents were the most frequent food item, representing 29% or more of the food items for each species. However, consumption of cricetines was greatest by pampas cats (almost 50% of food items). The second most frequently consumed

item was tuco-tucos (another rodent) for pampas cats, mountain vizcachas for Andean cats, and birds for culpeos. Most of the plant material found in feces was grasses, so we assumed that this was consumed incidentally and did not count as a food item.

All three species had similar diet overlap (mean index of overlap = 0.82, 1 indicates complete overlap), although the pampas cat had more overlap with both Andean cats (0.82) and culpeos (0.85), than did culpeos and Andean cats (0.78).

Fig. 10. Dimensions 1 and 2 of the correspondence analysis comparing frequency of occurrence of food items in diet with carnivore species.



The diets of the three species were clearly differentiated in the correspondence analysis, with Andean cats consuming more mountain vizcachas, Pampas cats consuming more cricetines and tuco-tucos, and culpeos consuming mainly hares, invertebrates, birds, and carrion from camelids (Fig. 10). The Andean cat had a diet specialized towards mountain vizcachas, the Pampas cat specialized

on tuco-tucos and cricetines, and the culpeo had a more generalized diet.

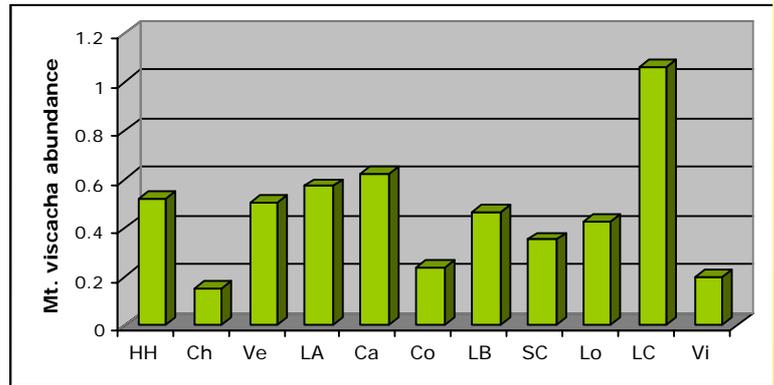
Diet diversity was similarly reduced for Andean (standardized niche breadth index = 0.19) and Pampas cats (0.15), but much greater for culpeos (0.62).



During our expeditions, we also recorded data on the abundance of mountain vizcachas, using two different indices: 1. number of individuals spotted / sampling effort, 2. Abundance of fecal pellets along transect lines.

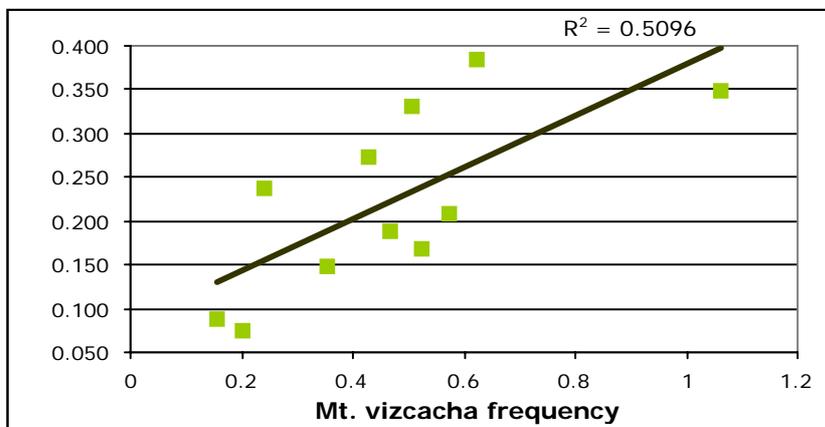
The first index showed that the abundance of this rodent's population varies geographically (Fig. 11).

Fig. 11. Geographic variation in camera trap capture rates for different carnivore species.



Using the data from these 11 areas where the strongest sampling effort was completed, we found a strong correlation (explaining 51% of the variation in data) between the encounter rate of small cat signs and the frequency of Mt. vizcacha sightings (Fig. 12).

Fig. 12. Linear regression between abundance of small cat signs of presence and abundance of mountain vizcachas.



The abundance of small cats signs of presence increased directly with the abundance of mountain vizcachas.

We have not completed yet the analysis of the information collected along line transects. Nevertheless,

these data have provided strong support to the relationship between the presence of Mt. vizcachas and that of small cats.

104 line transects were carried out in 10 areas, for a total length of 36,555 m (mean = 351.5 m, range: 240-755 m), from 3720 to 4940 m of elevation. The total area covered by transects was 731.1 km².

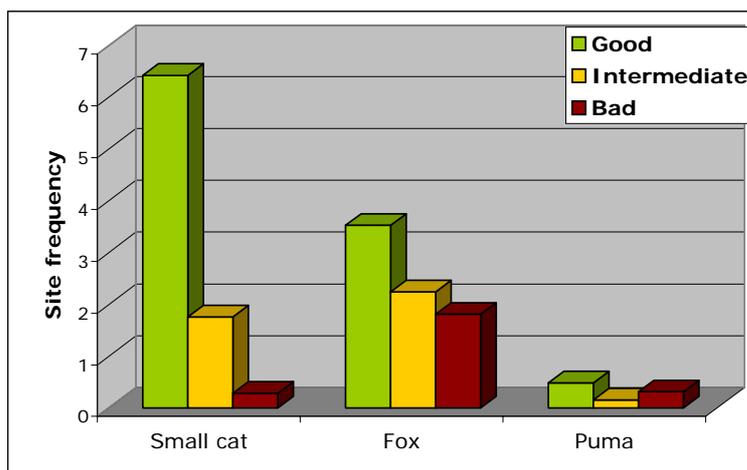
Based on our previous experience in field data collection on small cats in the high Andes, habitats crossed by transects were classified *a priori* in one of 3 categories: Good, Intermediate and Bad, where a Good habitat is the type of areas where we expected to maximize the number of small cat findings. 32 transects were placed in Good habitats, 35 in Intermediate habitats, and 37 in Bad habitats (habitats where we did not expect to find cat signs).



210 carnivore sites (a carnivore site is defined a site where 1 or more carnivore signs of presence were detected) were found.

The results of the preliminary analysis clearly show that the density of signs decreased from the transects crossing the habitats that we defined as Good to those in Bad quality habitats for all carnivores (Fig. 13), and that these decrease was particularly strong for small cats (from 6.4 signs/km of transect for Good habitats to 1.7 for Intermediate habitats down to 0.3 for Bad habitats).

Fig. 13. Encounter rate of signs of carnivores along line transects crossing habitats of different qualities.



Along line transects we also recorded a Roughness Index, ranging from 0 (plane areas) to 3 (very broken areas), the Mean Slope, estimated in degrees and ranging from 0 (flat) to 90 (vertical), the Vizcacha abundance Index, ranging from 0 (absent) to 3 (very abundant), as well as the proportion along transects of the 3 main habitat types (rocky areas, scrublands, and grasslands), which may range from 0 (habitat absent) to 1 (habitat always present along the transect).

The characteristics of the 3 habitat types were very different (Tab. 1). Good habitats, where the carnivore sign density was maximum, had steeper slopes, a more roughed terrain and a greater proportion of rocky areas, but less grasses than Bad habitats. In Good habitats, the abundance of Mt. Vizcachas was almost 3-fold greater than in Bad habitats (Tab. 1).

Tab. 1. Number of transects, their total length, Number of wild carnivores signs/km, and main characteristics of the habitat along the 3 types of transects.

| Transect type | # | Total Trans. length | Mean slope | Roghness index | Total wild carnivore sign freq. | Viscacha abundance index | Rocky | | |
|---------------|----|---------------------|------------|----------------|---------------------------------|--------------------------|-------|-----------|-----------|
| | | | | | | | area | Scrubland | Grassland |
| Good | 32 | 10550 | 33.7 | 2.16 | 10.8 | 1.74 | 0.95 | 0.17 | 0.07 |
| Intermediate | 35 | 12825 | 27.9 | 1.8 | 4.23 | 1.26 | 0.84 | 0.23 | 0.18 |
| Bad | 37 | 13180 | 16.1 | 1.09 | 2.66 | 0.61 | 0.55 | 0.32 | 0.47 |

We also made an *a posteriori* analysis of habitat characteristics along line transects. We arbitrarily defined High density habitats for small cats as those crossed by transects where encounter rate was > 4 signs/km (n = 23, mean encounter rate: 9.1 signs/km), and as Low density habitats those crossed by transects where no small cat signs were recorded (n = 47). As expected the differences between these two types of habitats closely reflected those between Good and Bad habitats (Tab. 2).

Interestingly, the encounter rate of foxes was similar in these two categories of habitats (2.7 and 1.8 signs/km in high and low density habitats, respectively).

Tab. 2. Number of transects, their total length, Number of wild carnivores signs/km, and main characteristics of the habitat along transects where a high density of cat signs was found and transects where no cat signs were recorded.

| Transect type | # Trans. | Total length | Mean slope | Roghness index | Total wild carnivore sign freq. | Viscacha abundance index | Rocky area | | |
|---------------|----------|--------------|------------|----------------|---------------------------------|--------------------------|------------|-----------|------|
| | | | | | | | Scrubland | Grassland | |
| High density | 23 | 7385 | 34.8 | 2.22 | 12.7 | 1.62 | 0.94 | 0.19 | 0.11 |
| Low density | 37 | 15945 | 20 | 1.33 | 2.19 | 0.99 | 0.69 | 0.3 | 0.32 |

Using the areas where transects were carried out as sampling units, small cat density (sign encounter rate) was strongly correlated to mountain viscacha abundance (Fig. 14). Although the strength of this direct relationship was already great (black line, Fig. 14), when we used a second order polynomial function the regression improved and became capable of explaining almost 83% of the variability of data (red line, Fig. 14).

Fig. 14. Linear (black) and polynomial (red) regressions between the abundance of small cats (expressed as number of signs/km) and mountain viscacha (index of faecal pellet abundance), as recorded along line transects.

This suggests that small cats' abundance is strongly affected by that of their main prey and increases with it, until mountain viscachas become very abundant and the density of cats tends to reach a maximum.

Finally, line transect data

enabled us to estimate the effort necessary to record the presence of carnivores in the high-altitude areas of the Andes. When we pooled the data from all transects, 183 m of transect were sufficient to find a carnivore signs, but this distance increased to about 400 m if we our aim was to prove the presence of a small cat of or a culpeo and to 3.6 km if we were looking for a puma (Fig. 15).

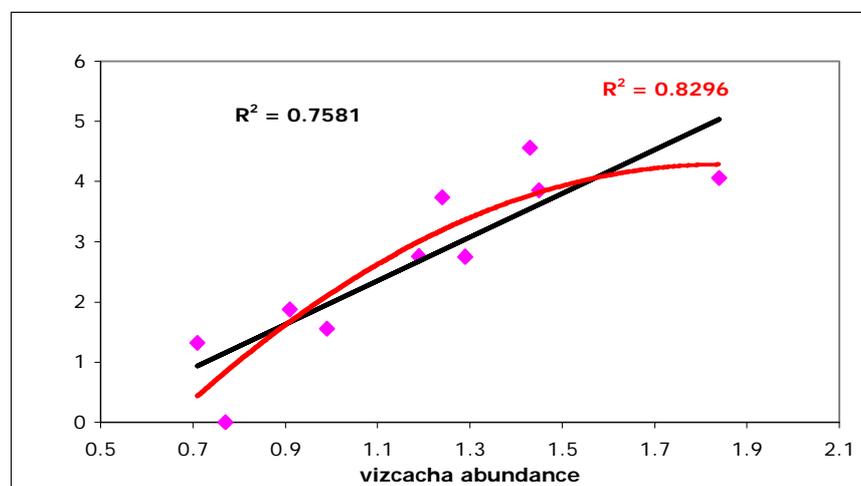
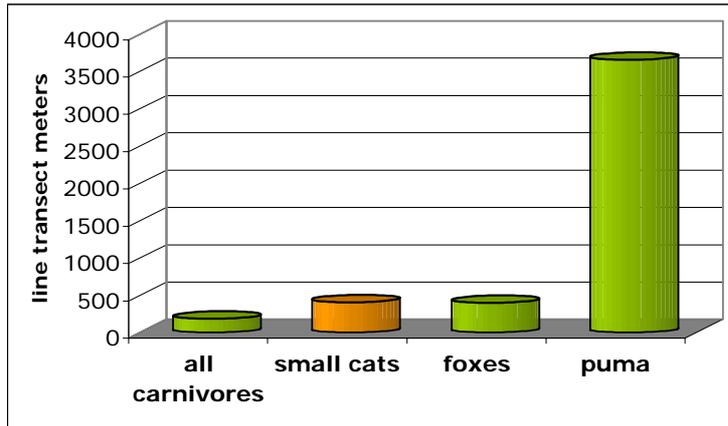


Fig. 15. Mean effort necessary to record the presence of different carnivores along line transects.



However, our previous experience on habitat preferences of carnivores would enable us to reduce this effort. If we select a High quality habitat, we may expect to be able to confirm the presence of small cats in an area by walking a transect line of less than 170 m.

Nevertheless, given the low proportion of Andean cat faecal samples shown by their DNA-based identification, we would need at least approximately 3.4 km, of line transects (or cover an area of 0.68 km²) in Good quality habitats if our purpose is to test the presence of this cat in a new area.



In 3 expeditions, we also tested hair trapping as a technique to record data on the presence of carnivores in the Puna and collect biological samples (hair) suitable for genetic identification of species and individuals. Unfortunately, despite we used the same scent bait that we utilized for camera trapping, this method failed to provide a consistent number of carnivore evidences and we abandoned it.

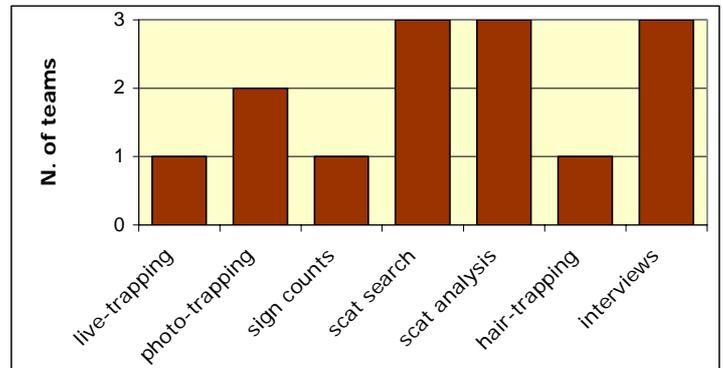


CONSERVATION THREATS

To revise the conservation Status of the Andean Cat, a written questionnaire was sent to all the persons working on the Andean cat in 2000. A detailed report of this revision is showed in Appendix 1, and we will summarize here the most relevant and useful results.

Until 2000, faecal collection and analysis and interviews were the most commonly used field study techniques, while live trapping, sign counts and hair trapping were used by only one team and camera trapping by 2 (Fig. 15). Our Team was the one using the wider range of study methods.

Fig. 15. Number of AGA teams using different methodologies for the study of Andean cat in 2000.

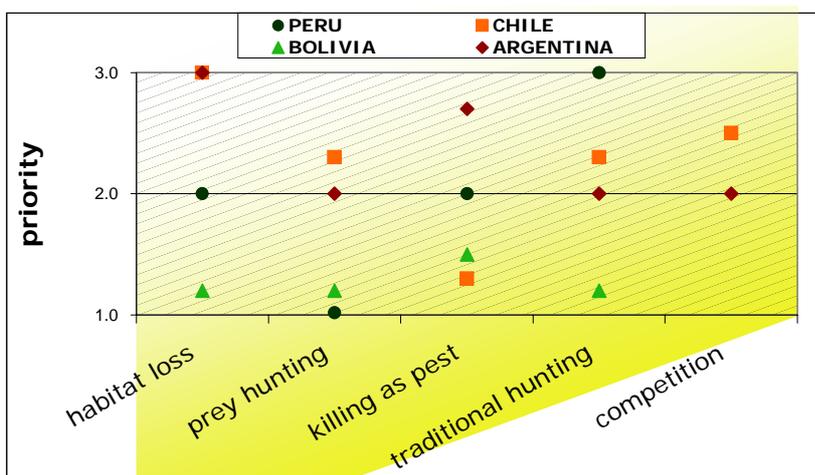


We compiled and submitted to the evaluation of participants a preliminary list of threats:

- 1 Habitat Degradation and Fragmentation
- 2 Reduction of Natural Prey due to Hunting
- 3 Killing in Retribution for Livestock Depredation
- 4 Killing for Traditional Purposes
- 5 Intraguild Competition

The prioritization process showed that these threats had a highly variable importance in the four range countries of the Andean cat (Fig. 16).

Fig. 16. Ranking for a preliminary list of threats to the conservation of the Andean cat in its range countries. 3 indicates high priority, 0 low priority.



This list served as a base for the subsequent discussion among AGA members that eventually led to the final list of threats and their respective priority appearing in the Andean Cat Conservation Action Plan (Villalba et al. 2004) (Tab. 3), which is still guiding the conservation planning of all

AGA members.

The final list showed that some form of hunting (for traditional purposes in Chile and without precise reasons in Argentina) were considered the most important threats to the survival of Andean cat populations in 2 countries of its range, while habitat loss and/or fragmentation was the highest ranking threat in the remaining two countries (Peru and Bolivia) (Tab. 3).

Tab. 3. Priority list of threats to the conservation of the Andean cat in its range countries. 1 indicates the highest priority, while 8 indicates the lowest. Number of conservationists participating in this prioritization for each country is shown in parentheses.

| | PERU (n = 2) | BOLIVIA (n = 3) | CHILE (n = 3) | ARGENTINA (n = 3) |
|----------------------------|------------------------|---------------------------|-------------------------|-----------------------------|
| TRADITIONAL HUNTING | 3 | 3 | 1 | 4 |
| PREY REDUCTION | 2 | 2 | 5 | 3 |
| HABITAT LOSS/FRAGMENTATION | 1 | 1 | 4 | 7 |
| KILLING BY MEN | 4 | 4 | 6 | 1 |
| SMALL POPULATIONS | 5 | 5 | 2 | 5 |
| INTRAGUILD COMPETITION | 6 | 8 | 3 | 2 |
| GENETIC VARIABILITY | 7 | 6 | 7 | 8 |
| DISEASES | 8 | 7 | 8 | 6 |

In our questionnaire, we proposed four types of conservation actions:

1) **C**onservation.

- 1.1 establish new Protected areas and improve effectiveness of existing ones;
- 1.2 reduce resource extraction (mining) impact;
- 1.3 promote management of grazing practices in order to reduce disturbance to Andean Mt. cat populations;
- 1.4 develop wildlife-based eco-tourism and other economic activities that will generate alternative incomes to local communities with clear linkages to wildlife and habitat conservation;
- 1.5 reduce domestic animal losses through trapping and displacement of problem-individuals.

2) **E**ducation.

- 2.1 design and implement of both formal and no-formal educational programs aiming to raise public awareness;
- 2.2 initiate local sensitization initiatives specifically designed to change traditional attitude towards carnivores;
- 2.3 carry on mass-media campaigns;
- 2.4 conduct lobbying on lawmakers and other government agencies.

3) **P**olicy and **L**aws.

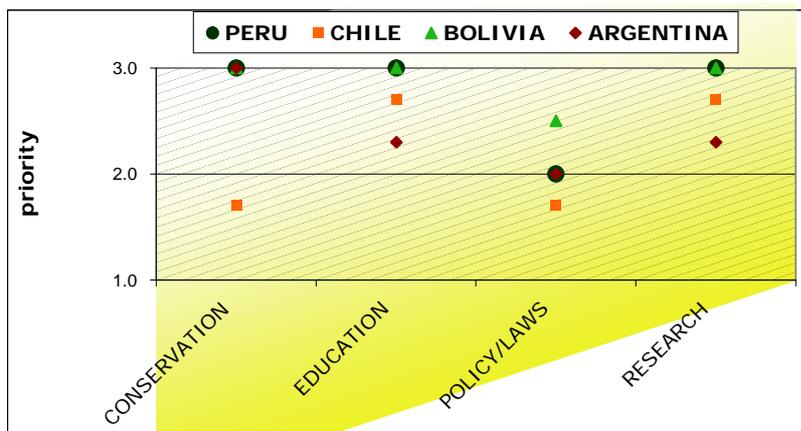
- 3.1 establish laws fully protecting the Andean Mt. cat and ensuring clear penalties for violations;
- 3.2 enforce/improve existing wildlife hunting/marketing laws;
- 3.3 enforce law application in existing protected areas;
- 3.4 develop and pass laws promoting the creation of locally-managed protected areas;
- 3.5 develop/implement laws requiring Environmental Impact assessments for any development project which may negatively affect habitat and wildlife within Andean Mt. cat range;
- 3.6 institute wildlife population monitoring programs.

4) Research.

- 4.1 current geographic distribution and “hot spots”;
- 4.2 factors affecting conservation status;
- 4.3 habitat and food requirements;
- 4.4 population dynamics;
- 4.5 extent of intra-guild competition;
- 4.6 population genetics.

With the only exception of Chile, direct conservation actions (e.g. Protected Areas creation and enforcement, economic incentives to local people, natural resources management, etc.) were considered as the highest priority by respondents (Fig. 17). Despite the fact that the ranking process showed that different actions were considered of variable importance in the four range countries of the Andean cat, it was generally recognized that both Education and Research were necessary lines of action (Fig. 17).

Fig. 17. Ranking for a general list of actions for the conservation of the Andean cat in its range countries. 3 indicates high priority, 0 low priority.



As in the case of conservation threats, this general list of actions was adopted by the AGA as a start-up for the Conservation Action Plan (Villalba et al. 2004).

CONCLUSIONS

This is the first study reporting extensive information on relative abundances of carnivore populations in the high Andes ecoregion.

All our results (sightings, DNA-identified faeces and reports from local people) support the hypothesis that the overlap in range between chillas and Andean cats is very reduced in the high Andes region, since the distribution of this fox would be mainly limited to the large open areas surrounding the salt flats or *salar*s, located at comparatively lower altitudes.

The overlap in distribution range with the other medium-sized carnivores and pumas is extensive.

Interviews to local people suggest that pumas and culpeos are the most homogeneously distributed carnivores of the high Andes of northwestern Argentina and that Andean cat populations are less common than Pampas cat populations. The latter hypothesis is also supported by the smaller number of Andean cat skins showed by informants. Nevertheless, according to this method, the populations of the two small cats occurring in this region would be also relatively widespread.



The same conclusion can be drawn on the base of our field surveys. Small cat signs were recorded in all the areas that we surveyed, but the Andean cat presence was confirmed only in a portion of them. However, this apparent rareness of the Andean cat may be a result of insufficient sampling effort, since we were successful at recording its presence in all the areas where we used all our surveying tools simultaneously.

In this study the proportion of genetically identified faeces belonging to *O. jacobita* was much lower than that of *O. colocolo*. This may suggest that the Andean cat was much rarer in the areas we searched. The other possible explanation of this result is that the Andean cat has a scent marking behaviour different from the Pampas cat and does not usually defecate in large latrines, but no data are available until now to test this last hypothesis.

On the other hand the difference in relative abundances between the two small cats suggested by genetically identified faeces seems far greater than what we would expect on the base of direct evidences.

The relative frequencies of direct signs, which are undoubtedly our most reliable type of evidences, strongly indicate that culpeos are the most common carnivores of the high altitude Andes of Argentina and that small cats are rarer. But they also suggest that the Andean cat is

only slightly less abundant than the Pampas cat, though small sample size prevents us from drawing definitive conclusions on the differences in population abundance between these two species.



The Andean cat conservation status (Nowell and Jackson 1996, Nowell 2002) and the species-specific conservation actions that it prompted (Villalba et al. 2004) are based on the critical assumption that the Andean cat is rare. Since a species can be rare because its populations occur low densities or/and because they have a restricted distribution, we aimed to understand whether the Andean cat has a

more restricted distribution than its main potential competitors and whether its populations are less abundant than those of the Pampas cat and culpeo.

We conclude that, in accordance with its comparatively greater adaptability, *it is probable that the culpeo is the most widespread and abundant carnivore of the high Andes of Argentina, that small cats have a more reduced distribution than culpeos and that the populations Andean cat are less homogeneously distributed than those of the Pampas cat.* On the other hand, whereas small cats are likely to be found at lower population abundance than culpeos, *we cannot conclude that Andean cat populations are less abundant than those of the Pampas cat, in the areas where the two felids are sympatric.* However, *if we combine the two component of population rareness that we tested, we should probably regard the Andean cat as the most rare medium-sized carnivore of the high Andes of Argentina.*

Our data also show that, despite the fact that the puma still appears to occur in most of the region, the abundance of its signs is consistently very low. Low puma population densities can be in part expected by its large body size and the related requirement for large territories, especially in the low productive ecosystems of the high Andes. However, we think that the remarkably negative attitude of local populations toward pumas (see next Chapter), summed to the naturally low population densities of this felid, suggest that the status of puma populations in the high-altitude regions of northwestern Argentina requires careful monitoring.



Because of their secretive habits and low numbers, the study of carnivore densities is usually difficult, especially when carried out in remote, little productive areas, as it is the case for the high Andes. Determining absolute densities of animal populations is complex and often controversial. A number of direct and indirect methods to study population numbers have been described (e.g., Macdonald 1988, Gese 2001), but none of them is free of flaws and the selection of one of these techniques should be based on different criteria, including the natural history and spatial distribution of the animals themselves, topography and vegetation of the study area, observer experience, research objectives, etc. (Gese 2001). Where terrain, visibility, manpower and budget permit, direct counts should be favored. For many species, however, direct counts are impractical and researchers must rely on indirect signs, such as tracks, scats or den sites (e.g. Wilson and Delahay 2001, Jackson et al. 2005). Furthermore, many ecological problems can be tackled with the help of indices of density (Caughley 1977) and many conservation priorities cannot wait until absolute estimates of density are reached.



Solitary and secretive felids are notoriously difficult to enumerate (Sunkuist and Sunkuist 2002, Jackson et al. 2005). In the case of the Andean cat, Perovic et al. (2003) recommended the combined use of interviews, short field surveys and genetic analysis of faeces to determine its status over large geographical areas. Based on our data, the use of this procedure can be successful at detecting the presence of the Andean cat, but only if the amount of samples obtained and analysed is sufficiently large to account for the rareness and/or low encounter rate of this felid's faeces. We suggest that *a more efficient and reliable strategy for rapid presence surveys should include camera trapping*, to increase detection probabilities.

Nevertheless, this procedure does not provide measures of absolute densities.

Until now, very few study attempted to correlate sign density and cat density. The use of encounter rates as abundance indices is based on the assumption that the finding success of signs belonging to different species and in different areas is comparable. In the open, vegetation-poor, and relatively homogeneous environment of the high Andes this assumption might be acceptable, but it is clear that a specific study is necessary to calibrate sign densities with known population densities, before we can conclude whether sign encounter rates or photographic capture rates can be reliably used to study variations in population abundance of small cats in the high-altitude Andean regions and whether the variations we recorded reflects true variations in population numbers. Furthermore, the differences in results between indirect signs of presence and direct

methods suggest that *the marking behaviour of the Andean cat may complicate estimating its abundance through sign counts and require a remarkable searching effort, which, in turn, implies high economic costs.* Finally, it is also necessary to keep in mind the difficulties and risks related to the task of finding carnivore signs in remote areas, and with the challenges caused by high altitude, harsh climate and rough/steep terrain. The advantages of sign counts are mainly related to their low equipment costs. But they also require a relatively lower time effort, when compared to camera trapping.

Photo trapping is a no-intrusive method that has been successfully used for checking the presence and population numbers of elusive animals, particularly carnivores, and even to estimate densities of rare cat populations in remote mountain regions (Jackson et al. 2005). The photos already obtained from camera trapping indicate that it is probably possible to individually identify Andean and Pampas cats through this method and that *photo trapping may be a promising strategy for the estimation of Andean cat population densities.* However, these preliminary results satisfy only one of the main assumptions underlying this methodology and thus the use of this technique and capture-mark-recapture procedures to study population densities of small cats in the high Andes needs to be thoroughly tested.



The study that we carried out with other AGA members is the first one that provided data on the Andean cat food habits, and showed that the three medium-sized carnivores of the high altitude deserts of Argentina used the same food resources, but in different proportions. The most specialized of the three is the Andean cat, which relied most heavily on mountain vizcachas. Our analysis did not take into consideration the biomass of the diet represented by different prey items. However, the *mountain vizcacha is undoubtedly the most important food item for the Andean cat* in terms of biomass, given that the body mass of an adult mountain vizcacha is 25 times that of the most frequent food item (cricketine mice).

In order to determine whether Andean cats are truly selecting for mountain vizcachas, it would be necessary to compare biomass of mountain vizcachas in the cat's diet with available biomass in areas with different densities of mountain vizcachas and alternative prey.

The Pampas cat also had a specialized diet, in contrast to what we had expected based on the little published information (Sunkuist and Sunkuist 2002). Tuco-tucos, although not as large as

mountain vizcachas, are much larger than cricetine rodents, and thus, likely represent the most important food item for pampas cats in terms of biomass.

The culpeo was much more of a generalist than the two cat species, consuming all the prey items that the cats used, and a greater variety of invertebrates.

Interestingly, we found remains of greater chinchillas (*Chinchilla brevicaudata*) in three culpeo scats from Catamarca. This proved that this rodent, which was considered extinct in Argentina, is still present in the wild in these habitats.



The coexistence of these three species of carnivores in the high altitude deserts appears to be facilitated by partitioning of food resources. Nevertheless, there was a relatively high overlap among carnivores in terms of food items used, and both culpeos and Pampas cats consumed mountain vizcachas, the major prey of the Andean cat.



Therefore, Pampas cats and culpeos could be exerting intense resource competition on the Andean cat, in spite of the fact that they consume comparatively fewer mountain vizcachas and this would be especially so if their population density is greater than that

of Andean cats.

The patchy distribution of major prey species of the two cats suggests that very large areas may be required to support individual cats and populations. Nevertheless, human activities that impact even a small proportion of a cat's range may have an inordinately large effect on that individual if the area affected is an important patch or habitat feature, such as a rock outcrop with mountain vizcachas, an area of sandy soil with tuco-tucos, or meadows and streams that provide habitat for cricetine mice.



Although the presence of skins of both the Andean Mountain cat and Pampas cat in the homes of villagers of the Andean Puna had been previously reported, we collected the first empirical evidence that these two cats can live sympatrically (in the same area) and at the same site (see Lucherini and Luengos Vidal 2003, Appendix 2).

Our analysis of habitat use by the Andean cat is the first attempt to understand its habitat requirements. Although it has not been completed yet, it has already provided important results that suggest the *great importance for all carnivores in the high Andes species of the rocky areas*

with steep slopes. This habitat offers abundant shelter and, probably, facilitates the ambush hunting behaviour of small cats. However, it is likely that the main advantage of this habitat is its high density of mountain vizcachas, which almost exclusively occur in these rocky patches. This conclusion is supported by the strong correlation that we found between the abundance of small cat signs and that of Mt. vizcachas. The strength of this relationship is highlighted not only by its high statistical predictive capacity, but also by the fact that we obtained it using two different techniques for sign abundance estimation and two different indices of vizcacha abundances.

Although we still have a small amount of Andean cat confirmed sites, the results of diet analysis suggest that rocky habitats are very important for this cat. On the other hand, since most of the faecal samples that have been genetically identified belong to Pampas cats, we can already conclude that rocky patches are also very frequently used by the Pampas cat and that overlap in this component of the ecological niche of these two species is extensive.

Culpeos appear to move over a more varied range of habitats and be less dependent on rocky areas than small cats, but this habitat is the one where the highest density of fox signs has been recorded.

The next step of this analysis is to compare habitat use by carnivores with the availability of the same habitats, in order to test the existence of selection and how it varies between carnivores. However, based on the results previously showed and the fact that rocky sections occupy areas clearly smaller than other habitats in most of the sites we surveyed, we predict that small cats are



highly selective in their use of habitats, and use rocky areas with steep slopes and broken terrain more than expected based on their availability, while a less selective behaviour may be expected for culpeos.

Thus, all the data on habitat suggests that *there is a large overlap in space use by the three medium-sized carnivores of the high Andes* and that partitioning of habitat may be even more limited than that recorded for food resources.

A further implication of these results is that, because the major prey species of the two small cats have a patchy distribution, *very large areas may be required to support individual cats and populations.* Our data on population abundance support this expectation, especially in the case of the Andean cat.



Population density has been found to be strongly correlated to prey biomass in many carnivores (Fuller and Sievert 2001). One of the implications of intraguild competition is that human-caused changes to the main prey of one carnivore species are likely to have a cascade of effects through the entire carnivore community. Chinchillas, which were most likely one of the most important food resources of the Andean cat, have almost been exterminated in the wild because of their prized fur and are now listed as critically endangered both nationally and internationally. It is logical to speculate that a decrease in the availability of chinchillas caused a direct reduction in the numbers of the Andean cat individuals. The indirect consequences of this alteration in prey populations are more difficult to predict. In the co-occurrence of two similar-sized, evolutionary-related, carnivores, we might expect that when a resource becomes limiting, intraguild competition increases strongly. The Pampas cat, because of its wide geographical and ecological distribution, is considered more adaptable (Oliveira 1994), and would be competitively favored with respect to the more specialized Andean cat in such a competition frame.

All the above supports the need of conservation measures for the Andean cat, especially because this cat, unlike its potential competitors, is exclusively distributed in the high Andes ecoregion, and is in agreement with the conclusions obtained by the survey on local people's perceptions and attitudes (Lucherini et al. 2004, see following Chapter).



Habitat loss, caused by extensive cattle (lama) ranching activities in some areas (Bolivia and Peru) and by mining in other areas (central Argentina) has been identified as one of the main reasons of concerns for the long-term survival of the Andean cat. Hunting, either for using pelts

in traditional ceremonies (Peru and Bolivia) or for preventing possible livestock killing (in Argentina, see next Chapter) also resulted a major cause of the present-day conservation status of Andean cats.

Prey reduction by man (chinchilla hunting for its fur) was probably an important cause of decline of Andean cat populations in the recent past. Small population sizes (which exposes them to stochastic events) and competition for reduced resources with other carnivores of the same community (intraguild competition) have also received a relatively high ranking, while reduced genetic variability and diseases has not been listed as important threats, mainly because they become particularly dangerous in small populations.

The analysis of conservation actions revealed the urgency of implementing activities directly favouring the preservation of Andean cat populations in the wild through a reduction of the main threats, but also confirmed the importance of research studies and education programs, which recognizes a widespread lack of information and knowledge at different levels of the society.

Both threats and actions were ranked differently in the four range countries. This suggests the need for country-specific (and, to some extent, also regionally differentiated) conservation strategies.



FINAL EVALUATION

The evaluation of our results shows that almost all the objectives of our scientific research component have been successfully fulfilled, since we raised a large amount of novel knowledge that has critical implications for the conservation of the Andean cat in Argentina and throughout its distribution range.

The new data on geographic distribution and population abundance we have obtained suggest that, at present, both the culpeo and the Pampas cat, its two most important potential competitors, are probably more common than the Andean cat. We also collected evidences that range overlap between them is extensive, and also occurs at a fine geographic scale. The study of resource use by carnivores showed that niche overlap between these three carnivores is also very wide, since it comprises food and habitat, two of the main component of the ecological niche.

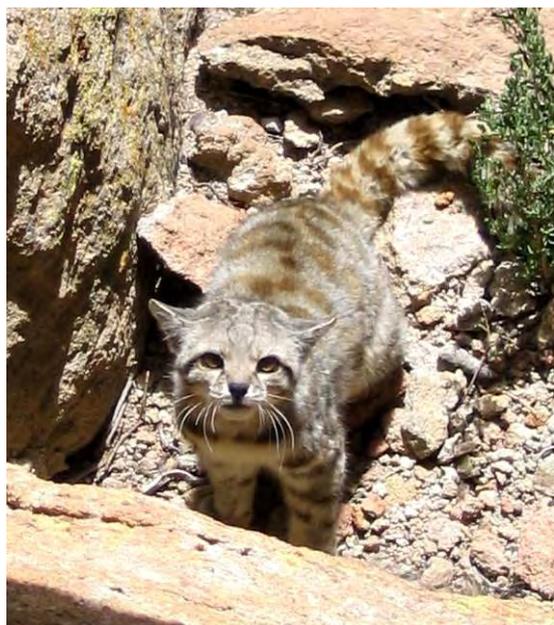
Since it has been shown that intraguild competition can have particularly negative effects on the conservation status of extinction-prone carnivore populations (Creel et al. 2001), our results mainly support the hypothesis that interspecific competition is affecting the current status of the Andean cat. However, they also proved important for the evaluation of other threats, like prey reduction, hunting and habitat loss caused by man.

Consequently, results supported the assumption that the guild-based approach that we adopted is most appropriate for collecting information and, ultimately, conserving the Andean cat.

The list of threats to the conservation status of the Andean cat that we elaborated identified hunting and habitat loss as the primary reasons of concern. We were happy to see that our initiative formed the base of a later revision by the AGA, which expanded it, but also confirmed these same threats as the most important ones. Similarly, we gave a start to a process that led to the final selection of priority actions for the conservation of this cat.

Our comparison between methodologies for field data collection provided much-needed suggestions for future research. Although our population abundance study was not conclusive, we were able to show that photo trapping should be used for presence/absence surveys and also has a great potential for population density estimates. We also proved that a large sampling effort is required to collect Andean cat evidences through sign search.

The evaluation process also revealed that more information can certainly be obtained from the large mass of data that we have gathered. In spite of the fact that some publications have already been completed by our team, we are aware that we need to increase our efforts to publish our data and thus make them available to a wider audience.



Chapter 3

COMMUNITY PARTICIPATION
EDUGAT PROGRAMME





ABSTRACT

Ecological research will undoubtedly be fundamental to save the Andean cat, but there is also great need for a strategy that recognizes the importance of the contribution from local communities and is able to balance conservation and community survival. *EduGat Programme* is a conservation education initiative aiming to answer to this need, supporting the conservation of the *Soul of the Andes* through the participation of local communities. The Programme has already completed seven campaigns in the high-Andes communities located within the potential distribution range of the Andean cat in the Argentine provinces of Jujuy, Salta, Catamarca and Tucumán. Until the moment, we visited 39 localities, carried out formal education in 18 schools (reaching 393 students), no-formal activities, 5 participative community workshops, festivals and informal interviews. Each target public was reached by a different set of activities. Interviews showed that local people's perception of and attitude towards high Andes carnivores is negative, especially in the cases of pumas, culpeos and small cats, but also confirmed the potential for a change.

A mid-term evaluation of the progresses of *EduGat Programme* was carried out using a range of quantitative and qualitative tools, including questionnaires, observations, and external evaluation. The analysis of the evaluation process suggested that our activities for school-age children were particular successful, but also revealed the need to increase efforts to guarantee teacher and adult participation in conservation plans. To improve the effectiveness of the Programme, we are implementing new initiatives: workshops aiming to create a network of educators; new educational materials to improve the comprehension of ecological concepts; a community conservation centre to increase the presence and interaction of our project with local people; facilitate capacity building for the development of a community-led ecotourism initiative that will provide an example of sustainable, and profitable, use of natural resources.

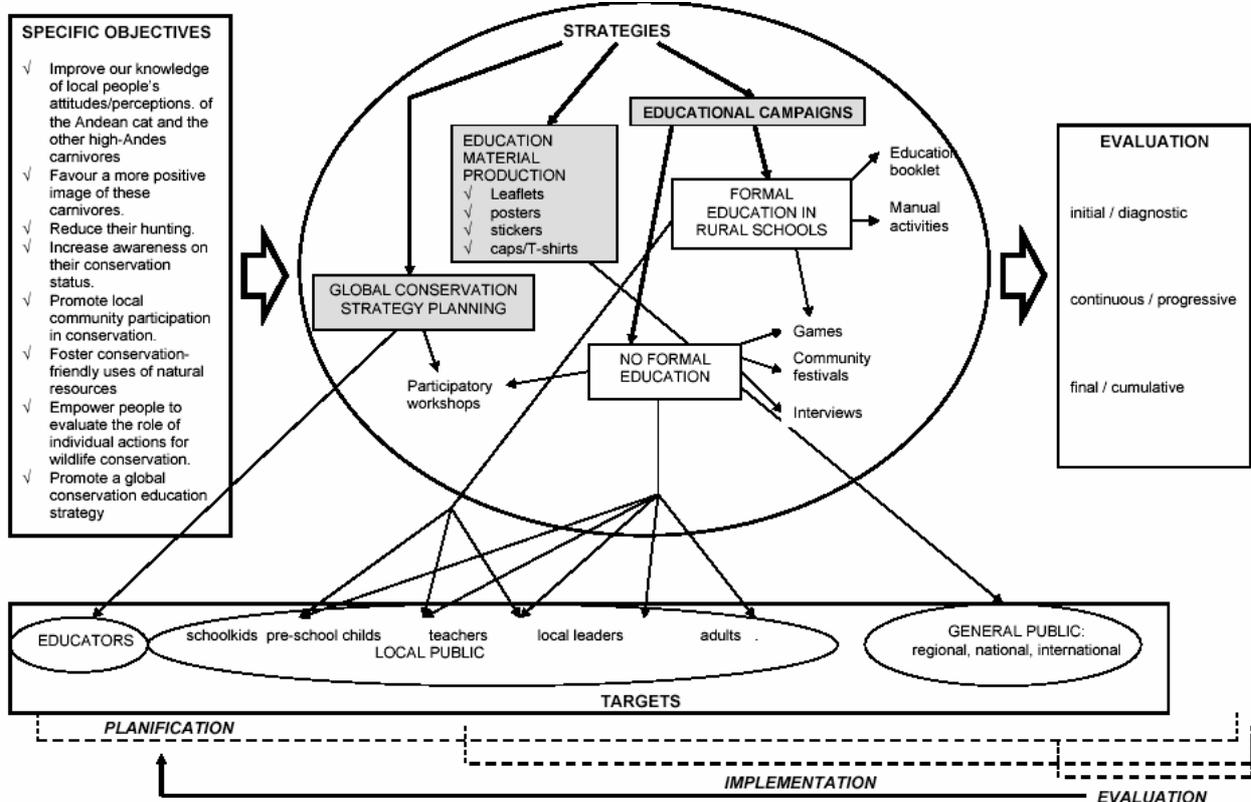


SPECIFIC OBJECTIVES and METHODS

We are convinced that conservation can be achieved only through a strategy that will enable to couple research to simultaneous conservation actions. For this reason, we felt the urgency of developing a strong education and community participation programme, and decided to create a specific programme, which we called **EDUGAT PROGRAMME** (in charge of M.J. Merino). Although EduGat Programme constantly interacted with the rest of the project, it identified its specific goals, its target audience and elaborated strategies, tools and evaluation methods (see the **Conceptual flowchart**).



Conceptual flowchart of EduGat Programme, the educational component of The Soul of the Andes project.



Objectives were strictly derived from the list of threats for the conservation of the Andean cat elaborated by our Team and later completed by the AGA (see the Research Chapter):

- ✓ Improve our knowledge of local people's attitudes/perceptions of the Andean cat and the other high-Andes carnivores.
- ✓ Favour a more positive image of these carnivores among local people and the general society.
- ✓ Reduce their hunting and that of their prey.
- ✓ Increase awareness on their conservation status.
- ✓ Promote local community participation in conservation.

COMMUNITY PARTICIPATION

- ✓ Empower people to evaluate the role of individual actions for the conservation of wildlife and natural resources.
- ✓ Foster conservation-friendly uses of natural resources.
- ✓ Promote a global conservation education strategy.

Rational. Carnivore conservation is extremely difficult without the support of local communities. Our preliminary data showed that local villagers generally considered carnivores as pests, but

more information was needed on people's perceptions and attitudes. At the same time it was necessary to start developing a more conservation-friendly attitude at all levels of the society and promote local people's participation in conservation.

Furthermore, in spite of the enormous potential of the

Andean cat as conservation tool, the lack of local, regional and national awareness on this cat's uniqueness prevented its suitability as a flagship species for conservation. To revert this situation, an awareness campaign was necessary, and the support of media should be gained. Finally, a global conservation strategy of the Andean cat would greatly facilitate fund raising and optimise the use of available resources.



To the previous, conservation-focused, objectives, we added a last one, which has not a direct effect on the conservation of the Andean cat, but certainly has profound direct implications on it:

- ✓ Develop and carry out an evaluation process of our education programme, to improve its effectiveness.

Rational. Long-term conservation of an endangered species must be a dynamic process, where positive feedback mechanisms

enable learning from the experiences that one has gathered and applying the lessons learnt in real time (Kleiman et al. 2000). Because of this, evaluation is a task that should go along with the whole development process of an educational programme, following it step-by-step, and analysing not only its results but also its processes. Furthermore, evaluation should also allow the intervention of all stakeholders (Jacobson et al. 2006). No single perfect technique exists for the evaluation of a

COMMUNITY PARTICIPATION

conservation education programme and relying exclusively on a final evaluation of results would not enable us to provide adequate feedback for the improvement of tools and procedures.

For all these reasons, we combined three types of evaluation, following Gómez and Rosales' (2000) suggestions (Tab. 1).

Tab. 1. Types of evaluation adopted by EduGat Programme, with details of their respective techniques.

| TYPE | TECHNIQUE | WHAT DOES IT EVALUATE? | WHO EVALUATES? |
|-----------------------|---|---|--------------------|
| INITIAL EVALUATION | Oral previous ideas, open-ended questions and attitude rankings | Interests, knowledge, beliefs and attitudes | educator |
| | Initial questionnaire | Interests, motivations, consciousness, daily conducts | educator |
| CONTINUOUS EVALUATION | Class diary, daily recollection of information | Habits, behaviours, individual and group skills | educator |
| | Interpretation games | Attitudes, values, knowledge, skills, strategies | educator |
| | Booklet of activities | Knowledge, interests, skills | educator |
| FINAL EVALUATION | Final questionnaire | Evolution in interests, preferences, knowledge, beliefs and attitudes | educator |
| | Questionnaire on the education tools and educator performance | Project development, learning climate y educator performance | students |
| | External evaluation | Project development, analysis of results and conclusions, improvement suggestions | external evaluator |

Strategies.

1. Carry out Education and Community Participation Campaigns, using both formal and no formal educational tools
2. Produce, use and spread Education Materials
3. Facilitate the development of a Global Education Strategy for the Conservation of the Andean cat
4. Complete a preliminary evaluation of tools, strategies, and results that can produce improvements to the effectiveness of the Programme.

Tools. Within the frame of the above listed strategies, the following tools were used:



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COMMUNITY PARTICIPATION

1. **Interviews** to local villagers were used to understand people's knowledge, perceptions of, and attitudes towards high-Andes carnivores. They were also used to create awareness in interviewees about our projects and the conservation issues related to the Andean cat. Interviews are a widely used technique for surveying mammals, especially carnivores, and for understanding people's perceptions (Dietrich 1995, Rabinowitz 1997, Conforti and de Azevedo 2003). The settlements we visited were located from 2000 to 4500 m of elevation, but our interviews of adults were always aimed at people who either lived or frequently visited the Puna areas (herders, in the great majority of cases, or guides). Interviews followed a semi-structured procedure (Kapila and Lyon 1994), and were based on a standard questionnaire that was not used in the presence of the interviewees. Interviews were informally carried out by two-three researchers, who



alternated between making specific and more general questions. Schoolchildren were individually interviewed through a written form. The questionnaire asked them to list the wild animals of their region and to choose between two opposite situations, one showing a man shooting at a wild small cat and the other featuring a man watching a wild cat through binoculars.

Last year the questionnaire model for adults that we had used as a base for this activity was replaced by a new one, addressing in a more detailed form the reasons of the negative perceptions and attitudes that we recorded in the first phase of the project as well as the knowledge of the conservation status of the Andean cat. We started using this new form in Laguna de Vilama landscape, where we settle down for the last campaigns.

2. **Education Booklet**, specifically designed for the project and comprising a set of activities



for kids of different ages, to be used when working in formal environments.

3. **Manual activities (drawings, constructing a 3D Andean cat model, mural paintings)**, to be used in the same setting, but sometimes involved also schoolteachers.

4. Project-specific **games** to make learning a funnier activity. This kind of tool is very flexible and can be used in formal and no formal settings

COMMUNITY PARTICIPATION

and for kids of different ages.

5. Community Festivals. These are a more complex type of tool, which can greatly enhance community participation but also requires a great effort and greater time availability. They were planned to include different types of activities. Some of them, like communal food cooking of traditional recipes and traditional music and dances, depend on local people, while others, a puppet show featuring the Andean cat and other mammals of the Puna and a rural theatre



drama, were designed by our team and then modified with the participation of kids and teachers.

6. Participatory Workshops.

These were one of the major tools of the Programme and were used for a range of objectives. We organized them primarily to inform communities of our project,

debate on the conservation issues of the Puna, giving people tools to set this issues into the wider frame of the status of environment in Argentina, provide a chance to all stakeholders to present their opinions on the community needs and the use of natural resources and suggest possible alternatives, empowering them to take conservation-friendly initiatives.

Workshops were also used as a participative tool - with all AGA members working in Environmental Education- to agree on a global strategy for education of local communities and provide them with training for the development of conservation education activities in their home countries as well as -with rural school teachers- to create a network of educators compromised for the conservation of the Andean cat.



7. Education materials.



A range of materials were designed, targeting different audiences and for a variety of uses. These materials featured a conservation message and, whenever, possible, showed the BPCP logo.

Finally, contacts with local, regional and national media were also planned.

RESULTS

EDUCATIONAL CAMPAIGNS

In most cases, educational activities were carried out in parallel to field data collections, during the same expeditions to NW Argentina previously listed, and the only specific education campaign was completed in the area of Punta de Balasto, Catamarca province, in 2003 (see Complete List of Expeditions and Research Chapter).



Until the moment, we completed 7 educational campaigns, which brought us in contact with villagers of **39 settlements** (15 in Jujuy, 15 in Salta, 8 in Catamarca and 1 in Tucuman provinces) located from 2000 m to 4000 m of elevation.



En **18** of these localities EduGat Programme visited local **schools** (see Map in Research Chapter) and worked with a total of **393 students** from 6 to 14 years old (Tab. 1).

5 participative community workshops were organized, in 4 different villages, which gathered a total of **66 adults** (36 women y 30 men).

Community workshops were always announced with anticipation, through street signs, personal invitations to parents of school students, and spreading the voice through community leaders.



Despite the fact that results of this type of activity are difficult to evaluate, it was clear that both the number of attendants and their respective degree of participation varied greatly. In all cases community workshops proved very useful to raise awareness on our project and its aims among adults and establish personal contacts with them, which are the first steps to involve people in it, as well as to collect a great deal of

COMMUNITY PARTICIPATION

information on different themes, from traditional legends and beliefs on the Andean cat to potential guides, gender participation on decision-making processes, data on priorities for



community development, and how our project could help with them.

As expected, adults proved to need identifying a direct benefit to their quality of life from the participation in the project activities. Interestingly, we found great interest in the idea that Puna landscapes have a big potential for ecotourism activities and

felt that this theme could create a connection between wildlife conservation and economic incentives to local people since it can witness that natural –and cultural- resources can be used in sustainable form.

Our staff compiled an evaluation of workshop, examining 2 variables: percentage of participants who showed interest in participating in our project, and their average level of involvement in the activities of workshops (using arbitrary classes: Low, Medium, High).

The proportion of attendants showing evident interest varied greatly among localities, ranging from 0 to 60% (Fig. 1).



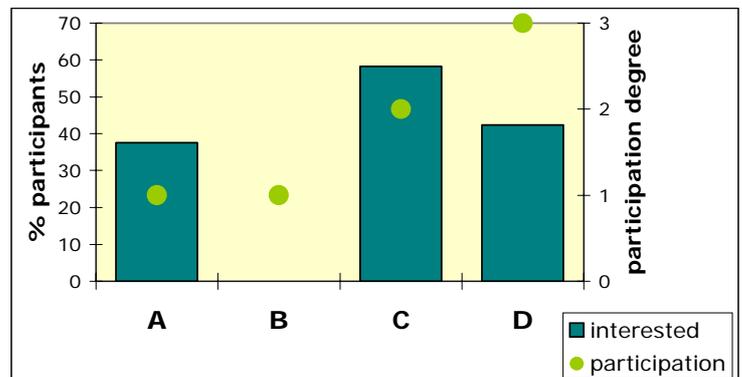
The second indicator of

success showed that the degree of participation was low in two cases, medium in one and high in the last community (Fig. 1).

The best results were obtained in the villages where EduCat Programme spent the longest time.

The **Andean Cat Community Festival** was carried out at Punta de Balasto and Laguna Blanca (within the borders of the homonymous Biosphere Reserve), both located in

Fig. 1. Evaluation of participatory community workshops Bars and values on the left axis indicate the proportion of participants showing interest in our activities; points and right axis report the average level of participation in the workshop by attendants (0: null, 3 high).



COMMUNITY PARTICIPATION

Catamarca province. These parties gathered a lot of people of all ages, who shared food and drinks, games, gifts and traditional music and dances.

In 2 localities, we played the **puppet show**, which was especially popular among the youngest children, but was also followed by adults. The show star character was Mr. Andean Cat, who discussed about the scarcity of keens with Mrs. Vicuna (the vicuña has also been in danger of extinction), and shared a meal at Restaurant “La Puna” with Mr. Guanaco, where also a mountain vizcacha showed up. All these characters interacted with the audience.

A **rural theatre drama** was played at Laguna Blanca, applauded by a captivated audience, and with the participation of local people and teachers. The script was about



a hunter coming from the city to the Puna to kill an Andean cat. Fortunately, the hunter, despite all his technology, gets lost and is forced to ask for help to a couple of local shepherds, who explain him that all animals have their role in the ecosystem and are loved and protected by *Pacha Mama*, the Mother Earth of the high Andes cultures.

Mural paintings were another tool that proved useful to foster community participation. These paintings featured the Andean cat and were done on walls of local schools with the participation of teachers, local artists and school students. They left a long-term message of our mission in the villages we visited, disseminated a message to all people getting to these villages and favoured a sense of ownership in all participants



COMMUNITY PARTICIPATION

Tab. 1 List of localities, with their respective provinces, where the EduGat Programme visited schools, and number of schoolstudents we worked with in each one of them.

| Locality | Province | Number of students |
|------------------------------|-----------|--------------------|
| Pastos Chicos | Jujuy | 12 |
| Catua | Jujuy | 28 |
| Olaroz Chico | Jujuy | 11 |
| Coranzuli | Jujuy | 18 + 30* |
| Olacapato | Jujuy | 14 |
| Cobres | Salta | 19 |
| Tolar Grande | Salta | 8 |
| Salar de Pocitos | Salta | 7 |
| Santa Rosa de Pastos Grandes | Salta | 21 |
| Punta de Balasto | Catamarca | 8 |
| Casa de Piedra | Catamarca | 30 |
| El Desmonte | Catamarca | 9 |
| Andalhuala | Catamarca | 10 |
| Laguna Blanca | Catamarca | 31 |
| Santa Catalina | Jujuy | 26 |
| Loma Blanca | Jujuy | 28 |
| Cusi Cusi | Jujuy | 62 |
| Lagunillas del Farallón | Jujuy | 21 |

* This school was visited twice, in 2001 and 2004.

INTERVIEWS TO ADULTS

Although we have not completed yet the analyses of the data collected until now, we report here the data on people's perceptions and attitudes. We defined perception as the opinion showed by respondents while we used the outcome of their actions to define attitude. Results were expressed as the percentage of responses.

We interviewed 50 adults belonging to different families from 33 settlements and 226 students from 14 rural schools. The area covered by these surveys falls within four Argentine provinces (Catamarca, Jujuy, Salta and Tucumán) and measures approximately 89,500 km².

The great majority of the adults who expressed their opinion considered pumas and foxes as pests for preying on livestock (Fig. 2). Although the largest of the fox species occurring in the Puna (the culpeo) can only reach a maximum body mass of 11 kg, foxes were widely reported to attack both young and adult goats, sheep and even llamas, similarly to the larger puma. Herders



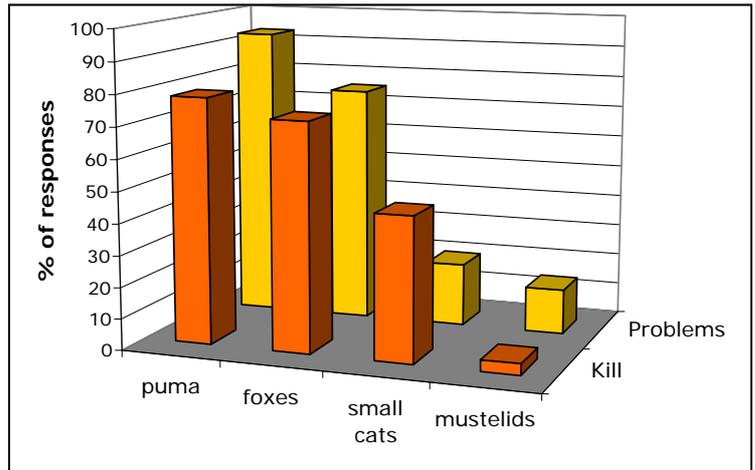


also frequently mentioned that these carnivores were responsible in cases of surplus killing (killing of a number of individuals that exceeds the feeding capacity of the predator).

Fig. 2. Perceptions (proportions of respondents who reported problems of predation on livestock, yellow bars) and attitudes (proportions of respondents who were found to kill carnivores, orange bars) related to high-Andes carnivores by local people.

Perception of smaller carnivores (small cats and mustelids) appeared to be substantially more positive (Fig. 2) and the reported cases of predation were mostly limited to hens.

More than 75% of the respondents reported to hunt pumas and foxes actively while this figure decreased to slightly less than 50% in the case of small cats and to only 3.6% for mustelids (Fig. 2).



Most of the cases of hunting on small felids (56.3%) was discovered only when we specifically asked the interviewees if they possessed some carnivore pelts. As a consequence, the figure we

report here is likely to be an underestimation of the true frequency of kills of small cats.



Although our interview was not specifically planned to detect the reasons why carnivores were killed, information on this issue was also collected. While pumas and foxes were mostly killed for retaliation or to prevent livestock predation, the reasons for the attitude of local villagers towards small cats were less clear. In many cases, small cats were hunted because they “might prey on chickens or young sheep/goats”, but it was also very frequently reported that small felids were accidentally killed by shepherd dogs.

37 interviews were completed with the new questionnaire that we adopted since 2005 in the region of Vilama,

Jujuy province.

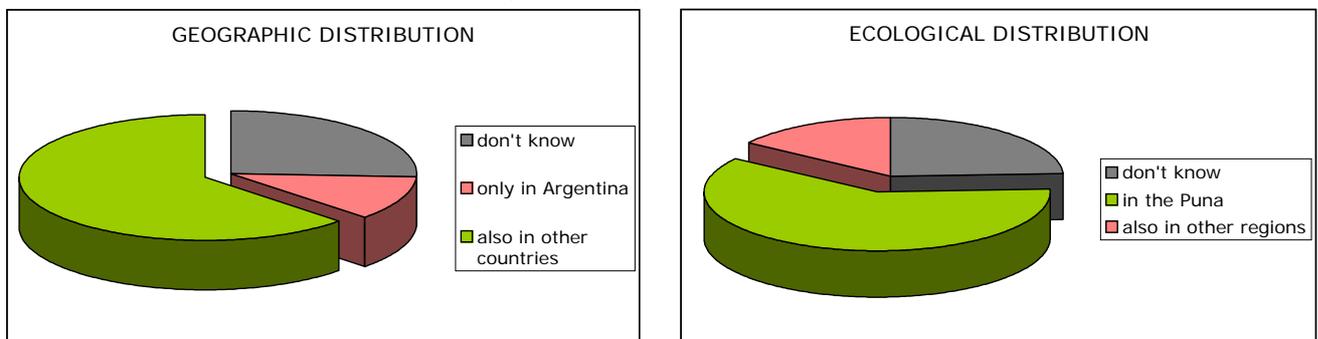
COMMUNITY PARTICIPATION

They revealed that most local people consider small cats rare (24.3%) or very rare (51.4%). Only 8% of them reported the presence of both Andean and Pampas cat in the area where they lived (we have already proven that both species occur in the region), whereas 81.1% indicated the Andean cat as the small cat they knew and 70.3% that they had seen the Andean cat once or more. 10.8% of interviewees thought that no cats exist in the area.

However, only 62.5% of the informants who stated to know small cats were consistent when explaining how they identified Andean cats.

Interestingly, most interviewees proved to be aware of the geographic and ecological distribution of the Andean cat (Fig. 3).

Fig. 3. Local people's knowledge on the distribution range and habitat association of the Andean cat. Green sections of pies correspond to the correct answer.

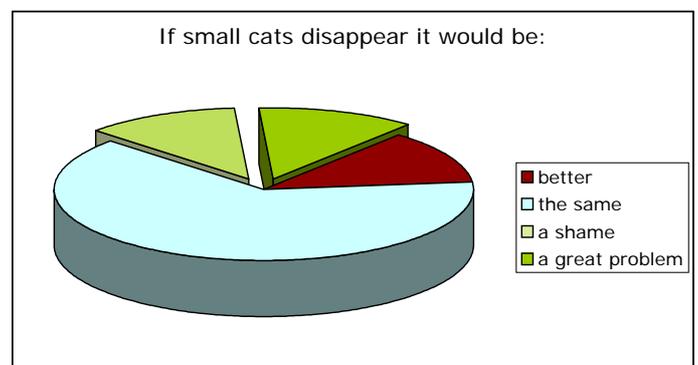


Only 26.7% of respondents think that carnivores have a role in nature, while most believe that they don't or don't know, and a similarly small proportion consider that small cats disappearance would be negative, whereas 63.6% of them feel that it would make no difference (Fig. 4).

Fig. 4. Local people's knowledge on the distribution range and habitat association of the Andean cat. Green sections of pies indicate the correct answer.

A minority (34.5%) of the persons we interviewed stated that they hunt small cats. These hunters kill cats mainly for their skin (53.3%), but a large percentage (40%) does not mention any reason for doing so.

Finally, the data we collected until the moment suggest that the knowledge of the Argentine law forbidding small cat killing is not very widespread (45% of answers).



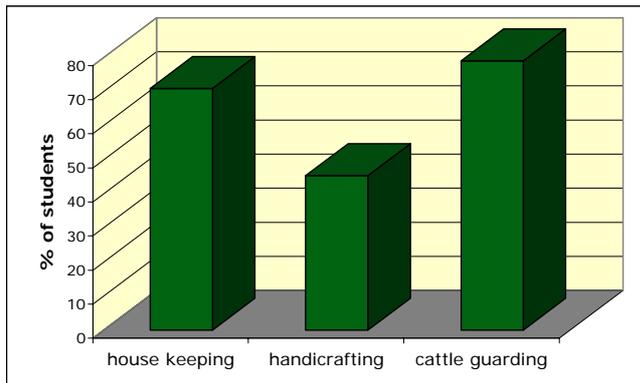
STUDENT QUESTIONNAIRES

Written questionnaires to school students were used for a range of different objectives. They aimed to give us insights into children knowledge of native wildlife and of ecological concepts, but we also adopted them as evaluation tools for our programme. Finally, a before and after comparison was used to learn about their attitudes towards carnivores and test if our activities had improved understanding of conservation concepts and produced meaningful attitude changes.

Almost all schoolchildren contribute to family activities, and are frequently engaged in more than one task (Fig. 5).



Fig. 5. Proportion of students participating in different family activities.



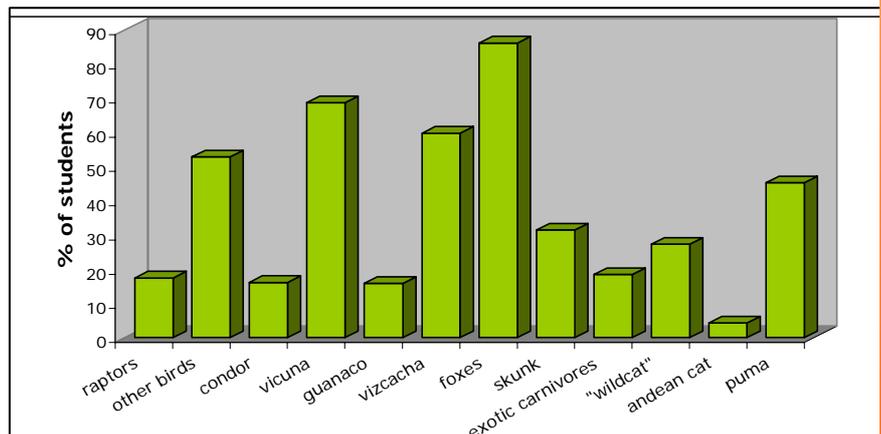
When asked what wild animals they knew of the Puna, almost all students (94.7% of 303 completed forms) reported the presence of some carnivore species in the area where they lived.

Foxes were the carnivores most frequently mentioned (86.1%), followed by pumas (45.2%), while skunk and –especially- small cats frequencies were lower (31.4% and 19.5%, respectively).

As a comparison, the very common mountain vizcacha was reported by 59.7% of the students (Fig. 6).

Fig. 6. Wild animals reported for the Puna by schoolchildren.

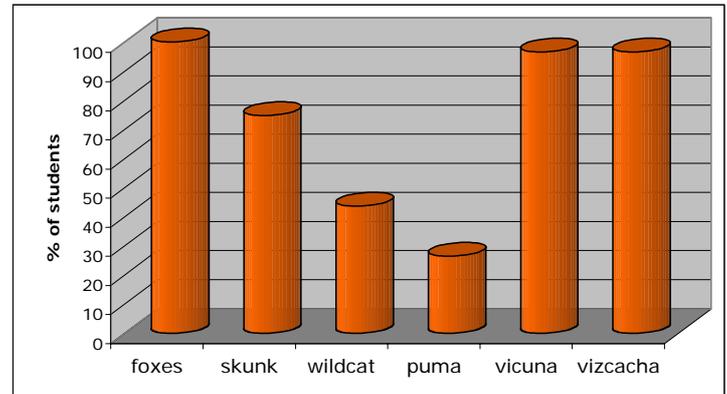
Answers gave a slightly different picture of young villagers' knowledge of their fauna, when we gave them the option of ticking the names of species they had seen in the surrounding of their villages.



COMMUNITY PARTICIPATION

Foxes, vizcachas, and vicunas were sighted by the greatest majority of them, which could be expected based on their relative abundance in the region, while it was more surprising that almost 44% of students reported they had seen a small cat (Fig. 7).

Fig. 7. Proportion of students reporting that they had seen at least once the Puna species we listed.



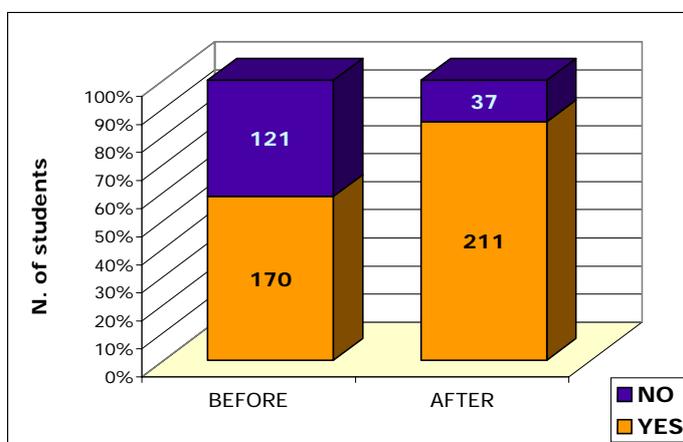
Most students (83.9%) answered that carnivores have a specific role in natural ecosystems, but, when asked to explain what this function is, only 53.4% of them provided a correct reply.

When given a multiple choice, 64.5% of schoolchildren identified the proper definition of species conservation.

Although 97.7% considered necessary biodiversity conservation, only 44.2% were able to give a correct explanation of the reason why it was necessary.

Our exploration of their attitude towards wild carnivores, carried out at the beginning of our visit to their school, revealed that 58.4% of these young citizens were contrary to small cat killing. Fortunately, this proportion increased considerably when we repeated the question at the end of their activities with us (Fig. 8).

Fig. 8. Attitude change: proportion of students reporting that they were favorable to carnivore killing (YES) and against it (NO) before and after their activities with us.



At the end of our activities, a questionnaire was also used to have students providing a process evaluation of our education programme.

The great majority of schoolchildren reported that they had enjoyed and learnt a lot from the activities they took part of with our staff (Fig. 9).

COMMUNITY PARTICIPATION

Fig. 9. Opinions on EduGat Programme of students who had participated in its activities.

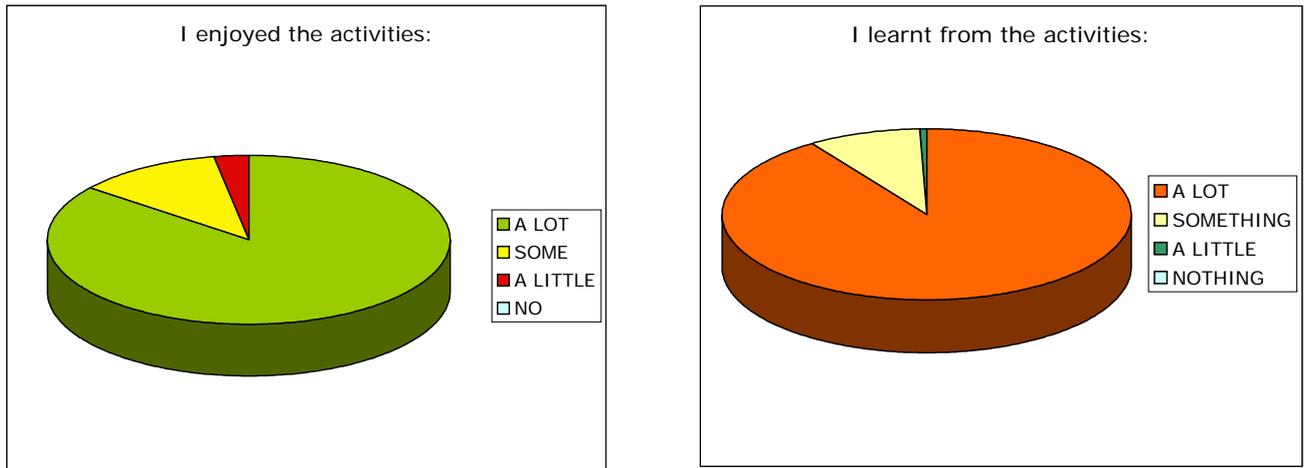
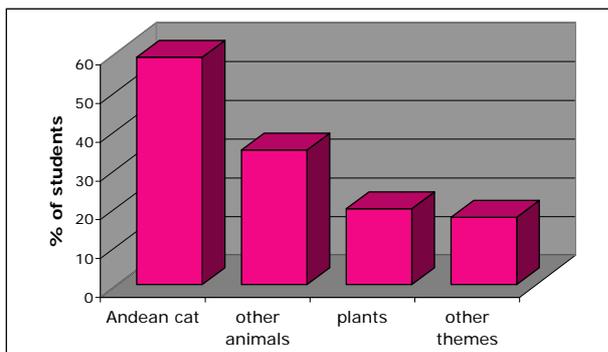


Fig. 10. Issues of interests for students who had participated in our education activities.



To learn about their interests, we also asked to students what they would be mainly interested to learn more about.

Most of them mentioned the Andean cat, but other animals and plants were also listed rather frequently (Fig. 10).

EDUCATION MATERIALS

EduGat Programme invested a lot of effort in the production of an array of material that could cover the need of educators working in a variety of settings, with different specific goals, and with a variety of audiences.

- a. **Brochures.** They introduced our project and its aims in an accessible language and with an appealing design, relating them to the conservation needs of the Andean cat and Puna wildlife. Brochures were used with a very large diversity of targets, from local institutions to foreigner donors.



COMMUNITY PARTICIPATION

- b. **Postcards.** They featured pictures of the Andean cat (2 models) and the Andean cat and its habitat (1 model), and were used as a project business card, but also as a small present for school kids and teachers.



- c. **Stickers,** featuring an Andean cat drawing, and **pens,** with a conservation message, were given as presents to all students and adults we worked with.
- d. **Booklet of activities.** This is a tool specifically designed for formal education activities. Its first version was produced in 2000, but it has been updated and reformed. It introduced students to native species of their region, particularly the Andean cat, explains its food habits, ecological relationships, the adverse effects of extinction on food webs and the need for nature conservation. Concepts are

reinforced through a range of different and creative activities.

- e. **Poster.** A bilingual poster was produced to introduce the Soul of the Andes project, and the activities it carries on, to educated audiences and was showed in conservation/scientific conferences and meetings.
- f. **Banners.** A set of 4 banners have been recently produced to present in a plain language, respectively: the Andean cat conservation status; wildlife of the high Andes and its adaptations; characteristics of Puna ecosystems; food webs of the high Andes. They have been planned to be exposed in community workshops but can be also used for different settings (Festivals, schools).
- g. **Baseball caps,** with the AGA logo, and **canvas bags,** with and Andean cat picture, were given to local villagers/educators directly participating in or collaborating with our project.
- h. **T-shirts,** featuring an Andean cat drawing, were worn by Project staff and volunteers, to make them -and the goal of their presence in a community- easily identifiable. They were also given as presents to individual donors.
- i. **Flags,** with Project logos, were hung in classrooms, schools, squares, vehicles, base camps and every other site where we were working.
- j. **3D cat model.** This material allows kids building their own Andean cat and challenges their manual ability. This activity had a great acceptance among young villagers.



Usted puede contribuir a salvar al **Gato Andino**

Es uno de los felinos más misteriosos, se encuentra amenazado y... ¡Vive junto a usted en los cerros!

¿HA VISTO ALGUNA VEZ A ESTE GATO?
El gato andino -llamado por los científicos *Oreailurus jelskii*- es de tamaño pequeño y pesa aproximadamente 4.5 kg. Su pelaje es gris ceniza con manchas café-amarillentas en los flancos, y también posee óculas en las mejillas y en las frentes. Los animales jóvenes su raña es negra. Su característica más sobresaliente es una larga cola de pelos espesos, con 6 a 8 anillos anchos y oscuros. Es un animal muy especializado porque se alimenta principalmente cazando tunicillas y vicuñas, o, cuando éstas escasean, ratones y pequeñas aves.

¿SI USTED TUVERA EL SENTIDO DEL OÍDO TAN SENSIBLE COMO EL GATO ANDINO, ¿SE SORPRENDERÍA DE LO QUE PUEDE HACER?
Un gato muy desarrollado en el sentido de la vista el gato andino de poca avidez en la caza y la cola larga y gruesa le permiten poder fácilmente las chiviconas y tunicillas, tunicillas y vicuñas.

¿ANTIGUAS TRADICIONES:
Una de estas, que aún conservan los ancianos en algunos lugares, relaciona la observación de un gato andino con la abundancia y fertilidad del ganado. Por eso el animal es matado con respeto, ya que trae suerte.

¿MOMIANDO ESFUERZOS:
Por su estrecha asociación con el ambiente de la tupa, su rareza y la falta de conocimiento, el gato andino es una de las prioridades de conservación a nivel mundial y es clasificado "amenazado de extinción". Por esta razón se ha creado entre todos los que se dedican a la preservación de este felino, llamado Alianza Gato Andino (AGA), cuya misión es la de coordinar y desarrollar los esfuerzos para su conservación.

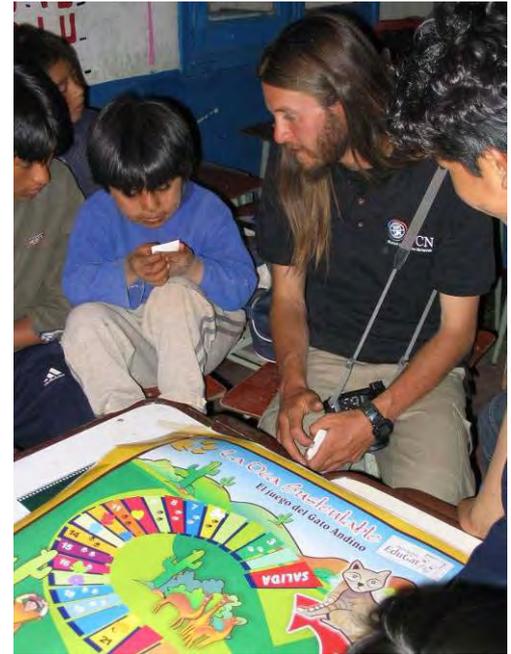
Sin embargo, la conservación del gato andino nos involucra a todos. Y en particular, ¡a los pobladores que viven junto a él!



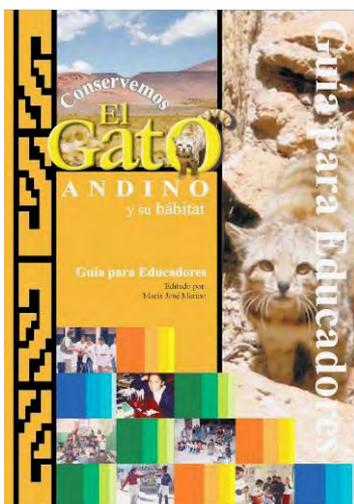
| the bp conservation programme |

COMMUNITY PARTICIPATION

- k. **Games.** EduGat Programme produced both schoolroom and open-air games, which can be used in formal and no formal environments. Some of them, like the “Web of Life” and “Food chain”, are well-known environmental education game. Others are new games, like the “Track game” (aiming to build on children’s previous knowledge of their wildlife and show them how science makes use of classification keys) and the “Resources game” (which aims to explain the effect of human use of natural resources on Andean cat survival). More recently, we adapted two classic games, the “Dominoes”, using native animals and plants, and “Goose Game”, with questions on wildlife and conservation. All these games proved to be highlights of our formal and no-formal education activities



- l. **Animal face masks** (Andean cat and llamas) and **Puppets** were designed and produced to be used in the rural theatre and puppet shows and introduce in an entertaining form the Andean cat and other wildlife of the high Andes to local audience (see Educational Campaigns).
- m. **A multimedia audiovisual slideshow**, introducing not only our project and its activities but also the beauty and vastness of Puna landscapes, has been produced thanks to the cooperation with a professional photographer (S. Enrietti) and used in schools, community workshops and fundraising events.



- n. The **Guide for Educators** (“Conservemos El gato Andino y su habitat”) is the most recent, but possibly the most meaningful education material produced by EduGat Programme. This 77-pages book went through a complete validation process. Initially, it has been planned by the delegates attending the First International Workshop on Education for the Conservation of the Andean Cat as the main tool for the Global Conservation Education Strategy launched by this workshop (see next section). It was then tested with local school students by our staff and finally evaluated by their teachers, during the Workshop for High

COMMUNITY PARTICIPATION

Andes Educators (see Networking Chapter). The Guide is divided in two sections: one on formal education for the conservation of the Andean cat and the Puna ecosystems and the second one on no formal education, specifically addressing adult villagers participation. It includes some simple background information, and a number of activities and games for young people, as well as for adults.

- o. A plush of the Andean cat is presently being designed, through a cooperation with ECOSYS, a private firm producing and selling wildlife conservation-related products. Part of incomes generated by sells will be returned to our project.

Following the agreement reached on education strategies by attendants of the International Workshop on Conservation Education for the Andean Cat (see Global Conservation Education Strategy), most of these materials have been provided for free to the other AGA members.

GLOBAL CONSERVATION EDUCATION STRATEGY

Because we found a wide agreement among AGA members about the potential role of local communities both in the present-day status of the Andean cat and its future conservation, and the suggestion by the Andean Cat Conservation Action Plan (Villalba et al. 2004) that more emphasis had to be devoted to education activities directly supporting the conservation of the High-altitude wildlife and particularly carnivores, in 2005, EduGat Programme decided to launch a specific sub-project addressing this need in a coordinate manner. This project aimed at building on the experience



collected by all conservationists working with educational activities on the Andean cat throughout its range, with the goal of designing a common educational strategy. The expected outcome was a global strategy for an Andean Cat-focused conservation education campaigns. EduGat Programme successfully applied for a specific grant for this project from Wildlife Conservation



COMMUNITY PARTICIPATION

Network (USA), but also BPCP and Darwin Initiative (UK) funds were used.

The **International Workshop on Conservation Education for the Andean Cat** (see Appendix 7) was held in the city of Salta, from the 14th to the 16th of November 2005 and counted with the full endorsement of the Cat Specialist Group (IUCN) and the participation of Claudio Sillero-Zubiri, Chairman of the IUCN Canid Specialist Group and leader of the Ethiopian Wolf Conservation Programme, who provided useful insights on the general issues of carnivore conservation in developing countries.

The workshop participants represented seven teams working to increase public awareness and acceptance of the Andean cat in the four range countries. Delegates shared experiences, discussed achievements and problems, and identified the points in common as well as the differences between countries and native populations.

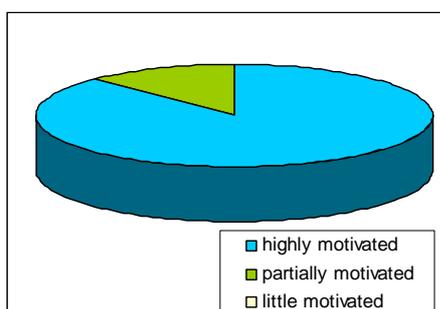
Representatives were provided a draft list of all procedures, tools and techniques used until the moment for the educational activities on the Andean cat and were asked to analyze and comment each one of them to decide about their potential inclusion in the global strategy.

The main result of the workshop was that all participants agreed on a common educational strategy to support the conservation of this small felid through the participation of local communities. It was also decided that this much-needed strategy was going to be supported by a specifically designed Guide for Educators, co-authored by all delegates and edited by M.J. Merino.

The SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis technique was used as tool for the preliminary evaluation carried out by the organizers, which concluded that, in spite of all the difficulties it could imply, the proposal of agreeing a common strategy for the conservation education on the Andean cat was a necessary and especially innovative idea. For a more objective evaluation all participants were asked to complete an evaluation form elaborated by the organizers of the event. Questions aimed at evaluating a range of topics.

The level of personal motivation of delegates to participate in the Workshop was mostly high (Fig. 11).

Fig. 11. Personal level of motivation to participate in the Workshop.



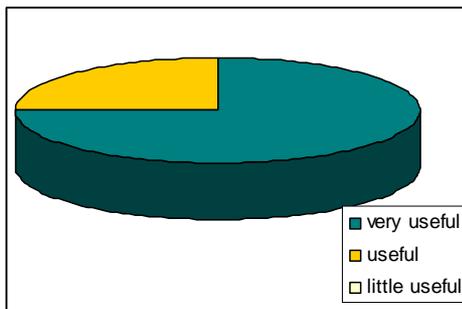
Attendants felt that the Workshops provided a lot of opportunities to share experiences and ideas as well as to integrate with both organizers and participants (Fig. 12).



100% of delegates reported that the duration of the workshop was sufficient and the great majority felt that a second workshop would have been also useful.

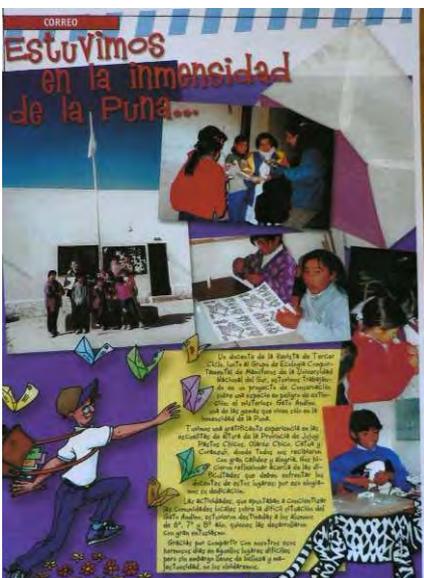
Finally, they agreed that the Workshop very useful or useful (Fig. 13).

Fig.13. Opinion of attendants on the Workshop's utility.



MEDIA COVERAGE

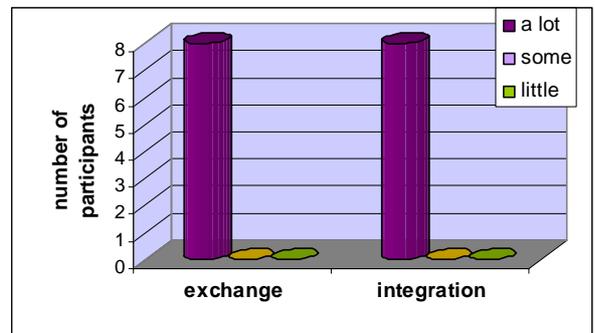
EduGat Programme not only devoted to education of local people, but also developed an outreach component for a wider public, aiming to results dissemination at



different levels, from local school and communities, to national governmental and international agencies, and by a range of tools, from public talks, to brochures and other outreach materials, local and regional radio broadcasts, articles in regional and national magazines/newspapers. The complete list of publications and notes produced by our project is available in the final chapter of this report, and includes:

- 8 papers and notes in international scientific journals;
- 3 articles in national education magazines;
- 16 presentations in scientific and conservation meetings;

Fig 12. Delegates answers to the questions: A. How many opportunities did you have to exchange experiences/ideas with the other participants? B. Was there integration between organizers and participants?



COMMUNITY PARTICIPATION

- 2 presentations in fund-raising events;
- 5 update notes for BPCP newsletter;
- 3 TV and 7 radio broadcasts;
- 4 articles in regional and national newspapers;
- a number of progress reports to school, provincial and local government agencies.

Scientific publications, reports, and brief notes in international and national journals as well as presentations in national and international meetings/workshops provided an external evaluation of the academic value of the results we obtained.

Project accomplishments and news were posted to the websites of Earthwatch Institute (www.earthwatch.org) and the Argentine conservation NGO Huellas (www.huellas.org.ar) and used for the dissemination of results to a global audience.

Finally, we recently established a specific agreement with an Argentine No-profit, Tierra de Exploradores (www.tierradeexploradores.org), whose mission is to raise awareness in society about the transcendence of research and exploration, as a means to positively transform the reality of a community, to have it contributing to the project diffusion.



EVALUATION PROCESS

Education is often defined as a process of imparting or acquiring general knowledge, developing powers of reasoning and judgment, and preparing oneself or others intellectually for mature life. If we are to monitor the success of our educational activities, all these components of the process should be evaluated. As mentioned at the beginning of this Chapter, from the beginning, EduGat Programme set, as one

of its main objectives, to carry out a complete as possible evaluation of its results and identified a number of tools to collect the information necessary. This was, however, not an easy task.

Initial Evaluation was based on the questionnaire we asked students to fill (formal setting) and our direct observations of students, teachers, villagers, shepherders etc., as well as informal discussion with local people (no formal setting). These tools provided a first insight into previous experiences, knowledge, beliefs and perceptions of carnivores and, in more general terms, wildlife

COMMUNITY PARTICIPATION

conservation. These, in turn, guided the design and development of our following activities. An important input that we received from this first analysis was that we had to take into account the specific features of each community we visited and to mould our times to those of local villagers, respecting their festivities and involving in their celebrations. Flexibility and the capacity of taking advantage of new opportunities proved fundamental to increase success.

For the Process Evaluation, we mainly used the outcomes and outputs of our activities, but also observations of the degree and motivation of kids and adults participating in them. A tool that we found useful was the brief conclusion that we asked to students to write at the end of our daily activity with them. These sentences -for instance: "Let's take care of the Andean cat, it forms part of nature and we all have the right to live" or "The Andean cat is a amazing animal, it does not make any damage and only lives in the mountain peaks. Take care of it, we are asking for your support!"- agreed with our observations in suggesting that we had obtained a clear increase in awareness.



The evaluation of Interviews also proved that they may give satisfactory results and enable us to gather precious information, but also as an outreach tool. However, the mid-term analysis of these data, clearly show that they could be improved and completed in order to obtain a more complete understanding of the relationships between humans and carnivores in the high Andes.

To carry out a Final Evaluation of the results obtained and the adequacy of the methods and tools adopted, we used the answers received from students in the final questionnaires. These answers showed that children left the experience enthusiastic about nature conservation and interested in learning more. They also appeared to have spread their enthusiasm and newfound knowledge to their families, peers and other members of their communities. We also observed, and were told, that parents and community leaders were pleased and grateful for this opportunity for their children. In spite of the fact that the data we collected indicated that EduGat Programme was successful, we followed the example of other conservation/outreach project and also asked for external evaluations (Jacobson 1999) in two different forms: **A)** a complete internal revision was carried out by M.J. Merino in 2004, prior the start of the last phase of this project, as theme of her Master dissertation in Environmental Education (see Appendix 4), and, as such, was revised by her supervisors, who provided an indirect external evaluation; **B)** an external evaluation by S. Alegria, an expert in Environmental Information (Universidad Nacional de Lujan, Argentina), who provided us a report and final suggestions.

COMMUNITY PARTICIPATION

Following these different evaluation steps, and the feedbacks they produced, we have use an adaptative approach and gone through a continuous process of renovation, actualization and re-design of our activities, materials and strategies that continued throughout the entire duration of the project.



CONCLUSIONS

Education is a crucial element of any conservation project. The effect of educational programmes is always long term and the results are slow to manifest themselves. To significantly alter the attitudes of a community normally takes many years, if not generations (Jacobson 1999).

Community participation in conservation is frequently defined as the final goal of education activities in conservation projects and it is true that, without participation, not only it is unlikely that project managers can gain sufficient understanding of the culture, perceptions, and attitudes of local people to be able to address their needs and values properly, but also it is probable that our conservation actions will not have long-term consequences.

Thus, the first step in this process is obviously the acquisition of information about people's knowledge, perceptions and attitudes relevant to natural resources and their conservation.

This is the first study reporting information on the local populations knowledge, perceptions of and attitudes towards carnivore in the high Andes ecoregion.



Our data showed that local people perceive the existence of conflicts with carnivores in the high Andes of Argentina, similarly to many other areas (Kruuk 2002, for a review), and that, consequently, people's perceptions of large carnivores are clearly negative. In the case of pumas and foxes, this opinion was mirrored by a similarly negative attitude towards them (only a minority of the respondents passively accepted livestock losses).

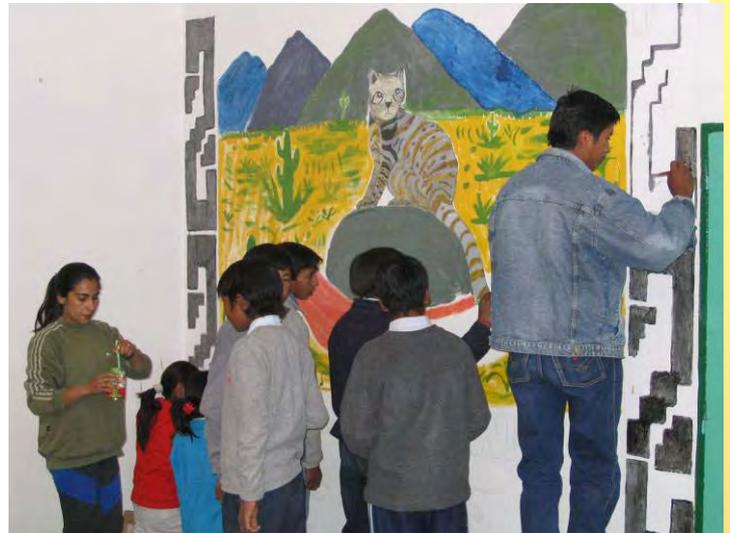
On the other hand, despite the fact that most interviewees did not show a negative perception of the two small cats occurring in the high Andes, we found that killing of these species is relatively widespread. The causes of this attitude are different, but appear to rely mainly on the concept that the only good carnivores are the dead ones.

COMMUNITY PARTICIPATION

It is difficult to evaluate the impact of hunting on the high-Andes carnivores based on the human attitudes that we recorded, since no estimates of carnivore population density/trends are available for this region. Nevertheless, because of the low productivity of the Puna, it is logical to expect large home ranges and low population densities for carnivores. In this scenario, even moderate losses caused by hunting can have disproportionately negative effects.

Since intrinsic biological traits greatly affect the probability of extinction in carnivores (Cardillo et al. 2004), it may be expected that the present level of human pressure affects differentially the carnivore species living in the Puna. In the case of the Andean cat, it was suggested that the effect of hunting is possibly not a major cause of mortality, because: i) human density in the Puna is low, especially in the southernmost part of the distribution range of the Andean cat; ii) in some areas of the Puna in neighbouring countries, small cat skins are used for traditional ceremonial purposes and transferred from one generation to the next.

Our data suggest that the situation in Argentina is different. Although small cats are rarely



considered to have a negative effect on livestock, the frequency of killing was relatively high and people often claimed that these kills were followed by the long-term disappearance of small felids from the areas surrounding their settlements. We also observed that the traditional respect that surrounds cats in other parts of its range is rare in our country (out of the 12 small cat pelts that we recorded in Argentina, only two showed the typical decoration for religious ceremonies). Furthermore, only a few of the people interviewed (mainly in the part of the country bordering with Bolivia) were aware of this traditional use of cat pelts.

Despite a more complete study is needed to understand the true extent of human-carnivore conflicts, we suggest that in the case of the Andean cat, which has a reduced distribution range and is apparently rare (two of the main biological traits affecting extinction risk), hunting may represent one of the main factors affecting its survival in Argentina.

COMMUNITY PARTICIPATION

Although small cats are legally protected in Argentina, given the remoteness and large expanse of the Puna region, it is obvious that law enforcement agencies are able to exert very little control on hunting. Nevertheless, other aspects of our results suggest some optimism about the future attitude of local communities towards small cats.

Our interviews of young villagers showed that they are aware of the presence of carnivores in their region and their perception of small species is, in most cases, tolerant and we also proved that their perception of carnivores can

be improved through awareness activities. We also found that, frequently, small cats were not actively persecuted by herders; rather they were killed by shepherd dogs, a kind of “accident” that can be reduced if local people start perceiving the Andean cat as an important component of their own heritage.

On the other hand, the evaluation of students’ knowledge revealed that only a minority of them knows the Andean cat and a need for awareness campaigns. It also identified gaps or

inconsistencies in their comprehension of some concepts that are fundamental for a correct interpretation of conservation themes and that more effort has to be devoted to fill these gaps, not only through the activities of our project but also strengthening the attention given to these concepts by local teachers.

Our educational programme empowered local populations to understand how unsustainable use of resources will adversely affect the future of everyone in

the communities. The economic value of healthy wildlife populations and ecosystems was also emphasized. Educational activities also encouraged children to form emotional attachments to nature. EduCat programme taught local children conservation concepts, to give them an understanding of ecological relationships, the value of biodiversity, an appreciation of Andean



COMMUNITY PARTICIPATION

cats and the role they play in ecosystems, and to inspire an emotional attachment to the beauty and complexity of nature.

The numerous educational materials produced by EduGat Programme (brochures, posters, banners, games and especially the Manual for high-Andes Educators) represent one of the more important -and tangible- outputs of the Soul of the Andes project. But, more importantly, is the fact that these materials enabled us to build awareness and start filling the gap between local people and biodiversity conservation. Thus, the outcomes of formal and non-formal education activities with young citizens positively influenced the relationship between the project and the community, generating more of a stakeholder attitude toward the project's conservation goals in general, and the protection of the Andean cat populations specifically.

But education alone is not enough. Lack of alternatives, associated with poverty and unemployment, may lead local people to abuse their natural resources, in order to merely survive.

In the long-term, community attitudes must be modified to encourage sustainable use of natural resources, including wildlife. Sustainable community development is a process and a capacity to make decisions that consider the long-term economy, ecology and equity of all communities and its ultimate goal is to build sustainable communities: communities with the ability to remain healthy and prosperous over the long term.

By using a range of tools and forms of communication, project staff should target training and awareness rising at particular stakeholders. Adult participation in conservation is another ambit where we identified a potential -and a need- for improvement. More importance should be given to local, official and unofficial, leaders, since they can set an example for the rest of their community. More time should be devoted by our staff to activities specifically designed for adults, but also - simply- to be accepted as part of the community. The participation of adults is necessary to identify strategies for a sustainable use of natural resources, and we already discovered that ecotourism has the potential for gaining local people's attention, as well as to teach them to look at the habitat where they live with different eyes. These conclusions confirmed the necessity of concentrating our conservation efforts in a specific region, where a greater investment may produce greater progresses.



COMMUNITY PARTICIPATION

Finally, as could be expected based on the richness of the Andean culture, we found a clear necessity for an approach to local communities that respects and, especially, incorporates their native traditions into our proposals, revitalizing them, if we wish to make people develop a sense of ownership towards the idea of wildlife conservation.

In conclusion, though we are conscious that all our tools and strategies may be improved, we feel



that our analysis and evaluation proved that EduGat Programme accomplished most of its objectives. We were certainly successful at greatly improving our understanding of local people knowledge, perceptions and attitudes with respect to carnivores; at largely increasing the awareness on the Andean cat -a previously little known component of the high Andes ecosystems- and its conservation status; at favouring a more positive perception of this carnivore; at empowering a number of local inhabitants to

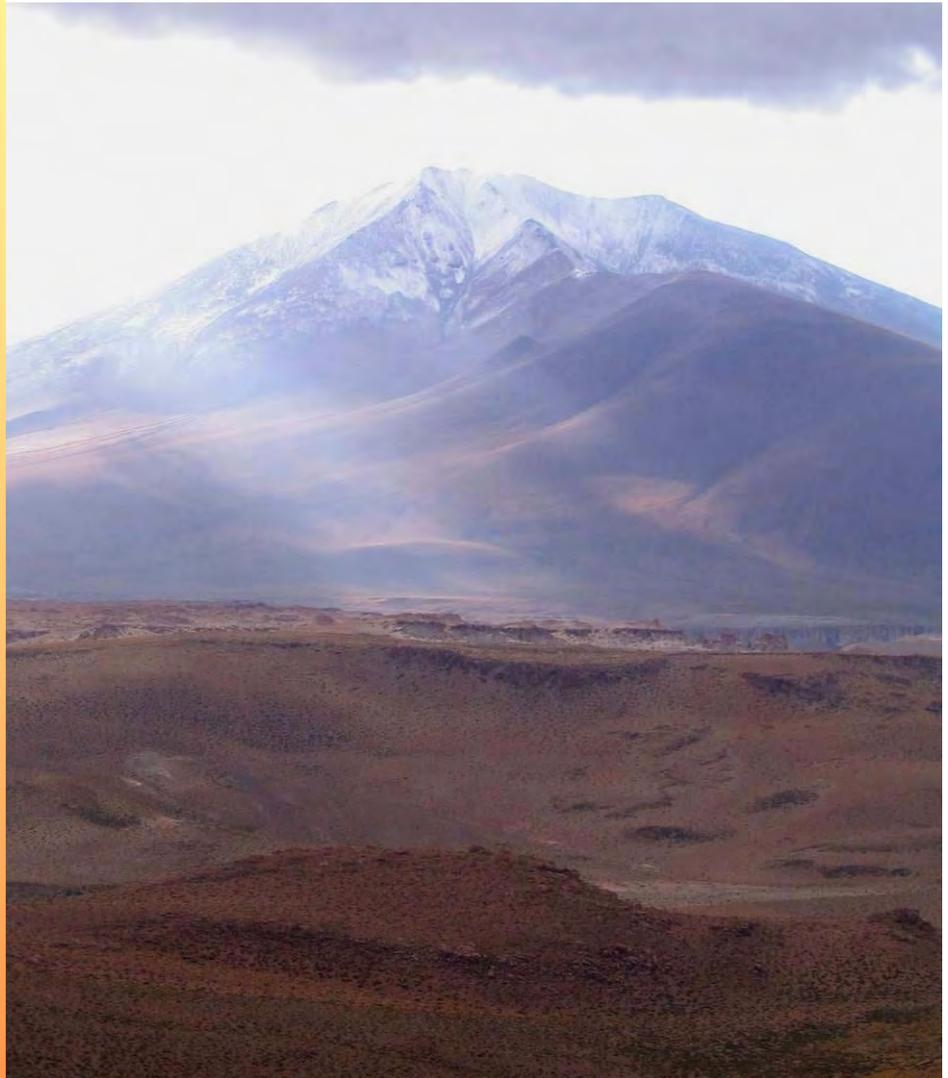
evaluate the need for different, more sustainable, use of natural resources; at promoting a greater participation of local communities in our conservation actions. Finally, we think that our proposal for the creation of a global educational strategies for the conservation of the Andean cat in its entire distribution range was accepted very positively by the conservation community, raised interest -and new funding- in donors, and adopted a very satisfactory approach that gave rapid and concrete outputs.

Our monitoring progress was also very useful at giving suggestions to elaborate novel evaluation tools for the future phases of the project. New questionnaires and auto-evaluation forms for participants to educational activities, as well as observational sheets to be filled by project staff have been specifically designed for collecting quantifiable data on the progresses and achievements of most of the follow-up activities now planned by EduGat Programme. We hope that they will enable us to carry a rigorous monitoring of the programme and thus to keep improving its effectiveness.



Chapter 4

NETWORKING



NETWORKING THE ANDEAN CAT ALLIANCE



Our Team has always given importance to collaboration as a necessary strategy to efficiently use the reduced resources available for conservation in developing countries. From the beginning of our project on the Andean cat, it was clear that our Team could not cover the entire distribution range of this felid and that a cooperative effort was necessary. Thus, in 1999, we took the initiative and, with the support of *La Torbiera Zoological Society* (Italy) and *Cat Action Treasury* (USA), we organized the International Workshop on the Andean cat, in Salta, Argentina. The objectives of this workshop were to evaluate the status of knowledge on the Andean cat and to agree on actions for its conservation. The workshop participants formed the **Andean Cat Conservation Committee (COCGA)** to coordinate individual efforts, share knowledge and experiences as a way of to contribute to the growth of knowledge of the Andean cat, and to develop actions for conservation of the species. M. Lucherini was selected as Coordinator of the Committee.

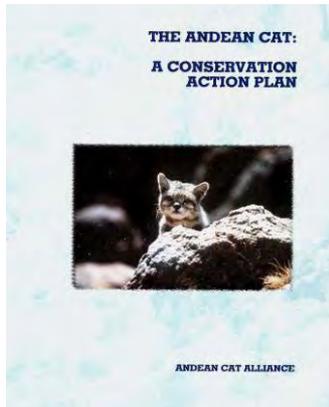
As a result of this workshop and the creation of COCGA, different cooperative activities have been carried out: A) under the coordination of Chilean members a poster on the Andean cat was produced, with the text printed in Spanish and local languages (Aymara and Quechua). The poster was distributed within local communities of the four range countries; B) our Team coordinate the elaboration of Spanish-English edition of a brochure on the Andean cat and the function of COCGA; C) A multinational project in order to update and evaluate the information on Andean cat distribution was started, and later produced the first map of its potential distribution showing the confirmed presence sites; D) A bi-national Argentina-Bolivia expedition was carried out in South-western Bolivia, to begin standardizing survey/collecting methods and to test the efficiency of attractants for camera trapping (with the grant we received



from BPCP); E) Peruvian researchers were integrated to COCGA to carry out field surveys and assess Andean cat distribution and status in this country.

Later our project leader participated in the search for a specific sponsor for this collaborative effort and that led to start a partnership with *Wildlife Conservation Network* (USA). This new phase began in October 2003 with the *Andean Cat Strategy Planning Workshop*, Los Altos, California, attended by researchers from the four range countries. In this workshop the basis for the development of an action plan was established and COCGA was renamed **Andean Cat Alliance (AGA)**, from Spanish name: *Alianza Gato Andino*). During the following months, AGA members elaborated

a first draft of the Action Plan, which was discussed in April 2004 during the III International Andean Cat Conservation Workshop, Arica, Chile.



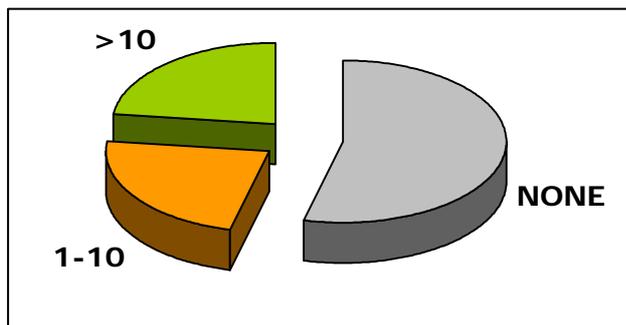
The most meaningful output of this network was the publication of the **Andean Cat Conservation Action Plan**, in 2004, which revised the knowledge available on this cat and its conservation status and established a list of most urgent actions for its conservation.

Since the creation of AGA, The Soul of the Andes regularly participated in its meetings and mailing list and advocated the need of expanding its membership to include a larger number of conservationists and thus reduce its bias towards research. For this same reason, in April 2006, we asked to all participants to the IV International Andean Cat Conservation Workshop, La Paz, Bolivia to fill a brief questionnaire (Appendix 10) and used their answers to complete a progress evaluation of the degree of importance given by AGA members to education and outreach that we presented during the workshop.

This evaluation revealed that a new report on the Andean cat presence was less important (46.2% of 13 respondents) or equally important (53.8%) to completing education work in a new school and that the majority ((53.8%) of teams counted with a person exclusively in charge of the educational component.

Nevertheless, the number of school visited (an indicator that we took to estimate the effort dedicated to education and community participation) by the AGA projects was still rather low (Fig. 1).

Fig. 1. Effort dedicated to education activities by AGA members (proportion of teams whose educational programme had reached a given number of schools).



We have taken advantage of this network to exchange experiences and technical advances in a timely manner with colleagues dedicated to scientific investigation, specifically on issues like scent baits and camera trap models performances.

Recently, this network gave birth to an important project that is leaded by D. Cossios (AGA Peru) and will produce the first estimation of genetic diversity and isolation of Andean cat populations throughout most of its range, thanks to the sharing of faecal and tissue samples from AGA members working in Argentina, Bolivia and Peru and the support of a Kaplan Award from Wildlife Conservation Society (USA).

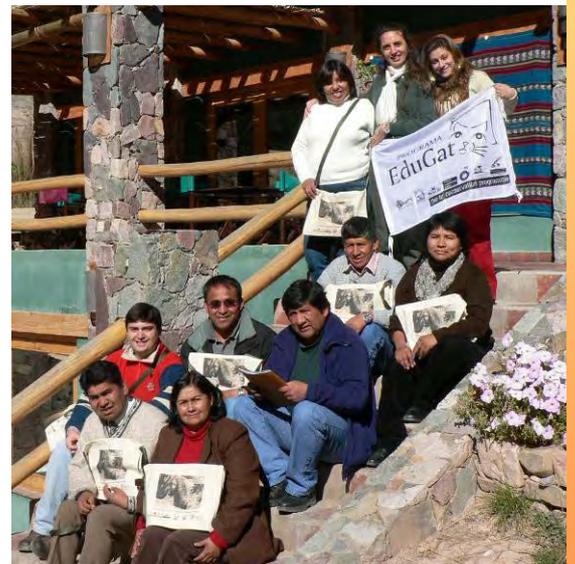


Another collaborative project we form part of has surged in the three-national border between Argentina, Bolivia and Chile. This project started in 2005 and will last until mid 2008 thanks to a grant obtained by C. Sillero-Zubiri, University of Oxford, from the Darwin Initiative of the UK government. It specifically aims to achieve biodiversity conservation by promoting collaboration across national boundaries, gathering high quality data on vertebrate distribution, training stakeholders (especially Protected Areas personnel and university students), strengthening conservation networks.

To improve the coordination of community participation and awareness raising efforts, our EduGat Programme promoted the formation of a no formal network that groups all conservationists working in education for the preservation of the Andean cat within the AGA and who participated in our Global Education Strategy (see Community Participation Chapter). This networks aims to share education materials, tools and strategies and facilitate the diffusion of successful experiences.

THE HIGH ANDES EDUCATORS NETWORK

This new initiative was launched during the Workshop for teachers working in the rural schools of the Argentine Puna organized by M.J. Merino in Purmamarca, Jujuy province in June 2006. The workshop was co-funded by WCN, Darwin Initiative and BPCP and gathered 7 teachers interested in participating in the conservation education activities of EduGat Programme and 1 undergrad student willing to engage in the Programme. During this meeting, participants and organizers shared experiences, examined in detail a draft of our Guide for High Andes Educators (see Community Participation Chapter and Appendix 11) and received specific training in environmental education tools.



The necessity of a permanent Network surged spontaneously as the most efficient way of establishing a long-term cooperation between the Soul of the Andes Project, these teachers and other Educators interested in supporting the conservation of the Puna ecosystems.

One of teachers, R. Puca Farfán, has already incorporated the Andean cat and its conservation among its annual didactic plan and, as itinerant teacher, will take it to 7 schools of the region.

This network will hopefully expand soon, but it already covers 11 rural schools in 2 provinces (Ujuy and Catamarca) and some 300 students.

Las plantas de la Puna no son muy grandes, tienen resinas olorosas, las hojas y raíces son gruesas, y siempre intentan vivir en lugares protegidos.

Vegetación de los roquedales: predominan especies con crecimiento en roseta como la yareta.

• Nombre vulgar: yareta
Nombre científico: *Azorella compacta*
Crece muy lentamente en forma de cojín. Su tronco crece mayormente bajo tierra, sus pequeñas hojas se disponen en forma de roseta y tiene flores muy reducidas. Posee mucha resina, y es utilizada como combustible.

Bosques de queñoa asociadas a especies de cactus

• Nombre vulgar: Queñoa
Nombre científico: *Polylepis* spp.
Es un arbusto, a veces puede crecer hasta constituir un árbol, vive en grupos cerca de lugares con agua y en las faldas de los cerros sobre rocas gruesas y suelos profundos y fértiles. Son plantas muy importantes, porque en ellas viven muchos insectos que son alimento para algunas aves. Su uso por parte del hombre como combustible hizo desaparecer esta especie de muchos lugares.

Tolar-pajonal, donde predominan pajas duras y arbustos

• Nombre vulgar: Tola
Nombre científico: *Parastrephia* spp.
Existen varios tipos de tolas, pero son siempre arbustos bajos con muchas ramificaciones. Poseen un alto contenido en resinas y son usadas por el hombre en la medicina tradicional.

Plantas y animales que viven estrechamente relacionados y adaptados a la escasez de agua, fuertes vientos, grandes amplitudes térmicas.

Seres vivos únicos y muy especializados

Los animales de la Puna son muy característicos y en algunos casos sólo pueden vivir en este tipo de ambiente. Tienen colores muy parecidos al paisaje.

Nombre vulgar: vicuña
Nombre científico: *Vicugna vicugna*
Camélido silvestre de cuello largo, patas delgadas y figura muy esbelta. El cuerpo es de color canela claro uniforme, el pecho (con pelos largos) y el vientre son blancos. Es un animal muy apreciado por su lana finísima. Se alimenta de plantas.

Nombre vulgar: vizcachá
Nombre científico: *Lepus arizonae*
Roedor pequeño de color amarillento plumizo, de pelaje largo y tupido, con un cuerpo pequeño y una gran cola con pelos largos. Tiene largas orejas, patas traseras muy desarrolladas para poder saltar. Se alimenta de plantas y a veces de insectos. Vive en lugares barrancosos y rocosos, allí se aselean, descansan, hacen sus nidos y se refugian.

Nombre vulgar: zorro colorado o andino
Nombre científico: *Pseudalopex culpaeus*
Es un carnívoro mediano, de pelaje amarillento y gruesa cola de punta negra. Se alimenta de ratones, liebres, vizcachas, lagartijas y aves. En ocasiones puede preñar sobre animales domésticos.

Nombre vulgar: colocolo o gato pajero
Nombre científico: *Lynx baileyi*
Es un gato silvestre de tamaño pequeño. De color plumizo rubio, con manchas alargadas rojizas o grises en el dorso y rayitas en la nuca hasta los hombros. En las patas y en la cola lleva franjas transversales café. Su cola es mucho más corta que en el gato andino. Se alimenta de ratones, tuco-tucos, vizcachas y aves.

Nombre vulgar: ñandú o suri
Nombre científico: *Pelecanus patagonicus*
Es un ave grande no voladora, que tiene plumas de color gris o café con rayitas blancas. Su cuello es muy largo y también sus patas que le permiten correr a grandes velocidades. Se alimenta de plantas. Vive en tolares y pastizales, generalmente en grupos.

the bp conservation programme

HUMAN RESOURCES TRAINING

The project provided a training opportunity to 16 volunteers, mostly Biology students. Most of them took part in one of our expeditions, but some participated in up to 4 of them and a few of them also collaborated with data analysis and were then included as co-authors of congress presentations reporting on the results they worked on.

However, two theses were the most important outputs of this component of the Soul of the Andes project.

As shown by the following list, most of them were Biology students, but we also counted on the participation of 2 wildlife photographers.

We are happy to report that most of our volunteers are still involved in wildlife conservation and/or research.



Pregraduate students

1. Guillermo Gorg: (field data collection in 1998), Argentine. He graduated as Biologist at Bahía Blanca University, Argentina.
2. Denis Sana: (field data collection in 1999), Brazilian. He is presently leading a conservation biology project on the jaguar in Brazil.
3. Mariano Ciuccio: (field data collection in 1999), Argentine. Full time postgraduate Biology student at Bahía Blanca University, Argentina.
4. Claudia Manfredi: (field data collection in 2003), Argentine. Full time postgraduate Biology student at Bahía Blanca University. She is presently leading a carnivore conservation biology project in Argentina and providing our project with GIS-mapping expertise.
5. Mabel Cabarcos: (community work in 2003-2004), Argentine. She is a retired teacher.
6. Juan Carlos Huaranca: (field data collection and community work in 2004), Bolivian. He graduated as Biologist at Cochabamba University, Bolivia, defending a thesis on the Andean cat with the data he collected during 3 of our expeditions. He is presently principal investigator of a project for Andean cat conservation with AGA Bolivia.
7. Gabriela Tavera: (field data collection and community work in 2004), Bolivian. She graduated as Biologist at Cochabamba University, Bolivia, and is presently working for Andean cat conservation with AGA Bolivia.
8. Joaquín Baglioni: (community work in 2004), Argentine. Undergraduate Biology student at Bahía Blanca University. He is presently part of the staff of a carnivore conservation biology project in Argentina.



NETWORKING

9. Valentina Segura: (field data collection and community work in 2005), Argentine. She graduated as Biologist at Tucumán University, Argentina.
10. Diego Chartier: (field data collection in 2005), Argentine. Undergraduate Biology student at Cordoba University, Argentina.
11. Hugo Marrero: (field data collection in 2006), Argentine. Undergraduate Biology student at Bahía Blanca University, Argentina.

Postgraduate students

12. Claudia Manfredi: (field data collection and GIS-based spatial analyses), Argentine. Full time postgraduate Biology student at Bahía Blanca University, Argentina. She received a Scholarship to get training on GIS techniques by the Society from Conservation GIS, USA. She is still supporting our project.
13. Simona Savini: (field data collection and community work in 2004-2005), Italian. She had a Training Scholarship from Università degli Studi di Roma, Italy, to participate in our project. She is presently working in wildlife conservation at Istituto di Ecologia Applicata, Italy.
14. Ivana Amellotti: (field data collection and community work in 2005), Argentine. She is presently working as wildlife Biologist in Argentina.
15. Alejandra Torrez: (community work in 2006), Bolivian. She graduated as Biologist at Cochabamba University, Bolivia, and is presently working for Andean cat conservation with AGA Bolivia.
16. Pablo Cuello: (field data collection in 2006), Argentine. He graduated as Biologist at Río Cuarto University, Argentina. He is still volunteering in our project.

Photographers

17. Marco Guoli: (community work in 2003), Italian. He has started a career as wildlife photographer.
18. Silvina Enrietti: (field data collection in 2005), Argentine. She is presently working with a NGO aiming to raise awareness about the transcendence of research and exploration in Argentina.



Local people

Finally, The Soul of the Andes also provided capacity building -and alternative incomes- to local people who participated in our expeditions. These 10 villagers received training in new techniques (usage of GPS, compasses, radios and cameras, map interpretation, camera trapping setting, etc.) but also had the chance, through their personal involvement with project staff and volunteers, to gain a deeper understanding of the justifications laying below our project, its goals and its implications for local people lives, thus becoming ambassadors of our conservation messages.



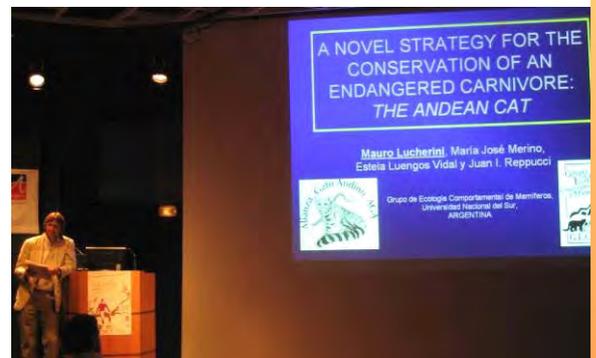
LIST OF PUBLICATIONS AND NOTES ON THIS PROJECT

Papers

1. Lucherini M. & Luengos Vidal E. 2003. Intraguild competition as a potential factor affecting the conservation of two endangered cats in Argentina. *Endangered Species Updates* 2: 211-220.
2. Lucherini M., Huaranca J.C., Savini S., Tavera G., Luengos Vidal E. & Merino M.J. 2004. New photographs of the Andean Mountain cat: have we found a viable population? *Cat News* 41: 4-5.
3. Lucherini M., Merino M.J., Soler L., Birochio D. & Luengos Vidal E. 2004. Evaluación del conocimiento y actitud humana hacia el gato andino, un carnívoro amenazado de extinción. Pp. 435-440, in Memoria VI Congreso sobre Manejo de Fauna Silvestre en la Amazonía y Latinoamérica (Ed. R. Bodmer). Wildlife Conservation Society y Durrell Institute of Conservation and Ecology, Iquitos.
4. Lucherini M. & Merino M.J. 2006. Planning a common educational strategy for Andean cat conservation. *Oryx* 40: 137-138.
5. Merino M.J. (Ed.). 2006. *Conservemos el gato andino y su hábitat: Guía para Educadores*. Alianza Gato Andino, Bahía Blanca. 77 pp.
6. Walker R.S., Novaro A., Perović P., Palacios R., Donadio E., Lucherini M., Pía M. & López M.S. *in press*. Diet of the Andean mountain cat (*Leopardus jacobita*), colocolo (*Leopardus colocolo*), and culpeo (*Lycalopex culpaeus*) in high-altitude deserts of Argentina. *Journal of Mammalogy* 88.
7. Lucherini M. & Merino M.J. *submitted*. Human-carnivore conflicts in the high-altitude Andes of Argentina. *Journal of Arid Environments*.
8. Merino M.J., Lucherini M., Luengos Vidal E. & Reppucci J.I. *submitted*. "Programa EduGat": el componente educativo de un proyecto para la conservación del gato andino. *Tópicos en Educación Ambiental*. (Appendix 10)

Conferences presentations and posters

9. Lucherini M., Manfredi C. & Casanave E. 2000. Small cat ecological selectivity and their role in conservation in Argentina. Annual Meeting of the Society for Conservation Biology 2000, Missoula, EEUU.
10. Birochio D. & Lucherini M. 2000. Relevamiento ecológico y geográfico del Gato Andino (*Oreailurus jacobita*) en el Propuesto Parque Nacional Aconquija. Taller de Felinos: evaluación del estado de conocimiento de los felinos en Argentina, La Plata, Argentina.
11. Lucherini M., Merino M.J. & Soler L. 2001. Cat research and conservation in Argentina. 6th International Small Felid Workshop, San José, Costa Rica.
12. Merino M.J., Lucherini M., Birochio D., Luengos Vidal E. & Soler L. 2001. Un acercamiento a la conservación del gato andino: conjugando educación e investigación. V Congreso Latinoamericano de Ecología, Jujuy, Argentina.
13. Merino M.J., Lucherini M., Birochio D., Luengos E. & Soler L. 2003. El Gato Andino: "El Alma de los Andes". I Jornadas Argentino-Chilenas de Educación Ambiental. Junín de los Andes, Argentina.



14. Lucherini M., Merino M.J., Soler L., Birochio D. & Luengos Vidal E. 2004. Evaluación del conocimiento y actitud humana hacia el gato andino, un carnívoro amenazado de extinción. VI Congreso Internacional sobre Manejo de Fauna Silvestre en la Amazona y Latinoamérica, Iquitos, Perú.
15. Lucherini M. 2004. Report on the activities of The Soul of the Andes project. III Taller Internacional para la Conservación del Gato Andino, Arica, Chile.
16. Savini S., Lucherini M., Luengos Vidal E., Huaranca J.C. & Birochio D. 2005. Características de las cuevas de gatos silvestres en la Puna Argentina. Primer Congreso de Mastozoología en Bolivia. Cochabamba, Bolivia.
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18. Merino M.J., Lucherini M., Luengos Vidal E., Savini S., Huaranca J.C., Tavera G. & Birochio D. 2005. Hunting as a factor affecting the conservation of the endangered Andean cat in Argentina. 19th Annual Meeting of the Society for Conservation Biology 2005, Brasilia, Brasil.
19. Lucherini M., Merino M. J., Luengos Vidal E. & Manfredi C. 2005. The Soul of the Andes: Promoting the long-term conservation of the Andean Mountain cat. ESRI User Annual Conference, San Diego, California, EEUU.
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21. Lucherini M. and Merino M.J. 2006. Report on the activities of The Soul of the Andes project. IV Taller Internacional para la Conservación del Gato Andino, La Paz, Bolivia.
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23. Lucherini M., Luengos Vidal E., Reppucci, J.I. & Huaranca, J.C. 2006. Evaluación de la abundancia relativa de carnívoros alto-andinos a través de conteos de evidencias en transectas lineales. Reunión Argentina de Ecología 2006, Córdoba, Argentina.
24. Merino M.J., Lucherini M., Reppucci J.I., Arellano J. & Amelotti J. 2006. Programa EduGat: estrategias educativas y de participación comunitaria para la conservación del gato andino en el noroeste de Argentina. I Congreso Sudamericano de Mastozoología. Gramado, Brasil.

Thesis Dissertations

1. Maria Jose Merino. 2004. *La conservación del gato andino en argentina: un enfoque desde la educación ambiental*. Master in Environmental Education. Instituto de Investigaciones Ecológicas, Málaga, España and Universidad de Yucatán, Mexico. 60 pp. (Appendix 4).
2. Juan Carlos Huaranca Ariste. 2006. *Abundancia relativa y uso de recursos por carnívoros alto-andinos en tres áreas del Noroeste Argentino*. Tutors: Luis Fernando Aguirre and Mauro Lucherini.



Graduation in Biology. Universidad Mayor de San Simón, Cochabamba, Bolivia. 69 pp. (Appendix 9).

Articles in Argentine newspapers and magazines

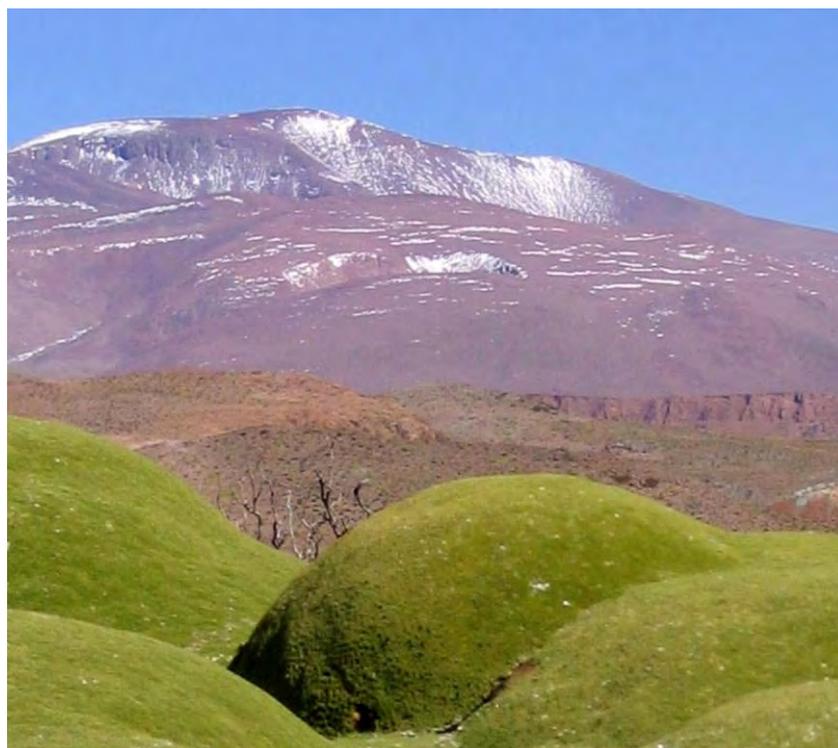
1. EL TRIBUNO DE SALTA (main newspaper in Salta province), April 2003.
2. LA NUEVA PROVINCIA (published at Bahía Blanca, this is the major newspaper of Southern Argentina), July 2003.
3. 3ER CICLO (Education magazine for teachers), August 2004
4. ECOLÓGICA (Argentine wildlife magazine) 9, 2005.
5. 1ER CICLO (Education magazine for primary school teachers), February 2005.
6. LANACIÓN ((major Argentine newspaper), September 2005.
7. EL PREGON DE JUJUY (main newspaper in Salta province), julio 2006.

Radio and TV broadcasts

1. LU2 (FM channel, Coronel Dorrego, Buenos Aires prov.), July 2003.
2. Radio universidad (FM channel, Bahía Blanca, Buenos Aires prov.), July 2003.
3. Cable Visión (local TV channel, Bahía Blanca, Buenos Aires prov.), July 2003.
4. Local Radio and TV channels (Santa María, Catamarca prov.), November 2003.
5. Local Radio (Belen, Catamarca prov.), November 2004.
6. FM Soldados (IFM channel, Buenos Aires), September 2005.
7. Local Radio (Coranzuli, Jujuy prov.), Abril 2006.

Web-sites news

1. Earthwatch Institute (USA), July 2003.
2. Cat Specialist Group, IUCN (Swiss), March 2006.
3. Earthwatch Institute (USA), August 2006.



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M. Lucherini is Joint Researcher of CONICET.

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