Darwin Initiative Annual Report 2

Capacity Building for Temperate Rainforest Biodiversity Conservation in Chile

Biodiversidad
en el bosque templado lluvioso

Centro para la Biodiversidad

un proyecto Iniciativa Darwin

Darwin Initiative Annual Report

Darwin Project Information

Project Ref Number	15/006
Project Title	Capacity Building for Temperate Rainforest Biodiversity Conservation in Chile
Country(ies)	Chile
UK Contract Holder Institution	Macaulay Institute, Aberdeen
UK Partner Institution(s)	Wildlife Conservation Research Unit, Oxford
Host country Partner Institution(s)	Pontificia Universidad Catolica de Chile (Catholic University of Chile) Corporacion Parques para Chile
Darwin Grant Value	£200,000
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Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	1 April 2007 – 31 March 2008 Annual report 2
Project Leader Name	Prof. Alison Hester
Project website	www.macaulay.ac.uk/bosquetemplado/ www.temperaterainforests.net
Author(s), date	Nicolas Galvez, Jerry Laker, et al.

1. Project Background

This project aims to establish public-private partnerships for conservation, with a particular focus on securing habitat connectivity in the Valdivian temperate rainforest region of Chile. The partnership seeks to create a local research infrastructure with practical forest conservation activities designed to engage the private sector in sustainable forest management, through demonstration, capacity-building, and volunteer-driven actions. Research focuses on the role of transition zone habitats, currently outside the national protected area system, for endemic mammal and avian fauna. This will give important information on the dynamics of large-scale biodiversity threats, and provide a framework for prioritising future activities in support of the Convention on Biological Diversity

The Macaulay Institute and the Wildlife Conservation Research Unit, Oxford, have both worked in Chile for around 10 years on wildlife management issues affecting the country's rich endemic fauna, with our local partner, Fauna Australis, the wildlife research unit of the Catholic University in Santiago. Since mid-2002, we have developed collaboration with the Chilean NGO, Parques para Chile (PPC), and the national parks authority, CONAF, to establish a research and education facility in the Valdivian forest ecoregion of Chile that will underpin their work to support the National Biodiversity Strategy. This facility is being constructed using local private sector financing, and will undertake locally-relevant biodiversity research to support sustainable development initiatives.

Valdivian rainforest is widely recognised as a globally important "biodiversity hotspot" (e.g. by Conservation International and WWF Global 200). Forest clearing for farmland has reduced and fragmented lowland forests in the IX and X Regions of Chile. Now, 80% of what remains, including remnant stands of Araucaria (*Araucaria araucana*), is found at altitudes above 1000m. Lower altitude forests support higher biodiversity, but remain threatened.

The project is located in the pre-Andean cordillera of the Araucania region of Chile (Fig. 1.1), which is a representative area of the threats and dynamics of the Valdivian Temperate Rainforest. Initial analysis shows that public and private protected areas represent 29% of the study area. In turn, 60% of these lands are above the line of permanent snow during winter (i.e. 1100m), reducing access to (and therefore effectiveness of) protected areas for wildlife during the winter season. The project attempts to address this by assessing and monitoring key lowland habitats for wildlife. Wildlife data will be presented to key stakeholders and decision makers, specifically in support of an ongoing process to establish this area as a Biosphere reserve.

Figure 1.1. General location of study area in Chile

The detailed map (Fig. 1.2) shows our study area near the small town of Pucon. The permanent snow line during winter is shown in white and public and private protected areas are represented in green. The main lakes, Villarica, Caburgua and Cólico are highlighted. The protected areas that are shown are: Huerquehue National Park, Villarica National Park, Villarica Reserve. The Namuncahue Biological Corridor, a private conservation initiative led by Parques para Chile (project partner), gathers a group of land owners for land conservation. The first private conservation initiative in Chile: the Cañi Natural Sanctuary, is shown.

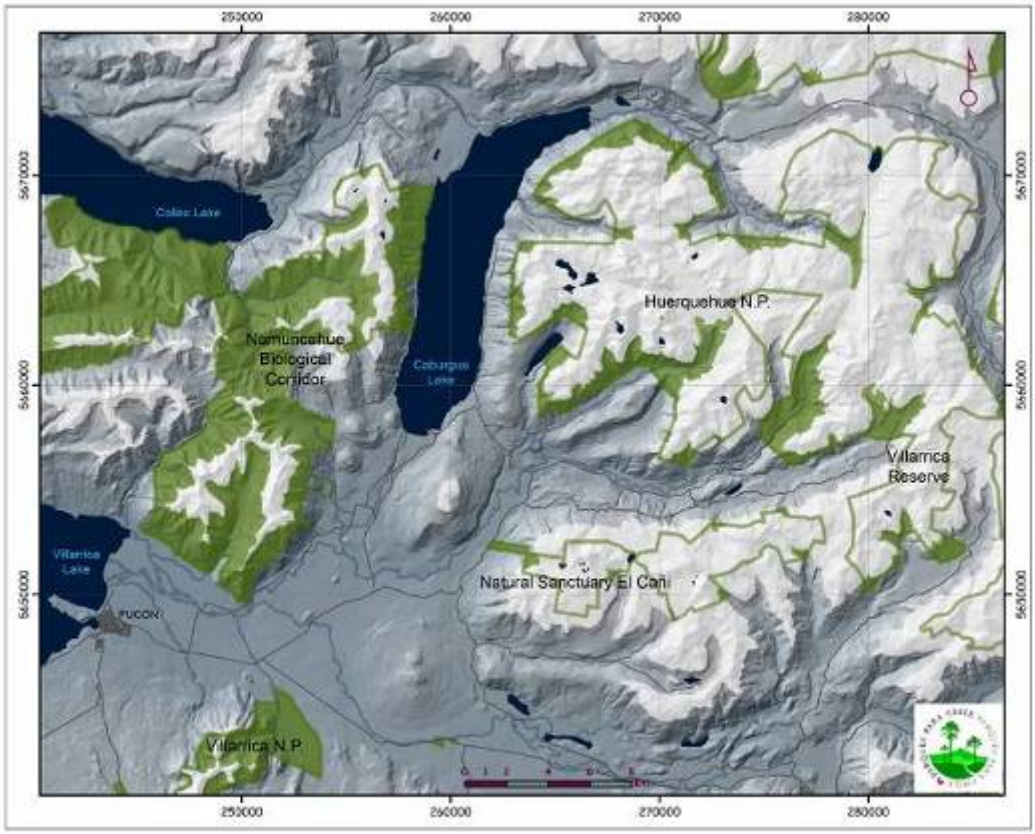

Figure 1.2. Detail of study area, showing the location of the Centre for Biodiversity (below El Cañi), and the public and private park system around the town of Pucon.

2. Project Partnerships

Macaulay Institute has worked closely with both host country partners during the past year. The Catholic University has been dedicated primarily to the research component of the project, in close collaboration with Macaulay and WildCRU, and they have also supported a UK-funded DPhil student supervised by Professor David Macdonald. This research component has involved continuous fieldwork collaboration between staff members of all three organizations on-site in Chile, a scientific exchange visit to Scotland by Chilean partner, Cristian Bonacic, and joint development of research methods for assessing the relative abundance of cryptic mammals in the temperate rain forest. Collaboration with Parques para Chile involved a remote sensing exercise undertaken at Macaulay, under instruction from the NGO, to develop a methodology for interpretation of satellite images to produce vegetation maps for the Araucarias biosphere reserve. Macaulay Institute also co-wrote a successful proposal to a Chilean government grant programme (CONAMA-FPA) to undertake work on puma-livestock conflicts. This project was run by Parques para Chile until February 2008, giving them the opportunity to develop new partnerships with local agencies such as the Office of Statistics (INE). A further successful proposal to the same fund in 2007 for a project on kodkod has brought in several new partners for the Catholic University, in particular Fauna Andina, who has expertise in ex situ conservation. Support from the Darwin Initiative has helped Parques para Chile facilitate a consortium of government agencies to put together a proposal to extend the Araucarias Biosphere Reserve. This “expedient” will be presented to UNESCO-MAB later this year and will make a strong contribution to creating a political framework to support the CBD objectives in this area.

The degree of collaboration between the partners has been limited by lack of a document explaining in detail the plans for the Centre for Biodiversity on the part of Parques para Chile. Such a concept document - the business plan, a Year 1 deliverable for the project - was formally requested at meetings and in correspondence by project leader throughout the year.

This appears to have been a delicate time for the NGO in their fund-raising efforts, so they were not keen to make public the details of this ongoing process. The Directors of the Centre for Biodiversity are still seeking ways to secure funding and financial stability to maintain the centre in the long term. In view of the above, we did not release Darwin funds for this activity and we propose to remove the production of the business plan from our Darwin project deliverables.

Other Collaboration
We are actively exploring new collaboration opportunities with the Darwin-supported project Senda Darwin. Areas of work envisaged include pudu (*Pudu pudu*, Cervidae) predation by feral dogs and amphibian conservation issues. These ideas are awaiting funding opportunities. A partnership for the development of environmental education about the kodkod cat has been established with local NGOs Fundación San Cristóbal and Fauna Andina, through the winning of a small Chilean grant (further details included in this report). The Catholic University research team is engaged in collaboration with another Darwin Initiative project: 'Implementing an otter action plan for marine environments of Tierra del Fuego, Patagonia'. Following on from last year's visit to Chile by a DPhil student working on that project, Dr. Cristian Bonacic from Catholic University presented the research work to date from this Darwin project in a workshop organised by Dr. Cassini and Prof. Macdonald (Ushuaia, November 2007). Collaboration with the Huilo huilo Foundation (http://www.huilohuilo.cl/fundacion/english/index.html) is in the form of a German DAAD postdoc studying reintroduction of guanacos in the temperate rainforest ecoregion, supervised by Dr. Bonacic.

The project does not have a link with the CBD focal point in Chile.

3. Project Progress

3.1 Progress in carrying out project activities

3.1.1 Output 1: A research and education facility for local biodiversity issues

Activity 1.1: Develop field centre for research and education in Pucon.
Parques para Chile has advanced the Centre for Biodiversity project during the year, developing both research and training capacity for conservation science and sustainable development. The NGO has established a GIS laboratory in Pucon for six staff members for office-based work. Their site at Pichares, developed for accommodation and restaurant facilities during year 1, has been used for volunteer activities and training while a plan is developed to address uncertainties over the long-term security of tenure for the NGO. This issue has slowed down the process of developing further infrastructure at the site.

However, Parques para Chile has been developing its conservation action agenda for the Centre for Biodiversity. The approach aims at training biodiversity experts, planning and zoning authorities, protected area managers and research students in the use of standardised methods and tools for assessing ecosystem health, creating adequate base-line data for planning, development of monitoring programmes and distribution maps for endangered species, and protected area management. The Centre has carried out research as well as practical innovation in sustainable use of ecosystem goods and services.

Public-private alliances for conservation and development are strengthened through standardised, multidisciplinary ecosystem monitoring based on precise base-line data. The Centre´s main conservation objective is to participate in the production of data relevant to establishing priorities for protection of biodiversity. This data is extremely important to all regional planning efforts and can be used as a shared data source for establishing conservation objectives in the region. The Centre will also develop learning tools and field-based datasets that enhance regional biodiversity decision-making efforts.

The Centre for Biodiversity is focusing on the following programmes as part of a three year business development plan. These programmes have been designed with a view to securing the economic sustainability of the Centre, while contributing to achieving the Centre's strategic goals:

- Conservation science short-courses for University students, NGO leaders and protected area managers – (e.g. 15 students from Cambridge University trained in ecological survey and census methods, December 2007),
- Capacity building in management and monitoring for protected area administrators and rangers,
- Production of distribution and density data for endangered and endemic species,
- Courses in regional planning and zoning,
- Production of digital cartographic base-line maps for public-private sustainable development projects,
- Production of learning tools such as Regional Atlases, a fauna and flora compendium and guides, information centres in protected areas,
- Hosting of seminars and training workshops,
- Native tree reproduction for reforestation.

The Centre for Biodiversity is expanding its collection of datasets on biodiversity, and identification of conservation goals through the study of biodiversity. Land Use research supports the designation of priority areas for conservation. The Centre aims to contribute to the overall implementation of conservation actions and participate with public and private stakeholders in the maintenance of protected area networks or wildlife corridors which enhance survival of endangered and sensitive species.

The Centre is building up expertise on endangered species via participation in the Araucarias Biosphere Reserve, Namoncahue Biological Corridor as well as within Red List committees such as IUCN and the Regional Committee on Biodiversity. There are several endangered species of flora and fauna within the Biosphere Reserve study area. The Centre will work alongside regional and international experts in order to produce and gather accurate data on endangered species distribution, density and habitat needs within the planning region. The centre will host seminars and workshops for training stakeholders in methods for monitoring biodiversity.

The Centre is now represented on the Regional Committee on Biodiversity (COB) led by the head of the Regional Government and organised by CONAMA (the Ministry of the Environment). The committee is a public-private group responsible for establishing priorities and decision-making regarding conservation of the region´s biological and cultural diversity. The committee is the regional representation of the Convention on Biological Diversity. Parques para Chile is also now a member of the Chilean Committee of IUCN.

Activity 1.2: Volunteer programme.

Year 2 saw a smaller number of volunteers working on the project but staying longer than the volunteers in the first year. This had the negative impact of raising less revenue, but had a strong operational advantage of having more independent, trained helpers on-hand to support the fieldwork and other activities. The volunteer agency, Working Abroad sent two UK volunteers during April and May 2007, Natan Levy and Kharis Wong. They lived at the Centre for Biodiversity, working with Nicolas Galvez and Pia Bustos on the camera trapping programme, as well as a range of other activities, such as working the organic vegetable gardens. The two integrated effectively into both the work needs, and also into the local community at the Centre for Biodiversity.

A UK volunteer, Charlie Watson, with support from Rainforest Concern, spent 3 months, from September to December 2007 working with Parques para Chile. He worked on developing information resources for the Araucarias Biosphere Reserve, supporting the training course at the Centre for Biodiversity for students from Cambridge University, and assisting with the camera trap research. Two Danish Students worked in support of the bird survey in Jan 08. An Australian biology student joined the Chilean survey team for 1 month in Feb-Mar 08.


Figure 3.1. UK Volunteer, Natan Levy, working in the vegetable gardens of the Centre for Biodiversity, April 2007. Two Danish volunteers take a break during bird surveying in Huerquehue National Park, January, 2008.

Activity 1.3: WildCRU and MLURI scientists supervision of Chilean MSc students

Visits were made by Alison Hester (Dec, 07), Jerry Laker (May 07-Feb 08) (Macaulay) and Tucker Murphy (WildCRU, Dec 07-Mar 08). Each of these visits involved supervision and training of the MSc and Honours students at the Catholic University. Jerry Laker is the external supervisor for Chilean MSc student, Felipe Hernandez for his study on kodkod cats (Efecto de la fragmentación del hábitat sobre las poblaciones y el estado de salud de la Güiña (*Leopardus guigna*) en la IX Región de la Araucanía). Tucker Murphy spent one month of his 3 months in Pucon training project staff and students on puma ecology and management, GPS collars, and experimental design.


Figure 3.2. Alison Hester oversees fieldwork at Rio Nevado. Jerry Laker with supervisee, Felipe Hernandez.

3.1.2 Output 2. Knowledge on temporal-spatial use of habitats.

Activity 2.1 Identify spatio-temporal dynamics of key mammal and avian endemic fauna

Activity 2.1.1. Research design in key lowland habitats

Catholic University, in close collaboration with Macaulay and WildCRU, are conducting an evaluation of the ecology of wildlife using habitats peripheral to the NPR to assess the options for improving the conservation of endemic species of this biodiversity hotspot and the implications for the future Araucarias Biosphere Reserve. As the main focus of our research activities within the Darwin, this activity has been directed at 5 specific, though interconnected, components:

i. Evaluation of large mammal presence and distribution though camera trapping, recording of scats and tracks and direct observations
ii. Field evaluation of vegetation community distribution, composition and structure
iii. Spatial ecology of puma and kodkod, in relation to habitat fragmentation
iv. Studies of woodland bird communities, in relation to habitat structure and altitude, using mark-recapture.

i. Evaluation of large mammal presence and distribution though camera trapping, recording of scats and tracks and direct observations

As a basis for all other studies on fauna in the area, we have set up a programme to record signs of animal presence in different landscape elements We assessed the presence of wildlife through transects: recording tracks, signs, scats, direct observation, and camera trapping. Direct observation is only possible for birds, due to the secretive behaviour of mammals in the forest.

During winter 2007 we sampled the same sites as summer and added two more sites. Winter conditions were the worst in 60 years. Some camera sites suffered from fluctuating snow cover and therefore did not produce data. Track surveys in snow were used together with camera results, to maximise benefits and minimise disruption effects of the snow. Track plates are used when snow is not present, to give all year data on animal tracks to complement the camera data. Starting summer 2008, with agreement of senior scientists, we have expanded our work to include small fragments in the agricultural matrix, in order to assess their relative usage and importance to different mammals. A total of 21 landowners were contacted and permits received to work on their land. We set up 27 camera sites, 2km apart. Nine total sites in each habitat type: Continuous forest, Large fragments (>100ha), Small fragments (<20ha). All camera sites have installations for wildcat lures plus roofs for the rain. The sites will be maintained all year round to analyze temporal variations in occupancy and as a proposal for a long term monitoring scheme of large mammals.

Figure 3.3 .Left: Nicolás Gálvez (Catholic University field researcher) Right: Two Chilean students (Felipe Hernández and Robert Petitpas) . August 2007

ii. Field evaluation of vegetation community distribution, composition and structure

Woodland fragmentation is an increasing problem for biodiversity conservation, in particular for the increasing border effects and isolation of remaining habitat patches. This study aims to evaluate the effect that fragment size has on species composition and forest structure in native forest remnants in the Araucania Region of Chile. This information is a key part of the analysis of species-habitat relationships with the camera trap data.

Following the methodology of fragment selection used for the studies on fauna, the analysis is based on 12 sites - 3 Continuous forest replicates, 3 Large Fragments replicates (>100 ha) and 6 small fragments (<22 ha) in the same geographical area. At each site, surveys consisted of two 140m long transects with 5x5m plots every 20m (total of 16 plots per site). Species

composition was recorded, along with tree density and % vegetation cover for the different forest strata. Indications of human activities were also recorded, such as cattle faeces, cut tree stumps, and signs of fire.

Preliminary results indicate no differences in total species richness. However, the small fragments have a higher incidence of introduced species. Tree density is higher in the smaller fragments than in the larger woodland patches. Level of human impact is greater in the small patches, and the depth of the leaf litter layer is less.

Figure 3.4. Thesis student Robert Petitpas measuring tree DBH, and a Darwin Frog, sampled for fungal diseases (part of Activity 1).

iii. Ecology of puma and kodkod, in relation to habitat fragmentation.
Official permits were obtained (by Catholic University scientist) from the relevant wildlife authority, S.A.G, to conduct captures of puma, güiña or kodkod cats and birds in mist nets. Permits have also been given by CONAF, under a collaboration agreement to undertake research in protected areas, The work involves tracking a puma in the study zone, using a GPS collar, and trapping kodkods to assess physiological condition.

We have a full set of LOTEK GPS tracking equipment ready and on site in Pucon, with one GPS collar. We have a puma trap on loan from SAG, as part of our ongoing collaboration agreement. Initial attempts to capture a puma in our La Barda large forest fragment in January proved unsuccessful. We are now waiting the onset of winter to launch another trapping effort.
A project aimed at conservation of kodkod cats has been started, led by Catholic University, Fundacion San Cristóbal and Fauna Andina (local NGOs), and receives additional funding (£9k) from the Environmental Agency of Chile CONAMA (FPA 2008). The project addresses conservation issues from both biological (e.g. presence, occupancy, health status, diet) and human (e.g. education, knowledge and perception) dimensions. The educational strategy involves taking school children to a wildlife rescue centre to actually see and interact with captive Güiñas (kodkods) that cannot be released. The aim is for the most inspired children to become ‘ambassadors’ for the species in their communities, supported by documents from the project which they can give out. The biological dimension will be obtained mainly from camera trap data, track plate surveys and live trapping with tomahawk traps. During February we conducted the first 10 nights of capture effort, but with no luck. This is known to be a difficult task, and we hope for more success in the next capture effort.

A further collaborative study launched in the past year is with the Huilo-Huilo Foundation, a private reserve of temperate rainforest. This work is assessing the effectiveness of reintroduction of the regionally extinct guanaco to an area of apparently appropriate habitat. Fauna Australis is working on limiting predation by pumas of these guanaco which are captive-bred. The project has co-financing from the German Agency, DAAD and is conducted by Dr. Almut Popp as part of a post-doc programme.


Figure 3.5. Nicolas Galvez launching the kodkod project in Catholic University regional campus in Villarica with local partners and environmental authorities. Tomahawk trap in place and set for guigna captures to study health and ecology.

iv. Studies of woodland bird communities, in relation to habitat structure and altitude, using mark-recapture.

Bird sampling and Mist-netting (Darwin Initiative-Fauna Australis). One week of field work was carried out in Huerquehue national park in February 2008. Four main habitat types were determined: 1) Shrub, 2) Mid-succesional evergreen forest, 3) Old-growth Mañio-Tepa forest, 4) Old-growth Araucaria. Five point count stations were made in each habitat type with the following activities: habitat/vegetation recording; play-back for nocturnal birds of prey; 2 mist-net stations opened for 7 hours. Sampling will be continued throughout 2008 to analyze temporal variations in bird composition, abundance and site re-capture.


Figure 3.6. Tomas Ibarra inspects mist nets in Huerquehue NP and rings a Chuncho owl.

Activity 2.1.2. PhD project on Puma conflict mitigation

Conflict between pumas (*Puma concolor*) and livestock owners in Chile promotes the hunting of this species considered vulnerable to extinction (and protected by the Chilean Government), reduces the effectiveness of protected areas and may have severe costs for local farming economies. Historically, the perceived high economic cost and the low cultural status of pumas have led to their extirpation in other parts of the Americas. In spite of these potential consequences, puma attacks on livestock in Chile are poorly monitored and rarely verified. The role of livestock owners' perceptions and management practices also receive little scrutiny. Our goal is two-fold: to understand livestock owners' perception of pumas and to develop an effective method of monitoring puma predation on livestock in the Chilean Lake District.

WildCRU DPhil student, Tucker Murphy, conducted 60 interviews to farmers in all areas where we have camera sites deployed. Five nights of capture effort were also conducted, and five alleged attacks were verified in the field. Nicolás Gálvez and Francisca Amar gave a training workshop in Santiago in mid-December on camera trapping and faeces analysis for carnivore conflict resolution to 20 practitioners from the government agencies, SAG and CONAF.

Figure 3.7. Tucker Murphy (WildCRU) out in the field during his study of farmer attitudes to puma.

An important part of the Puma conflict project is the verification of predation calls to the authorities. Since many puma kills appear to go unreported to the authorities, we printed a handout that contains some basic information of puma biology, differences between puma and dog tracks, along with an explanation of what we are doing and encouraging farmers to call us when they, or a neighbour suffer an attack. These are being distributed throughout the study area to local farming groups and municipalities.

Activity 2.1.3 Darwin frog project

Samples from year 1 fieldwork were sent off to be tested for fungal diseases, an important threat for this species. Results proved negative, which was very good news. No further studies are planned in year 3.

Activity 2.1.4. Define threats to biodiversity and incentives for conservation

As detailed in a manuscript submitted to the conservation journal, Oryx, the camera traps have picked up reliable evidence of the high level of activity of feral dogs, wild boar and domestic cattle in these forests. All three of these alien species are considered to be detrimental in their own way to the endemic fauna and flora. Measures are being taken to develop more specific programmes to assess the level of impact that each of these threats really poses and to raise awareness of the need for control measures to be instigated.

Figure 3,8, A litter of 7 wild boar piglets adding to the Namoncai population. A feral dog captured far away from human habitations in Namoncai, winter 2007.

Activity 2.2: Map habitat use

Spatial analysis of the data collected through the field studies is work in progress. The experimental design is based on a classification of the landscape of the study area into three forest structure classes, based on the level of anthropogenic influence. Figure 3.9 shows the results of an exercise by Parques para Chile to identify forest parcels meeting different structural criteria, that has been used as a basis for focusing the wildlife survey.

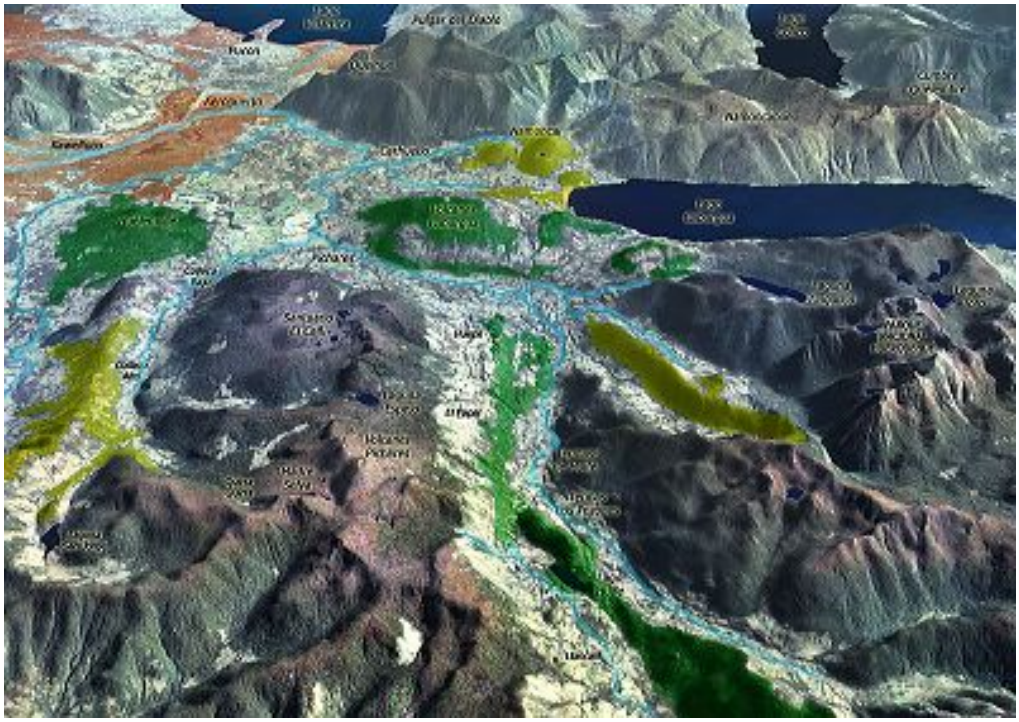

Figure 3.9. Landscape classification to identify and map different forest types – Continuous forest (linked to protected area system), large faragments (>100ha), surrounded by farmland, and small fragments (<22ha), within the farmland matrix.

Figure 3.10 . Final distribution of permanent camera trap sites to be maintained for the rest of the project. Prepared by Nicolás Gálvez, Felipe Hernández and Cristián Bonacic (Fauna Australis-Catholic University).

3.1.3 Output 3. Three-six Chilean MSc research projects advancing project research objectives

Activity 3.1 Training of Chilean MSc and undergraduate students

Two Chilean MSc research projects are currently under way:
Felipe Hernández - 'Health status and habitat quality for the kodkod cat in the Villarrica catchment'. Status: Proposal approved and funded and conducting data collection (to be completed in May 2009)
André Rubio – 'Conservation challenges facing the pudu in the Villarrica catchment'. Status: Planning stage (to be completed in December 2009).

Three undergraduate (year–long) theses are currently under way (started in 2007/8):
Isabel Rojas – 'Effects of fragmentation on forest structure and function'.
Robert Petitpas.- 'Land use change processes in the Villarrica catchment area.
Manuel Rios – 'An architectural study of the Centre for Biodiversity'.

A course on wildlife tracking was held in September 2007 for students at a local school for Mountain Guides (ITUR www.itur.cl). Second year students were given lectures on wildlife tracking and observation as well as conservation issues of native fauna. Field activities to observe birds in forest habitat and wetland were also carried out, as well as track identification in snow. 25 students participated, with activities lasting 2 days in total.

Figure 3.11. Students and instructors from ITUR, during the wildlife tracking course.

Activity 3.2. MSc project on guina (kodkod)

The project aims to address conservation issues facing the Kodkod, or Güiña (Leopardus guigna) from the biological (e.g. presence, occupancy, health status, diet) and human dimension (e.g. education, knowledge and perception). Through the camera trapping monitoring scheme we are obtaining presence data from Continuous forest (>100ha) and small fragments (<20ha). The scheme considers sampling during the whole year in 27 camera sites. Habitat evaluation (i.e. forest composition and structure) has been conducted at each site to explore species-habitat relationships. In areas where we have confirmed presence of Güiña a live trapping effort is underway to asses the health status of individuals present in Continuous forest compared to small fragments. Also scats are being collected for diet analysis. To address the human dimension we have conducted a pilot study with 60 interviews to local farmers near our study sites to see attacks on family run poultry production. Results show that less than 1% has suffered an attack in the last years. We believe that negative perceptions are

based more on an almost mythological image than reality, encouraged by stories of neighbours or events that occurred years ago.

3.1.4 Output 4. Workshops with campesinos on sustainable forest management

Activity 4.3: Community workshops

Several talks were given in the region during the year to inform the local community about the aims of the project and share some results to date. In addition, 60 door-to-door visits to farmers and landowners were made in the course of our study on the puma conflict. This opportunity was used to disseminate a leaflet informing about pumas, and also for the researchers to explain about the project objectives to the people most able to respond.

Two workshops were arranged for the Namuncai and Kawellucó communities (land owners-stakeholders) during February 2008 to explain the work that had been done on those sites, and share results and wildlife images with those involved.

Figure 3.12. Nicolas Galvez at one of the workshops to explain the aims and results of the project to the local community.

A 1-day talk and field activity was held in January 2008 with Park Rangers of the Villarica National Reserve (CONAF). Participants were 4 park rangers, Dr. Cristian Bonacic, Tucker Murphy, Felipe Hernández, and Nicolás Gálvez..

Figure 3.13. CONAF rangers in a capacity-building course for wildlife management professionals

3.1.5 Output 5: Participatory consultative process for UNESCO Biosphere Reserve.

Activity 5.1 Conformation of committee for the Proposal

The Centre for Biodiversity has become a key member of the regional committee for extension of the existing Araucarias Biosphere Reserve containing nearly 93,000 hectares, to a reserve totalling 1,140,000 hectares. Parques para Chile has been in charge of editing and publishing the expedient document for submission to UNESCO. Involvement in the expedient has been in the following areas:

- Co-coordination with CONAF of monthly B.R. committee meetings
- Co-development of regional statistics with the National Institute of Statistics
- Editor of the expedient document for UNESCO
- Official Zoning of the Biosphere Reserve
- Establishment of social and political frameworks for collaborative planning
- Development of GIS datasets for the study area.

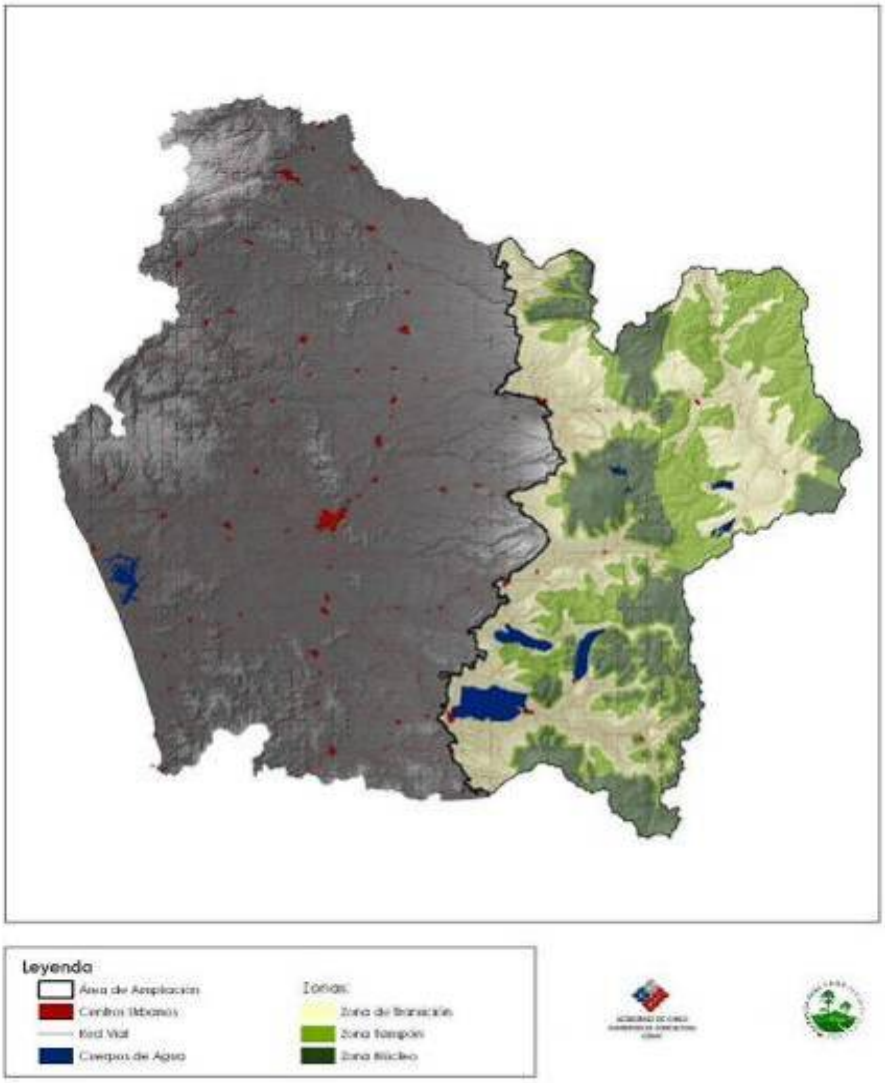

Figure 3.14. Zoning map of the proposed Araucarias Biosphere Reserve.

Parques para Chile and CONAF have been jointly preparing a document which describes the social, biological, physical and economic attributes of the area proposed for extension. This document is over 350 pages in length and contains up-to-date information on biodiversity and culture within the proposed extension area. The document outlines the reasoning behind the zoning of the Reserve and how this would create positive short to long-term economic and social benefits. The document is due for completion in May/June 2008.

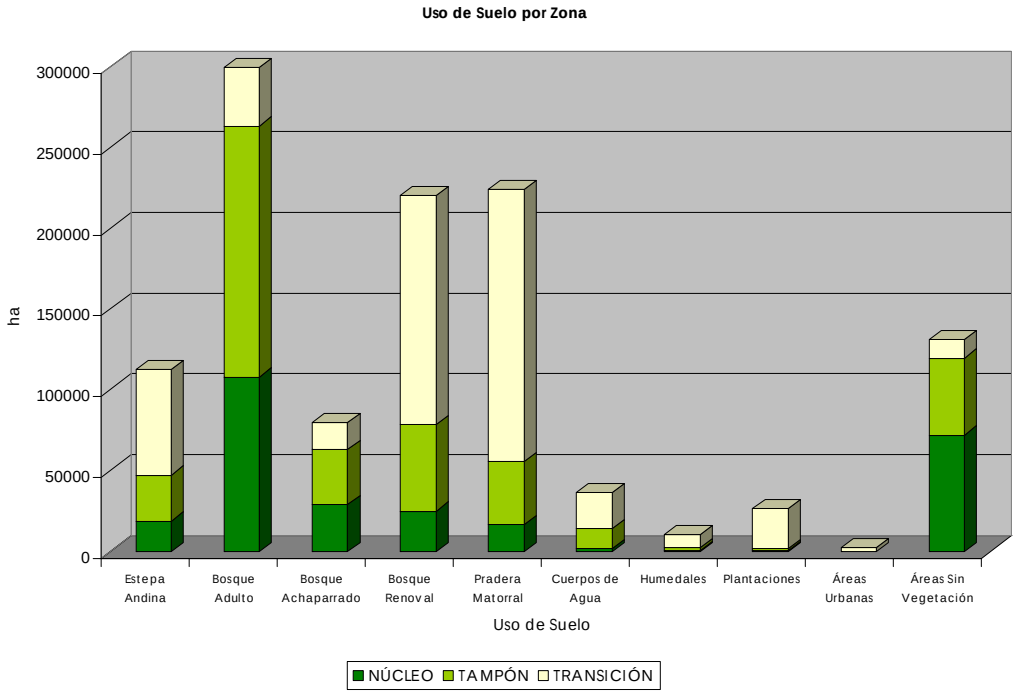

Figure 3.15. Land cover classification of the Araucarias Biosphere Reserve and its zones.

The preparation of the expedient document has involved first informing, and then seeking the approval of, several important Chilean Government Ministries, including Agriculture, Economy and Education. Support for the Biosphere Reserve now includes the following government institutions; CONAMA, CONAF, CORFO, MOP, CONADI, INIA, SERNATUR and Sendero de Chile.

A Management Committee, headed by the regional Governor (*Intendente Regional*), and made up of representatives of agencies and relevant local actors together responsible for regional development policy. This public-private committee is a permanent body now and will continue to coordinate the actions of the different agencies involved at the local and district level, based on the zoning criteria and the functions of the biosphere reserve. As a second tier of management, an executive committee has been formed responsible for implementing the agreements defined by the political process, in an integrated way, by the public services, municipalities and representatives of social and commercial organizations.

Output 6: Project management

Activity 6.1 Management meetings

Regular meetings between the lead organisation and both host country partners have been held (Pucon: 8, Santiago: 3, UK: 1). A six month report was submitted to the DI secretariat to schedule. This report is presented to schedule. Management meetings between Macaulay institute were held in April 07 (UK) Jun 07 (Santiago), Aug 07 (Pucon), Oct 07 (Pucon), Dec 07 (Santiago) and Jan 08 (Pucon), Meetings were held with Parques para Chile in May 07 (Villarrica), July 07 (Santiago), Dec 07 (Pucon), Jan (Villarrica), and Feb 08 (Pucon).

Activity 6.2. Project reporting.

Six-month and annual reports presented to schedule. We keep bi-monthly progress summaries for internal management purposes.

3.2 Progress towards Project Outputs

As described in Section 3.1, there has been a tremendous effort invested in the project activities during year 2, and this is reflected in satisfactory progress in achieving the outputs originally conceived for this project. Our main year 2 outputs - tracking key forest endangered species, the Biosphere Reserve proposal (expedient), and the field centre - have been largely achieved, summarised below (with details in previous sections).

Tracking key forest endangered species.
A large database of presence-absence information and habitat occupancy by pudu, kodkod, puma, wild boar and feral dogs, has been created, with a permanent network of 27 camera trapping sites in the study area, augmented by other information sources, such as snow track transects in the winter, track plates when snow is not present, and animal signs. A GPS tracking capacity is now in place, just waiting for the capture of an appropriate puma. An array of 10 Tomahawk traps for kodkod is also currently deployed as part of this comprehensive sampling programme for a wide range of the forest dwelling species found in this ecosystem and evaluation of the threats posed to them by introduced exotic species.

Biosphere Reserve Proposal.
The Araucarias Biosphere Reserve had its first exploratory meeting of key actors one year ago. At the time of writing, the expedient is almost complete, and pending approval from a set of ministries. Parques para Chile has been an important player in facilitating the many meetings required to get to this stage and in supplying the important GIS services to support the zoning process.

Construction of a field centre.
Construction of office facilities, visitor centre, and accommodation at Pichares was largely complete by the end of year 1. Further work to meet building regulations in the restaurant was required, and improvements were made to visitor accommodation during this 2nd year. Amongst other activities, Parques para Chile used the site for a 15 day field course in ecology for students from Cambridge University during December 2007. With the completion of construction, there is now increasing pressure on the Centre for Biodiversity to secure the finance base for the venture.

3.3 Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	TOTAL
1A	PhD student from Bermuda at WildCRU-OXFORD. Mitigation of Puma (*Puma concolor*) conflict.	1	1			
1B	PhD degree candidate	1	1			
2	Chilean MSc research projects advancing project research objectives	1	2			
4A	Undergraduate research training projects	1	15			
4C	Training of Chilean MS(c) students of the wildlife conservation programme-PUC	9	5			
4D	Total weeks of Chilean MSc training	4	30			
14A	Meetings		4			
14B	Presentations at conferences	1	3			
16A	Darwin Newsletter Nº8 March 2007. "Biodiversity conservation in Chile´s Temperate Rainforest Ecoregion"	1				
16C	Darwin Newsletter available on internet-wide circulation of newsletter	-				
19C	Interviews on local radio		1			
22	Sites for wildlife monitoring	6	9			
New-Brochure	Brochure of the centre of biodiversity and the Darwin project-English and Spanish	1				
23	Finance from other sources (£)	88620	57600			

Table 2 Publications

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Conference proceedings*	Description of habitat use by large mammals in peripheral zones to National parks and reserves in pre-Andean areas of the Araucanía, Chile. Gálvez, Laker and Bonacic (2007)	Bi-National Meeting of the Society of ecology of Chile and the Association of Ecology Argentina. La Serena, Chile.	http://www.socecol.cl/index.html	-
Journal paper*	Wildlife Conservation outside Protected Areas of Valdivian Temperate Rainforest in Southern Chile.Gálvez, Laker and Bonacic (submitted).	Oryx, Cambridge.	Submitted	
Conference poster*	Puma and livestock farming: a multi-level approach in 3 eco-regions of the Chilean Andes. C Bonacic, N Galvez, F Amar, J Laker, T Murphy and DW Macdonald (2007)	Felid Conference, Oxford University, 17th - 20th September 2007. (Annex 3.3)	http://users.ox.ac.uk/~zoofelid/	
Conference paper*	Efectos de la Fragmentación sobre la Composición florística y Estructura del Bosque precordillerano (39ºLS;72ºLO) de la Región de la Araucanía, Chile. Rojas, I.; Gálvez, N; Petitpas, R.; Becerra, P; Ibarra, J.T. & C Bonacic	IV Congreso Chileno de Ciencias Forestales. Universidad de Talca, 1-3 Octubre 2008.	http://cienciasforestales.utalca.cl/congreso/	
Popular article	Importance of the Namoncahue corridor is recognized by the Chilean Ministry of Environment. Gálvez, N. and K. Yunis (2007).	Rainforest Concern Newsletter. pp 12-13.	www.rainforestconcern.org	
Popular article*	Pequeños y grandes esfuerzos para cuidar nuestro patrimonio natural. Gálvez, N. 2008.	Revista Travesía (2):24.	www.travesiaweb.com	
Popular article*	Filling gaps for Güiña cat (Kodkod) conservation in Southern Chile. Gálvez, N and C. Bonacic (2008: In press).	Wild Felid Monitor: Newsletter of wild felid research and management association (WFA).	http://www.wildfelid.com/WFA%20Newsletter.html	

3.4 Progress towards the project purpose and outcomes

The project has so far been successful in its purpose to establish new public-private partnerships for conservation. Research is advancing well, within a clearly defined framework directed towards understanding the role of peripheral areas to protected forests in securing the long-term conservation of endemic forest fauna. Likewise, progress has been made towards achieving the necessary public sector coordination and to create consensus on the important goals for the proposed Araucarias Biosphere Reserve. Cartographic data co-funded by Darwin in Year 1 has proved of great value in year 2, contributing to the lead role that Parques para Chile has played in the process of zoning the Reserve.

The existence of this Darwin grant played a significant role in the securing of funding for the construction during year 1 of accommodation, office and visitor facilities at the Centre for Biodiversity Pichares site. Likewise, the grant has helped secure two successful Chilean grant applications for conservation research, by acting as a source of co-funding.

The fieldwork is now well-established with state-of-the-art equipment for camera trapping, and trained and motivated staff to maintain the system year-round. The research is also providing good opportunities for training of young conservationists. The number of UK students is less than originally anticipated by this stage, but with the imminent arrival of an MSc candidate from Imperial College to undertake fieldwork for her thesis, it is anticipated that the interest will grow in the future as the opportunities and facilities for research become better known. A preliminary analysis of the phase 1 camera trap data has been submitted to the conservation journal, Oryx, for publication. More detailed analysis of the occupancy patterns is planned for year 3. The MSc student from Imperial College is currently planning an MSc project on 'Development of field methodologies for assessing abundance of kodcod cats - a cryptic, obligate forest dweller of Southern Chile', with supervision from the Institute of Zoology, London during 2008. Another MSc student from Chile is planning his research work on the presence of pudu in forest fragments.

3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

This project is having a positive impact on biodiversity conservation in this area. In particular, increased knowledge of habitat use by wildlife, backed up with empirical data and images, has been disseminated locally in meetings, household visits, and in the press. This is increasing people's awareness of conservation issues. Information on the role of forest fragments in the ecology of key endangered species will help efficient conservation measures to be implemented to reduce future habitat losses (e.g. deforestation and fragmentation) and mitigate threats for biodiversity in the area.

The research and education centre for temperate rainforest biodiversity conservation now has a small and active team of conservation workers, engaged in long term activities in research and conservation action at a local scale. The Centre for Biodiversity was set up during the first year of the project and the early progress has been consolidated in year 2 by the important work carried out in preparing the Biosphere Reserve proposal documents

4. Monitoring, evaluation and lessons

This project has been monitored by the Project Leader during the whole year. The Project manager, Jerry Laker, has set up home on-site in Pucon for the management of this project, and has been personally involved in a great many of the activities planned and undertaken in the course of the work. This close participation in the day-to-day, coupled with the 'overseeing' management from Alison Hester at Macaulay Institute, who has worked hard to maintain a view of the 'bigger picture', has been very effective for monitoring and managing the project and the issues affecting progress. Regular meetings were held with both host country partners to focus

on the immediate needs for action and to develop the long term research methodologies and activities required.

These meetings also serve to identify the steps required to achieve the larger, long term objectives defined in the log frame, for example, the time frame required for deployment of camera traps, and the need to coordinate separate activities, such as work with volunteers, and different research tasks.

There have been periods during the year when communication with our NGO partner has been less interactive than was hoped. Various factors played a role, such as poor health of their key contact, extreme commitments on their part to other work and simply a lack of understanding by both of us of each other's priorities. Happily, this did not unduly affect the achievement of the project goals, but it did affect the degree of collaboration and communication along the way. Lessons learned from this are that different organizations have different kinds of priorities that may appear unintelligible to the 'outsider', and the need for open communication and understanding is paramount. Uniting such organizations in a multidisciplinary partnership can require considerable patience, understanding, and flexibility for that partnership to work.

5. Actions taken in response to previous reviews (if applicable)

The general points raised by our year 1 review were:

1. *More feedback is needed on the training of MSc and environmental education.*
2. *Reasons for Quest overseas not sending more volunteers*
3. *Have two milestones in year 1 been completed (business plan and field guide to rainforest fauna).*
4. *Reasons for changing campesino workshops (see comments below).*
5. *Revise purpose level indicators in the logical framework.*
6. *Dissemination in year 1 (Radio, Video, web page)*
7. *Sustainability analysis of Research centre (demand, market costs etc).*

These points have been addressed as follows:

1. This point was addressed in our half year report and earlier in this document. There are fewer MSc projects in the pipeline than anticipated, because of the small class size of students undertaking the MSc at the Catholic University in the last 2 years. Of these, only one MSc student per year has so far set up a research programme in the project. To compensate for this, active efforts have been made to also bring in undergraduate students - there are currently 3 working on their dissertations within this project.

2. Several attempts have been made this year to bring more Quest volunteers to work with the Centre for Biodiversity. A problem with the first expedition (year 1) was that so much work was involved in managing it that the NGO was left with serious doubts as to the cost-benefit of hosting larger groups of unskilled gap-year students. Quest have now changed their website recruiting pages to reflect the need for higher skill levels in the volunteers, or at least for the Quest manager. We have also actively searched for other sources of volunteers: we attracted four throughout the year, including two from another volunteer agency, Working Abroad, that have been much easier to integrate successfully into the work programme.

3a. Business plan: The business plan for the centre for biodiversity has been a continued difficult issue throughout year 2. Repeated attempts to oblige Parques para Chile to prepare such a document were not successful, for the following reason: as the financial basis for future development of the centre is still very much in the negotiation stage with potential donors and collaborators, PPC understandably regards their business plan as sensitive internal information that they are unwilling to commit to a freely-distributed Darwin publication. In view of the above, our proposed resolution is to remove the business plan from our list of project milestones (it has not received any Darwin financing).

3b. Field guide: Parques para Chile has published a guide to endemic biodiversity on their web site, which will continue to be expanded. This milestone is a co-funding activity by PPC and has not received any Darwin financing.
4. During this year we have had a much higher level of contact with the local community than in year 1, with two local community workshops to disseminate information, as per the format envisaged by the initial proposal document. This has been combined with an extended programme of household visits (approx 60) through the farmer interview programme (we feel this gives different but equally important benefits to workshop activities, as described earlier), plus many additional visits by Nicolas Galvez and others to farms, e.g. while seeking access permission from the land owner. It has been a joy to see some of our publicity material now on display in people's homes.
5. This has been done.
6. The project website is: www.temperaterainforest.net, with a link from the Macaulay web site: http://www.macaulay.ac.uk/projects/projectdetails.php?302135. A blog for the Biosphere Reserve process is maintained by Parques para Chile: http://rbaraucarias.blogspot.com/.
7. The details given under no. 3 above are also relevant to this point: PPC consider this to be sensitive information which they wish to keep internal to PPC at this stage. This activity has not received any Darwin financing.

6. Other comments on progress not covered elsewhere

There have been two areas where anticipated progress in year 2 has not been fully realised and one problem area in relation to funding transfers:

1. The Biosphere reserve strategic plan is taking longer than expected (original proposal deadline was 15 March 2008). A deadline extension was agreed between PPC and UNESCO-MAB. This caused problems in the project time-frame with processing the claim for that work, as it was then not possible to obtain the completed deliverable before the financial year end. The Darwin Secretariat was informed of this problem and Alison Hester arranged with Lisa Spencer for the funding for this work to be held for one calendar month after the financial year end, until production of the plan or other verification of work done could be obtained. As the UNESCO proposal deadline was later moved to May 2008, third party endorsement of PPC's progress was sought and received from our project partners CONAF, who are close collaborators on the biosphere reserve project.

2. Capturing of pumas and kodkod for the purposes of radio tracking and GPS tracking is taking much longer than anticipated. In spite of many nights of monitoring traps, no animals have been caught to date and this is starting to set back progress on these areas. We have had expert advice on trapping of both species but are reviewing our methods again to see if any improvements can be made.

The time taken for deposits of funds to cover our field ecologist's salary from Macaulay Institute to the Catholic University (typically 6 weeks) has been a cause of complaint from that partner. Measures are being sought with our bank and their bank to speed up the process and to obtain the information necessary for our partner to access those funds once sent (it is not clear where the hold-up is happening: apparently between 'payment' and 'receipt').

7. Sustainability

Co-funding to maintain research and collaboration in the long term is still uncertain but options are actively being explored. This is an issue of particular concern for our partner, the Catholic University. We will be putting special attention in this last year to securing funding from other sources beyond the end of this project so as to maintain the unique long-term monitoring programme for temperate rainforest fauna that we have established.

Additional funds have been brought into the project so far by winning research contracts with Chilean funding. An appropriate funding source is being sought for the £18,000 per year (approx) required to maintain the camera trap stations for monitoring wildlife beyond the end of the project.

8. Dissemination

Dr. Cristian Bonacic organised a workshop for Chilean wildlife officers about mountain lion and conflict resolution in Santiago in December 2007. The workshop included talks by SAG authorities, Dr. Cristian Bonacic, Prof. Alison Hester, Tucker Murphy, and presented results from the Darwin work on wildlife conflicts with special emphasis on carnivores and pumas.

Figure 8.1. Participants at the training workshop for SAG on puma conflict and management

The project has an information website at www.temperaterainforests.net and a separate blog maintained by Parques para Chile for the Biosphere Reserve at: http://rbaraucarias.blogspot.com/.

Published and submitted scientific publications: journals and meetings:

Gálvez, Laker and Bonacic (submitted). Wildlife Conservation outside Protected Areas of Valdivian Temperate Rainforest in Southern Chile. Oryx. (Annex 3.1)

Gálvez, Laker and Bonacic (2007) Description of habitat use by large mammals in peripheral zones to National parks and reserves in pre-Andean areas of the Araucanía, Chile. III Bi-National Meeting of the Society of Ecology of Chile and the Association of Ecology Argentina. La Serena, Chile. 30 September - 4 October. (Annex 3.2).

C Bonacic, N Galvez, F Amar, J Laker, T Murphy and DW Macdonald (2007) Puma and livestock farming: a multi-level approach in 3 eco-regions of the Chilean Andes. Felid Conference, Oxford University, 17 - 20 September 2007. (Annex 3.3)

Rojas, I.; Gálvez, N; Petitpas, R.; Becerra, P; Ibarra, J.T. & C Bonacic (Submitted) Efectos de la Fragmentación sobre la Composición florística y Estructura del Bosque precordillerano (39ºLS;72ºLO) de la Región de la Araucanía, Chile (1). IV Congreso Chileno de Ciencias Forestales. Universidad de Talca, 1-3 Octubre 2008. (Annex 3.4)

Popular publications

Gálvez, N. and K. Yunis (2007). Importance of the Namoncahue corridor is recognized by the Chilean Ministry of Environment. Rainforest Concern Newsletter. pp 12-13.

Gálvez, N. 2008. Pequeños y grandes esfuerzos para cuidar nuestro patrimonio natural. Revista Travesía (2):24. www.travesiaweb.com (Annex 3.5)

Gálvez, N and C. Bonacic (2008: In press). Filling gaps for Güiña cat (Kodkod) conservation in Southern Chile. Wild Felid Monitor: Newsletter of wild felid research and management association (WFA). (Annex 3.6) http://www.wildfelid.com/WFA%20Newsletter.html

Scientific publications in prep.

Laker, Galvez, Murphy and Bonacic (in prep). Incidence of feral dogs in native forest habitats in Chile.
Hernandez, Galvez, Bonacic (in prep). Health status of kodkod (Leopardus guigna) in two habitat types in Southern Chile.
Galvez, Hernandez Bonacic, Laker and Hester (in prep). Temporal variation in occupancy of different forest types by kodkod (Leopardus, guina).
Murphy, Galvez and Macdonald (in prep) Farmers attitudes to puma management, livestock predation and conservation in agricultural landscapes bordering protected areas.
Bonacic, Laker, Galvez and Hester (in prep). Occupancy of different forest types by an invasive species in Chilean forests – the wild boar (Sus scrofa).
Ibarra, Galvez, Bonacic and Hester (in prep). Temporal relationships between forest bird assemblages and hábitats in Chilean native woodlands.

9. Project Expenditure

Table 3 Project expenditure <u>during the reporting period</u> (Defra Financial Year 01 April to 31 March)

Item	Budget	Expenditure	Balance
Rent, rates, heating, overheads etc			
Office costs (eg postage, telephone, stationery)			
Travel and subsistence			
Printing			
Conferences, seminars, etc			
Capital items/equipment			
Others			
Salaries (specify)			
TOTAL			

NB the amounts reported above differ from those reported in our financial report because of a delayed claim in April 2008 from Parques para Chile - delay agreed in advance with the Darwin Secretariat.
The overspend in travel this year can be offset to an extent by the year 1 underspend of £695. This category was unavoidably increased by fieldwork logistics costs during the peak sampling period in Jan-Mar 2008. Measures will be taken during 2009 to bring the total project expenditure for this category within the original budget forecast.

10. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

I agree for ECTF and the Darwin Secretariat to publish the content of this section

Getting to know the kodkod cat

The kodkod cat or Güiña *Leopardus guigna*, a forest dweller, is one of the smallest wildcats in the world. It is endemic to Central and Southern Chile as well as a small strip of temperate forest in Argentina. Main threats to the populations are fragmentation, habitat degradation, and illegal hunting. Hunting has been fuelled by a general negative attitude towards the species, resulting from a reputation for attacking poultry.

A new research programme, set up within the Darwin Initiative project 'Capacity building for temperate rainforest biodiversity conservation in Chile' (15/006), sets out to learn more about the effects that life in an increasingly fragmented habitat is having on the kodkod, to increase public awareness of this threatened species and its conservation needs.

Our study area, in the pre-Andean zone of the Araucanía district of southern Chile (IX region), represents the northern limit of the temperate rainforest in Chile (39º15´LS).

Through a camera trapping monitoring scheme we are obtaining occupancy data from continuous forests (>10,000ha), large fragments (>100ha) and small fragments (<20ha). We have 27 camera sites maintaining year-round monitoring. In areas where we have confirmed presence of güiña a live trapping effort is under way to assess the health status of individuals present in Continuous forest compared to small fragments. Scats are being collected for diet analysis.

To address the human dimension we have conducted a pilot study with 60 interviews to local farmers near our study sites to evaluate the number of attacks on family run poultry production. Results show that less than 1% of farms suffered an attack in recent years. It appears that negative perceptions are based more on myth than reality, encouraged by stories of neighbours or events that occurred years ago.

The project aims to address this apparent negative image and lack of awareness by work in local schools and visits for the pupils to the reproduction and rescue center Fauna Andina (www.fauna-andina.org). Will give them a unique opportunity to see and interact with the species. The main goal is to motivate children about the importance of the species in the ecosystem and to emphasize its uniqueness. Particularly inspired individuals will be encouraged to become "Ambassadors" of the species in their communities and take the role of promoters of conservation, and environmental education in their schools.

We see an urgent need to turn around the fortunes of this wonderful species, the smallest cat in the Americas, through conservation oriented research and outreach. We are doing this by making conservation science accessible to young and inquisitive minds by putting them in direct contact with the species, and letting the cat weave its own magic over them.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2007/08

Project summary	Measurable Indicators	Progress and Achievements April 2007 - March 2008	Actions required/planned for next period
Goal: *To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve:* *The conservation of biological diversity,* *The sustainable use of its components, and* *The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.*		*Research is advancing well, within a clearly defined framework directed towards understanding the role of peripheral areas to protected forests in securing the long-term conservation of endemic forest fauna.* *Progress has been made towards Araucarias Biosphere Reserve extension to increase protection of 1Mha.*	*(do not fill not applicable)*
Purpose To establish new public-private partnerships for conservation, with a particular focus on securing habitat connectivity in the Valdivian temperate rainforest region of Chile. The work supports National Biodiversity Strategy objectives, and relates to Articles 8, 10, 12, 17 and 18 of the CBD.	Long-term fauna monitoring and research capacity established. Policy developments to improve integration of biodiversity conservation in land use decision making. Establishment of Centre for Biodiversity facilities. Local outreach to rural community Meetings and door to door visits.	Main research and monitoring phase successfully installed. 27 camera trap sites established and maintained. Biosphere Reserve Committee established and progressing well towards submission of expedient to extend the Araucarias BR to over 1Mha. Due for completion May/June 2008. Centre largely built in year 1. Progress continued this year with construction to meet building regulations, and to improve accommodation. 4 workshops held to present work concepts to SAG, CONAF, CONAMA. 2 dissemination meetings held with local community and over 100 household visits.	Continued monitoring of camera sites. Snow track transects in National parks this winter. Complete and submit UNESCO expedient document (requires ministerial approval). Prepare management plan for Namoncahue Biological Corridor. Secure long-term financial stability of the facilities, and advance plans to build a dedicated laboratory facility. Activities held during year.

Output 1. A research and education facility for local biodiversity issues	Facility constructed using co-financing from local business	Facilities at the Pichares site have been improved during the year. Changing priorities on the part of the NGO, Parques para Chile, led to the visitor centre/ restaurant being closed to the public since August 2007 but still used for training activities.
Activity 1.1 Develop field centre for research and education in Pucon		Field centre built and equipped. Used for training 15 students from Cambridge University who attended a two week field course in ecology in December 2007. Office facilities for the Centre for Biodiversity are now well established in Pucón.
Activity 1.2, Volunteer programme		6 Volunteers from overseas (UK: 3, Denmark: 2, Australia: 1) supported fieldwork activities over extended periods this year. Two have been through Working Abroad, the rest arrived independently.
Activity 1.3 WildCRU and MLURI scientists supervision of Chilean MSc students		Visits were made by Alison Hester (Dec, 07), Jerry Laker (May 07-Feb 08) (Macaulay), and Tucker Murphy (WildCRU, Dec 07-Mar 08). Each of these visits involved supervision and training of the MSc and Honours students at the Catholic University.
Activity 1.4 Opening of the visitor centre		The visitor centre, Cafe del Centro, is complete, and was passed over to Parques para Chile in August 2007 for them to manage it on loan from Pensamiento Global. Since that time, the centre has been closed to the public and used privately for training activities. A mechanism for maintaining long-term economic sustainability will be developed during year 3.
Output 2. Knowledge on temporal-spatial use of habitats	Scientific and popular publications	The research programme has established a network of 27 permanent camera trap sites to monitor endemic (and introduced) mammals. Habitat evaluation and animal signs recording support this information. A bird survey programme is in progress, as are studies on amphibians and bats. 1 paper was submitted to a refereed journal reporting preliminary results. 3 presentations were made at conferences.
Activity 2.1. . Identify spatio-temporal dynamics of key mammal and avian endemic fauna		Experience gained in year 1 was used to establish 27 permanent monitoring sites for endemic fauna using camera traps. These have been maintained and serviced throughout the year. Data to be analysed in year 3. Preliminary results indicate widespread activity of feral dogs and wild boar in areas of native forest.
Activity 2.1.1. Research design in key lowland habitats		A range of assessment and monitoring programmes for fauna and vegetation have been set up: Evaluation of large mammal presence and distribution though camera trapping, recording of scats and tracks and direct observations; Field evaluation of vegetation community distribution, composition and structure;

		Ecology of puma and kodkod, in relation to habitat fragmentation; Studies of woodland bird communities, in relation to habitat structure and altitude, using mark-recapture.
Activity 2.1.2. PhD project on Puma conflict mitigation		WildCRU PhD candidate, Tucker Murphy, spent three months in Chile (Dec 07-Mar 08) studying the conflict between puma and livestock farmers, as well as training local staff in puma ecology and experimental design. A GPS collar is ready and on standby, pending capture of a suitable puma to put it on.
Activity 2.1.3. Darwin Frog project		Samples from year 1 were sent off to be tested for fungal diseases – an important threat to this species. Results proved negative. No studies are planed in Year 3.
Activity 2.1.4. Define threats to biodiversity and incentives for conservation		Evidence is accumulating of a significant threat to endemic wildlife posed by 'alien' species, wild boar and feral dogs. Measures are being taken to develop more specific programmes to assess the level of impact that each of these threats really poses and to raise awareness of the need for control measures to be instigated.
Activity 2.2. Map habitat use		Digital cartography (1:10,000) was completed for the Villarrica Catchment. Spatial analysis of the data collected through the field studies is work in progress. The experimental design is based on a classification of the landscape of the study area into three forest structure classes, based on the level of anthropogenic influence.
Output 3. 3-6 Chilean MSc research projects advancing project research objectives	MSc courses successfully completed, plus two research projects initiated to date.	A Chilean MSc research student won a grant (CONAMA FPA) to co-fund his thesis on kodkod cat ecology. Another is developing his study on pudu. Three undergraduate projects (1 year each) are in progress.
Activity 3.1. Training of Chilean MSc and undergraduate students		8 undergraduate and MSc students from Chile have received training this year, and have formed an effective team for enthusiastically carrying out the range of fieldwork required. .
Activity 3.2 MSc project in Guiña (*Oncifelis guigna*)		An MSc student candidate is working on his thesis with supervision from Catholic University and Macaulay Institute on kodkod cat ecology. He is at present living on site, and engaged in fieldwork with an array of 10 Tomahawk traps.
Output 4. Workshops with *campesinos* on sustainable forest management	Workshop programme, report and course notes	Several events were held during the year to inform about conservation issues in temperate rainforest.
Activity 4.2 Stakeholder workshop series for Huerquehue National Park concession, CONAF-SERNATUR.		This project has been set back by a legal challenge to the tender system itself in another region. The whole programme of ecotourism tenders has been on hold pending resolution of the issue.

Activity 4.3. Community workshops		Two informative workshops held in Feb 08 with the communities of Namoncai and Kawellu-co to show camera trap and other images of the wildlife found in their woodlands, and discuss conservation threats and opportunities
Output 5. Participatory consultative process for UNESCO Biosphere Reserve	Nomination documentation and supporting information compiled.	Parques para Chile has been leading the editing and publishing the expedient document for submission to UNESCO. Submission deadline was extended by UNESCO until later in 2008 to allow time for ministerial approval of the proposal.
Activity 5.1 Conformation of committee for the Proposal		The Centre for Biodiversity has become a key member of the regional committee for extension of the existing Araucarias Biosphere Reserve, nearly 93,000 ha, to a reserve totalling 1,140,000 ha. Parques para Chile and CONAF have been jointly preparing a document which describes the social, biological, physical and economic attributes of the area proposed for extension. This document is >350 pages long and contains up-to-date information on biodiversity and culture within the proposed extension area. The document outlines the reasoning behind the zoning of the Reserve and how this would create positive short to long-term economic and social benefits.
Output 6. Project management	Project management documentation	Regular meetings between the lead organisation and both host country partners have been held (Pucon: 8, Santiago: 3, UK: 1). A six month report was submitted to the DI secretariat to schedule. This report is presented to schedule.
Activity 6.1 Management meetings		Management meetings between Macaulay institute were held in April 07 (UK) Jun 07 (Santiago), Aug 07 (Pucon), Oct 07 (Pucon), Dec 07 (Santiago) and Jan 08 (Pucon), Meetings were held with Parques para Chile in May 07 (Villarrica), July 07 (Santiago), Dec 07 (Pucon), Jan 08 (Villarrica), and Feb 08 (Pucon).
Activity 6.2. Project reporting		Six-month and annual reports presented to schedule. We keep bi-monthly progress summaries for internal management purposes.

Annex 2 Project's full current logframe (not changed from original proposal)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: To draw on biodiversity expertise from UK scientists to work with local partners in countries rich in biodiversity but poor in resources, to achieve: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources			
Purpose To establish new public-private partnerships for conservation, with a particular focus on securing habitat connectivity in the Valdivian temperate rainforest region of Chile. The work supports National Biodiversity Strategy objectives, and relates to Articles 8, 10, 12, 17 and 18 of the CBD.	New research and education field centre Information on habitat use by endemic mammals and birds. Education for Chilean and international post-graduates. Local capacity building for *campesinos* and indigenous groups. A plan for a UNESCO Biosphere Reserve to catalyse private sector involvement in forest conservation	1. Facility commissioned and constructed. 2. Scientific papers analysing spatial ecology of endemic fauna 3. Formal collaboration agreements with universities. 4. Course outlines and reports 5. Nomination documents presented	Darwin grant succeeds in leveraging local financial resources. Successful management of fieldwork Facilities, funding, and supervision offered meets university requirements Sufficient local interest in courses Sufficient agreement between local stakeholders to support this initiative
Outputs 1. A research and education facility for local biodiversity issues 2. Knowledge on temporal-spatial use of habitats. 3. 3-6 Chilean MSc research projects advancing project research objectives 4. Workshops with *campesinos* on sustainable forest management 5. Participatory consultative process for UNESCO Biosphere Reserve.	1. Facility constructed using co financing from local businesses 2. Scientific and popular publications 3. MSc courses successfully completed, Work presented at appropriate conference and submitted to appropriate journals 4. Workshop programme, report and course notes 5. Nomination documentation and supporting information compiled.	1. Output presented to Darwin Initiative with project report 2. Output presented to Darwin Initiative 3. Copies of theses and conference abstracts presented to Darwin Initiative. 4. PPC reports presented to Darwin Initiative 5. Documentation presented to Darwin Initiative.	1. Local private sector funding can be leveraged using Darwin grant 2. Successful collaboration of research partnership 3. MSc. Students will select offered programme 4. *Campesinos* receptive to sustainable development approach 5. Evidence from output 2. supports Biosphere reserve as appropriate mechanism to engage private sector in conservation.

Activities	Activity Milestones	Assumptions
Research 1. Identify spatio-temporal dynamics of key mammal and avian endemic fauna 2. Map habitat use 3. Define threats to biodiversity and incentives for conservation Capacity building 4. Develop field centre for research and education in Pucon 5. Training in non-exploitive forest management. 6. WildCRU and MLURI scientists supervision of Chilean MSc students. Dissemination 7. Publications in both English-language and Chilean scientific press Project management 8. Coordination meetings, periodic evaluation, quality standards, internal peer review, reporting.	Year 1. 1. Start-up meeting, Pucón, July 2006. 2. Stakeholder workshop held with community leaders and sustainable development experts 3. Complete business plan and designs for research centre. 4. Establish wildlife monitoring transects, camera traps, and mist netting sites in study areas. Year 2 5. Tracking key forest endangered species (e.g. Magellanic woodpecker, wild cat, native deer) 6. Strategy developed for Biosphere Reserve with stakeholder participation 7. Build and equip field centre Year 3 8. Analysis of results from 4. Publish preliminary results 9. Policy report published on private sector conservation 10. Develop long-term international r&d strategy for Centre Year 4 11. Publication of results from 4 and 5. 12. Biosphere Reserve nomination completed 13. Commission research centre building. Ongoing 14. Host 2 MSc research projects in Pucón per year, 15. Wildlife monitoring by UK volunteers and Chilean research workers 16. Local training courses and workshops 17. Management meetings and reports to Darwin Initiative 18. Peer review of manuscripts by Macaulay Institute and Fauna Australis.	Proposed methods appropriate for field conditions Effective capture methods developed Local community support is secured. Stakeholders support biosphere concept Government continues to support CBD objectives Continued enthusiasm by local institutions Local financing leveraged by Darwin grant

Annex 3 **supplementary material (optional)**

3.1 Abstract of article submitted to Oryx

Wildlife Conservation outside Protected Areas of Valdivian Temperate Rainforest in Southern Chile Galvez, N. (1), J. Laker (1,2), C. Bonacic (1)

Abstract
Temperate rainforest has been largely replaced by agriculture and plantation forestry in Chile. Currently, the extensive protected area system is mainly limited to the highlands, leaving remaining lowland forests areas a priority for conservation. Given the rigorous winter climate of the protected areas, little is known about the year round habitat needs of endemic forest fauna. An initiative to improve ecological integration of highland protected areas with unprotected lowland habitats (agriculture combined with patchy and fragmented natural ecosystems) is in the process of development in the form of a substantial new biosphere reserve in the Araucania region. Historically, parks lack any buffer zone management and peripheral private land is influenced by crop agriculture, extensive livestock management and forestry. This paper is a preliminary assessment of wildlife presence and activity in private forest areas, peripheral to the national parks, using camera traps. Puma *Puma concolor*, the endemic kodkod cat *Leopardus guigna*, and the dwarf deer pudu *Pudu puda* inhabit fragmented areas and continuous forests. The camera traps are also revealing the presence of potentially threatening exotic species such as wild boar *Sus scrofa* and feral dogs *Canis familiaris* not only in fragments, but in continuous forests. Introduced species are present in the same areas as endangered species and we suggest that the lack of control might contribute to ease the access of introduced species inside protected areas. Buffer zone management and introduced species control should be a priority when setting up a Biosphere reserve in the region.

Keywords
Biological invasions, Buffer zones protected areas, camera trap survey, exotic species, habitat use, temperate Valdivian rainforest

3.2 Poster presented at III meeting of the Societies of Ecology, Chile and Argentina

Antecedentes de uso de hábitat por macromamíferos en zonas periféricas al SNASPE, precordillera de la Araucanía, Chile

Gálvez, N. (1); Laker, J. (2); Bonacic, C. (1) Macdonald D. W. (3)
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Introducción

El Sistema Nacional de Áreas Silvestres Protegidas del Estado (SNASPE) no asegura la protección de formaciones vegetacionales (1), como tampoco la viabilidad poblacional de macromamíferos (2). El 90% del SNASPE en el bosque templado se encuentra en zonas alto-andinas por lo que las áreas periféricas son prioritarias como objetivos de conservación (3). En nuestra área de estudio coinciden 3 Áreas protegidas del estado y 2 iniciativas privada (Figura 1). Estudiamos áreas privadas de bosque templado (i.e. siempreverde y bosque de *Nothofagus*) periféricas al SNASPE en las cercanías de Pucón. Entre julio (2006) y marzo (2007) usamos cámaras trampa en una micro cuenca inserta en bosque continuo (>1000 há) y un fragmento grande (>100 há) entre los 400-800 msnm. Reportamos presencia y uso de hábitat de macromamíferos.

Métodos

Usamos 14 cámaras trampa (Trailmaster ®) sin cebo, activadas las 24 horas. Entre julio-diciembre, 8 en bosque continuo (BC) y 6 en fragmento (FG). Entre enero-marzo, 7 en BC y FG. Se instalaron a una distancia entre 200 y 800m en senderos con cobertura baja (< 20%) y alta (>80%) de sotobosque (0-1 m), en igual proporción para asegurar probabilidad de detección según comportamiento de movimiento en el bosque (4). Se excluyeron del análisis las fotos de aves, roedores y personas con animales domésticos. Para cada especie se reporta: i) el promedio de días en ser detectada, ii) fotos por especie, (iii) frecuencia de detección, como el número de días que una especie fue detectada en una o más cámaras (i.e. combinación de todas) (5) y iv) actividad diaria en intervalos de 4 horas para especies que registraron más de 5 fotos totales, independiente del área de estudio.

Figura 1. El 60% de las áreas protegidas público-privadas en el área de estudio se encuentran sobre los 1100msnm y bajo nieve permanente durante el invierno e inicios de primavera.

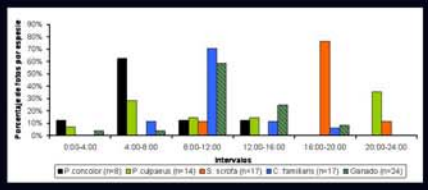


Figura 2. Actividad diaria de las especies con más de 5 fotos totales, independientes del área de estudio (Bosque continuo y fragmento) en intervalos de 4 horas.

Resultados

Se registraron un total de 181 y 176 cámaras trampa/días en BC y FG respectivamente. De un total de 224 fotos, 69 fueron de macromamíferos. Se detectaron 6 especies nativas, 3 exóticas, perros (*Canis familiaris*) y ganado doméstico (Tabla 1). Aunque *Sus scrofa* presentó baja actividad en FG, se observaron signos de presencia. Lagomorfos se observaron frecuentemente durante los trabajos de terreno, por lo que no se incluyeron en el análisis de actividad. En BC la mayor frecuencia de detección se observó en *S. scrofa* (0,090) y *C. familiaris* (0,084) y en FG, *P. concolor* (0,040) y ganado doméstico (0,034). Especies que mostraron patrones de concentración de actividad diaria fueron *P. concolor*, *C. Familiaris*, *S. scrofa* y ganado doméstico (Figura 2).

Tabla 1. Listado de especies detectadas por Orden y Familia, número de fotos totales, días promedio a detección, y frecuencia de captura.

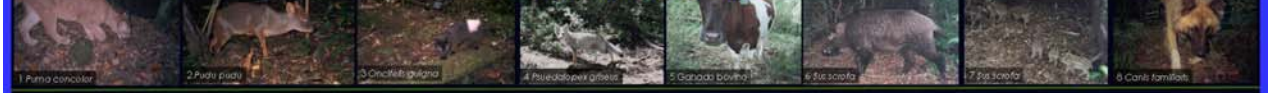
Orden y Familia	Especies	Promedio días a detección días ± SD	Bosque continuo fotos	Bosque continuo FD (**)	Fragmento fotos	Fragmento FD
Carnivora						
Felidae	*Puma concolor*	20 ± 17 (n=5)	1	0,006	7	0,040
	Oncifelis guigna	14 ± 13 (n=3)	2	0,012	1	0,006
Mustelidae	*Conepatus chinga*	34 (n=1)	-	-	1	0,006
Canidae	*Pseudalopex culpaeus*	31 ± 19 (n=6)	11	0,042	3	0,017
	Pseudalopex griseus	28 ± 21 (n=3)	3	0,018	-	-
	Canis familiaris (*)	21 ± 19 (n=9)	3	0,084	3	0,017
Artiodactyla						
Cervidae	*Pudu pudu*	13 ± 6 (n=2)	1	0,006	1	0,006
Suidae	*Sus scrofa*	13 ± 8 (n=4)	16	0,090	1	0,006
Equidae-Bovidae	Ganado doméstico (*)	18 ± 13 (n=3)	3	0,048	9	0,034
Lagomorfa						
Leporidae	*Lepus europaeus*	-	2	-	-	-
	Oryctolagus cuniculus	-	1	-	-	-

(*) Individuos
(**) Frecuencia de detección días de capturas combinando el total de cámaras / días de trampeo

Discusión

Los resultados nos entregan antecedentes preliminares de patrones de actividad y presencia en las zonas periféricas al SNASPE. Reportamos importante actividad de especies catalogadas como dañinas en bosque continuo (i.e. *S. scrofa* y *C. familiaris*). La baja detección de *S. scrofa* y *C. familiaris* en fragmento podría deberse a interacciones negativas con *P. concolor*. Los patrones de actividad diaria sugieren posibles estrategias de defensa de *S. scrofa*. La actividad de las tres especies podrían estar incidiendo en los bajos registros de *P. pudu* (8). El método con cámaras trampa usado para estimar niveles de uso es conservador por lo tanto puede estar subestimando actividad (4). Además es imposible determinar si los niveles de actividad, con el diseño ocupado, reflejan abundancia (6, 7). Los resultados son parte de una investigación a más largo plazo para analizar tendencias temporales (i.e. invierno-verano) y estudios especie-específicos.

Algunas capturas fotográficas



Referencias

Agradecemos a Darwin Initiative (15/006) y el Wildlife Trust Alliance; Karl Yunk y Mercedes Ibáñez de Parques para Chile; Alison Hester, Alessandro Gimona, Andrew Taber, Fernando Vidal, propietarios de Namoncal y La Barda, y voluntarios varios.

Darwin Initiative

3.3 Felid Conference Poster, Oxford University, UK.

FAUNA AUSTRALIS

Pumas and livestock farming:

a multi-level approach to conflict resolution in 3 eco-regions of the Chilean Andes

[1] Cristian Bonacic, [1] Nicolas Galvez, [1] Francisca Amar, [2] Jerry Laker, [3] Tucker Murphy & [3] David Macdonald
[1] Fauna Australis, Pontificia Universidad Catolica de Chile, [2] Macaulay Institute, [3] Wildlife Conservation Research Unit. University of Oxford

Introduction

Chile, the narrow ribbon of land that runs north to south for 4000 km to the west of the Andes Mountains, covers a distinctive ecological gradient, ranging from tropical desert to temperate rain forest. Farming systems and cultural attitudes towards wildlife vary along this gradient, influenced by different indigenous cultures and the region's colonial history. The puma (*Puma concolor*), however, is ubiquitous throughout this gradient. Its habit of predating livestock has created conflict with farmers, even though studies show that livestock make up a low proportion (< 10%) of pumas' diet. All hunting of pumas is prohibited in Chile by wildlife conservation legislation. However, current wildlife management by authorities includes such practices that have been proven ineffective in other countries, such as the translocation of problem animals. We are studying the nature of this conflict across three eco-regions in terms of (i) puma ecology, (ii) scale and patterns of livestock predation, (iii) cultural attitudes towards puma, and (iv) livestock management practices. Our research will evaluate how wildlife management strategies may take into account cultural and ecological contexts to improve stakeholders' attitudes towards pumas, and lead to more effective and appropriate strategies for promoting the coexistence of pumas and livestock.

The Puma (Puma concolor) is the top predator in all the terrestrial ecoregions of Chile. Camera traps are being used to monitor Puma activity patterns and habitat associations in the temperate rainforest

Andean Dry Puna (18°-28° S)

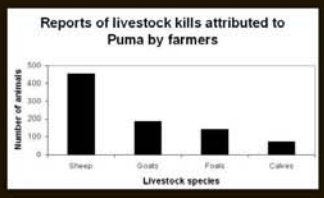
The high altitude puna and the pre-cordillera transition zone ecosystems are strongly influenced by the Aymara indigenous culture that has based its economy there for centuries on extensive management of llamas (*Lama glama*) and alpacas (*Vicugna pacos*). The Puma appears to have always been considered a pest, and is excluded from the eight sacred animals of the Aymara, which include the Andean cat (*Oreailurus jacobita*) and the Andean condor (*Vultur gryphus*). Our work in this area aims to collect quantitative data on puma diets through analysis of faeces samples, and to develop ethnozoological knowledge of the Aymara's relationship with the puma. We have also conducted environmental education activities with Aymara school children, including field visits, a climbing wall with carnivore tracks and mural painting activities, to highlight the importance of wildlife and conservation.

The puna supports traditional subsistance livestock farming following Aymara customs. Puma predation is perceived as negative and affecting subsistance economies.

Aymara children painting a climbing wall with an indigenous wildlife theme as part of our programme to increase awareness in the community of wildlife conservation issues.

Chilean Matorral (29°-37° S)

Our study area covers the pre-Andean and Andean ecosystems of Central Chile that experience a Mediterranean type climate. Livestock production in the San José de Maipo catchment is oriented around seasonal transhumance between upland and lowland pastures. Surveys of farmers (n=63) show that they perceive pumas as a threat, although samples of puma faeces that have been collected (n=132) have shown their diet contains a low percentage domestic livestock (7.14%), compared to lagomorphs (96.94%).



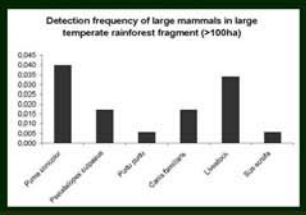
During 2006 we interviewed 63 farmers that reported their livestock losses to Puma. Pumas preyed higher number of sheep (n=458), followed by goats (n=187), colts (n=145) and cattle (n=73). Ranchers also reported predation by Andean condor and foxes. We are currently conducting an economic evaluation of the perceived loss by farmers.

Transhumant sheep farming is exposed to Puma predation on the montane summer grazings.

Valdivian Temperate Rainforest (38°-43°S)

This study area is within the Araucanía region at the northern limit of the temperate rainforest. We are studying seasonal and diurnal activity patterns of pumas in relation to different landscape elements (continuous and fragmented native forest). We have set up arrays of camera traps, and conducted transects looking for puma sign in large forest fragments (>100ha) and continuous forest (>1000ha). Our preliminary results show that puma activity is highest between 4:00 and 8:00 am (62% of photos, n=8). We have also demonstrated that these large fragments are important puma habitat (7 out of 8 puma images), including for reproduction. These fragments are close to the farmland matrix, and have higher presence of livestock (35% of positive wildlife images, compared with 27% for puma). The detection frequency in such places is consistent with farmers' perceptions of predation risk, ascertained through informal interviews of local livestock owners.

A puma kill at our study site. Typical behaviour of hiding prey. We came back the next day to find that parts of the sheep had been eaten by Puma.



From July (2006) to March (2007) 11 camera trap sites surveyed the large fragment. A total of 176 trapping nights were registered. Camera sites in the large fragment were >5 km from each other and at different altitudes (i.e. 400, 800 and 1000m). Latency to puma detection (i.e days before photo capture) was 24 ± 18 days and interval between photos 31.3 ± 14.6 days (mean ± SD). Detection frequency, a proxy measure of activity level, was obtained by combining the number of nights a species was registered at one or more cameras in the fragment. This is a conservative approach to assess levels of use, and therefore is thought to underestimate actual animal activity (Hilty & Merendeler, 2004). In addition to pumas, the cameras captured 5 native mammal species (two shown on graph), feral dogs (*Canis familiaris*) and the exotic invader, wild boar (*Sus scrofa*).

Winter conditions of Large fragment surrounded by Farming activities shown left of photo. The elevation in the forest fragment goes from 400 masl, bordering pasture lands, to high altitude evergreen forest at 1100 masl.

Conclusions

This is an ongoing long term multi-level investigation of human-wildlife conflict over 4,000 km of puma's geographic range. We aim to undertake parallel methodologies in all the eco-regions of Chile.

At present we conclude that:

1. Puma conflict with farmers exists in all 3 eco-regions surveyed
2. Attacks are sporadic and Puma management by authorities is not effective nor efficient.
3. Negative attitudes towards puma and perceived livestock loss by farmers does not equate well with our initial results of diet assessment.
4. Camera traps have proven to be useful for monitoring pumas in temperate rainforest and future work will include their use in the 2 remaining eco-regions

This sub-adult Puma was photographed by one of our camera traps in a forest fragment, accompanied by its mother. The trap is close to farmland where livestock losses have been reported.

3 eco-regions: Altiplano, Mediterranean and Temperate Rainforest. These areas are influenced by three distinct cultures: two indigenous, Aymara (Altiplano) and Mapuche (Temperate Rainforest) and descendents of European colonists that are rooted from colonial times (e.g. mainly Spanish) and migrations beginning in the early 1900 (Mediterranean and Temperate Rainforest).

Acknowledgements
These projects are receiving valued support from the following organisations and individuals: Darwin Initiative 15/006, CONAMA FPA 2007, The Wildlife Trust Alliance, S.A.G IX Region, CONAF I and IX Regions, INDAP RM, Fernando Vidal, Virginia Macarotte, Javiera Valencia, Lorena Ordenes, Paulina Gerda, and various volunteers.

THE MACAULAY INSTITUTE
GOBIERNO DE CHILE
Darwin Initiative

3.4 Abstract submitted to Congress of Forestry Sciences in Chile.

Efectos de la Fragmentación sobre la Composición florística y Estructura del Bosque precordillerano (39ºLS;72ºLO) de la Región de la Araucanía, Chile.

Rojas, I. (2); Gálvez, N. (3); Petitpas, R. (2); Becerra, P (2,4); Ibarra, J.T. (3) & C. Bonacic (2,3)

(1) Agradecimientos: "Capacity Building for the Conservation of Temperate Rainforest Biodiversity in Southern Chile" DEFRA, U.K. (ref 15-06).
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(4) Instituto de Ecología y Biodiversidad, IEB.

La fragmentación de bosques es una creciente amenaza para la conservación de su biodiversidad ya que genera cambios microambientales por efecto borde y aislamiento de especies. El tamaño de fragmento ha sido documentado como el factor más crítico determinante de cambios microambientales y biodiversidad. En este estudio se evalúa el efecto del tamaño de los fragmentos remanentes de bosque templado de la zona precordillerana (39ºLS; 72ºLO) de la Región de la Araucanía de Chile, sobre la composición de especies y estructura vegetacional. Se seleccionaron 6 fragmentos pequeños (< 22 há) y 6 fragmentos grandes (> 100 há) en una misma área geográfica y climática. En cada fragmento se realizaron 2 transectos, con 8 parcelas de 25m^2 dispuestas cada 20m. Se evaluó composición de especies, se estimó la densidad de árboles a través del método de cuatro cuartos y se tomaron medidas de % de cobertura por estrata y elementos antrópicos (fecas de ganado doméstico, incendios y madereo). Los resultados indican que no existen diferencias marcadas en la riqueza total de especies. Sin embargo, al analizar el origen de las especies se observó mayor presencia de especies alóctonas en los fragmentos pequeños. Además, se observó mayor densidad de árboles en los fragmentos pequeños que en los grandes. Finalmente, se observó mayor grado de perturbación y una menor cobertura de la capa de hojarasca en los fragmentos más pequeños. Los resultados sugieren que la fragmentación facilita la invasión de especies alóctonas, y produce una alteración en algunas variables de la estructura vegetacional.

3.5 Popular publication Travesía Magazine.

CÁMARAS EN EL BOSQUE

Pequeños y grandes esfuerzos para cuidar nuestro patrimonio natural

Nicolás Gálvez*

La naturaleza de nuestra fauna nativa es críptica. Es decir que, difícilmente, vamos a tener la oportunidad de ver su presencia en el bosque. Esta dificultad de observación se traduce en escaso conocimiento de nuestro patrimonio faunístico, especialmente de mamíferos grandes como el puma, el pudú, el gato güiña, el chingue, el quique y el zorro. El Bosque Templado, además, entrega excelentes refugios para que las especies no lleguen a nuestra vista.

Tradicionalmente la identificación de huellas ha sido el método para observar la presencia de las especies en los bosques de Chile. Sin embargo, a través de una tecnología que empezó a desarrollarse a inicios de 1900, ahora llamadas cámaras trampa, podemos remotamente "ver" qué especies andan en el bosque. Esto es lo que hemos estado realizando desde mediados del 2006 en las cercanías de la comuna de Pucón. Un número importante de propietarios con amabilidad sureña y motivados por la curiosidad nos han abierto sus campos, bosques y orillas de río para trabajar y "ver" que especies se encuentran en sus predios. Muchas veces nos hemos encontrado con la grata sorpresa que aparecen especies que los propietarios no han visto por largo tiempo o que sólo sabían de su presencia por historias de sus padres o incluso de sus abuelos. El trabajo que se está realizando se enmarca dentro de una investigación científica de tres años de duración que busca entender qué está pasando con la fauna fuera de las áreas protegidas en zonas con bosque. Las cámaras ofrecen la posibilidad de determinar con pruebas contundentes (fotos) la presencia de las especies en sectores determinados, además de entregar información sobre patrones de actividad durante el año. Preliminarmente podemos compartir resultados que nos permiten hacernos preguntas relacionadas con los problemas de conservación de las especies nativas, la presencia de especies exóticas y la compatibilidad con las actividades humanas.

sigue

Uno de los lugares donde se ha realizado esta experiencia con uso de cámaras es en la cordillera de Namoncahue, en la comuna de Pucón.

ARCHIVO TRAVESIA-CORTESIA PPCH

Dentro de las especies nativas hemos encontrado al puma (*Puma concolor*), pudú (*Pudu pudu*), güiña (*Leopardus guigna*), chingue (*Conepatus chinga*), quique (*Galictis cuja*) y zorros culpeo (*Pseudalopex culpaeus*) y chilla (*Pseudalopex griseus*). De las especies exóticas presentes en nuestros bosques hemos captado al jabalí (*Sus scrofa*), perros y ganado doméstico, principalmente vacuno y caprino. Los resultados preliminares de la investigación indican que las especies exóticas, jabalí, perros y ganado doméstico han sido detectadas con mayor frecuencia, seguidas por las especies nativas zorro culpeo y puma. A su vez, especies como el pudú y la güiña representan menos del 3% de las fotos. Aunque no podemos afirmar que haya pocos individuos de estas especies, sí podemos afirmar que el jabalí, ganado doméstico y perros tienen una alta actividad de uso de hábitat en los sitios estudiados. Esto abre la discusión sobre qué es lo que está pasando con nuestras especies nativas que se encuentran con algún grado de amenaza a la extinción, especialmente el pudú (Vulnerable) y la güiña (En peligro).

El pudú, considerado el ciervo más pequeño del mundo y que sólo habita los bosques de Chile y Argentina, presenta una situación preocupante dado los resultados expuestos anteriormente. Es conocida la capacidad de jaurías de perros para cazar y/o herir al pudú, incluso es considerada como una de las principales amenazas a las poblaciones existentes. Además, es común ver y escuchar cómo gente bota perros no deseados en sectores rurales y que eventualmente se pueden tornar boguales en nuestros campos. Por otro lado, el ganado doméstico y el jabalí, representan una competencia por alimento y disminución de la calidad de hábitat. Si incluimos la presencia de su predador natural, el puma, la situación del pudú se torna compleja.

Por otro lado la güiña, pequeño gato silvestre asociado principalmente a zonas con bosque y presente sólo en Chile y Argentina, tiene varios aspectos que quisiéramos resaltar. Es un animal de bosque que, se estima, está siendo afectado por la disminución en la calidad de su hábitat boscoso y por la caza furtiva. Esta última tiene estrecha relación a la mala fama que tiene el felino en el ámbito rural por predar sobre gallinas que son parte del sustento familiar. Es conocida la capacidad del animal para ingresar a los gallineros y hacer de las suyas con un número importante de gallinas. Debemos preguntarnos ¿Es culpa del animal? o nuestro manejo de las aves. Puedo contar una experiencia en la cual la güiña me eliminó 6 gallinas y 2 gallos en menos de media hora. Razón, mal sellado del gallinero. Además hemos visto que muchas veces las personas tienen este concepto negativo por historias que permanecen en el tiempo y no por un hecho reciente y/o cercano. Por otro lado es importante resaltar que la güiña es un activo depredador de roedores, incluyendo en su dieta al ratón de cola larga (*Oligoryzomis longicaudatus*), conocido trasmisor del virus Hanta.

Por último quisiéramos resaltar la importancia de pequeños y grandes propietarios que contienen dentro de sus deslindes zonas con bosque y orillas de río. Independiente del uso que ellos hagan de sus bosques (madereo, ganado, etc), hemos encontrado la presencia de todas las especies mencionadas. Esto nos muestra que todos tenemos un rol en la mantención de nuestro patrimonio natural y no sólo parques nacionales o reservas privadas grandes.

Invitamos a propietarios a tomar ciertas precauciones y manejos que pueden mejorar condiciones para nuestra fauna silvestre. Por ejemplo, amarrar a sus perros durante la noche o tener cercos para que no salgan hacia sectores boscosos. Además tomar medidas para controlar los perros sin dueño o jaurías boguales que puedan estar rondando en sus campos. Fomentar la caza responsable del jabalí para disminuir la presión de este animal exótico sobre la fauna nativa y sobre la regeneración del bosque. Excluir al ganado doméstico y el madereo en quebradas húmedas que son importantes refugios para nuestra fauna. Entendemos que el bosque muchas veces es una fuente de forraje para el ganado durante el invierno y el verano cuando el pasto de las praderas escasea. Sin embargo, la exclusión de sectores claves como quebradas húmedas puede ser un aporte fundamental. Las actividades productivas son prioritarias para el bienestar humano del ambiente rural por lo que nuestro norte de investigación se enfoca en buscar formas de convivencia armónica con las especies silvestres.

Lab. Fauna Australis, Facultad de Agronomía e Ingeniería Forestal, Pontificia Universidad Católica de Chile. Proyecto Darwin Initiative (15/06).

3.6 Popular press in Wild Felid Monitor Newsletter, US. (In press)

Filling gaps for Güiña cat (Kodkod) conservation in Southern Chile

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The kodkod cat or Güiña *Leopardus guigna*, a forest dweller, is one of the smallest wildcats in the world. It is endemic to Central and Southern Chile as well as a small strip of temperate forest in Argentina. Main threats to the populations are fragmentation, habitat degradation, and illegal hunting. In addition there is a general negative attitude by rural communities towards the species, mainly because of attacks on poultry.
The lack of knowledge on the present conservation status of the populations indicate urgent needs to asses the present status. Populations are highly fragmented as well as knowledge. Research efforts have concentrated in the VII and X Regions of Chile. Our study area, in the pre-Andean zone of the Araucanía district of southern Chile (IX region), represents the northern limit of the temperate rainforest in Chile (39º15´LS). This is the first research effort to understand more about the populations of Güiña in this part of Chile.
In general terms the forest can be characterized by Valdivian type forest (e.g. evergreen) intertwined with Deciduous *Nothofagus* forest and replaced by the Monkey puzzle tree forest *Araucaria araucana* in higher altitudes (>1000masl). Continuous forests are replaced by agriculture (e.g. mainly animal production) and tree plantations in the lower valleys, leaving behind a matrix of fragments and river corridors. National parks and private land conservation initiatives represent the only protected refuge for wildlife. These areas are located at high altitude sites, leaving lower land forests without official protective measures. Lower land forests are recognized as a conservation target in the temperate rainforest (Armesto et al., 1998).
Since 2006, thanks to a **Darwin Initiative project (15/06)** we have been conducting wildlife research in peripheral areas to the protected area system. For 2008 we obtained Government funding through the Environmental Agency CONAMA (FPA 2008) to conduct research specifically on Güiña. The project aims to address conservation issues from the biological (e.g. presence, occupancy, health status, diet) and human dimension (e.g. education, knowledge and perception).
Through a camera trapping monitoring scheme we are obtaining presence data from Continuous forest (>100ha) and small fragments (<20ha). The scheme considers sampling during the whole year in 27 camera sites. Habitat evaluation (i.e. forest composition and structure) has been conducted at each site to explore species-habitat relationships. In areas where we have confirmed presence of Güiña a live trapping effort is underway to asses the health status of individuals present in Continuous forest compared to small fragments. Also scats are being collected for diet analysis.
To address the human dimension we have conducted a pilot study with 60 interviews to local farmers near our study sites to see attacks on family run poultry production. Results show that less than 1% has suffered an attack in the last years. We believe that negative perceptions are based more on an almost mythological image than reality, encouraged by stories of neighbors or events that occurred years ago. Most adults and their children have never seen a Güiña and are very surprised when we tell them that we have confirmation from our cameras that the species is present in the forest neighboring their farms. Another set of interviews is under way to further explore the perception towards the species.
A repeated story is that the Güiña when chased out of the chicken coup, climbs and stays in a near by tree. It seems that this typical behavior of cats when in danger has facilitated farmers killing animals. The same behavior was witnessed from a personal experience of an attack (yes, the Güiña did kill my chickens); although I immediately understood that it was my fault because of a poorly sealed chicken house. This is probably not the general rational thinking of farmers after an attack, especially if poultry is an important source of income or protein.
The educational strategy involves workshops with farmers and activities with school children. The workshops will describe proper construction of chicken coups and management of poultry to lessen probabilities of attacks. Also, we will emphasize the role of the Güiña as a rodent

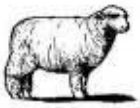
predator, and to some extent of *Oligorizomys longicaudatus*, main vector of the deadly Hanta virus.
School children will have a hands-on experience with the species by taking them to the reproduction and rescue centre Fauna Andina (www.fauna-andina.org). Rural school children will have a unique opportunity to see and interact with the species they have only heard stories about from their elders. The main goal is to motivate children about the importance of the species in the ecosystem and to emphasize its uniqueness. The goal is that these children become “Ambassadors” of the species in their communities and take the role of main speakers at educational talks in their schools.
We want to promote the Güiña cat in a positive way through conservation oriented research and outreach to make sure that people get to know and learn about a species that is unique in the world and part of our natural heritage.

Special thanks to Fernando Vidal, Felipe Hernández, Jim Sanderson and Jerry Laker
Figure 1 Logo of the project inviting to learn about the Güiña cat* *Photo by ©Fernando Vidal
Figure 2 Güiña (*Leopardus guigna*) caught on camera ©Nicolás Gálvez

Reference Armesto, J.J., R. Rozzi, C. Smith-Ramírez & Arroyo M.T.K. (1998) Conservation Targets in South American Temperate Forests. Science, 282, 1271-1272.

3.7 Handout informing about pumas, and how to recognise their signs

- made by Tucker Murphy (WildCRU) for distribution to the households he visited as part of his research, and to local agencies, CONAF and SAG for distribution.



DENUNCIAS

El Proyecto Darwin pretende estudiar y evaluar el conflicto entre la ganadería y el puma durante el año 2008.

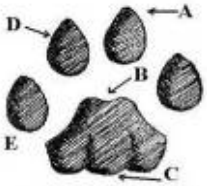
Si usted o algún vecino tiene una denuncia reciente acerca de un ataque de puma a su ganado (durante las últimas 8 horas; con evidencia (huellas, animales muertos o heridos), por favor, no se deshaga de los animales hasta que los hallamos visto.

POR FAVOR CONTÁCTENOS

TEL: 9-1621839 Pinche este número y nosotros lo llamaremos
Nicolás Gálvez, Fauna Australis, Pontificia Universidad Católica
Tucker Murphy, WildCRU, Universidad Oxford

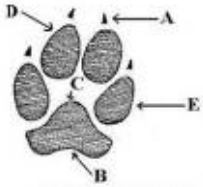
EL PUMA

- Es un animal solitario y territorial.
- No viven más de 4 pumas en un área de 10.000 hectáreas.
- Según los estudios realizados en la Región de Los Lagos se ha descubierto que el puma se alimenta más de liebres que de cualquier otro animal.



HUELLA DE PUMA

A. El puma no marca las uñas
B. La palma tiene una parte plana adelante
C. La palma tiene tres guatitas atrás
D. Los dos dedos de adelante NO están alineados
E. Cada dedo tiene la forma de una lágrima



HUELLA DE PERRO

A. El perro marca las uñas
B. La palma tiene una hendidura y dos guatitas atrás
C. La palma tiene una punta redondeada adelante
D. Los dos dedos de adelante están alineados
E. Los dos dedos laterales tienen la forma de un triangulo