Darwin Initiative Final Report

Capacity Building for Temperate Rainforest Biodiversity Conservation in Chile

Biodiversidad
en el bosque templado lluvioso

un proyecto Iniciativa Darwin

Darwin Initiative – Final Report

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UK Contract Holder Institution	Macaulay Institute, Aberdeen
UK Partner Institution(s)	Wildlife Conservation Research Unit, Oxford
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Project Leader Name	Prof. Alison Hester
Project Website	www.temperaterainforests.net
Report Author(s) and date	N. Galvez, J. Laker, C. Bonacic, A. Hester. 31 July 2009

A group of farmers takes part in a capacity-building exercise aiming to increase awareness and engender positive attitudes towards the kodkod cat. April 2008

1 Project Background

This project aimed 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 set out to create local biodiversity 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 focused on the role of transition zone habitats outside the national protected area system for endemic mammal and avian fauna. Important information was created on the dynamics of large-scale biodiversity threats, which would providing a framework for prioritising future activities in support of the Convention on Biological Diversity.

The project is located in the pre-Andean cordillera (Piedmont) of the Araucania region of Chile, which is a representative area of the dynamics of and threats to the Valdivian Temperate Rainforest.

The detailed map (Figure 1.1) shows our study area near the small town of Pucon.

Figure 1.1 shows an aerial photo mosaic (2007) of the study area in the upper Tolten catchment showing a fragmented lowland agricultural/forest matrix surrounded by high-ground protected areas. The conservation field station site is indicated in the Pichares valley.

2 Project support to the Convention on Biological Diversity (CBD)

The project has a direct relevance to the CBD objectives, particularly in **monitoring and identifying components of biological diversity**. The fauna of the Chilean temperate rainforest is unique, exposed to serious threats and requires urgent conservation. We identified the ongoing processes that make up these threats: primarily the combined impact of habitat fragmentation and invasive alien species. In the course of this work we generated a unique dataset of records, much of it camera trap data and images from elusive mammals and birds, and small mammals from live captures as well as plant community features in different altitudes and types of forests. GIS and landscape tools were used to describe habitat changes and conservation opportunities in the study area. The monitoring effort is set to continue into the future, and the results have and will be conveyed to relevant CBD authorities primarily, through

presentations at meetings. Local communities were also actively involved, from schoolchildren to farmers and park rangers, in various activities and workshops for the duration of the project. This is expected to continue into the future, albeit more informally.

The project was successful in its aim to **establish systems of protected areas with guidelines for selection and management**. A new biosphere reserve for the Araucania Region has been designed, in collaboration with stakeholders, and approved by the regional government authorities (*Intendente Regional*). The reserve remains to be approved by UNESCO/MAB, but this is expected within 2010. The future RB Araucarias will establish a nucleus zone of 271,624ha, corresponding to the existing protected areas system, a buffer zone of 372,949ha, and a transition zone of 498,277ha. The reserve will create a framework for strengthened environmental regulation of development in more urban and agricultural areas. Our research has highlighted the high level of activity in remnant forests of invasive alien species. These include wild boar, lagomorphs, dogs, rats, and domestic livestock. This work is paving the way for future ecological studies to evaluate the relationships, positive and negative, between these and the endemic fauna, and is expected to play an important role in informing future policy development relating to alien species.

The project has made a significant contribution to **promote understanding of the importance of measures to conserve biological diversity.** Our environmental education programme on the kodkod cat was awarded a prize by the regional office of the CBD focal point, CONAMA for the best environmental protection project of 2008. The programme addressed the issues of predation of chickens by this endemic wild cat, and the poor reputation that the species has, as a result, in rural communities. We took representatives from 8 rural schools to a wildlife rescue centre to “get to know the guina”, after which we accompanied these “ambassadors for the guina” to their schools to perform activities related to temperate rainforest ecology. A total of 200 children were reached in this way. This work is still ongoing until the end of 2009, within the framework of an FPA project with co-financing from CONAMA. Other outreach activities aimed at local campesinos (in many cases the parents of the same children in the schools programme) in which we explored the positive impacts of kodkod, such as the control of rodents, and in particular the rodent vectors of the locally-prevalent Hanta virus.

We made a special effort to convey our work to the CBD focal point. At the start of the project, in 2006, noting that there were 5 DI projects starting up in Chile, we organised a special seminar in the Catholic university for all these projects to present their work to the Natural Resources head of CONAMA, the UK Foreign Office, and other interested stakeholders. Since that time we have kept in touch through the medium of project activities and through participation in the Regional Biodiversity Committee for the Araucania Region.

No contact has been made with CMS or CITES, as this has not been considered relevant. In one of our reports, we reported no contact with the CBD focal point...an observation that raised eyebrows in our assessment. However, this referred to our lack of contact with the gentleman listed on the CBD website as the CBD focal point for Chile, whose address is in Montreal, Canada. The person engaged to fulfil the CBD commitment in Chile is Sr Miguel Stutzin, at a national level, and Sra Jovanka Pino, at regional level, with whom we have had extensive contact throughout the 3 years of the project.

3 Project Partnerships

Macaulay Institute worked closely with both host country partners during the project. In the case of the Catholic University, this has involved continuous fieldwork collaboration between staff members of both organizations on-site in Chile, a scientific exchange visit to Scotland by Chilean partner, Cristian Bonacic, DPhil., and joint development of research methodologies for assessing the habitats and relative abundance of cryptic mammals in the temperate rain forest. Collaboration with Parques para Chile involved a remote sensing exercise undertaken at Macaulay to develop a methodology for interpretation of satellite images to produce vegetation maps for the Araucarias biosphere reserve. Macaulay Institute 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 cats

brought in several new partners for the Catholic University, in particular the NGO Fauna Andina, who has expertise in ex-situ conservation. Support from the Darwin Initiative helped Parques para Chile facilitate a consortium of government agencies to put together a proposal to extend the Araucarias Biosphere Reserve. The "expedient" document was required to pass a lengthy political process of approval before it could pass to UNESCO-MAB, but this appears to be close to complete now. The Biosphere Reserve will make a strong contribution to creating a political framework to support the CBD objectives in this area.

Parques para Chile retired from the project in August 2008. This followed a period of frustration, highlighted in earlier reports. In particular, collaboration between the partners was affected 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 to form the basis of the collaboration between the partners in Chile, and was formally requested at meetings and in correspondence by the project leader throughout the year. As no plan was delivered, we were unable to release DI funds for this deliverable. After much discussion between all parties and members of the Darwin secretatiat, the end result was a decision by Parques para Chile to withdraw from this Darwin project. Their contributions up to this point, especially in relation to the Biosphere reserve proposal, were important and highly valuable.

The simplification of the project partnership at this point streamlined the achievement of remaining project goals in all areas - the science programme, the development of the conservation field station, (now the responsibility of Fauna Australis and the local company, Pensamiento Global Ltda.), and the outreach activities. Local stakeholders such as the regional University campus with their environmental education department and local NGO Fundacion San Cristobal then became key partners to extend environmental educational work in the region.

Other Collaboration

A partnership for the development of environmental education about the kodkod cat was established with local NGOs Fundación San Cristóbal and Fauna Andina, through the winning of a small Chilean grant. The Catholic University research team is also engaged in collaboration with another Darwin Initiative project entitled: 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 has also been extended to the Huilo huilo Foundation (http://www.huilohuilo.cl/fundacion/english/index.html) in the form of a German DAAD postdoc on reintroduction of guanacos in the temperate rainforest ecoregion, supervised by Dr. Bonacic.

The chilean wildlife service requested training and research for puma conflict resolution in another two regions of Chile, building up from the experiences obtained in our DI project. Currently 2 new grants are in progress, both closely related to the use of methods and approaches generated from the DI project contracted by the Government (invasive species in temperate rainforest and mountain lion studies of conflict).

4 Project Achievements

This project has achieved all the main outcomes foreseen in our proposal.

1. The project was successful in establishing a new research and education field centre. The field centre has already become widely known as a source of reference for information about wildlife conservation and management. Government agencies and local stakeholders have drawn on this experience by inviting our team to participate in capacity-building activities. Private funding has established the Kodkod restaurant and visitor centre, and cabins for accommodation of students and visitors. The field centre has become an important attraction for summer tourism, offering healthy food, musical events, meetings and workshops. Nursery schools, students from Chile and abroad, as well as farmers and stakeholders have visited and conducted activities in the centre.

2. We successfully generated new Information on habitat use by endemic mammals and birds, notably logging up over 10,000 camera trap survey nights in the course of our research to evaluate spatial-temporal changes in fauna abundance. Seasonal mist nest work also sparked off an initiative for long-term monitoring of migratory and resident birds of the temperate rainforest in two sites (Pichares field station and Kawellu-co private reserve). Information is published in conference presentations and technical reports, as well as on our web site.

3. The project provided high-quality educational opportunities in conservation science for a total of 43 post-graduate and undergraduate students.

4. We successfully implemented a wide-ranging programme of capacity building workshops for local campesinos (100 families), landowners (25) and schoolchildren (200).

5. The public consultation and proposal development process for the Araucarias UNESCO Biosphere Reserve was successfully completed. The proposal has been recently approved by regional authorities, ready for submission to UNESCO.

In its impact, the project reached beyond what was proposed. The Darwin Initiative enabled us to leverage extra funding from a Chilean government Environmental Protection fund for three years in succession and 2 graduate scholarships were awarded to Chilean students to continue research work in key species for the next 4 years. Our environmental education programme for kodkod cats won a prize in 2009 for the best project in the portfolio of 2008. That work was also selected as 'Project of the month' by the IUCN cat specialist group. The field centre itself is moving beyond the original concept, to establish itself as one element in the Parque Rural Sustenta, a rural business park for environment and sustainable living. Under the new name of Centro Chilihueque, the field station is now managed by Fauna Australis in close collaboration with the University regional campus. Other elements of the park are the Kodkod restaurant and its organic vegetable gardens, ecotourism guides of the Cani Sanctuary, an interpretative woodland trail, a rare breed survival project, and a children's area.

4.1 Impact: achievement of positive impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

The project foresaw a positive impact on biodiversity conservation through the improvement in habitat connectivity, expanding the existing protected area system, and engagement of local landowners in conservation management.

Habitat connectivity certainly remains one of the key issues affecting the conservation status of Chile's temperate rainforest fauna. Fragmentation of habitats represents a challenge for dispersal at all scales, affecting different species in different ways. The project sought to assess habitat connectivity by researching the ways in which endemic fauna use the fragmented landscapes of woodlands and fields. This is an area that will require a longer time-frame before research becomes incorporated into development planning and through into on-the-ground action to create ecologically-functional connectivity. We have, however, been successful in gaining a new understanding of wildlife behaviour in fragmented forests through our research.

A puma passes one of our camera traps in the night

The camera trap programme used an array of 27 cameras (increasing recently to 36), set out at selected woodland sites throughout the study area. During the course of the project, the monitoring programme notched up 10,300 active camera trap nights/days, representing c. '28 years' of continuous surveillance. This effort returned c. 700 positive photographic detections. These records were augmented by further presence data obtained from direct observation, tracks and scats to create a unique database of the mammalian fauna of these temperate

rainforests.

The results included 60 camera trap records of kod kod cats, and demonstrated that the forest specialist kod kod cat will utilise forest fragments of >10ha. Several of the small fragments surveyed were positive for kod kod. We are currently assessing the factors associated with fragments where kod kod was absent. Pudu was present, but with a very low detection frequency highlighting a likely critical conservation status in the region. An intensive survey of pumas by Oxford DPhil candidate, Tucker Murphey, was able to evaluate the population density of pumas – the first time this has been achieved in the temperate rainforest.

Analysis of these data has demonstrated that almost half of the detected mammalian activity in the study area is represented by introduced alien species – principally, wild boar, feral dogs and livestock. A further Sherman trap study of rodents revealed that 50% of the rodents captured in the forest were of invasive alien species (*Rattus rattus, R. norvegicus, Mus musculus*).

Rhinoderma darwinii,Darwin's frog - endemic and endangered amphibian forest specialist

A separate study to find the current sites where Darwin's frog is still found recorded 20 sites in our area. Most sites were linked to the high ground (>1000m) Araucaria/Nothofagus forest, and represent only a small proportion of the potential habitat available. An evaluation of the factors challenging the Darwin's frog concluded that habitat modification by grazing livestock, and wild boar could be the most important. So far, no positive identifications of Chiitrid fungus infection have been recorded.

This scientific output has and will be reported in journal papers, conference and seminar presentations. It has been used to train wildlife management staff of SAG and to inform the Regional Biodiversity Committee of CONAMA. Our biodiversity knowledge is being incorporated in a catchment-level decision support system for the Tolten river, being developed by PUC Villarrica, Universidad Catolica de Temuco, and many other local partners.

The project has greatly facilitated the establishment of a demonstration centre for sustainable living. The field station and Kodkod restaurant together are now linked by the Parque Rural Sustenta concept, and this is likely to continue to develop over the coming years, with Chilean government support, as a model for sustainable development. Communicating the results of environmental research is one of the fundamental elements of this project.

4.2 Outcomes: achievement of the project purpose and outcomes

Achieving the purpose

The purpose of the project was to establish new public-private partnerships for conservation, with a particular focus on securing habitat connectivity in the Valdivian temperate rainforest region of Chile. This long-term objective has been successfully addressed by the project by initiating a process of generating information and awareness at many levels about the problems facing the temperate rainforest, and the urgent necessity to take action to ameliorate them. Our field station itself is a public-private partnership, in which a commercial company has incorporated environmental research and conservation as part of its business strategy, providing a platform for research and education, and an interesting experience for customers of the Kodkod restaurant and other ecotouristim activities.

Knowledge

The most successful elements of our approach to achieving the project purpose were the establishment of a long-term fauna monitoring programme, the first of its kind in Chile, and the

use of the outcomes of that research for outreach activities to stakeholders. When we started the project, we had virtually no prior empirical information about wildlife in the Andean temperate forest, previous studies having been carried out in the Coastal forests of Chiloe (some with DI funding). After three years, we have established an important raft of data, including over 700 photographic fauna records, unique ultrasound recordings of endemic bats, a GIS compendium of land-cover maps and extensive data on forest birds, forest structure and main threats.

Leopardus guina, the kodkod, endemic wild cat of the temperate rainforest

In general, public knowledge about the endemic rainforest fauna is limited. We used camera trap images and high quality pictures of local wildlife that has proved extremely effective at generating interest. During the summer season 2009, the exhibition was on show at our Kodkod restaurant, where it was a constant topic of comment and conversation. At present the photos are on display at the Catholic University regional campus in Villarrica. We have requests for future installations in a school in Villarrica, in Chiloé at the Senda Darwin conservation research centre, and in the Santiago campus of the Catholic University.

Social Networks

Our research work was carried out for the most part on private land. All installations of camera traps were done by prior arrangement with the land owner or tenant, and we have been careful to devote time to talking to that person, and ensuring that he/she receives feedback from the work, usually in the form of prints of any photos of fauna taken on that land. Attention to detail in all dealings with landowners is an important part of our strategy to achieve positive change. A key point here is to gain respect on the part of the farmer. This may often be slow to come, but with repeat visits, a friendly but formal attitude, and the feedback of results, our field workers have built up a valuable network of committed stakeholders, who are demonstrating an increased interest in “their” fauna and expressing an intention to conserve it.

Physical resources

An interesting outcome of the project has been the creation of the “Chilihueque” conservation field station. This is run by Fauna Australis, and aims to continue long-term studies on key species of the temperate rainforest. The Darwin project has played a fundamental role in levering the necessary funding, training and support for this to happen. One such example is in the training of staff. Our two primary field researchers in Pucon, Nicolas Galvez, and Tomas Ibarra have both been awarded grants from the Chilean government Millenium Awards programme to undertake MSc training in the University of Kent, DICE in 2009/10. Both are planning to return afterwards to full-time jobs in the Chilihueque Centre as researchers.

Money

Grants worth GBP126,000 have been won in the form of 4 student grants (2 Msc from UK, 2 PhD in Chile), and 2 Chilean government projects on wildlife management. This is an important contribution to future economic sustainability, and a direct result of DI. Several sources of continued funding are being explored, including the Chilean Enterprise Agency, CORFO, CONAMA, and the Inter-American Development Bank. US-based NGO, Conservation International is developing a project to establish an Amphibian Conservation Officer based at the Chilihueque Centre to address the urgent needs of *Rhinoderma darwinii* - Darwin’s frog.

4.3 Outputs (and activities)

Output 1. A research and education facility for local biodiversity issues

This facility has been successfully established. A business plan was drawn up in late 2008 by a local company and the site owner, Pensamiento Global, that set out a strategy for developing the 6 hectare site as the "Sustenta Rural Park", an experience in Sustainable Living. The idea of the park is to achieve economic and environmental sustainability of rural businesses by associativity – sharing the costs of higher environmental standards, and attracting more business out of a shared commitment to the environment. The activities so far ongoing at the Sustenta site are: the Kodkod restaurant, which employs local people, and has a visitor centre role, to bring tourists in closer contact with the local environment and the issues affecting its conservation; organic vegetable gardens, a woodland walk, and an adventure playground.

Nico Galvez, Horacio Gilabert, Felipe Hernandez and Cristian Bonacic discuss the kodkod research programme on the terrace of the KodKod restaurant, Summer 2009

One of the activities within the Sustenta Rural Park is the Chilihueque research centre. This is, strictly-speaking, the research and education facility for local biodiversity issues referred to in the log-frame. Now run 100% by Fauna Australis, the Centre is proving extremely popular with students.

The project has participated in 56 outreach events to date, from scientific conferences to public awareness meetings and local, as well as international, publications. The web page for the project: http://www.temperaterainforests.net/ and news blog http://chilihueque.blogspot.com/ have been constantly updated.

Dissemination of wildlife issues through diverse products as well as workshops and talks has created an impact in the community and projects have been recognized internationally, nationally and at a local level.

The Güiña project as a joint project between the CONAMA Fondo Proteccion Ambiental- FPA (Environmental Protection Fund) was awarded the 'Project of the Month' (June 2009) by the Cat specialists group of the IUCN (http://www.catsg.org/catsgportal/project-o-month/20_potm/home/index_en.htm) and won an award from its co-sponsors CONAMA for the best project in its 2008 round at a national level (http://www.conama.cl/ciudadaniaambiental/1312/article-45548.html: rmoreno.9@conama.cl). The prize given to the project is a result of the quality of the work and impact in the community. Also, the Güiña project was selected to represent the FPA projects of the Araucanía Región in a travelling panel expo that will go to all regions of Chile, organized by CONAMA (http://www.conama.cl/portal/1301/article-46252.html; jugalde@conama.cl). In close alliance with the educational department of the Villarrica campus of the Catholic University we conducted educational activities with 100 families of small farmers and approximately 200 elementary school children. The Multi-media CD, for long-term educational purposes, has also been distributed in the schools. Future school teachers from the Villarrica campus participated as monitors and were trained in wildlife ecology. Our work on predation verification and Puma ecology has resulted in requests by the wildlife authorities of the Araucanía to train officials in verification protocols. The experience gained has enabled Fauna Australis and the Centre to obtain a government grant to train wildlife officials

Several outreach materials have been distributed throughout the study area. A multi-media CD with relevant information on biodiversity with an innovative video for children, two public awareness wildlife posters, a brochure on the Güiña cat, brochure of the Centre, and pins with wildlife for children. A portable exhibition of wildlife photography arising from the Darwin project has been created. The show spent the summer season in the Kod kod restaurant in Pichares, and is now on tour, starting with the Villarrica campus of the Pontificia Universidad Catolica de Chile in March 2009.

Output 2. Knowledge on temporal-spatial use of habitats

Survey efforts have proven successful to identify spatio-temporal dynamics of key mammal and avian fauna. We have made conference presentations on endemic bats, bird communities and large mammal ecology, as well as a number of papers submitted or in preparation for peer reviewed journals.

Dr.Cristian Bonacic planning carnivore ecology research with Prof. David Macdonald to the Araucaria forest. Cani Sanctuary. Pucon.

Four theses are completed. In summary, we registered data from 10,300 camera trap nights, 3010 minutes of point counts for birds, 32 nocturnal birds of prey playback points, 600 hours of mist netting for birds, 75 hours of point counts for bats, 90 hours of mist nets for bats, seasonal monitoring of 20 plots for amphibian richness and habitat for 2 years, 1640 trap nights for rodents, 470 trap nights for güiña, 40 trap nights for Puma and 24 transects for vegetation sampling. A public access report and digital maps are ready for the Villarrica-Tolten catchment development centre of the Pontificia Universidad Católica Villarrica campus. The centre is working on a digital platform where the maps will be made available to stakeholders and decision-makers. Collaboration with the Laboratory of Territorial Planning of the Catholic University of Temuco has proven useful for spatial analysis of the data and habitat-species modelling. Conference papers and manuscripts in preparation have focused on habitat requirements and the importance of lowland habitats for wildlife. We have identified wild boar and feral dogs as important threats to wildlife in the area. Sustainable tourism is seen as a potential ally in creating positive messages for conservation, as is the control of rodent vectors of Hanta virus by endemic wildlife.

Output 3. 3-6 Chilean MSc research projects advancing project research objectives

Imperial College MSc student, Vanessa Coldwell combing the Araucaria forests for snow tracks

We have successfully trained postgraduate and undergraduate students during the project, as follows. Four MSc dissertations are complete that have resulted in conference papers, as well as submitted and in-preparation peer reviewed papers.

Rojas, I. (2008) Patrón de variación de la riqueza de especies invasoras en un gradiente de tamaño, degradación y altitud de fragmentos remanentes del bosque precordillerano de la IX región de la Araucanía, Chile.

Vanessa L. Coldwell.(2008). An analysis of Methodologies used to study medium and large mammals in the Valdivian Temperate Rainforest of Central-Southern Chile.

Manuel Ríos.(2008). Centro para la Biodiversidad en el bosque templado: Propuesta Arquitectónica Pichares.

Felipe Hernandez. (2009). “Antecedentes de historia natural y ocupación de Leopardus guigna en un ambiente fragmentado de bosque templado en la zona andina de La Araucanía,Chile (39º15´S, 71º48´O).”

In addition, a book chapter as a result of a PhD thesis in preparation. Still ongoing are: a MSc thesis, two PhD candidates.

A total of 18 post graduate students and 25 undergraduate students received training for a total of 100 weeks.

Output 4. 4. Local capacity building for rangers, campesinos and schoolchildren

Informative workshops proved important to disseminate results of the project as well as addressing sustainability issues linked with wildlife conservation, human benefit and habitat protection. We were able to address both *Campesino* parents and children as an intergenerational strategy. Important private landowners and stakeholders in the area were also informed on issues arising in their land and options for sustainable management.

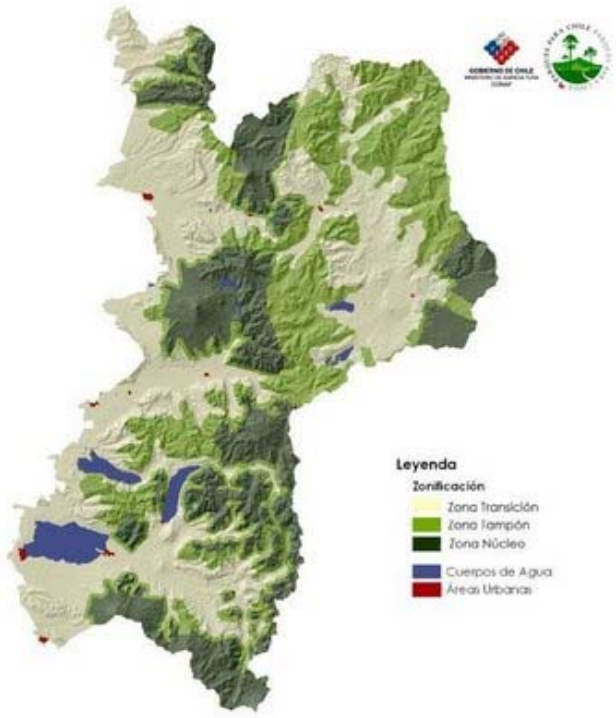
A total of 5 informative workshops with land owners were organized (Kawellucó, Namuncai, and camera trap site land-owners). We discussed conservation issues and presented camera trap and other images of the wildlife found in their woodlands, and discussed conservation threats and opportunities.

Schoolchildren from Relicura School take part in the Ambassadors for the guina programme, Pucon.

Approximately 200 *Campesino* schoolchildren of the 8 rural schools of our study area participated in wildlife educational activities during 2008 (see Güiña map). We emphazised the ecological role of several species, highlighting in particular the kodkod cat and habitat protection. The head of the Municipal educational department commended the appropriateness of the activities and the positive feedback that he received (ezerene@municipalidadpucon.cl).

Informative workshops were held with approximately 100 *Campesino* families in five parishes in the study area. We evaluated knowledge on carnivores and ecology, in particular the kod kod cat. The workshops emphasized the role of the kodkod as a rodent predator, and its contribution to the control of *Oligoryzomys longicaudatus*, an important reservoir host of the deadly Hantavirus pulmonary syndrome. Thus, this approach was quite effective to inspire farmers to avoid killing the kodkod and to protect the species and to conserve its habitat. We also described proper construction of chicken coups to lessen probabilities of attacks. The head of the rural development agency (PRODESAL), commended the appropriateness of the activity and the positive feedback that he received (prodesal@municipalidadpucon.cl).

Output 5. Participatory consultative process for UNESCO Biosphere Reserve



Zoning in the proposed Araucarias Biosphere Reserve, undertaken by Parques para Chile

During 2007-2008 Parques para Chile became 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 jointly prepared a document which describes the social, biological, physical and economic attributes of the area proposed for extension. This document is 500 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. The Araucarias Biosphere Reserve proposes zoning over a total area of 1,142,850 ha to create a nucleus zone of 271,624ha, a buffer zone of 372,949ha, and a transition zone of 498,277ha.

Between August 2008 and August 2009 the expedient was subject to approval by the regional government. This was ultimately successful, and it is now being presented to UNESCO/MAB for their approval. The CONAF official responsible, P.Araya, informs us that this is expected in September 2009, once some relevant documents are signed. Progress is reported on the blog: http://rbaraucarias.blogspot.com/.

Output 6. Project management

Regular meetings between the lead organisation and host country partners have been held.

Throughout the project we have held various meetings between project partners: This is a summary: A plenary coordination meeting took place in Pucon, in July 2006. Bi-monthly meetings have been held between Chilean partners and Macaulay to review progress and plan activities. Formal Management meetings between Macaulay institute and Fauna Australis 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). During 2008-2009 we have had regular meetings held in July 2008 (San José de Maipo), Nov 2008 (Pucón), Feb 2009 (Pucón), April 2009 (Pucón), July 2009 (Santiago). Less formal contact was maintained by phone, Skype and email between all partners throughout the project.

Six-month and annual reports have been presented to schedule. Responses to reviewers have been included in annual and half year reports. Regular reports on progress have been distributed for internal management purposes.

4.4 Project standard measures and publications

Standard measures and publications are detailed in Annexes 4 and 5. The projected managed a total of 610 standard measures and 29 published works. Here is a detailed account for each.

Training Measures

1a Three PhD theses are in progress: Tucker Murphy (Oxford, UK), Tomás Altamirano (PUC, Chile), Nicolás Guarda (PUC, Chile).

2 Four Masters qualifications were obtained: Vanessa Coldwell (Imperial College, UK), Isabel Rojas (Forestry Engineer-PUC, Chile), Manuel Ríos (U. Central-Architecture, Chile), Felipe Hernández (PUC, Chile)

3 Felipe Hernández and Nicolás Gálvez attended a Radio Telemetry course provided by the US Fish and Wildlife Service and the University of Los Lagos.

4a 25 undergraduate students received training. Robert Petitpas, Gonzalo Ossa, Thomas Kramer, Tomás Altamirano, Nicolás Guarda, Anais Boutin, Claire Thomson and first Cambridge group 2006 (3) and second Cambridge group 2007 (15).

4b 50 training weeks for undergraduate students.

4c 18 postgraduate students received training: Tomás Ibarra (PUC), Robert Petitpas (PUC), André Rubio (PUC), Tomás Altamirano (PUC), 2006 MSc Conservation and Wildlife Management graduate course winter expedition-PUC, 2008 MSc Conservation and Wildlife Management graduate course winter expedition-PUC.

4d 50 training weeks for postgraduate students. This Includes students in measures 1-3.

5 Field officer Nicolás Gálvez deepened his knowledge of field ecology, habitat and large mammal survey and analysis.

6a 32 people received other forms of short education: Education students from the Villarrica campus of the Pontificia Universidad Católica in wildlife ecology, Local Ecotourism Guides in wildlife ecology, Park Rangers in Wildlife survey techniques.

6b This training summed 3 weeks in total.

7 We designed and printed 6 types of training materials: Puma leaflet, FPA 08-09 Posters, FPA 2008 brochure, FPA 2008 Teaching guide, FPA 2008 CD multi-media.

Research Measures

8 4 UK project staff spent 6 weeks on project work in Chile: Alison Hester 4, Alessandro Gimona 1, D.W. Macdonald 1. J.Laker based on-site in Pucon.

9 The Biosphere Reserve expedient was signed by regional authorities and will be presented to UNESCO by September 2009.

11a A paper on the invasive mink was published in Oryx.

11b 10 papers are being prepared to be submitted in peer reviewed journals, on birds, bats, vegetation, Darwin´s Frog, Large Mammals and Kodkod cat.

Dissemination Measures

14a 18 conferences/seminars/workshops were organised to present/disseminate findings from Darwin project work: Darwin projects Chile 2006, SAG seminar Santiago 2007, Predation verification workshop Araucanía, 2008 Fauna Australis Conference on Raptor conservation and Medicine, 2008; First Darwin frog conference (cohosted by Fauna Australis), CONAF Reserve workshop, CONAF workshop, Seminar to close Güiña project FPA 2008, Seminar Güiña CD and FPA 20095 Small farmers committees. Namuncai community talks(2), Kawellucó community talk (2), Photo Expo talk in kodkod restaurant, Namuncahue committee workshop, FPA 2009 talk to Education students-PUC of wildlife ecology.

14b	18 conferences/seminars/ workshops were attended at which findings from Darwin project work was presented: Bi-National Ecology Conference La Serena, Forestry Science Congress Talca, Ecology Conference Pucón Ornithological Congress El Tabo, International Mammalogical congress Mendoza Felid ecology and conservation Oxford, U.K. Symposium Faculty Agriculture and Forestry-PUC Amphibian symposium, Carnivores-PUC, Seminar on Güiña conservation Intendencia P.N. Lanin, Junin Argentina Sustainable Tourism workshop Camina Biodiversity Commision for the Araucanía workshop (COB), first environmental "Pastoral" in Villarrica, October 2008, FPA 2008 meeting, Darwin 7th annual Darwin lecture, Wildlife Trust Alliance annual meeting. Bat symposium, Ecuador. New techniques for animal welfare research in wildlife species (Organised by The Central Laboratory Services, York, 2007).	
15a	Number of national press releases or publicity articles in host country(s):	2
	Magazine Visión Universitaria, FPA prize.	
15b	Number of local press releases or publicity articles in host country(s)	5
	Weekend, Travesía magazine, Diario Austral, Correo del Lago.	
15c	Number of national press releases or publicity articles in UK	2
	Darwin newsletter, IUCN project of the month.	
15d	Number of local press releases or publicity articles in UK	0
16a	Number of issues of newsletters produced in the host country(s)	3
	Darwin Newsletter Nº8 March 2007. “Biodiversity conservation in Chile´s Temperate Rainforest Ecoregion” GÜIÑA Project of the Month IUCN Cat Specialists Group and Wild Felid Monitor Newsletter.	
16b	Estimated circulation of each newsletter in the host country(s) Darwin Newsletter and project of the month IUCN available on internet- wide circulation of newsletter.	
16c	Estimated circulation of each newsletter in the UK Darwin Newsletter and project of the month IUCN available on internet- wide circulation of newsletter.	
18c	Number of local TV programme/features in host country	1
	Pucón TV FPA Güiña.	
19c	Number of local radio interviews/features in host country (s)	9
	Radio Puelche Pucón, 2 interviews and 1 participation as a talk show panel. Montecarlo; Rítmica; Pianísima; Parque Nacional; Estación de Pucón; Puelche.	
19d	Number of local radio interviews/features in the UK	0
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	£10,000
21	Number of permanent educational/training/research facilities or organisations established	1
	Centro Chilihueque.	
22	Number of permanent field plots established	40
	Includes Puma, Güiña, Frog, Bird.	
23	Value of additional resources raised for project	£119,420
Other Measures used by the project not currently included in DI standard measures		
Book Chapter	Book: Murphy T. and D.W. Macdonald. 2009. See list of publications.	1
Photo Expo	Photo expo of Temperate Rainforest Wildlife that has been shown in Pucón and Villarrica. It will travel to Chiloé and Santiago.	1
Web page	Project web page and news blog	1
http://www.temperaterainforests.net/		

http://chilihueque.blogspot.com/	
Schoolchildren and families that participated in environmental education	300

4.5 Technical and Scientific achievements and co-operation

The project established a framework for technical and scientific cooperation between two research-orientated UK institutions, the Macaulay Institute and the Wildlife Conservation Research Unit of Oxford University, together with the Wildlife Research laboratory Fauna Australis, of the Pontificial Catholic University of Chile. The main outcome of this cooperation was the.establishment of a unique long-term fauna monitoring programme. When we started the project, we had virtually no prior empirical information about wildlife in the Andean temperate forest, previous studies having been carried out in the Coastal forests of Chiloe (some with DI funding). After three years, we have established an important raft of data, including over 700 photographic fauna records, unique ultrasound recordings of endemic bats, a GIS compendium of land-cover maps and other resources.

The research effort can be divided into several specialisations:

Wildlife monitoring

Staff involved: Cristian Bonacic, Nicolas Galvez, Jerry Laker, Alison Hester, Pia Bustos

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 to observe 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.

The camera traps have demonstrated so far the presence of 8 species of large mammals in continuous forest as well as remnant forest fragments. The native species captured by the cameras so far are: Puma (Puma concolor), Kodkod (*Leopardus guigna*), Pudú (*Pudu pudu*), Chingue (*Conepatus chinga*), Culpeo fox (*Lycalopex culpeus*), and Grey fox (*Lycalopex griseus*). Two exotic species were recorded, these being Wild boar (Sus scrofa) and the European Hare (Lepus capensis). Also, feral dogs have been recorded at all the sites, which, along with the wild boar, are suspected to represent a significant threat to wildlife conservation in the area. Domestic cows were also recorded at several sites, giving important insights into the use of these forest areas by local farmers. These results have been used, together with existing literature and expert advice, for the development of a new long term monitoring scheme to analyze the importance of lowland forest habitat for large mammals in the Namuncahue biological corridor and other forested areas outside protected areas of the IX region.

To date, this monitoring scheme involved sampling during two winters and two summers at the same sites. All cameras were set up within the 400-800 masl altitude range. We considered that below this range human activities dominate the landscape and above this range, environmental conditions during winter pose important environmental stress for wildlife populations, so this is likely to be a zone of wild fauna activity. All sites were south facing slopes of lowland temperate rain forest, specifically, mixed Evergreen with deciduous forest habitat. During winter 2007 we sampled the same sites as summer and added two 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 set up to be complementary to camera results.

Starting summer 2008, we expanded our work to include small forest fragments in the agricultural matrix. A total of 21 landowners were contacted and permits received to work on their land. We set up 27 camera sites, 2km apart. Nine sites in each habitat type: Continuous forest, Large fragments (>100há), Small fragments (<20há).

All camera sites had scent stations for lure with a small roof for protection. Complementary information was taken with track plates. The sites were maintained all year round to analyze

temporal variations in occupancy and this will be used as a proposal for a long term monitoring scheme for large mammals.

Further studies aimed to deepen our understanding of the conflict and its potential resolution between livestock farmers and puma, kod-kod cat ecology, the feral dog issue and a more objective evaluation of wild boar impacts in this ecosystem.

Living with carnivores

Staff Involved: David Macdonald, Tucker Murphy, Nicolas Galvez, Anais Boutin

Conflict between pumas (Puma concolor) and livestock owners in Chile promotes the hunting of this species which is considered vulnerable to extinction (and protected by the Chilean Government). This 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 roles of livestock owners' perceptions and management practices also receive little scrutiny. Our goal was/is two-fold: to understand livestock owners' perception of pumas and to develop an effective method of monitoring puma predation on livestock in the Araucanía region of Chile. The purpose of such a system was to verify puma predation and to construct a comprehensive database on puma-human conflict. This database has identified depredation hotspots as well as seasonal trends and differences in habitat or livestock practice that lead to increased conflict. For example, it is now clear that puma use linear woodland features to travel between high ground and low ground, particularly the steep river valleys (*quebradas*). Ultimately, our study aims to determine a culturally relevant and economically feasible manner to reduce the conflict between humans and pumas. The issue has local importance, though it is also of widespread relevance for puma conservation and habitat protection in the rest of Chile.

Habitat assessment

Staff involved: Isabel Rojas, Alison Hester, Robert Petipas, Alessandro Gimona, Claudia Rios

Woodland fragmentation is an increasing problem for biodiversity conservation, in particular for the increasing border effects, and isolation of remaining habitat patches. This study sets out 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 key to analyze 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 (< 22 ha) and 6 small fragments(> 100 ha) in the same geographical area. At each site, survey consisted of two 140m long transect with 5x5m plots every 20 m (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.

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.

Ecology of puma and Kodkod

Staff involved: Felipe Hernandez, Jerry Laker, Nicolas Galvez, Vanessa Coldwell, Omar Ohrens, Nicolas Guarda, Cristian Bonacic

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 indicates an urgent need to assess the present status. Populations are highly fragmented as well as knowledge. Research efforts have previously 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.

Bird Community Studies

Staff involved: Tomas Ibarra, Tomas Altamirano, Nicolas Gálvez, Omar Ohrens, Isabel Rojas, Robert Petitpas, Alessandro Gimona

Field studies are being carried out to determine how the different native forest habitats are used by bird communities throughout the year. Specifically, this focuses on three research issues:

1. Does forest bird assemblage richness, composition, relative abundance and diversity vary through the year?

2. Does forest bird assemblage richness, composition, relative abundance and diversity vary in an altitudinal and vegetational gradient?

3. Does forest structure explain differences in bird assemblage diversity between pristine old growth and disturbed forests?

Bird community sampling

The study is being carried out in two areas: Huerquehue national park as the old growth forest and the private reserve “El Cañi” as the secondary forest site.

In the two areas, 15 census sites have been established in the three habitat types distributed along an altitudinal gradient (Fig. 1). Five Point counts will be established in each habitat type. The point counts sites will be separated by at least 150m horizontally between each other and 200m vertically.

In each area, 6 (2 for each habitat type) of the point counts sites will be complemented using mist nets for 6 hours per day starting at sunrise (Whitman 2004).

Characterization of habitat structure

At each site, we will use compositional and structural elements or properties of forests that could be important for bird habitat. These are: availability of large trees (larger than 60cm DBH), dense understory, fallen logs and tree density. We will quantify the abundance of these elements to empirically assess their importance for birds.

Data collected

Species richness, Species composition, Species relative abundance, Diversity, Morphometric measures of birds captured with mist nests and band code for each bird, Site where it was observed (air, ground, or tree), Habitat quantitative features (compositional and structural)

Studies on endemic bats

Staff involved: Gonzalo Ossa, Jerry Laker, Tomas Ibarra, Felipe Hernandez, Cristian Bonacic

This study was set up to detect and analyze the ultrasound calls emitted by M. chiloensis in southern Chile, and to describe the importance of these studies to extend the knowledge about bat ecology.Recordings were obtained from male bats, caught in January 2009 using mist nets near Pucón city (39º15'S 71º00'W), Araucanía Region, Chile.Mist nets were installed for 5 days at 2m from the shelter where a colony of male bats was living.

Echolocation calls were recorded from released bats using the Pettersson D240x ultrasound detector in 10X time expansion mode, connected to an Edirol R-09 digital recorder. Recordings have been analyzed with the Avisoft SASLab Pro 4.51 software, using 22,050 sampling frequency, FFT length 256, Hamming window and Overlap of 75%, following the method published by Barboza et al, 2006.

RESULTS:

22 echolocation calls of captured and released individuals and 75 calls of individuals flying near the shelter were recorded. The calls of 12 captured and released individuals have been analyzed. The search phase pulse analysis showed that the characteristic terminal frequency for this species is 20.8 ± 0.6 kHz, with a duration of 5.3 ± 2.5 ms and a pulse interval of 149.9 ± 24.1 ms (Fig 2). The call type is FM – QCF, where pulses start with a large narrowband, and then continue with a small frequency variation between the onset and the end of the component.2,11

DISCUSSION:

This call type is distinctive for the Vespertilionid family and for edge space aerial foragers11, like M.chiloensis. The first FM component is well suited for accurate target localization. The second QCF component is well suited to detect weak echoes from small insects. This is the first time that M. chiloensis calls have been published, and this work opens up opportunities for future studies to better understand the foraging behaviour and habitat use by this species.

4.6 Capacity building

The capacity of host county partners has been increased for further biodiversity work as a result of the project. At the start of this project, there was limited local capacity to undertake research in the Andean section of the temperate rainforest. Pioneering work, some of it carried out within the framework of an earlier DI project, had been undertaken on Chiloe island and in the coastal hills around Valdivia in the Chilean X Region. Our project succeeded in opening up an entirely new capacity to address important biodiversity issues in the Andean cordillera, using a novel, and potentially replicable, public-private model.

Our field station is well-established now, and our next phase is to align our activities with the Regional enterprise agency such that the site evolves as a demonstration project for good practice for the environment and sustainable development. Future studies at the Chilihueque Field Station can now draw on at least 28 monitor-years of camera trap data, plus mist net records for birds and bats, point counts of birds, Sherman trap rodent records, tracks and sign transects, as well as an extensive collection of remote sensed data and derived land-cover overlays.

This environmental data is being integrated into a Catchment management project for the Tolten river system being developed by the Catholic University in Temuco, and PUC Villarrica, as a biodiversity component to accompany demographic, ethnic and economic indicators.

We have successfully trained postgraduate and undergraduate students during the project. Four MSc dissertations are complete that have resulted in conference papers, as well as submitted and in preparation peer reviewed papers. Also, a book chapter as a result of a PhD thesis in preparation. Ongoing is a MSc thesis, and two PhDs. Future plans include an EU Marie Curie scholarship, currently undergoing evaluation.

18 post graduate students and 25 undergraduate students received training for a total of 100 weeks.

A total of 4 Master students completed their studies during the project. One from the UK and 3 from Chile. A 5th project is advancing to study landscape change in our study area, conducted by Robert Petitpas (Forestry Engineer).

Tucker Murphy has completed field work for a Puma density study as part of the biological aspect of his PhD thesis dissertation. His work should be complete by 2009. Two PhD students with Chilean government scholarships (CONICYT) will continue work for the next 3 years.

Financing for the continued development of our research station is secure in the short-term, and looks promising for the medium to long-term. The need to develop sustainable models for development that take into account wildlife and habitat conservation, as well as energy efficiency and sustainable living, appears to be recognised by regional government. Our Sustenta Rural Park concept, that should pioneer new standards in sustainable tourism, ecotourism, and sustainable rural development has received preliminary positive feedback from the enterprise agency, and we hope will receive future financial support from that organisation to help develop the concept.

The Macaulay Institute has had very close contact with the project on a day-to-day basis, by keeping the staff member responsible for project coordination on-site in Pucon almost continuously for the duration of the project. This mechanism helped to ensure that problems were signalled early to the project leader and could be dealt with effectively. The Macaulay Institute was efficient and effective in handling the not-insubstantial administrative burden of the project, including accounting, and overseas payments of expenses and salaries. A factor which may be worth flagging up is the importance of having bilingual capacity in the lead organisation. Much of the day-to-day work of this project was carried out in Spanish, and as lead organisation, the Macaulay built its own capacity to operate in a bilingual setting.

4.7 Sustainability and Legacy

Achievements most likely to endure

The project has successfully established a new research and education field centre. The field centre has already become widely known as a source of reference for information about wildlife conservation and management, even in the short time of this DI. Government agencies and local stakeholders have drawn on this experience by inviting our team to participate in capacity-building activities. Private funding has established the Kodkod restaurant and visitor centre, and cabins for accommodation of students and visitors. The field centre has become an important attraction for summer tourism, offering healthy food, musical events, meetings and workshops. It is already economically stable, and will be developing its role as a demonstration centre over the next year or so with financial support from the Enterprise agency, CORFO.

We successfully generated new Information on habitat use by endemic mammals and birds, notably logging up over 10,000 camera trap survey nights in the course of research to evaluate spatial-temporal changes in fauna abundance. This information is published in conference presentations and technical reports, as well as on our web site. We have secure funding, through the Chilean government agency SAG, and CONICYT studentships, for research work that will draw on and add to this database. The impact of our monitoring programme is set to endure for many years.

We successfully implemented a wide-ranging programme of capacity building workshops for local campesinos (100 families), landowners (25) and schoolchildren (200). This is expected to have a lasting impact, though will need constant reinforcement through future field activities to maintain the momentum.

The public consultation and proposal development process for the Araucarias UNESCO Biosphere Reserve was successfully completed. The proposal has been recently approved by regional authorities, ready for submission to UNESCO. If all the political hurdles are overcome, the Biosphere Reserve will provide a framework for sustainable development for many years to come.

Project staff and resources after the project ends

Most staff will continue work on temperate rainforest conservation issues: 2 staff (N. Galvez, T.Ibarra) are going to the UK for MSc training, hoping to return to develop careers in the Field Station in Pucon. 2 senior staff (C. Bonacic and J. Laker) are continuing to work on the Chilihueque Field Centre project. 2 students have got 4-year PhD grants based on work carried out at the centre.

2 students are still undertaking thesis work.

The Centre will remain open and available to students, as will all the equipment. Camera traps will remain in Chile for use by students. Work planned includes a study of puma ecology, and an evaluation of the use by mammals of wetland habitat of Darwin's frog.

Are partners likely to keep in touch?

Fauna australis remains in close touch with both Macaulay Institute and WildCRU. Future joint projects are being discussed with both organisations. No specific future links with Parques para Chile are currently planned, other than between PPC and Rainforest Concern who continue to work together.

5 Lessons learned, dissemination and communication

The key lessons learned from this project are as follows:

1. The ability of a university department to dedicate students studying diverse biodiversity topics, but linked by sharing the same geographical space, is a powerful tool to generating a multidisciplinary approach. Their enthusiasm and support has been one of the key underlying forces that contributed greatly to the success of this project. To facilitate this, the provision of T&S to support the extra costs to have the students in the field proved to be an extremely cost-effective way of getting the necessary manpower on the ground.

2. In order to achieve an effective ecosystem-level approach to conservation, one needs to maintain sufficient detail at the species level for such studies to have any validity. In practice, to have several students doing species-specific work (kodkod, puma, bats, etc.), proved useful to reach this level of depth but also to share more general data such as habitat structure, from which higher level relationships can be elucidated.

3. An issue which created confusion with one of our partners was the issue of co-financing. The need to present the whole project as one, with financing from different sources, means that it is not always clear from project documents which outputs have Darwin funding, and which do not. A lesson leaned is that the source of funding for each output ought to be formally agreed with each partner at the outset, and put in writing.

4. We found that the project management moved on much more simply and smoothly when the host country partnership was reduced to 1 partner. We could work more closely with more stakeholders on the execution of the project, and spend less time on project management issues.

The information relating to project achievements has been disseminated and applied to a wide range of target audiences, including scientific meetings, technical meetings, campesinos, landowners and rural schoolchildren. The following publications have been presented to disseminate the results to a scientific audience:

Publications

1. Ibarra, J.T., N. Gálvez, O. Ohrens, I. Rojas, J. Laker & C. Bonacic. 2008. Monitoring temporal bird-habitat relations in primary and antropic forests of the Araucania Region, Chile. Boletín Chileno de Ornitología 14: 44.
2. Ibarra, J.T., N. Gálvez, I. Rojas & C. Bonacic. 2008. Relative abundances and habitat use of the Austral-Pigmy Owl (Glaucidium nanum) and the Rufous-legged Owl (Strix rufipes) in Primary and Antropic forests in the Araucania, Chile. Boletín Chileno de Ornitología 14: 76.

3. Rojas I., N. Gálvez, R. Petitpas, P. Becerra, J.T. Ibarra, & C. Bonacic. Relación entre fragmentación y degradación antrópica y la composición florística y estructura del Bosque precordillerano (39ºLS;72ºLO) de la Región de la Araucanía. National Forestry Congress.

4. Bonacic C., N. Gálvez, F. Amar, J. Laker, T. Murphy and D.W. Macdonald. Pumas and Livestock Farming: a multi-level approach to conflict resolution in 3 eco-regions of Chile. Felid Biology and Conservation Conference. 17-21 Sept.

5. Gálvez, N., J. Laker, C. Bonacic and D. W. Macdonald. 2007. Habitat use of large mammals in peripheral areas of protected areas in the Araucanía. III Bi-National meeting of the Ecological societies of Chile and Argentina. 30 Sept-4 Oct.

6. Bonacic, C. Laker, J., Gálvez, N. and Murphy, T. Variación estacional de ataques a Ganado doméstico comparado con presencia de PUMA CONCOLOR EN UN FRAGMENTO DE BOSQUE NATIVO EN LA PRECORDILLERA DE LA ARAUCANÍA. XV Reunion Annual Sociedad Ecología de Chile. Biological Research 41 (suplemento A).

7. Gálvez, N., Hernández, F., Coldwell V., Laker, J. and Bonacic, C. 2008. Occupancy and activity patterns of Leopardus guigna in pre- Andean areas of the Araucanía, using camera traps. XV Reunion Annual Sociedad Ecología de Chile. Biological Research 41 (suplemento A).

8. Laker, J. Gálvez, N., Bonacic and Coldwell.V. 2008. Observations on the presence of exotic mammals in native woodlands of the precordillera of the IX Region. XV Reunion Annual Sociedad Ecología de Chile. Biological Research 41 (suplemento A).

9. Gálvez, N., Hernández, F, Petitpas, R., Laker, J., Gilabert, H., Miranda , M , Gimona A., Hester, A., and Bonacic, C. 2009. ESTIMATING OCCUPANCY OF Leopardus guigna FROM CAMERA TRAP DATA IN THE ARAUCANÍA OF SOUTHERN CHILE. Accepted: 10th International Mammological congress, Mendoza Argentina August 2009.

10. Hernández, F., Gálvez, N., Laker, J. and Bonacic, C. 2009. ACTIVITY PATTERNS AND PHENOTYPICAL TRAITS OF Leopardus guigna IN THE ARAUCANÍA DISTRICT OF SOUTHERN CHILE. Accepted: 10th International Mammological congress, Mendoza Argentina August 2009.

11. Ossa G., Laker, J., Gálvez, N., Ibarra, J.T., Hernández, F., Bonacic, C. 2009. Preliminary acoustic analysis of Myotis chiloensis, Vespertilionidae, an endemic Bat of southern temperate rainforest Accepted: 10th International Mammological congress, Mendoza Argentina August 2009.

12. Kathrin Barboza , José Carlos Perez-Zubieta, Elisabeth Kalko, Luis F. Aguirre & Gonzalo Ossa. 2009. LA IMPORTANCIA DEL MONITOREO ACÚSTICO EN EL ESTUDIO DE COMUNIDADES DE MURCIÉLAGOS. Importance of the acoustic survey in community studies of bats. First Symposium on research and conservation of Bats. Ecuador. May.

13. Murphy, T., Laker, J., Galvez, N., and Bonacic, C. 2009. INVESTIGATING THE LANDSCAPE OF TOLERANCE FOR PUMAS (PUMA CONCOLOR) IN THE ARAUCANÍA LAKE DISTRICT OF CHILE. Accepted: 10th International Mammological congress, Mendoza Argentina August 2009.

14. Murphy T. and D.W. Macdonald. 2009. Pumas and people: lessons in the landscape of tolerance from a widely distributed felid. The Biology and Conservation of Wild Felids. Ed. David Macodnald and Andrew Loveridge. Oxford: Oxford University Press. (In press).

15. I. Rojas. 2009. Patrón de variación de la riqueza de especies invasoras en un gradiente de tamaño, degradación y altitud de fragmentos remanentes del bosque precordillerano de la IX región de la Araucanía, Chile. Forestry Engineer Thesis. Faculty of Agriculture and Forestry, Pontificia Universidad Católica de Chile

16. Vanessa L. Coldwell. 2008. An analysis of Methodologies used to study medium and large mammals in the Valdivian Temperate Rainforest of Central-Southern Chile MSc Thesis Imperial College. Contact: nessi_e.co_ldwell@yahoo.co.uk.

17. Ibarra, J.T, T. Altamirano, N. Gálvez, I. Rojas & C. Bonacic. (Submitted). Avifauna in Araucaria araucana temperate forests of southern Chile. Ecología Austral.

Publications in preparation

18. Gonzalo O, J Laker, N Galvez, J T. Ibarra & C Bonacic. (in prep) First Acoustic analysis of Myotis chiloensis (Waterhouse, 1838), Chiropetra, Vespertilionidae: an endémic bat of the Temperate Rainforest of South América.

19. Rojas, I; Becerra, P; Bonacic, C, Hester, A. (In prep). Patterns of native and exotic species richness along an elevational gradient of fragmentation and degradation of a pre-Andean temperate forest in Chile.

20. C Bonacic., A Charrier., N Gálvez, J Laker, J Ibarra., I. Rojas and A Aguirre (in prep). Chytrid survey and microhabitat features for Rhinoderma darwinii in Chilean temperate rainforest. Eco-Health.

21. Ibarra, J.T, T. Altamirano, N. Gálvez, I. Rojas & C. Bonacic. (In prep). Rufous-legged owl (Strix rufipes) and austral pigmy owl (Glaucidium nanum) abundances in a gradient of disrupted and old growth temperate rainforests of southern chile.

22. Ibarra, J.T, T. Altamirano, N. Gálvez, I. Rojas & C. Bonacic. (In prep). Forest structure and bird diversity in a human-altitudinal gradient in the temperate rainforests of Southern Chile.

23. Gálvez, N., Hernández, F, Petitpas, R., Laker, J., Gilabert, H., Miranda , M , Gimona A., Hester, A., and Bonacic, C. (In prep). Activity patterns and phenotypic traits of the Kodkod cat (Leopardus guigna) in a fragmented landscape of the Araucanía district of southern Chile. (39º15´S, 71º48´O)..

24. Gálvez, N., Hernández, F, Petitpas, R., Laker, J., Gilabert, H., Miranda , M , Gimona A., Hester, A., and Bonacic, C. (In prep). Estimation of Occupancy of the kodkod cat (Leopardus guigna) in a fragmented landscape of the Araucanía district of southern Chile. (39º15´S, 71º48´O)..

25. Hernández, F, Gálvez, N., De la Maza, F., Benavides S.P., and Bonacic, C. (In prep). Knowledge, perception and attitudes towards the kodkod cat L. guigna in rural communities of the Araucanía district of southern Chile. (39º15´S, 71º48´O).

26. Gálvez, N., Hernández, F, Petitpas, R., Laker, J., Gilabert, H., Miranda , M , Gimona A., Hester, A., and Bonacic, C. (In prep). Conservation threats to wild mammals in the temperate rainforest of the Araucanía district of southern Chile.

27. Hernández, F (in prep). Antecedentes de historia natural y ocupación de Leopardus guigna en un ambiente fragmentado de bosque templado en la zona andina de La Araucanía, Chile (39º15´S, 71º48´O)". MSc thesis, PUC Chile.

Dissemination activities

We have put considerable effort into dissemination activities with land managers and stakeholders in our study area. In the course of our fieldwork, we have established personal contact with approximately 50 landowners, who have allowed us to carry out long-term wildlife monitoring on their land. This kind of collaboration has been successful not just to have a place to put our camera traps, but also we have seen how being involved in the research has sparked the interest of many of the landowners in the wildlife they have on their farms. We have been careful to feed back information about wildlife during each visit, and have given printouts of photos from the camera traps to the relevant farmers. We held 5 more organised workshops with land owners (Kawellucó, Namuncai, and Camera trap site land-owners), where we discussed conservation issues and presented camera trap and other images of the wildlife found in their woodlands, and discussed conservation threats and opportunities.

Collaborators on the educational CD rom project from PUC Villarrica, CONAMA, SAG, CORFO, Fauna andina, Fauna australis

Approximately 200 Campesino schoolchildren of the 8 rural schools of our study area participated in wildlife educational activities during 2008 (see Güiña map). We emphazised the ecological role of several species, highlighting the kodkod cat and habitat protection. The head of the Municipal educational department commended the appropriateness of the activities and the positive feedback that he received (ezerene@municipalidadpucon.cl).

Informative workshops were held with approximately 100 Campesino families in five parishes in the study area. We evaluated knowledge on carnivores and ecology, in particular the kodkod cat.

The workshops emphasized the role of the kodkod as a rodent predator, and its contribution to the control of Oligoryzomys longicaudatus, an important reservoir host of the deadly Hantavirus pulmonary syndrome. Thus, this approach was quite effective to inspire farmers to avoid killing the kodkod and to protect the species and to conserve its habitat. Also, we described proper construction of chicken coups to lessen probabilities of attacks. The head of the rural development agency (PRODESAL), commended the appropriateness of the activity and the positive feedback that he received (prodesal@municipalidadpucon.cl).

Dissemination will continue and develop after project completion. The size and complexity of the camera-trapping database has in some ways slowed down the preparation of publications. There are several journal articles in preparation related to kodkod cats and pumas that can be expected within 2009. There is also a large amount of information related to non-target species, such as feral dogs and foxes. It is anticipated that these areas will in time be further analysed and form the basis of further publications. All of these future developments will be reflected in our website. Funding secured from other sources, such as SAG (detailed elsewhere in this report) will ensure continued dissemination of our outcomes to policy relevant stakeholders.

5.1 Darwin identity

Effort to publicise the Darwin Initiative

The Darwin Identity itself has proved to be a useful tool for promotion. We have used the logo widely: at the Chilihueque Field Centre, on the doors of 3 vehicles, on all our poster and Powerpoint presentations, a banner, and for our photographic exhibition.

Cast of the multimedia educational video that we made for use as a teaching aid in schools to highlight endemic wildlife conservation issues..

This photo shows the cast of the multimedia educational video that we made for use as a teaching aid in schools. It was taken to a public meeting held at PUC Villarrica for the launch of the programme, and was attended by 80 adults and children. Our photographic exhibition was also on display at that event, accompanied by the Darwin project banner.

The Darwin initiative has also been presented more generally in its role as co-funder for a wider programme of conservation actions. The multimedia video was a case in point, as that activity was co-financed by the CBD focal point, CONAMA. Both organisations were presented, within the wider context of advancing the CBD goals through generating public awareness of biodiversity conservation issues and environmental education.

The DI logo on our jeep has been useful for the fieldwork, as it gives an air of respectability on arrival at a new landowner to ask permission to work on his/her land.

Being able to demonstrate the institutionality of collaborators is important on signposting at the Chilehueque field centre, and web site. The DI logo really helps to support the work, alongside the partner logos (Macaulay Institute, Oxford University, and PUC).

Understanding of Darwin Initiative within in the host country appears to be patchy. Within the scientific community it is widely known, and highly respected. Likewise, CONAMA and the other relevant agencies are conscious of the programme, as there have been several DI projects in Chile apart from this one. Out in the field, we did not initially find anybody with prior knowledge of DI, but we are quite a distance from where other former projects have operated. As may be appreciated from other sections of this report, local awareness of DI is now quite widespread as a result of this project.

6 Monitoring and evaluation

Changes in the project design

In August 2008, our local partner, Parques para Chile officially withdrew from the Darwin project and from the Centre for Biodiversity project in Pucon. This development was not unexpected. A full account of the circumstances was annexed to our Y3 6 month report. With the withdrawal of Parques para Chile, the participation of Rainforest Concern (directly to support PPC work) became irrelevant. Quest Overseas had already suspended their volunteer programme with Parques para Chile, and thus, independently, had already become inactive in the project. This loss of three of our project partners at that advanced point of the project is envisaged to have had a relatively minor impact on our meeting the project objectives – progress was much easier in many areas, and we had (in anticipation) already made contingency plans for other ways to to meet our project commitments which had been linked to

these partners. In particular, these related to the following co-funded activities: the establishment of the Centre for Biodiversity, with its business plan, the development of GIS resources, and the guide to local fauna.

Together with Fauna Australis, we developed alternative approaches to meet each of these objectives:

1: The physical infrastructure of the former Centre for Biodiversity is now overseen by Fauna Australis, and is used as a base for our fieldwork. Fauna Australis had established a collaborative project with other local actors for integrated catchment management in the Villarrica (RiverTolten) area. The project includes multidisciplinary catchment management planning, and local capacity building for conservation. We see this as an effective way to channel the Darwin supported research activities over the coming years into practical conservation action.

2. A business plan outlining an innovative strategy to manage the development of the former Centre for Biodiversity site was sent to DI with our last 6-month report. The plan was developed by a local company, Pensamiento Global Ltda., and envisaged the conservation science field station that we have developed at the centre of a new “rural technology park” – a model for sustainable rural development.

3. GIS resources development is a central activity in the new catchment management project. Fauna Australis is now working with the Catholic University of Temuco, Dept Geography, and the Pontificia Catholic University in Villarrica to develop GIS resources. In particular, a Fauna Australis student has begun his landscape ecology thesis on land use change in the Pucon study area.

4. The planned ‘guide to local fauna’ was changed into a portable photographic exhibition to support outreach activities of the Darwin team. We have made large prints of 50 images from the camera trap work, as well as wildlife and landscape photography from the Pucon area and a didactic guide. Several events have taken place (more are planned) – the workshops with landowners and campesinos, Nov 2008; the Chilean Ecology Society Conference in Pucon, Nov 2008.

Two main Parques para Chile Activities, the Araucarias Biosphere Reserve proposal, and the Namoncahue Biological Corridor Management Plan - The Biosphere Reserve proposal for the Araucarias Biosphere Reserve was written prior to withdrawal of PPC from the project (325pp) and pre-approved by the regional government prior to submission to UNESCO at the end of this year (http://rbaraucarias.blogspot.com/).. The Corridor Management Plan will not receive Darwin funding, and will be an activity to be undertaken by agreement between Parques para Chile and rainforest Concern, who finance the Namoncahue Biological Corridor project.

The adjustments to the partnership structure had no impact on the project budget. Tasks receiving support from Darwin have been reallocated to Fauna Australis. The changes necessitated minor adjustment to the log-frame, and the schedule of output delivery – with this, the project successfully achieved its objectives within the remaining time available.

6.1 Actions taken in response to annual report reviews

All issues raised in the annual reviews were comprehensively addressed. The review document was circulated to project partners, and fully discussed. The following responses were made in response to the review of April 2008: The general points raised in our year 2 review were:

- the formal position of Quest in the project and whether they should be removed as project partners (section 3);
  • the implications to project outputs of the non-achievement of the milestones mentioned in section 4.1;
  • the value of radio and GPS tracking (section 4.1);
  • the sustainability of the Biodiversity Centre and the monitoring programme (section 6);
  • clarification is requested on the status of the weekend courses on local environmental issues, and the courses for Fauna Australis postgraduates (section 4.1).

- clarify in what way project inputs are contributing to Biosphere Reserve proposal work (section 4.2).

Also, examples of training and extension materials and feedback from trainees, participants at local awareness meetings and local schools (section 4.1) are annexed to this report.

1. **The formal position of Quest in the project and whether they should be removed as project partners.**

Quest Overseas had a commercial relationship with Parques para Chile to send expeditions of volunteers to Chile. Apparently Quest had their own issues with that organisation which prevented the successful organisation of regular expeditions following the first of these in 2005. With the retiral of Parques para Chile in August this year, no further role was available for Quest. They have now retired from the project

2. **The implications to project outputs of the non-achievement of the milestones mentioned in section 4.1;**

A business plan outlining an innovative strategy to manage the development of the former Centre for Biodiversity site has been prepared and is annexed to this report. This plan has been developed by local company, Pensamiento Global Ltda., and envisages the conservation science field station that we have developed at the centre of a new "rural technology park" – a model for sustainable rural development.

The guide to local fauna has been changed into a portable photographic exhibition to support outreach activities of the Darwin team. We have made large prints of 50 images from the camera trap work, as well as wildlife and landscape photography from the Pucon area, plus a didactic guide.

As detailed in this report, the other concerns about research projects and community meetings have been addressed and corrected. The draft of the Biosphere Reserve proposal can be found on the blog (http://rbaraucarias.blogspot.com).

We are currently exploring the potential to start up new volunteer activities now that we are not obliged to do this through Parques para Chile. These new activities are being developed with Working Abroad, who sent two volunteers on a successful visit last year.

3. **The value of radio and GPS tracking (section 4.1).**

Radio and GPS tracking is proving a challenge in this environment, both in terms of the difficulty to trap carnivores, and the limitations of the extreme terrain. However, it is increasingly clear that the issues we are addressing in predator-community interactions require a more direct observation of predator behaviour than can be achieved using any of the other field techniques available (camera traps, tracks and signs, direct observation). In order to address the concerns expressed in our mid-term review about progress with the GPS study on pumas, we designed and commissioned our own puma trap. The trap is fully dismountable, collapsing into 6 sections that fit easily in the back of a pick up. Each can be carried by one person. The trap is equipped with a trap monitor transmitter: (Telonics TBT-60 - www.telonics.com/products/vhfSpecial/trapsite.php), so the status of the trap, set, or sprung, can be assessed from approx 10km. This will greatly reduce the amount of time necessary for monitoring, increasing the number of effective trapping days. The design for the Puma trap includes various benefits and upgrades from the Trap used by the wildlife authorities (SAG). The trap is set up and on site where we have recorded regular puma presence. Still we wait to catch a puma…

4. **The sustainability of the Biodiversity Centre and the monitoring programme**

Now that development of the previous Centre for Biodiversity (now named Chilihueque) is being jointly run by Fauna Australis and Pensamiento Global, our new plans put us in a strong position to secure the sustainability of the Centre and the monitoring programme. Essentially, we are creating a "Rural Park", in which Fauna Australis houses its field station, working independently alongside other commercial activities, such as the restaurant, a hostel and manufacturer of beverages based on endemic plants. The rural development element of the park is the site management agency that will have the role of organising events and activities

that will realise the synergies between the different companies involved. It is envisaged to seek Chilean government support for projects on renewable energy and energy efficient construction, local development, and conservation. Commercial activities foreseen include courses on environment and wildlife, permaculture and sustainable development.

5. The status of the weekend courses on local environmental issues, and the courses for Fauna Australis postgraduates:

Fauna Australis undertook 2 field courses in rainforest ecology with groups of students. The courses addressed local conservation issues affecting the temperate rainforest and demonstrated wildlife survey techniques.

Three meetings were held with small farmers (approx 30 people attended each meeting) in parishes within the study area to share information on predator abundance, impact mitigation, and benefits. The purpose of the meetings was both to teach these communities about the benefits of protecting carnivores, and also to collect information from these communities about the prevailing attitudes and level of knowledge that these people have.

Our “Ambassadors for the Güiña” environmental education programme set up visits by schoolchildren and local ecotourism guides to Fauna Andina (Wildlife rescue center), and this was followed by school visits to 7 local schools to give information on kodkod conservation.

One point raised by the reviewers referred to our lack of communication with the CBD focal point in Chile. Actually, we have had extensive contact with the relevant authority, both at national and local level. This misunderstanding arose as a result of an ambiguity in the CBD. According to the web site, http://www.cbd.int/doc/lists/nfp-cbd.pdf, the CBD focal point is the Consulate General of Chile in Montreal, Canada (Mr. Patricio Victoriano M.). As stated in the last report, we have had no contact with this gentleman but plenty of contact with the local representatives. Within Chile the CBD is the responsibility of CONAMA, and specifically of Sr Miguel Stutzin. Sr Stuzin is well known to us, and has been kept fully informed about the project. He attended the Darwin workshop we organised in year one. CONAMA runs the “Environmental Protection Fund” (FPA) programme which is cosponsoring Darwin work on kodkod ecology and capacity building. A new proposal for 2009 has passed the round 1 filter, and a round 2 proposal has recently been presented. At a local level, we presented our results to the Biodiversity Committee of CONAMA in the IX Region in August this year.

6**. Clarify in what way project inputs are contributing to Biosphere Reserve proposal work**

At the time of our 2nd year report we were concerned about the capability of our partner, Parques para Chile, to deliver outputs. We came to an agreement with them to pay our part of the development of the Araucarias Biosphere Reserve proposal on delivery of the document. This was not delivered by the time agreed (March 2008), but with agreement of the Darwin Secretariat, this deadline was extended for 3 months. In the end, the document was finished and sent off to the regional government in Temuco for approval. Parques para Chile was paid GBP 10,000 to cover the not-inconsiderable cost of preparing this 500 page document (http://documentos.parquesparachile.cl/expediente_rba.pdf.pdf).

Shortly afterwards, Parques para Chile retired from the project. A detailed account of the circumstances was included in our HR3 report. This change has not affected the creation of the Biosphere Reserve, and the collaboration that the whole partnership has with CONAF, the National Parks authority. It has taken one whole year for the proposal to get political approval, and we are assured by CONAF that presentation to UNESCO/MAB is assured and imminent.

This process of extending protection from inappropriate development and promoting sustainable development principles is long-winded and slow, but continues to go in the right direction. The research team support the general aims of the Reserve. In the mean time, our research is feeding into a smaller-scale programme to assist zoning in the Tolten catchment, run by a local consortium of universities and government agencies.

7 Finance and administration

7.1 Project expenditure

	Budget	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Total*	*Difference*
Staff							
Overhead							
Travel							
Printing							
Conferences							
Capital							
Fieldwork consumables							
Totals							

The smaller budget headings, Printing and Conferences were underspent by £2000 each, while the even smaller heading, Other, which was used for Fieldwork Consumables was underspent by £700. These were all underspent to make up for a small percentage overspend on salaries. The fundamental cause of the overspend was the progressively worsening exchange rate between the pound and the Chilean peso. This fell from $CLP1100/£ when the budget was drawn up to $CLP870/£ in the last weeks of the project. Salaries was our least-flexible item. Overall, the expenditure kept to about 0.5% of the original budget.

Detail of Capital item expenditure

	Total expenditure
Camera trap equipment	
GSM collars	
Bat detector	
Field equipment (binoculars, night scope etc.)	
Replacement monitor	
Weather station	
Telemetry equipment	
Total	

Detail of salaries

	Budget	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Total*
Prof. Alison Hester						
Jerry Laker, MSc.						
Dr. Alessandro Gimona						
Prof. David MacDonald						
Tucker Murphey						
Dr Cristian Bonacic						
N. Galvez/ M. Ibanez						
Pía Bustos MSc Vet.Med.						
Karl Yunis						

7.2 Additional funds or in-kind contributions secured

The expected collaboration between Parques para Chile did not turn out as forseen at the time of the preparation of the budget. Quest did not send any more volunteers, following a difficult experience with the first pioneer group in late 2005. In addition, the level of support reported by Parques para Chile from Rainforest Concern was lower than anticipated. As a result, it was important for the project to raise additional funds from other sources. These are detailed in the table below:

Cofinancing arrangements foreseen and acheived

Private sponsorship:	**Expected**	**Actual**
Rainforest Concern, UK		
Quest Overseas, UK		
Pensamiento Global Ltda., Pucón £ 25,000		
In-kind support from public bodies:		
Local government – Municipalidad de Pucón (Pucón Sustentable)		
CONAF		
Donations to be raised		
Total public in kind support	317,950	95,300
Total contributed from other funding sources		
Volunteers	Actual	
Natan Levy (2 months)		
Kharis Wong (2 months)		
Landmark College, Vermont (16 volunteers x 5 days in January 2007)		
Cambridge University volunteers		
Hendrikus van Hensbergen		
Edouard Hilfiker		
Volunteers from UK Kharis Wong/ Natan Levy		
Volunteer, Veronique Mocellin (Australia)		
Volunteer worker, Anais Boutin 3 months		
Seasonal fieldwork assistants (Chile)		
Subtotal	26920	
Additional investments by partners		
Parques para Chile - Biosphere reserve development "*Araucania lacustre*"		
Fauna Australis support for bird sampling campaign		
Wildlife Trust Alliance (Survey of forest amphibian		
Wildlife Trust Alliance support via Fauna Australis		
Fauna Australis - cofunding for raptors seminar		
Fauna Australis contribution to Darwin Frog research (Isabel Rojas salary)		
Subtotal	21500	
Co-funded research projects won		
Research grant (CONAMA) to support work on Guina		
CONAMA FPA Environmental Environmental education project		
Support from DAAD (Germany) on forest fauna		
Puma research grant (SAG-Fauna Australis)September-December 2007		
Subtotal	48000	

Student grants			
CONICYT - Chilean studentship for Felipe Hernandez			
Imperial College MSc student (Vanessa Coldwell)			
Tucker Murphey WildCRU Dphil student studentship (part)			
CONYCIT PhD studentships Nicolas Guarda, Tomas Altomirano			
Architectural study for Centre for Biodiversity			
	Subtotal	17500	
Contributions in kind			
Collaboration with SAG (Min.Ag) for puma research			
Camera trap equipment for field station (T. Murphey)			
	Subtotal	5500	
Additional funds or in-kind contributions secured			119,420
Total cofunding secured			214,720

7.3 Value of DI funding

The DI funding has been enormously useful for several reasons, primarily:

1. It created stable employment for several research staff in Chile, focused on an important conservation goal that had hitherto been totally neglected.

2. It was an important lever in the winning of several research grants.

3. It provided the team with a full set of camera trap equipment and paid for its field maintenance and running costs. This equipment logged up 10,000 active camera-trap days in the field, during the project, providing data for research, and some excellent photos for outreach. The equipment will remain in Pucon, and will continue to be used for research for the foreseeable future.

4. It paid for the basic T&S costs associated with an intensive fieldwork campaign, supporting the establishment of accommodation facilities at the field station.

5. The DI created financial stability for 3 years which would not otherwise have been possible. It provided co-funding for other project proposals set up to complement the work.

6. The DI enabled logistical support to be maintained far away from university facilities, through funding bus and plane fares, and the running cost of a field vehicle. This would not otherwise have been possible.

Annex 1 Report of progress and achievements against final project logframe for the life of the project

Project summary	Measurable Indicators	Progress and Achievements July 2006 - June 2009	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		The project had a direct relevance to the CBD objectives, particularly in **monitoring and identifying components of biological diversity**. We were successful in our aim to **establish systems of protected areas with guidelines for selection and management.** Our research has highlighted the high level of activity in remnant forests of **invasive alien species**. The project has made a significant contribution to **promote understanding of the importance of measures to conserve biological diversity.**	We plan to continue this work to coordinate, integrate, inform and inspire an ecosystem-based approach to address the biodiversity threats posed by habitat fragmentation and alien species in the Chilean/Argentinian temperate rainforest,.concentrating on four focal species – a wildcat (Kodkod, Leopardus guigna), a deer, (Pudu, Pudu pudu), a bird-of-prey (Rufous-legged owl, Strix rufipes), and an amphibian (Darwin´s Frog, Rhinoderma darwinii) – endangered, endemic, sentinels of ecosystem health.
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 rangers, campesinos and schoolchildren A plan for a UNESCO Biosphere Reserve to catalyse private sector involvement in forest conservation	We were successful in establishing public-private partnerships for conservation. We generated information and awareness at many levels about the problems, in particular habitat connectivity, facing the temperate rainforest, and the urgent necessity to take action to ameliorate them. All measurable indicators have been fulfilled, as detailed below.	(Highlight key actions planned for next period) N/A

Project summary	Measurable Indicators	Progress and Achievements July 2006 - June 2009	Actions required/planned for next period
Output 1. A research and education facility for local biodiversity issues	Facility constructed using co financing from local businesses	Facility is running and following a business plan that entails co-financing from local businesses and government agencies. The 6ha plot is now the Parque Rural Sustenta for rural sustainable development , aiming to demonstrate good practice in sustainable development and wildlife conservation research and education. Through the commercial activity of the Kodkod restaurant and visitor Centre we have had direct contact with at least 2000 people in the community, as visitors, volunteers and workshop participants.	
Activity 1.1 Business plan complete		A business plan was prepared to take over management of former Centre for Biodiversity of Parques para Chile. Local not-for-profit company, Pensamiento global Ltda. Is now responsible for management. The plan envisages a rural business park to facilitate economic sustainability of environmentally orientated activities by associativity. One such activity is the Chilihueque research station of Fauna Australis, the base for research and education on which our capacity-building actions have been focused. It is planned to develop the role of Sustenta further, with support from the Chilean enterprise agency, CORFO.	
Activity 1.2 Field station restaurant opens for summer season 2007		The restaurant was launched twice. First, in 2007, under co-management with PPC. The Cafe del Centro was closed in August 2008. The new restaurant, Kodkod opened for the summer season to the public on 12 January 2009. The restaurant is aimed at bringing tourists in closer contact with the local environment and the issues affecting its conservation. We had a very successful summer with live music 4 nights per week. Our organic vegetable gardens, woodland walk, and adventure playground are a unique part of the Kodkod experience, which looks set to establish itself as an important new tourist destination in the future	
Activity 1.2 Develop field centre for research and education in Pucón		The “Chilihueque” research and education field station of Fauna Australis is active and running for the foreseeable future on co-funding grants for monitoring/research and education (FPA 2009, SAG invasive species project, CONICYT studentships). Two PhD students with Chilean government scholarships (CONICYT) will continue work for the next 3 years. In the past year there have been continuous research activities with students spending over 400 days in the field station. During the project life there have been continuous activities that have been addressed in previous reports.	
Activity 1.4 Workshop with CONAF Park Rangers		During April 28-29 of 2008, twelve park rangers from the main protected areas of the region learned about conservation issues and wildlife survey techniques in the temperate rainforest. Evaluations from the workshop are attached and an e-mail from supervisor for flora and fauna of CONAF regarding the success of the workshop for their personnel (marcelo.saavedra@conaf.cl).	
Activity 1.5, Volunteer programme		During the 3 years of the project we have had over 30 volunteers that have worked in various aspects involving wildlife research to practical organic farming work. The Pichares site is ideal for long-term work with volunteers in research and sustainable living.	
Activity 1.6 WildCRU and MLURI scientists supervision of Chilean MSc students		There has been a continuity of supervision by senior scientists of the project. Visits were made by Alison Hester (several visits), Jerry Laker (on site)and Alsessandro Gimona (Macaulay) (Jul 06), David MacDonald (Nov 06) and Tucker Murphy (Jan 07) from WildCRU.	

Project summary	Measurable Indicators	Progress and Achievements July 2006 - June 2009	Actions required/planned for next period
		Each of these visits involved supervision and training of the MSc students at the Catholic University.	
Activity 1.7 Public dissemination of results		The project has participated in 56 activities, from scientific conferences to public awareness meetings and local, as well as international, publications. The web page for the project http://www.temperaterainforests.net/ and news blog http://chilihueque.blogspot.com/ have been constantly updated.	
Activity 1.7.1 Local network of Eco-tourism and workshop on sustainable tourism		A training seminar was held in the Municipality of Pucon, 2, 5 and 6 July 2009 to develop capacity for sustainable tourism in the region of Araucania. Fauna Australis presented a comprehensive presentation on local biodiversity, particularly focusing on recognition of wildlife signs, such as tracks in the case of mammals and bird calls. Also on proper land management to benefit wildlife. The seminar was organised by environmental consultants, Camina, as part of the development of a network of ecotourism ventures, in which our field station in Pichares and the Kodkod restaurant are participating.	
Activity 1.7.2 Community impact of Wildlife projects		The Güiña project as a joint project between the CONAMA Fondo Proteccion Ambiental- FPA (Environmental Protection Fund) was considered the project of the Month (June 2009) by the Cat specialists group of the IUCN (http://www.catsg.org/catsgportal/project-o-month/20_potm/home/index_en.htm) and won an award from its co-sponsors CONAMA for the best project in its 2008 round at a national level (http://www.conama.cl/ciudadaniaambiental/1312/article-45548.html: rmoreno.9@conama.cl). The prize given to the project is a result of the quality of the work and impact in the community. Also, the Güiña project was selected to represent the FPA projects of the Araucanía Región in a travelling panel expo that will go to all regions of Chile, organized by CONAMA (http://www.conama.cl/portal/1301/article-46252.html; jugalde@conama.cl). In close alliance to the educational department of the Villarrica campus of the Catholic University we conducted educational activities with a 100 families of small farmers and approximately 200 elementary school children. Also, the Multi-media CD, for long-term educational purposes, has been distributed in the schools. Future school teachers from the Villarrica campus participated as monitors and were trained in wildlife ecology. Our work on depredation verification and Puma ecology has resulted in requests by the wildlife authorities of the Araucanía to train officials in verification protocols. The experience gained has enabled Fauna Australis and the Centre to obtain a government grant to train wildlife officials from all regions of Chile in predation verification protocols (September 2009).	
Activity 1.7.3 Dissemination products		Several outreach materials have been distributed throughout the study area. A multi-media CD with relevant information on biodiversity with an innovative video for children, two public awareness wildlife posters, a brochure on the Güiña cat, brochure of the Centre, and pins with wildlife for children. A portable exhibition of wildlife photography arising from the Darwin project has been created. The show spent the summer season in the Kodkod restaurant in Pichares, and is now on tour, starting with the Villarrica campus of the Pontificia Universidad	

Project summary	Measurable Indicators	Progress and Achievements July 2006 - June 2009	Actions required/planned for next period
		Catolica de Chile in March 2009.	
Output 2. Knowledge on temporal-spatial use of habitats	Scientific and popular publications	Survey efforts have proven successful to identify spatio-temporal dynamics of key mammal and avian fauna. There have been conference presentations on bats, birds and large mammals, as well as a number of papers submitted or in preparation for peer reviewed journals. Also 4 theses completed.	
Activity 2.2. Identify spatio-temporal dynamics of key mammal and avian endemic fauna		Seasonal survey efforts for birds and mammals have produced data for different seasons and habitat types. A paper on seasonal variation of avian fauna in Araucaria Forests has been submitted to a peer reviewed journal and another is in preparation for all habitat types studied. For mammals, maps of capture frequency temporal variation of for all mammal species are reported in the public access report. A paper on wildlife of the Araucanía is in preparation, as well as habitat modelling from the camera trap data.	
Activity 2.2.1. Research design in key lowland habitats		In summary we registered data from 10.300 camera trap nights, 3010 minutes of point counts for birds, 32 nocturnal birds of prey playback points, 600 hours of mist net for birds, 75 hours of point counts for bats, 90 hours of mist nets for bats, 20 plots for amphibian richness and habitat, 1640 trap nights for rodents, 470 trap nights for Güiña, 40 trap nights for Puma and 24 transects for vegetation sampling.	
Activity 2.2.2. Puma conflict mitigation and ecology.		This project has resulted in a book chapter on Puma and people from data obtained from interviews. Also, 2 conference papers. Field work to estimate Puma density is completed as part of Tucker Murphy´s PhD thesis. Puma capture for GPS tracking has proven unsuccessful at the time of the issuing of this report. Fauna Australis will continue efforts.	
Activity 2.2.3. Darwin Frog project		Data has been gathered for two seasons on permanent monitoring sites and surveys for potential new sites has been conducted. A paper on the results from the *Chytrid* fungus presence, together with habitat data is being prepared. Further survey efforts for potential sites as well as collaboration with Conservation International is the follow up work on Darwin´s Frog.	
Activity 2.2.4 Birds		A total of 2 conference papers were disseminated and a paper to a peer reviewed journal was submitted. Two more papers are in preparation.	
Activity 2.2.5 Bats		A conference paper will be presented in the 10th mammological congress and a paper is being prepared with the first acoustic analysis of *Myotis chiloensis,* an endemic bat of the temperate forest. Also, the acoustic survey picked up on a genus not described yet for Chile: *Eumops*. This is being further analyzed for publication.	
Activity 2.2.6 Güiña ecology		A total of 3 conference papers have been presented, and 2 papers are in preparation. These will entail occupancy modelling, activity patterns, and phenotypical traits. Also, socio-cultural perception in rural areas of the Araucanía.	
Activity 2.2.7 Large mammals in lowland forests		Two conference papers were presented with preliminary results on the large mammal	

Project summary	Measurable Indicators	Progress and Achievements July 2006 - June 2009	Actions required/planned for next period
		community present in the study area, with a special focus on exotic species and threats to native wildlife. A comparative study from 2008-2009 data is being prepared.	
Activity 2.2. Map habitat use		A public access report and digital maps are ready for the Villarrica-Tolten catchment development centre. The centre is working on a digital platform where the maps will be made available to stakeholders and decision makers. Further modelling is being conducted for peer-reviewed publication. Collaboration with the Laboratory of territorial planification of the Catholic University of Temuco has proven useful for spatial analysis of the data and habitat-species modelling.	
Activity 2.3. Define threats to biodiversity and incentives for conservation		Conference papers and manuscripts in preparation have focused on habitat requirements and the importance of lower-land habitats for wildlife. We have identified exotic species as wildboar and feral dogs, as important threats in the area. Sustainable tourism and health benefits associated with the presence of species (pest control) is a relevant conservation incentive in the area.	
Output 3. 3-6 Chilean MSc research projects advancing project research objectives	MSc courses successfully completed, Work presented at appropriate conference and submitted to appropriate journals.	We have successfully trained postgraduate and undergraduate students during the project. Four MSc dissertations are complete that have resulted in conference papers, as well as submitted and in preparation peer reviewed papers. Also, a book chapter as a result of a PhD thesis in preparation. On going is a MSc thesis, and two PhD candidates. Future plans include an EU Marie Curie scholarship, currently undergoing evaluation.	
Activity 3.1. Training of Chilean MSc and undergraduate students		18 post graduate students and 25 undergraduate students received training for a total of 100 weeks.	
Activity 3.2 MSc projects completed and advancing		A total of 4 Master students completed their studies during the project. Rojas, I. (2008) Patrón de variación de la riqueza de especies invasoras en un gradiente de tamaño, degradación y altitud de fragmentos remanentes del bosque precordillerano de la IX región de la Araucanía, Chile. Vanessa L. Coldwell.(2008). An analysis of Methodologies used to study medium and large mammals in the Valdivian Temperate Rainforest of Central-Southern Chile Manuel Ríos.(2008). Centro para la Biodiversidad en el bosque templado: Propuesta Arquitectónica Pichares. Felipe Hernandez. (2009). "Antecedentes de historia natural y ocupación de Leopardus guigna en un ambiente fragmentado de bosque templado en la zona andina de La Araucanía,Chile (39º15´S, 71º48´O)". A 5th project is advancing to study landscape change in our study area, conducted by Robert Petitpas (Forestry Engineer).	

Project summary	Measurable Indicators	Progress and Achievements July 2006 - June 2009	Actions required/planned for next period
Activity 3.2. PhD projects completed and advancing		Tucker Murphy has completed field work for a Puma density study as part of the biological aspect of his PhD thesis dissertation. His work should be complete by 2009. Two PhD students with Chilean government scholarships (CONICYT) will continue work for the next 3 years.	
Output 4. Local capacity building for rangers, *campesinos* and schoolchildren	Workshop programme, report and course notes	Informative workshops proved important to disseminate results of the project as well as addressing sustainability issues linked with wildlife conservation, human benefit and habitat protection. We were able to address both *Campesino* parents and children as an intergenerational strategy. Also, important private landowners and stakeholders in the area were informed on issues arising in their land and options for sustainable management.	
Activity 4.1. Training in non-exploitive forest management. Sustainable forest management workshop, Namoncahue Biological Corridor		A workshop was conducted for 25 people involved in the Namoncahue Biological Corridor project in October 2006. The event involved 4 formal presentations, followed by a field visit to the proposed public-private park.	
Activity 4.2. Community workshops		A total of 5 informative workshops with land owners were organized (kawellucó, Namuncai, and Camera trap site land-owners). We discussed conservation issues and presented camera trap and other images of the wildlife found in their woodlands, and discussed conservation threats and opportunities.	
Activity 4.5 Educational activities with schoolchildren on wildlife conservation and forest protection		Approximately 200 *Campesino* schoolchildren of the 8 rural schools of our study area participated in wildlife educational activities during 2008 (see Güiña map). We emphazised the ecological role of several species, highlighting the kodkod cat and habitat protection. The head of the Municipal educational department stated the appropriateness of the activities and the positive feedback that he received (ezerene@municipalidadpucon.cl).	
Activity 4.4 Small farmers committees workshops of sustainable forest management		Informative workshops were held with approximately 100 *Campesino* families in five parishes in the study area. We evaluated knowledge on carnivores and ecology, in particular the kodkod cat. The workshops emphasized the role of the kodkod as a rodent predator, and its contribution to the control of *Oligoryzomys longicaudatus*, an important reservoir host of the deadly Hantavirus pulmonary syndrome. Thus, this approach was quite effective to inspire farmers to avoid killing the kodkod and to protect the species and to conserve its habitat. Also, we described proper construction of chicken coups to lessen probabilities of attacks. The head of the rural development agency (PRODESAL), commended the appropriateness of the activity and the positive feedback that he received (prodesal@municipalidadpucon.cl).	
Output 5. Participatory consultative process for UNESCO Biosphere Reserve	Nomination documentation and supporting information compiled.	Expedient for nomination with supporting information presented to UNESCO for 30 September 2009 deadline (P.Araya, CONAF, pers.comm.).	

Project summary	Measurable Indicators	Progress and Achievements July 2006 - June 2009	Actions required/planned for next period
Activity 5.1 Conformation of committee for the Proposal		The Biosphere Reserve stakeholders meeting in January 2007 was the culmination of an extended period of lobbying by Parques para Chile. There was enthusiastic support for the plan to revitalize the existing, but ailing Araucarias Biosphere Reserve, by extending the nucleus, and creating an effective policy for buffer zone management. A committee was established to prepare submissions to MAB-UNESCO. Activities during this next year included the consulting process in the communities, gathering of information and documents, and writing the proposal and submission.	
Activity 5.2 Preparing the expedient		During 2007-2008 Parques para Chile became 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. http://zonifrb.blogspot.com/ Parques para Chile and CONAF jointly prepared 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. The proposal can be downloaded from: http://documentos.parquesparachile.cl/expediente_rba.pdf.pdf	
Activity 5.3 Biosphere Reserve proposal approved by regional government and presented to UNESCO		Parques para Chile has been leading the editing and publishing of the expedient document for submission to UNESCO. Submission deadline was extended by UNESCO until later in 2008. During 2008 de expedient was approved by the regional government and it now being presented to UNESCO. The process can be followed on http://rbaraucarias.blogspot.com/	
Output 6. Project management	Project management documentation	Regular meetings between the lead organisation and host country partners have been held. Half year reports were submitted to the DI secretariat to schedule. This report is presented to schedule.	
Activity 6.1 Management meetings		Throughout the project we have held various meetings between project partners: This is a summary: A plenary coordination meeting took place in Pucon, in July 2006. Bi-monthly meetings have been held between Chilean partners and Macaulay to review progress and plan activities.Formal 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). During 2008-2009 we have had regular meetings held in July 2008 (San José de Maipo), Nov 2008 (Pucón), Feb 2009 (Pucón), April 2009 (Pucón), July 2009 (Santiago).	
Activity 6.2. Project reporting		Six-month and annual reports have been presented to schedule. Response to reviewers has been included in annual and half year reports. Regular reports on progress have been distributed for internal management purposes.	

Annex 2 Project's final logframe, including criteria and indicators

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: **To draw on expertise relevant to biodiversity from within the United Kingdom 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.	1. New research and education field centre 2. Information on habitat use by endemic mammals and birds. 3. Education for Chilean and international post-graduates. 4. Local capacity building for rangers, *campesinos* and schoolchildren 5. A plan for a UNESCO Biosphere Reserve to catalyse private sector involvement in forest conservation	1. Field centre 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	1. Darwin grant succeeds in leveraging local financial resources. 2. Successful management of fieldwork 3. Facilities, funding, and supervision offered meets university requirements 4. Sufficient local interest in courses 5. 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. Environmental education with	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	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. Reports presented to Darwin	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. Participant f*eedback reports* 5. Successful approval by Regional government and

rangers, *campesinos* and schoolchildren on local wildlife ecology and conservation 5. Participatory consultative process for UNESCO Biosphere Reserve.	4. Workshop reports 5. Nomination documentation and supporting information compiled.	Initiative 5. Documentation presented to Darwin Initiative.	UNESCO

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 Pucón 5. Environmental education in wildlife and conservation 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 of wildlife monitoring. Publish preliminary results 11. Publication of results 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 Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use		Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	60%	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	20%	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation		Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity		Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training		Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness	20%	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources		Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.

Article No./Title	Project %	Article Description
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information		Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Other Contribution		Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	3 Tucker Murphy, Tomás Altamirano, Nicolás Guarda
1b	Number of PhD qualifications obtained	0
2	Number of Masters qualifications obtained	4 Vanessa Coldwell, Isabel Rojas (Forestry Engeneer), Manuel Ríos (arquitecture), Felipe Hernández.
3	Number of other qualifications obtained	2 Felipe Hernández and Nicolás Gálvez Radio Telemetry course provided by the US Fish and Wildlife Service and the University of Los Lagos.
4a	Number of undergraduate students receiving training	25 Robert Petitpas, Gonzalo Ossa, Thomas Kramer, Tomás Altamirano, Nicolás Guarda, Anais Boutin, Claire Thomson and friends (3) and Cambridge group (15).
4b	Number of training weeks provided to undergraduate students	50
4c	Number of postgraduate students receiving training (not 1-3 above)	18 Tomás Ibarra, Robert Petitpas, André Rubio, Tomás Altamirano 2006 MSc Expedition, 2008 MSc Expedition
4d	Number of training weeks for postgraduate students	50 Includes Postgraduates in 1-3.
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(ie not categories 1-4 above)	1 Nicolás Gálvez in field ecology, habitat and large mammal survey and analysis
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	32 Education students from the Villarrica campus of the Pontificia Universidad Católica in wildlife ecology, Local Ecotourism Guides in wildlife ecology, Park Rangers in Wildlife survey techniques

6b	Number of training weeks not leading to formal qualification	3
7	Number of types of training materials produced for use by host country(s)	6 Puma leaflet, FPA 08-09 Posters,FPA 2008 brochure, FPA 2008 Teaching guide, FPA 2008 CD multi-media
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	6 A Hester 4, A Gimona 1, D.W. Macdonald 1. J. Laker, 3 years
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	1 Biosphere Reserve expedient
11a	Number of papers published or accepted for publication in peer reviewed journals	1 Mink paper for Oryx
11b	Number of papers to be submitted in peer reviewed journals	10 Tomás (3), Icha (2), Gonzalo (1), Nico-Felipe (3), Nico-Jerry (1).
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	1
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	18 Darwin projects Chile 2006, SAG seminar Santiago, Predation verification workshop Araucanía, CONAF Reserve workshop, CONAF workshop, Seminar to close Güiña project FPA 2008, Seminar Güiña CD and FPA 2009 5 Small farmers committees. Namuncai talk (2) Kawellucó talk (2) Photo Expo talk (1) Namuncahue committee workshop FPA 2009 talk to Sede students of wildlife ecology
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	18 Bi-National Ecology Conference La Serena,

		Forestry Science Congress Talca, Ecology Conference Pucón Ornithological Congress El Tabo, International Mammalogical congress Mendoza Felid ecology and conservation Oxford, U.K. Symposium Faculty Agriculture and Forestry-PUC Amphibian symposium Birds of Prey Seminar Symposium Carnivores-PUC, Seminar on Güiña conservation Intendencia P.N. Lanin, Junin Argentina Sustainable Tourism workshop Camina Biodiversity Commision for the Araucanía workshop (COB) Pastoral medio ambiente Araucanía FPA 2008 meeting Darwin 7th annual Darwin lecture Wildlife Trust Alliance annual meeting. Bat symposium, Ecuador
15a	Number of national press releases or publicity articles in host country(s)	2 Magazine Visión Universitaria, FPA prize.
15b	Number of local press releases or publicity articles in host country(s)	5 Weekend, Travesía magazine, Diario Austral, Correo del Lago
16a	Number of issues of newsletters produced in the host country(s)	3 Darwin Newsletter Nº8 March 2007. “Biodiversity conservation in Chile´s Temperate Rainforest Ecoregion” GÜIÑA Project of the Month IUCN Cat Spetialists Group and Wild Felid Monitor Newsletter.
16b	Estimated circulation of each newsletter in the host country(s)	Darwin Newsletter and project of the month IUCN available on internet- wide circulation of newsletter.
16c	Estimated circulation of each newsletter in the UK	Darwin Newsletter and project of the month IUCN available on internet- wide circulation of

		newsletter.
18c	Number of local TV programme/features in host country	1 Pucón TV FPA Güiña
19c	Number of local radio interviews/features in host country (s)	9 Radio Puelche Pucón, 2 interviews and 1 participation as a talk show panel. Montecarlo; Rítmica; Pianísima; Parque Nacional; Estación de Pucón; Puelche
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	**£10,000**
21	Number of permanent educational/training/research facilities or organisation established	1 Centro Chilihueque
22	Number of permanent field plots established	40 Includes Puma, Güiña, Frog, Bird.
23	Value of additional resources raised for project	119,420
Other Measures used by the project and not currently including in DI standard measures		
Book Chapter	Book Murphy T. and D.W. Macdonald. 2009. See list of publications.	1
Photo Expo	Photo expo of Temperate Rainforest Wildlife that has been shown in Pucón and Villarrica. It will travel to Chiloé and Santiago.	1
Web page	Project web page and news blog http://www.temperaterainforests.net/ http://chilihueque.blogspot.com/	1
Educational activites	Schoolchildren and families that participated in environmental education	300

Annex 5 Publications

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Brochure	Centre for Biodiversity, Chile		Macaulay Institute (available in English, Spanish and Portuguese)	Free
Poster	Hester, A. and Laker, J. (2006). Capacity Building for Temperate Rainforest Biodiversity Conservation.	Macaulay Institute	Macaulay Institute, or internet download	£10, in print, free as .pdf.
Conference poster	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	-
Conference poster	Puma and livestock farming: a multi-level approach in 3 eco-regions of the Chilean Andes. C Bonacic (1), N Galvez (1), F Amar (1), J Laker (1,2), T Murphy (3) and DW Macdonald (3) (2007)	Felid Conference, Oxford University, 17th - 20th September 2007. (Annex 3.3)	http://users.ox.ac.uk/~zoofelid/	
Conference poster	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 Chilean Congreso of Forestry Science. University of Talca 1-3 Octuber 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 in Chilean press	Pequeños y grandes esfuerzos para cuidar nuestro patrimonio natural. Gálvez, N. 2008.	Revista Travesía (2):24.	www.travesiaweb.com	
Popular article in	Filling gaps for Güiña cat (Kodkod) conservation in Southern Chile. Gálvez, N	Wild Felid Monitor: Newsletter of wild	http://www.wildfelid.com/WFA%20N	

English press	and C. Bonacic (2008: In press).	felid research and management association (WFA).	ewsletter.html	
* Popular article in English press	Connecting biological and socio-cultural dimensions of conservation: a strategy to engender positive attitudes towards the kodkod cat, *Leopardus guigna,* within rural communities in Southern Chile Gálvez N. and F. Hernández. 2009	Project of the Month Cat Specialists Group- IUCN	http://www.catsg.org/catsgportal/project-o-month/20_potm/home/index_en.htm	
Conference poster	Monitoring temporal bird-habitat relations in primary and antropic forests of the Araucania Region, CHILE. Ibarra, J.T., N. Gálvez, O. Ohrens, I. Rojas, J. Laker & C. Bonacic. 2008.	Chilean Bulletin of Ornithology 14: 44.	http://us.geocities.com/unorch/BOLCHIOR.HTM	
Conference poster	Relative abundances and habitat use of the Austral-Pigmy Owl (Glaucidium nanum) and the Rufous-legged Owl (Strix rufipes) in Primary and Antropic forests in the Araucania, Chile. Ibarra, J.T., N. Gálvez, I. Rojas & C. Bonacic. 2008	Chilean Bulletin of Ornithology 14: 76	http://us.geocities.com/unorch/BOLCHIOR.HTM	
Conference poster	Temporal variation of predation attacks to livestock by *Puma concolor* in a large fragment of the Araucanía Chile Bonacic, C. Laker, J., Gálvez, N. and Murphy, T.	XV Reunion Annual Sociedad Ecología de Chile. Biological Research 41 (suplemento A) ISSN: 07169760	http://www.scielo.cl/bres.htm	
Conference poster	Occupancy and activity patterns of *Leopardus guigna* in pre- Andean areas of the Araucanía, using camera traps. Gálvez, N., Hernández, F., Coldwell V., Laker, J. and Bonacic, C. 2008.	XV Reunion Annual Sociedad Ecología de Chile. Biological Research 41 (suplemento A) ISSN: 07169760	http://www.scielo.cl/bres.htm	
Conference poster	Observations on the presence of exotic mammals in native woodlands of the precordillera of the IX Region. Laker, J. Gálvez, N., Bonacic,. And Coldwell.V. 2008.	XV Reunion Annual Sociedad Ecología de Chile. Biological Research 41 (suplemento A) ISSN: 07169760	http://www.scielo.cl/bres.htm	

Conference poster	Importance of the acoustic survey in community studies of bats. Kathrin Barboza , José Carlos Perez-Zubieta, Elisabeth Kalko, Luis F. Aguirre & Gonzalo Ossa. 2009.	First Symposium on research and conservation of Bats. Ecuador. May.	http://acbbolivia.blogspot.com/2009/02/primer-simposio-ecuatoriano-sobre.html	
Conference poster (Accepted)	ESTIMATING OCCUPANCY OF *Leopardus guigna* FROM CAMERA TRAP DATA IN THE ARAUCANÍA OF SOUTHERN CHILE. Gálvez, N., Hernández, F, Petitpas, R., Laker, J., Gilabert, H., Miranda , M , Gimona A., Hester, A., and Bonacic, C. 2009.	10th International Mammological congress, Mendoza Argentina August.	http://www.cricyt.edu.ar/imc10/program.html#schedule	
Conference poster (Accepted)	ACTIVITY PATTERNS AND PHENOTYPICAL TRAITS OF *Leopardus guigna* IN THE ARAUCANÍA DISTRICT OF SOUTHERN CHILE. Hernández, F., Gálvez, N., Laker, J. and Bonacic, C. 2009.	10th International Mammological congress, Mendoza Argentina August.	http://www.cricyt.edu.ar/imc10/program.html#schedule	
Conference poster (Accepted)	Preliminary acoustic analysis of *Myotis chiloensis,* Vespertilionidae, an endemic Bat of southern temperate rainforest Ossa G., Laker, J., Gálvez, N., Ibarra, J.T., Hernández, F., Bonacic, C. 2009.	10th International Mammological congress, Mendoza Argentina August.	http://www.cricyt.edu.ar/imc10/program.html#schedule	
Conference poster (Accepted)	INVESTIGATING THE LANDSCAPE OF TOLERANCE FOR PUMAS (*PUMA CONCOLOR*) IN THE ARAUCANÍA LAKE DISTRICT OF CHILE. Murphy, T., Laker, J., Galvez, N., and Bonacic, C. 2009.	10th International Mammological congress, Mendoza Argentina August.	http://www.cricyt.edu.ar/imc10/program.html#schedule	
Book Chapter (In press)	Pumas and people: lessons in the landscape of tolerance from a widely distributed felid. Murphy T. and D.W. Macdonald. 2009.	In: The Biology and Conservation of Wild Felids. Ed. David Macodnald and Andrew Loveridge. Oxford: Oxford University Press..		
Journal article	Avifauna in *Araucaria araucana* temperate forests	Ecología Austral	http://www.ecologiaaustral.com.ar/i	

(sent)	of southern Chile. IBARRA, J.T, T. ALTAMIRANO, N. GÁLVEZ, I. ROJAS & C. BONACIC.	ISSN 1667-7838	ngles/index2.php	
Forestry Engeneer Thesis	I. Rojas Patrón de variación de la riqueza de especies invasoras en un gradiente de tamaño, degradación y altitud de fragmentos remanentes del bosque precordillerano de la IX región de la Araucanía, Chile.	Thesis. Faculty of Agriculture and Forestry, Pontificia Universidad Católica de Chile		
MSc Thesis Imperial College	An analysis of Methodologies used to study medium and large mammals in the Valdivian Temperate Rainforest of Central-Southern Chile Vanessa L. Coldwell	Thesis: Imperial College		
Arquitecture Theses	Centro para la Biodiversidad en el bosque templado: Propuesta Arquitectónica Pichares. Theses Manuel Ríos	Theses Universidad Central, Santiago Chile		
*Brochure	Cuidemos y Valoremos nuestra fauna Silvestre CONOZCAMOS AL GATO GÜIÑA	Pontificia Universidad Católica de Chile		free as pdf
*Poster	CONOZCAMOS AL GATO GÜIÑA	Pontificia Universidad Católica de Chile		Free as pdf.
Brochure	Gato Huiña	Proyecto Huiña Delegación Técnica Sur Administración Parques Nacionales		Free as pdf
*CD Multi-media	CONOZCAMOS AL GATO GÜIÑA An interactive journey with the main characters of the Temperate Rainforest	Pontificia Universidad Católica de Chile		free upon request
*Poster	CONOZCAMOS NUESTRA FAUNA SILVESTRE	Pontificia Universidad Católica de Chile		Free as pdf.

Annex 6 Darwin Contacts

Ref No	15/001
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