Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

Project title	Huemul ecology research for conservation planning, Southern Chile.
Country(ies)	Chile
Contractor	Raleigh International
Project Reference No.	162/09/014
Grant Value	£132,850
Start/Finishing dates	Original: 1 August 2000 – 31 July 2003
	(with time extension authorised to 31 October 2003)
Reporting period	2002-2003

2. Project Background

Introduction

The southern Andean deer (*Hippocamelus bisulcus*), or 'huemul', is protected in 13 Chilean national parks and reserves – managed by the Chilean state body Corporación Nacional Forestal (CONAF) - primarily in Region XI (Aysén) in Chilean Patagonia. Protection is not considered adequate due to the small size of many reserves and inadequate coverage of the protected areas network relative to the huemul's distributional range.

The huemul is an endangered species as defined by the Red List of Threatened Animals (IUCN) and by the Red Data Book of Chilean Terrestrial Vertebrates, with less than 2500 individuals occurring in fragmented populations. The current population is thought to consist of less than 1000 animals (IUCN/SSC Deer Status Survey and Conservation Action Plan, Wemmer, 1998). The huemul is a 'flagship' species for conservation furthermore and is the national symbol of Chile, and its conservation is thus a high priority for CONAF.

An action plan for conservation and recovery of the huemul deer has been developed by CONAF and CODEFF (a Chilean environmental NGO) which recognises that huemul are affected by several factors and specifies a list of conservation action and research priorities. The main factors that affect the species are interaction with livestock, habitat loss and alteration, as well as predation by domestic dogs and puma, but it is unknown how these factors affect precisely the survival of huemul.

Considering that a significant percentage of the huemul population is present in private land or outside of protected areas, there is a need to undertake applied research to establish the interaction of huemul populations with productive activities such as livestock farming and forestry exploitation. This study is contributing to a number of the priorities of the national species conservation action plan, for example through the provision of management guidelines to productive sector activities to mitigate significant impacts to huemul populations. Furthermore, it is generating fundamental information on the ecology of the deer species, including their interactions with other native herbivores (guanacos), which is currently lacking.

3. Project Objectives

Project purpose
To understand better the ecology of the huemul to ensure its survival in Region XI, southern Chile.

Project objectives
1. To identify interactions between huemul and forestry exploitation, livestock and other ungulates (guanaco).
2. To obtain information to assist understanding of the relationship between huemul movement and habitat type.
3. To assess seasonal and diurnal movement patterns.
4. To obtain estimates for rates of recruitment and adult survival, to help identify the causes of population change and individual animal mortality.
5. To integrate land use data with huemul distribution data using GIS, as a contribution to the establishment of protected areas and corridors for huemul conservation.
6. To promote environmental education and public dissemination focused upon local communities in the project area.

4. Progress

- **Brief History of Project to date**

The project was developed jointly between CONAF and Raleigh International (RI) in 1999, following a long period of huemul field research dating back to the 1980's by CONAF and involving RI youth expedition projects since 1995 in Region XI, Chile. Following a bid made to the Darwin Initiative in October 1999, funding approval was given in March 2000 and the project formally started in August of that year. During the first (reporting/financial) year of the project, four study sites were selected and extensive training of Chilean field researchers and park rangers in deer capture and radio-tracking techniques was undertaken. Following initial deer captures, a temporary permit suspension was instituted by the licensing authority Servicio Agrícola y Ganadero (SAG) due to the unfortunate death of a collared animal. Additional field methods were subsequently developed for complementary application (including pellet and vegetation plots) to support the data collected by radio collars and the problems experienced with deer captures were later overcome and considerable progress made in collaring animals (12 huemul individuals presently have a collar fitted). The production of a technical plan for the project helped to clarify the priorities and process of fieldwork furthermore. A significant amount of information has thus been generated through the efforts of project personnel, CONAF park rangers and Raleigh International Venturers (youth volunteers), set against the difficulties of working with a timid and sparsely distributed species that lives in an extreme mountainous environment, with difficult access and weather conditions. Progress has also been made in the area of environmental education and dissemination (both to the Chilean public and scientists/conservationists) at the local, regional, national and international levels.

- **Project Overview for 2002/03**

Considerable progress has been made through continuing radio telemetry work, additional deer captures (including the fitting of 2 GPS collars and a VHF-satellite collar), undertaking follow-up counts of established pellet plots, and monitoring of guanaco, livestock, human and dog activity in the study areas. Numerous additional activities have been undertaken, including new public awareness initiatives both locally (with neighbouring farmers and foresters) and nationally (e.g. a national cycle ride to raise awareness and funds). Strong links were also developed with a range of Chilean state institutions, such as the National Forestry Institute of Patagonia (INFOR), SAG, CODEFF and local police forces. Management guidelines were provided to foresters on means to reduce their impacts on huemul populations. Meanwhile, the illegal killing of a collared animal by a local farmer (*gaucho*) to feed his dogs resulted in a court prosecution (ongoing) and generated significant regional and national publicity in the media.

A steering group meeting was held in Chile in September 2002 to review progress and plan future work in the areas of fieldwork, data analysis, publications, dissemination of results, the final conference and options for continuing research. Lastly, project personnel participated in several high-profile international seminars and conferences to disseminate the project experience, and the project is now recognised as a leader in the area of huemul deer distribution and allied research initiatives in both Chile and Argentina.

Further details of project activities in this reporting year are given in **Table 1** (below).

Table 1: PROJECT ACTIVITIES UNDERTAKEN IN 2002-03

DATE	ACTIVITIES PLANNED (*Those marked in **bold** as on original project schedule*)	ACTIVITIES REALISED
April 2002		- End of Raleigh expedition 4 in LB. - Talks given on huemul deer conservation in Cochrane schools. - Co-operation agreement established between the Chilean Centre for Applied Ecology and Conaf on Huemul research. - 3 presentations given at the 4th Binational meeting for Huemul Conservation Strategies in Chillán.
May–August 2002	- Input **field data** and complete analysis of results to date. - Field **trips** to make captures during **wintertime** in La Baguala and Candonga to be considered.	- Undertaken in August 2002 and reviewed by Dr. Robin Gill. - 3 captures at C during the austral autumn (March) but further capture efforts were unsuccessful due to poor weather. - Interpretative display given to local community in Cochrane during "Environment Week" in June. - One-month long training and fieldwork placements on huemul radio tracking in Tamango for 3 undergraduate students. - Field meeting at Candonga between CONAF and Forestal Aysén forestry company to seek to reduce operational impacts on huemul deer.
September 2002	**Planning fieldwork for forthcoming spring and summer season.** **Assess progress.**	- Steering group meeting held in Coyhaique (XI Region). - Further schools talks in Cochrane and radio coverage of project activities. - Radio tracking training for a new CONAF park ranger at Tamango. - Participation and 5 presentations at an Argentinean protected areas workshop on huemul ecology for park rangers. - Loss of collared animal at C through illegal persecution and start of judicial process.
October – December 2002	**Raleigh Venturer project 5**.	- Raleigh expedition at La Baguala, radio tracking and monitoring livestock and guanacos under supervision of Ernest Kleinwort Charitable Trust (EKCT) funded scientist. - Faecal counts of 300 plots were completed by project staff and volunteers in Candonga and Tamango. - Meeting held with the regional Minister of Agriculture and SAG to plan future policy regarding the conflict between dogs, local farmers and huemul deer. - Invitation from INFOR to define the terms of reference of a huemul baseline study in a state forestry concession of 27,000 ha. - Dissemination event and exchange at Candonga valley to 16 local farmers. - Collaboration with campaign on a national cycle ride for huemul.
November -December 2002		- Huemul deer census by project personnel and CONAF park rangers at Tamango detects 45 animals. - 3 deer captures (2 males and 1 female) to fit satellite and VHF collars in C and LB. - New permit obtained from SAG for deer captures in 2003.
January – April 2003	**Raleigh Venturer project 6**.	- Raleigh expedition 6 studies radio telemetry and pellet plots in Candonga and La Baguala. - 10 days training of 4 field technicians from INFOR by project staff at T and C. - Weekend poster display, slide shows and presentations at Cochrane Cultural Centre. - Further meeting with 2 large forestry companies to discuss conflicts with huemul deer. - Launch at Coyhaique of national huemul awareness-raising cycle ride. - Participation and training of 4 undergraduate veterinary and forestry students.
February 2003		- Presentation and discussion at Candonga with 62 foresters of Forestal Aysén.
March 2003		- Completion of the huemul national cycle ride and presentation of formal proposals for huemul conservation to senators in the National Congress. - CONAF-Raleigh meeting to review project progress and update work plan. - Training of new CONAF park ranger in radio tracking.

- RESEARCH METHODS EMPLOYED:

The following methodologies were employed during the reporting period for the four project study sites - Tamango National Reserve (**T**), La Baguala (**LB**), Candonga (**C**) and Traiguanca (**Tr**) – as detailed in the project's technical plan (see **2nd Year Progress Report 2001-2002**, Annex 1):

1. Deer captures
2. Radio telemetry
3. Pellet surveys

1. Huemul capture and collaring

The capture team now possesses valuable experience in huemul capture, including related procedures for anaesthesia, which will be of great importance for future huemul research and conservation programmes, including proposed re-introductions of huemul in other regions and related research in Argentina. Capture expeditions entail considerable hard work and effort by the team due to the fieldwork difficulties previously mentioned, with many days generally required to obtain a single capture outside a protected area. The achievement of a total of 21 huemul immobilisations (including some recaptures) and 16 radio-collared deer (with 12 currently surviving), represents the first time that such a monitoring programme has been possible.

2. Radio telemetry and GPS collars

During this third year, the radio tracking of collared animals was carried out regularly in the four study sites, obtaining a total of 750 VHF fixes as well as recording data on associated environmental variables. Detailed analyses of home range, habitat selection and changes in population composition based on information from both radio tracking and pellets plots is currently in progress. Descriptive data on species biology (e.g. time of first antlers in fawns, lactating behaviour, etc) has also been obtained. With the high-profile deployment of GPS and satellite collars in November-December 2002, the first example of its use on an endangered species in southern Chile, more data will be obtained for this austral winter season when fieldwork is usually very difficult. Captures to retrieve the collars and download the data are planned after the austral winter of 2003.

3. Pellet surveys

During this period, the project's monitoring work of faecal plots succeeded in revisiting a total of 450 plots in three sites covering an area of c. 5000 ha. approximately. The distribution of the study sites and pellet plots is shown in a map of Chile's Region XI in **Appendix 3, Figure 1**.

- PRELIMINARY RESULTS:

A summary of the research findings from each of the study sites during this third project year is given below.

- Tamango National Reserve (T)

- 45 animals were recorded in the recent CONAF census, of which 5 animals have been captured in the area (although 1 was killed by a puma). The remaining 4 (2 males and 2 females) continue to be monitored by radio tracking throughout the year (see **Appendix 3, Figure 2**). The 2 collared females again gave birth in mid-spring and early summer (October and December) to a single fawn each, demonstrating that females can reproduce year after year in the breeding season.
- The fawn of one collared female was killed by a red fox at just a few weeks old, supporting the significance of frequent predation by both native (puma and red foxes) and introduced carnivores (domestic dogs) which requires closer monitoring and control in the latter case.
- Dispersion of juvenile animals from the Reserve to adjacent areas, including close to Cochrane town, is occurring and thus public information on minimising disturbances by people and dogs to deer has proved important.
- Home ranges vary between 258-465 ha., although ranges overlap throughout the year between males and females from both the same and different groups.

- Candonga (C)

During this period the area was intensively disturbed by road construction and establishment of a large logging camp, as well as 65% of the forest area being selectively felled and serious conflicts resulting from the continuing illegal introduction of grazing livestock (40–50 cattle, accompanied by dogs).

- 18 animals were estimated to be using this area, but lack a homogeneous distribution.
- A total of 4 animals were collared (1 female and 3 males) and radio tracked; one male was captured and fitted with a satellite-VHF transmitter. Home ranges vary from 100 – 900 ha (see **Appendix 3, Figure 3**).
- Tragically, the collared female and its fawn were poached by a local farmer who apparently persecutes deer in the winter to provide free food to his working dogs. SAG and a criminal judge are undertaking an investigation and the stolen radio collar has now been retrieved from the farmer's possession, at which time further evidence of poaching of protected species came to light.
- 3 uncollared animals were found dead in the forestry concession after the winter season, apparently killed by a dog, which has also been reported to the authorities and prompted interaction with and education of forestry personnel. Dogs have since been prohibited from the forestry camp.
- Collared and uncollared animals continue to use mid-altitude and peri-glacial zones as well as wet areas usually above the 800 m.a.s.l.. This use is related to the presence and pressure by livestock and dogs, as well as by logging activities. Evidence of dispersion of a collared juvenile male exists. Deer behaviour and distribution was variable, with many instances of records in logged areas or in areas undergoing logging or even close to the forestry camp.
- Winter habitats and natural corridors for the area were identified and characterised according to exposure, vegetation and food availability.
- Deer reproduction (activity and behaviour) continues to be recorded in the area. Evidence of natural mortality has also been found.
- Two repeat counts of the 150 pellet plots established have been made.

- Traiguanca (Tr)

This valley seems to have been very important for huemules prior to forestry exploitation, based on the discovery of numerous signs of previous huemul presence in the two different areas surveyed. The last intensive forestry activity on this private forestry concession occurred between 1995 and 2000, although there was some continued activity in 2001. The original forest has been altered greatly by poorly managed logging, thus affecting the possibility of future natural regeneration. Some past hunting and consumption of huemul has also been reported. Currently, the other side of the valley is being logged.

- 3 transects of 2.5 km each were established by CONAF to record huemul evidence to monitor long term trends (8-15 years).
- Capture activities were ruled out for the second year, due to the very low deer density evident and only occasional records of deer presence.
- 150 pellet plots have been established to monitor decay rates and to analyse pellet spatial distribution. Little evidence of huemul presence was recorded.

- La Baguala (LB)

This farm of 1,600 hectares has recently been passed to the Chilean Government, and in the medium term it will pass to CONAF administration as a protected area (extension to the Tamango reserve). CONAF rangers have been carrying out an annual huemul census there since 1998, as well as recording the presence of *guanaco* and livestock (who enter freely, as the land is unfenced).

- A total of 32 animals were counted in LB during a long fieldwork period of 5 months during two Raleigh expeditions.
- 2 new captures (juvenile female and male) were made at LB to fit GPS-VHF collars. All collared animals were monitored by radio tracking; huemul ranges in the area vary from 250-680 ha (see **Appendix 3, Figure 4**). One previously collared male was found dead in the nearby large lake, apparently a result of fighting between males.
- Interactions with livestock during this period were limited. On some occasions, a few cattle (5-6) were recorded in the area as well as 2 herder visits (*puesteros*) accompanied by dogs.
- Transects to estimate guanaco density and abundance as well as to assess interactions with huemul were carried out. Guanaco presence is concentrated in steppe and burnt areas, using the forested areas only to pass through. No clear negative interactions have been recorded between guanacos and huemules, on the contrary huemul are alerted to danger by guanaco alarm calls and also use their established paths.

- TRAINING:

Training sessions on project fieldwork methods, especially radio tracking techniques, were carried out by project personnel for undergraduate students and professionals with an interest in wildlife conservation and research. The volunteer students contacted the project to become involved for 3-4 weeks in fieldwork activities, with this level of volunteering in Chile resulting from personal interest of students being exceptional. Furthermore, the EKCT-funded scientist Amparo Echenique, who supervised Raleigh expedition fieldwork for a 6-month period, received training and subsequently acquired considerable experience in both huemul field research and data management. In addition, two training sessions on theory and practice were run at Tamango for 3 new CONAF park rangers who are working in protected areas with huemul presence and will participate in future monitoring activities in the study areas. Lastly, training was provided to INFOR forestry professionals in huemul identification, signs and habitat preferences, to enable them to conduct a baseline study of a new 27,000 ha. forestry concession.

Standard training sessions included a detailed review of radio tracking techniques (including data generation, equipment and navigation) and other project field methods.

The individuals that have been trained are:
1.Jessica Thierney (biology student of the University of California) for 4 weeks.
2.Pedro Hevia (forestry engineer student of the Catholic University of Chile) for 4 weeks.
3.Jorge Espinosa (forestry engineer student of the Catholic University of Chile) for 4 weeks.
4.Dennis Muñoz (vet of the University of Concepción) for 4 weeks.
5.Patricia Mora (vet student of the Mayor University of Chile) for 4 weeks.
6.Nicolás Galleguillos (forestry engineer student of the Catholic University of Chile) for 4 weeks.
7.Eduardo Navarro (vet student of the Mayor University of Chile) for 4 weeks.
8. CONAF new park rangers (3) - Hernán Amado, Daniel Velásquez and Julio López.
9. INFOR state forestry personnel (4) - Luigi Solis, Félix Zapata, Javier Salvatierra y José Manuel Montt.

- DIFFICULTIES, ANALYSIS AND SOLUTIONS:

The principal problems encountered in the past year continue to be the lengthy process of capturing huemul deer to fit radio collars and the access restrictions for fieldwork and data collection (less problematic at Tamango) during the harsh winter conditions. A delay in fieldwork also ensued following the sinking of a CONAF boat used to reach LB. Satellite tracking technology was thus used to try to solve the issue of obtaining data during winter, although it was unfortunately not possible to fit them prior to the previous austral winter. It has thus been decided not to retrieve these collars (which have a working life span of approximately 1 year) until after the coming austral winter of 2003.

- Planned activities for next implementation period:

These are summarised in **Table 2** (below), and largely consist of winding down the fieldwork programme for the austral winter, continuing with analysis of the large amount of data generated to date and producing project and scientific reports and research papers on this basis. The main activity, planning for which has been started, will be a final project conference to be held in Region XI in October with an invited international audience, to disseminate the project achievements and discuss our findings in the context of current knowledge and conservation practice on this threatened species.

Table 2: FUTURE ACTIVITIES PLAN FOR APRIL–OCTOBER 2003

Date	**Activities** (those marked in **bold-** as on original project schedule)
April-June 2003	**- Final data analysis and reporting work.** - Radio tracking of the radio-collared animals will continue intermittently in study sites by CONAF.
July 2003	- Final conference planning. **- Final data analysis and scientific reports completed.**
August –October 2003 (Project extension period)	- Results publication and dissemination. - Huemul Darwin project binational **final conference** in Cochrane in October. - Production and publication of the workshop proceedings, to input to the next update of the national species conservation action plan.

5. Partnerships

5.1. Raleigh International (RI) – Corporación Nacional Forestal (CONAF) – UK Forest Research Agency (UKFRA) – Macaulay Land Use Research Institute (MLURI)
- Huemul ecology research for conservation planning in southern Chile.

This project is jointly managed between Raleigh's UK-based Projects Office and CONAF. Approximately 90 Raleigh youth volunteers supported field research at T, LB and C during two expeditions in the past year, enabling collection of data that would have been almost impossible to obtain without their support, as well as providing an opportunity to learn about species conservation and research issues. UKFRA, through Dr. Robin Gill, has provided technical support to data organisation, analysis and storage, as well as reviewing research progress. Lastly, Professor Iain Gordon of MLURI is also contributing technical advice to the research programme.

5.2. Welcome Trust Project (WTP)
-A study of the effects of natural factors and livestock competition on the population viability of the huemul in the temperate rainforest of Chilean Patagonia.

The analysis of huemul biological samples (serum, plasma and faeces) obtained during project captures were facilitated and analysed in the laboratories (funded by WTP). The database on sanitary aspects was updated, and is now awaiting the lab results of the remaining samples obtained. The two projects are working collaboratively on data analysis and production of future joint publications on huemul health and sanitary aspects.

5.3. Genetics of the Huemul in Chile
-Studies on Huemul population genetics variability and conservation planning.

Collaboration exists with this study, undertaken by Masters student Alfonso Jara Flores (University of Concepción) with Drs. Pedro Victoriano S. and Juan Carlos Ortiz, to determine the genetic status of huemul through a co-operation agreement signed in November 2002 also involving CODEFF. Dr. Susana Gonzalez, Chair of the IUCN/SSC Deer Specialist Group and Regional Coordinator for Latin America of the Cytogenetic Division of IIBCE, is also involved. In February 2003, the project provided all the biological samples (hair, white cells, muscle, skin and bones) obtained to date for genetic analysis (to be carried out in May-June 2003) which will result in joint publications.

5.4. Huemul Conservation in VIII Region (Nevados de Chillán)
The fourth binational meeting was organized by CONAF and CODEFF in Region VIII of Chile with the support of the Darwin Project Co-ordinator in aspects of its organisation and national dissemination. Project personnel presented their experience of huemul capture and management, as well as recent research results, which contributed to discussions of the feasibility of translocation as a potential management tool for conservation of the isolated northern remnant huemul population.

5.5. INFOR (National Forestry Institute of Patagonia) project
-Sustainable management models for Southern Beech Lenga Forests (Nothofagus pumilio) in Region XI.

This project is funded by CORFO (the regional development commission) and its main objective is to generate models for sustainable multifunctional management of native forest. INFOR wish to gain an understanding of huemul presence in the project area, and need to generate management actions and recommendations on a new 27,000 ha. forestry concession. Darwin project personnel defined the components and terms of reference of the baseline study of huemul in this area, as well as training their technical team.

5.6 Argentinean Huemul Project (AHP)

This project is funded by the Wildlife Conservation Society and supported by Fundación Vida Silvestre (FVSA) and Administración de Parques Nacionales (APN). They invited the Project Co-ordinator and 3 CONAF rangers involved to participate and present their experience in a workshop for Argentinean park rangers on huemul ecology at Los Alerces National Park in September 2002. In addition, the project co-ordinator of the AHP is in regular contact with Darwin Project staff to exchange knowledge and technical advice. Their project has requested the support and participation of Darwin Project members in huemul deer capture expeditions planned for the austral spring of 2003 furthermore.

5.7 Inter-Governmental agency co-ordination

Project personnel have participated in many different regional fora to inform government bodies of huemul deer distribution and major threats, and have actively worked with:

a. **CONAMA** (the Chilean Environmental Commission) – participation in 3 workshops in July-August 2002 to develop the Regional Strategy and Action Plan for Biodiversity (part of a wider national initiative).

b. **SAG** (Servicio Agrícola y Ganadero, the state agricultural extension service) – this authority gives permissions for huemul deer capture and is responsible for enforcement of wildlife protection legislation. Co-operation over deer capture protocols and consideration of new conservation initiatives have taken place.

c. **Ministerio de Bienes Nacionales** (MBN, the public lands ministry) – this Ministry authorises regulated concessions to private economic activities on state lands, much of which is forested huemul habitat. Based upon CONAF concerns, joint working has been initiated and GIS-based information on huemul distribution is to be supplied to them to guide the process of licensing new concessions.

5.8 CODEFF (National Committee for the Defence of Flora and Fauna)

This recognised Chilean NGO is actively involved with the Darwin project through, for example, applying public pressure through the media and undertaking political lobby to safeguard the huemul. They are particularly concerned to see this programme of applied research continued, especially in the area of huemul-forestry interactions.

6. Impact and Sustainability

The high profile enjoyed by the project over the past year in both scientific/technical and public circles, and the means in which it has come about are explained in detail in Section 8 (Dissemination) below. Raising public awareness is a significant concern given the nature of the main threats to huemul in Region XI, and thus many efforts have been made to reach local communities (including farmers and foresters), with a focus on informing them of applied results and demonstrating how they can contribute to the survival of the huemul and biodiversity conservation in general. Events have been run with neighbouring farmers, and forestry companies are now starting to take heed of public pressure on the impacts of their extraction methods and have met with Darwin Project staff on several occasions. Considerable interest (both nationally and internationally) has been aroused furthermore in conservation, scientific and academic sectors as witnessed by the variety of conference presentations made and student volunteers receiving field training.

The national huemul cycle ride from Coyhaique to the National Congress (more than 1600 Km) in particular generated greater public awareness about the plight of the huemul and the importance of its conservation through extensive media coverage. A programme for action was handed to the Chilean Congress (Chamber of Deputies and Senators) at the end of the ride and is now being followed up through political lobby. Politicians have been requesting information about huemul and the project research programme, and some well-publicised politicians' declarations have lent considerable support and weight to the project. Media coverage and increased public awareness have created great expectations on the project outcomes (which is producing significant and unprecedented scientific results) and the future research and conservation actions required.

Meanwhile, the capacity for huemul conservation has been greatly enhanced through the strong involvement of CONAF park rangers in the project fieldwork and dissemination, as well as through the applied training provided to INFOR in their biodiversity assessment capabilities. This agenda has also been advanced through work with SAG to pursue the first ever prosecution of a case of illegal huemul persecution. Regional government agencies, politicians and local NGO's have all sought to involve project research findings in the development of management guidelines to include in decision-making analyses of land use furthermore.

Lastly, there now exists a focus on finalising this current project as completely as possible given the short remaining time of implementation that exists, through disseminating the project results and producing research papers. As detailed below, there is a strong desire to obtain further funding to carry out a second phase of project activity and short-term small follow-on funding bids (including to the DEFRA/FFI Flagship Species Fund) have been made for this purpose (their outcomes are awaited). This is a critical issue to be resolved, especially for CONAF as the nationally recognised leader on huemul research and conservation.

7. Post Project Follow up Activities

There is a will of all involved, in particular CONAF, to continue the progress made on huemul research and conservation work in the future. Significantly, there is now considerable local capacity, in terms of trained, equipped and highly motivated staff to carry out such work. A suite of follow-up activities are contemplated to consolidate the project experience, including:

- Further monitoring of huemul using GIS/telemetry, to develop a broader and deeper understanding of huemul ecology - including land use interactions, dispersal patterns, ranging behaviour and rates of recruitment and mortality - vital to maximise the impact of the present research efforts.
- Establish the full effects of forestry on huemul, a priority as this represents a poorly known yet significant threat, with major forestry exploitation continuing in Candonga and a new large concession opening nearby. The opportunity now exists to broaden the scientific information base on huemul-forestry interactions through new collaborative research studies with INFOR and the private sector.
- Development of a national huemul population monitoring programme (using the GIS database created on habitat and huemul distribution), establishing survey transects both within and outside protected areas. This is a long-standing objective of the national action plan and would be established as a simple and cost-effective system.
- Environmental education and social research on huemul interactions, to consolidate and develop the embryonic initiatives undertaken so far at a local level. We would seek to increase public interest and awareness of huemul conservation, especially with regard to the threat from illegal hunting and persecution by dogs.

These CONAF-led initiatives require further outside funding support, due to their own limited financial and human resources to manage protected areas which restricts a dedicated focus on a single species. Huemul conservation would thus undoubtedly benefit from consideration of further funding by the Darwin Initiative.

8. Outputs, Outcomes and Dissemination

- OUTPUTS:
Project outputs are detailed in **Table 3** (below), demonstrating extensive technical dissemination and publicity coverage, as well as significant training inputs to various recipients.

- PUBLICATIONS AND DISSEMINATION:
The past year has been very positive for the project's profile in both the scientific/technical and public arenas.

- Scientific/technical dissemination
In the former instance (see **Appendix 1)**, Darwin Project presentations resulted in three articles in the Proceedings of the Fourth Bi-national meeting on Huemul Conservation Strategies, Chillán, April 2002, including on CONAF's and the Huemul Darwin Project's experience of capture, management and conservation and protection in Region XI. Five presentations were also given at the Argentinean park ranger workshop on huemul conservation in Los Alerces National Park, December 2001. All publicly accessible written publications involving Darwin project work are detailed in **Table 4 (**below).

- Public dissemination
At the public level, dissemination has been even more extensive (see **Appendix 2)** through various means:
- Environment Week (June 2002), at which more than 200 people participated, a typical festive weekend (February 2003) and talks to schools in Cochrane: including presentations, poster displays, equipment demonstrations by project personnel and CONAF rangers. These activities were covered in depth by local radio ("Santa María, Patagonia and Río Baker").
- 41 press articles in national and local newspapers, as well as some national and local TV coverage (Megavisión, Rocco channel) and radio interviews: providing a means to convey messages to promote communication with farmers and foresters; expose cases of illegal huemul mortality by dogs and hunters; and disseminate the use of satellite technology and participation of Raleigh volunteers in huemul research.
- Collaboration with the national huemul cycle ride: covering more than 1,600 km and passing through many centres of population, this initiative has sought to raise public and political awareness (through lobbying Congress) of huemul conservation through its web page www.salvemosalhuemul.cl, poster displays, videos, leaflets, radio interviews, newspaper and TV coverage, and distribution of t-shirts (400).
- Local events with farmers: this is a group of great importance to huemul conservation given the scale of negative interactions, with activities including farm visits, preparation of 10 awareness-raising radio programmes including a regional singer "El Malebo", distribution of a calendar and leaflets. CONAF has undertaken to have the radio programmes broadcast on regional stations from May 2003.

Table 3: PROJECT OUTPUTS

Those marked in **bold –** in the 'Description' **–** are as on the **original** project schedule.

Date	Output Code No.	Quantity	Description – Planned Outputs	Observations – Outputs Achieved
April 2002	14 B	1 (3 papers)	Participation in the 4th Binational meeting on Huemul Conservation, Chillán.	Two staff members and a park ranger presented findings produced during the Darwin project.
	6A/ 6B	1,1		Consolidation of field training and data management given to the Chilean vet, María Isabel Vega.
May – September 2002	8	1 visit		Dr. Robin Gill spent 2.5 weeks in Chile for a steering group meeting, review of the data produced and a site visit to La Baguala.
	14 B	1 (5 papers)	Project co-ordinator and 3 park rangers presented findings of Darwin Project.	Participation in a ranger workshop on huemul ecology in Los Alerces National Park (Argentina).
	6A/6B/23	1,2	With EKCT funds (£1,323) a Chilean scientist is supported for 2 Raleigh expeditions.	Amparo Echenique received training in radio tracking, field methods and data management.
	4A/4B	3,4		Training of 3 undergraduate students (PUC and University of California).
October – December 2002	15A/15B	9,16	**National and local press releases in UK and Chile focused on the Raleigh expedition and the Darwin grant**	National articles in *Las Ultimas Noticias, El Mercurio, La Revista del Domingo, El Diario de Aysén,* and *Divisadero n*ewspapers.
	19A/19C	4,5		Radio interviews on local and national radio (*Nuevo Horizonte*, and *Ventisqueros, Agricultura).*
	17B	6		Huemul project information uploaded to the following websites: www.salvemosalhuemul.cl www.huemul.net www.fauna.australis.puc.cl/ www.hajek.cl/ecolyma www.patagoniachile.cl www.vidasilvestre.org.ar
January-March 2003	15A/15B	2,14	**National and local press releases in UK and Chile focused on the Raleigh expedition and the Darwin grant**	National articles in *El Mercurio, El Divisadero* and *Diario de Aysén* newspapers.
	19A/19C	2,6		Radio interviews on *Santa María, Río Baker and La Chilena*.
	18A	1		The national TV channel (*Megavision*) and local TV (*Rocco*) also covered the project research.
	18C	3		
	3/4A/4B	1,3,4	Training on radio tracking techniques.	A vet (University of Concepción) and 3 undergraduate students (Mayor and PUC universities) received training.
	3/6A	4,2		Project personnel in Tamango and Candonga trained INFOR technicians over 2 weeks.
	6A/6B	3,2	**Training for rangers in huemul tracking.**	3 CONAF park rangers received training in June and Sept '02 and March '03.

Table 4: PUBLICATIONS

Type * *(e.g. journal paper, book, manual, CD)*	*Detail (e.g. title, authors, journal, year, pages)*	*Publishers (name, city)*	*Available from* (e.g. contact address, email address, website)	*Cost £*
CD	Workshop on Development of a Conservation and Recovery Plan for the Huemul (April 2002). Incl. Ssummary of Darwin Project presentations.	IUCN Deer Specialist Group (SSC), Montevideo, Uruguay.	Mariana Cosse Deer Specialist Group mcosse@iibce.edu.uy http://iibce.edu.uy/citogenetica/deer/dsgwww/deer_specialist_group.htm)	*N/a*
Book	4th Binational Huemul Meeting Proceedings (March 2003) (*). Incl. Summary of Darwin Project presentations.	CONAF, CODEFF, Las Trancas, VIII Región, Chile.	CONAF VIII Region Gerardo Acosta-Jamett gacosta@conaf.cl	*N/a*
Book (in press). (*)	Argentinean Huemul Conservation Park Rangers Workshop Proceedings. Incl. summary of Darwin Project presentations.	Administración de Parques Nacionales, Parque Nacional Los Alerces, Futalaufquén.	Eduardo Ramilo, Administración de Parques Nacionales (APN).	*N/a*
Journal paper submitted	For publication in Oryx – the International Journal of Conservation: "Wildlife conservation and farming in Chilean Patagonia: opportunities and threats facing the huemul (*Hippocamelus bisulcus*, Cervidae)." *Jerry Laker and Pia Bustos.*		Jerry Laker and Pia Bustos, Macaulay Institute, Craigiebuckler, Aberdeen. AB15 8QH. UK j.laker@macaulay.ac.uk piavicuna@hotmail.com	*N/a*
Poster (submitted)	For the 3rd International Wildlife Management Congress: "The Huemul Project in Chile: Saving an endangered national symbol." *Pía Bustos, Cristián Saucedo and Eleny Montero.*		Cristián Saucedo, CONAF UGPS Region XI, Recinto CONAF, Los Coigues s/n, Coyhaique, Region XI de Aysén, Chile csaucedo@conaf.cl	*N/a*

9. Project Expenditure

Table 5: PROJECT EXPENDITURE (during the reporting period)

Item	Budget (+Yr. 2 under- or over-spend carried forward)	Expenditure

Overall expenditure was close to that originally budgeted for the financial year 2002/03. There remains an underspend which we wish to carry forward to the 2003/04 financial year to be used in the final implementation period (including in the time extension of 3 months, August-October 2003, authorised by the Darwin Initiative). Details of the budget to be displaced to this additional period are to be provided.

Salaries: Expenditure on this element was within 10% of the budgeted amount; the small underspend in this area we wish to utilise during the project extension as well as on temporary employment of a local data analyst (proposed to the Darwin Initiative in email communication dated 15th May 2003).
Travel & Subsistence: Expenditure in this area was also within 10% of the original budget, with the residual underspend proposed to be employed principally in the running of the final conference at the end of the project.
Capital items/equipment: This residual budget line has now been almost entirely spent, although a minor amount remains to carry forward for expenditure on small consumables and maintenance costs it is proposed.

10. Monitoring, Evaluation and Lessons

Internal progress monitoring is the responsibility of the Project Co-ordinator and Steering Group who evaluate the achievements periodically, as reported by project personnel, against the outputs agreed in the original project contract and against the more detailed project technical plan (see **2nd Year Progress Report 2001-2002**, Annex 1). This latter document was partly developed to ensure that specific indicators exist that relate to the project research objectives and activities rather than a suite of generic outputs as are contained in the original project contract. Quantitative output indicators thus exist for the areas of Training, Presentations & Publications, and Publicity (& Events), with a set of additional more detailed targets framed within the context of the technical plan and annual agreed work plans which deal with the timing and scale of project activities. Examples include the number of captured/collared huemules by study area, and the number and timing of subsequent counts of established pellet plots per site.

Communication within the Steering Group is largely by email, although an annual meeting of those involved is held to review progress and issues in greater detail, and update the work plan accordingly. Further review procedures include monthly internal meetings within CONAF, as well as occasional country visits by both the Raleigh Project Officer (Emily Wood) and Technical Director (Dr. Robin Gill).

Project progress is considered to be good overall, with a fuller assessment of research achievements becoming possible as the final phase of data analysis is conducted, although much work remains to ensure effective technical dissemination of the project findings in the final period of project implementation.

The main lessons learned during the past year have included: the importance of environmental education and local community involvement in support of extensive public relations at national and regional level to enhance the impact of the scientific research programme; joint working with other Chilean institutions (both governmental and NGO's); and the significance of Chilean research capacity-building for future biodiversity research by scientists, students and park rangers.

11. Author(s)/ Date

1. **Cristián Saucedo (Project Co-ordinator, CONAF)**
2. **Robin Gill (Technical Director, FRA)**
3. **Emily Wood (Project Officer, RI) & Rich Howorth**

- Coyhaique, Chile & London, UK 21st May 2003 -

APPENDICES

1.**Scientific dissemination:** 4th Binational Conference Proceedings (cover), related articles & leaflets.
2.**Chilean press articles:** national and regional levels.
3.**Figures:**
Figure 1: Study areas and pellet plots in Region XI (Chile)
Figure 2: Radio fixes and home ranges of 2 deer in Tamango (nos. 2 "Mulato" & 06 " Clara Luna")
Figure 3: Radio fixes from 2 deer in Candonga (nos. 0 "Truco" & 12 "Candonga")
Figure 4: Radio fixes from 2 deer in La Baguala (nos. 04 " Chacabuco" & 10 "La Baguala").