Huemul Ecology Research for Conservation Planning

Final Report

August 2000- October 2003

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Darwin Initiative for the Survival of Species

Final Report

1. Darwin Project Information

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

2. Project Background/Rationale

The southern Andean deer (*Hippocamelus bisulcus*), or "huemul" inhabits the southern Andes of Chile and Argentina. It is protected in thirteen Chilean National Parks and Reserves, managed by the Chilean state body Corporación Nacional Forestal (CONAF), primarily in Region XI (Aysén) in Chilean Patagonia.

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 its current population thought to be less than 1,000 individuals (IUCN/SSC Deer Status Survey and Conservation Action Plan, Wemmer 1998). In addition, the species is listed on CITES Appendix 1 and urgent actions are required according to the CONAF Programme for the Chilean Native Flora and Fauna Conservation (1999).
The deer is a flagship species for conservation and the national symbol of Chile, thus its conservation is considered a high priority by CONAF.

An action plan for conservation of the huemul 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 actions and research priorities.
A variety of explanations have been proposed to explain the reasons for the decline and scarcity of huemul. These include habitat loss (mainly conversion of native forest to pastoral farmland), illegal hunting, diseases spread from livestock, predation by puma (*Puma concolor*) and dogs, and livestock competition. The reliability and relative importance of these factors are unclear. Essentially the Darwin project design is a response to this need, particularly as the largest applied study of the Huemul ecology.

The project was developed jointly between CONAF, Raleigh International (RI), Forest Research (FRA), the Macaulay Land Use Research Institute (MLURI) and the Pontificia

Universidad Católica de Chile (PUC), 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 by Chilean and British institutions to the Darwin Initiative in October 1999, funding approval was given in March 2000 and the project formally started in August of that year.

3. Project Summary

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, thus an assessment can be made on the isolation of populations.
3. To assess seasonal and diurnal movement patterns.
4. To obtain estimates for rates of recruitment and adult survival, so as to identify the causes of population changes 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.

A further objective was added and approved by Darwin Secretariat (in July 2001):

6. To promote environmental education and public dissemination focused upon local communities in the project area.

Details of project activities for years 1 to 3 are included in **Annex 1.** Project activities during year 4 are detailed in Table 1 (below).

Abbreviations used in timetables

C – Candonga forestry farm study area, XI Región Chile
CB – Dr. Cristian Bonacic (Pontificia Universidad Católica de Chile- PUC, Chile)
DA – Dr. Dennis Aldridge (CONAF Region XI, Chile)
EKCT - Ernest Kleinwort Charitable Trust, UK
IG - Professor Iain Gordon (The Macaulay Land Use Research Institute-MLURI, Scotland)
INFOR – National Forestry Institute, Chile
LB – La Baguala farm study area, Region XI, Chile
MF - Mathew Foster (Raleigh International-RI, UK)
RN Tamango – Tamango National Reserve, XI Región, Chile (protected and study area)
RG - Dr. Robin Gill (Forest Research Agency-FRA, UK)

TABLE 1. Year 4. Outline timetable of project activities. April - October 2003

DATE	ACTIVITIES PLANNED	ACTIVITIES REALISED	OBSERVATIONS
April – June 2003	**-Data analysis and reporting starts.** -Radio tracking continue in study sites by CONAF.	-Review and checking of data sets lead by Dr. Robin Gill. -Radio tracking in study sites particularly in C and LB. -Project personnel's statement was required by the Judge on the case of the poached huemul. -Writing the text for a Huemul poster for educational purposes. -Huemul census undertook by project personnel and CONAF park rangers at T & LB. -In June, CS organised a co-ordination meeting in Santiago with PUC, CONAF and MLURI researchers.	-Inputs received from other UK and Chilean researchers. -In addition the Judge requested an experts report on the huemul skin evidence found. Press releases on the case. -Objectives were to analyse and discuss the progress achieved on data analysis.
July - September 2003	**-Final data analysis and reporting is completed** - Final conference planning	-Continue with data analysis and discussion on the contents of the final report. -Planning and design of the Final Conference structure -Radio tracking continues in study sites with CONAF. -CS visited the Argentinean Huemul Project for 10 days, to provide capture support in Los Alerces National Park. -Invitations to participate in the Huemul Final Conference were dispersed for a varied audience. Conference details, programme and registrations were available on the IUCN/SSC Deer Specialist Group web page: //www.iibce.edu.uy/citogenetica/deer/dsgwww	-To define objectives, contents and the timetables. -Based on a permanent support between the Darwin and FVSA/APN Project. -Wide dissemination using different means i.e.: local radios, newspapers, web pages, the Huemul network (www.huemul.net) and the Huemul Mountain Forum.
October - November 2003	**-Bi national conference on huemul conservation held in Cochrane, Region XI.**	-A Huemul Darwin Project Final Conference (**Annex 2**) was held in Cochrane (near to the Tamango reserve). It involved 50 participants from different countries. The abstracts of the presentations held at the conference are available in English and Spanish in a CD-ROM produced by the organising committee. It includes power point presentations, pictures, and an updated version of the huemul conservation plan (2003). -Talks and slide shows to disseminate main results obtained by the Huemul Darwin project to schools during the Science and Technology Week (Coyhaique) and after the Final Conference (Cochrane). - Recapture of 2 deer (1 males and 1 female) in LB to retrieve GPS collars and download stored data.	-Wide dissemination pre and post workshop by regional media and web pages: www.fauna-australis.puc.cl www.salvemosalhuemul.cl www.patagoniachile.cl www.elbosquechileno.cl www.vidasilvestre.org.ar -Project publications submitted to the Newsletter of the Deer Specialist Group/SSC/IUCN, Oryx and Chile Forestal Journal (Chilean Forestry News). -Fitting of 2 new VHF collars. -GPS data clearance and input to databases. Work on CONAF GIS.

(*Those activities marked in **bold** as on original project schedule*)

The project enabled Chile to directly address the following obligations under the Convention on Biological Diversity:

Article 8. In-situ Conservation (c)(d)(h), Article 12. Research and Training, Article 13. Public Education and Awareness, Article 15. Access to Genetic Resources, and Article 18. Technical and Scientific Cooperation.

The Darwin project strived to address the lack of information on huemul ecology in Chile and to promote the close collaboration between Chilean and UK partners. The project's objectives were addressed through field research, environmental and awareness activities, creation and management of huemul data bases, data analysis, the organisation and development of a Huemul Final Conference, and finally the permanent establishment and promotion of collaborative work.

Assessment of project objectives

1) The project was successful in monitoring the response of radio-collared huemul to logging operations, demonstrating that avoidance of these operations occurs, including one example of extreme dispersal. Animals normally return to their home range after logging has ceased. This is the first time that effects of logging have been demonstrated on huemul and is an important step towards providing guidance to local government, industry and conservation bodies on the likely impact of forest operations.

Surveys based on faecal pellet counts (in both the study areas and other sites in region XI) were successful in demonstrating that huemul generally avoid contact with livestock, and appear to neither avoid nor associate with guanaco. We however had few opportunities to investigate reactions to livestock through radio telemetry.

2 and 3) Detailed and unique information on huemul movements were obtained. These included seasonal and diurnal movements, measurements of home range size and habitat type characteristics (vegetation type, land use, altitude, aspect and slope angle). Some occurrences of long-distance dispersal were also recorded.

4) Information on fawn recruitment and adult survival and sources of mortality were obtained. These reveal that populations in the study areas are currently limited by a combination of poor fawn survival, predation on adults by puma and poaching. The study also highlights an urgent need for more research on the sources and rates of juvenile mortality and on dispersal.

5) The integration of the land use data with huemul distribution data using the Geographic Information System (GIS) was achieved, by linking the project's data sets and CONAF's existing GIS. It was also possible to add CONAF's available data in non-digital formats. The updating of the GIS has made it possible to identify natural corridors and artificial barriers. It is imperative that the established GIS database is used as the base of a national huemul population-monitoring programme, as well as to assess the likely impact of land use changes and development schemes.

4. Scientific, Training, and Technical Assessment

Research

a.Study sites (Annex 3)

Four main study sites were selected to undertake the research:

1.Tamango National Reserve (TNR) is located to the NE of the town of Cochrane, at 47°11' S, 72°29' W. It was created in 1967 in order to protect south beech lenga (*Nothofagus pumilio*) forest and a huemul deer population. The vegetation of TNR is classified as Deciduous Forest with a mosaic of shrubs (dominated by *N. antarctica*), forest (*N. pumilio and N. dombeyi*) and "old" burned areas (occurred during 1942-45). A large proportion of the area utilised by deer is dominated by steep terrain (23% of the entire area has a gradient of over 45°) and rocky flat outcrops. Mean temperature is 7,6 °C and annual rainfall is approx 805 mm. The 6,925 hectare reserve is surrounded by private sheep and cattle ranches at the north, east and west, and Lake Cochrane and the river to the south and southeast.

2.La Baguala Farm (LB) is located 20 Km east of TNR at the northern border of Lake Cochrane near the Argentinean border, 47°08' S, 72°12' W. In less than two years' time it will be taken under administration by CONAF as a protected area (as an extension of TNR). The area of 1,600 hectares is located in the transition from lenga forest to "estepa patagonica" and is characterised by steep slopes (30% of the area has a gradient of over 45°) with vegetation habitats classified in three main sections.". The lower area is dominated by grasses (*Stipa sp. and Festuca sp*.) and shrubs (*Embothrium coccineum*, *N. antarctica*); in the mid-level patches appear of *N. dombeyi* and *N. pumilio* intercalated with grass, shrub and burned areas. *N. pumilio* in *Krümholz* ("stunted lenga"), burned areas and nude rocks dominate the higher area. In addition to the deer, two other ungulate species are present, the *guanaco* (*Lama guanicoe*) and domestic livestock, who enter freely as the land is unfenced.

3.Candonga forestry farm (C) is 1,200 hectares of private land owned by a logging company. It is located at 46°14' S, 72°26' W. The vegetation of the valley is dominated by lenga (*N. pumilio*) forest with more than 90% of cover. Numerous glaciers are present and the zone is characterised by very steep terrain (60% of all the area has a gradient of over 45°). The entire area was greatly affected by the Hudson Volcano eruption in 1991, this was responsible for the high covering of volcanic ash in the ground (in some areas almost 50 cm).

4.Traiguanca forestry farm (TFF) is a private farm owned by a logging company. It is located at 46°18' S, 72°44' W. Vegetation species are dominated mainly by coigue (*N. dombeyi*) forest with more than 70% of cover with the presence of numerous vegetation species characteristic of the coastal area, lenga (*N. pumilio*) in the mid and high altitude areas. The 1,050 ha. are characterised by a heavy cover understory (80%), very steep terrain and by the volcanic ash cover.

b. Staff

A detailed list of personnel staff involved in the different stages of research is included in **Annex 4**.

c. Methodology

The research activities and methods were decided and agreed as part of the formal Technical Plan (see **Annex 5**) developed by the steering group. Additional activities were included to those considered in the initial proposal, to use as baseline methods in the selected study areas in support of the radio-tracking data.

The primary research field activities undertaken in the study areas were:

1. Site mapping
2. Pellet surveys
3. Vegetation sampling
4. Deer captures
5. Radio telemetry (where applicable)

Huemul capture, collaring and biotelemetry

The capture team (composed of vets & park rangers) now possesses pioneering and valuable experience in huemul captures, including related procedures for anaesthesia. This 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 and Chile.

Capture expeditions entail considerable hard work and effort by the team due to the difficulties of working on a timid and sparsely distributed species that lives in a mountainous and extreme environment. This environment results in difficult access and weather conditions, with lengthy fieldwork excursions required to obtain a single capture. However, the information provided by each collared animal is invaluable and impossible to obtain any other way. The achievement of a total of 23 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 on an endangered species in southern Chile (see **Annex 6** on Huemul Capture results).

During this fourth year, the bio telemetry monitoring of collared deer with VHF, satellite and GPS transmitters provided sufficient information from 1,857 fixes to consolidate a data base linked with the CONAF GIS that includes huemul movements, home ranges & habitat use.

d. Findings

The results reported in this section are a summary. A more detailed presentation of the results is in Annex 6.

The effects of logging operations on huemul

The effects of forest activities were studied in Candonga, where a selection felling was carried out between July 2002 and April 2003. Four huemul were caught in the valley and radio-collared; three in March 2002 and one in November 2002. A total of 166 radio locations were obtained.

The results show that huemul move away from the area during logging operations, but return again when logging has ceased. The effect appears to be most pronounced in the immediate vicinity of logging operations. The movements made by one radio-collared animal included the largest temporary dispersal we recorded during our study. The animal moved approximately 7 km from his normal home range and up in elevation, returning again about 1 month after logging ceased. Other large movements were made by radio-collared animals during logging operations which might have been in response to movement by animals more directly affected by the logging.

We did not identify any harm or reduced performance as a direct result of the logging operations. However long-distance movements in response to logging may expose the animals to risks of poaching or predation, or reduced performance. We recommend that the study be continued to obtain more evidence of avoidance behaviour as well as the aftermath of logging.

Interactions with livestock

The results of the surveys of huemul by Raleigh International revealed that huemul avoid livestock. Occurrence of huemul was greater on sites with steep slopes or in remote locations away from contact with people and livestock

We originally intended to monitor the behaviour of radio-collared huemul in response to the presence or movements of livestock within our study areas. In the event, this proved impractical because most collared animals remained within protected areas and did not come into contact with livestock. Where contact did occur (principally in Candonga), we were unable to co-ordinate monitoring with the movements of livestock.

Further analysis of our data can be done to examine the distribution of radio-locations in relation to the occurrence of signs of livestock, and to vegetation altered by grazing. This may however be hampered by the limited sample size currently available.

The reasons for avoidance of livestock are believed to be due, at least in part, to dogs which are kept by farmers in the region, often in poor conditions (see **Annex 3** on submitted publications for Mountain Research). The majority of the local economies are subsistence, therefore dog food is a considerable cost to farmers. This cost can be reduced by poaching of native species (on huemul as well as carnivores such as *Pseudalopex culpaeus* and *Puma concolor*). In addition, dogs are selected by farmers for their ability to manage domestic animals and to pursue native species. There are many anecdotal reports of harassment of huemul by dogs in the region. Besides the case of poaching, there were two incidents where dogs were reported to pursue radio-collared huemul, one of which resulted in injury.

Interactions between huemul and guanaco.

Interactions between guanaco (*Lama guanicoe*) and huemul are limited since the two species are principally associated with different habitats (lenga forest and estepa respectively) and in geographic range. In one study area (La Baguala), where the two species co-exist, we found no evidence of a positive or negative association between the

them on the basis of faecal pellet distribution. Observations of behaviour made during the study suggest that huemul may benefit from association with guanaco, by being alerted by alarm calls made by guanaco when predators are detected, and also using their established paths.

Ranging behaviour, dispersal movements and habitat selection

Ranging behaviour and habitat selection in huemul were investigated in 3 of the study areas (Tamango, La Baguala and Candonga). Sixteen animals were caught between September 2000 and November 2002 and equipped with radio-collars. Two of the collars included GPS units and one was a satellite collar. We obtained over 1800 radio-locations, approximately half of which were from the GPS units.

The majority of animals had a relatively stable home range and did not undertake long distance movements. For those animals for which we could obtain sufficient radio-locations, average home range size was approximately 400ha (excluding those that under-took long-distance movements). Three animals undertaking long-distance movements (a maximum of 9km) had ranges between 800-1400 ha.

Relatively modest seasonal movements have been recorded. Most animals do not appear to move home range position (in latitude or longitude) between summer and winter. In some cases huemul will use higher elevations in summer than winter, and average seasonal differences in elevation of up to 300m have been recorded. However huemul do not undertake these movements at all sites and some individuals do not conform to the general pattern within any one site. The two animals with GPS collars also showed some tendency to make nocturnal movements down slope.

Both temporary and permanent long-distance dispersal movements of up to 9km have been recorded. However, too few examples of these movements have occurred for any general conclusions to emerge.

The fact that adult huemul have a relatively small and stable home range, and exist at low densities suggests that breeding population size may be very low in many areas where they occur. Dispersal is likely to be undertaken by sub-adults, but more information is needed on these movements to be able to assess the degree of isolation that could occur amongst huemul populations.

Data on group size and composition revealed that huemul form into larger groups in winter. Group size (particularly of females) differed between study areas. The home ranges of radio-collared animals typically partially overlapped those of other individuals in the area. The composition and interactions between these individuals are being analysed.

Habitats selected by huemul included Lenga forest, Rocky sites and open shrubs and habitats avoided included grassland and steppe (pampa). However there were significant differences between individuals in the pattern of habitat selection.

Estimation for rates of recruitment and adult survival

Monitoring of the radio-collared animals yielded information on survival rates and sources of mortality in huemul. Six adult radio-collared females were monitored for up to three breeding seasons, making it possible to assess the fate of fawns produced during 12 breeding attempts. Of these, only 3 survived to the age of one year, suggesting a recruitment rate of 0.333 fawns per adult female per year. Three of the fawns were known to be killed by foxes.

The radio collars were equipped with mortality sensors, making it possible to locate a dead animal and in some cases identify the cause of death. Of the sixteen animals that could be tracked for a reasonable length of time (2-37 months), four were found dead. One was killed by a poacher, two by puma (2), (one after being injured by dogs) and a fourth drowned, sometime after being chased by another male. The rate of fatalities of the marked deer yields an annual adult survival rate of 0.837.

A simple population model shows that the rate of population increase implied by these survival rates is 0.979 (r=-0.021). A sensitivity analysis revealed that population growth rate is most sensitive to changes in adult female survival. The estimate of 0.979 for population growth rate is lower than previously reported for the species and shows that in our study areas huemul are barely able to maintain their numbers. This is not encouraging, given that most of the marked animals are living in protected areas, and are relatively well protected from poaching. The reasons for the low rate of increase are due to a combination of adult mortality and a low rate of juvenile recruitment.

The data we have available on the population dynamics of huemul is limited and the results should be regarded as preliminary. So far we have also not been able to obtain information on survival rates of animals between one and two years old. This age class is likely to include dispersing young animals, and in most ungulates their survival rates are lower that those of adults. Information on the rates and causes of mortality of fawns and sub-adult huemul is now urgently needed to develop an adequate understanding of the factors limiting huemul populations. We were able to determine the fate of some of the fawns born to collared females, but much more accurate information about the cause and rates of fawn mortality could be obtained if the fawns themselves were marked.

Surveys for huemul in region XI and integration of data using GIS

Surveys for huemul (based on pellet counts and other signs) have been carried out by Raleigh International in Region XI since 1996. A consistent methodology was adopted on all these surveys since 1996. The results from these surveys have now been compiled and analysis begun. Results reveal that huemul have a very localised distribution, favouring steep slopes and avoiding areas used by livestock. Use of terrain differed between sites.

Data on the distribution of huemul from these surveys and other sources including CONAF's data have been digitalised. In addition, observations obtained during radio-telemetry and vegetation assessments during this project were geo-referenced using GPS receivers (see annex 5). Data sets were prepared for use on a Geographic Information System (GIS) (Arc View 3.3™/ESRI) A total of 270 Megabytes (50 MB in data sets) were generated and stored, and are available in CD-ROM format.

Altogether, sixteen layers of information have been assembled:

1.Grid reference
2.Cities and towns
3.Main roads and paths
4.Rivers, lakes, lagoons and glaciers
5.Altitude
6.Aspect and slope
7.Land property (private and governmental)
8. Protected area borders
9.Vegetation types
10.Habitat types
11.Logged areas
12.Huemul presence (records and sightings)
13.Huemul populations monitored by the Darwin project
14.Huemul movements (fixes of collared animals: ranging behaviour, dispersal patterns)
15.Transects (huemul and guanaco)
16.Vegetation plots
17.Pellet plots

GPS records were standardised according to the following geodesic variables:
Map Datum: South America-69 (SAM-69)
Projection: UTM (Universal Transversal Mercator)
Time zone: 18 South.

Some practical applications for the Huemul GIS database include:

-A first step towards assessing the degree of isolation of huemul populations in relation to the network of protected areas and to identify natural corridors for the species.
-To support decision makers and government policies (*e.g.* to assess impacts of land use changes and plans, development schemes, concessions, private and productive projects).
-To integrate long-term huemul data sets (presence, abundance, sampling, research, etc.).
-To help in detecting where there are gaps in huemul information.
-To allow a better focus of the available resources..
-To provide support to other local initiatives (*e.g.* FVSA-CODEFF) focusing on huemul distributional range analysis.

The current GIS database has some shortcomings, which need to be addressed to improve accuracy. The main aspects are with regard to the livestock and grazing activity, specifically the distribution of domestic livestock, and identification of seasonally grazed areas.

Finally, some future challenges for of the GIS database are:
1.To improve the huemul distribution databases with information that will be obtained by CONAF and other sources in the future.
2.To add other relevant information (livestock uses and government concessions).
3.To make use of survey data to develop better predictions of huemul distribution and habitat suitability (prediction of presence and trends).

Environmental education and public dissemination

Raising public awareness is a significant concern given the nature of the main threats to huemul in Region XI. Therefore many efforts have been made to reach local communities (including farmers and foresters), with a focus on informing them of the 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.

Numerous activities were developed for the Chilean community (local & regional) and have included radio programmes, meetings, poster displays, video showings, the design and distribution of leaflets and posters, talks (schools, cultural centres, scientific and book fairs), guided visits to huemul protected areas, web site dissemination, and local press releases (**Annexes 12 & 13**).

The national huemul cycle ride from Coyhaique to the National Congress (covering 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. It was a pioneering event in the biodiversity conservation field in Chile. A plan of action (**Annex 14**) was handed to the Chilean Congress (Chamber of Deputies and Senators) at the end of the ride and is now being followed up through the political lobbying process. 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.

Considerable scientific and academic conservation interest (both nationally and internationally) has been aroused as by the variety of presentations made, student volunteer involvement and the organisation of the huemul Darwin Final Conference.

Huemul and native species protection in Chile has been greatly enhanced in working with SAG to pursue the first ever court prosecution of a case of the illegal killing of a huemul by a local farmer (gaucho) to feed his dogs. This case received significant regional and national media publicity.

The huemul is now a permanent feature of discussions and disseminations by the national community. This is as a the result of project initiatives and involvement.

In November 2003 the project accepted an invitation to begin the management and redesign of the web site: www.salvemosalhuemul.cl, originally created for the huemul cycle ride. Using this mean the project will disseminate the Darwin project issues, including the scientific results, images, basic information on the natural history of the species for students, an update of the species conservation plan, press releases, bibliography, and it will invite other huemul conservation initiatives to include their current activities and news. Currently, the site is under construction.

Planned research publications

A number of publications on project findings (including those produced with collaborators) are currently being undertaken. They are to be submitted to peer and non-peer review journals. They are included in **Annex 15**.

- Training and capacity building activities

A complete overview on training activities is described per project running year.

When the project started the first training session (one day) took place at Auchtermuchty, Scotland, run by John Fletcher for Pía Bustos (MLURI) and Robin Gill (FRA) on the use of the dart gun, anaesthetic drug(s) and antagonists selected, and deer physiological response. Alternative drugs and their availability were also discussed.
A practical exercise took place working with two red deer, including taking blood samples and applying antagonists.

Trainees in Chile were selected amongst the project personnel (Darwin project and Wellcome Trust project) and CONAF staff (park rangers at RN Tamango).
Methods of capture, handling, radiotracking and vegetation and pellet surveys were drawn up in collaboration between UK and Chilean researchers. Mike Thomas (independent deer expert) ran training sessions in huemul capture and radio tracking in Chile for five days, for three Chilean veterinary researchers (Cristián Saucedo, Pía Bustos and Eleny Montero) and three park rangers at RN Tamango (Hernán Velasquez, Javier Subiabre and Tomás Ormeño). The topics covered included different capture methods, use of the dart gun (pressure cylinders & telescope) and darts (use and charging), selection of darting target sites in deer bodies, use of anaesthetic drugs (alternative drugs, doses, risks and safety measurements), and use of radio telemetry equipment (receivers, antennas and radio collars). During these sessions artificial targets were selected for practice, with training on distance estimation in the field also given.

In the second year of the project training sessions on captures and fieldwork methods were developed by RG in April 2001 at Tamango. Sessions were refreshed for three Tamango park rangers (Hernán Velasquez, Javier Subiabre y Tomás Ormeño), two Chilean veterinary researchers (Eleny Montero and Cristián Saucedo) and a Chilean PUC student (Cristóbal Labbé). These training sessions were a detailed review of:
-Dart gun properties and functions, use of the rangefinder, selection and use of darts.
-Capture procedure (stress management, animal handling under anaesthesia and monitoring).
-Evaluation of radio telemetry equipment.
-Review of field methods (transect lines- vegetation and pellet plots; site mapping and radio tracking).

In November 2001 project staff ran two training sessions for Eladio Ramírez, CONAF park ranger from Chillán (VIII Region). He visited the project and study areas for nine days to learn the radio-tracking and field methods employed.

In December 2001 René Millacura was trained by project staff members in the use of radio-tracking equipment and data collection methods prior to his involvement in fieldwork.

In January 2002 the project team invited Gerardo Acosta, a vet from CONAF VIII Region, responsible for local huemul conservation and recovery project, to participate in huemul captures. He had a keen interest in the capture aspects of evaluating the possibility of establishing a huemul translocation programme to support the northern huemul population. During his 15-day visit he participated in three captures and in the radio telemetry monitoring.
María Isabel Vega, a Chilean vet, participated in the fieldwork during February and March 2002, through a bursary program provided by EKCT. Training was provided by project staff on the use of the radio tracking equipment, as well as general research method procedures.

In the third and fourth year, training sessions on project fieldwork methods, particularly 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 joined project personnel to become involved for 3-4 of weeks in fieldwork activities. This level of volunteering in Chile is 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 in Tamango for 3 new CONAF park rangers who are working in protected areas with a huemul presence, and will participate in future monitoring activities in the study areas. Lastly, training was provided to INFOR professionals in huemul identification, signs and habitat preferences, to enable them to conduct a baseline study of a new 27,000 ha. forestry concession.

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

The individuals that were trained in the third and fourth years are included in **Annex 16**.

During the last stage the Project Co-ordinator in Chile received training from Dr. Gill in the field of database management (including monitoring that the information is correct, and how to eradicate any potential errors) to enable the necessary statistical analysis.

The project co-ordinator of the Argentinean Huemul Project is in regular contact with Darwin Project staff to exchange knowledge and technical advice. The Darwin project co-ordinator participated and supported a 10-day capture expedition in Los Alerces National Park to transfer practical experiences and knowledge acquired during the Darwin project.

Local capacity has greatly increased, in terms of experienced, equipped and trained personnel in huemul research (rangers, vets, biologists, students), highly motivated staff, databases established (management, feeding and GIS), administrative management, public and relationship management (authorities, academics, NGO's, media, etc…).

5. Project Impacts

The project achievements provide answers on aspects of huemul ecology, motivating their inclusion as specific objectives and in the design of the study carried out.

Then, it is possible to evaluate as considerably positive the information produced over the project work.

The affirmation is based on two main points; firstly, the evaluation of the steering committee based on the activities proposed by the Technical Plan against the data and results obtained. Secondly, participants that attended the huemul Final Conference, who were impressed with the numerous advances on the knowledge of the species ecology, accomplished in a relatively short period of time by the Darwin funded project. In addition, new questions and hypotheses emerge from the results and achievements obtained to date.

The inclusion of environmental education and public dissemination, as an additional project objective, was a response to the need to approach the local and national community regarding project activities and huemul conservation issues. The response and attitude detected and the link established with the scientific research was fundamental to make a wider approach following the model of other conservation projects.

Other unexpected results derived from the achievement of objectives were those related with:

- The illegal hunting of the huemul (and related issues).
- The close work and response to the project by people from logging companies.
- The generation of huemul genetics and health/ sanitary data (**Annex 17**).
- The experience achieved on capture and management, widely recognised as leading in Chile and Argentina.
- The production of environmental education materials (poster, leaflets, etc…).

From a critique review, in some cases the achievements could have some limitations in terms of limited sample sizes. It is important to remark that the study was developed on an endangered species that shows very low densities (1.2-5.4 deer/ Km^2), with a shy behaviour (not approachable), occupying steep slopes, in remote areas with difficult access and against weather limitations characteristic of the extreme environment inhabited by the species.

The project helped Chile to meet its obligations under the Biodiversity Convention (CBD), particularly on the five following articles:

1. **Article 8**. In-situ Conservation (c, d, h),

2. **Article 12**. Research and Training

3. **Article 13**. Public Education and Awareness,

4. **Article 15**. Access to Genetic Resources, and

5. **Article 18**. Technical and Scientific Cooperation.

The project focused on the huemul as a key large herbivore species in the South American temperate rainforest ecosystem. It enabled Chile to develop its first successful experiences with regard to direct management of a species' individuals, as well as to obtain basic data. The project provides information on key issues to identify its habitat in

and outside protected areas, in order to develop conservation strategies to ensure the survival of viable populations in the long term.

In addition the understanding of the huemuls basic ecological requirements will allow the national authorities to take actions to control and to prevent the introduction of competitor species such as the red deer.

Flagship species characteristics were employed to promote the protection of the habitats that the huemul inhabits. The habitat is the temperate forests of Chile and Argentina. The WWF has classified these environments in the top 200 areas where the Earth's biological wealth is most distinctive and rich, and therefore where conservation efforts should be concentrated.

Huemul research is a priority for Chile, as highlighted in the species conservation plan. The research priorities are listed and detailed in the national plan. The financial resources to carry out such work are not available within Chile, requiring outside funding support to be sourced.

The project enabled Chile to undertake a major theoretical and practical exercise, employing new and applied technologies and research methods under the guidance of UK based experts on ungulates, bringing together key institutions in wildlife conservation and research from both countries.

The training on research issues provided by UK professionals to project staff and rangers, which was subsequently transferred to volunteers and collaborators (students and professionals), enabled the establishment of an expertise in the study of ungulates in Latin America, and especially of the huemul in Chile & Argentina.

The project developed numerous initiatives to promote public education and awareness of the Chilean and international community. They were mainly focused on the importance and measures required for huemul conservation, its habitat, and biodiversity in general.
In order to achieve this objective a wide variety of means were employed, such as:

- Local press releases & TV features.
- Radio programmes, meetings, poster displays, video showings, leaflets and posters distribution.
- Internet dissemination (Web related sites: conservation, deer, research, fauna).
- Talks (logging camps, farmers, schools, cultural centres, community & scientific events).
- Political lobby with National Congress (during & after the cycle ride).

During its lifetime the project was able to maintain these different activities, particularly at the national and local level. They were focused on different actors within Chilean society: the community in general, media, politicians, industry (i.e. farms industries and forestry companies), universities, academics governmental and non-governmental institutions.
The participants of the Huemul Darwin Conference recognised the unprecedented presence of the huemul as a matter of education and awareness as one of the project's major outputs at the national level.
In effect, the experience and information gained in this arena will enable the discussion and design of suitable strategies and actions to be included in future initiatives.

It was the first time that genetic samples of the species were obtained under a wide partnership international collaboration research programme, which included scientists and institutions from the UK, Chile, Uruguay, and the US.

The analysis and management of the samples were carried out under Chilean (*e.g.* SAG permissions) and international regulations (*e.g.* CITES authorisations).

There was a notable involvement of the IUCN/SSC Deer Specialist Group, through the active participation of its Chairman, Dr. Susana Gonzalez (IIBCE Cytogenetic Division, Uruguay). In addition Dr. Gonzalez provided training (3 weeks) to a Chilean Masters student Alfonso Jara (University of Concepción) in laboratory genetic analysis of huemul samples. The major objective of this initiative was to promote local capacity in Chile, by way of training a young biologist to carry out such work. This collaboration is a strong base to continue the progress on huemul genetic research, which is only just beginning. It is fundamental to extend the programme to other Chilean regions (with northern populations) and simultaneously to increase the number of samples obtained in Aysén.

The project constitutes a collaborative model on how scientists from different countries can be involved in huemul research, crossing regional, national and institutional borders. The result was a widely scientific and technical cooperation leaded by the UK researchers, who enabled Chile (particularly CONAF XIth Region) to increase and develop its capacity in terms of human and institutional capabilities in the field of huemul conservation.

It is remarkable that researchers from other regions of Chile, Argentina, Uruguay and the US were also actively involved. The different participants were able to provide their expertise in different arenas to support the achievement of the collaborative goals.

The project has provided the opportunity to develop a cooperative programme of research and the development of technology and capacity (professional and institutional). The major challenge of this established collaborative network will be its sustainability. Perhaps the advances to date and agreed interests in huemul conservation research constitute key elements to achieve this .

As a result of the Darwin Final Conference, the Huemul National Species Conservation Plan (HNSCP) 2003 was discussed and updated in the light of project results, and actions and priorities reassessed. It was decided to develop the plan into a more active programme with the nomination of a follow-up committee.
The first meeting of this committee was held in November in 2003 in Santiago (Chile) with the involvement of CONAF, SAG, universities, researchers and NGO representatives. Some of the main points discussed and agreed on were:

1. The need to widely disseminate the current updated version of the HNSCP (by different means).
2. To compile information produced on the species until date.
3. To have at least two meetings per annum.
4. The creation of a huemul newsletter to widely distribute. Its first edition will include a description of the action plan.
5. To analyse the possibility of the HNSCP publication and sale to generate funding for research into the species.
6. The necessity to include mid term goals and activities for each of the planned outputs.
7. The next committee meeting is planned for April 2004.

During the first quarter of 2004 the main objective of the committee will be to review the plan as a whole and reassess it according to the national scenario and funding viability, moving the plan from theory to practice completing a detailed review of its priorities.

In addition, the project lead to the compilation of the formal document: A National Proposal for the Huemul Conservation in Chile (**Annex 14**). It includes a complete review of the species conservation issues and some of the main action points (political, legislative, administrative, funding, research) required to ensure its objective.
The proposal was submitted to special sessions of the environmental commissions of the Chamber of Deputies and Senators.

The proposal to declare the huemul as a **Natural Monument** – a special protection category- was exposed to the National Congress, governmental bodies (Ministry of Agriculture - CONAF & SAG) as well as for NGO's (CODEFF) at the end of the cycle ride. Now the proposal is awaiting the review and approval of the Agricultural Minister. If this happens, the species will have an additional legal protection that could mean some limitations to human related activities.

6. Project Outputs

The project achieved all but three of the sixteen original outputs in the agreed schedule (the three were related to the UK media - local press releases, national & radio interviews). In addition, fourteen outputs were achieved, totalling 27 outputs covering training, research, dissemination and physical topics. A list of the project outputs is detailed in Appendix II. The main materials produced that can be publicly accessed are listed in Appendix III.

The information of project outputs and outcomes will be disseminated by a variety of means (see 4d. Environmental education, public dissemination & planned research publications section). Given the nature of the collaborative work, links and interest of CONAF, FRA and RI, the former two will take the responsibility to develop this material after project completion. Both institutions have staff who have been involved since the original project design-Dr. Robin Gill (UK) & Dennis Aldridge (CL)- that will be responsible for this task.

A fraction of the associated costs of the initiatives to disseminate project results could be included in the current budget programme and activities of both institutions. Small funding applications will be submitted to cover any additional needs.

7. Project Expenditure

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

Overall expenditure was close to our budget allocations for the period 01 April- 31 Jul 2003, the final stages of the project.

Salaries: Expenditure was within 10% of the budgeted amount.

Travel and Subsistence: We have an underspend in this budget line just beyond 10%.

Capital items/ equipment: We have spent the majority of Year 3 underspend in this budget.

8. Project Operation and Partnerships

As originally planned, two main Chilean partners were involved in project activities and development: CONAF XI Region and the Pontificia Universidad Católica de Chile (PUC). Both played a key role in maintaining links with project participants. They were involved jointly with the UK partners (RI & FRA) at the steering committee meetings and electronic discussions, for project planning, implementation, monitoring and updating.

The major responsibility of project management was handled by CONAF, given that the Chilean Project Co-ordinator and researcher was based at its offices. PUC were most heavily involved in the first half of the project.

CONAF is responsible for protected areas and wildlife management in Chile. It coordinates the majority of the initiatives related to the huemul conservation in Chile. As such it constitutes as the principal client for this project.

The PUC and its Faculty of Agriculture and Forestry lead by Dr. Bonacic is a research and academic group. Its main purpose is the development of applied research to address conservation issues of wildlife species in South America and particularly in Chile. It was the main source of Chilean wildlife biologists (DVM's Pía Bustos & Eleny Montero), thesis students and volunteers to carry out field research. Also it provided support in technical aspects.

Other non-planned partnerships were the involvement with other Chilean government agencies as SAG (the State Agricultural and Livestock Service), INFOR (National Forestry Institute of Patagonia), and NGO's such as CODEFF (National Committee for the Defence of Flora and Fauna).

The project has established a link with similar projects in Chile and Argentina, which are detailed bellow. The project also actively participates in all the initiatives lead by the Chilean Biodiversity Strategy Office (see Chile point 6).

Chile

1. 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.

This project, funded by the Welcome Trust, has investigated the interactions between huemul and other ungulates, focussing on habitat use and health of huemul based on blood and faecal samples & their lab analysis (**Annex 17**). The project members - Iain Gordon, Cristián Bonacic, Pía Bustos and Eleny Montero - were also involved in the Darwin Initiative project, and thus the two projects have agreed to work collaboratively. Project fieldwork ended in July 2001. Huemul Darwin Project collaboration included collection of blood and faecal samples during captures. Joint publications are currently in process of writing-review.

2. Huemul Conservation in VIII Region (Nevados de Chillán)

This project is aimed at studying and monitoring the northernmost population of the species in Region VIII, and has been developed over many years by CONAF (including DVM Gerardo Acosta- GA) and CODEFF with the participation of Dr. Anthony Povilitis (University of California, USA).

This population is small and completely isolated from the species' main range. It is hoped at some stage to translocate some animals from the Region XI to supplement populations in the Region VIII. Discussions have taken place with the project researchers as to the practicalities and difficulties of capturing huemul found in Region XI and VIII.

In November 2001 and January 2002, Eladio Ramírez (Park ranger) and Gerardo Acosta (DVM), respectively, from CONAF Region VIII, visited study sites and participated in Darwin project activities and fieldwork. In addition, GA took part and was an active collaborator during the first capture expedition to La Baguala in January 2002.

Experience and scientific information about capture methods and genetic results are currently available to evaluate the feasibility of these translocations as a potential management tool. They were presented during the fourth binational meeting (organised by CONAF and CODEFF) developed in Chillán (2002).

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 Co-ordinator 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, which will result in joint publications (**Annex 17**).

4. Pontificia Universidad Catolica de Chile (PUC) project

Two thesis students of PUC (supervised by Dr. Cristian Bonacic) were involved in a huemul dietary study based on faecal microhistology, using some of the Darwin project study areas. During May-July 2001 (Cristóbal Labbé) and January-April 2001 (Daniela Sierralta) worked on sample collection to assess the huemul winter/ summer diet, as well as assisting with radio tracking and participated in the first set of captures at Tamango.

In addition, the Darwin project experience on the management of the huemul is employing as a model for the project developed by PUC in the North of Chile entitled: *Ecology and behaviour of the taruca (Hippocamelus antisensis) in Putre,* which is funded by Wildlife Trust (USA).

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.

6. 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 three workshops in July-August 2002 to develop the Biodiversity Regional Strategy and Action Plan for Biodiversity (part of a wider national initiative).

b. **SAG** (Servicio Agrícola y Ganadero, the State Agricultural and Livestock 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** (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.

7. Museo Nacional de Historia Natural (MNHN), Santiago

Co-operation exists through the collection of material (bones and skulls), by project staff and park rangers, for Juan Carlos Torres-Mura (Zoology Curator) of the Santiago museum. No material is presently held there and it is required for both display and as reference material in archaeological studies. In return, MNHN are to provide assistance with constructing a complete huemul skeleton for display in a proposed visitor centre to be established at Tamango.

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

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

Argentina

1. Argentinean Huemul Project

This project is funded by the Wildlife Conservation Society and supported in Argentina by Fundación Vida Silvestre (FVSA) and Administración de Parques Nacionales (APN). Studies are concentrated on aspects of huemul ecology, such as interaction with red deer, habitat use and the determination of important huemul populations in Argentina. The Argentinean research team visited Darwin project study areas with CONAF personnel to discuss collaboration and the practicalities of huemul capture and radio telemetry methods.

It is imperative that fact that staff members of the Argentinean Project are in continuous and close contact with the Darwin Project staff to exchange knowledge and technical advice. Both projects stimulate the proactive involvement of park rangers, technicians and professionals of both countries to organised conferences and workshops.

Based on Darwin project advice, Argentinean researchers decided to employ GPS transmitter collars in an attempt to monitor some huemul populations affected by livestock and human activities. It is the first attempt to capture huemul in that country for scientific purposes. Their project has requested the support and participation of the Darwin Project Co-ordinator in two huemul deer capture expeditions that were unsuccessful (due to shy individuals) However this was an opportunity to share practical field advice and experience.

Several national and international partners participated in different project activities during the research. The main partners are listed in a Table in **Annex 18.**

The completion of the Darwin project did not constitute a reason to end the established collaboration links amongst local partnerships. Quite the opposite, these institutions are currently planning, discussing and trying to develop new initiatives focused on huemul conservation in accordance with the development plan for southern Chile.

All the institutions are permanent regional actors involved in the process of discussion and decision-making with regard to biodiversity strategies and governmental activities. The majority of them are governmental institutions.

It is necessary in the mid and long term to proactively involve the local community (especially farmers, "puesteros" & "gauchos") to increase awareness of huemul protection. Also, the continuity of the educational initiatives in local schools (rural and urban) – including a particular emphasis on teachers - should be developed by local partners to achieve an increase in participation and involvement of the community in the national species conservation plan.

It is worth highlighting the fact that the project was able to obtain the attention and involvement of local private logging companies (and its staff - managers, field workers, etc…) on the research, discussion, and management decisions on private land where the interaction of the species with this human activity occur, and will continue to occur, in the region. It is the first time in Chile that such private actors were actively included in a research and conservation project. Clearly, this experience should be considered for future activities to incorporate the perspective of other sectors such as logging, mining, farming and other development schemes.

9. Monitoring and Evaluation, Lesson learning

The project was coordinated by Raleigh's London-based Projects Office, with a full time Chilean Project Officer based at CONAF's offices in Coyhaique. The Project Officer was actively involved as a field researcher, administrator and joined other wildlife biologists to supervise and manage Raleigh-supported fieldwork. The Raleigh Project Office was responsible for financial monitoring and control, and reporting to the steering committee throughout the project.

Members of Raleigh's Projects Office (Richard Howorth and Emily Wood) and the Technical Director travelled regularly to Chile to hold review meetings with local key partners. These visits proved to be good opportunities for face-to-face dialogue to address outstanding project's issues.

Overall project direction was provided by a steering committee of the leading huemul experts, consisting of Dr Robin Gill (UK Forest Research Agency), Dr Iain Gordon (Macaulay Land Use Research Institute, UK), Cristian Bonacic (PUC & WildCRU, University of Oxford), Dennis Aldridge (Head of protected areas & wildlife, CONAF, Region XI and national coordinator for huemul conservation). The constitution of this committee was responsible for following the achievement of actions and forward planning for each year of the project. This was a key element for project monitoring and evaluation.

A clear set of action points and responsibilities for each team member were produced early (during the first co-ordination visit to Chile by UK partners), just after the selection of the project personnel. Internal progress monitoring was the responsibility of the Project Co-ordinator and Steering Group who evaluated the achievements periodically, as reported by project personnel, against the outputs agreed in the original project contract and against the Technical plan.

The Technical Plan constitutes the main practical basis by which to track progress internally, including planned fieldwork and outputs. This document was developed to ensure that specific indicators existed that relate to the projects research objectives and activities rather than a suite of generic outputs, such as those contained in the original project contract. Quantitative output indicators thus existed for the areas of Training, Presentations & Publications, and Publicity (& Events). There was also a set of additional more detailed targets framed within the context of the Technical Plan and agreed annual work plans which deal with the timing and scale of project activities. The measurement of these indicators was principally the responsibility of the Technical Director, in considering their significance and any need to revise the original Technical Plan.

Communication within the Steering Group was largely by email, although a total of seven meetings of those involved were held to review progress and issues in greater detail, and update the work plan accordingly. Further review procedures included monthly internal meetings within CONAF.

Project achievements were considered to be good overall, with a fuller assessment of research goals becoming possible now that the data analysis has been conducted. Some work remains to maximise an effective technical dissemination of the project findings, in addition to those initiatives developed to date.

No external evaluations were carried out during the projects lifetime, perhaps during project monitoring activities this would have been possible to undertake. In addition, the Huemul Final Conference organised by the project provide an excellent opportunity to receive inputs and objective evaluations from other actors based on the project's expected outputs against those presented as final results & findings.

At the end of January 2004 a final internal evaluation of the project is planned amongst project partners, which will support and provide key elements to be included in the discussion and design of the post project funding proposal to be submitted for Darwin.

As mentioned before, the project will be evaluated by the constituted CONAF committee for follow-on the national species plan considering that Chilean conservation strategies for the huemul are currently in discussion to decide the next steps. Partners related and non-related directly to the project will participate in this exercise.

The main lessons learnt during the project to date are summarised here:

- Ensure links with partners are strong before you start, both at national (if possible) and local levels.
- Sign agreements or Memorandums of Understanding (MoU's) between project partners early on in the project to ensure each partner has their terms of reference (**Annex 19**).
- Detailed co-ordination of project partner activities and individual team members, researchers and other stakeholders to jointly deliver the project objectives.
- Ensure the project has a host-country facilitator / co-ordinator, with significant commitment and time to dedicate to the project (preferably salaried)
- Ensure full participation and ownership of the project by host-country collaborators.
- The importance of the Technical Plan to support project decisions and activities, as well as a basis to detect difficulties and develop alternative exit strategies.

- The need for a frequent internal monitoring exercises to detect issues at an early stage and develop alternative strategies where necessary.
- Close supervision of data collection and quality to ensure consistency and adherence to protocols.
- Thoroughly check all project timings so that problems of climate, national holiday etc. do not occur.
- Look for funding support to add value to the core of the Darwin Initiative project.
- The necessity to report, involve and work closely with the other Chilean institutions (both governmental and NGO).
- The importance of information dissemination and environmental education at both the local and national level, including the scientific and local communities to enhance the impact of the scientific research programme and activities.
- The significance of Chilean research capacity-building for future biodiversity research by scientists, students and park rangers on ungulates & endangered species.

10. Darwin Identity:

All equipment (field & vehicle), project materials (record sheets, abstracts, news, posters, calendars, leaflets, etc…), events (final conference), presentations (talks, abstracts & power point presentations) included the Darwin Initiative logo in reference to the funding and support provided. As well including a briefing on why the Initiative is funding the project and its main objectives. The Final Conference was held under the banner of the Darwin Initiative with speakers using the DI pin, and a poster display on the Initiatives principles, aims and funded projects. Also VHS videos were widely displayed and given as a present for some Chilean institutions and researchers.

This was an agreed compromise between project partners included in the Memorandum of Understanding signed that explicitly say:"…All public relations activities carried out in relation to the Project will mention the project name "Huemul ecology research for conservation planning in southern Chile", as well as the names of the two principal project partners Conaf and Raleigh International, in addition to acknowledgement of the financial assistance provided by the Darwin Initiative for the Survival of Species and inclusion of their logo."

The project follows the strategy to have a shortened name: "Huemul-Darwin project" to be more familiar and manageable in the host country and providing an opportunity to explain the reasons for this name widely. It allowed the project and its staff (technical director, project co-ordinator, researchers and training students) to become known at governmental and non-governmental, political and community levels as Huemul-Darwin associates. As practical example, all offered bursary opportunities for training people were publicised as possible by the existence of the Darwin support, which was acknowledged by all those involved.

The described strategies enabled a wide dissemination of the importance of Darwin Initiative support for conservation in Chile, particularly on the huemul. The project was able to generate extensive national interest and expectations from other institutions and individuals (universities, NGO's, students, politicians and local communities) who are concerned with huemul conservation and research efforts in Chile, who manifested concerns and interest in the future of these efforts.

The project is clearly recognised as an unprecedented leader in the field of wildlife research and conservation in Chile, especially in the huemul and ungulate circles in the Southern Cone of South America. Without Darwin funding this work would not have happened, given the fact that resources for conservation of the huemul were historically limited .

It increases considerably the challenges and goals for future biodiversity research endeavours in Latin America, particularly in huemul distributional range.

11. Leverage

The resources provided by project partners (local and UK) are included in the original proposal and in the Memorandum of Understanding (**Annex 19**) of the project.

The project, during its development secured additional funding to support some activities and items that were not planned in the original proposal. They include:

- CONAF: provided funding for the construction of a refuge for researchers and park rangers in La Baguala.

- Pontificia Universidad Católica de Chile: provided support with field equipment, lab materials and analysis.

- Chilean Applied Ecology Centre (CEA): who donated a new radio-satellite collar transmitter and funding for a two-year period for downloading the satellite data tracking.

- National Forestry Institute of Patagonia (INFOR, Chile): who provided personal and logistical support for field expeditions.

- Ernest Kleinwort Charitable Trust (EKCT, UK): provide funding for the participation (travel airfares, subsistence and funding for field equipment) for four scientists (3 Chilean and 1 British), who received training and subsequently supervised Raleigh expedition fieldwork, and gained experience in field research and data management.

- Biodiversity Aysén Project (European Commission): provided funding (airfares, subsistence and funding for field equipment) for the participation of a Chilean undergraduate student.

- Idea Wild (USA): provided field equipment (VHF radio receiver, software for radio programming, a photographic camera and three pairs of binoculars).

UK partners stimulated a positive discussion prior to project completion focused on a short to medium-term research perspectives on the potential of the project to continue obtaining ecological data, which could support planning decisions in Chile. As initial outputs of this exercise, three short-term small follow-on funding bids (including to the CONAF central offices, DEFRA/FFI Flagship Species Fund, and The People's Trust for Endangered Species) have been made with unsuccessful results. The UK partners, in conjunction with CONAF, established contact with The World Wildlife Fund-UK, Rufford Foundation, Conservation International, The British Embassy, and The Wildlife Conservation Society to search the feasibility for funding huemul research, but no responses have been received to date. This is a critical issue to be resolved, especially for CONAF as the nationally recognised leader on huemul research and conservation.

12. Sustainability and Legacy

The project achieved a high profile over the three years in both scientific/technical and public circles. Raising public awareness was a considerable achievement at national level, particularly in local communities.

The impact of the project will be felt beyond the funding period in a number of other ways. It enhanced the capacities within Chilean institutions (e.g. universities) and provided CONAF with information for management that will allow them to more accurately target their huemul conservation effort. As Chilean coordinators of the huemul conservation action plan, CONAF will be well placed to ensure that the outputs of this project lead to the implementation of effective decision making. Since the huemul is a nationally recognised icon of conservation significance the project is likely to have an influence beyond the immediate scope of huemul conservation issues, both at a professional level relating to the formulation of an endangered species conservation strategy, and at a popular level linked to the huemul's status as one of the country's most prominent endangered species.

Furthermore, the strong ongoing commitment to huemul conservation on the part of partners bodes well for continued interventions and attempts to gain funding for huemul conservation. Although mindful of the difficulties of raising funding, the group is acutely aware of the high profile of the species, and the importance of related issues, and feels confident that the Darwin project proved to be a significant turning point in securing the resources necessary to make progress.

The huemul action programmes follow-on and political lobby is now occurring in the National Congress by different actors (the programme was presented at the end of the national cycle ride).

Meanwhile, the capacity for huemul conservation has been greatly enhanced through the strong involvement of numerous CONAF park rangers in the project fieldwork and information dissemination. 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 and results in the development of management guidelines to include them in decision-making analyses of land use furthermore.

Lastly, the project completion culminated with the Final Conference, which enabled personnel to widely disseminate the project's achievements. Furthermore, project partners continue to work on the dissemination of project results and producing research papers.

The project staff (project co-ordinator, technical director, researchers, and field assistants) are currently uncertain on their future activities. The main priority is the discussion and development of project design, in order to submit an application for Post Project Funding according to the invitation received from the DI in December 2003.

Project partners and their staff are committed to maintaining contact, to design project applications focused on the species to propose to other suitable funding agencies in 2004.

Project partners will continue communication to finalise the long process of writing and reviewing project articles. All are interested to extend the research on the species, ensuring the maintenance of established relationships and links.

The resources made available to CONAF during the project will remain in the technical department, particularly for use by personnel from protected areas (with important deer populations). They will also be used by professionals and researchers involved in monitoring deer and investigations developed by/ with CONAF.

As mentioned before, project experiences, outputs and conclusions are currently being employed to plan and define a series of future actions and projects at national level, regarding huemul conservation (*e.g.* monitoring and evaluating, and the new edition of the species conservation plan).

At the local level, project data is currently being used to consider: priority areas for huemul conservation in the XIth region (GIS), management actions and police initiatives in protected areas & logging farms delineated by CONAF, the need to, and methods of, improving environmental educational activities. The project's experiences are widely used as a model to be analysed and discussed by other huemul research and conservation experiences planned to occur, or that are already occurring, occurring in the northern species distributional range (Chillán Region) and Argentina (Patagonia).

The legacy of the project could be improved with an extended programme on two main aspects: the species ecology research and environmental education. The former focusing on obtaining of medium long-term data sets, in relation to human activities, genetic diversity and distributional- connectivity aspects with the involvement of more local/ international researchers and institutions. The second needs to be strongly supported by governmental institutions with a coordinated programme.

A clear example of this is the discussions at the end of 2003, on the possibility of long-term collaborative work between CONAF, Darwin project partners & Canadian institutions (lead by the University of Sherbrooke, Quebec with Dr. Marco Festa-Bianchet and a DVM, M.Sc., Ph.D. candidate Paulo Corti). This work would begin an investigation into genetics (kinship lines & variability), behavioural (parental care) and dispersion aspects of the huemul employing the established study sites (as well as adding new ones) and the monitoring of previous marked individuals (through the Darwin project) and adding more capture and marking of fawns-juveniles and adult deer. This research will be funded initially for two years with resources made available by Dr. Festa- Bianchet, and supported with additional funding sought (applications including those to institutions such as the National Geographic Society, The Canon National Parks Science Program for the Americas 2004, & Calgary Zoological Society). This collaborative opportunity in conjunction with the possibility to apply for Darwin post project funding could provide an unprecedented potential to maximise research with a positive cost-benefit for all involved in the huemul research in southern Chile.

13. Post-Project Follow up Activities *(max. 300 words)*

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 (marking individual fawns and juveniles) - 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.
- Genetic studies, involving Chilean-UK partners, Deer Specialist Group IUCN/SSC and Canada researchers, in order to make a wide evaluation of national populations.

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 for further funding from the Darwin Initiative (**Annex 20**).

14. Value for money

We evaluate the project as excellent value for money considering its global & specific achievements against the budget. The challenging remote project locations where the activities were carried out, and the scenario of the species must also be taken into consideration.

Furthermore, it is important to note that many young volunteers (participants of Raleigh International expeditions – providing essential manpower, and existing logistical resources), scientists, Chilean students and rangers were involved and contributed significantly to the development of the project. Their salaries, travel and/ or subsistence were not covered by the project.

The collaborating organisations and individuals effectively and successfully managed their relevant budgets.

In 30 years of CONAF's efforts of huemul research there is no project or initiative in Chile, that includes research or conservation, that has come anywhere near to the achievements of the Darwin Initiative project. Clearly, for what it has achieved, the Darwin Initiative project has provided real value for money based on the level, detail and volume of information obtained during the lifetime of this project.

Author(s) / Date

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

- Coyhaique, Chile & London, UK. 30th January 2004 -

Annexes list

Appendix I: Project Contribution to Articles under the Convention on Biological Diversity (CBD)
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Annex 3. Study sites.
Annex 4. Personnel staff list.
Annex 5. Technical Plan.
Annex 6. Results on Huemul capture; Recruitment & survival; Logging effects; Ranging behaviour; movements & Habitat use**.**
Annex 7. Article in Mountain Research and Development Journal.
Annex 8. Oryx article for Conservation News section – Poached Huemul.
Annex 9. Huemul census.
Annex 10. Standard survey forms.
Annex 11. SIG map exercise
Annex 12. Environmental education material (poster & calendar).
Annex 13. Press releases.
Annex 14. A proposal for the National Congress.
Annex 15. Planned research publications.
Annex 16. List of trained people (years 3 and 4).
Annex 17. Results on Huemul genetics & health status.
Annex 18. Project partners.
Annex 19. Memorandums of Understanding.
Annex 20. IUCN/ DSG supporting letter.
Annex 21. Article (book review) in the Mountain Research and Development Journal.
Annex 22. Article and talk presented at an Epidemiological Congress regarding sanitary issues on huemul.
Annex 23. Poster and Talk presented at the 3rd International Wildlife Management Congress.
Annex 24. Oryx article for Conservation News section – Huemul Darwin Final Conference.
Annex 25. Deer Specialist Group Newsletter article on project findings.

Appendix I: Project Contribution to Articles under the Convention on Biological Diversity (CBD)

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use		Develop national strategies which integrate conservation and sustainable use.
7. Identification and Monitoring		Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities which have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	35	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	30	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	15	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.
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.
Total %	**100%**	**Check % = total 100**

15. Appendix II Outputs

Code	Total to date	Detail
Training Outputs		
4a	8	Chilean undergraduate students received training on the use of radio telemetry equipment and on field research methods for applying on study of ungulates species.
4b	10	
4c	2	Pía Bustos, a Chilean DVM. MSc. received training during the early stages of the project on deer captures, anaesthesia, and radio tracking. A Chilean DVM. MSc. doctorate candidate (Paulo Corti) from the University of Sherbrooke (CAN) participated in two deer captures to recover GPS collars, and received training on huemul radio tracking on its environment. Currently, he is starting his post graduate research on huemul in Patagonia in collaboration with Conaf.
4d	4	
6a	29	Training sessions for Chilean field researchers, field assistants, CONAF park rangers, technicians and biologist volunteers involved on huemul research, capture and radio tracking. A further person received a training session in the UK.
6b	23	
7	500 1,000 1,000	Production and distribution of the Huemul and nature of Aysen calendar (2003). Natural history poster entitled: a Year on Huemul's Life. Huemul leaflets (including information on natural history, conservation problems, project activities and contacts).
Research Outputs		
8	10.5 2 3 3	Technical Director (RG) in Chile for initial project activities, site visits, evaluation of advances, difficulties, and to provide training on huemul captures. Also include visits for steering group meetings, and review of the data produced. UK RI officer (MF) made a visit to Chile for administrative and project management issues. Field visit by Rich Howorth (RI). MLURI scientist (IG) in Chile to assess progress on research at the study sites and discuss the methodological aspects with field researchers. Technical Director (RG) and Raleigh project officer (EW) visited Chile to organise final details regarding the Darwin Final Conference, project data bases and ending activities.
9	1	The production of an updated version (2003) of the National Species Conservation Plan as result of the Huemul Darwin Final Conference. It includes new information and contents. Chilean governmental institutions (CONAF, SAG) and NGO's (CODEFF) will manage the document.
11a	2	A book review: The Patagonian Huemul- A Mysterious deer on the Brink of Extinction by the N. Diaz and J. Smith-Flueck was written for the journal *Mountain Research and Development* by Robin Gill (**Annex 21**). Wildlife conservation and farming in Chilean Patagonia: opportunities and threats facing the huemul (*Hippocamelus bisulcus*, Cervidae) by Jerry Laker and Pía Bustos in *Mountain Research and Development*.

Code	Total to date	Detail
11b	31	Huemul conservation and its research in Region XI, published in the Chilean journal *Tecnovet*. A dissemination article for inclusion on the Huemul section of the *Fundación Vida Silvestre Argentina* (NGO) web page. Two articles, on Chilean experiences of huemul conservation in protected areas and a second about the Huemul-Darwin Project, were included in the proceedings book and CD-ROM of the workshop: *Conservation and Recovery Plan for the Huemul* (Bariloche, December 2001) organised by the Argentinean National Parks Administration and IUCN – Deer Specialist Group support. Three articles for the proceedings of the *Fourth Bi-national meeting on Huemul Conservation Strategies* (Chillán, April 2003). They include CONAF's and the Huemul Darwin Project's experience on huemul capture, management, conservation and protection in Region XI. Three summary documents of the talks performed at the *Argentinean park ranger workshop on huemul conservation* (Los Alerces National Park, September 2002). The article: "Antibodies levels against DVB, IBR & PI-3 viruses in free-ranging huemul (*Hippocamelus bisulcus*) in Chilean Patagonia", for the proceedings of the Xth *International Congress on Veterinary Epidemiological* (Viña del Mar, October 2003) – **Annex 22**. The article: "The Huemul Project in Chile: Saving an endangered national symbol" for the proceedings book of the *3rd International Wildlife Management Congress* (Christchurch-New Zealand, December 2003) – **Annex 23**. Two articles submitted to the *Conservation News section of Oryx* – the International Journal of Conservation for publication on next edition (April 2004). Their titles are: 1. Huemul Deer found dead in a Patagonian Farmhouse (**Annex 8)** 2. Huemul Ecology Research For Conservation Planning, Southern Chile Final Conference and Workshop Darwin-CONAF (**Annex 24**). Fifteen summary talks articles included in the Proceedings Book and CD-ROM of *The Huemul Ecology Research for Conservation Planning, Final Conference and Workshop* (Cochrane, October 2003) – **Annex 2**. An article for publication in the *Chilean Forestry News Journal* entitled: "Investigación sobre la ecología del Huemul del Sur (*Hippocamelus bisulcus*) en la región de Aysén" for publication on next issue on March 2004. The article: Huemul (*Hippocamelus bisulcus)* ecology research: conservation planning in Chilean Patagonia approved for publication on the next number of the *IUCN Deer Specialist group Newsletter*(**Annex 25**) to be published on February 2004.
12a	1	Chilean huemul genetics database established with collaborative partners and managed by CONAF & IUCN DSG (SSC).
12b	1	Enhanced CONAF Geographic Information System database on huemul distribution and land use on region XIth.

Dissemination Outputs		
14a	1	The Huemul Ecology Research for Conservation Planning, Final Conference and Workshop were organised and held in Cochrane (October 20-24th, 2003) under the banner of the Darwin Initiative to disseminate project findings, results and as a closing event.
14b	6	Staff members presented findings produced during the Darwin project on the following events. One in Santiago (Chile) regarding the management of endangered species and perspectives for management in captivity. The other in Argentina about huemul conservation and the development of a species action plan. The third were several talks performed during the 4th Binational meeting on Huemul Conservation, Chillán (VIII Region, Chile). The project co-ordinator and CONAF park rangers participate in a ranger workshop on huemul ecology in Los Alerces National Park (Argentina). Finally, the project participates on a Chilean park rangers course organised to prepare and train them in huemul research at the Chilean Magellan region.
15a	19	National articles about the huemul and its study by the project in the *El Mercurio, Las Ultimas Noticias, La Tercera, La Revista del Domingo* newspaper. Also articles in the magazine Vida Silvestre (Argentina) were published.
15b	41	National articles in *El Diario de Aysén, El Pilchero and El Divisadero* local newspapers.
15c	1	A feature in *Sunday Telegraph* covering the participation of Raleigh International and Prince William in the study of a rare deer species in Patagonia.
17b	10	Constant feedback of project activities and research to the huemul electronic group network at www.huemul.net. Also, information, news and opportunities for young researchers to participate in the project were offered and uploaded to eight different web sites related with conservation and research in South America.
18a	1	A national TV channel (*Megavisión*) covered the project research and activities.
18c	5	A local TV channel (*Rocco*) disseminated project activities and news. A digital video footage of the huemul were prepared and disseminated on public events and schools. A brief version was prepared for use during the huemul cycle ride presentations.
18d	1	Programme (TV documentary) by Radio Television Hong Kong about the Huemul Project and Raleigh.
19a	12	Radio interviews and contacts in Agricultura, and Chilena stations. Wide coverage on the Huemul Darwin Final Conference event.
19c	25	Radio interviews with Chilean researchers and park rangers in local and regional stations (Nuevo Horizonte, Patagonia, Río Baker, *Ventisqueros,* and Santa María).
Physical Outputs		
20	11,000	PC computer & printer. Dart gun rifle & related equipment. GPS units and compasses (x 4). Radio (12) and GPS (3) collars transmitters. VHF receivers units (x 2). Park rangers equipment (3-backpacks, binoculars, footgear). Jeep Suzuki Samurai 4WD 1998.
22	450 6	Pellet plots for huemul habitat use monitoring by CONAF and Raleigh International. Established lineal transects for long term monitoring in protected and non-protected areas.
23	£5,300	Ernest Kleinwort Charitable Trust (EKCT) and the European Commission (Biodiversity of Aysén) funded the training and participation of scientists in five Raleigh expeditions. Idea Wild support with field equipment (photographic camera, binoculars & tracking equipment).

16. Appendix III: Publications

Mark (*) all publications and other material that you have included with this report

Type *	Detail	Publishers	Available from	Cost £
Educational leaflets	1.Los Huemules te necesitan ¡Ayúdalos! 2.El proyecto Huemul. Región de Aysén.	Corporación Nacional Forestal XI Región, Coyhaique.	Víctor Cornejo, CONAF Region XI, Los Coigues s/n, Coyhaique, Region XI de Aysén, Chile vcornejo@conaf.cl	*N/a*
Tecnovet Journal	El Huemul Conservación y estudio en la Región de Aysén by Cristián Saucedo	University of Chile, Santiago.	Faculty of Veterinary Science. Av. Santa Rosa 11.735, La Pintana, Santiago. Casilla 2. Correo 15. Santiago, Chile. bsmartin@uchile.cl	*N/a*
CD- ROM	Workshop on Development of a Conservation and Recovery Plan for the Huemul (April 2002). Incl. Summary of Darwin Project presentations.	IUCN Deer Specialist Group (SSC), Montevideo, Uruguay.	Deer Specialist Group Lic. Mariana Cosse 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 DVM 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.	Administración de Parques Nacionales (APN), Argentina DVM Eduardo Ramilo, eramilo@apn.gov.ar	*N/a*
Video (VHS)	The Huemul Deer of Patagonia: Endangered Deer (45 min)	Michael L."Blue Thomas"	M.L. "Blue Thomas" Tokaanu Lodge, Tokaanu, New Zealand tokaanulodge@paradise.net.nz	*10*
Calendar (*)	2,003- The Huemul and nature of Patagonia	Corporación Nacional Forestal XI Región, Coyhaique.	CONAF XI Región U.G Patrimonio Silvestre. DVM Dennis Aldridge aldridge@conaf.cl	*N/a*
Poster (*)	The Huemul Natural history	Corporación Nacional Forestal XI Región, Coyhaique.	CONAF XI Región U.G Patrimonio Silvestre. DVM Dennis Aldridge aldridge@conaf.cl	*1*
CD – ROM (*) and Proceedings Book	The Huemul Ecology Research for Conservation Planning, Final Conference and Workshop (October 2003).	Corporación Nacional Forestal XI Región, Coyhaique.	CONAF XI Región U.G Patrimonio Silvestre. DVM Dennis Aldridge aldridge@conaf.cl	*N/a*
Book (in press)	Plan nacional para la conservación del Huemul del Sur *Hippocamelus bisulcus* en Chile.	Corporación Nacional Forestal & Comité pro defensa de la fauna y flora (CODEFF).	CONAF Head Office Depto. Patrimonio Silvestre. José Luis Galaz jgalaz@conaf.cl	*N/a*
Journal paper submitted (*)	For publication in Mountain Research and Development Journal: "Wildlife conservation and farming in Chilean Patagonia: opportunities and threats facing the huemul (*Hippocamelus bisulcus*, Cervidae)." *Jerry Laker and Pia Bustos.*		Jerry Laker and Pía Bustos, Macaulay Institute, Craigiebuckler, Aberdeen. AB15 8QH. UK j.laker@macaulay.ac.uk piavicuna@hotmail.com	*N/a*
Poster and article (*)	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, Los Coigues s/n, Coyhaique, Region XI de Aysén, Chile csaucedo@conaf.cl	*N/a*
Web site	Internet network web site under Darwin Project management.	Huemul Darwin Project and Agrupación Amigos del Huemul	www.salvemosalhuemul.cl CONAF Region XI, Los Coigues s/n, Coyhaique, Region XI de Aysén, Chile info@salvemosalhuemul.cl	*N/a*

Annex IV: Darwin Contacts

To assist us with future evaluation work and feedback on your report, please provide contact details below.

Project Title	Huemul ecology research for conservation planning, Southern Chile.
Ref. No.	162/09/014
UK Leader Details	
Name	Emily Wood, Rich Howorth, Andy Wahid. Raleigh international
Role within Darwin Project	Funding beneficiary, management and administration. Project support.
Address	Raleigh House 27 Parsons Green Lane, London, SW 6 4HZ.
Phone	
Fax	
Email	
Other UK Contact	
Name	Dr. Robin Gill. Woodland Ecology Branch, Forest Research
Role within Darwin Project	Technical Director.
Address	Alice Holt Lodge, Wrecclesham, Surrey GU10 4LH, England
Phone	
Fax	
Email	
Partner 1	
Name	Dennis Aldridge
Organisation	Corporación Nacional Forestal XI Región
Website address	www.conaf.cl
Role within Darwin Project	Steering committee (advisor), fieldwork guidance and logistics arrangements.
Address	Los Coigues s/n, Coyhaique, Chile, South America
Fax	
Email	
Partner 2	
Name	Cristián Saucedo
Organisation	Corporación Nacional Forestal XI Región
Role within Darwin Project	Project Co-ordinator and field researcher, CONAF
Address	Los Coigues s/n, Coyhaique, Chile, South America
Fax	
Email	