Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

Project title	Huemul ecology research for conservation planning in southern Chile
Country(ies)	Chile
Contractor	Raleigh International
Project Reference No.	162/09/014
Grant Value	£132,850
Start/Finishing dates	1 August 2000 – 31 July 2003
Reporting period	Year One

2. Project Background

Introduction

The southern Andean deer (*Hippocamelus bisulcus*), or "huemul", is protected in thirteen national parks and reserves in Chile, managed by the state body Corporación Nacional Forestal (CONAF), principally in Region XI (Aysén) in Chilean Patagonia. The species is listed on CITES Appendix 1 and classified as endangered by the IUCN Red List of Threatened Animals (IUCN) and Red Data Book of Chilean Terrestrial Vertebrates, with its current population thought to be less than 1000 individuals (IUCN/SSC Deer Status Survey and Conservation Action Plan, Wemmer 1998). The deer is a flagship species for conservation and the national symbol of Chile, thus its conservation is considered a highest priority by CONAF.

Protection of the species through the protected areas network alone is not considered adequate, however, due to the small size of occupied reserves, inadequate coverage of utilised huemul habitat in protected areas, the need for other areas to be used for seasonal or permanent dispersal, growing economic development pressures, uncontrolled grazing and the threats from introduced species such as red deer.

CONAF has developed an action plan for huemul conservation and recovery, in partnership with CODEFF (a Chilean NGO), that documents the factors affecting the species – livestock interactions, habitat loss and alteration, predation by puma and domestic dogs – and sets out necessary action and research priorities, given the many uncertainties that exist concerning huemul ecology.

Since private land outside of protected areas is important to the species' conservation, applied research is necessary focused upon the interaction of huemul populations and economic activities, such as livestock grazing and forestry exploitation. This study aims to address some of the main priorities identified in the national species action plan and produce management guidelines to promote the conservation of huemul alongside productive sector activities and interaction with other native herbivores (guanacos).

3. Project Objectives

Project purpose

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

Project objectives

1. To identify interactions between huemul and forestry exploitation, livestock and other ungulates (guanaco).
2. To obtain information to assist understanding of the relationship between huemul movement and habitat type.
3. To assess seasonal and diurnal movement patterns.
4. To obtain estimates for rates of recruitment and adult survival, to help identify the causes of population change and individual animal mortality.
5. To integrate landuse data with huemul distribution data using GIS as a contribution to the establishment of protected areas and corridors for huemul conservation.

4. Progress

- Set-up

Following an extended programme of Raleigh International (RI) expedition projects on huemul research in Chile since 1995, this project was elaborated jointly between CONAF and RI in 1999 to advance the species' conservation agenda. Potential project partners in both Chile and the UK were consulted and a bid made to the Darwin Initiative in October 1999, with an announcement of successful funding in March 2000.

Prior to the project's formal commencement in August 2000, an initial planning meeting was held in the UK including project steering group members Robin Gill (RG - Forest Research Agency), Mathew Foster (MF – Raleigh International), Dennis Aldridge (DA – CONAF UGPS Region XI), Iain Gordon (IG – Macaulay Land Use Research Institute, MLURI) and Cristián Bonacic (CB – Pontificia Universidad Catolica de Chile, PUC). Points discussed included recruitment of a biologist for the project, the project objectives and outline methods, capture methodology, radio telemetry equipment, and dates for visits by RG and IG to Chile and for commencement of fieldwork.

- Overview

The first eight months of the project, August 2000 to March 2001, have seen progress made (see **Table 1**) in the face of various challenges, both scientific and organisational. Good early work was undertaken on site suitability assessments and training of Chilean field researchers and park rangers in the use of deer capture and radio tracking equipment. The first four animals were caught in Tamango National Reserve near Cochrane during September-October 2000, with the subsequent unfortunate death of a collared animal which led to temporary suspension of the darting-and-collaring exercise. The surviving animals have been the subjects of ongoing radio tracking in the field by park rangers and Welcome Trust project researchers, however, with the collection of valuable data. In the absence of an

ongoing collaring programme, project scientists and Raleigh volunteers have focused upon carrying out site reconnaissance surveys and vegetation and huemul pellet plots in areas of potential interest. Assessments were also made of the feasibility of capturing animals in these additional sites, enabling development of a list of priority sites for future research. Causes of the individual fatality were resolved in discussion with the permit licensing authority Servicio Agrícola y Ganadero (SAG), and an interim revised permit later authorised for Tamango.

TABLE 1 - OUTLINE TIMETABLE OF PROJECT ACTIVITIES 2000/2001

DATE	ACTIVITIES PLANNED	ACTIVITIES REALISED	OBSERVATIONS
August 2000	-	Suitable equipment identified & purchased	Necessary equipment, including a dart gun, radio collars, radio receivers and tranquillising drugs, was researched by RG, involving two visits to a dart-gun dealer. Purchase and import/export procedures were investigated and resolved. Some of the tranquillising drugs were supplied free of charge by John Fletcher (JF) and Mike Thomas (MT).
August	-	Training in darting deer	Undertaken to JF's deer farm in Auchtermuchty, Scotland by RG & Pia Bustos (PB - MLURI) to gain familiarity in the use of a dart gun and the tranquillising drug Immobilon.
September	-	Interviews & appointment of Project Co-ordinator at CONAF	Interviews of three candidates were carried out by steering group members RG, DA and MF in Santiago. Cristián Saucedo, a qualified veterinary scientist, was subsequently appointed and fortunately was able to start work immediately.
September	Identification of suitable sites	RG visit to Chile, incl. site visits for study suitability assessment	Sites visited included RN Tamango and adjoining areas (La Chiquetada, Marquez, Puesto Tejuela) and Traiguanca and Rio Sin Nombre. A full assessment of all these sites was not possible because of limited access and deep snow conditions.
September	Development of fieldwork protocol	Elaborated jointly by RG, DA & Chilean field researchers	The fieldwork protocol deals with methods for radio telemetry and vegetation assessment and collection of associated data.
September	-	First five training sessions provided to Chilean researchers -3- and park rangers -3	Training run by MT, focused on capture methods, use of the dart gun and tranquillising drugs and safety measures, as well as the use of radio tracking equipment.
September	Collaring of animals begins	Collaring of animals began, with 2 darted & collared; collection of blood and parasites samples also made.	RN Tamango chosen as the first of the two main study sites. Sample analyses later carried out in the UK.
October	Field research initiated – focusing on livestock / huemul interaction at site 1.	2 further animals captured Darting then suspended	Having captured and collared four animals in total, a fatality of one of the earlier caught individuals was discovered and further captures were suspended by SAG. An autopsy was carried out.
October – December	Raleigh Venturer Project 1 in support of research (Field work will begin at site 2 when satisfactory progress has been achieved at site 1)	Radio-tracking continued New site reconnaissance surveys undertaken Visual observation, vegetation and faecal	Radio tracking undertaken initially by Raleigh expedition volunteers at Tamango, later by rangers and other Chilean field researchers. Reconnoitres were done to select a second main study site, focused on five sites: Marquez, La Chiquetada, Puesto Tejuela, Traiguanca and Candonga. Alternative survey strategies were introduced in the absence of continued darting, working in

		pellet surveys initiated	the above sites.
November	-	Public huemul meeting	Event held in Cochrane.
December	-	Final training session delivered to Chilean researchers and park rangers	Training run by MT.
December	Assess progress	Internal progress reports produced Interim report sent to Darwin	
January 2001	Collaring of animals at sites 1 and 2.	-	Not possible due to the ongoing capture permit suspension and continuing dialogue with SAG.
January	-	IG (MLURI) visit to Chile	Visit to Tamango, Marquez and discussions with project members (PB, CS, CB, DA) to review and develop field methods.
January – March	Raleigh Venturer Project 2	Raleigh venturer survey work (general reconnaissance, vegetation survey & pellet plots) at two sites	Surveys undertaken at Rio Barrancos (area of livestock interaction) and Candonga (forestry exploitation area).
January – March	-	Additional research work, including: - Ongoing radio tracking, RN Tamango - Huemul dietary study - Huemul census in RN Tamango - Huemul census & recce visit to La Baguala	The study of the diet of huemul at three sites – Tamango, Rio Barrancos & Candonga - was started by two students from PUC, supervised by CB.

- Research

Methods employed:

- Reconnaissance method

The main objectives of the reconnaissance work are to:

a) assess the potential of the area for darting (presence and abundance of huemul; tameness, steepness of terrain and opportunities to investigate grazing and forestry, etc.)
b) map the main vegetation zones present
c) assess the practical aspects of the site for camping, access, etc.
d) seek information from local people

All huemul evidence is recorded, including direct observations and indirect signs (e.g. footprints, faecal pellets, velvet, huemul paths & beds), on standard sheets with general information (e.g. date, time, weather, location etc.) also noted (see **Annex 1** for survey sheet).
Data is entered into a computer and analysis focuses on identifying the main areas used by huemul, with estimates made of numbers of animals using the area and their approachability.

- Radio tracking field work

Individual animals are capture and sedated following a standard approach, and radio tracking data is entered on a standard recording sheet along with general information including huemul number, radio/visual register, observer and huemul position, behaviour, etc. (see **Annex 2** for capture protocol and survey sheets). Wherever possible several radio fixes are obtained for maximum possible accuracy of estimation of the home range and movement patterns of each animal. Data is entered on a computer and marked on maps for a visual analysis of huemul movement patterns.

- Pellet and vegetation surveys

The pellet and vegetation plots are established along transect lines that span environmental gradients (usually altitudinal). The start of the first transect is at random, with subsequent transects in parallel. The distance between each plot is different depends on the different strata (habitat classes, vegetation zones, management regimes) present. At each sampling point one vegetation plot and one pellet plot is created.

a) Pellet counting method

'Clearance plot' methods are used (methodology in Mayle, Peace & Gill 1999). A plot of fixed size (25x2m) is marked, pellets are marked, and the plot visited again after an interval and the new pellet groups counted.

The second count is made 2-6 months after the initial site visit; old marked and fresh pellets are counted, allowing an estimation of decay rate and thus indirect assessment of huemul population size.

Initially stratified random sampling within strata was employed for plot selection, but this proved unsatisfactory due to difficulties locating exact areas in the field.

See **Annex 3** for the pellet plot protocol and survey sheet.

b) Vegetation plots

Vegetation is sampled in order to:

a) clarify the habitat features that huemul select when using an area
b) determine whether huemul are selecting areas on the basis of food plant availability or some other factor
c) help test hypotheses about why huemul usually avoid areas used by livestock.

A land use classification map is used as a basis for sampling, with the main vegetation zones marked. Areas of bare rock or ice above the tree line, lakes and farmland (permanent, fenced pastures) are ignored for plot sampling. Two overlapping plots (2x2m & 5x5m) with a common SW corner are employed for sampling the field and canopy layer (respectively) with subdivisions to assist with vegetation cover assessment.

Information noted includes plot location, % cover of each plant species in two height zones and presence of animal dung or pellets.

See **Annex 4** for the vegetation plot protocol and survey sheet.

Preliminary results:

A summary of the early research findings is given below according to study site.

RN Tamango

The results from this site, the first area to be studied and only area with collared animals and radio-tracking data, include:
- 43 animals recorded during a census in March 2001.
- 4 animals captured, with information obtained on capture risks, anaesthetic drugs and dosage levels and sensitivity to disturbance.
- Movements data (from radio-tracking): tendency to occur in small groups (usually 1-3 animals, occasionally 5); males tamer in groups; preference for extended use of small areas of quality habitat before making any significant movements.
- Behavioural information: animals were very sensitive to external stimuli; highly selective in searching out fresh plant growth; disturbance by dogs of females with fawns significant.
- Reproductive & juvenile care information: mating season observations were made, including male courting, competition and mating with females; timing of birth of young, suckling, independent feeding, growth and juvenile rejection by does all noted.
- Basic information on chance dead animals recorded, including predation by puma.

Areas adjacent to RN Tamango:
Marquez (M), La Chiquetada (LC), Puesto Tejuela (PT) & La Baguala (LB)

These areas were investigated for the possibilities of studying the interactions of huemul with livestock (not **PT**) and guanacos (all sites). A small number of shy individual animals were encountered (**M**, **LC** & **PT** - 3, 2 & 3 individuals respectively), with more animals possibly having used the area in the past. Huemul behaviour appeared to be affected by the movement of cattle by farmers using dogs at **M** and **LC**.

The huemul census undertaken at **LB** (over 1,600 ha.) recorded 27 huemuls (10 males and 17 females) in different groups that were quite approachable (to within 15 m). 42 guanacos were recorded as using the same areas as huemul, with some livestock also present, including in areas occupied by huemul.

Traiguanca and Río Sin Nombre

Traiguanca is an area of forestry exploitation (since 1995), with great alteration of the original forest having occurred. Only 3 animals were recorded, with old evidence of use also detected as well as signs of persecution by dogs. A return visit at another time of year may be justified.

Río Sin Nombre, north-east of Candonga, was visited but no huemul detected (during a period of heavy snow). Evidence of huemul population movements between the two areas were found, however, with the likelihood that animals move from Candonga in summer to Río Sin Nombre in the winter.

Río Barrancos

A broad valley used for cattle grazing, with much suitable huemul habitat (*lenga* forest and periglacial zones) and observations by local farmers of huemuls. An

estimate of at least 13 animals using the area was made, with the animals being shy and sensitive to disturbance. Most individuals were associated with the periglacial zone during the summer, with faecal pellet evidence of occupation of the valley bottom and lower altitudes during winter, the more disturbed area utilised by livestock. Recce work over 2,000 ha. included 20 pellet and 20 vegetation plots undertaken.

Candonga

The proposed forestry concession here covers 1,273 ha. of largely *lenga* forest, with some use of the valley bottom by cattle (probably herded with dogs). Two recce visits resulted in an estimate of at least 10 - 15 animals using the area, with 3 females and 3 accompanying fawns observed in the first visit. 104 vegetation plots and 97 pellet plots have been established. Preferred areas of huemul use have been noted, generally the highest parts of the valley (above 900 m altitude) and undisturbed *lenga* forest. Movements of males between areas generally occurred above the tree line, with particular activity during the mating season. The valley bottom, however, appears to be important during winter. Wet areas were found to be important for huemul feeding.

Provisional findings:

Following the programme of fieldwork and reconnaissance visits made to date, it has been decided to focus detailed research work on three sites, to increase the numbers of huemul to be collared and compare behaviour and habitat use between protected and non-protected areas. The three selected sites are:

- **RN Tamango** - scope for investigating ranging behaviour, habitat use & livestock interactions; accommodation & facilities available; animals approachable.
- **Candonga** – assessment of effects of commercial forestry operations through baseline data collection prior to their commencement; livestock grazing also evident; captures difficult due to wary animals (?).
- **La Baguala** – investigation of interactions between huemul, livestock and guanaco.

(**Traiguanca** remains a possibility for further study, of the effects of forestry operations.)

The remaining sites that were the subject of recce visits (Marquez, La Chiquetada and Puesto Tejuela) were rejected because few animals (or little evidence of presence) were found during the visits, with Río Barrancos having very shy and thus difficult to capture animals.

- Training

Trainees were selected amongst the project personnel (Darwin project and Welcome Trust project) and CONAF staff (park rangers at RN Tamango).

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 (immobilon) and antagonists (revivon) 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.

Methods of capture, handling, radiotracking and vegetation and pellet survey were drawn up in collaboration between UK and Chilean project personnel. Training sessions in huemul capture and radio tracking in Chile were then run by Mike Thomas (independent deer expert) 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). Topics covered included different capture methods, use of the dart gun (pressure cylinders & telescope) and darts (usage and charging), selection of darting target sites in deer bodies, use of anaesthetic drugs (alternatives, 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.

- Difficulties

There are a number of issues that have impacted upon the project's progress during its first year which have implications for future outcomes, most important of which was the death of one collared individual and subsequent suspension of the capture permit by SAG.

Huemul death & permit suspension:
The capture permit suspension caused a substantial delay (6 months) in the capture programme, which means that revisions will have to be made to the previous estimates of numbers of animals to be caught as well as the amount of radio tracking data to be obtained. An autopsy on the fatality revealed that the animal concerned regurgitated during anaesthesia and subsequently inhaled vomit, which developed into a fatal pneumonia some days later. SAG conducted an investigation of the incident, and following extensive discussions between project members and SAG officials, permission for new captures was granted at the beginning of April 2001 on the understanding that future progress and problems would be discussed in detail with them. Discussions on future captures focused upon how to minimise the risk of any accident during/after capture while accepting that some risk always exists when dealing with wild animals.

Vomiting is a rare occurrence during ungulate anaesthesia and was therefore unexpected. In view of the fact that relatively few captures of huemul had been attempted in the past, the first few captures, by necessity, involved some experimentation with drugs and dose levels. It remains unclear to what extent the vomiting was caused by the type of drug, the stress or excitement of capture, or handling under sedation. Extensive advise has, however, been sought from other practitioners in the filed, including John Fletcher (Auchtermuchty deer farm), Bob Lawrence (West Midlands Safari Park), Terry Kreeger (Wyoming Fish and Game Service) and Jesus Fernandez-Moran (Veterinary Service, Barcelona Zoo).

Identification of suitable study sites:
Secondly, it has proved difficult to find suitable study areas that:
a) are accessible
b) have a reasonable population of huemul
c) have animals that are approachable enough to be caught
d) offer the possibility of investigating the influence of grazing and forestry on huemul.

In spite of the difficulties outlined above, there is no fundamental reason at this stage why sufficient huemul cannot be captured to obtain statistically significant data, and the three main sites chosen offer reasonable prospects of addressing the project objectives within the timeframe of the project.

Lastly, there is a need to better promote the involvement of local communities in the project aims, through involvement in biodiversity conservation activities and schools-based environmental education.

TABLE 2 – FUTURE ACTIVITIES PLAN APRIL 2001 – MARCH 2002

Date	**Activities** (those marked in **bold** as on original project schedule)
April-May 2001	- Final review of the scientific literature on the physiology of anaesthesia and action of drugs and continue consultation with wildlife/zoo vets and other experts in the field of animal anaesthesia. Decide on suitable drug and dose levels. - Meeting and agreement about the captures with SAG. - Continue captures in Tamango. Consolidate training on the use of dart-guns, drugs, monitoring anaesthesia and radio-telemetry. Visit Candonga to plan further work and assess the feasibility of captures.
March-October	- Production of agreements between the partners involved in the project and the development of strategies to involve the participation of other Chilean researchers and park rangers in the activities of the project. - Planning technical work programme by steering group. - Evaluation, discussion and attempts to make **captures during winter**time in La Baguala, and if feasible, also in Candonga. A provisional target of 10 animals in each site should be aimed for. - Radio-telemetry of the radio-collared animals will continue in Tamango. - Enter data into the computer for **preliminary data analysis** and checking of the data collected. - **Planning fieldwork for forthcoming summer season.** - **Planning of work for writing peer and nonpeer reviewed publications.** - During June-August undertake talks and show a video about huemul in local schools
September 2000	- **Assess progress**. Assuming sufficient animals have been caught, then the programme for the next six months will be as follows:
October-December	- **Raleigh Venturer project 3** (radio tracking, vegetation and visual/pellet surveys in Candonga, La Baguala and Tamango).
December	- **Assess progress.**
January-March 2002	- **Raleigh Venturer project 4** (radio tracking, vegetation and visual/pellet surveys in Candonga, La Baguala and Tamango).
March	- **Assess progress** and report.

5. Partnerships

1. Raleigh International (RI) – Corporación Nacional Forestal (CONAF)

This project is jointly managed between Raleigh's London-based Projects Office and CONAF, with a full-time Project Officer (CS) based at CONAF's offices in Coyhaique (XI Region, Chile) involved in both project management and scientific research. The relationship is based on a long-standing and productive partnership between the two organisations, including the successful implementation of the Darwin Initiative project *Biodiversity surveying & information management in Laguna San Rafael National Park*.

Raleigh acts as the funding beneficiary and provides management and administrative support and logistical support for field research through its expeditions programme, with approximately 90 Raleigh volunteers in Expeditions 00I and 01A having collected large volumes of data and gained greater awareness of species conservation

issues and ecological survey techniques. CONAF, on the other hand, has actively supported fieldwork with dedicated parks personnel and arrangement of site access, communication and transportation. This project will make a valuable contribution to both CONAF's huemul species action plan (the first of its kind in Chile) and their Programme for Conservation of Endangered Chilean Fauna and Flora Species.

2. Welcome Trust Project:
A study of the effects of natural factors and livestock competition on the population viability of the huemul (Hippocamelus bisulcus) in the temperate rainforest of Chilean Patagonia

This project, funded by the Welcome Trust, aims to investigate the interactions between huemul and other ungulates, focussing on habitat use and health of huemul based on blood and faecal samples. The project members - Iain Gordon, Cristián Bonacic, Pía Bustos and Eleny Montero - are also involved in the Darwin Initiative project, and thus the two projects have agreed to work collaboratively. Project fieldwork began in September 2001 for a one-year period, with collaboration including collection of blood samples during Darwin project captures and radio tracking undertaken by Welcome Trust project staff. Detailed agreements on joint publications are to be developed.

3. Conservation Genetics of the Huemul in Chile and Argentina
- *Population Genetics of Hippocamelus bisulcus*
- *Taxonomic Status of Hippocamelus based on genetic evaluation*

Collaboration also exists with the above two research projects, undertaken by Jo Anne Smith Flueck (Universidad de Comahue-Bariloche, Argentina) and Werner Flueck (CONICET, Argentina), with the collaboration of Dr. Jaime Rau (Universidad de Los Lagos, Chile), Dr. Steven Carr (University of Newfoundland, Canada) and Dr. Frank Bayliss (San Francisco State University, USA). The Darwin project is to take white blood cells and hair samples during the huemul captures for analysis in North American laboratories.

4. 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 Gerardo Acosta) 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 XI region to supplement populations in the VIII region. Discussions have taken place with the project researchers as to the practicalities and difficulties of capturing huemul, with their participation in future captures agreed. Experience and information about capture methods and genetic results will help to evaluate the feasibility of these translocations.

5. Pontificia Universidad Catolica de Chile (PUC) project

Thesis students of PUC (supervised by Dr. Cristian Bonacic) are involved in a dietary study based on faecal microhistology, using all of our proposed main study areas: Tamango, La Baguala and Candonga. During January-April 2001 Daniela Sierralta (PUC thesis student) worked on sample collection to assess the huemul summer diet, as well as assisting with radio tracking in Tamango, with another student to research the winter diet shortly.

6. 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). The project is studying various aspects of huemul ecology, with detailed objectives and methodologies still to be defined. A visit took place to Tamango by the project research team to discuss collaboration and the practicalities of huemul capture and radio telemetry methods.

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

Co-operation exists through the collection of material (bones and skulls) for Juan Carlos Torres-Mura of the Santiago museum by project staff and park rangers, since 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.

6. Impact and Sustainability

The project has had a limited impact to date, related to the short time of its operation. Good working relationships have been developed with CONAF park rangers throughout the project activities. In conjunction with them, the project held a public presentation in Cochrane in November 2000 to inform the public about the study's objectives, related work and the conservation status of the species. The public meeting was publicised through invitations, a special poster and local radio. Speakers were Dennis Aldridge (Head of CONAF UGPS, Coyhaique), Hernán Velasquez (Head CONAF ranger, RN Tamango) and Cristián Saucedo (Project Officer). Attendees included local people, businesses and teachers, with valuable contacts made and ideas arising for mutual work.

Lastly, for the second year of the project, funds have been secured from the Foreign & Commonwealth Office (FCO) for construction of a huemul visitor centre at RN Tamango involving both Raleigh International and CONAF.

7. Outputs, Outcomes and Dissemination

Publications -
No literature published by the project as yet; internal survey protocols and recording forms are however available from the project co-ordinator (see Annexes).

Dissemination -
Press coverage (see **Annex 5** for UK national press article) in the UK and Chile is detailed in **Table 3**, including a TV documentary filmed at Candonga in March 2001. One of the project team (MT) was able to take video footage of the huemul and prepare a short film, for intended use with Region XI schools in the project area over the coming year.

TABLE 3 - PROJECT OUTPUTS

Date	Output Code No.	Quantity	Description – Planned Outputs	Observations – Outputs Achieved
September-March	6A	7	Training for Chilean field researchers and rangers in huemul capture and tracking.	6 people in Chile received training & a further person in the UK over a total of 5 training sessions.
September 2000	8	1 visit	Robin Gill to spend 4 weeks in Chile for site selection, research methods and huemul capture.	Robin Gill visited 6 sites in the region to evaluate their suitability for field research & huemul capture. Plus Matt Foster (RI) made a 1 week visit to Santiago.
October-December	15A 15B 15C (15D) 19C (19A/19D) + 18	2 2 1 ? 2 - 1 TV documentary	National and local press releases in UK and Chile focused on the Raleigh expedition and the Darwin grant.	National articles in the *El Mercurio* newspaper in December and February. Articles in *El Diario de Aysén* local newspaper in October. Feature in *Sunday Telegraph* . Programme by Radio Television Hong Kong about the Huemul Project and Raleigh at Candonga.
October-December	6A		Training for Chilean field researchers and rangers in huemul capture and tracking	Consolidation in training session by Mike Thomas in the use of darting and radio tracking equipment.
January 2001	8	1 visit	Iain Gordon to spend 2-3 weeks in Chile to assess progress with huemul/livestock interaction research.	Iain Gordon visited Tamango and Marquez to assess the project progress and discuss the methodological aspects with field researchers.
February	17B	0	Feedback of research to huemul electronic group.	This electronic working group is currently not operational sent.
Additional **January – March** **February** **March** **March** **Early 2001**	 4A, 4B 8 15A 11A	 1 1 70 1 1		 Undergraduate PUC student received training on the use of radio telemetry equipment over 2 weeks. Field visit of 1 week by Rich Howorth (RI) to Río Barrancos. A T-shirt was designed by Raleigh to promote the huemul project and show the participation of Raleigh venturers. Photographs and a summary of the project were accepted for publication in *El Mercurio*. A book review (of a recent publication on huemul, by the N. Diaz and J. Smith-Flueck) was written for the journal *Mountain Research and Development* by RG.

8. Project Expenditure

Table 4: Project expenditure during the reporting period (£)

Item	Budget	Expenditure

Variation in expenditure (+/-10% of budget):
Salaries – There was a moderate underspend on this element given the later-than-anticipated start date for the CONAF Project Co-ordinator.
T&S – There is a moderate underspend here too partly because of the later acquisistion of a project vehicle (and thus reduced fuel expenditure) and also due to a number of outstanding invoices and expenses claims which are being processed now that the main field season has ended.
Equipment - Again a slight underspend has occurred due to a number of factors, including vehicle-related expenses yet to be processed, reduced demand for both radio collars and tranquillising drugs given the suspension of the darting permit and less IT expenditure during the intensive fieldwork programme.

9. Monitoring, Evaluation and Lessons

Monitoring -

Monitoring of technical progress consists of monthly reporting by the CONAF Project Co-ordinator to the steering group, with additional information received at the end of each expedition from staff to Raleigh's Head Office. Financial control between Raleigh and CONAF comprises quarterly budgets, advances and associated reporting. The loss of the principal research method of radio tracking for a 6 month period, with a consequent low number of collared and captured animals and associated data, has prevented the full use of this key indicator of project progress. The limited data on radio-tracking obtained so far, however, as well as the other site information collected, is of direct significance to the delivery of the project objectives. Furthermore, it has enabled the project to make qualified decisions on how to proceed in terms of methodologies and sites to be utilised. Associated progress indicators are to be developed as part of the technical planning for the austral winter 2001.

Lessons -

Many lessons have been learned from this initial period of operation of the project, including:

- The need to further develop the technical details and project planning to relate directly to the main objectives
- Greater co-ordination of project partner activities and individual team members to jointly deliver the project objectives
- More focused and frequent internal progress monitoring to detect issues at an early stage and develop alternative strategies where necessary
- Closer supervision of data collection and quality to ensure consistency and adherence to protocols
- The necessity of closer working with SAG and others over huemul captures and tracking
- The importance of project dissemination to all relevant parties, including local communities who may be suspicious of scientific research methods

10. Author(s) / Date

1. Cristián Saucedo (Project Co-ordinator, CONAF)

2. Robin Gill (Technical Director, FRA)

3. Rich Howorth (Project Officer, RI)

Coyhaique, Chile & London, UK – 4th June 2001