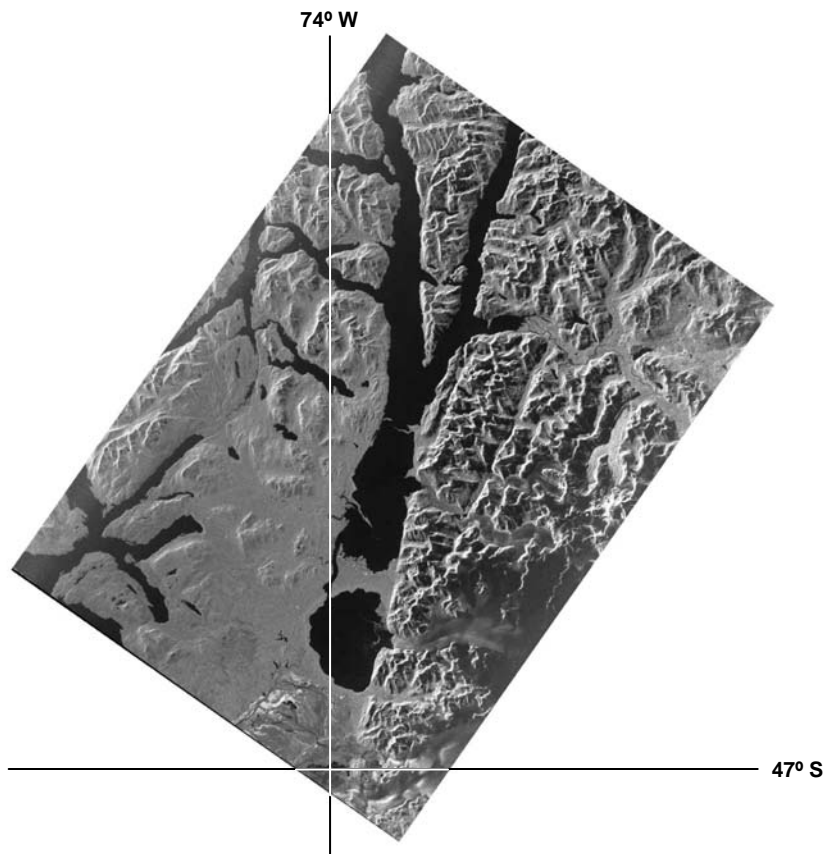


# Biodiversity surveying and information management Laguna San Rafael National Park (LSRNP), Chile

DARWIN INITIATIVE  
FINAL REPORT



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## 1. Basic Project Details

- *Project Title*

Biodiversity Surveying and Information Management, Laguna San Rafael National Park (LSRNP), Chile

- *Contractor*

Raleigh International, with the World Conservation Monitoring Centre (WCMC) and the Natural History Museum (NHM)

- *Host country collaborating institute(s)*

Corporación Nacional Forestal (CONAF) the Chilean Forestry and Protected Areas Authority, and the Museo Nacional de Historia Natural (MNHN) from 1998

- *Grant Round*

4

- *Grant Value*

£134,160

## 2. Project Expenditure

- *Total grant expenditure*

£134,160

- *Breakdown of expenditure (using expenditure categories in the original application form)*

- *Explain any variations in expenditure +/- 10%*

The only significant variation in expenditure arose from the late start of both Project Officers. The unused salary from this was carried over to the following year to be used for travel and subsistence<sup>1</sup>.

## 3. Project Background/Rationale

- *Why was the project needed? Please explain the project development process.*

*Context: regional development and protected areas*

Corporación Nacional Forestal (CONAF) are charged under Chilean law to manage a system of state protected areas, the Sistema Nacional de Áreas Silvestres Protegidas - SNASPE. These areas are protected at one of three levels: National Parks (IUCN Category II), National Reserve (IUCN IV) and Natural Monument (IUCN III). Within CONAF, this job is undertaken by the Unidad de Gestión Patrimonio Silvestre (UGPS), the department of wilderness heritage. Within Region XI, the administrative region in which LSRNP is situated, nearly 48% of the land area is protected as 19 separate units.

Largely due to its location - not just its remoteness from the capital Santiago, but also the nature of the terrain - Region XI is the least developed of Chile's thirteen Regions. Until recently access has been difficult and even now it is an expensive and/or time-consuming area to reach. This has been one of the major limiting factors to population growth; the entire region (two thirds of the size of England) contains only 80,000 people, half of whom live in the regional capital, Coyhaique. The other reason is the comparative lack of good agricultural land. Much that is used is marginal, suitable only for grazing purposes.

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<sup>1</sup> Detailed in correspondence from Valerie Richardson to Jonathan Cook, Feb 14, 1997.

With improving access, the region is developing rapidly. There is an increase in mineral and water resources exploration and exploitation, commercial forestry is becoming one of the major threats to the region's forests and agricultural improvements are making land less marginal. Commercial salmon farming is affecting the marine areas, along with an increase in other commercial fisheries - particularly shell fish - and marine algae, harvested for oil-based products. In the service sector, tourism is the fastest growing industry, with an increasing in sports-focused tourism (particularly fishing) and ecotourism. The combination of these factors indicate a region undergoing an economic transition.

The high percentage of protected land in Region XI is largely an artefact of the presence of the country's two largest Protected Areas, Bernardo 'O Higgins National Park (BOHNP) and LSRNP. This situation exists because of the original SNASPE policy to wholly protect uninhabited areas of particular landscape value. Those factors, along with a consistently upheld exclusionist non-use policy, have ensured that such large areas (all still virtually uninhabited) are protected.

The maintenance of such a vast network implies a strong and effective system of management. The reality is, however, that CONAF Region XI is chronically under-resourced, particularly in view of the land area managed. Many protected areas are effectively that in name alone - with little more than a signboard to indicate their presence. CONAF have only 34 field staff (guardaparques - park rangers), most of whom are concentrated at the most frequently visited areas, and seven management and support staff, based in Coyhaique. Their role is to support the infrastructure of the park (usually only trail systems) so enabling minimal impact tourism, to educate and guide visitors and to (loosely) police boundaries. Environmental education resources are also limited because of lack of detailed information about the ecosystems and biodiversity.

The key problems now facing the region's protected areas, and in particular LSRNP because of its size, result from the pace of development. Much of the protected land is perceived by the population at large to be unused, and potentially ripe for exploitation. The value of protected areas per se is not widely recognised, so the pressure for exploitation, as perceived by the wider populace or commercial interests, would mean either reducing size of the protected areas, increasing their commercial forestry component, or increasing tourist activities. All of these factors would negatively affect the ecosystems and the biodiversity of the existing protected areas, with ecotourism offering possibly the least destructive path. Examples in neighbouring Region X (such as Vicente Perez Rosales National Park), have shown ecotourism working to a point, but it is not without problems, and often the most serious damage is not obvious, such as the introduction of weed species or exotics.

Because of the comparatively pristine nature of LSRNP and other protected areas in the region, CONAF are very well placed to help conserve some of Chile's most important biodiversity, and to implement management plans that allow activities such as ecotourism with minimal degradation. Lack of resources aside, the single biggest obstacle to doing this is lack of information. Partly because of the region's isolation and distance from Santiago, very little research has been undertaken within its protected areas. CONAF are not a research organisation, the guardaparques have a wide variety of skills and knowledge of the area, but are not scientists. Prior to the submission of this proposal, knowledge about the biodiversity and ecosystems of LSRNP was scarce and disparate, with very little national or global context and almost no capacity to address the information needs.

### ***Context: the Laguna San Rafael National Park***

The Laguna San Rafael National Park might be considered *the* park of the region, for several reasons: it is the largest; it is known to comprise a high diversity of ostensibly different ecosystems; and it has the most spectacular natural features in the region. It has the greatest potential of perhaps any park in Chile, but also the most to lose and knowledge of the park's biodiversity to date is too poor to influence and affect management decisions effectively. Difficulty of access means that human impacts to date were thought to be relatively small, however threats come in a number of forms, some more obvious than others.

Each year up to 20,000 tourists visit LSRNP, or rather they visit the Laguna San Rafael (often without knowing it is a national park). Currently, more than 95% of these are boat-borne, so the biggest threat this currently poses is to the marine systems. Should smaller boats be used and should there be a more active will by the tourists to land, the potential for degradation concentrated on small pressure points is massive. Currently, most tourists do not land because they don't know about facilities or 'attractions' ashore. As this information becomes more available, and access becomes easier, CONAF will need to carefully manage those areas most affected.

Other overt threats include salmon fishing, logging and grazing. Salmon farming is moving steadily south from Puerto Aysen towards LSRNP and brings pollution, settlements and exotic species. Commercial forestry is a major issue in neighbouring Region X and the logging that was once undertaken in the park (stopped after proving economically not viable) might restart with improved technology and an increasing demand for pulp and timber. Grazing is a problem around the northern, eastern and southern valleys, and although the current densities are relatively low there have already been observable impacts on populations of huemul deer<sup>2</sup>.

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<sup>2</sup> Valverde V. (Ed.) 1998

## ***Context: project development with Raleigh International***

It is within this context that Raleigh International has been working with CONAF since launching its youth development programme in Chile in 1985. Many projects have been logistical support for infrastructure development, but scientific research within CONAF areas (including LSRNP) was a feature of expeditions as early as 1990. Although generating information that was given back to CONAF, this research was entirely UK-driven and covered a variety of disciplines, principally geomorphology and geology. Although of interest, the information was of little practical use to CONAF for management purposes - their most pressing need.

This project arose out of strong relationships with CONAF Region XI, CONAF at the national level, senior Chilean scientists and the UK scientific community. Knowing Raleigh's proven ability to facilitate and manage research projects, CONAF looked for a closer working relationship in which Raleigh might facilitate research to address their current priorities. The first such collaboration was to undertake region-wide surveys of the huemul (*Hippocamelus bisulcus*), an endangered deer species, for which Raleigh fund-raised and recruited UK expertise to lead groups of young volunteers (known as Venturers) in a labour intensive research project. The results of these population distribution and density surveys have been important for CONAF to gain a realistic idea of the threat to huemul in this region.

The potential for the Darwin Initiative project was realised after the early success of these surveys and in the context of accelerating regional development. LSRNP was very clearly identified as CONAF's highest regional priority for management information, so Dennis Aldridge<sup>3</sup> and Jonathan Cook<sup>4</sup>, with a number of external sources<sup>5</sup>, developed the Darwin bid to address these needs. In particular, the project developed was one that would not only gather information, but also would use a structured process for identifying and reviewing research priorities, and provide the theory behind information management so as to ensure that the research would be of most value to CONAF. Training in biodiversity surveying, GIS and information management was all integrated into the project to assist long-term sustainability and build capacity within CONAF. Finally, workshops were planned not only for training, but to disseminate the model used in LSRNP throughout other regions thereby improving the legacy and ensuring that lessons learnt from this experience could be applied elsewhere.

### ***· How was it related to conservation priorities in the host country?***

By addressing the key information needs of one of Chile's most important protected areas, this project has been entirely focused on a conservation priority. Moreover inclusion of some of the country's senior biologists as key stakeholders in the consultative priority setting-workshops ensured that the project would address a broad spectrum of Chile's conservation priorities.

It was also very clear from the literature and initial stages of the project development that Region XI is the principal 'gap' in knowledge of the country's biodiversity, and the need for this project was critical.

Specific project objectives were defined with reference to the draft of the *Propuesta de Plan de Acción Nacional para la Biodiversidad en Chile (Proposed Chilean national action plan for biodiversity)*, and *Una Política Ambiente de Desarrollo Sustentable en Chile (An environmental policy for sustainable development in Chile)*, both unpublished documents in preparation by CONAMA<sup>6</sup>.

### ***· How was the project intended to assist the host country to meet its obligations under the Biodiversity Convention?***

The project was intended to generate information, and build capacity to help Chile meet its obligations under the Convention on Biological Diversity (CBD). Specifically, the research would generate new information and provide training for CONAF personnel in information management and use. Moreover, the objective of building collaborations and networks, implicit throughout the proposal, is critical in helping to build a country's ability to understand its own biodiversity by the ability to draw on the expertise of others around the world.

Several specific project objectives were defined with reference to Articles 7 & 13 of the CBD, and Article 21 of the Río Declaration.

### ***· Was there a clear 'end-user' for the project in the host country? Who?***

Corporación Nacional Forestal (CONAF), the forestry and protected areas authority.

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<sup>3</sup> Head of CONAF UGPS, Region XI

<sup>4</sup> Raleigh International Projects Director

<sup>5</sup> Carlos Weber (Now Chief Executive CONAF, Chile), Professor Javier Simonetti (Universidad de Chile), Professor Fabian Jaksic (P. Universidad Católica de Chile), Professor Ian Gauld (Natural History Museum, London), Dr John Busbys (World Conservation Monitoring Centre).

<sup>6</sup> Comisión Nacional de Medio Ambiente – Chilean Environment Agency

## 4. Project Objectives

· *What were the objectives of the project (as stated in the original application form)?*

- i) A baseline survey of the components of biological diversity, and associated habitats, in LSRNP
- ii) In consultation with WCMC, provide the framework for data collected during fieldwork - for application in information management, monitoring and management decision making for this and other protected areas in Region XI
- iii) Establish monitoring techniques designed for replication by locally based CONAF rangers and Chilean scientists throughout the region's protected areas; and disseminate this information to CONAF's 13 regions via workshops
- iv) Train local CONAF personnel (rangers) in sampling and monitoring techniques; and (management personnel) at regional level in information management and presentation for decision making through local workshops with WCMC input.
- v) Identification of species that could serve as indicators of ecosystem health and areas of special ecological significance for management purposes; and identification of potential polluting processes and activities with potential impacts on the biodiversity of the park. This will extend to perceptions of LSRNP by the population of Region XI
- vi) Make recommendations for future management of the park (there is currently only a general management guide), with particular attention to the suitability of boundaries
- vii) Promote awareness and understanding of biodiversity, and its conservation, among the young people taking part in the fieldwork, and to a wider audience in Chile and Britain.

· *Were the objectives of the project revised? If so, how?*

No revision was made of the objectives *per se*. The mechanism and outputs for objective iv), regarding ranger training, was changed during 1998<sup>7</sup>, but the objectives remained the same.

· *Have the objectives (or revised objectives) been achieved? If so, how?*

This section discusses each objective in turn. This is followed by a discussion of the project legacy following a successful application to the European Commission for funding to continue biodiversity research in LSRNP and other protected areas in Region XI, Chile.

<i>i) A baseline survey of the components of biological diversity, and associated habitats, in LSRNP</i>
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The implication of this objective is of a survey of the key, or priority, components of the flora, fauna and associated habitats, rather than *all* of the components of biodiversity. In this respect the project has overwhelmingly achieved this first, and most significant objective.

With twelve different research streams over the three years, the project has undertaken baseline surveys of a large number and wide variety of taxonomic groups, ranging in detail from individual species (e.g. Kodkod - *Oncifelis guigna*), to orders of animals (e.g. Coleoptera). The groups studied directly addressed priorities established at the first project workshop and revised at the second. These priorities were determined by a systematic evaluation of existing information, of the perceived importance, of vulnerability and of threat to different groups, of the practicalities of research, and of which groups were critical for management purposes.

To address the priorities with fieldwork, researchers in the specific fields were contacted and invited to be part of the programme. Many of these, particularly those at the Natural History Museum (NHM) were already involved in the project to the extent that once the priorities were established, they were able to respond immediately. Other specialists, required to study groups for which expertise was not available at the NHM, were contacted and invited to become part of the programme. Nigel Dunstone (University of Durham), for example, was invited to lead a study of the Kodkod, a small wild cat known to exist in the park, and Sebastian Teillier (Universidad Central, Santiago de Chile), became involved to study and assess management issues regarding the park's

<sup>7</sup> Ref.: correspondence from Valerie Richardson (VR) to Jonathan Cook (JC) 9/7/98, from Sam Rose (SR) to VR 1/9/98 and from VR to SR 7/9/98

vascular plant flora. Each of the researchers (31, plus 2 assistants, over the three years) undertook their research in the context of five Raleigh International expeditions in Chile<sup>8</sup>, with logistical and manpower support from young 17-25 year old volunteers.

The result of this is a comprehensive survey of the priority components of biodiversity of the park. As it is 1.7m ha. in size, project locations were focused according to priority areas, determined by CONAF's management needs. Requirements of particular research projects also determined location in order to draw comparisons between the distinctly different habitats existing within the park, showing variation in biodiversity by habitat associations, crucial for management of the greater, un-studied area of the park.

*ii) In consultation with WCMC, provide the framework for data collected during fieldwork - for application in information management, monitoring and management decision making for this and other protected areas in Region XI*

The provision of the framework for data collected during fieldwork has been achieved in a number of ways:

a) *Workshops and the Biodiversity Information Management framework:* Crucial to the project process has been the workshop input of WCMC. Their main role was to drive the process and apply the framework to the data collected. Based on a limited amount of resources, both financially and time, it is not possible to do everything, so rather than undertaking a set of arbitrarily chosen research projects, and then trying to make sense of the data afterwards, the WCMC framework was designed to ensure that all fieldwork has a focus and a practical *a priori* end use (either specific or general) by CONAF for management decision making. Briefly, this framework involves the following four steps:

1. identify priority needs facing CONAF;
2. determine information products (systems, reports, maps etc.) to address these needs;
3. identify priority data sets needed to create the information products (biological and non-biological);
4. identify primary attributes and standards needed for these data-sets.

The first workshop introduced the framework and led delegates through the process<sup>9</sup>. The first two seasons implemented some of the identified priority projects and the framework and priorities were reviewed at the second meeting.

This was an wholly new process to all delegates at the first workshop and was also the first time that it had been applied to an individual protected area, rather than at a national level. This resulted in some initial reservations of applying this framework, essentially developed in the UK, in a developing country context. With adaptation and discussion, the logical approach proposed by the method was accepted and by the time of the review process at the second workshop it was clear that the method had been embraced by the conservation planners and scientists alike as a sensible and logical way to approach the problems facing LSRNP; and many of the other protected areas both within and outside of Region XI.

b) *Data standards:* A practical aspect of the framework, crucial to the successful management of information is the prior recognition of a set of standard variables for researchers to use when collecting or analysing information. In collaboration with WCMC, a comprehensive list of possible variables and standards for data collection were prepared and all field researchers were asked to follow the guidelines set out. This has helped the data to be standardised, where appropriate, and has established a precedent for fieldwork to be undertaken in the future (although a post-project review would be necessary). See Annex 1 for the list as originally prepared, along with some examples of data variable sheets used for one the projects.

c) *GIS.* After the framework was set out by WCMC and utilised at the workshops, implementation took two paths, fieldwork and the use of a Geographical Information System (GIS). This latter activity is for managing the information generated by the project, and making information products. This was the first such system to be established in Coyhaique, although all government agencies now have their own systems. The GIS enables CONAF to show any of the spatial data sets generated by the project in different ways, either for presentation purposes or for analysis. This is an essential part of the framework, and in providing training, advice and data, WCMC and Raleigh International<sup>10</sup> have ensured that this aspect of the framework - the provision of a tool for information management and decision making - is in place.

d) *Reporting requirements:* Finally, a key implementation issue for this type of project is to ensure that pure data is easily understood or can be interpreted into an accessible format. One of the key outputs of this project, for this purpose, has been the provision of reports designed for CONAF, produced following a standard format, that highlight the relevance of the research to CONAF. The standard forms are attached as Annex 2.

<sup>8</sup> Coded 97A (Jan - Mar '97), 97H (Oct - Dec '97), 98A (Jan - Mar '98), 98H (Oct - Dec '98), 99A (Jan - Mar '98).

<sup>9</sup> See Rose & Herrera (1997) for full details

<sup>10</sup> Advice and training from Raleigh International has been through Dr Sam Rose

*iii) Establish monitoring techniques designed for replication by locally based CONAF rangers, and Chilean scientists throughout the region's protected areas; and disseminate this information to CONAF's 13 regions via workshops.*

Through the 12 different research streams this project has been very effective in setting up a range of monitoring techniques that may be undertaken by rangers and scientists alike in the future. This has involved the following two approaches.

1) *Baseline information and long term monitoring.* A set of projects have been undertaken with the specific intention of long term monitoring. These have included the research into diatoms (microscopic silica-based algae) and chironomids (non-biting midges), aquatic insects in general and the lichen surveys. Each of these may be used for monitoring environmental quality, particularly water (diatoms and chironomids, other aquatic insects) and air (lichens). One of the key features of these projects is that the techniques for sampling require no specialist expertise (as proven in the effective use of Raleigh volunteers), just a very basic set of instructions and a small amount of equipment. The samples can then be sent to the expert for analysis over the long term.

A good example is that presented by vascular plants. Sebastian Teillier (Universidad Central) undertook a survey of the development zone of LSRNP. He then compared his results against the last known survey of the area in 1988 (by Edmundo Pisano) and observed an increase in over 100% of the number of introduced species. This information, in addition to being of enormous interest to CONAF, means that a monitoring programme to look at the spread of these species (undoubtedly brought in by tourists) can be implemented by CONAF using the park rangers.

Finally, from the experience of the ranger training day (see below), it was clear the CONAF rangers would be able to implement the basic level of monitoring required, given more opportunities for training, a guide and a small level of resources.

2) *Field or monitoring guide.* While some of the projects (as described above) have or will produce keys, reference collections and guides to groups, many are for taxonomic groups where specialist equipment and expertise is needed to carry out the identification, other projects have established monitoring through clear guides or keys. The first example is the research project into the Kodkod, a wild cat that, as a top predator, is indicative of ecosystem health (see below). With ten animals in the park now having ear tags, the rangers can undertake long term monitoring of this species, by the use of a key (now in the ranger station at LSRNP) and a form of the type shown in Annex 3. A further example is seen in the Marine Biotope Manual (attached as a document) that has been generated by the marine research team as a practical and useful means of not only identifying marine habitats, by observing change and monitoring the system long term.

The results of these projects, and the techniques used, have been disseminated to all participants of the workshops (see above and sections 5 and 6), including staff from CONAF regions VII, X, XI, XII, Metropolitana and central office. Of particular note is that at the end of the project closing presentation (May 26 1999), Pedro Araya, the then national head of CONAF UGPS, announced that his office would finance a small document summarising the monitoring techniques used in all of the project, which may then be used throughout all of Chile's 13 regions<sup>11</sup>.

In summary, all of the projects undertaken had a monitoring component and the techniques used were, of necessity, very simple, making them ideal for long term monitoring purposes and replication in other protected areas.

*iv) Train local CONAF personnel (rangers) in sampling and monitoring techniques and (management personnel) at regional level in information management and presentation for decision making through local workshops with WCMC input.*

See other sections regarding problems encountered in ranger training. The objective was not changed, only the objectively verifiable indicators.

### **Ranger training**

*Ranger training 1 (LSRNP rangers):* Five CONAF rangers (Christian Bain, Juan Nitor, Angel Miranda, Luis Azocar, Carlos Lagos) are assigned to LSRNP, working in pairs for 44-day rotating shifts. At any one time there will only be a presence of two rangers. They are responsible for the infrastructure, for tourists and for any other activity within the park. Due to their heavy workload, the time available for Ranger training in research techniques within this project has been limited. Despite these constraints, training of these five individuals has been achieved in a number of ways.

i) They have all at some point been very heavily involved in the Kodkod research project. Practical training, by UK and Chilean researchers (Nigel Dunstone, Leon Durbin, Ian Wyllie, Gerardo Acosta, Rachel Freer and Ricardo Figueroa) has been given in the use of live-trapping and radio-telemetry equipment. Rangers have been monitoring still-collared cats over the winter period (outside of Raleigh field seasons), and have been trapping and monitoring at a level equal to that of the project groups. They now

<sup>11</sup> This product was entirely the responsibility of CONAF and is not listed as a project output.



have a guide to cats living in the area (distinguished by ear-tag colour) and are taking records of observations. Their involvement has been crucial to the success of this particular project because of their knowledge of the local area. Their improved understanding of the species is now considerable, crucial for informing tourists, furthering the protection of the species and understanding the area in which they work. They also now have a full colour poster, with information about the project and the species, to use as an information tool for tourists.

ii) Juan Nitor and Cristián Bain were each delegates at one of the project workshops, improving their basic understanding of the process being undertaken in the project, the rationale and the activities, and taking part in the training process which these workshops involved. Crucially, their presence at the meetings allowing their practical input into the process.

iii) All five rangers have come into contact with some of the researchers who worked in the Laguna San Rafael (some 25 of the 31). The scientists ensured they made them aware of their plans, why they are doing the research and what their results are likely to be. Before this project none of the rangers had had significant contact with scientists in the context of working within the park.

*Ranger training 2 (other Region XI rangers):* The difficulties involved in this were highlighted in a letter to Valerie Richardson (see footnote 4), and were principally due to lack of staff and resources in the region. However, to meet this objective, a training day was held in Coyhaique for eight rangers from throughout the region, and two ranger support staff from the CONAF UGPS office. The day, which set a precedent in CONAF ranger / scientist interactions, was facilitated by Sergio Herrera (Darwin Initiative) and was led by Sebastian Teillier, a botanist from the Universidad Central in Santiago and the Museo Nacional de Historia Natural, and Claudio Ramírez, an entomologist from the Universidad de Chile in Santiago.

Comprising two distinct parts, theory in the morning and practical (in the nearby Reserva Nacional Coyhaique) in the afternoon, the day-long workshop was considered by the rangers to be an excellent introduction to new techniques. It also included them in the research programme, gave them greater understanding of research and any monitoring with which they may be involved, and helped them fulfil their role as environmental educators. See Annex 4 for a one page summary for the day, and Table 4 (page 28) for a list of the staff involved.

### ***CONAF management personnel***

CONAF Region XI personnel were involved in training through the priority-setting workshops, and through individual GIS tuition.

*Workshops.* Of the three project workshops, the first two were training exercises in information management, and lasted four and a half and three days respectively. The third two day meeting was for dissemination purposes and for imparting to a wider audience the lessons learnt throughout the project. Dennis Aldridge, responsible for all of the protected areas in Region XI, attended all three workshops. From the same office, Sergio Herrera also received the training, and passed on the information to others within CONAF UGPS. Gerardo Elzo, the head of UGPS Region X, was a delegate of the second and third workshops and therefore undertook the biodiversity information management training that was delivered.

At the third workshop, two further senior CONAF representatives were present, Juan Ivanovitch, the head of UGPS Region XII, and Ivan Benoit, the National Head of protected floras division. Although neither had participated prior to this meeting, a summary of the information management framework used in the project was included within this meeting. Finally, a summary presentation of the project achievements was given at the end of the third workshop to senior CONAF personnel, which again included a summary of the information management framework used in the project. This is detailed in section 6: workshops.

*GIS.* The other component of training for CONAF office personnel was in GIS techniques. Sergio Herrera received a significant amount of training in GIS, in order to transfer the skill to other staff in the UGPS. This training comprised a two-day course at ESRI<sup>12</sup>, a further two days of digitiser training and data collection at WCMC, and 4 weeks of intensive capacity building in GIS delivered by Sam Rose. In total, this capacity building also involved the UGPS cartographer, Anibaldo Leviñanco, for one week and Carlos Lizama, the deputy to Dennis Aldridge, for two days.

With regards the long-term legacy, it is encouraging that not only has the GIS system been used by Sergio Herrera for another protected area within the region (Reserva Nacional Coyhaique - see Annex 5 for an example map), but Sr. Leviñanco is now sufficiently competent with the system to ensure that the office has long-term skill resource for information management for decision-making.

The workshops also provided an opportunity for other local NGO and government sector workers to participate in the process and undertake the information management training. These included representatives from CONAMA, CODEFF and SAG.

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<sup>12</sup> Proprietary GIS software.

v) *Identification of species that could serve as indicators of ecosystem health and areas of special ecological significance for management purposes; and identification of potential polluting processes and activities with potential impacts on the biodiversity of the park. This will extend to perceptions of LSRNP by the population of Region XI.*

This objective may be split into three sections: that of species that could serve as indicators; areas of special ecological significance; identification of potential polluting processes and activities with potential impacts on the biodiversity.

*Indicators of ecosystem health.* The need for indicators of ecosystem health was one of the criteria used for determining the research priorities at the outset. Many of the taxonomic groups have been studied with a view to assessing the ecosystem health now, not just to generate a baseline data set for future monitoring. There is considerable, and inevitable, overlap with objective iii). A healthy ecosystem is often identified by the presence of key predators - 11 individuals of Kodkod in an area of less than 20 sq. km. Demonstrates this well for the park. Others groups, such as diatoms, can show pollution incidents, such as indicated by the presence of diatom genera indicative of farm pollutants in the upper Leones Valley. It is particularly significant, and an overall theme of the project, that the links built up between CONAF and the scientific community mean that they have a pool of expertise from which to ask advice.

*Areas of special significance.* Many different research locations have been identified throughout the project; projects have covered an extensive geographical area. The Laguna San Rafael and surrounding land is a very significant ecosystem for many reasons (e.g. the black-necked swan colony or the distinct and unique beetle assemblages). Also, some areas *within* these zones have particular ecological significance, such as the extensive and pristine lichen communities near the hotel next to the Laguna San Rafael, or the Isla Arbolada within the Bahía San Quintín. Sea lion colonies and dolphin runs were found and mapped and are significant for a number of reasons - not least the tourist interest - and the end of the Leones Valley has a small but previously unknown and completely isolated population of huemul. The park is full of areas of special significance and this project has identified many that are not only important to its biodiversity, but from a management perspective.

*Pollution:* Identification of potential polluting processes and activities with potential impacts on the biodiversity of the park is something that all scientists were asked to consider when undertaking research. The outcome of this is perhaps less defined in terms of potential processes - but more by the potential impacts on specific populations or habitats. For example it is now clear that the increase boat traffic into the Laguna San Rafael would have a potentially devastating effect on the fragile marine ecosystems, often dominated by one species.

It is clear that for the moment, pollution is not a particular risk. However, should more sources become evident e.g. salmon farms, mine spoil, boat waste etc, CONAF are significantly better placed to deal with the problems these might bring and prevent an strong *a priori* case for prevention.

vi) *Make recommendations for future management of the park (there is currently only a general management guide), with particular attention to the suitability of boundaries.*

This objective is one that will be develop in significance over time. The existing management plan of the park, which by coincidence was undergoing an update process throughout the three years of the project, had prior to this project been made effectively without any detailed biodiversity information<sup>13</sup>. It is only now that projects have ended and results can be produced and interpreted that the management plan based on this information will be developed fully, and is a lengthy process.

To date, two sets of recommendations have been made from the project. The first are general recommendations or themes from the UGPS park management, based on either their own interpretations of the information provided, or the interpretations of information provided by the scientists themselves. The second set of recommendations have come from the scientists - generally in the form of a summary interpretation or recommendations specifically relating to each of their projects. The former can be found in Annex 6 and the latter recommendations can be found in each of the scientists' reports.

Regarding the production of recommendations from scientists, the following provisos are important:

- 1) Unless so directed, most scientists will not habitually generate information for management purposes
- 2) Most protected areas managers are not used to receiving scientific information of this type, nor do not have the expertise or knowledge necessarily to interpret it to the best of their ability
- 3) Some samples take a number of years to be fully worked up and some results may not be available for a while

At the moment, the themes as outlined in Annex 6 are only draft. The process of incorporating these into the Regional strategy is a long one, but is one that will happen. Dennis Aldridge is also very keen that some are applied nationally, particularly with respect

<sup>13</sup> In 1957, 1963 & 1983

to issues such as introduced species. This project has identified problems that CONAF did not know existed – such as the extent of exotic species in the park – many of which are important nationally as well as locally. The research has started a process that should have far reaching implications

*vii) Promote awareness and understanding of biodiversity, and its conservation, among the young people taking part in the fieldwork, and to a wider audience in Chile and Britain.*

### ***Raising awareness in the field***

Over the course of the programme, over 500 Raleigh International volunteers have been involved in the field research. Mostly in direct fieldwork (such as marine surveying, radio tracking, insect or lichen sampling), logistical support for the projects (in the form of boat handlers, radio-operators or medics), and backup support at field base (such as deployment, rations provision or re-supply, emergency backup or information relay to and from London). Over 90% of the young volunteers (in the 17 to 25 group) throughout the five expeditions will have been on at least one of the Darwin Initiative supported projects. At the start of each of the expeditions, the Chile-based projects officer did presentations to all volunteers to explain the project background and the importance of biodiversity. Each project was then given briefing information (a sample of which has been included here in Annex 7) to further explain the project.

Project implementation is always more effective when the volunteers are fully informed. This is particularly important for projects where immediate results will not be seen, such as many undertaken on this project. It was therefore important to ensure that each scientist fully briefed the staff and Venturers at the start of the phase to promote understanding of the issues of biodiversity and the project's significance. The value of then working with an experienced scientist in the field became more rewarding, and the issues more powerful. A good example was shown by Prof. Geoff Boxshall FRS, who undertook fieldwork into copepods in the park. Apart from viewing through a microscope the volunteers were unable to see the results of their hard work, making it all the more important for Geoff to explain the organisms' importance to the marine system.

It would be fair to say that at the end of the expedition, every single Venturer (not only from the UK but from Chile, and a range of other countries<sup>14</sup> - see outputs) know what the Darwin Initiative project was and had a heightened awareness of the importance of biodiversity and the need for research of this type to be undertaken.

### ***Non-field awareness***

Post expedition, the Raleigh legacy is a strong one. When ex-Venturers from these expeditions are asked which projects they undertook, the Kodkod project or the marine research (two good examples) come up frequently. The expedition will have been a very powerful experience in almost all of their lives and the projects provide the vehicle for that experience.

With respect to a wider audience in the UK, Raleigh provides press briefs for volunteers, and although not always successful, a significant number of small articles in local paper (see outputs and Annex 8 for a very broad selection of dissemination documents) show that dissemination of the project has been wide. Raleigh's Research and Conservation News has been instrumental in disseminating information about the project to the wider research community, with a list of more than 2000 recipients in the UK and overseas (see Annex 9 for copies of this newsletter).

Word of mouth is a highly effective tool for raising awareness and it is clear that returning Venturers are the best vehicles for disseminating the message of the project. Talks have been delivered at Raleigh International head office by the UK Project Officer, at the Natural History Museum by a number of the scientists, at university societies and even to schools. See outputs for more information. Raleigh has a very strong presentation-based recruitment policy, and the Darwin Initiative project is mentioned as a prime example of a high quality expedition project at recruitment talks (about 150 per year).

Within Chile, apart from the Chilean volunteers involved in the projects, the Chilean Project Officer gave a number of public presentations within Coyhaique, to disseminate information about the project and about the biodiversity of the region. There have also been a number of local press articles, and many radio interviews with both Project Officers or the expedition leaders, all of which have been about the Darwin Initiative project and its aims and objectives.

Although it is often very difficult to get this kind of message over to a very wide and diverse audience, this project has been particularly successful at raising awareness among the young volunteers due to their deep involvement with the projects in the field.

<sup>14</sup> See appendix 5 of Rose & Herrera (1999) for a full list of volunteers, and outputs for their nationalities

***Sustainable management of protected areas in Region XI, Chile. Successful funding application to European Commission for I.3MEURO; Raleigh International with CONAF, the Natural History Museum, the Museo Nacional de Historia Natural (Santiago de Chile) and UNEP-WCMC.***

This project will undertake four years of biodiversity research, capacity building and biodiversity awareness-raising in LSRNP and four other protected areas in the same region. The project arose, and was funded, as a direct result of the work undertaken during this Darwin Initiative project. It will build on the projects described here and continue region-wide research to enable CONAF to develop an informed sustainable management strategy for all of the region's protected area network. A copy of the grant proposal is in Annex 11.

#### Summary of key implications for the Darwin legacy

*Management plan:* The continued research in LSRNP until 2004 will most likely postpone the management plan final production until the end of the EU project. This will ensure that the research undertaken by Darwin reaches its full potential – and therefore is used most effectively. By providing the initial baseline information necessary for the continuation project, the value of the Darwin research for management purposes has been magnified many times.

*Capacity building:* The solid level of capacity building and institutional strengthening undertaken at CONAF in this project will be built on with three new staff, training for up to 6 further staff in GIS, ranger involvement at all levels equipment and institutional support and networks. Other institutions, in particular the MNHN, will also benefit from their increased level of involvement.

*Awareness:* Outreach programs and generation of environmental education products will enable the ideas created and needs identified during the Darwin project to be realised. Although awareness was always a priority in Darwin, funding did not permit the creation of products of this type and due to its successful legacy this will now take place.

In summary, the continuation of the work in LSRNP – a direct result of the Darwin project – will add value to each of the objectives described above and is itself the realisation of a set of objectives successfully realised.

#### *· If relevant, what objectives have not been achieved, or only partially achieved, and why?*

The degree to which each objective has been achieved is discussed in each of the relevant sections above. Of the seven original objectives, six were fully achieved and only one (iv) was partially achieved. Realisation of this during the project allowed the objective to be redefined more realistically, and then achieved fully.

## 5. Project Outputs (see the attached list of project outputs which we would like you to use in compiling this section of the report)

- *What output targets, if any were specified for the project? (Please refer to the project schedule agreed with the Department where relevant.)*

In summary the original project output schedule was:

Ref:	Details
<i>1996/7</i>	
6	Workshop in biodiversity information management
6	Approx. 25 Chilean decision makers involved
8	Baseline surveys during first field season
<i>1997/8</i>	
8	Continuation of surveys and establishment of monitoring techniques
12	Production or research reports
6	CONAF progress review workshop
<i>by end 1998/99</i>	
6	Up to 40 CONAF (Region XI) park rangers trained <sup>15</sup>
6	Up to 30 CONAF decision making personnel, Chilean academics and other with similar interests involved in identification of priority information management requirements
9	Recommendations for park management
11	Scientific papers and biological inventories produced, one paper and inventory produced or planned by end year 3.

Please see comments on the output schedule in the three annual reports. The only major revision to this schedule related to the number of rangers receiving training - see footnote.

- *Have these been achieved?*

On the whole, yes. The project outputs are listed below. Please note that because of the time it takes for many of the research results to be finalised scientific papers not outlined here will be forthcoming over the next couple of years. Raleigh International will be the main facilitator of this information, and will pass information on to DETR as appropriate.

Ref:	Details
<b><i>Training outputs</i></b>	
6A	<p><b>Workshop on biodiversity information management, Coyhaique, November 12-15 1996.</b></p> <p>This workshop established the priority information needs for the Laguna San Rafael National Park and produced an agenda for research to address these needs. Facilitated by two senior consultants from WCMC, the meeting involved 22 Chilean delegates from a wide range of governmental, non-governmental and academic institutions, including: CONAF, CONAMA (Chilean environment agency), SAG (Chilean agricultural service), Museo Nacional de Historia Natural, Universidad de Valparaiso, Universidad Austral de Chile, Universidad de Magallanes, Instituto de Investigaciones Ecologicas Chiloé, CODEFF (national conservation NGO), Fundacion Lighthawk (international conservation NGO). Representatives were also present from the Natural History Museum in London and Raleigh's London and Coyhaique offices. A full list of delegates can be seen in Rose &amp; Herrera (1996).</p> <p>Key outputs of the workshop were the determination of priority taxonomic groups for research, and priority geographical areas within the Laguna San Rafael National Park.</p>

<sup>15</sup> See correspondence described earlier between DETR and Raleigh International for changes in this output

Ref:	Details
6B	The workshop provided four days training in biodiversity information management issues and theory for 22 delegates. Total training weeks on a pro rata basis = 17.6
6A	<p><b>Project review workshop (19 delegates), Coyhaique, March 30 - April 1 1998</b></p> <p>This workshop included a full review of the fieldwork undertaken between October 1997 and March 1998, and provided an opportunity for feedback from the Chilean and UK research communities, and from CONAF. The three-day meeting also reviewed the progress of other project objectives, particularly the information management framework and use of GIS as a management tool. Facilitated by Don Gordon and Javier Beltrán from WCMC, the meeting involved delegates from CONAF (X &amp; XIth regions - management staff and rangers), Universidad de Chile, the Museo Nacional de Historia Natural, SAG, Raleigh International, The Natural History Museum in London, The Universidad Austral de Chile and the Universidad de Valparaíso.</p> <p>Key outputs of the workshop were revised priorities, further capacity building amongst delegates and a focused action plan for the final research field season.</p>
6B	The three-day workshop involved a training and education exercise in biodiversity information management and the use of GIS as a management tool. Total training weeks on a pro rata basis = 9.5
6A	<p><b>Field volunteers</b></p> <p>Approximately 340 young people (aged 17-25) mostly from the UK, but also from Australia, Belgium, Chile, France, Greece, Hong Kong, Ireland, Japan, Malaysia, New Zealand, Singapore, Spain, Venezuela and Zimbabwe, were fully involved in the field research side of all Darwin Initiative projects undertaken over the three years. They received background information about the Darwin Initiative and the research tasks (see Annex 7 for example), and project dependent training in: radio-telemetry; coastal and hydrographic surveying; sampling, sorting and preservation of marine organisms; insect trapping; huemul ecology and surveying; lichen collecting; amphibian trapping and survey; plant collecting and use of GPS. Direct involvement in fieldwork with experts is the most powerful and instructive form of environmental education and raising awareness of the environment and its biodiversity, this direct involvement is very effective.</p> <p>Over the course of the three years over 140 volunteer staff members - the volunteers (aged over 25) who managed the projects and supported the expedition - were involved in these projects. Although their involvement was often less, such as logistical support, many were very heavily involved and all were aware of the objectives and the reasons for the Darwin Initiative project.</p>
6B	<p>Each of the 340 young people worked on a research project for three weeks. The period of initial training would have been between two and five days and the volunteers would have been continually learning new skills.</p> <p>The staff were involved in the project over the length of the whole expedition, a ten-week period.</p>
6A	Five CONAF rangers have been heavily involved in the mammal research project over the course of the four expeditions. They have all received training in radio-telemetry and live-trapping techniques and are now continuing to monitor the Kodkod within the park, using the ear-tags for identification
6B	The rangers, Christian Bain, Juan Nitor, Angel Miranda, Luis Azocar and Carlos Lagos, will have worked on the project for an average of three days per expedition, during their allocated time in the park. This can be estimated to a total of about 36 person days. However, as they are a constant presence in the park, they have worked with the researchers and volunteers on a continual basis.
6A	Eight CONAF rangers (see table 4 for list), and two administrative staff received theoretical and practical training in plant and insect surveying and monitoring on a dedicated capacity building day – see Annex 3 for more details. This day was facilitated by Sergio Herrera (CONAF) and delivered by botanist, Dr S Teillier (MNHN affiliated) and entomologist Dr C Ramirez (Universidad de Chile).
6B	A total of two training weeks (ten person days) was achieved by the event described above.
<i>Research outputs</i>	
8	Over the three years a total of 151 weeks were spent by UK-based project staff on work in the host country. Listed by organisation, they were (No. wks): <i>NHM</i> : Dr M Wedin (4), Dr I Sime (10), Dr P Hammond (3), Dr D John (9), Dr D Reid (4), Dr G. Paterson (5), Dr N Evans (7), S. Brooks (3), Prof G Boxshall (4), P. Clark (4), K Jackson (16), Dr T Ferrero (3), M Spencer-Jones (8); <i>University of Durham</i> : Dr N Dunstone (3), R Freer (20). <i>University of Kent</i> : C Williams (3). <i>ITE</i> : Dr L Durbin (10), I Wyllie (10). <i>Raleigh International</i> : Dr S Lee (10), Dr S Rose (13), J Cook (2)
8	An additional 55 weeks were spent by Chilean project staff on fieldwork in the national park. Listed by

Ref:	Details
	organisation, they were (No. wks): <i>Museo Nacional de Historia Natural</i> : Dr M E Ramírez (6), MA Ibañez (3), Dr S Letelier (6), AM Ramos (3), Dr S Teillier & assistant (6), J Mondaca (3), A Vera (3). <i>Universidad de Chile</i> : Dr C Osorio (3), G Acosta (10) Dr C Ramírez (3). <i>Universidad de Concepción</i> : H Díaz (3). <i>Universidad de Los Lagos</i> : R Figueroa (3). <i>Universidad de Valparaíso</i> : Dr W Quilhot (3).
Note	The surveys undertaken during this field season were all carried out in response to information priorities identified by CONAF. An emphasis was placed on sharing skills between UK and Chilean scientists, and CONAF rangers where possible.
9	The attached document Annex 6 represents the initial recommendations for park management as drawn up by CONAF, and suggested by the researchers. This project was aimed at provision of information for CONAF, empowering them to make their own decisions about the park. The document is only the start of this process, and as CONAF are able to assimilate the information generated by the biodiversity surveys, they will integrate this into the existing management plan and strategy.  The initial recommendations will also be disseminated throughout the protected area managers of the other regions, as many of these have relevance nationally as well as locally.
10	John, D., Paterson G. L. J., Evans, N.J., Spencer Jones, M., Ramirez, M.E. & D. Reid (1999). <i>Provisional Biotope Manual for the Laguna San Rafael National Park</i> . The Natural History Museum.
11A	Boxshall, G.A. & Bravo, S. On the identity of the common Caligus (Copepoda: Siphonostomatoida: Caligidae) from salmonid netpen systems in southern Chile. <i>Contrib. Zool</i> , 69: 137-196.
11A	Jørgensen, P.-M. & Wedin, M. (1999). On some Psoroma species from the Southern Hemisphere with cephalodia producing vegetative dispersal units. <i>Lichenologist</i> , submitted.
11A	Paterson, G.L.J., John, D. M., Spencer Jones, M., Ramírez, M.E., Evans, N.J., Davenport, J., Manly, R., Reid, D.G., Osorio, C., Clark, P.F., Plaza, J., Rose, S. & S. Letelier (in press) Marine biology of the intertidal and shallow subtidal of the Laguna San Rafael National Park. In D. Aldridge, S. Beer, J. Cook, J. Davenport, D. Galloway, S. Harrison, C. Weber (Eds). <i>Laguna San Rafael National Park, Chile</i> . Intercept.
11A	Quiroz, A., Fuentes-Contreras, E., Ramírez, C.C., Russell, G.B. & Niemeyer, H.M. (1999) Host plant chemicals and the distribution of Neuquenaphis (Hemiptera: Aphididae) on Nothofagus (Fagaceae). <i>Journal of Chemical Ecology</i> 25 (5): 1043-1054.
11A	Reid, D & C. Osorio (November 2000) The shallow-water marine Mollusca of the Estero Elefantes and Laguna San Rafael, southern Chile. <i>Bulletin of the Natural History Museum (Zoology)</i> , 66 (2).
11B	The proceedings of the first workshop, published in English and Spanish. Rose, S. & Herrera Encina, S. (1997) <i>Managing information in support of park management goals and priorities. Proceedings of the 1st workshop of the Laguna San Rafael National Park Biodiversity Research Programme, Coyhaique, November 1996</i> . Raleigh International
11B	The proceedings of the second workshop, published in English and Spanish. Rose, S. & Herrera Encina, S. (1998) <i>Biodiversity research in the Laguna San Rafael National Park : programme review and forward planning. Proceedings of the 2nd workshop of the Laguna San Rafael National Park Biodiversity Research Programme, Coyhaique, March / April 1998</i> Raleigh International
11B	The proceedings of the third workshop, published in English and Spanish. Rose, S. & Herrera Encina, S. (1999) biodiversity research in the Laguna San Rafael National Park: an exercise in collaboration. <i>Proceedings of the 3rd workshop of the Laguna San Rafael National Park Biodiversity Research Programme, MNHN, Santiago de Chile, May 1999</i> Raleigh International
11B	Acosta, G.A., Simonetti, J & Bustamante. R (in prep) <i>A model of Oncifelis guigna metapopulation in Central Chile</i> .
11B	Acosta, G.A. & J. Simonetti (in prep) <i>Huellas de los Mamíferos del bosque templado de Chile</i> .
11B	Acosta, G.A & I Wyllie (1998) <i>Uso de la asociación anestésica Ketamina-Xilacina para el manejo de Oncifelis guigna</i> . in Proceedings of the 12 <sup>th</sup> Jornadas Argentinas de Mastoología, Puerto Iguazú, Argentina, 11 al 13 de Noviembre.
11B	Boxshall, G.A. & P. F. Clark. (1999) <i>Copepod Crustaceans</i> . Project report for CONAF and Raleigh International.
11B	Brooks, S.J. & K.A. Jackson (1998) <i>Biodiversity of non-biting midges (Insecta: Diptera: Chironomidae) and other freshwater insects of the LSRNP, southern Chile</i> . Project report for CONAF and Raleigh International.
11B	Cox, E.J. (1998) <i>Diatoms from freshwaters in the Southern Andes (LSRNP)</i> . A preliminary report. Project report for CONAF and Raleigh International.
11B	Dunstone, N., Durbin, L., Wyllie, I., Rose, S. & G. Acosta (1998) Ecology of the Kodkod in the Laguna San Rafael National Park, Chile. <i>Cat News</i> 28: 19-21.
11B	Dunstone, N., Durbin, L., Wyllie, I., Freer, R., Acosta, G., & S. Rose (in prep) The ecology of the Kodkod ( <i>Oncifelis guigna</i> ) in the Laguna San Rafael National Park (LSRNP), Región XI, Chile.

Ref:	Details
11B	Dunstone, N., Durbin, L., Wyllie, I., Freer, R., Acosta, G., & S. Rose (in prep) Activity and habitat utilisation of the Kodkod ( <i>Oncifelis guigna</i> ) in the Laguna San Rafael National Park (LSRNP), Región XI, Chile.
11B	Dunstone, N, R. Freer (in prep).The diet of the Kodkod ( <i>Oncifelis guigna</i> ) in the Laguna San Rafael National Park (LSRNP), Región XI, Chile.
11B	Dunstone, N., Durbin, L., Wyllie, I., Freer, R., Acosta, G., & S. Rose (in prep) Conservation implications of ecotourism development on the behaviour and ecology of the Kodkod ( <i>Oncifelis guigna</i> ) in the Laguna San Rafael National Park (LSRNP), Región XI, Chile.
11B	Dunstone, N., Durbin, L., Wyllie, I., Freer, R., Acosta, G., Mazzoli, M. & S. Rose (n prep) Spatial organisation, ranging behaviour and habitat utilization of the Kodkod ( <i>Oncifelis guigna</i> ) in southern Chile
11B	Durbin, L (1998) <i>Kodkod (Oncifelis guigna) Research in Parque Nacional Laguna San Rafael, Chile (97H Expedition)</i> . Project report for CONAF and Raleigh International.
11B	Elgueta, M. & Mondaca, J. (1999) <i>Entomofauna del Parque Nacional Laguna San Rafael. Insectos Con Desarrollo En El Medio Terrestre</i> . Project report for CONAF and Raleigh International.
11B	Díaz-Páez, H. (1999) <i>Uso de recursos por los anfibios de la Patagonia Chilena</i> . Project report for CONAF and Raleigh International.
11B	Hammond P.M. (1999) Beetles in Southern Chile. – in Darwin’s footsteps. <i>Raleigh International Research and Conservation News</i> 19.
11B	Hammond P.M., & K.A. Jackson (1999) Beetle (Coleoptera) assemblages in the Laguna San Rafael National Park, Region XI, Chile. Project report for CONAF and Raleigh International.
11B	Lee, S (1997) Population surveys of the huemul ( <i>Hippocamelus bisulcus</i> ) in Leones Valley, east side of Laguna San Rafael National Park. Project report for CONAF and Raleigh International.
11B	Letelier, S. & A.M. Ramos (1999) <i>Biodiversidad de los moluscos terrestres y de aguas continentales, Parque Nacional Laguna San Rafael (PNLSR), Provincia de Aysén</i> Project report for CONAF and Raleigh International.
11B	Letelier Vallejos S.L. & Spencer Jones M.E. (in prep) <i>Distribution of Mollusca in an Estuarine System in the Bahía San Quintín, Chile</i> .
11B	Osorio, C. (1997) Una experiencia reconfortante. <i>Noticiero Mensual MNHN</i> , 334 : 9-10.
11B	Paterson, G.L.J., John, D.M., M., Evans, N.J., Reid, D.G. & M. Spencer Jones (1999) <i>Marine biology of LSRNP</i> . Project report for CONAF and Raleigh International.
11B	Quilhot, W., Wedin, M., Bernal, M., & C Rubio (in prep) <i>Estructura y biomasa de comunidades liquénicas epífitas en troncos basales de <i>Embothrium coccineum</i>, Laguna San Rafael</i> .
11B	Quilhot,W., Fernández, E., Rubio, C. & R. Segovia (in prep) <i>Tasas de acumulación de l'-cloropananina en <i>Erioderma leylandii</i></i> .
11B	Ramírez, C.C. (1999) <i>Colecta de áfidos en el Parque Nacional Laguna San Rafael</i> . Project report for CONAF and Raleigh International.
11B	Ramírez, M.E., Osorio, C., & S. Letelier (1998) Marine Surveys in the ‘Canales Patagonicos’ <i>Raleigh International Research and Conservation News</i> 17.
11B	Rojas, F. & Vera, A. (1999) <i>Lista representantes de Ordenes de Insecta de Desarrollo acuático colectados en Febrero de 1999 en el Parque Nacional Laguna San Rafael, sector Valle Soler</i> . Project report for CONAF and Raleigh International.
11B	Rose, S. & S. Herrera (1998) An information system for the Laguna San Rafael National Park, Chile. <i>Raleigh International Research and Conservation News</i> 18.
11B	Spencer Jones M.E. (in prep) <i>The Bryozoa of the Laguna San Rafael National Park</i> . planned for the International Conference of the International Bryozoology Association is scheduled to be in Chile at Concepcion, 2004.
11B	Spencer Jones M.E. & Letelier Vallejos S.L. (in prep) <i>An estuarine community in the Bahía San Quintín, Chile</i>
11B	Teillier, S. & C Márquez (1999) Vascular plant flora of the Laguna San Rafael National Park: context and current work. <i>Raleigh International Research and Conservation News</i> 20.
11B	Teillier, S., Barrera, E., Meza, I., & C. Márquez (1999) <i>Parque Nacional Laguna San Rafael: estudio de su Riqueza Florística</i> . Project report for CONAF and Raleigh International.
11B	Wedin., M. (1998) <i>Epiphytic macrolichens as a tool for forest biodiversity evaluation in LSRNP</i> . Project report for CONAF and Raleigh International.
11B	Williams, C. & R. A. Griffiths (1999) Amphibian Diversity And Abundance In Laguna San Rafael National Park, Chile. Project report for CONAF and Raleigh International.
11B	Williams., C. & H. Díaz-Páez (1999) Amphibian Diversity in Laguna San Rafael National Park, Chile.



Ref:	Details
	<i>Raleigh International Research and Conservation News 20.</i>
11B	Williams., C. & H. Díaz-Páez (in prep) <i>On the occurrence of Batrachyla nibaldoi in Laguna San Rafael National Park.</i>
11B	Williamson. W. (1998) <i>List of the group of green algae known as desmids (Division. Chlorophyta, Order Zygnematales) collected by D.M. John in a small freshwater pond at Laguna San Rafael.</i> Project report for CONAF and Raleigh International.
11B	Wyllie, I & G. Acosta (1998) <i>Kodkod research January - March 1998 at Laguna San Rafael National Park, Chile.</i> Project report for CONAF and Raleigh International.
13	<u>Algae</u> already divided by David John and María Eliana Ramírez, and reference collections in London (NHM) and Santiago (MNHN)
13	<u>Molluscs</u> main collection already returned to MNHN and Universidad de Chile (David Reid)
13	<u>Polychaete</u> collections to be returned to MNHN c. 2000-2001 (Gordon Paterson)
13	<u>Echinoderm</u> collections to be returned to MNHN c. 2000 (Gordon Paterson)
13	<u>Decapod</u> collection was divided by Paul Clark and Pedro Báez in MNHN, copepods will be returned c. 2000-2001 (Geoff Boxshall)
13	Miscellaneous <u>marine invertebrate faunas</u> (bryozoa, sponges etc) will be returned to MNHN c.2001-2002 (Maery Spencer Jones et al.)
13	<u>Diatoms</u> : Duplicate set of slides and bottled samples to be sent to Prof. Rivera (University of Concepción) by end 2000. (Eileen Cox)
13	<u>Amphibian</u> specimens reference collection were deposited in the University of Concepción, and the MNHN (Helen Díaz & Clair Williams)
13	<u>Beetles</u> : As species are named, representative series are being put to one side for return to the MNHN in Santiago. The first batch (of perhaps 50 or so species) is expected to be sent this year (1999).
13	<u>Aphid</u> specimen reference collections will be kept in the Universidad de Chile and the Natural History Museum of London (Claudio Ramírez)
13	<u>Chironomid</u> reference collections will be returned to Chile after sorting and identification, within the next three years (Steve Brooks)
13	<u>Lichens</u> collected in the Park are deposited in the Lichen Herbarium of the Escuela de Farmacología, Universidad de Valparaíso, Valparaíso, Chile (Wanda Quihot & Mats Wedin)
14A	Workshop to disseminate project results, MNHN, Santiago Coyhaique, May 25-27 1999  This workshop allowed presentation of project results, discussion of the next steps and evaluation of the project. The meeting involved 25 Chilean delegates from a wide range of governmental, non-governmental and academic institutions, including: CONAF, CONAMA, SAG, MNHN, Universidad de Chile, Universidad Central, Universidad de Valparaíso, CODEFF. Representatives were also present from the NHM, WCMC and Raleigh International. A full list of delegates can be seen in Rose & Herrera (1999).
14A	A one day workshop in environmental education was held in Coyhaique on April 2, 1998. The objective of this day was to discuss the potential for developing environmental education products in Chile from the results of the Darwin Initiative project. This WCMC-facilitated workshop was attended by the local CONAF environmental education co-ordinator, two CONAF rangers, a representative from CODEFF (a conservation NGO) and 12 local teachers.
14A	Cecilia Osorio: “ <i>Una experiencia de terreno en zoología. Expedición Raleigh en Chile</i> ”. 3 talks at the opening of academic year in the zoology degree course of biology and environmental sciences at the Universidad de Chile in 1998 and 1999
14A	Geoff Boxshall: “ <i>Advances in the biology and control of sea lice</i> ”. Universidad Austral de Chile, Puerto Montt, 4th March 1998.
14A	Gerardo Acosta: 1998. “ <i>Ecología de Oncifelis guigna en el Parque Nacional Laguna San Rafael</i> ”. Talk given to the faculty of veterinary science, Universidad de Chile.
14A	Mats Wedin “ <i>Phylogeny and evolution of Caliciales (Ascomycotina) using rDNA sequences</i> ”. School of chemistry and pharmacology, faculty of medicine, Universidad de Valparaíso 25 November 1997.
14A	Nigel Dunstone: “ <i>Ecology and pest status of the American Mink in the British Isles</i> ”. Faculty of science, Universidad de Chile, December 1997.
14A	Paul Clark: “ <i>Larval rearing techniques for decapod crustacea</i> ” MNHN, March 1998
14A	Sergio Herrera & Sam Rose: <i>El Proyecto Darwin: programa de estudios sobre biodiversidad en el Parque Nacional Laguna San Rafael</i> , Third Darwin Workshop May 25-27 1999
14A	Sebastián Teillier: <i>Parque Nacional Laguna San Rafael: estudio de su riqueza florística</i> , Third Darwin Workshop May 25-27 1999

Ref:	Details
14A	Claudio Ramírez: <i>Colecta de áfidos en el Parque Nacional Laguna San Rafael</i> , Third Darwin Workshop May 25-27 1999
14A	Claudio Ramírez and P. Brown: <i>Host specificity of Neuquenaphis species (Hemiptera: Aphidoidea) on Nothofagus (Southern Beeches) species in Chile</i> , 'Aphid Special Interest Group' meeting of the Royal Entomological Society, London, 5 July 2000.
14A	Wanda Quilhot: <i>Estructura y biomasa de comunidades liquénicas epífitas en troncos basales de Embothrium coccineum, Laguna San Rafael</i> , Third Darwin Workshop May 25-27 1999
14A	Wanda Quilhot: <i>Tasas de acumulación de 1'-cloroparanina en Erioderma leylandii</i> . Third Darwin Workshop May 25-27 1999
14A	Mario Elgueta : <i>Entomofauna de desarrollo terrestre</i> , Third Darwin Workshop May 25-27 1999
14A	Fresia Rojas: <i>Entomofauna de desarrollo acuático</i> , Third Darwin Workshop May 25-27 1999
14A	Sergio Letelier: <i>Biodiversidad de los moluscos terrestres &amp; de aguas continentales</i> Third Darwin Workshop May 25-27 1999
14A	Dave John & Gordon Paterson: <i>Biotopos marinos en el PNLSR</i> . Third Darwin Workshop May 25-27 1999
14A	Rachel Freer: " <i>Behaviour and Ecology of the Kodkod</i> ". Department of biology, Universidad de Los Lagos, Osorno.
14A	Sergio Herrera & Sam Rose: " <i>El Proyecto Darwin</i> ". Presentation to local CONAF / SAG / SERPLAC staff in CONAF regional office, Coyhaique, Chile. April 9 1999
14A	Sergio Herrera: " <i>El Proyecto Darwin del PNLSR</i> ". Presentation to the attendants at the VII Encuentro Artístico Ecológico, Aysén Reserva de Vida organised by CODEFF and Coyhaique town council. February 7, 1999
14A	Sergio Herrera: " <i>El Proyecto Darwin del PNLSR</i> ". Presentation as part of a series of talks in Coyhaique on environmental issues. March 17, 1999
14B	Iain Sime: " <i>Diatoms in Chile: field work in a thin country</i> " Internal dissemination talk in the Natural History Museum, London. July 1998
14B	Kelly Jackson: " <i>Chile Warming</i> ". Public presentation to be made at the Natural History Museum as part of a Voyages of Discovery exhibition.
14B	Nigel Dunstone: " <i>Behaviour and Ecology of the Kodkod</i> ". The Zoological Society of Scotland, Edinburgh Zoo, March 1999.
14B	Sergio Herrera: " <i>El Proyecto Darwin del PN Laguna San Rafael: Estudios de biodiversidad en la Patagonia chilena</i> ". Presentation to postgraduate students at Programa Regional en manejo de Vida Silvestre para Mesoamerica y el Caribe, Universidad Nacional, Costa Rica. October 1, 1998
14C	Cecilia Osorio: " <i>La malacofauna marina en el Parque Nacional Laguna San Rafael</i> ". Congress; Molluscs of Latinamerica. 7th to 10th September 1999.
14C	Cecilia Osorio: " <i>La presencia de Moluscos en el Estuario Elefantes y la experiencia junto a Raleigh</i> " Monthly meeting of Chilean Malacological Society, April 1998
14C	María Eliana Ramírez : " <i>Las especies de Porphyra (Rhodophyta, Bangiales) en el PNLSR</i> ". M.E. Ramírez, M. Alejandra Ibáñez y Edith Moyano. 19th Congress of Marine Science, Antofagasta, Chile, 3rd to 7th May 1999.
14D	Dr Sam Rose (UK Project officer) presented a poster describing the Darwin Initiative project at the British Ecological Society Annual Meeting, Dec. 1997.
14D	Dr Sam Rose (UK Project officer) attended a presentation about Darwin supported research (first field season) into the Huemul deer in LSRNP, given by Dr Sonia Lee at the British Ecological Society Annual Meeting, Dec. 1997.
14D	Gerardo Acosta: " <i>Uso de la asociación anestésica Ketamina-Xilacina para el manejo de Oncifelis guigna</i> ". Acosta, G.A & Wyllie; I. XII Jornadas Argentinas de Mastozoología, Puerto Iguazú, Argentina, 11th to 13th November 1998.
14D	Helen Díaz: " <i>Diversidad de anfibios en el Parque Nacional Laguna San Rafael</i> ". Poster to be presented at the Fifth Latin American Herpetological Congress, 12th to 17th December 1999, Uruguay.
14D	María Eliana Ramírez: " <i>Biodiversidad de la flora y fauna marina bentónica en el PNLSR</i> ". M.E. Ramirez, D. John. C. Osorio. N. Evans, D. Reid. Seventh Latin Americano Congress of Botany, México City, 18th to 24th October 1998.
14D	Rachel Freer: " <i>Behaviour and Ecology of the Kodkod</i> ". to The Mammal Society annual conference, Reading University, March 1999
15	Throughout the project many articles about Raleigh have mentioned the project, citing the Darwin Initiative. A selection of these are attached in Annex 8. They include press cuttings, internal newsletter articles and other dissemination publications.

Ref:	Details
15B	Two pieces in the local press specifically about the project
16A	Two editions of a newsletter, entitled “ <i>LSRNP Biodiversity Bulletin</i> ”, was produced and distributed
16C	UK circulation of each “ <i>LSRNP Biodiversity Bulletin</i> ” was circa 1900
16C	Circulation of Raleigh’s <i>Research and Conservation News</i> , in which appeared many articles about the Darwin Initiative, is circa 1900, including about 100 in Chile.
17A/ B	A dissemination network has been established between the research scientists involved in the project to date. Originally facilitated by the Project coordinators, contacts between researchers have been made through fieldwork, meetings, seminars, laboratory work or by written means. This group currently numbers 80+ people, all of whom were involved in the project in some form (see table 2). A core group of about 50 researchers and managers should remain in contact and the network will be facilitated by means of a four person steering committee, (Jonathan Cook, Raleigh, Gordon Paterson, NHM, María Eliana Ramírez, MNHN and Dennis Aldridge, CONAF).
18C	Two local TV news features about Coyhaique workshop.
19C	Five radio interviews in Coyhaique, Sergio Herrera and Sam Rose (Radio Santa Maria)
19C	Many local radio interviews in Region XI about Raleigh International, including information about the Darwin Initiative projects
19D	One local (Southern Counties Radio) radio broadcast in UK
23	<ul style="list-style-type: none"> <li>- The <u>People’s Trust for Endangered Species</u> gave grants of £6,000 to buy specialist equipment for the mammal project being led by Dr Nigel Dunstone of the University of Durham.</li> <li>- The <u>Ernest Kleinwort Charitable Trust</u> provided £7,500 to provide additional support for the mammal and marine projects. Specifically, this grant enabled the purchase of essential equipment and allowed four Chilean researchers to undertake fieldwork with their UK counterparts.</li> <li>- The <u>British Council, Chile</u> gave £2,900 to support three UK scientists undertaking work on this project. As well as covering three airfares, this grant covered the subsistence costs for the three scientists to meet collaborators and give seminars after their period of fieldwork.</li> <li>- <u>Shell Chile</u> gave a donation of US\$5,000 to cover the costs of the review workshop in Coyhaique, March 30 – April 1 1998.</li> <li>- Additional support, in terms of equipment, researchers’ time, and airfares have been received from the <u>Natural History Museum</u>, the <u>University of Durham</u>, <u>ITE Monks Wood</u> and <u>British Airways</u>.</li> <li>- Funding from the EC (1.3 MEURO) was granted for a project to continue the work started in this Darwin Initiative project and expand it region-wide. This is a lasting and powerful legacy to the success of this project.</li> </ul>

- *If relevant, what outputs were not achieved, or only partially achieved, and why?*

The number of CONAF ranger staff trained over the life of the project is less than originally envisaged. See ‘Objectives’ section above.

- *Were any additional outputs achieved?*

- In November 1996, the British Ambassador (HE Frank Wheeler) hosted a reception to launch this and the two other Darwin Initiative projects based in Chile. This event brought together over 100 guests from Santiago’s government, business and academic communities and increased their awareness not only of biodiversity but also of the UK government’s commitment to increase the understanding and conservation of biodiversity world-wide.
- A further reception of the same type was held in 1999 by the next Ambassador (HE Glynne Evans) to mark the end of the project. Approximately 80 guests, including the Executive Director of CONAF attended this reception and had the opportunity to speak to many people who had been involved in the initiative first hand.
- As one of Raleigh’s key current activities in Chile, the project has been mentioned in a number of more general national newspaper articles and TV features about Raleigh’s work in the country. Some of these can be seen in Annex 8.
- A key agreement regarding the deposition of specimens and the responsibilities of project staff has been signed at director level by all of the collaborating institutions; Raleigh International, Corporación Nacional Forestal, the World Conservation Monitoring

Centre, the Natural History Museum (London) and the Museo Nacional de Historia Natural in Santiago (recognised as the fifth major project partner). Copies in Annex 10.

- *If output targets were not specified, please state the outputs achieved by the project. As far as possible, we would like you to work through the list of outputs attached to this paper and to report on those which are relevant to your project.*

n/a

## **6. Project Operation/Management**

- *Research projects - please provide a full account of the scientific work undertaken, outlining the methodology adopted, the staff employed and the research findings. The extent to which research findings have been subject to peer review should be addressed*

The main activity of the project was biodiversity surveying; hence its classification as a research project. This section of the report is therefore the principal one to cover all operational aspects of the work. Details of the project workshops and the research activities comprise the greater part of this section, but a number of other significant operational management points are also drawn out here, including project facilitation, collaboration management, visits, and fundraising.

### **Workshops**

To address the needs of CONAF - the project overseas project partner and client - the project used a process of consultative training workshops, facilitated by the World Conservation Monitoring Centre. Three workshops were held, of which two were priority setting and training. The third was purely dissemination and review.

#### ***Workshop I***

The first workshop, held in Coyhaique in November 1996, launched the project by bringing together 25 senior national researchers and local conservation planners for five days to discuss LSRNP, its problems and its needs. This meeting laid out the WCMC-developed process of guiding information management decisions by a priority-led process, and took the delegates through that process to produce a set of research priorities.

Although the process put forward by WCMC was unfamiliar, it was regarded by most as being as being logical and thorough. Early on in the meeting, the facilitators encountered problems of translating a process designed for a national level to a local level, particularly as the it was one previously untried in Chile and designed in the developed world. Despite some reservations, the objective – to enable CONAF to most effectively determine research priorities to address LSRNP needs – was very clearly evident and wholeheartedly supported. Overall, the meeting was productive, with a clear set of research priorities and a general ‘wait and see’ feeling amongst the Chilean research community present. A full account of this meeting can be seen in Rose & Herrera (1997), enclosed.

#### ***Workshop II***

The second workshop, also in Coyhaique, was held just after the end of the first of the two principal field seasons. During this six-month period (October 1997 - March 1998), more than 20 researchers had undertaken fieldwork in the park, of which five were Chilean. The total field time and other outputs are listed in section 6, and details of the projects are below. Some of the same researchers from the first workshop were present again, but the notable addition to this meeting was the presence of a number of people (three Chilean, one British) who had undertaken fieldwork responding to the first meeting priorities and who were able to present their initial results.

The meeting was shorter than the first, yet followed a learning process certainly as detailed and perhaps more tightly focused. Drawing on the experience of that first meeting enabled the second to be tailored to the specific needs of CONAF and the Chilean research community. The workshop reviewed work undertaken to date and the information management process, allowing a full review of project priorities. This meeting also allowed the project to evaluate how effectively the original objectives were being met, with a specific view to the project’s end, and future project and funding considerations.

The feeling from this meeting was overwhelmingly positive. The 'wait and see' reaction to the first meeting and the initial project ideas had been fully addressed and delegates could see the following key points:

- i. Work had been undertaken as planned to address specific research priorities identified by CONAF and the delegates of the first meeting;
- ii. Chilean scientists had been involved at all times, whether this was in an accepted or declined invitation to work in the field, or just regular contact and consultation through the Chilean Project Co-ordinator Sergio Herrera;
- iii. CONAF could see that scientists were generating information for management purposes - improving the relationship between the research community and the protected area administrators - and other Chilean Regions, were interested (apparent by the presence of the head of Region X UGPS).
- iv. There was already a need to look for continuation funding for the work<sup>16</sup>.

The workshop ended with a revision of the first action plan and a set of continuation ideas for the final major field season. It was very clear that the ideas were being taken on board, and that the real issues behind the management of LSRNP were becoming evident. A full description of this meeting can be found in Rose & Herrera (1998).

### ***Workshop III, May 1999***

The third workshop was held in Santiago in the Museo Nacional de Historia Natural after the completion of all fieldwork. Its principal aim was to review the preliminary results of the projects, evaluate, and consider how the many links and networks generated by the project might develop in the future (EU funding had not been secured by this point). This meeting was facilitated and driven by CONAF, and comprised one part presentation of results, the other part discussions. The 25 delegates were a fairly equal mix of scientists and conservation planners from CONAF (three regional heads of UGPS and the national flora section head), CONAMA (national and local representatives) and CODEFF (national biodiversity co-ordinator). Eight researchers, six from Chile and two from the UK, gave presentations demonstrating their preliminary findings.

Discussions drew on the presentations and allowed the meeting to determine delegates' thoughts about the project; note that some of those present had had only marginal involvement and knowledge of the project prior to this meeting. It also provide a forum for discussing practical ways of maintaining momentum. The results of these discussions, although tinged with the reality of no immediate continuation funding, were positive and included a set of agreements that reflect a considerable will on behalf of those involved to continue. This process also effectively disseminated the messages of the project to those who were largely outside the process before this meeting. Rose & Herrera (1999) present a detailed summary of the meeting, including presentations and details of the agreements.

Following this meeting, a closing presentation was made in the national archive building in central Santiago, to disseminate the results to a wider audience still. Specifically, attendees at this hour-long presentation included **Pedro Araya**, the national head of UGPS, **Juan Pablo Reyes**, CONAF's national director of operations, **Gerardo Tornquist**, the director of CONAF's international relations secretariat, **Manuel Henríquez** and **Carlos Weber**<sup>17</sup>, the CONAF regional directors of the XIth and Metropolitan Regions respectively, and four regional head's of UGPS, **Alexis Villa**, **Dennis Aldridge**, **Gerardo Elzo** and **Juan Ivanovich** from the VIIth, Xth, XIth and XIIth regions respectively. **Dr Alberto Carvacho**, the outgoing director of the Museo Nacional de Historia Natural also attended and addressed the audience for a few minutes.

In summary, the workshops provided not only a method of driving the research programme, but a well-structured set of objectives towards which all project activities could aim. Although they did not always run perfectly, they were accepted by the delegates as essential to the process. Moreover, the whole concept of using consultative workshops rather than prescriptive meetings, was relatively new, but is certain to be used more and more now, not only by those who were involved, but hopefully throughout Chile. Finally, it was a great way of getting people together for a few days and focusing them on the issue in hand, particularly when they are up to 2000km from their normal place of work.

## **Field research**

While the project workshops drove the project process and guided its programme, the biodiversity surveying, in the form of fieldwork, addressed the priorities outlined at these meetings over the course of three field seasons.

*Season 1, October 1996 - March 1997, Raleigh International expeditions 96J and 97A*

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<sup>16</sup> Early discussions at the workshop led to the development of a project proposal accepted for funding by the European Commission to continue the work.

<sup>17</sup> **Carlos Weber**, a strong project supporter from the start, is now overall national Chief Executive of CONAF (2000).

Because fieldwork was restricted by necessity to the Austral spring and summer (October to March), the timing of the first workshop meant that research in the first field season was limited to several important reconnaissance trips (one including Dr Nigel Dunstone to establish the Kodkod project) and a survey into the endangered deer, the huemul (*Hippocamelus bisulcus*).

*Season 2, October 1997 - March 1998, Raleigh International expeditions 97H and 98A*

The limited amount of research undertaken during season 1 was more than compensated for on season 2, highlighting the value of sufficient preparation time. 20 researchers from a range of institutions undertook work into the following project streams: Kodkod (*Oncifelis guigna*) and birds; marine biodiversity; terrestrial and freshwater molluscs; lichens; chironomid midges; diatoms; beetles; and crustaceans.

*Season 3, October 1998 - March 1999, Raleigh International expeditions 98H and 99A*

Season 3 saw continuation of many of the lines of research undertaken the previous year, and established some new lines of research, that were: amphibians; vascular plants; aquatic and terrestrial insects and aphids. Over the course of the two expeditions, 19 researchers were involved in the project of which 12 were from Chile.

The projects are summarised in table 1, below. Specific details of each of the projects can be found in the project reports, the format of which is shown in Annex 2. Copies of all reports are attached along with this document and are listed in the bibliography. Table 1 only lists the principal researchers for each project - usually not the only person involved in the research. Table 2 gives a complete listing of all personnel involved in the project and the details of their involvement.

In addition to these core research projects many of the scientists were collecting for each other, or were looking at different groups in which they had an interest. For example, David John collected samples of water for the study of a group of freshwater algae called Desmids - a report of which is included with this report - and Ian Wyllie undertook bird mist netting and compiled a comprehensive list of the species found in the development zone of the park.

The extent to which research findings have been formally subject to peer review cannot yet fully be answered due to the considerable time lag between fieldwork and peer reviewed publications. Nonetheless, a number of publications are already emerging from the work, all of which have undergone formal peer review. Jorgenson and Wedin (in press) and Paterson et al (in prep) are amongst those awaiting publication. It is a stated intention of all researchers to publish the results of their findings in respected academic journals. In addition, as is clear from the bibliography (see outputs section), many have already delivered presentations about the field work to international audiences at conferences. To insist on a rigorous academic journal review process for the work at this stage would have detracted from the core aims of the project, i.e. to provide information for park management. The style of work presented by necessity in an academic paper is distinct from one that is useful for protected area management, even though the results from which both are generated are the same. To achieve its core objectives this project has guided researchers towards providing summary interpretations from the perspective of land management, such as the following issues (taken from guidelines shown in Annex 2):

*Are there introduced species, and if so what are they?*

*How might they affect the ecosystem?*

*Are there any new species, and what is their significance from a broader perspective?*

*Are there any endemics?*

*Are there any interesting biogeographical patterns?*

*What is the global significance of the assemblages found there?*

*Are the ecosystems unique?*

*Are they (ecosystems / species) affected by man?*

*Are there any pollution incidents?*

*Does the data provide a useful baseline for future monitoring, and if so, monitoring for what purpose and over what time-scale?*

Finally, it is worth pointing out that all project researchers, particularly those with overall responsibility for individual projects, are highly respected researchers at key national institutions. Each has a proven track record and undertook the work on this project as part of their long-term research plans within their respective institutions. A good example might be Professor Geoff Boxshall, a Fellow of the Royal Society from the NHM who undertook fieldwork into crustaceans during February 1998, or Dr Claudio Ramirez, an entomologist from the Universidad de Chile.

Table 1 Summary of research projects undertaken in the Laguna San Rafael National Park

	Title	Taxonomic groups	Principal researchers	Brief description of principal activities	Location	Field season	Principal data type
1	<b>Behaviour and ecology of the Kodkod (<i>Oncifelis guigna</i>)</b>	The Kodkod ( <i>Oncifelis guigna</i> ) wild-cat, mammals, birds	Nigel Dunstone (University of Durham)	Live-trapping and radio tracking of Kodkods, photo-traps.	LSRNP Development Zone	1, 2, 3	·Home ranges / activity patterns of Kodkods ·Fecal analysis ·Bird list ·Mammal obs.
2	<b>i) Epiphytic macrolichens as a tool for forest biodiversity evaluation in LSRNP ii) Collection of lichens for studies of diversity and physiology</b>	Lichens, lichen inhabiting fungi	i) Mats Wedin (NHM) ii) Wanda Quilhot (Universidad de Valparaíso)	Sampling of lichens on <i>Nothofagus</i> spp. and up to 250 m. Sampling of lichen communities from coast to hills.	LSRNP Development Zone and northern shore of the Laguna San Rafael	2	·Species lists ·Secondary analysis of lichens for UV radiation studies
3	<b>Research into chironomid (non-biting) midges, diatoms and dragonflies in lakes and rivers of the southern Andes</b>	Chironomid (non-biting) midges, diatoms, dragonflies	Steve Brooks (NHM) Eileen Cox (NHM)	Samples were taken from lakes and rivers (over an altitudinal range of 200 to 1,000 metres) using a range of methods.	Leones and Nef valleys, to the east of the ice-cap, and the Laguna San Rafael	2, 3	·Species lists ·Physical information (pH, temp etc.)
4	<b>Research into the coleopteran fauna of the southern Andes</b>	Beetles	Peter Hammond (NHM)	Beetles and other terrestrial insects were collected using a variety of interception traps and other methods.	Leones, Nef and Soler valleys, to the east of the ice-cap, and the Laguna San Rafael	2, 3	·Species lists ·Predictions of total beetle diversity
5	<b>Marine biodiversity and distribution of biotopes in the Laguna San Rafael National Park and the Chonos Archipelago</b>	Algae, marine invertebrates (molluscs, crustaceans, polychaetes, echinoderms, bryozons, sponges)	Gordon Paterson, David John (NHM) María Eliana Ramírez (MNHN)	Biotopes and marine habitats were surveyed using quadrats, transects, general collecting, dredges and grabs.	Between the Laguna San Rafael and the Isla Traiguén, and the Bahía San Quintín	2, 3	·Biotope distributions ·Species lists ·Salinity meas. ·Shore profiles ·Mammal obs.
6	<b>Biodiversity of terrestrial and freshwater molluscs in LSRNP and the Chonos Archipelago</b>	Terrestrial and freshwater molluscs	Sergio Letelier (MNHN)	Collections of molluscs were made from a variety of freshwater and terrestrial environments.	Between the Laguna San Rafael and the Isla Traiguén, and the Bahía San Quintín	2, 3	·Species list
7	<b>Diversity of copepods in LSRNP</b>	Copepods, decapods and other marine taxa	Geoff Boxshall, Paul Clark (NHM)	Samples of copepods were collected in various habitats, including freshwater, brackish, glacial and fully marine.	Laguna San Rafael, Río Negro, Bahía San Quintín and Golfo San Esteban.	2	·Species lists ·Information about sea-lice and fisheries
8	<b>Amphibian diversity and ecology in LSRNP</b>	Amphibians	Richard Griffiths, (DICE, University of Kent)	Individuals were collected by different techniques for lab analysis or immediate id. Morphometrics were also taken.	LSRNP Development Zone & south and west shores of Laguna San Rafael	3	·Species list ·Habitat preference and morphometrics
9	<b>LSRNP: a study of its floristic richness</b>	Angiosperms, Gymnosperms & Pteridophytes	Sebastian Teilleir (Universidad Central)	Samples of vascular plants were collected and preserved.	LSRNP Development Zone & south and west shores of Laguna San Rafael	3	·Review / comparison of previous studies ·Species list
10	<b>A study of the aphids of LSRNP</b>	Aphids	Claudio Ramírez (Universidad de Chile)	Aphids were collected from <i>Nothofagus</i> spp. trees	LSRNP Development Zone & south and west shores of Laguna San Rafael	3	·Species list ·Ecological information
11	<b>Terrestrial and aquatic insects of LSRNP</b>	Insects	Mario Elgueta, Fresia Rojas, Ariel Camousseight (MNHN)	Terrestrial and aquatic insects were collected by diverse techniques	The Soler valley, on the east of the icecap	3	·Species lists ·Ecological information ·Distribution data
12	<b>Surveys of the huemul (<i>Hippocamelus bisulcus</i>)</b>	Huemul ( <i>Hippocamelus bisulcus</i> )	Sonia Lee (Raleigh International)	Transects were used to locate huemul presence and indicate population sizes	The Leones Valley, on the east of the icecap	1	·Presence / absence Data for huemul ·Population data

Results are not summarised here, but are available in the project reports and papers attached to this document.

Table 2 Complete list of people involved in the LSRNP Darwin Initiative project, and their involvement

	Name	Project (code)	Specialist field / title	Research involvement	Fieldwork expedition s	Workshops attended	Organisation (... ) = formerly	
1	<b>Nigel Dunstone</b>	Kodkod (1)	Mammal ecology	Principal researcher, fieldwork and analysis	96J, 97H	-	University of Durham, UK	
2	<b>Agustín Iriarte</b>	Kodkod (1)	Mammal ecology	Meetings and support	-	1	DEPROREN, SAG, Santiago, Chile	
3	<b>Jaime Rau</b>	Kodkod (1)	Mammal ecology	Meetings and support	-	-	U. de Los Lagos, Osorno, Chile	
4	<b>Juan Carlos Torres M.</b>	Kodkod (1)	Birds, mammals	Specimen support	-	1,2,3	MNHN, Chile	
5	<b>Leon Durbin</b>	Kodkod (1)	Mammal ecology	Fieldwork and analysis	97H	-	(ITE Banchory, UK)	
6	<b>Ian Wyllie</b>	Kodkod (1)	Birds, Mammals	Fieldwork, bird specialist	98A	-	ITE Monks Wood, UK	
7	<b>Gerardo Acosta</b>	Kodkod (1)	Wildlife vet. and ecology	Fieldwork and veterinary studies	98A	2,3	Universidad de Chile, Chile	
8	<b>Ricardo Figueroa</b>	Kodkod (1)	Mammal ecology	Fieldwork	99A	-	U. de Los Lagos, Osorno, Chile	
9	<b>Rachel Freer</b>	Kodkod (1)	Mammal ecology	Fieldwork and analysis	98H, 99A	-	University of Durham, UK	
10	<b>Mats Wedin</b>	Lichen (2)	Lichens	Principal researcher, fieldwork and analysis	97H	-	NHM, UK	
11	<b>Wanda Quilhot</b>	Lichen (2)	Lichens	Principal researcher, field, lab and analysis	97H	1,2,3	Universidad de Valparaíso, Chile	
12	<b>Steve Brooks</b>	Chironomids / Diatoms (3)	Chironomids / dragonflies	Principal researcher, fieldwork and analysis	98A	-	NHM, UK	
13	<b>Eileen Cox</b>	Chironomids / Diatoms (3)	Diatoms	Principal researcher, analysis	-	1	NHM, UK	
14	<b>Kelly Jackson</b>	Insects (3 & 4)	Chironomids / Beetles	Fieldwork and analysis	98A, 99A	2	NHM, UK	
15	<b>Iain Sime</b>	Chironomids / Diatoms (3)	Diatoms	Fieldwork	98A	-	NHM, UK	
16	<b>Peter Hammond</b>	Coleoptera (4)	Beetles	Principal researcher, fieldwork and analysis	99A	-	NHM, UK	
17	<b>Gordon Paterson*</b>	Marine research (5)	Polychaetes	Principal researcher, fieldwork and analysis	98A	3	NHM, UK	
18	<b>David John*</b>	Marine research (5)	Algae	Principal researcher, fieldwork and analysis	98A, 99A	3	NHM, UK	
19	<b>María Eliana Ramírez*</b>	Marine research (5)	Algae	Principal researcher, fieldwork and analysis	98A, 99A	2	MNHN, Chile	
20	<b>David Reid<sup>6</sup></b>	Marine research (5)	Molluscs	Fieldwork and analysis	98A	-	NHM, UK	
21	<b>Cecilia Osorio<sup>6*</sup></b>	Marine research (5)	Molluscs	Fieldwork and analysis	98A	3	Universidad de Chile, Chile	
22	<b>Nick Evans*</b>	Marine research (5)	Marine surveying	Fieldwork and analysis	98A, 99A	-	NHM, UK	
23	<b>Tim Ferrero*</b>	Marine research (5)	Nematodes	Fieldwork and analysis	99A	-	NHM, UK	
24	<b>Mary Spencer-Jones*</b>	Marine research (5)	Bryozoa	Fieldwork and analysis	98A	2	NHM, UK	
25	<b>María Alejandra Ibañez,</b>	Marine research (5)	Algae	Field assistant to María Eliana Ramírez	99A	-	MNHN, Chile	
26	<b>Sergio Letelier<sup>5*</sup></b>	Terrestrial & freshwater molluscs (6)	Molluscs	Principal researcher, fieldwork and analysis	98A, 99A	3	MNHN, Chile	
27	<b>Ana María Ramos<sup>5*</sup></b>	Terrestrial & freshwater molluscs (6)	Molluscs	Field assistant to Sergio Letelier	99A	-	Universidad de Chile, Chile	
28	<b>Geoff Boxshall</b>	Crustaceans (7)	Copepods	Principal researcher, fieldwork and analysis	98A	-	NHM, UK	
29	<b>Paul Clark</b>	Crustaceans (7)	Decapods	Fieldwork and analysis	98A	-	NHM, UK	
30	<b>Fernando Jara</b>	Crustaceans (7)	Marine ecology	Meeting and contact with Geoff Boxshall. Workshop delegate	-	1,2	Independent ecologist, Puerto Montt, Chile	
31	<b>Richard Griffiths,</b>	Amphibians (8)	Amphibians	Principal researcher, advisor and analysis	-	-	DICE, University of Kent, UK	
32	<b>Clair Williams</b>	Amphibians (8)	Amphibians	Fieldwork and analysis	99A	-	DICE, University of Kent, UK	



	Name	Project (code)	Specialist field / title	Research involvement	Fieldwork expeditions	Workshops attended	Organisation (...) = formerly	
33	<b>Helen Díaz</b>	Amphibians (8)	Amphibians	Fieldwork and analysis	99A	-	Universidad de Concepción, Chile	
34	<b>Sebastian Teillier</b>	Plants (9)	Vascular plants	Principal researcher, fieldwork and analysis	99A	3	Universidad Central, Santiago, Chile	
35	<b>Inés Mesa</b>	Plants (9)	Ferns	Post-field analysis with S.Teillier	-	3	MNHN, Chile	
36	<b>Elizabeth Barrera</b>	Plants (9)	Ferns	Post-field analysis with S.Teillier	-	3	MNHN, Chile	
37	<b>C Márquez</b>	Plants (9)	Vascular plants	Field assistant to Sebastian Teillier	99A	3	U. Central, Santiago, Chile	
38	<b>Claudio Ramírez<sup>4</sup></b>	Aphids (10)	Aphids	Principal researcher, fieldwork and analysis	99A	3	Universidad de Chile, Chile	
39	<b>Mario Elgueta,</b>	Insects (11)	Beetles	Principal researcher, post-field analysis	-	3	MNHN, Chile	
40	<b>Fresia Rojas,</b>	Insects (11)	Aquatic insects	Principal researcher, post-field analysis	-	3	MNHN, Chile	
41	<b>Ariel Camousseight,</b>	Insects (11)	Insects	Insect co-ordinator. Workshop. Project advisor	-	1,2,3	MNHN, Chile	
42	<b>José Mondaca<sup>4</sup></b>	Insects (11)	Terrestrial insects	Fieldwork (for project with Mario Elgueta)	99A	-	MNHN, Chile	
43	<b>Alejandro Vera<sup>4</sup></b>	Insects (11)	Aquatic insects	Fieldwork (for project with Fresia Rojas)	99A	3	MNHN, Chile	
44	<b>Sonia Lee</b>	Huemul Surveys <sup>^</sup>	Ecology	Fieldwork	97A	-	Raleigh International	
45	<b>David Williamson</b>	-	Desmids	Post-field analysis through David John	-	-	NHM, UK (affiliated)	
46	<b>Roberto Murúa</b>	-	Mammal ecology	Workshop delegate	-	1	U. Austral de Chile, Valdivia, Chile	
47	<b>Edmundo Pisano<sup>a</sup></b>	-	Botany	Workshop delegate	-	1	Universidad de Magallanes, Chile	
48	<b>Ian Gauld</b>	-	Hymenoptera	Senior project advisor Workshop delegate	-	1,2	NHM, UK	
49	<b>Dennis Aldridge V.</b>	-	Head, CONAF UGPS, RXI	Senior Darwin Project manager (CONAF)	-	1,2,3	CONAF UGPS, Region XI, Chile	
50	<b>Gerardo Elzo</b>	-	Head, CONAF UGPS RX	Workshop delegate	-	2,3	CONAF UGPS, Region X, Chile	
51	<b>Juan Ivanovich</b>	-	Head, CONAF UGPS, RXII	Workshop delegate	-	3	CONAF UGPS, Region XII, Chile	
52	<b>Ivan Benoit</b>	-	Head, CONAF UGPS wild flora section	Workshop delegate	-	3	CONAF UGPS, Santiago, Chile	
53	<b>Carlos Lizama</b>	-	Forestry engineer	Workshop delegate	-	1	CONAF UGPS, Region XI, Chile	
54	<b>Juan Nitor</b>	-	Park ranger	Workshop delegate Ranger LSRNP	-	1	CONAF UGPS, Region XI, Chile	
55	<b>Cristián Olivares</b>	-		Workshop delegate	-	1	CONAF, Aysén office, Chile	
56	<b>Cristián Bain L.</b>	-	Park ranger	Workshop delegate / Ranger LSRNP	-	2	CONAF UGPS, Region XI, Chile	
57	<b>Ernesto Ortiz</b>	-	Biodiversity unit head	Workshop delegate	-	3	CONAMA, Santiago, Chile	
58	<b>Millaray Hernández</b>	-	Head CONAMA XI	Workshop delegate	-	1	CONAMA, Region XI, Chile	
59	<b>Daniela Castro<sup>**</sup></b>	-	Agronomy	Workshop delegate	-	3	CONAMA, Region XI, Chile	
60	<b>Ricardo Pérez</b>	-		Workshop delegate	-	1	CONAMA, Santiago, Chile	
61	<b>Jonathan Cook</b>	-	Projects Director	Senior Darwin Project manager (Raleigh)	-	1,2,3	Raleigh International, UK	
62	<b>Peter Hartmann</b>	-	Environment	Workshop delegate	-	1	CODEFF, Region XI	
63	<b>Victoria Maldonado</b>	-	Biodiversity unit head	Workshop delegate	-	3	CODEFF, Santiago, Chile	
64	<b>Carmen Blumberg</b>	-	Environmental awareness	Workshop delegate	-	1	(CODEFF, Region XI)	
65	<b>Javier Beltrán</b>	-	Information management	Workshop facilitator	-	2,3	WCMC, Cambridge, UK	
66	<b>Donald Gordon</b>	-	Information management	Workshop facilitator	-	1,2	(WCMC) BGCI, London, UK	
67	<b>John Busby</b>	-	Information	Workshop facilitator	-	1	(WCMC) BIU	

	Name	Project (code)	Specialist field / title	Research involvement	Fieldwork expeditions	Workshops attended	Organisation (...)= formerly
			management				
68	<b>Julio Cerda</b>	-	Wildlife management	Workshop delegate	-	1	SAG, Region XI, Chile
69	<b>Paula Cruces P.</b>	-	GIS	Workshop delegate	-	2	SAG, Region XI, Chile
70	<b>Emma Elgueta</b>	-	Environmental education	Workshop delegate, education advisor	-	1,2	Independent, Santiago, Chile
71	<b>Keith Bennett</b>	Chironomids (3)	Palaeoecology	Consultant for Steve Brooks	-	-	Universitat Uppsala, Sweden
72	<b>Pedro Báez</b>	Crustaceans (7)	Crustaceans	Meetings and contact with Paul Clark	-	-	MNHN, Chile
73	<b>Doris Soto</b>	Crustaceans (7)	Marine ecology	Meeting and contact with Geoff Boxshall	-	-	U. Austral de Chile, Puerto Montt, Chile
74	<b>José Arenas,</b>	Chironomids / Diatoms (3)	Aquatic insects	Meeting with Steve Brooks	-	-	U. Austral de Chile, Valdivia, Chile
75	<b>Patricio Rivera</b>	Chironomids / Diatoms (3)	Diatoms	Contact with Eileen Cox	-	-	Universidad de Concepción, Chile
76	<b>Elliot Shubert</b>	-	Soil algae	Post-field analysis through Eileen Cox	-	-	NHM, UK
77	<b>Javier Simonetti</b>	-	Biodiversity	Project advisor	-	-	Universidad de Chile, Chile
78	<b>Patricio Ojeda</b>	-	Marine ecology	Initial project advisor	-	-	P. Universidad Católica de Chile
79	<b>Fabian Jaksic</b>	-	Mammal Biology	Initial project advisor	-	-	P. Universidad Católica de Chile
80	<b>Carlos Weber</b>	-	Head, CONAF RM	Initial project advisor	-	-	CONAF, Región Metropolitana
81	<b>Jaime Plaza</b>	-	Marine surveying	Workshop delegate	98A	2	Independent, UK
82	<b>Mauricio Fierro</b>	-	Environmental protection	Workshop delegate	-	1	Independent, Puerto Montt
83	<b>Rodrigo Sandoval</b>	-	Veterinary science	Workshop delegate	-	1	Independent, Chile
84	<b>Rachel price</b>	-	Outdoors	Workshop delegate	-	1	(NOLS, Coyhaique)
85	<b>Sergio Herrera E</b>	-	Biology and wilderness management	Darwin Project co-ordinator	-	1,2,3	(CONAF UGPS Region XI) CONAMA, Region XI, Chile
86	<b>Sam Rose</b>	-	Biodiversity / GIS	Darwin Project co-ordinator	-	1,2,3	(Raleigh International, UK) University of Leeds, UK (Jan '00)

<sup>4</sup> = collaborated in the field with project number 4, <sup>5</sup> = collaborated in the field with project number 5

<sup>6</sup> = collaborated in the field with project number 6, <sup>a</sup> = deceased 1997

\* = marine research group members who have collaborated in many different ways

^ = in addition to the the Darwin Initiative supported huemul survey, a further three surveys, supported by alternative sources, were undertaken within the borders of LSRNP, in the Nef, Steffen and Soler valleys.

\*\* = Now working as Chilean project co-ordinator for the EU funded continuation project

Expedition key: **97A** = Jan–Mar 1997 / **97H** = Oct–Dec 1997 / **98A** = Jan–Mar 1998 / **98H** = Oct–Dec 1998 / **99A** = Jan–Mar 1999

## Project facilitation

This short section refers to the means by which the 12 individual sub-projects and 85 involved people were managed.

The number of organisations and people involved in the research was considerable. The initial four project partners, Raleigh International, CONAF, the Natural History Museum and the World Conservation Monitoring Centre have all been key players, but in many ways so have all of the other organisations; ranging from nine other research institutions allowing their researchers to go into the field, to statutory bodies in Chile providing permissions to undertake research.

Table 3 shows the extent of the project's institutional stakeholders<sup>18</sup>. One of the key co-ordination problems of this project has been to balance each of their different needs, requests or aspirations; be they funder reporting requirements or universities needing information to release their staff to undertake fieldwork.

Table 3 List of stakeholders (principal project partners in bold)

<sup>18</sup> see also p6 of Rose & Herrera (1998) for a facilitated hub diagram of these links

Research organisations	Statutory authorities	Funders and supporters	Implementers and assistance
<b>Natural History Museum, London, UK</b>	<b>CONAF (client)</b>	UK Government DETR - Darwin Initiative	<b>Raleigh International</b>
<b>Museo Nacional de Historia Natural, Chile</b>	DEPROREN (permissions and advice)	People's Trust for Endangered Species (UK)	<b>World Conservation Monitoring Centre</b>
University of Durham, UK	SAG XI Región (permissions and advice)	Ernest Kleinwort Charitable Trust (UK)	Raleigh International in Chile & 500 volunteers
Institute of Terrestrial Ecology, UK	SUBPESCA (marine permissions)	The British Council, (Chile)	CONAF guardparques
Universidad de Chile, Santiago, Chile	SERNAPESCA XI Región (marine permissions)	Shell (Chile)	Chilean Navy
Universidad de Los Lagos, Osorno, Chile	DIFROL (Raleigh expedition permissions)	British Airways Assisting Conservation (UK)	Carabineros (police)
Universidad Austral de Chile, Chile	DIBAM (MNHN directorate)	WWF (UK)	SERPLAC (GIS data)
Universidad de Concepción, Chile	CONAMA (workshop involvement)	(Natural History Museum*)	Bienes Nacionales (GIS data)
Universidad de Valparaíso, Chile	CODEFF (workshop involvement)	(University of Durham*)	
DICE, University of Kent, UK		<i>Continuation support from the EU granted 11/99</i>	

\* Although project partners as research organisation, in-kind support from the NHM and Durham University has been significant to warrant their inclusion in this category.

#### Two case studies:

##### *MNHN*

One of the key partnerships was developed early on with the Museo Nacional de Historia Natural, in Santiago de Chile. It became very clear at the first project workshop that there was an urgent need for a more formal link with one of the Chilean research Institutions, as a provider of expertise. Due to the involvement of key MNHN personnel at the first workshop, their status in the Chilean biodiversity sector and their keenness to participate, they were the logical partners. To formalise this agreement an MoU was drafted and signed by the directors of each of the now five principal project partners, but that also applied to any other organisation that was involved in the project. This is attached as Annex 10. Although general, this set out the principles by which the project should operate, that have been, almost without exception, adhered to throughout its course. This agreement was extremely important from the perspective of formalising the Chilean links and the degree to which it was clear that it was in all respects a UK-Chilean initiative.

##### *Dr Nigel Dunstone, University of Durham*

One of the key priorities that came out of the first project workshop was the need for research into the endangered mammals of the area, one of which, the Kodkod (güiña, *Oncifelis guigna*) had not previously been studied in the wild. In response to this need, and because the NHM are not active in large mammal ecology, one of the UK's leading mammalogists, Dr Nigel Dunstone, was approached to undertake a preliminary survey. Although not party to the original project proposal, an initial reconnaissance from Dr Dunstone identified the potential for the project and the subsequent partnership has seen four expeditions of research, five further field workers, considerable data and a number of grants to fund different aspects of the field work (e.g. equipment costs etc.). This project was, in many ways, a flagship project because of the focus on a 'charismatic mega-fauna' species, with a high threat status. With the end of this Darwin project, a new grant from WWF will enable the project to continue over the next two years at least, involving a range of different UK and Chilean researchers and providing valuable information for CONAF.

The facilitating *hub* at the centre of all of these organisations and individuals comprised Raleigh International's head office in London and CONAF's Region XI UGPS office in Coyhaique; each site having a project co-ordinator and overall manager. That both co-ordinators could devote all of their efforts full time to this role was the key factor in making the project work, by facilitating links between all parties. Rather than just playing a co-ordinating and supporting administrative role, the facilitation hub was able to put UK researchers in touch with each other, was able to act as a sounding board between the stakeholders and their ideas of how the project should run and significantly, a direct link between the client (CONAF) and the implementation agency's (Raleigh International's) in-country team.

Probably the most appropriate summary of the relationship is that the project provided a model of collaboration in which each organisation undertook the role at which they were specialist: Raleigh International provided facilitation, manpower and logistical support, and a range of UK research contacts; CONAF, as the client, were able to drive the research in a way in which their needs were being met, and provided in-field support in the form of park rangers; WCMC provided the knowledge of process and methodology, GIS and information management; the NHN and MNHN provided the scientific expertise.

Key to all of the above was constant communication, now possible by email. Although taken for granted in the UK, electronic communication has really only taken off in Chile during the last three years and this project was the first CONAF email link in Coyhaique.

## **Volunteer support**

Finally, the work undertaken by the volunteers was key to the research projects. Their roles – as an unskilled but highly motivated work force – varied from project to project. In each different circumstance they received training, and were guided through the early stages by the appropriate scientist. Roles included learning live-trapping and radio tracking on the Kodkod project, the deployment of flight interception traps to survey insects, night surveying for amphibians and undertaking detailed beach transects and quadrants for marine surveying. Not all of the work was detailed - much was hard work and required a large team, such as one project, where Venturers were needed to dig large holes in the beach to sample for crustaceans. Finally, and just as important was the logistical support, including equipment movement, boat driving, camp duties and safety procedures. On the whole, feedback from the scientists is that the volunteers provided a very willing and able labour force without whom undertaking the project would have been either very difficult or impossible. The full list of volunteers involved in the field research can be found in Rose & Herrera (1999).

## **Miscellaneous**

Other activities, that were essential to the smooth running of this research project, included the following:

- Regular visits to the host country by UK-based project co-ordinators, and return visits by counterparts. These visits helped to maintain a high degree of personal contact between partners, provided opportunities to address problems and issues in detail and to assess progress in the field. They also allowed time for intensive GIS training and meetings with stakeholders. The value of these visits should not be underestimated.
- Raising extra funds was a time consuming but essential part of the project. The extra funds and support in kind secured ensured that the potential of the project could be more fully realised; these funds provided for Chilean scientists to undertake fieldwork, and equipment on the marine and Kodkod projects.
- Briefing Raleigh International volunteers thoroughly was essential to the smooth running of the projects in the field; ensuring they all knew the task that faced them and the reasons for doing it. Briefing took the form of the production of material (Annex 7) and presentations in Coyhaique by the scientists and Sergio Herrera, and in the UK by Sam Rose.
- Meetings between the project collaborators at the Chilean (and occasionally UK) host institution have been very important to help build relationships and discuss the work. This has also helped the UK scientists realise the lack of resources in Chile and how they might be able to address this. This has normally been undertaken after the fieldwork period and has also proven useful for sorting specimens.
- *Training projects - please provide a full account of the training provided. This should cover the content of the training, arrangements for selecting trainees, accreditation, etc.*

The project was not categorised under the Darwin Initiative as a “Training project”, but the original project proposal said that “*training will be a very significant part of the project*”. The training activities undertaken over the three years (all non-accredited) are summarised below:

### ***CONAF ranger training***

The extent of ranger training was discussed in the objectives section of this report. Apart from ad-hoc training by the Kodkod biologists on a variety of occasions over the two years, the principal activity was the ranger capacity building day (see Annex 4). This day provided an opportunity to build knowledge and capacity about biodiversity surveying techniques, both theory and practice, amongst CONAF personnel. The list of participants is below in Table 4.

Table 4 The following rangers from Region XI took part in a biodiversity measuring and monitoring training day led by Drs. Sebastian Teillier (vascular plants, U. Central) and Claudio Ramírez (insects, U. Chile).

Ranger	Protected area	Ranger	Protected area
Luis Montecinos	Reserva Nacional Cerro Castillo	Jaime Calderon	Monumento Natural Dos Lagunas
Orlando Beltran	Reserva Nacional Coyhaique	Apostol Tenorio	Reserva Nacional Rio Simpson
Jorge Osses	Reserva Nacional Coyhaique	Carlos Lagos	PNLSR
Sergio Ferrerira	Reserva Nacional Coyhaique	Hernan Amado	Area de Proteccion Rio Claro

### **CONAF management personnel**

A number of CONAF management staff took full part in the biodiversity information management workshops. These are discussed at length in the objectives and project management sections of this report and full details are provided in Rose & Herrera (1997, 1998 & 1999). Additional material from the workshops to show the kind of training material used can be provided on request. The presence of senior CONAF personnel at the project closing presentation was useful in showing what the project had achieved, not only in terms of the research results but also from the perspective of information management training.

During visits to the UK, Sergio Herrera received two days of training at ESRI<sup>19</sup>, and a further two days of training at WCMC<sup>20</sup>. In Chile, Sr. Herrera received a total of four weeks informal training (in two separate parts) from Sam Rose. During this period, training was also given to two further CONAF personnel; Sr. Herrera delivered this training to his colleagues<sup>21</sup> under the supervision of Sam Rose. Directly after the training period, the knowledge was applied to a forestry project in the Reserva Nacional Coyhaique, demonstrating the capability of the system to a much wider range of people in CONAF.

### **Scientist training**

A number of young biologists undertook fieldwork in the park as part of the project. Although each has their own specialist skill, ostensibly their principal reason for undertaking the work, they also worked with other specialists to learn new skills in their field.

- *Alejandro Vera* and *José Mondaca* are junior entomologists from the MNHN. Both undertook fieldwork for their supervisors (Fresia Rojas and Mario Elgueta respectively) and used the period as a period to gain experience of new techniques and to learn from Peter Hammond (NHM), the senior entomologist present.
- *Kelly Jackson* (NHM) undertook two periods of fieldwork to research chironomid midges and beetles. Because one of these periods was with Peter Hammond, her senior at the NHM, Peter used the opportunity to teach a range of new field sampling techniques as part of her professional development.
- *Claudia Márquez* is a student of Sebastian Teillier (U. Central), and worked with him in the park for three weeks, gaining experience of the flora of this part of Chile and of different sampling techniques.
- *María Alejandra Ibañez* worked as assistant to María Eliana Ramírez (now Director of the MNHN) in the Bahía San Quintín, learning field sampling processing and identification of marine algae.
- *Ana María Ramos* is assistant to Sergio Letelier (MNHN), and undertook a three week period of fieldwork with Tim Ferrero (NHM) gaining valuable field experience in mollusc sampling.
- *Gerardo Acosta* is a veterinarian who undertook three months fieldwork researching the Kodkod in LSRNP with Ian Wyllie (ITE Monks Wood). Sr. Acosta developed his radio tracking skills, learnt bird misting from Ian Wyllie, and gained experience of working with small wild cats.

Finally, there are a range of students who have been involved in the processing and analysis of results in the UK, learning from the principal project scientists. Although not directly involved in the research, it is encouraging to see the range of different spin-offs that are coming from this project.

<sup>19</sup> Proprietary GIS suppliers

<sup>20</sup> Training and support given by Simon Blyth and Jonathan Rhind

<sup>21</sup> Also present were two staff from SAG (Servicio Agrícola y Ganadero)

## Local educators involvement

As part of the second project workshop a half-day training workshop was hosted by CONAF to facilitate the participation of local teachers in the creation of any education products that might have been developed from the project. Although there was no funding for these products at the time, most of the teachers considered it a useful and novel process; they are accustomed to being *told*, rather than *asked*, what such products should be. The results of this workshop are in Rose & Herrera (1998), and helped in the design of the environmental education component of the continuation EU project.

Table 5 The following people were involved in a half day local education workshop to look at possible outputs from the project for educative purposes:

Educator	Organisation	Educator	Organisation
Héctor Caballero	4 x la Ecología, CONAF	José Cayún	Escuela Pablo Neruda
María Jimena Rojas	CONAF	Pedro Guerrero A,	Escuela Canadá
Alicia Pinuer G	Escuela Diferencial España	Antonio Sáez	Escuela Río Claro
Carmen Cárcamo B	Liceo Josefina Aguirre	Nora Contreras R	Escuela José A Silva Ormeño.
Ana María Pino H.	Escuela Nieves del Sur	Hipólito Medina	CODEFF, Region XI
Elba González	Escuela Nieves del Sur	Hernán Velásquez	Park Ranger, Reserva Nacional Tamango

### · Did any issues or difficulties arise in running and managing this project?

The tone of this document is generally to stress the positive lessons that have been learnt from the experience. However, a steady stream of small problems arose during the three years, as would be expected. Below are listed some of these, with either actual or proposed solutions for future reference. It should be emphasised that the problems we faced did not detract from achieving the objectives, as work-rounds were normally found.

#### GIS

The GIS system and data established at CONAF has, as proposed originally, laid the foundations for a comprehensive information system, although one not as comprehensive as all parties would have liked. A number of problems were encountered:

*Problem:* Purchase of equipment in Chile took an inordinate length of time; the project was half-way through before it arrived.

*Solution:* Purchase at start and keep pushing collaborators. Ensure good service contracts available and included in budget.

*Problem:* No base information of sufficient detail (1:50,000 coast, contours, rivers etc.) was made available to the project until its end.

*Solution:* The project used low resolution data (1:3,000,000) but could have bought data sets earlier. Either build into budget or arrange MoU / data sharing agreement with suppliers beforehand.

*Problem:* Training took longer and more resources than expected, and a commitment by CONAF for permanent staff involvement was not made until near the end.

*Solution:* Involve all relevant local staff early and agree time commitments. Build in formal training / capacity building (preferably on an accredited course), even if, as in this case, the GIS is only a component of a research project.

#### Politics

Two main issues arose during the course of the project:

*Problem:* The arrest of General Pinochet might have caused a cessation of activities because of the FCO travel advice not to travel to the country.

*Solution:* Although a problem specific to Chile, similar situations are conceivable in many countries in which Darwin works. Raleigh's solution was to stay in very close contact with the British Embassy in Santiago, and to maintain a low profile, particularly in Santiago and Coyhaique - the nearest town to operations. Although Raleigh in Chile received a certain amount of negativity from individuals, the overwhelming feeling from the local community in Region XI was that they would be offended if the expeditions were cancelled. This emphasises the importance of strong links not only between the project partner (who were entirely supportive throughout this period) but also within the local community in which a project is working.

*Problem:* Throughout the second and third years, internal politics within partner organisations caused parts of the programme to be adjusted, and in one case cancelled.

*Solution:* Although this problem was largely out of the project's hands, it in fact caused minimal impact. Replacements were found for all but one of the people affected, and normally to the benefit of the Chilean partners. The key lessons from this were: i) to set a good precedent early in the project, so that if people are called on at the last minute they have a frame of reference to see how the project has worked for others and can understand more what they are getting involved with; ii) maintain a wide network of contacts, even if some are with people who are not initially planned to be involved in the project.

### ***Communication***

Although generally very good, there were some problems regarding communication:

*Problem:* Although communication was facilitated by the co-ordinators as far as possible, some communication between collaborators or potential collaborators was either infrequent or non-existent. This gave a negative impression to counterparts.

*Solution:* The solution to this, although not ideal, was for the project co-ordinators to maintain control over the contact and ensure some level of collaboration was achieved.

*Problem:* Language difficulties sometimes proved a problem in the field, at workshops and when collaborating via email.

*Solution:* By learning quickly from the first workshop, the simple solution to this was to offer the opportunity for translation should people need it; bilingual personnel were assigned to those who could only speak English. Simultaneous translation for this type of meeting would have been detrimental to the atmosphere and would not be recommended. Collaborating, the project co-ordinators acted as translators whenever necessary so the importance of bilingual (or close) co-ordinators in this type of project cannot be over stressed. NB. One of the WCMC facilitators at the second and third workshops was Argentinean, and hence a native speaker. This proved of immense value to the smooth running of the project.

### ***Participation - senior personnel***

*Problem:* Despite invitations to workshops, fewer senior CONAF managers and scientists attended than hoped. This was partly due to the remoteness of Coyhaique, and also due to the duration of the meetings.

*Solution:* The third workshop (particularly important for dissemination) was therefore held in Santiago and as such attracted a wider variety of people. Moreover it lasted only two days - about the optimum time for delegates to focus on this type of meeting. Moreover, the closing presentation was held close to the CONAF offices and was scheduled only for an hour at the end of a working day. This proved more attractive for the key senior staff, who were well represented at this event - proving effective for dissemination.

### ***Timings***

*Problem:* The fieldwork was limited in timing to the Austral summer, reducing the scope of some projects and forcing researchers into a rigid timetable. This led to an uneven distribution of scientists per expedition, with most going between January and March of each field season. Most Chileans could not undertake fieldwork outside of this period due to work pressures.

*Solution:* Although it is a problem specific to this project, it is important that all projects should bear in mind factors such as academic terms, national holiday periods (e.g. February in Chile) and climate, and how this might affect the objectives of a specific project (e.g. the wet / dry seasons might not be suitable for collection or analysis of certain taxonomic groups).

### ***Funding for Chilean scientists***

*Problem:* i) Within the initial proposal, there was no specific budget for Chilean scientists to undertake fieldwork, although collaboration both lab and field based was a key project objective.  
ii) Chilean scientists did not have institutional support for field equipment and were poorly equipped.

*Solution:* As a general rule, collaborators are much happier when they can see exactly the resources available for them. Our solution to that was to find alternative funding sources, using Darwin as the catalyst and clarify as early as possible how many scientists (with equipment) could be supported. This ensured Chilean scientists were able to go into the field at the first opportunity. Funding sources used for this were the British Council (Chile), the Peoples Trust for Endangered Species, the Ernest Kleinwort Charitable Trust and flights from the BA Assisting Conservation scheme.

## ***Future funding***

**Problem:** At the project's physical end there were no funds for continuation of the most aspects of the work<sup>22</sup>, despite considerable momentum and will on the part of the scientists involved.

**Solution:** The realisation of this possible exit scenario mid-way through the project had led to the submission of a bid to the European Commission. Although other potential funders had been investigated, this was the most appropriate donor for a continuation project of this type. The bid was submitted in October 1998, timed for the end of the Darwin Initiative work. The bid was eventually successful and is now being undertaken, but was not granted until November of 1999, four months after the end of Darwin. The *one-shot* strategy adopted here was risky but eventually successful because of the forward planning (submission nearly a year in advance of the end of the existing project), the success of this project, and the strong relationships not only with partners, but with EU representatives in the host-country and in Brussels.

## ***Skills***

Finally, it is clear that although the Chilean biodiversity research community is active, it is small, and recruiting locals with sufficient skills (e.g. in radio tracking or live trapping) is difficult. There is no real solution to this except for more projects of this type that provide opportunities for training and capacity building, and that increase the skill base.

## **7. Project Impact**

- *To what extent has the project assisted the host country to meet its obligations under the Biodiversity Convention, or to what extent is it likely to do so in the future? Please take account of the following in preparing this section of the report:*

This project has addressed or contributed to the following articles of the CBD of particular significance to the host country.

<b>Article 7. Identification and Monitoring</b>
<b>Article 8. In-situ Conservation</b>
<b>Article 12. Research and Training</b>
<b>Article 13. Public Education and Awareness</b>
<b>Article 17. Exchange of Information</b>
<b>Article 18. Technical and Scientific Co-operation</b>

In more general terms, and accounting for the three points in turn below, the project has achieved the following:

- *The way in which research findings have been **used** to address biodiversity objectives. What actions have been taken, or are expected to be taken, as a result of the project? How will these contribute towards the conservation of biodiversity in the host country concerned?*

All information generated by this research project is new and is helping Chile meet its obligations to the CBD, particularly with respect to Article 7. Additional value is gained from the previous lack of information about the study area, due to its inhospitable climate and inaccessibility. As results are finalised then the information will start to be used to direct protected area management plans, drive future research programs (such as in the EU continuation project). Examples to date are:

An early example of the use of information concerns marine protected areas. Discussed at length in Rose and Herrera (1998), the issue of marine protected areas is one that is not resolved yet in Chile. The information produced by this project for CONAF concerning the marine environments has been crucial in highlighting the importance of LSRNP for marine areas as both a transition zone and as home to unique biotopes. This information will enable CONAF to take the lead in the national debate regarding management of marine areas within existing protected areas.

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<sup>22</sup> The Kodkod project had achieved independence for future work by gaining funds from WWF



The importance of LSRNP for terrestrial research, as a largely pristine natural laboratory, has also come to light through this project. The information generated will be used to reinforce protection arguments, thus helping to safeguard an extensive area of in-situ biodiversity conservation (Article 8).

The presence of exotic or invasive species in visited areas of the park is a key information issue that has arisen from the research. This is of particular concern to CONAF and a nation-wide focus for research within protected areas is likely in the near future, in order to determine the extent of the problem.

Work on the Kodkod is a good example of one type of information to come out of this project aimed at local use. Prior to this project, information about this animal in the wild was almost non-existent. Shortly to be published<sup>23</sup> are the early results of this study, which have immediate implications for all protected areas and land managers in Chile who have jurisdiction over land with Kodkod populations. This, in turn has serious implications for the long-term survival of the species, which in the far south at least, appear at the moment to be good.

Finally, the volume *Diversidad Biologica de Chile* (Simonetti et al., 1995) described the then state of knowledge of taxonomic groups in the plant and animal kingdoms within Chile. This book highlighted the paucity of knowledge of many taxa. Five years on, after a number of the authors of chapters in this book were involved in the research in LSRNP, a comparable volume would be able to state that a significant gap in the nation's knowledge of its own biodiversity has started to be filled.

- *The extent to which training provision has improved the capacity of the host country to conserve biodiversity in the future, and the extent to which the training has addressed real skill needs. Information should be provided on what **each** student/trainee is now doing (or what they expect to be doing in the longer term), and the extent to which their skills are being used in a positive way to promote biodiversity conservation in the host country.*

This project was not a specific training project and could not hope to significantly address Chile's obligations to this part of the CBD. This. However, capacity has been built in many ways throughout the project, as described above in other sections of this report. They are summarised as follows:

CONAF's capacity to conserve biodiversity in the future has improved in the following ways:

- Decision-makers have received training in information management techniques and are using these for further research projects (EU)
- GIS skills – Anibaldo Leviñanco is now using GIS to meet all CONAF's cartographic needs in Region XI. NOTE: Skills training in GIS is a real necessity in Chile, as users are keen to adopt the technology, but effective trainers and training programs are scarce
- Sampling and monitoring techniques amongst guardaparques (rangers) was undertaken and at the very least has improved their knowledge and ability to heighten awareness amongst visitors to protected areas (Article 13)
- Sergio Herrera, who was CONAF's project co-ordinator, has since received a British Council Chevening scholarship to undertake a Masters degree at DICE (University of Kent) in Conservation Biology. As a result, he will personally have improved capacity to personally contribute more to conservation of Chile's biodiversity on his return
- CONAF UGPS Region XI has, as an institution, benefited considerably from being the principal client for, and driving partner in this project. It will continue to do so over the next four years as a result of the EU-funded project. A particular benefit is their improved links with the Chilean research community – this project allowed an unprecedented relationship between the protected areas authority and the biodiversity research community

The Chilean research community's capacity to conserve biodiversity has improved in the following ways:

- The reference collections provided by the project will be of immense value for long-term biodiversity conservation and training of taxonomists
- Several students (José Mondaca & Alejandro Vera) gained valuable field experience and are still working at the Museo Nacional de Historia Natural. As the research community is ageing, investment in youth is crucial

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<sup>23</sup> Dunstone, N., Durbin, L., Wyllie, I., Freer, R., Acosta, G., Mazzolli, M. & S. Rose (in prep) Spatial Organization, ranging behaviour and habitat utilization of the Kodkod (*Oncifelis guigna*) in Southern Chile

- The researchers involved each improved their own research records, thus improving their knowledge and ability to receive further biodiversity research funding. Some have undertaken trips to the UK to improve their knowledge and all are part of a wide information and dissemination network built up throughout the project.
- The collaborations with UK scientists will enable Chile researchers to more effectively answer difficult questions of taxonomy, as the NHM in London has such an extensive pool of expertise and specimens
- The EU project, that will build on Darwin, will involve the same and other, new researchers and will allow them to build their own personal capacity to conserve biodiversity further. The Chilean biodiversity research community is small therefore this type of project will have had proportionately more of an affect than a similar project in, for example, the UK.

*The wider impacts of the project in terms of the level of collaboration achieved between UK and host country institutions, and the prospects for greater joint working/information exchange in the future. To what extent has good collaboration been achieved?*

Much has been written in this report about the collaborative element of the project. It is clear that good collaboration has been achieved, both between institutions and between researchers; the latter both in fieldwork and general exchange of information. Not all possible collaborations have been successful and it is something that can always be improved on, but depends greatly on the will of the people involved. By engaging and involving Chileans from the start and by taking a participative approach to all collaborations, local researchers felt sufficiently empowered to want to collaborate at a number of levels. The different researchers and research groups are shown in tables 1 and 2 above.

The will to collaborate was probably best expressed in the combined bid to the European commission, which has now been successful and will involve many of the same people working together over the next four years. The agreements made at the final workshop, listed in Rose and Herrera (1999) also show this desire to continue collaborating (see table 6 below). In particular agreements 1, 2, 3, 4, 6 and 7 show very strongly that collaboration is a key part of how they (the Chilean scientists mainly) perceive the future.

Table 6 List of agreements taken at the final project workshop

<b>1. Provisional steering committee</b>	In order to maintain momentum and keep project collaborators informed about developments once the project co-ordinators have left the project, a provisional steering committee was formed comprising one representative of each of the main project partners (MNHN - María Eliana Ramírez, NHM - Gordon Paterson, CONAF - Dennis Aldridge, Raleigh – Jonathan Cook. See attached list of names and addresses for contact details)
<b>2. Electronic communication &amp; meta-database</b>	The possibility of using collaborating institutions' resources to create both a web page about the project and a forum for discussion (listserv or newsgroup) will be explored. Both tools would be intended to facilitate dissemination of information about LSRNP and develop further research opportunities. Similarly, the creation of a meta-database (with information that indicates the type, quality, status, origin and methods of access of the information produced in the project) will be explored, with the aim to help to disseminate the work undertaken and improve the future possibilities for collaboration; a guide should be produced that indicates a standard method for researchers to provide this meta-data.
<b>3. Synthesis volume in a scientific journal</b>	The possibility of publishing a synthesis volume of the studies undertaken in the project was discussed. An appropriate journal might be one at national level circulation in Chile; moreover it would be an advantage if this were also to have an international audience (e.g. Revista Chilena de Historia Natural or Boletín del MNHN).
<b>4. Publication of the volume</b>	Once a journal for a synthesis has been identified, the specific requirements and instructions for articles (normally dictated by the journal), and deadline date for submission should be sent out to all of the participating researchers.
<b>5. Reports for CONAF</b>	The co-ordinators will produce and send all researchers a guide for the preparation of reports and data sets for CONAF, indicating the deadline date for their submittal.
<b>6. Proposal to continue / extend studies</b>	The proposal submitted to the EU should be revised and the possibility of its resubmission should be considered by the four project partners.
<b>7. Sources of finance</b>	It was suggested that a database of sources of data for financing projects would be useful tool for researchers and that it may be possible for a the project co-ordinators to produce it. Information about funding sources should be collated from the individuals involved in the project.
<b>8. Dissemination over the short term</b>	General information about the project should be disseminated on the MNHN web page or by an article in CONAF's journal <i>Chile Forestal</i> .

## 8.Sustainability

- *Did the host country institute(s) contribute resources to this project (these may have been provided in-kind, for example staff, materials etc)?*

### *CONAF*

- Region XI CONAF provided an office space and overhead costs for the Darwin Initiative project co-ordinator
- Dennis Aldridge (Head of UGPS Region XI) dedicated approximately 5% of his time to the project
- CONAF guardaparques dedicated considerable time to the project in LSRNP
- The regional CONAF office provided a meeting room for the first two workshops and numerous other meetings

### *Museo Nacional de Historia Natural*

- The MNHN allowed six of their staff to undertake fieldwork, and provided some financial support for field equipment (personal and project).
- The meeting room and facilities from the final workshop were provided by the MNHN, and the room for the closing presentation was made available by DIBAM, the government department of museums and archives.

The Universidad de Chile, Universidad de Valparaíso, Universidad de Los Lagos, Universidad de Concepción and the Universidad Central all allowed members of their staff to undertake research as part of the programme, contributed the required field research equipment and provided resources for seminars and presentations.

- *If so, what is the monetary value of the resources committed to the project by the host country institute(s)?*

CONAF office space and overheads for the project co-ordinator are in the region of £5,000 per year.

It would be difficult to attribute an exact monetary value to the remaining resource contributions mentioned above. However it is unlikely to be less than £50,000

- *To what extent was Darwin funding a catalyst for attracting resources (including in-kind contributions) from other sources? Please provide details on the other sources from which resources were secured for this project.*

Resources were secured from the following sources:

- The Peoples Trust for Endangered Species provided funds for the Kodkod project in two separate grants
- The Ernest Kleinwort Charitable Trust provided funds for the marine and Kodkod projects - principally for equipment
- The British Council, Chile provided grants for three senior UK researchers to visit Chile, meet their collaborators and give seminars
- Shell Chile supported the first two workshops
- British Airways, through their Assisting Conservation programme, provided seven flights over the course of the project
- WWF - UK and WWF-USA have agreed to continue funding of the Kodkod project over the next two years
- The British Embassy in Santiago hosted two receptions, one each to launch and close the project

The Natural History Museum, the University of Durham, the University of Kent (DICE) and the Institute of Terrestrial Ecology all provided staff and equipment for the project.

- *What is the monetary value of resources generated for the project from other sources (please provide an estimate for each funding source)?*

• The Peoples Trust for Endangered Species	£6,000
• The Ernest Kleinwort Charitable Trust	£7,500
• The British Council, Chile	£2,600
• Shell Chile supported the first two workshops	US\$10,000
• British Airways	approx. £5,000
• WWK - UK	£6,500
• WWF – USA	£6,500

Estimates, *excluding* staff costs:

• The Natural History Museum (equip.)	at least £7,000
• The University of Durham (equip.)	£2,000
• The University of Kent (equip.)	£500

NOTE: Raleigh International's contribution to the project was significantly greater than stated in the original proposal (£275,446). This was a reflection of increased costs in reaching the park and of the quantity of research activity eventually generated.

- *To what extent is work begun by the project likely to be continued in the future (if this is relevant - some projects may come to a natural end at completion)? This is more likely to be relevant for research-based projects.*

At the end of the project there was a strong desire amongst CONAF and the research scientists to continue with research in LSRNP and the surrounding area. This was particularly clear from the agreements made in the final workshop<sup>24</sup> and the proposal “*Sustainable management of protected areas in Region XI, Chile*” written by Raleigh and the four collaborating partners and submitted to the European Commission<sup>25</sup> (see Annex 11).

With the award in November of the above-mentioned grant proposal the work begun by the project will be continued, and expanded region-wide, from 2001 to 2004. The project model is very similar and the key partners are the same, so the degree of disruption will be kept to a minimum allowing a smooth transition between projects.

- *Has the project acted as a catalyst for other projects/initiatives in the host country? Is it likely to do so in the future?*

*Research:* The project has been a catalyst for many of the Chilean researchers to branch out and expand their research interests. By providing an avenue for collaboration, it has also widened their perspectives and ideas for funding. For example, many wish to visit their UK counterparts, as María Eliana Ramírez did during June 1999. Cecilia Osorio is also due to visit the NHM in September. New initiatives such as research into Kodkod and red fox interactions proposed by Gerardo Acosta and Javier Simonetti are very much in people's minds. In addition, Claudio Ramirez has secured a three year grant from the Chilean government for an in-depth study of Aphids along Chile. He is also part of an academic link between the Natural History Museum London and the Universidad de Chile financed by the British Council to study Neuquenaphis aphids. These two research programmes would not have been possible without the experience and information obtained during the Darwin project.

*Legacy:* The Legacy of the project, in terms of personnel, results, outputs and publications is very strong. The workshop proceedings provide a good indication of the progress of a project from start to finish.

*Field manual:* Pedro Araya (National Head of CONAF UGPS) made it very clear after the closing presentations that he would like to see a manual produced out of the project that compiles all of the different field methods used and how they may be used by

<sup>24</sup> See Rose & Herrera (1999) and Table 6

<sup>25</sup> Submitted to European Commission budget line ‘Environment in Developing Countries’, the bid was initially graded 1<sup>st</sup> reserve from 127 submitted proposals (only seven initially supported), and was subsequently one of three further projects funded.

rangers for monitoring purposes. Although the co-ordinators have not been able to compile this before the end of the project, it is hoped that CONAF will commit some resources to undertake it in the near future.

*EC project:* The details and needs for the successful EC application was driven largely by CONAF and a number of the senior scientists involved in the Darwin Initiative project. In every sense this project acted as the catalyst for its successor, and was generated as an Anglo-Chilean collaboration.

## 9. Outcomes in the Absence of Darwin Funding

- *Had Darwin funding been unavailable for the project, what would have been the most likely outcome:*

~~The project would have proceeded with other funding? From whom?~~

~~The project would have proceeded at a reduced scale? Please explain.~~

~~The project would have been delayed? Please explain.~~

**The project would not have proceeded**

- *Had this project not been undertaken, how would the users/beneficiaries of the project have met their requirements? Would other organisations/ initiatives have been able to meet their needs (at least to some extent)?*

It is very unlikely they would have been able to meet their information needs. CONAF are not a research organisation, nor do they have the resources to recruit scientists to undertake research on their behalf, particularly not on the scale undertaken by this project.

Although over the long term, it is possible that some of the scientists might have undertaken research in the area, it is unlikely that they would have had as their aim the need to provide information useful for management purposes. The relationship between scientists and CONAF - as protected area administrators - has not historically been a strong one. It is not uncommon for a researcher to undertake work in a protected area throughout Chile and not even send CONAF the report. This project has been a tremendous success in helping to build the “*acercamiento*” (the “*growing closer together*”), of the land managers and the research community, and it is hoped that this relationship will not only continue to be mutually beneficial, but also be a model for people working in protected areas the country over.

## 10. Key Points

- *What would you identify as the key success factors of this project?*
- The facilitation hub of Raleigh International working closely with CONAF; constant contact between all stakeholders, including researchers, statutory authorities and implementers
- Each project partner drew on their own strengths rather than trying to undertake tasks outside of their usual remit
- By actively promoting collaborations and bringing researchers together for extended periods, the degree of collaboration between UK-Chile, UK-UK and Chile-Chile has been considerable
- By continually stressing that the end use of the research is for CONAF protected area management, rather than purely academic ends, the project has succeeded in not only generating information valuable for this purpose, but actively helped to build the relationship between CONAF and the research community.
- By actively generating additional funding, the project has been able to stretch the resources significantly beyond that envisaged in the original proposal; it has been tremendous value for money
- By disseminating widely research activities and results, this Darwin Initiative project has shown a method, or model of working new to Chile, and which has been generally very well received throughout the research and protected area management community.

- By engaging and empowering host-country scientists and conservation planners, the project gained considerable momentum amongst Chileans, the direct result of which is a further four years of collaborative research in LSRNP and surrounding protected areas.
- *What were the main problems/difficulties encountered by the project?*
- The perception of the project being UK-led for UK scientists was a problem early on, but resoundingly overcome during its life
- Working with a diverse group of people and organisations, each with their own agenda, often proved difficult, although never to the point of failure. Effective communication was essential
- Securing proposals, results and information from researchers can be slow, and has often delayed the production of reports or the confirmation of specific projects
- Institutional support, at the national and regional levels, was often not as forthcoming as it might have been
- One of the most difficult aspects of the project was maintaining focus on the objectives, as the potential to address a very wide range of activities was considerable
- *What are the key lessons to be drawn from the experience of this project? Please try to provide as much information on this point as you can so that others can learn from the experiences of your project.*

Section 6 (problems) discussed some of the lessons that can be drawn from the project, based on problems encountered. Key points are summarised here:

- Maintain frequent contact between all partners, researchers and other stakeholders
- Ensure full participation and ownership of the project by host-country collaborators
- Ensure links with partners are strong before you start, both at national (if possible) and local levels
- Ensure the project has a host-country facilitator / co-ordinator, with significant commitment and time to dedicate to the project (preferably salaried)
- Clarify and agree at the start the resources available for each project partner, particularly in-country collaborators
- Sign agreements or MoUs between project partners early in the project to ensure each partner has their frame of reference
- Disseminate results and activities as widely as possible, ensure Inclusivity throughout the community (local and research)
- Thoroughly check all project timings so that problems of climate, national holiday etc. do not occur
- Look for support funding to add value to the core Darwin Initiative project
- *Does the experience of this project imply a need to review arrangements for developing and managing projects funded as part of this Initiative?*

No. The flexibility of the present system allows the creation of small projects that can achieve very significant results in a short period of time for relatively small sums of money. In terms of value for money, the Darwin Initiative is incomparable.

If one suggestion presents itself, there is so much potential generated by these projects (if this is representative of others) that many would benefit from a contingency 'Exit fund' to capitalise on the potential.

## 11. Project Contacts

To assist future evaluation work, please provide contact details (name, current address, tel/fax number, e-mail address), for the following:

UK project leader (and other key UK staff involved in the project)

**Jonathan Cook**, Projects Director, Raleigh International, 27 Parsons Green Lane, London, SW6 4HZ,  
**Dr Sam Rose**, Project Co-ordinator, (from 1/1/2000) School of Geography, University of Leeds, Leeds, LS2 9JT,  
**Dr Gordon Paterson** (key NHM contact), Zoology, Natural History Museum, Cromwell Road, London, SW7 5BD,  
**Javier Beltrán** (key UNEP-WCMC contact), UNEP - World Conservation Monitoring Centre, 219 Huntingdon Road, Cambridge, CB3 0JG,

Host country project leader/co-ordinator (and other key people involved in the project at the host country collaborating institute)

**Dennis Aldridge** (Head of CONAF UGPS Region XI), CONAF XI Región, Bilbao 234 Piso 2, Casilla 412, Coyhaique, XI Region, Chile

**Sergio Herrera**, Project co-ordinator, c/o, DICE, University of Kent, Canterbury, UK (Until October 2001)

**María Eliana Ramírez** (key MNHN contact), Directora, Museo Nacional de Historia Natural, Interior Parque Quinta Normal, Casilla 787, Santiago, Chile

‘End users’ for the output produced by the project in the host country (ie. government departments, agencies, universities, local communities etc)

Principal end users are CONAF, via Dennis Aldridge (as above) and project scientists (see table 2)

Other potential end users organisations are:

- CONAMA (Comisión Nacional del Medio Ambiente)
- CODEFF (Comité Pro Defensa de la Flora y Fauna)
- Museo Nacional de Historia Natural, Santiago
- Universidad de Chile, Santiago
- Universidad de Valparaíso, Valparaíso
- Universidad de Los Lagos, Osorno y Coyhaique
- Universidad Austral de Chile, Puerto Montt
- Universidad de Concepción, Concepción
- Servicio Agrícola y Ganadero
- SUBPESCA, Región XI
- SERNAPESCA Región XI

Local school and colleges in Coyhaique could also benefit from the information generated  
See table 2 for details

Project trainees/students

n/a

Other project beneficiaries

See table 2

Other key players involved in the funding/operation/utilisation of the project.

See table 2

**PLEASE REMEMBER TO ATTACH COPIES OF ALL DOCUMENTATION  
PRODUCED BY THE PROJECT IE. REPORTS, PAPERS,  
MANUALS GUIDES, CONFERENCE/WORKSHOP PROCEEDINGS TRAINING  
MATERIALS ETC**

Ref: 9120/FORMS/9120-FRS