

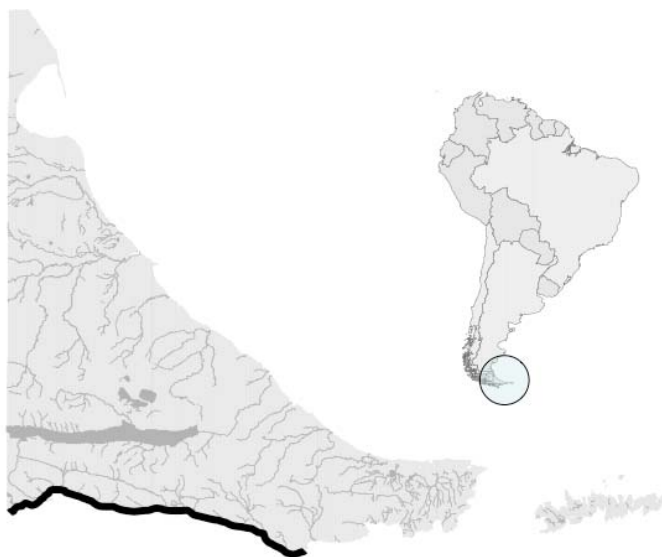
Darwin Initiative – Final Report

Darwin project information

Project Reference	EIDPO021
Project Title	Implementing an otter action plan for marine environments of Tierra del Fuego, Patagonia
Host country(ies)	Argentina
UK Contract Holder Institution	University of Oxford
UK Partner Institution(s)	University of Oxford
Host Country Partner Institution	PROFAUNA Organisation
Darwin Grant Value	£ 92,240
Start/End dates of Project	June 2007/May 2009
Project Leader Name	David W. Macdonald
Project Website	www.profauna.org.ar/iniciativadarwin.htm
Report Author(s) and date	Marcelo H. Cassini & D.W. Macdonald, 31 July 2009

1 Project Background

The Beagle Channel, in southern Argentinian Patagonia, provides a corridor for marine wildlife between the Pacific and Atlantic oceans. The purpose of this Post Project was to evaluate the status of marine populations of two endangered otters (*Lontra provocax* and *L. felina*) and develop a management plan for coastal habitats in the region. Project outputs include student and local manager training, stakeholder and policy maker workshops, press releases, scientific publications and conference presentations, and an action plan and monitoring program. An important achievement for the project was the commitment of local wildlife agents to future monitoring and management of biodiversity.



Study area. Thick line indicates the Argentinean coast of the Beagle Channel

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

This Post Project has developed the knowledge and tools required for conserving marine and coastal biodiversity, and has initiated a permanent conservation programme in the southern coastal region of Argentinian Patagonia. The host country, Argentina, is a party to the Convention of Biological Diversity, signed in 1992. This project helps Argentina to build their capacity to meet CBD commitments by working with and training local people (e.g. National Park wardens). See Annex 3.

In addition the project fulfils several objectives within the conservation and capacity building sections of Argentina's (2003) National Strategy for Biodiversity, most notably by strengthening the national system of protected areas, and increasing knowledge on biodiversity.

3 Project Partnerships

Team composition for this post project

- DW Macdonald (Director of WildCRU) was the general coordinator of the project and MH Cassini (President of PROFAUNA Organization and Director of GEMA, Group of Studies in Ecology of Mammals, group at the University of Luján) coordinated all local work.
- Field work was conducted by MH Cassini and D Centrón (University of Buenos Aires), and local partner collaborators. Additional field work was conducted by L Fasola (WildCRU).
- The genetic team consisted of D Centrón (leader, University of Buenos Aires), JI Tunez (posdoc, Argentinean Research Council) and M Nardelli (undergraduate student, University of Luján).
- The diet analysis was conducted by two undergraduate students, JJ Lopez and AC Gozzi (University of Luján).
- GIS analysis was conducted by JI Tunez and JJ Lopez

Partnerships with local conservation agencies

Conservation issues in Tierra del Fuego, and other nearby islands in Argentina, depend on three main offices:

- 1) Departamento de Fauna (Wildlife Department of Tierra del Fuego)
- 2) Dirección de Planeamiento y Gestión de Áreas Protegidas (Protected Areas Department of Tierra del Fuego)
- 3) Administración de Parques Nacionales (APN) - Parque Nacional Tierra del Fuego (TDF) (Tierra del Fuego National Park).

The Wildlife Department of Tierra del Fuego is a small office employing four people: the head D Valenzuela, one administrative employee, one zoologist, and one technician. The department handles relatively few activities, mainly planning for beaver control, hunting regulations (minimal), and sustainable use of guanacos. The Protected Areas Department is also a small office with few employees; in recent years they have created the first three provincial protected areas (SM Gigli replaced N Lokemeier as Director in 2008). As part of the Argentinean network of National Parks, Tierra del Fuego National Park has a healthy and effective organisation. The Director of the Technical and Research office of this Park is L Malmierca. L Malmierca and E Gallo coordinate wildlife research and monitoring within the Park. In a recent governmental reform, the Wildlife Department and the Protected Areas Department were incorporated into a new agency: Dirección de Areas Protegidas y Biodiversidad - Secretaría de Desarrollo Sustentable y Ambiente de la Prov.de Tierra del Fuego (DAPyB-SDSyA)

M Cassini, local partner of this post project, has developed long-standing partnerships with all three agencies and their members (see following sections). They are already working together to collect data and will jointly produce relevant outputs (action plans and monitoring programs for otters in Southern Patagonia and for the preservation of biodiversity on the coast of the Beagle channel).

Partnerships with local research institutions, and other Darwin Initiative projects

The only research institute in Tierra del Fuego is the Centro Austral de Investigaciones Científicas (CADIC), which depends on the Argentinean Research Council. We have consulted several of their researchers regarding the distribution of fish and crustaceans, pollution in Ushuaia harbour, geomorphology of the coast and other subjects. A particularly important collaboration was initiated with

the 'Ecology of Top Predators Group' headed by A Schiavini. For activities organised with this group see below.

We invited C Bonacic, head of Patagonia Natural (a wildlife research group in Chile), to visit Ushuaia (our study site) in November. C Bonacic directs a project on mink invasion in Navarino Island, on the other side of the Beagle channel and he is the local partner of another Darwin Initiative Project: 'Capacity Building for Temperate Rainforest Biodiversity Conservation in Chile'. A fruitful partnership was born from his visit.

Another Chilean researcher, W. Sielfeld (who previously conducted the most extensive survey of marine coastal mammals in Southern Chile) also visited the project; as a result we agreed to work in collaboration with the aim of understanding the links between Argentinean and Chilean otter populations.

We also worked in collaboration with the Department of Microbiology of the Faculty of Medicine at the University of Buenos Aires (where D Centrón is a Lecturer and researcher).

4 Project Achievements

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

In this Post Project we deal with the conservation of otter biodiversity in the Beagle Channel. Argentina has the highest biodiversity of otters, with four distinct species in its territory. However, 3 of these otters are endangered, and the other is of unknown status. The Patagonian otter *L. provocax* is distributed in two main populations in Argentina: the largest population is in freshwater habitats in Northern Patagonia (the main study area for the original DI project, conducted from 2004 to 2007), a smaller population is found in Southern Patagonia, on State island and in Lapataia bay (on the Argentina-Chile border). The two southern sub-populations were thought to be small and isolated, and thus vulnerable to local extinction. As part of our original DI project, we carried out the only survey of the coast of the Beagle Channel, and were surprised to find faeces of *L. provocax* 130 km from Lapataia bay. Given that this species is extremely difficult to observe, we hypothesised that it may be more common along the Beagle channel than previously believed. We proposed this Post Project to test this hypothesis. We were very successful in our task. We found signs *L. provocax* in many places along the coast of the Beagle channel. This result is a fundamental achievement with a considerable positive impact on otter biodiversity in Argentina. Our survey results suggest that the population of the Beagle channel could be large and stable. The IUCN considers a species to be endangered (Criterion B; IUCN, 2001) when its estimated extent of occurrence is < 5000 km², or its area of occupancy is < 500 km². Our most conservative estimate of the extent of occurrence for *L. provocax* in Argentina is 7395 km², and our less stringent estimate 15588 km², both of which are over the limit suggested by the IUCN. Our evidence, based on spatial information, supports a proposal for re-evaluating the status of *L. provocax* (Cassini et al. submitted, see list of submitted papers, paper 2). Otters are good indicators of habitat quality and the otter population in the Beagle Channel provides an emblem of the importance of conserving, more widely, the biodiversity of this region.

We spent 5 years working closely with local managers, technicians, and wardens from the two main wildlife agencies in Tierra del Fuego. We trained them in several ways, and they have committed to carrying out a long term monitoring program. It will be essential to evaluate the long-term abundance and stability of otter populations in the Beagle channel and this program provides the means and the commitment to achieve that.

Accurately identifying otter signs in the Beagle channel was not an easy task and we needed to develop special techniques. We developed genetic protocols that optimised the use of DNA obtained from poor faecal samples (Nardelli et al. submitted, paper 3) We also developed a method for discriminating hair samples to the level of species (Gomez et al. submitted, paper 4). These techniques will be useful tools for future monitoring.

The Beagle Channel has suffered invasions and/or introductions of non-native mink, beavers and foxes. Work carried out as part of this Post Project has increased our understanding of the status of these non-

native species and of their impact on native biodiversity. Results from the original project coupled with the Post Project showed that mink have expanded their distribution considerably, at a regional level within Patagonia, and at a local level along the Beagle Channel (Fasola et al submitted, paper 1). We evaluated the impact of the coastal population of exotic mink on the native otter, and on native aquatic birds (Gomez et al. submitted, paper 5). We found niche segregation between mink and otters, and a relatively low impact of mink on birds (the latter was in contrast to the high impact of mink on native birds reported in the neighbouring Navarino island).

We also analysed the interactions among the entire assemblage of carnivores utilising the Beagle channel coast: otter, mink, grey and red foxes. We found substantial use of marine resources by all four terrestrial carnivores. We propose that coexistence is facilitated by a constant flux of surplus food, which reduces the negative impact of competition between native, endangered species, and exotic ones.

The main current conservation concerns for the region are related to the impact of fishing on king crabs, and the introduction of salmon (Gomez et al. submitted, paper 5).

4.2 Outcomes: achievement of the project purpose and outcomes

A major outcome of this Post Project was our exciting discovery that the endangered otter *L. provocax*, thought to be restricted to a small bay close to the Chile border, is actually distributed along the entire Argentinean coast of the Beagle channel, almost 160 km of coastline. This discovery will probably change the present conservation status of this otter from 'endangered' to 'vulnerable'.

In contrast, we did not find any evidence of the presence of *L. felina* in Argentina. At present, the only confirmed location of this species in Argentina is the remote State Island.

The successful research outcomes of this Post Project are reflected in the substantial academic output, with 7 manuscripts in peer review journals and 4 presentations at national and international Ecological and Conservation Conferences.

Dissemination of results beyond academic outputs was also an important part of this project. We published two local press releases and, when our results are published (and have copyright protection), we will publish all our results on the website of the GEMA (PROFAUNA) group.

A second proposed outcome of this Post Project was to increase capacity for researchers, wildlife managers and Park wardens to implement effective monitoring of otter status, and to increase stakeholder commitment on a plan for integrative management of Beagle Channel coasts. To this end, we provided almost two full years of training for future Argentinean conservation biologists, and spent several weeks working with almost all members of the technical offices linked with wildlife conservation in Ushuaia town in Tierra del Fuego. We carried out several types of training, including training in laboratory methods (diet analysis, GIS and genetic analysis). We also prepared an action plan and monitoring program that will allow local managers to continue our surveys, to provide robust and reliable estimates of population numbers, and thus to assess the longer-term stability of otter populations in the Beagle Channel. These surveys will provide information on the segments of coast with the highest densities of otters, and will thus allow targeted conservation actions. As a result of extensive meetings with local wildlife agents, we secured a commitment to the permanent monitoring of the wildlife of the Beagle channel and the creation of a new protected area.

4.3 Outputs (and activities)

Programmed outputs

- **Training** of future Argentinian conservation biologists, along with managers and wardens of the National Parks of Patagonia. **Education** of stakeholders and policy makers via workshops.
- **Action plans** and other research products for the conservation of vertebrate biodiversity in Patagonia.
- **Academic outputs.**
- Diverse methods of **disseminating results.**

Programmed activities

- Detailed survey of the coast of the Beagle Channel.
- Sample and data processing with GIS, molecular techniques and diet analysis.
- Development of a draft action plan.
- Organisation of a bi-national meeting and a stakeholder workshop for discussion and dissemination of work.

As demonstrated in Annex 1, the project achieved all these outputs and activities.

4.4 Project standard measures and publications

Theses

1. Undergraduate thesis by Jonatan José Gomez: 'Ecología trófica, patrones distribución espacial y conservación de carnívoros costeros en la costa del Canal de Beagle, Tierra del fuego, Argentina' (Trophic ecology, spatial distribution patterns, and conservation of coastal carnivores on the coast of the Beagle Channel). To be presented in December 2009
2. Undergraduate thesis by Maximiliano Nardelli: 'Métodos no-invasivos de análisis genéticos aplicados a la ecología' (Non-invasive methods in genetic analyses applied to ecology'). Presented 10 August 2009
3. PhD thesis by Laura Fasola: 'Distribución, alimentación e interacciones de dos mustélidos semi-acuáticos en los bosques andino patagónicos: el huillín (*Lontra provocax*) nativo y el visón americano (*Mustela vison*) introducido' (Distribution, diet, and interactions of two semi-aquatic mustelids in Andean-Patagonian woodlands: the native huillín (*Lontra provocax*) and the introduced American Mink (*Mustela vison*). Presented 26 June 2009

Articles in peer review journals

1. Fasola L, Chehébar C, Macdonald D, Porro G, Cassini MH (2009) Do alien North American mink compete for resources with native South American river otter in Argentinean Patagonia? *Journal of Zoology*, 227:187-195.
2. Cassini MH, Fasola L, Chéhebar C, Macdonald D (2009) Scale-dependent analysis of an otter-crustacean system in Argentinean Patagonia. *Naturwissenschaften*, 96:593-9.
3. Fasola L, Muzio J, Chéhebar C, Porro G, Cassini MH, Macdonald DW (submitted) Range expansion and diet of American mink, *Neovision vison*, in Patagonia-Argentina: implications for regional conservation. *Biological invasions*
4. Cassini MH, Fasola L, Chéhebar C, Porro C, Gallo E, Gozzi AC, Gomez JJ, Nardelli M, Macdonald DW. Defining conservation status and threats using limited information: the case of patagonian otters *Lontra provocax* in Argentina. To be submitted to *Biological Conservation*
5. Gomez JJ, Macdonald DW, Gallo E, Gozzi AC, Centrón D, Cassini MH. Diet, habitat use and interactions of exotic and native carnivores in the coast of the Beagle Channel, Argentina. To be submitted to *Biological Conservation*
6. Nardelli M, Tunes JI, Centrón D, Macdonald D, Cassini MH. Técnicas de muestreo no invasivas aplicadas al estudio genético de la fauna (Non-invasive sampling techniques applied to the genetic study of wildlife) To be submitted to *Revista Chilena de Historia Natural*
7. Gomez JJ, Cassini MH. Uso de pelos guardianes para la identificación de especies de carnívoros costeros en la Patagonia. (Use of guardian hairs to identify coastal carnivore species in Patagonia). Submitted to *Revista de Biología Marina y Oceanografía*

Press releases

8. Cassini MH (2008) Las nutrias fueguinas: un tesoro escondido que merece ser descubierto. *Diario del Fin del Mundo*, Edición Nacional Electrónica
9. Cassini MH (2009) Las nutrias fueguinas: hemos descubierto un tesoro. *Diario del Fin del Mundo*

Action Plan

10. Cassini MH, Macdonald DW. Plan de acción para las nutrias patagónicas argentinas con especial referencia al Canal de Beagle (Action Plan for Argentinean Patagonian otters, with special reference to Beagle channel).

Conference presentations

11. Fasola L, Chehébar C, Muzio M, Macdonald DW, Porro G, Cassini MH. Invasion of North American mink in Argentinean Patagonia: degree of expansion and impact on native prey. BES Annual Meeting 10-12 September 2007. Universidad de Glasgow, UK

12. Fasola L, Gozzi AC, Malmierca L, Chéhebar C, Macdonald D, Cassini MH. Diet of the Southern river otter in Argentinean Patagonia. Xth IUCN Otter Colloquium, 10-16 October 2007, Hwacheon, South Korea.
13. Centrón D, Ramirez B, Fasola L, Macdonald DW, Chéhebar C, Schiavini A, Cassini MH. Genetic consequences of geographical distribution in an endangered Patagonian otter. BES Annual Meeting 3-5 October 2008, Imperial College, London, UK
14. Cassini MH, Fasola L, Chéhebar C, Malmierca L, Gallo E, Gomez J, Macdonald D. Otters versus mink in Patagonia: A large-scale natural experiment on the ecological disadvantages of specialism and its conservation consequences. 16-21 August 2009, 10th INTECOL, Brisbane, Australia

Preliminary reports (extra-studies within the project)

15. Fasola L, Macdonald D. Diving behaviour of coastal American mink (*Neovison vison*) in Tierra del Fuego
16. Túnez JI, Nardelli M, Cassini MH. Genetic identification of Patagonian populations of mink (*Neovison vison*) and genetic comparison with native populations and exotic populations of Europe and Asia.
17. Túnez JI, Nardelli M, Cenroón D, Cassini MH. Genetic identification of Patagonian species of sympatric foxes.

4.5 Technical and Scientific achievements and co-operation

The technical and scientific aspects of the Post Project were extremely successful. We have not only achieved the original objectives but have added supplemental research during the relative short project duration of two years. As planned, we obtained new knowledge of the current distribution and status of *Lontra provocax* and *L. felina* in Argentinean marine habitats and of the resource requirements of *Lontra provocax*, by conducting a detailed survey of the coast of the Beagle Channel and by processing samples and data using GIS, molecular techniques and diet analysis.

Additionally, we carried out studies of the other three species of carnivores that inhabit the coast of the Beagle channel: exotic mink (*Neovison vison*), exotic grey fox (*Pseudalopex grisaesus*) and native subspecies of red fox (*Pseudalopex culpaeus lycoides*).

L Fasola (an Argentinian graduate student team member) was trained in the use of temperature-depth recorders to investigate mink diving ability and behaviour, and in the analysis of TDR data, during her time in the UK at the University of Oxford (funded by a Darwin Initiative fellowship). We are currently applying this technique in Argentina and L Fasola will continue this work in her post-doctoral position at CADIC (see below). The technique has the potential to reveal aspects of the foraging behaviour of mink that was not previously possible, and may thus allow us to better predict the impact of mink in different habitats, different seasons and different climates.

We also developed new techniques, such as a method for identifying carnivores based on the micro-structure of hair. Another technical achievement was an investigation of the performance of different sources of DNA (faeces, tissue samples from dead and living animals, bone, and hair) for studies on conservation genetics.

Details of these achievements can be read in the drafts of submitted manuscripts (see Annex 5). Published papers have been subject to full peer review and submitted papers are currently under peer review.

4.6 Capacity building

Tierra del Fuego is a small province with low population density. As we explained in Section 2, public agencies concerned with conservation issues in Argentina have few personnel and low budgets. Most of the personnel within these agencies received training and showed commitment to the project and the monitoring program that will follow after the end of this Post Project.

Workshops

We organised two 2-day workshops. The first was bi-national (Chile and Argentina) and conducted on 13-14 November 2007 in an auditorium at the Dirección de Recursos Naturales (DRN), and in the auditorium of the CADIC. The first day comprised four lectures offered by an international team of

researchers: DW Macdonald (UK), W Sielfeld (Chile), MH Cassini (Argentina) and C Bonacic (Chile). Each speaker offered a wide view of their research that was related to the problem of otter conservation and other related topics. The second day, there were four presentations by D Centrón, L Fasola, E Gallo and MH Cassini, outlining the results of recent surveys conducted in the region. We also gave a formal presentation of this Post Project. During the workshop there was an opportunity for open interchange and discussion of ideas between the audience and speakers.

The second 2-day workshop was on the 19-20 March 2009, also in the DRN and the CADIC. The second workshop was a challenging experience for two reasons: (1) some of the presentations were made by the undergraduate students that had been trained during the 2 years of this project, and (2) the workshop included practical activities on laboratory techniques. On the first morning, we presented the results of this and the previous DI project. On the first afternoon, we gave lectures on field and laboratory methodology used in this Post Project and in the monitoring program that will continue. On the second morning, we conducted a field visit to Lapataia Bay, where attendees learned to recognise otter signs and carry out relevant field techniques. The second afternoon was the most challenging: MH Cassini, JI Túnez, JJ Gomez, and EM Nardelli used the laboratory and computer facilities of the CADIC to give practical demonstrations on: (1) the preparation and analysis of faecal samples for diet analyses, (2) the use of GIS, and (3) the use of GenBank and other genetic tools available on the internet.

The following is a list of local people that attended part or all of the workshops.

1. Leandro MIRI - Lic. en Biología
2. Ricardo SAMANIEGO - CADIC
3. Julio ESCOBAR - CADIC
4. Emilce GALLO - APN - TDF
5. Guillermina MASSACCESI- APN - TDF
6. Laura MALMIERCA- APN - TDF
7. Silvia María GIGLI - Directora de Areas Protegidas y Biodiversidad - SDSyA
8. Clotilde LIZARRALDE - DAPyB- SDSyA
9. Matías Alejandro MARTINEZ- Guardaparque - DAPyB - SDSyA
10. Marcos CISTER- Guardaparque - DAPyB - SDSyA
11. Diego Fernando VALENZUELA - Departamento Fauna - DAPyB-SDSyA
12. María Regina SILVA - Departamento Fauna - DAPyB-SDSyA
13. Adrián Schiavini - CADIC
14. Laura Fasola - WildCRU
15. Alejandro Valenzuela CADIC
16. Andrea Raya Rey CADIC

Students

Over the duration of this Post Project we trained a total of 5 students: 3 undergraduates, 1 graduate and 1 postdoc, from the University of Luján and the University of Buenos Aires (there is no local university):

1. Ana Cecilia Gozzi's undergraduate thesis was approved on May 2008 at the University of Luján. She investigated the diet of *L. provocax* in Lapataia Bay, using samples collected by the wardens of Tierra del Fuego National Park. This thesis was also part of our original DI project; she received her final training within the first months of this Post Project
2. Maximiliano Nardelli's undergraduate thesis was approved on July 2009 at the University of Luján. He worked very hard in the molecular lab, with the aim of identifying the species of faecal samples using molecular markers. He was able to develop a technique, with some success, to extract DNA from very poor samples, i.e. old and soft faeces. To complete his thesis project, he also worked with alternative sources of DNA and so was able to gain experience working with a variety of types of tissue sample. He worked over the duration of the two years of this Post Project.
3. Jonatan J. Gomez's undergraduate thesis will be presented on December 2009 (he has completed the work but is obliged by the University to complete his coursework before presenting the thesis). He carried out an excellent and very thorough dietary analysis of new carnivore faecal samples collected in the Beagle channel. He was able to identify many prey species to the level of genera or species. He also developed a guide for distinguishing hairs from three mustelids:

Lontra felina, *L. provocax* and *Mustela vison* (now renamed as *Neovison vison*). He worked over the duration of the two years of this Post Project.

4. Laura Fasola's PhD thesis was approved on June 2009. She started her thesis at the beginning of the original DI project in June 2004 as a member of GEMA. During the first year of this Post Project (2007-2008), she travelled to the UK and spent a year with the WildCRU, under a Darwin Initiative Fellowship. She returned to Argentina to work on the mink component of this Post Project. With the CADIC, we have organised that L Fasola will continue with her work as a postdoc of A Schiavini and DW Macdonald. A Schiavini is the head of the Wildlife Research Group of the CADIC, and at present is the Head of the whole Institute.
5. Juan Ignacio Túnez, a postdoc of GEMA group, collaborated on the genetic component of this Post Project and received training on the species under study and the use of GIS.

Managers, wardens, policy makers and stakeholders

As described above, the workshops were a fundamental component of the training of managers and other local stakeholders. MH Cassini also held several meetings with other members of the government. Substantial time was invested in face-to-face meetings with E Gallo, L Malmierca, D Valenzuela and MR Silva who will be in charge of future monitoring programs. On some field visits, we were also accompanied by personnel from the APN-TDF or DAPyB-SDSyA.

4.7 Sustainability and Legacy

There are four protected areas in the Tierra del Fuego Province and nearby Argentinian islands. Paradoxically, the region that probably shows the highest risk of degradation in the future is not currently protected. Most population growth and productive economical activities are developed on the coast of the Beagle channel. Thus, the region urgently requires the development of complex integrated strategies for the management of coastal habitats that includes pollution control, policies for sustainable fishery, and sustainable tourism.

Otter are good indicators of the habitat quality. By showing that *L. provocax* is occupying a relatively long stretch of coastline we can use it as an emblem of the importance of conserving the biodiversity of this region. Our work with stakeholders during this Post Project provided them with all the technical elements required to be successful in implementing the action plans that we have developed.

We prepared an action plan that provides the basis for sustainability in the region and outlines a monitoring program that utilises simple techniques that can be used by non-experts – this will be our legacy in Tierra del Fuego. Details can be found in the Appendices.

MH Cassini and DW Macdonald have been working together on collaborative projects for over ten years and therefore, this relationship is likely to continue. An additional partnership has also developed between DW Macdonald and A Schiavini at the CADIC in Tierra del Fuego; this partnership will be continued, in part, through the joint supervision of L Fasola, who is continuing her research as a postdoc at the CADIC.

5 Lessons learned, dissemination and communication

The first field visit that MH Cassini and D Centrón conducted to Tierra del Fuego was in January 2005, as part of the original DI project. The survey carried out as part of the original project was extensive (covering an area comparable to the width of Europe), and focused on freshwater environments. Therefore, little data was collected initially from the coast of the Beagle channel. However, over the last 2 years, frequent field trips have been undertaken to Tierra del Fuego. On every trip we interviewed local stakeholders and showed them our commitment to research and conservation in the region. People in these remote areas tend to be distrustful of 'outsiders' but our tenacity finally bore fruits and partnerships with local people have now been consolidated.

For this Post Project we developed a highly efficient team of people that worked simultaneously, using different approaches and methodologies (molecular techniques, GIS systems, diet analysis techniques,

field surveys) to achieve the aims of the project. As part of the project we did, however, need to perfect these techniques to work optimally with the type of samples and data that this project requires.

Fieldwork in this region is challenging. Navigation can be dangerous because the Beagle channel is characterized by sudden and unpredictable changes of weather. Terrestrial surveys also present difficulties due to the harsh, rocky terrain (accentuated because rocks become slippery in the high humidity of this region). We learned during this Post Project that field surveys in this region require considerable time and effort, and that frequently survey days are unrewarded because we did not find signs of otters.

The project leader and the general local coordinator met for the first time in 1990, when MH Cassini initiated a posdoc in Oxford University with John Krebs. Their first project together in Patagonia, a survey of mink in Victoria Island, in the middle of Nahuel Huapi lake in Northern Patagonia, started in 1996. Since then, they consolidated an academic link between a British and an Argentinean research team that has lasted until today. This type of long-term partnership between research groups of different countries is probably the best strategy for successful endeavours in the difficult task of conservation biology in the Southern Hemisphere.

We have produced all dissemination products that were scheduled and some additional products (as described above). Details of these products are given in Appendices.

5.1 Darwin identity

In order to publicise the Darwin Initiative the Darwin Logo was featured in all project outputs (see PVA report), on all field equipment and on information advertising the project. The Darwin Initiative has been acknowledged in seminars, newsletters, theses, reports and peer-reviewed publications. Throughout this Post Project, the Darwin Initiative has been linked to all project outcomes that were disseminated by radio, television, local and national newspapers.

Darwin Initiative support was recognised as a distinct project with a clear identity, because it is the only GEMA group project in Patagonia. Although the project receives some financial assistance from other sources, the DI is the most important source of support.

In Argentina, the Darwin Initiative program is not as well known as some other similar conservation programs, especially those promoted by NGOs based in the United States of America. It is, therefore, particularly important that DI projects are promoted properly in this country. Conservation biologists and wildlife managers are likely to be familiar with it.

6 Monitoring and evaluation

There were no changes to the original plan for this Post Project.

To determine whether the project and its components were conducted as planned both WildCRU and PROFAUNA carried out an internal progress evaluations throughout the course of the project. This progress evaluation determined whether the project was meeting its stated purpose, objectives, outputs and milestones according to the proposed timetable. Towards the end of each project year, a major evaluation took place to assess strengths, weaknesses and to implement corrective measures. We also assessed the cost-effectiveness of what had been accomplished, benefits to trainees and the effectiveness of individual project components. International specialists with expertise in the field of this project were recruited to act as evaluators. The evaluators determined how dissemination activities and outputs were providing feedback to inform decision-making. Success was estimated based on academic outputs (theses, papers and technical reports), training and education outputs (number of people trained and training weeks), cooperation activities with local institutions, etc. We also examined how research and training had contributed to our understanding of the key factors involved in the long-term conservation of otters and general biodiversity. Outcome indicators have served as a baseline for measuring success. At the end of the project we evaluated whether the project was replicable, transportable and applicable to other parts of Argentina and beyond.

The main project activities, timetables and the staff responsible for the execution of the project were included in the annual operational plans of PROFAUNA. These were evaluated annually using standardised internal procedures already in place. We applied the participatory principle by promoting the participation of all partners in the evaluation of the project. The Argentine universities involved also evaluated the proposed plans for the four theses conducted during this Post Project.

The main difficulties of the project were technical ones, e.g., how to reach certain remote areas of the Beagle Channel, how to obtain DNA from poor quality faecal samples, etc.

6.1 Actions taken in response to annual report reviews

Not applicable

7 Finance and administration

7.1 Project expenditure

Expenditure	Budget	Actual	% variance
Staff			
Rent,Rates			
Travel			
Printing			
Conference			
Consumables			

Due to different budget headings available on Oxford University's finance system "Oracle" the Items listed do not match those in the original budget. The difference in consumables was due to an increase in expenditures for the genetic work. We needed to analyse substantially large numbers of samples of putative otters, and we also incorporated two completely new genetically-based objectives to the project: (1) a study on the genetic links between populations of minks within Patagonia and between Patagonia, North America, Europe and Japan, and (2) a study on genetic differentiation between species of foxes. We can afford these objectives because we earned money on travelling.

7.2 Additional funds or in-kind contributions secured

7.3 Value of DI funding

DI funding for this Post Project allowed us to build on the findings of the original DI project, to investigate in detail the status of otter species in the Beagle Channel, to develop an action plan for the future conservation of otters in this region, and to instigate wider biodiversity conservation plans (to be implemented by local partners) for the Beagle Channel (itself an evocative site with the potential to become a flagship for conservation in the region). This work required intensive fieldwork by a team of scientists in the host country, considerable investment in training local partners in Tierra del Fuego and much time spent building relationships with local stakeholders – neither WildCRU nor PROFAUNA have core funds available to cover these types of activities, and this work would not have been possible without the funding received from the DI.

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

Project summary	Measurable Indicators	Progress and Achievements	Actions required/planned for next period
<p>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</p> <ul style="list-style-type: none"> • The conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources 		<p>Obtained new knowledge on the distribution and biology of marine populations of endangered otters in Argentina.</p> <p>Obtained the commitment of local wildlife agents for the permanent monitoring of the wildlife of the Beagle channel and creation of a new protected area.</p>	(do not fill not applicable)
<p>Purpose To protect the vertebrate biodiversity of Argentinean Patagonia both by protecting the marine populations of two endangered otters, and initiating a plan of multiple management actions for the coast of the Beagle Channel.</p>	<p>New knowledge regarding the present distribution of <i>Lontra provocax</i> and <i>L. felina</i> in Argentinean marine habitats and the resource requirements of both species.</p> <p>Increased capacity for researchers, wildlife managers and Park wardens to implement effective monitoring of otter status.</p> <p>Increased stakeholder commitment on a plan for integrative management of Beagle Channel coasts.</p> <p>Establishment of a flagship conservation initiative in the name and memory of Charles Darwin, capitalising on a unique historical link.</p> <p>Ultimately, prevention of the extinction of <i>L. felina</i> and of the marine stock of <i>L. provocax</i> in Argentina</p>	<p>We are very proud to say that we exceeded the objectives that we planned. We discovered an unknown population of <i>L. provocax</i> otters. This discovery will probably allow changing the present conservation status (endangered) of this species to a better level (vulnerable). In contrast, we did not find evidence of the presence of <i>L. felina</i> in the Beagle channel, given serious concern on the present status of this species in Argentina (but providing crucial information required for proper conservation planning for this species in the future).</p> <p>Our work with local people was very successful. There are three key institutions (National Park administration, local wildlife administration and a Research Centre) and we interacted with the three of them in the best possible way to improve capacity and commitment towards wildlife conservation in the</p>	(not applicable)

		coasts of the Beagle channel.	
Output 1. Training of future Argentinean conservation biologists, along with managers and wardens of the National Parks of Patagonia. Education of stakeholders and policy makers via workshops	3 undergraduate theses, 2 guards and 2 managers will receive training. Students will work for at least 1yr, while guards/managers will receive 3 weeks of field training. Additionally a bi-national workshop will be held with 30 stakeholders.	2 undergraduate theses successfully defended, 1 undergraduate theses drafted, 1 Ph D thesis successfully defended, 1 post doc trained. Almost all local people involved in wildlife conservation received training in 2 workshops, 1 bi-national meeting, several individual meetings, and several field campaigns.	
Activity 1.1 Organisation of two workshops		As planned, we organised one bi-national workshop in November 2007 and another workshop in March 2009	
Activity 1.2 Training of students, managers and gardens		3 students received 2-year training in 3 different fields: diet and GIS analyses, molecular techniques, and the use of radio-tags. 2 other students also received training. 12 local stakeholders received training during workshops and 4 managers received additional training during meetings and field visits.	
Output 2. Action plans and other research products for the conservation of vertebrate biodiversity in Patagonia.	An action plan for the conservation of marine populations of otters; a draft action plan for the conservation of vertebrate biodiversity in Tierra del Fuego. A training guide for monitoring marine coasts. A computer database.	A draft action plan together with a training guide, and a computer database were prepared and send to the local key institutions.	
Activity 2.1 Detailed survey of the coast of the Beagle Channel.		Done	
Activity 2.2. Sample and data processing with GIS, molecular techniques and diet analysis.		Done	
Activity 2.3. Development of a draft action plan, a training guide and a computer database		Done	
Output 3. Academic outputs.	3 manuscripts for peer-reviewed journals, and 3 conference presentations.	Exceeded	
Activity 3.1. 3 manuscripts to be written.		2 manuscripts accepted, 5 submitted	
Activity 3.2. 3 papers to be presented in scientific meetings		3 presentations in 2007 and 2008, and 1 will be presented in 2009	

Output 4. Diverse methods of disseminating results.	3 local press releases in Argentina. 2 webpage newsletters. 2 books (printed and pdf versions) for the dissemination of action plans.	Done
Activity 4.1. Contact local press		Done
Activity 4.2. Preparation of 2 webpage newsletters and 2 books		1 book prepared on Beagle channel wildlife that includes a plan for its conservation 2 webpages prepared

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

1. Project summary	2. Measurable indicators	3. Means of verification	4. Important assumptions
<p>Goal:</p> <p>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</p> <ul style="list-style-type: none"> • the conservation of biological diversity, • the sustainable use of its components, and • the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. <p>Purpose</p> <p>To protect the vertebrate biodiversity of Argentinean Patagonia both by protecting the marine populations of two endangered otters, and initiating a plan of multiple management actions for the coast of the Beagle Channel.</p>	<p>New knowledge regarding the present distribution of <i>Lontra provocax</i> and <i>L. felina</i> in Argentinean marine habitats and the resource requirements of both species.</p> <p>Increased capacity for researchers, wildlife managers and Park wardens to implement effective monitoring of otter status.</p> <p>Increased stakeholder commitment on a plan for integrative management of Beagle Channel coasts.</p> <p>Establishment of a flagship conservation initiative in the name and memory of Charles Darwin, capitalising on a unique historical link.</p> <p>Ultimately, prevention of the extinction of <i>L. felina</i> and of the marine stock of <i>L. provocax</i> in Argentina</p>	<p>Publication of theses, papers accepted by peer-reviewed journals, technical reports produced for National Park and partner organisations.</p> <p>Management plans, training and implementation guides, computer databases, fieldwork reports, workshop records, and formal agreements with National Park Administration and local environmental agencies.</p> <p>Stakeholder workshops organised every two years.</p> <p>Development of an inter-disciplinary, cross-cutting action plan to be adopted by the Planning Department of the Tierra del Fuego government.</p>	<p>National and local authorities maintain their present support for our CBD activities and continue to be prepared to incorporate our new management proposals.</p>

<p>Outputs</p> <p>Training of future Argentinean conservation biologists, along with managers and wardens of the National Parks of Patagonia. Education of stakeholders and policy makers via workshops</p> <p>Action plans and other research products for the conservation of vertebrate biodiversity in Patagonia.</p> <p>Academic outputs.</p> <p>Diverse methods of disseminating results.</p>	<p>Three undergraduate theses, two guards and two managers will receive training. Students will work for one year, while guards/managers will receive three weeks of field training. Additionally a bi-national workshop will be held with 30 stakeholders.</p> <p>An action plan for the conservation of marine populations of otters; a draft action plan for the conservation of vertebrate biodiversity in Tierra del Fuego. A training guide for monitoring marine coasts. A computer database. Three manuscripts for peer-reviewed journals, and three conference presentations.</p> <p>Three local press releases in Argentina. Two website newsletters. Two books (printed and pdf versions) for the dissemination of action plans.</p>	<p>3 undergraduate theses submitted/defended. Student performance reports, workshop participant records.</p> <p>Management plans, field implementation and training guides and computer databases sent to the DI.</p> <p>Papers and conference abstracts sent to the DI.</p> <p>Copies of all publications and records sent to the DI.</p> <p>Agreement with local agents and National Park administrators.</p>	<p>Students, National Park managers, and stakeholders are available and motivated for training and application of new skills.</p> <p>Journal editors/ conference organisers will accept papers. Newspaper, radio and TV producers will be interested. National Park Administration will be interested.</p> <p>Local press will be interested in conservation problems.</p>
<p>Activities [details in workplan]</p> <ol style="list-style-type: none"> Detailed survey of the coast of the Beagle Channel. Sample and data processing with GIS, molecular techniques and diet analysis. Development of a draft action plan. Organisation of a bi-national meeting and a stakeholder workshop for discussion and dissemination of work. 	<p>Activity milestones (summary of project implementation timetable)</p> <p>Inputs</p> <p>Budget £92,240 over two years</p> <p>Staff: UK project leader, three local partners, three students, three field assistants, occasional training and research assistants.</p> <p>Equipment: Project office, molecular laboratory, diet analysis laboratory, field work equipment, 4x4 van.</p>	<p>Assumptions</p> <p>Availability of equipment.</p> <p>Interest of stakeholders for attending workshops and meetings.</p>	

Annex 3 Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use		Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	45	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	25	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation		Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity		Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	20	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness		Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources		Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information		Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge

Article No./Title	Project %	Article Description
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Other Contribution	10	Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	1
1b	Number of PhD qualifications obtained	1
2	Number of Masters qualifications obtained	
3	Number of other qualifications obtained	3
4a	Number of undergraduate students receiving training	3
4b	Number of training weeks provided to undergraduate students	90
4c	Number of postgraduate students receiving training (not 1-3 above)	1
4d	Number of training weeks for postgraduate students	90
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(ie not categories 1-4 above)	1 (Dr. JJ Túnez)
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	9 (Attendants to the 2nd workshop, some of them received additional training)
a6b	Number of training weeks not leading to formal qualification	90
7	Number of types of training materials produced for use by host country(s)	3 (1 included in the action plan and 2 in technical articles in peer review journals)
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	1
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	1
10	Number of formal documents produced to assist work related to species identification, classification and recording.	1
11a	Number of papers published or accepted for publication in peer reviewed journals	7 (5 waiting for editorial decision on acceptance)
11b	Number of papers published or accepted for publication elsewhere	0
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	1
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	0
13a	Number of species reference collections established and handed over to host country(s)	1
13b	Number of species reference collections enhanced and handed over to host country(s)	0
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	2
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	4

Code	Description	Totals (plus additional detail as required)
15a	Number of national press releases or publicity articles in host country(s)	0
15b	Number of local press releases or publicity articles in host country(s)	2
15c	Number of national press releases or publicity articles in UK	0
15d	Number of local press releases or publicity articles in UK	0
16a	Number of issues of newsletters produced in the host country(s)	1
16b	Estimated circulation of each newsletter in the host country(s)	1 (webpage newsletter, in Spanish)
16c	Estimated circulation of each newsletter in the UK	0
17a	Number of dissemination networks established	0
17b	Number of dissemination networks enhanced or extended	0
18a	Number of national TV programmes/features in host country(s)	0
18b	Number of national TV programme/features in the UK	0
18c	Number of local TV programme/features in host country	0
18d	Number of local TV programme features in the UK	0
19a	Number of national radio interviews/features in host country(s)	0
19b	Number of national radio interviews/features in the UK	0
19c	Number of local radio interviews/features in host country (s)	0
19d	Number of local radio interviews/features in the UK	0
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	0
21	Number of permanent educational/training/research facilities or organisation established	0
22	Number of permanent field plots established	1
23	Value of additional resources raised for project	£20000 (approximately)
Other Measures used by the project and not currently including in DI standard measures		

Annex 5 Publications

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
journal	Fasola L, Chehébar C, Macdonald D, Porro G, Cassini MH (2008) Coexistence of North American mink and South American river otter in Argentinean Patagonia.	Journal of Zoology (London)	Wiley_Blackwell http://www.wiley.com/bw/journal.asp?ref=0952-8369	
journal	Cassini MH, Fasola L, Chéhebar C, Macdonald D (2009) Scale-dependent analysis of an otter-crustacean system in Argentinean Patagonia.	Naturwissenschaften (Germany)	Springer, Berlin http://www.springerlink.com/content/100479/	

Papers submitted to peer-review journals

1. Fasola L, Muzio J, Chéhebar C, Porro G, Cassini MH, Macdonald DW Range expansion and diet of American mink, *Neovision vison*, in Patagonia-Argentina: implications for regional conservation. Submitted to *Biological invasions*
2. Cassini MH, Fasola L, Chéhebar C, Porro C, Gallo E, Gozzi AC, Gomez JJ, Nardelli M. Threats to Southern River otter (*Lontra provocax*) in Argentinean Patagonia. Submitted to *Animal Conservation*
3. Gómez JJ, Macdonald D, Centron D, Cassini MH. Interaction between carnivores and wildlife conservation in the coast of the Beagle Channel, Patagonia, Argentina. Submitted to *Biological Conservation*
4. Nardelli M, Centrón D, Tunez JI, Macdonal D, Cassini MH. Eficiencia en el uso de marcadores mitocondriales a partir de muestras de tejidos, pelos, huesos y heces: sugerencias prácticas para ecólogos interesados en las aplicaciones de la biología molecular. (Efficiency in the use of Mitochondrial markers from tissue, hair, bone and faeces samples: practical suggestions for ecologists interested in molecular ecology applications) Submitted to *Revista Chilena de Historia Natural*
5. Gomez JJ, Macdonald D, Cassini MH. Nuevo método de identificación de tres especies de mustélidos semi-acuáticos simpátricos patagónicos a partir de la recolección de pelos. (New method for identification of three sympatric species of Patagonian, semi-aquatic Mustelids based on hair collection). Submitted to *Revista de Biología Marina y Oceanografía*

Webpage newsletter (in Spanish); available at http://www.profauna.org.ar/Iniciativa_Darwin.html

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