



EIDPO041

Submit by Monday 30 November 2009



DARWIN200

DARWIN INITIATIVE: APPLICATION FOR GRANT FOR ROUND 17: POST PROJECT

Please read the Guidance Notes for both Main Round and Post Project applications before completing this form. Where no word limits are given, the size of the box is a guide to the amount of information required.

Information to be extracted to the database is highlighted blue.

1. Name and address of organisation (NB: Notification of results will be by post)

Name: Dr. Carlos Garcia de Leaniz	Address: Swansea University, School of the Environment & Society Department of Pure & Applied Ecology Singleton Park, Swansea SA2 8PP, UK
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2. Post-Project details

Project Title (max 10 words): Protecting galaxiids from salmonid invasions in Chile and the Falklands				
Proposed start and end dates: 1 April 2010 - 31 March 2012 Duration of project: 2 years				
Darwin funding requested	2010/11	2011/12	2012/13	Total
	£101,420	£78,500	£0	£ 179,920

3. Original Project Title and Defra reference number (eg 14-065)

Reducing the Impact of Exotic Aquaculture on Chilean Aquatic Biodiversity (162/15/020)
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4. Principals in project. Please provide a one page CV for each of these named individuals. Letters of support must also be provided from the host country partner(s) endorsing the partnership and value of the Post Project funding. You may copy and paste this table if you need to provide more than one overseas project partner.

Details	Project Leader	Other UK personnel (working more than 50% of their time on project)	Main project partner and co-ordinator in host country/ies
Surname	Garcia de Leaniz	Consuegra	Gajardo
Forename (s)	Carlos	Sonia	Gonzalo
Post held	Senior Lecturer	Lecturer	Professor
Institution (if different to above)	Swansea University	Aberystwyth University	Universidad de Los Lagos (Chile)
Department	Pure & Applied Ecology	Institute of Biological, Environmental & Rural Sciences	Laboratorio de Genética y Acuicultura
Telephone			
Email			

5. Principals in project. Please provide a one page CV for each of these named individuals. Letters

of support must also be provided from the host country partner(s) endorsing the partnership and value of the Post Project funding. You may copy and paste this table if you need to provide more than one overseas project partner.

Details	Main project partner and co-ordinator in host country/ies
Surname	Rendell
Forename (s)	Nicholas
Post held	Environmental Officer
Institution (if different to above)	Falkland Islands Government PO Box 611 Stanley Falkland Islands FIQQ 1ZZ
Department	Environmental Planning Department www.epd.gov.fk
Telephone	
Email	

5. Define the purpose of the Post Project (extracted from logframe) and explain how it is linked to the objectives of the original Darwin project? (Max 200 words)

Building on our successful Darwin project, we now propose to develop practical, proactive measures to help reverse the widespread decline of native galaxiids in Chile and the Falklands Islands by:

- (1) Identifying those galaxiids populations most in need of protection from salmonid invasions using a novel landscape genetics approach that will integrate (and model) data on salmonid pressure, habitat connectivity, and galaxiid population structuring and gene flow using a combination of molecular markers, stable isotopes, and elemental composition analysis
- (2) Developing and implementing a reintroduction and captive breeding programme for endangered *Aplochiton zebra* and *Aplochiton taeniatus* based on Recirculation Aquaculture Systems (RAS) and our pooled expertise on ex-situ conservation, environmental enrichment, and conservation genetics
- (3) Field-testing novel in-situ approaches to galaxiid conservation based on the possible removal of invasive salmonids from critical habitats, and the implementation of control and legal measures designed to prevent salmonid colonization and encroachment of galaxiid refuge areas
- (4) Building capacity, as well as training and education material to draw attention to the conservation needs of galaxiids and the threats posed by salmonid invasions

6. What have been the main outcomes (achievements) of the original project to date? (max 300 words)

1. Training & Capacity Building for monitoring the origin and effects of salmonid escapees: Equipping of an Aquaculture Genetics laboratory in the host country for diagnosing the origin of salmonid escapees, development and field-testing of a molecular toolkit for Genetic stock identification (GSI) of Atlantic salmon (15 microsatellites DNA) and rainbow trout (8 microsatellites DNA), Isotopic toolkit for distinguishing farmed from free-living invasive salmonids based in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$, and for quantifying trophic overlap between exotic galaxiids and native salmonids, and quantification of direct and indirect effects of salmonid predation on galaxiids, and invasiveness of rainbow trout and brown trout
2. Assessing the prevalence of exotic salmonids: Online distribution atlas (under construction) with more than 200 sampling stations and +11,000 fish records of native fishes (14 species) and exotic salmonids (5 species).
3. Educating and raising public awareness: 3 International workshops, over 50 students trained, 4 UG dissertations completed, 5 MSc thesis completed, 2 PhD theses in progress, 9 staff and volunteers fully trained, 8 media releases, development of joint MSc in Sustainable Aquaculture
4. Disseminating and influencing policy-making: Code of Best Practices, 3 Peer reviewed publications (*Biological Invasions*, *Ocean & Coastal Management*, *Animal Conservation*), 2 MS under review, and 9 international presentations.

7. What steps have been taken to ensure that project purpose and outputs of the original project will be achieved within the original project term? (max 200 words)

Our original DI sought to reduce the impact of exotic aquaculture, namely salmonid farming, on Chilean Aquatic biodiversity by (1) establishing the capacity of Chilean researchers to monitor salmonid escapees, (2) assessing the prevalence of farmed and free-living salmonids (3) developing a MAP and CBP, (4) raising public awareness and (5) developing an education program. Virtually all the key objectives have been met or will be met before the project deadline (Dec 31st 2009), despite dramatic recent changes in the Chilean salmon industry (see annual and half-yearly reports). Three international workshops were organized and these were very popular with students and stakeholders. Valuable links, based on mutual trust, and the need for rigorous scientific data, have been forged with the salmon industry and key stakeholders and continuing dialogue has helped to develop (and ensure necessary endorsement of) a CBP. The main challenges have rested on the logistics of sampling remote aquatic ecosystems, which in Chile are particularly complicated. On the other hand, the DI following from the Falklands Scoping Award was due to have been submitted on October 2007, when there was a one year-gap in funding and is therefore integrated in the present post project application.

8. Please list all the institutions involved including the UK/collaborative (where there are partners in addition to the applicant organisation) and host country partners that will be involved in the Post Project, and explain their roles and responsibilities in the project and in the original project (if applicable). Describe the extent of their involvement at all stages, including Post Project development. This section should illustrate the capacity of host country partners to be involved in the project. Please provide written evidence of partnerships. Please copy/delete boxes for more or fewer partnerships.

<p>Lead UK institution and website where available:</p> <p>Swansea University (SU) School of the Environment & Society Biological Sciences Department of Pure & Applied Ecology www.swan.ac.uk/biosci/ www.biodiversity.cl</p>	<p>Details (including roles and responsibilities and capacity to engage with the project):</p> <p>The Project leader (CGL) at Swansea University (SU) will coordinate the overall project, overseeing the research program, capacity building and the training of staff in the UK, Chile and the Falklands. We will draw expertise at The Institute of Environmental Sustainability and the Centre for Sustainable Aquaculture Research (CSAR) to develop an Aquaculture Recirculation System suitable for the ex-situ conservation of the endangered galaxiid <i>Aplochiton zebra</i> and to develop a series of reintroduction strategies in collaboration with the project partners and stakeholders. SU will also carry out (and provide training on) Stable Isotope Analysis (SIA) to assist in the assessment of population connectivity of galaxiid populations, building on our experience in the current Darwin Project, and in collaboration with one of the original project partners (US Geological Survey).</p>
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<p>Other UK institution and website where available:</p> <p>Aberystwyth University (AU) Institute of Biological, Environmental & Rural Sciences www.aber.ac.uk/en/ibers/ www.biodiversity.cl</p>	<p>Details (including roles and responsibilities and capacity to engage with the project):</p> <p>Dr. Consuegra (AU) will develop and optimize the molecular markers necessary for the identification (barcoding) and genetic screening (microsatellites) of endangered galaxiid populations. As in the previous Darwin, she will provide molecular training in collaboration with the Chilean host partner (ULA, Dr. Gajardo), making use of the existing laboratory infrastructure at ULA, equipped during the original Darwin project. Molecular data will be used to target and prioritize galaxiid populations for reintroduction and <i>ex-situ</i> conservation, in collaboration with the rest of the partners and stakeholders.</p>
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<p>Lead host country Partner and website where available:</p> <p>Universidad de Los Lagos (ULA) Laboratorio de Genética y Acuicultura Osorno, Chile www.laboratorigenetica.cl/ www.biodiversity.cl</p>	<p>Details (including roles and responsibilities and capacity to engage with the project):</p> <p>As in the original Darwin project, Dr. Gajardo at ULA will be the lead host partner in Chile, will arrange logistic support and will coordinate the laboratory and training programs. He will also help develop the molecular toolkit for prioritization of endangered galaxiid populations. A Chilean research assistant will, after appropriate training, be appointed to carry out the implementation of the ex-situ conservation programme with assistance from volunteers and PG students.</p>
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<p>Lead host country Partner and website where available:</p> <p>Falkland Islands Government Environmental Planning Department (DEP) Stanley, Falkland Islands www.epd.gov.fk</p>	<p>Details (including roles and responsibilities and capacity to engage with the project):</p> <p>Nicholas Rendell, the Environmental Officer at the Environmental Planning Department (EPD), will be the lead host partner on behalf of the Falklands Islands Government. EPD will be responsible for overseeing and coordinating the project in the Falklands, in particular in relation to the reintroduction strategies and field work, building on our previous Scoping Award and a recent OTP-funded report on the conservation status of zebra trout. As in Chile, we envisage appointing a research assistant who, after appropriate training, will assist with all aspects of the project and develop the ex-situ conservation programme with assistance from volunteers and PG students. As well as the reintroduction project, EPD will oversee a pilot research on small-scale removal of invasive brown trout, will examine the effects of culverts on population connectivity, and will assess the feasibility of applying potential control measures to stop trout reinvasions in particularly sensitive waterways undertaken by the RA. For this, we will draw on the expertise of our US partners (OSU and US Geological Survey). EPD's contribution to the project include logistic support, availability of office facilities, as well as some matched funding. EPD will also make available archived galaxiid tissue samples for genetic and elemental analysis, thereby reducing the number of new samples required.</p>
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<p>Partner Name and website where available:</p> <p>Falkland Islands Development Corporation (FIDC) Stanley, Falkland Islands www.falklands.gov.fk/FI_Development_Corporation.html</p>	<p>Details (including roles and responsibilities and capacity to engage with the project):</p> <p>Daniel Fowler, Aquaculture Manager of Falkland Islands Development Corporation (FIDC), will take the lead in the development and implementation of the ex-situ conservation programme in the Falklands. FIDC has first-hand knowledge on Recirculation Aquaculture Systems (RAS) and live feed production, and also on working with galaxiids in the Falklands, both in the wild and in captivity. FIDC was very influential in helping to secure our previous Darwin Scoping Darwin Award and has again pledge full support to the project. FIDC will contribute by granting access to electro-fishing equipment and field gear, providing the site and manpower for running the RAS system for the captive breeding programme, and also by helping with the field work. It will also help secure access to the very well-equipped laboratory at the Fisheries Department, which will be essential for the preparation and processing of fish samples for the monitoring work.</p>
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<p>Partner Name and website where available:</p> <p>Oregon State University (OSU) Department of Fisheries & Wildlife Corvallis, OR, USA http://fw.oregonstate.edu/index.htm</p>	<p>Details (including roles and responsibilities and capacity to engage with the project):</p> <p>As in our original Darwin project, Dr. Guillermo Giannico (OSU) will help with the development of the public awareness and education programs, capitalizing on the outreach expertise at OSU and his experience at working on salmonid conflicts with a variety of stakeholders. Along with the other US partner, OSU will be instrumental in assessing the degree of population connectivity of galaxiid populations (in particular with respect to the effect of culverts, a growing problem in Falklands), and in integrating genetic and ecological data to identify and prioritize populations for conservation efforts. OSU has pledged full support to the project and will contribute in kind with Dr. Giannico's time and expertise.</p>
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<p>Partner Name and website where available:</p> <p>US Geological Survey (USGS) FRESC Corvallis Research Group Corvallis, Oregon, USA http://fresc.usgs.gov/corvallis/index.html</p>	<p>Details (including roles and responsibilities and capacity to engage with the project):</p> <p>Dr. Jason Dunham, a Senior Aquatic Ecologist at USGS, will continue taking a lead role in assessing the impact of salmonid invasions on native galaxiids, as in the original Darwin project. He will now, in collaboration with partners in the UK and Chile, help to develop a novel landscape genetics approach for managing impacts from invasive salmonids, and for targeting endangered galaxiids for reintroductions and ex-situ conservation. This will draw on a wealth of expertise in Dr. Dunham's group on integrating genetics and ecology in the study of invasive salmonids in the US, Chile and elsewhere. USGS will contribute in kind with (1) expertise in the assessment and design of translocation and reintroductions of fish for conservation, (2) access to facilities that can be used to analyze samples to ID migratory patterns based on elemental composition of otoliths, and (3) experience in landscape spatial analyses that will complement landscape genetic inferences.</p>
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9a. Have you consulted stakeholders not already mentioned above? **Yes** **No**

If yes, please give details:

Yes, we had contacted Dr. Rob McDowall (National Institute of Water and Atmospheric Research, New Zealand), Dr. Miguel Pascual and Dr. Javier Ciancio (Centro Nacional Patagonico, CONICET, Argentina) before and will continue to seek their advice and explore possibilities for collaboration. Dr. Pascual and Dr. Ciancio participated in one of our Darwin International workshop and helped us with the development of the isotopic toolkit in the original Darwin Project, while Dr. McDowall agreed to become external project advisor during our initial Scoping Award in the Falklands.

9b. Do you intend to consult other stakeholders? **Yes** **No**

If yes, please give details:

We have engaged with Marine Harvest, Salmones Multi-Export, Piscicultura Huilico, Aqualnovo, WWW Chile, TERRAM, Pure Salmon Campaign, Fundacion Huinay, and several angling associations in Chile as part of our original Darwin Project. We will seek to maintain such contacts and develop further collaboration in the post project. In the Falklands we intend to contact the angling association and the landowners. We will also continue to engage with University colleagues in Chile (Universidad de Valparaiso, Universidad Austral) and to seek the advice of external project advisors (Prof Ian Fleming Memorial University of Newfoundland), Dr. Eric Verspoor (Marine Scotland), and Dr. Rob McDowall in New Zealand.

9c. Have you had any (other) contact with the government not already stated? Yes No
If yes, please give details:

We have, via our Chilean host partner, contacted CONAMA (National Commission for the Environment), as well as the Secretariat for Fisheries (SUBPESCA) and the Fisheries Department (SERNAPESCA). These have regularly attended our Darwin workshops and have been instrumental in securing funding and support for the project, including the granting of legal permits.

In the Falklands we have been in contact with the Fisheries Department (FD), who have offered their full support for the project and were instrumental in securing the Scoping Darwin Award.

9d. Is any liaison proposed with the CBD/CMS/CITES focal point in the host country? Yes No
If yes, please give details:

Yes, via CONAMA in Chile, and Environmental Planning Department and Falklands Conservation in the Falklands Islands

9e. Will your project support any work in the UK Overseas Territories? Yes No

If yes, please give brief details stating which Territory/ies will be involved.

Yes, the project will be based in the Falklands Islands (in addition to Chile)

POST PROJECT DETAILS

10. Please provide a Concept Note (max 1,000 words). Describe the problem to be addressed, explain why it is a priority for the host country and how its resolution will improve host country ability to meet it's obligations under CBD/CMS/CITES. The proposed strategy and its intended outcomes should be described adequately, including justification for and brief details of the contribution of each UK and host country partner.

Like Chile, the Falkland Islands have a wealth of biodiversity but limited access to skilled practitioners in assessing and managing key biodiversity goals in freshwater environments. Salmonids are not naturally present in the Southern Hemisphere and constitute possibly the single most important threat to native freshwater fishes. With more than 40 endemic freshwater species (most of which are barely known to Science), there is increasing evidence that the widespread decline of native galaxiid fishes such as *Aplochiton zebra* and *Aplochiton taeniatus* has been triggered by the introduction of exotic salmonids, historically via sport fishing and more recently through accidental escapes from salmonid farming. The Governments of Chile and the Falklands Islands are committed to the implementation of the CBD through the development of Species and Habitat Action Plans for endangered species or geographic areas requiring special protection. Therefore one of the aims of the proposed project will be to inform such Action Plans for endangered native galaxiid fishes through the training of local officers on the development of both *in-situ* and *ex-situ* conservation measures. This post-project award therefore provides a unique opportunity to draw on global best practices for implementing management strategies for protecting native galaxiid fishes from salmonid invasions in both countries, and for addressing a urgent biodiversity crisis. We expect three main key outcomes from the project (1) an assessment of the current conservation status of threatened native galaxiids, in particular of *Aplochiton zebra* and *Aplochiton taeniatus*, (2) an implementation of appropriate management practices for a range of stakeholders, including the development of *in-situ* and *ex-situ* conservation programmes and (3) education and capacity building through training of Chilean and Falkland officers and exchange of students. Building on our highly successful Darwin Initiative in Chile and a Scoping Award in the Falklands, we propose to develop practical, proactive measures to help reverse the widespread decline of native galaxiids by:

(1) Identifying those galaxiids populations most in need of protection from salmonid invasions using a novel landscape genetics approach that will integrate (and model) data on salmonid pressure, habitat connectivity, and galaxiid population structuring and gene flow using a combination of molecular markers, stable isotopes, and elemental composition analysis
(2) Developing and implementing a reintroduction and captive breeding programme for endangered *Aplochiton zebra* and *Aplochiton taeniatus* based on Recirculation Aquaculture Systems (RAS) and our pooled expertise on *ex-situ* conservation, environmental enrichment, and conservation genetics

(3) Field-testing novel *in-situ* approaches to galaxiid conservation based on removal of invasive salmonids from critical habitats, and the implementation of control and legal measures designed to prevent salmonid colonization and encroachment of galaxiid refuge areas

(4) Building capacity, as well as training and education material to draw attention to the conservation needs of galaxiids and the threats posed by salmonid invasions.

The contribution of each partner within the proposed project strategy is as follows:

UK: Dr. Garcia de Leaniz at SU will coordinate the overall project, overseeing the research program, capacity building and the training of staff. He will draw expertise at The Institute of Environmental Sustainability and at the Centre for Sustainable Aquaculture Research to develop the *ex-situ* conservation programme for endangered galaxiids, based on Recirculation technology and environmental enrichment. SU will also carry out (and provide training on) Stable Isotope Analysis and growth profile analysis to assist in the assessment of population galaxiid connectivity in collaboration with the other UK and US partners. Dr. Consuegra at AU will develop and optimize molecular markers for identification and genetic screening of endangered galaxiid populations, which will be used to target and prioritize populations for reintroduction and *ex-situ* conservation. She will continue to provide molecular training, making use of the ULA laboratory equipped during the original Darwin project. **Chile (host country):** As in the original Darwin project, Dr. Gajardo at ULA (the University at the epicentre of salmonid invasions and distribution of Chilean galaxiids), will be the lead host partner in Chile, will arrange logistic support and will coordinate the laboratory and training programs.

ULA will also help develop the molecular toolkit for prioritization of endangered galaxiid populations, and will house the RAS and contribute to the captive breeding and reintroduction programs through the Aquaculture Department (Prof. Alberto Medina). A Chilean research assistant will, after appropriate training, be appointed to implement the ex-situ conservation programme with assistance from volunteers and PG students, and under the supervision of Prof Medina.

Falklands Islands (host country): Nicholas Rendell will be responsible at EPD for overseeing and coordinating the project in the Falklands, in particular in relation to the reintroduction strategies and *in-situ* approaches to removal of invasive brown trout and prevention of salmonid dispersal in sensitive areas. Daniel Fowler at FIDC will take the lead in the development and implementation of the ex-situ conservation programme. As in Chile, we will appoint a research assistant in the Falklands to assist with all aspects of the work.

USA: Dr. Giannico (OSU) and Dr. Dunham (USGS) will contribute within their respective areas of expertise and assist with the development of the public awareness and education programs, as in our original Darwin project. We will draw on Dr. Giannico's outreach experience on salmonid conflicts at OSU to engage with stakeholders, and to assess the degree of population connectivity of galaxiid populations (in particular with respect to the effect of culverts). Dr. Dunham will help implement a novel landscape genetics approach for managing impacts from invasive salmonids, and for targeting endangered galaxiids for reintroductions and ex-situ conservation. He will also facilitate capacity building fish translocations and reintroductions for conservation, and in elemental analysis of otoliths for assessing population connectivity. All partners will contribute to the dissemination and publication of results, and the formulation of the Action Plans.

The three principal partners, SU, ULA, and EPD, have pledged continuing support to ensure the continuation of the project after the Darwin initiative ends. Written evidence of the various partnerships is provided in the accompanying letters. Project principals are full-time, permanent members of staff with an established track-record of joint collaboration that is robust to staff changes.

11. Are you aware of any other individuals/organisations/Darwin Initiative projects carrying out similar work? Yes No

If yes, please give details explaining similarities and differences, and explaining how your work will be additional to this work and what attempts have/will be made to co-operate with and learn lessons from such work for mutual benefits:

We are not aware of any organisation or groups carrying captive breeding or in-situ conservation of endangered galaxiids anywhere in Chile or in the Falklands. There are other groups, most notably at University of Concepcion and Dalhousie University (Canada), studying galaxiids in Patagonia, and these have been invited since our first workshop (previous project) to share information and join efforts.

OTP funded a pilot project to update the distribution on *Aplochiton zebra* in the Falklands during 2009 and our proposed project will build closely on its findings and make use of samples already collected.

12. Please indicate which of the following biodiversity conventions your project will contribute to:

At least one must be selected.

- Only indicate the conventions that your project is directly contributing to.

- No additional significance will be ascribed for projects that report contributions to more than one convention

Convention on Biological Diversity (CBD)

Yes No

CITES

Yes No

Convention on Migratory Species (CMS)

Yes No

What problem is this project addressing and how was it identified? (150 words)

Exotic salmonids represent one of the biggest threats to native freshwater fishes in Patagonia, the Falklands Islands and other temperate zones of the Southern Hemisphere. Both the Chilean and Falklands Islands Biodiversity Strategies recognize the need to restore ecosystems as the first step towards reversing the loss of biodiversity by 2010. Furthermore, the Falklands Islands Draft Action Plan for the endangered *Aplocheilichthys zebra* recognizes the need to maintain AZ as a component of its native fresh water fish fauna and to prevent further loss of populations. Our project will help to identify those galaxiid populations most in need of protection from salmonids and will develop and field-test both ex-situ and in-situ proactive measures for galaxiid conservation. Our proposal is thus particularly timely and fully in line with the host countries' Biodiversity Strategies, given the dramatic recent increase in the spread of invasive salmonids and the widespread decline of native galaxiids.

What will change as a result of this project? (150 words)

Our current Darwin Initiative has identified predation and interference competition by Atlantic salmon and rainbow trout escaping from fish farms as a major risk for the survival of native galaxiids. But it has also served to draw attention to the threat posed by recreational fishing for brown trout (a salmonid species which is not farmed but which is deliberately introduced for angling) as a major impact, perhaps as big as that derived from accidental salmonid escapes. Therefore by combining information on salmonid pressure (and not just on fish farms), habitat connectivity, and novel estimates of galaxiid genetic variation, our project will change the way galaxiid populations are targeted for conservation. Our proposed approach to captive breeding and *in-situ* conservation will also represent a turning point in galaxiid conservation for Chile and the Falklands and will inform similar conservation projects in Argentina, New Zealand, and Australia.

Why is the project important for the conservation of biodiversity? (150 words)

The accelerated decline of Galaxiid fishes across the Southern Hemisphere has recently been highlighted as a major biodiversity crisis. The fact that many of these species are barely known to science (for example the reproduction of the endangered *Aplocheilichthys zebra* was only reported to the scientific community early this year) makes their conservation singularly poignant and our project particularly timely. The 2010 target of halting the actual rate of biodiversity loss requires urgent scientific data on several aspects targeted by our project, namely: (i) protection of biomes and habitats, (ii) protection of populations and species and (iii) monitoring of genetic diversity. By focusing on an endemic group of species of international importance we will generate critical information for their conservation. For example, the development of an ex-situ conservation and reintroduction program represents a turning point in the conservation of freshwater fishes in Patagonia and the Falkland Islands.

How does this relate to one or more of the biodiversity conventions? (150 words)

The proposed project will support the implementation of articles 8h, 10, 12-14, and 18 of the Convention of Biological Diversity, with special emphasis on Alien Species (30%), Biosafety (10%), Inland Waters Biodiversity (20%), Marine and Coastal Biodiversity (20%), and Sustainable Use (20%) themes. It will also inform, and help to implement, an Action Plan for the endangered *Aplocheilichthys zebra* in the Falklands and similar plans being developed in Chile. The project will generate valuable information regarding the nature of extinction risks for galaxiids and will identify critical populations in most need of protection. More generally, it will also pave the way for the long-term monitoring of genetic diversity of native freshwater fauna.

13. Explain how gains from the Post-project work will be distinct and additional to those of the existing project. Show, where possible, how these gains require limited resources and could not be achieved without the funding. (max 200 words)

Work by Chilean project partners has highlighted the need to assess the conservation status of native galaxiids, which is hardly known. Building on knowledge gained during the current project on the threat posed by invasive salmonids (of which few specifics were known before our project began), the post-project aims to take the conservation of galaxiids to a next phase. The complex life histories of galaxiids are difficult to describe using traditional ecological approaches, and our landscape genetics approach will give an insight that would take years to achieve using traditional methods. This will result in more effective long-term strategies for preventing future salmonid invasions, as well as for controlling existing populations. In addition, the project will go a step further by implementing control of nonnative trout in selected locations. To our knowledge, this represent one of the first attempts to actively manage invasive salmonids to benefit native species in S. America, and along with captive breeding, it represents a huge step forward. Moving from the 'ifs' and 'whys' of galaxiid declines, our post-project will target the 'hows' of galaxiid recovery, therefore taking conservation to the ground. Such a multidisciplinary approach in two countries would not be possible without additional funding.

14. What will be the long term benefits of the project in the host country or region and how will these help to strengthen the impact and legacy of your original Darwin project? Have you identified any potential problems to achieving these benefits? (max 250 words)

Chile has signed trade agreements with the US, EU, and Asian-Pacific countries that will likely promote the further expansion of salmonid farming. The Falkland Islands is also exploring the possibility of culturing salmonids, and both countries are also keen to support a rapidly growing and profitable tourist industry based on the angling of salmonids in remote and relatively pristine water bodies. Yet both countries have also signed international agreements to protect their native species. The proposed program of work will give Chilean and Falkland researchers and government officials the capacity to implement in-situ and ex-situ conservation programmes designed to halt the decline of endangered galaxiids and to protect them from further salmonid invasions, thereby supporting the implementation of articles 8h, 10, 12-14, and 18 of the Convention of Biological Diversity, with special emphasis on Alien Species (30%), Biosafety (10%), Inland Waters Biodiversity (20%), Marine and Coastal Biodiversity (20%), and Sustainable Use (20%) themes. The propose work will inform, and help to implement, an Action Plan for the endangered *Aplochiton zebra* which will ensure that any future developments in sport fisheries or in fish farming will be carried out in a sustainable way, with due consideration to the environmental threats posed by alien species. The proposed education program will provide specialized and continuing training for Chilean and Falklander students, and along with the research program and the recirculation aquaculture system for galaxiid breeding will constitute a lasting and timely legacy of the post-project award for the protection of native aquatic biodiversity.

15. State whether or not the project will reach a stable and sustainable end point. If the project is not discrete, but is part of a progressive approach, give details of the exit strategy and show how relevant activities will be continued to secure the benefits from the project. Where individuals receive advanced training, for example, what will happen should that individual leave? (Max 200 words)

An established professional relationship exists between UK and Chilean principals, as well as with most of the other partners. Possible hurdles have been identified through previous consultations with key stakeholders. Two of the critical problems envisaged are possible lack of field resources and setbacks in the development of action plans due to inter-stakeholder conflicts. We have considered the involvement of facilitators in the development process, and – as a last alternative - third party mediation if the process was derailed. Involvement in the running of the project will be progressively stepped down during the last months of the work, which is expected to end with the hatching of the first captive-bred galaxiids, the implementation of the first salmonid control measures, and the submission of research theses. Results of the project will also be presented at an international conference and written up for publications , after which the program will be run entirely by the host countries. The three principal partners, SU, ULA, and EPD, have pledged continuing support to ensure the continuation of the project after the project ends. Project principals are permanent members of staff with an established track-record of joint collaboration that is robust to staff changes.

16. How will the results of the project be disseminated? How will the project be advertised as a Darwin project and in what ways will the Darwin name and logo be used? (max 200 words)

As in our current DI, we will advertise results of the post-project award by stressing three key issues: (1) how the project fulfils the aims of the CBD, as well as National Biodiversity Strategies, (2) the uniqueness and fragility of native galaxiid populations and (3) the threats posed by invasive salmonids. Because Chile is a world leader in open-cage salmon farming (an activity increasingly under attack), any initiative intended to reduce its impact is bound to attract the public's attention and result in considerable media coverage. In addition, an increasing number of tourists are being attracted to the pristine Araucarian lakes and inner fjords of southern Chile and the Falklands and this, along with the work of the University, will provide numerous opportunities for promoting the Darwin Initiative and the dissemination of results. The Darwin name and logo will appear in the RAS systems in Chile and the Falklands and in all dissemination outputs and contacts with the media, as well as in the project website (in English and Spanish).

17. If your project includes training and development, please indicate how you will assess the training needs in relation to the overall purpose of the project. Who are the target groups? How will the training be delivered? What skills and knowledge to you expect the beneficiaries to obtain? How will you measure training effectiveness? (max 300 words)

You should address each of these points.

Assessment of training needs in relation to the overall purpose of the project

As in our current DI, specific training is required to implement the various stages of the in-situ and ex-situ conservation components.

Who are the target groups?

Training will be provided to two Research Assistants (to be appointed), one in Chile and one in the Falkland Islands. These will be selected primarily on the basis of their degree and relevant field experience. The positions will be advertised in local newspapers and in the project (and other) websites.

How will the training be delivered?

Staff will be trained by UK and associated US partners in two ways: by series of workshops each year (dates to be confirmed) and by coming to the UK at Swansea and Aberystwyth Universities to get training in recirculation technology and molecular and isotopic screening, respectively.

What skills and knowledge to you expect the beneficiaries to obtain? How will you measure training effectiveness?

It is envisaged that the two RA's will enrol during term 1 in the MRes in Aquatic Ecology and Conservation at Swansea University and then undertake their theses in their host countries as part of the project (2 years part time) . Swansea and ULA have an established and fruitful record of joint project supervision that has resulted in 4 successful MSc theses, and we envisage adopting the same successful approach to partnership in the Falklands. Training will be demonstrated by showing proficiency in key laboratory and field skills necessary to run project, by the ability to teach and train other people, and by submitting MRes theses at Swansea University at the end of the two years. In addition, two MSc students and two or more undergraduate students will undertake research projects within the project, and will attend the talks and seminars delivered within the project.

LOGICAL FRAMEWORK

18. Please enter the details of your project onto the matrix using the note at Annex 3 of the Guidance Note for Main applications.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Goal: Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.</p>			
<p>Sub-Goal: Endangered galaxiid populations in urgent need of protection from salmonid invasions are identified, screened, and targeted for conservation efforts in both host countries</p>	<p>Four project components are completed successfully, as per outputs below</p>	<p>Project reports, publications in peer-reviewed journals. independent DI review and checking against outputs and deliverables</p>	
<p>Purpose The purpose of the project is to develop practical, proactive measures to help reverse the widespread decline of native galaxiids in Chile and the Falkland Islands caused by salmonid invasions</p>	<p>1. Data on salmonid pressure, habitat connectivity, and galaxiid population structuring and gene flow is generated to prioritize galaxiid populations for conservation</p> <p>2. Ex-situ captive breeding programme for endangered galaxiid is tested</p> <p>3. Field-testing of in-situ measures to prevent salmonid colonization and encroachment of galaxiid refuge areas and (subject to stakeholder consent) eventual removal of invasive salmonids at selected sites.</p> <p>4. Capacity building and training to on conservation needs of endangered galaxiids</p>	<p>1. Project reports, presentations, and publications in peer-reviewed journals 2. Records of captive breeding programme</p> <p>3. Documentation and correspondence, field results 4 Records of educational programme and training. Staff trained under programme meet agreed standards and achieve qualifications</p>	<p>Increasing public awareness of the impact caused by invasive salmonids on endangered native galaxiids will lead to more support for the conservation of native freshwater fishes and the development of more proactive measures</p>
<p>Outputs (add or delete rows as necessary) 1. Estimates of effective population size, genetic variation, degree of isolation, and risk of salmonid encroachment for target galaxiid populations in Chile and the Falklands Islands</p>	<p>Field sampling and genetic/isotopic analyses completed in year 1. Conservation status assessed by year 2</p>	<p>Project reports, presentations, and publications in peer-reviewed journals</p>	<p>Molecular and isotopic markers prove informative, resolve population structuring and uncover degree of connectivity</p>

2. Deployment of 2 Recirculation Aquaculture Systems (RAS) for captive breeding of endangered galaxiids in the host countries (one in Chile, one in Falklands)	Acquisition and installation of RAS by mid year 1	Project reports, correspondence, auditing	Availability of suitable sites and required infrastructure is in place
3. Development and implementation of captive breeding and reintroduction programmes for endangered galaxiids in host countries	Reproduction of endangered Aplochiton in captivity, survival and development of larvae, release of first juveniles by year 2	Project reports, correspondence, media coverage, presentations	Collection of galaxiid broodstock , reproduction, and rearing in captivity are successful
4. Field-testing of in-situ salmonid control measures designed to prevent salmonid colonization and encroachment of galaxiid refuge areas	Assessment of effects of barriers to salmonid migration and removal measures during year 1 and 2	Project reports, media coverage, presentations, and publication in popular and peer reviewed journals	Stakeholder consent to salmonid control measures at selected pilot sites
5. Capacity building, training and education to draw attention to the conservation needs of galaxiids and the threats posed by salmonid invasions	Presentations to schools, two appointed RA enrolled in MRes/MSc programmes by year 1. Theses submitted by year 2. Results of projected presented at conference by end of year 2	Project reports, correspondence, achievement of training benchmarks, and academic qualifications (MRes/MSc)	Public awareness is maintained and stakeholders remain engaged over the course of the project
<p>Activities (details in workplan)</p> <p>1.1 Sampling of endangered galaxiids, habitat data, and collection of broodstock</p> <p>1.2 Genetic analysis and estimates of effective pop size and gene flow</p> <p>1.3 Isotopic & elemental analysis for estimates of connectivity</p> <p>1.4 Modelling and integration of ecological/genetic data for landscape approach with help from US partners</p> <p>1.5 Training on RAS technology, molecular and isotopic techniques and enrolment in MRes in Aquatic Ecology and Conservation in UK</p> <p>1.6 Captive breeding and rearing of juveniles in host countries</p> <p>1.7 First reintroductions of captive bred galaxiids in host countries</p> <p>1.8 Assessment of in-situ conservation measures to prevent salmoinid dispersal and encroachment</p> <p>1.9 Education and dissemination programmes, presentation of results and media coverage</p>			
<p>Monitoring activities:</p> <p>Indicator 1 Number of samples collected, collection and analysis of data</p> <p>Indicator 2 Genetic estimates</p> <p>Indicator 3 Isotopic & elemental analysis estimates</p> <p>Indicator 4 Connectivity estimates and quantification of salmind impact risk</p> <p>Indicator 5 PG Enrolment and completion of trainng during term 1</p> <p>Indicator 6. Production of galaxiids</p> <p>Indicator 7. Reintroductions figures for galaxiids</p> <p>Indicator 8 Fiel sampling and analysis of results</p> <p>Indicator 9. Number of presentations, articles and dissemination outputs</p>			

19. Provide a project implementation timetable that shows the key milestones in project activities. Complete the following table as appropriate to describe the intended workplan for your Post Project.

Activity	Months	Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1 Sampling of endangered galaxiids, habitat data, and collection of broodstock		X	X			X	X						
1.2 Genetic analysis and estimates of effective pop size and gene flow			X	X	X	X	X	X					
1.3 Isotopic & elemental analysis for estimates of connectivity			X	X	X	X	X	X					
2.1 Modelling and integration of ecological/genetic data for landscape approach with help from US partners						X	X	X	X				
2.2 Training on RAS technology, molecular and isotopic techniques and enrolment in MRes in Aquatic Ecology and Conservation in UK (2 yrs)		X	X	X	X	X	X	X	X				
2.3 Captive breeding and rearing of juveniles in host countries				X	X	X	X	X	X				
3.1 First reintroductions of captive bred galaxiids in host countries								X	X				
3.2 Assessment of in-situ conservation measures to prevent salmonid dispersal and encroachment					X	X	X	X	X				
3.3 Education and dissemination programmes, presentation of results and media coverage					X	X	X	X	X				

20. Please indicate which of the following Standard Measures you are likely to report against. You will not necessarily plan to cover all these Standard Measures in your project. Separate guidance on Standard Measures can be found at [http://darwin.defra.gov.uk/resources/reporting/standard measures/](http://darwin.defra.gov.uk/resources/reporting/standard%20measures/)

Standard Measure	Description	Tick if Relevant
1A	Number of people to submit thesis for PhD qualification (in host country)	
1B	Number of people to attain PhD qualification (in host country)	
2	Number of people to attain Masters qualification (MSc, MPhil etc)	YES
3	Number of people to attain other qualifications (ie. Not outputs 1 or 2 above)	YES
4A	Number of undergraduate students to receive training	YES
4B	Number of training weeks to be provided	YES
4C	Number of postgraduate students to receive training	YES
4D	Number of training weeks to be provided	YES
5	Number of people to receive at least one year of training (which does not fall into categories 1-4 above)	YES
6A	Number of people to receive other forms of education/training (which does not fall into categories 1-5 above)	YES
6B	Number of training weeks to be provided	YES
7	Number of (ie different types - not volume - of material produced) training materials to be produced for use by host country	YES
8	Number of weeks to be spent by UK project staff on project work in the host country	YES
9	Number of species/habitat management plans (or action plans) to be produced for Governments, public authorities, or other implementing agencies in the host country	YES
10	Number of individual field guides/manuals to be produced to assist work related to species identification, classification and recording	YES
11A	Number of papers to be published in peer reviewed journals	
11B	Number of papers to be submitted to peer reviewed journals	YES
12A	Number of computer based databases to be established and handed over to host country	YES
12B	Number of computer based databases to be enhanced and handed over to host country	YES
13A	Number of species reference collections to be established and handed over to host country(ies)	
13B	Number of species reference collections to be enhanced and handed over to host country(ies)	YES
14A	Number of conferences/seminars/ workshops to be organised to present/disseminate findings	YES
14B	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	YES
15A	Number of national press releases in host country(ies)	YES
15B	Number of local press releases in host country(ies)	YES
15C	Number of national press releases in UK	
15D	Number of local press releases in UK	
16A	Number of newsletters to be produced	
16B	Estimated circulation of each newsletter in the host country(ies)	
16C	Estimated circulation of each newsletter in the UK	
17A	Number of dissemination networks to be established	
17B	Number of dissemination networks to be enhanced/ extended	
18A	Number of national TV programmes/features in host country(ies)	
18B	Number of national TV programmes/features in UK	
18C	Number of local TV programmes/features in host country(ies)	
18D	Number of local TV programmes/features in UK	
19A	Number of national radio interviews/features in host county(ies)	YES
19B	Number of national radio interviews/features in UK	
19C	Number of local radio interviews/features in host country(ies)	YES
19D	Number of local radio interviews/features in UK	
20	Estimated value (£'s) of physical assets to be handed over to host country(ies)	YES
21	Number of permanent educational/training/research facilities or organisations to be established and then continued after Darwin funding has ceased	YES
22	Number of permanent field plots to be established during the project and continued after Darwin funding has ceased	
23	Value of resources raised from other sources (ie in addition to Darwin funding) for project work	YES

PROJECT BASED MONITORING AND EVALUATION

21. Describe, referring to the Indicators in the Logical Framework, how the progress of the project will be monitored and evaluated, including towards delivery of its outputs and in terms of achieving its overall purpose. This should be during the lifetime of the project and at its conclusion. Please include information on how host country partners will be included in the monitoring and evaluation.

The success of the landscape genetics approach will be measured by deriving robust estimates of effective population size and gene flow, and by our ability to prioritize populations for conservation in a rigorous and reproducible way. The merit of this approach will ultimately be measured by the quality of peer-reviewed publications. The success of the in-situ measures will be assessed by field sampling (electro fishing) and monitoring of salmonid numbers at pilot sites and control sites. The ex-situ conservation programme will be assessed by our ability to secure broodstock, achieve reproduction in captivity and release captive-bred juveniles at the end of the project. Project progress and deliverables in relation to the proposed timetable will be monitored by frequent contacts and visits from UK staff (who will undertake at least 2 visits per year) and associated partners. This will ensure that the core elements of the project and associated training are delivered on time and meet the required standards. Verification of outputs will be assessed by reference to the expected indicators specified in the Logical Frame. Scientific outputs will be peer reviewed before publication, thus ensuring the highest international standards. Quality of education and training components will be assessed internally by the associated partners, and also independently by outside experts, to highlight potential lessons and problems. The two host project coordinators will be responsible for overseeing the day to day management of the project and progress towards its outputs. Results will be continuously updated to databases as appropriate and exchanged via email. Review meetings will be held involving all local project staff during visits of UK personnel to Chile and Fk and during the visit by the RA to the UK. With UK staff and inputs from all partners, the host coordinators will co-author the intermediate and final progress reports. Scientific papers will be co-authored by all participating partners, according to contribution.

FUNDING AND BUDGET

Please complete the separate Excel spreadsheet which will provide the Budget information for this application. Some of the questions below refer to the information in this spreadsheet.

NB: Please state all costs by financial year (April to March). Use current prices – and include anticipated inflation, as appropriate up to 3% per annum. The Darwin Initiative will not be able to agree increases in grants to cover inflation on UK costs once grants are awarded.

22. How is your organisation currently funded? (max 100 words)

Swansea University is funded from tuition and education fees, and also from income from the Higher Education Funding Council for Wales. In addition, The University generates income from contracts with governmental and non-governmental bodies, including the OST Research Councils, the European Union, charities and private companies. In September 2005, the University of Wales Swansea implemented Full Economic Costing (FEC), and all applications for external funding are now costed in accordance with this methodology. See www.swansea.ac.uk

23. Provide details of all confirmed funding sources identified in the Budget that will be put towards the costs of the project, including any income from other public bodies, private sponsorship, donations, trusts, fees or trading activity. Please include any additional unconfirmed funding the project will attract to carry out additional work during or beyond the project lifetime. Indicate those funding sources which are confirmed.

Confirmed: (in kind)

Swansea University salary contribution CGL and equipment = £30,000
Aberystwyth University salary contribution SCDO and equipment = £18,000
Universidad de los Lagos salary contribution GG and inkind equipment incl vehicle and field gear = £30,000
Oregon State University salary contribution GG = £16,000
US Geological Survey salary contribution JD = £30,000
Falklands Government EPD salary contribution NR = £8,800
FIDC salary contribution DF and equipment = £6,000

Unconfirmed:

Falklands Government EPD = contribution towards sampling, transport, and sample analysis £10,000 pa

FIDC = contribution towards sampling, transport, and sample analysis £10,000 pa

24. Please give details of any further funding resources (confirmed or unconfirmed) sought from the host country partner (s) or others for this project that are not already detailed in the Budget or Question 22. This will include donations in kind or un-costed support eg accommodation. (max 50 words per box)

Financial resources:

It is envisaged that funding for the organization of one workshops (or an international conference) will be sought from CONICYT (National Commission for Scientific Research and Technology) at the next open call for proposals. In addition, we intend to use the Darwin Initiative as leverage to apply to the National Fund via CONICYT, or other agencies (e.g. FONDECYT). Other sources of funding that are being targeted for funding during the course of the project include the US Fulbright Fellowships, National Geographic, Fisheries Society of the British Isles, and NERC

Funding in kind:

Additional (uncosted) support for the project include (1) unrestricted use of the ULA van at Puerto Montt during sampling (valued at c. £3,500 per year); (2) time spent on project and field assistance by associated NGO's (Rio CONTACO, Southern Rivers, Genetics Society; valued at in excess of £5,000 per year), and (3) assistance and donation of samples by partner fish farms, valued at in excess of £4,000 per year.

25. What was the amount of funding for the original Darwin Project?

	Total Project Costs £
Amount of original Darwin Initiative project funding	193844
+ Funding/Income from other sources	210432
= Total original project cost	404276

FCO NOTIFICATION

Please check the box if you think that there are sensitivities that the Foreign and Commonwealth Office will need to be aware of should they want to publicise details of the Darwin Post-project and the resultant work in the UK or in the host country.

CERTIFICATION 2010/11

On behalf of the of company Swansea University

(*delete as appropriate)

I apply for a grant of **£101,420** in respect of expenditure to be incurred in the financial year ending 31 March 2011 on the activities specified in the above application.

I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful. (This form should be signed by an individual authorised by the lead UK institution to submit applications and sign contracts on their behalf.)

Name (block capitals)	Carlos Garcia de Leaniz		
Position in the organisation	Senior Lecturer		
Signed		Date:	30 /11/09

I enclose a copy of the organisation's most recent audited accounts and annual report, CVs for project principals and letters of support.



Post Project Application - Checklist for submission

	Check
Have you provided actual start and end dates for your project?	Yes
Have you provided your budget based on UK government financial years ie 1 April – 31 March?	Yes
Have you checked that your budget is complete, correctly adds up and that you have included the correct final total on the top page of the application?	Yes
Is the concept note within 1,000 words?	Yes
Is the logframe no longer than 2 pages?	Yes
Has your application been signed by a suitably authorised individual? (clear electronic or scanned signatures are acceptable in the email, but a wet signature should be provided in the hard copy version))	Yes
Have you included a 1 page CV for the Project Leader, any other UK staff working >50% on this project, and for a main individual in each overseas partner organisation?	Yes
Have you included a letter of support from the main overseas partner organisations?	Yes
Have you checked with the FCO in the project country/ies and have you included any evidence of this?	No
Have you included a copy of the UK organisations most recent annual report and accounts? An electronic link to a website is acceptable.	Yes
Have you read the Guidance Notes for both Main projects and Post Projects ?	Yes

Once you have answered Yes to the questions above, please submit the application, not later than midnight GMT on **Monday 30 November 2009** to Darwin-Applications@ltsi.co.uk using the first few words of the project title as the subject of your email. However, if you are e-mailing supporting documentation separately **please include in the subject line** an indication of the number of e-mails you are sending (eg whether the e-mail is 1 of 2, 2 of 3 etc). In addition, a hard copy of the application and any supporting documents not available electronically should be submitted to the Darwin Applications, c/o LTS International, Pentlands Science Park, Bush Loan, Penicuik EH26 0PL postmarked **not later than Tuesday 1 December 2009**.

DATA PROTECTION ACT 1998: Applicants for grant funding must agree to any disclosure or exchange of information supplied on the application form (including the content of a declaration or undertaking) which the Department considers necessary for the administration, evaluation, monitoring and publicising of the Darwin Initiative. Application form data will also be held by contractors dealing with Darwin Initiative monitoring and evaluation. It is the responsibility of applicants to ensure that personal data can be supplied to the Department for the uses described in this paragraph. A completed application form will be taken as an agreement by the applicant and the grant/award recipient also to the following:- putting certain details (ie name, contact details and location of project work) on the Darwin Initiative and Defra websites(details relating to financial awards will not be put on the websites if requested in writing by the grant/award recipient); using personal data for the Darwin Initiative postal circulation list; and sending data to Foreign and Commonwealth Office posts outside the United Kingdom, including posts outside the European Economic Area. Confidential information relating to the project or its results and any personal data may be released on request, including under the Environmental Information Regulations, the code of Practice on Access to Government Information and the Freedom of Information Act 2000.