

Darwin Initiative Annual Report

Darwin Project Information

Project Ref Number	14-048
Project Title	Galapagos Coral Conservation: Impact Mitigation, Mapping and Monitoring
Country(ies)	Ecuador
UK Contract Holder Institution	University of Edinburgh
UK Partner Institution(s)	N/A
Host country Partner Institution(s)	Charles Darwin Research Foundation, Conservation International, Galapagos National Park Service, WildAid
Darwin Grant Value	£150,000
Start/End dates of Project	May 2005 / April 2008
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1, 2, 3...)	1 Apr 2006 to 31 Mar 2007 Annual Report Number 2
Project Leader Name	Dr Terence P. Dawson
Project website	http://www.geos.ed.ac.uk/research/globalchange/group4/Galapagoscoral.html
Author(s), date	Terence Dawson, Stuart Banks, Scott Henderson, Godfrey Merlin, 2007

1. Project Background

Wolf and Darwin islands form a distinct and isolated biogeographic zone in the Galapagos Islands that supports a high level of biodiversity, including priority conservation endemic corals and associated species, subject to extreme 'natural' climatic and anthropogenic pressures. The extreme climatic fluctuations under El Niño events in the region are particularly damaging for coral populations - extensive coral reefs were reduced by 97% in 1982-83 and further compounded to 99% losses in 1997-98. Subsequent surveys show that Wolf and Darwin harbour >95% of the coral species now found in the Galapagos Marine Reserve (GMR) including rare corals (e.g. *Leptoseris* sp.) that may well become locally and indeed globally extinct, and demand special attention to their conservation. Although Galapagos coral research

has been carried out previously, this project constitutes the most comprehensive study using innovative mapping techniques undertaken to date in the remote northern islands. In addition to the comprehensive establishment of baseline biodiversity datasets, the project will actively engage with the fishing and tourism industries for improved management of the marine environment through capacity-building of local tourism and diving guides and fishers, and the establishment of permanent mooring buoys to avoid boat anchor damage.

Project Partnerships:

The partnership arrangement has continued to work very well, with a high degree of commitment from each of the principal partners. The University of Edinburgh has maintained regular communication with in-country partners, has coordinated project planning and reporting and participated in all major field campaigns.

The principal local collaborators (specifically, the Charles Darwin Foundation, WildAid and the Galapagos National Park) have worked cooperatively with each other for many years, and this long-term relationship has helped significantly in resolving minor difficulties in undertaking the project. By bringing these and new partners, including Conservation International and the University of Edinburgh, together the project has contributed significantly to Ecuador's knowledge of the composition and condition of the marine biodiversity in its threatened coral reefs, mapped coral reef cover to provide an important baseline against which future projects can be compared, established a monitoring protocol to ensure ongoing assessments, especially in the face of climate change, taken specific measures to mitigate the most critical, direct threat, anchoring, and brought in regional and international coral experts that have contributed to building the capacity of local institutions and individuals so that they can carry on the work once the project ends. Regarding the last point, many coral experts (see next section for details) have participated in trips and directly supervised field activities, and in some cases, hosted visits from the local Charles Darwin Research Station researchers to contribute to their professional development.

Other Collaborations:

The project has maintained an on-going working relationship with the Darwin project No. 12-021 (Marine biodiversity assessment and development in Perlas Archipelago, Panama) to share information and data to support high quality research, and 'best practice' approaches to managing marine protected areas. Dr Hector Guzmán, from the Smithsonian Tropical Research Institute (STRI) attended and contributed to an IUCN red-listing workshop to evaluate Eastern Tropical Pacific corals and using data collected on field expeditions funded under this project held on Santa Cruz, Galapagos from 27th-30th May, which was organised back-to-back with the 2nd Darwin expedition cruise to the northern Islands of Galapagos in May 2006. This expedition conducted over the period 15th to 25th May 2006, together with a 3rd expedition cruise from 2nd to 9th March 2007 included the following invited international marine and coral scientists (listed with their respective institutions):

Dr. Sylvia Earle, Executive Director, Global Marine Programs, Conservation International; Explorer in Residence, National Geographic Society, USA (Former chief scientist of the U.S. National Oceanic and Atmospheric Administration). May 2006 expedition and researcher in the Galapagos Islands in the late 1960's.

Professor Peter W. Glynn, Division of Marine Biology and Fisheries, Rosenstiel School of Marine and Atmospheric Science, University of Miami, USA (May 2006 and March 2007 expedition). Pre-eminent Galapagos coral researcher active in the Galapagos since the early 1970's.

Professor (Emeritus) Cleve Hickman, Department of Biology, University of Washington and Lee, Virginia, USA (May 2006 and March 2007 expedition), author of four field guides covering

Galapagos marine invertebrates, including the coral guide produced with support from this project.

Dr. Graham Edgar, Tasmanian Aquaculture and Fisheries Institute, University of Tasmania; Conservation International, Australia (May 2006 expedition), former Director of the Darwin Station's Marine Biology Department and expert in marine monitoring protocols in the Eastern Tropical Pacific.

Dr. Jorge Cortes, Centro de Ciencias del Mar y Limnologia (CIMAR), Universidad de Costa Rica, Costa Rica (May 2006 expedition), one of Costa Rica's foremost coral ecologists with extensive regional and international experience.

Dr. James D. Reimer, University of the Ryukyus - Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Okinawa 901-2213, Japan (March 2007 expedition), international expert on zooanthids.

Dr. Odalisca Breedy, Centro de Ciencias del Mar y Limnologia (CIMAR), Universidad de Costa Rica, Costa Rica (March 2007 expedition), foremost regional expert on soft corals (gorgonians).

Dr. Bernhard Riegl, National Coral Reef Institute, Oceanographic Centre, Nova Southeast University, U.S.A (March 2007 expedition), expert in coral ecology and recovery following disturbance events.

Dr. Iliana B. Baums, Department of Biology, The Pennsylvania State University, U.S.A (March 2007 expedition), expert in coral larval dispersal and genetics.

Adrienne M. Romanski (PhD candidate), Department of Ecology, Evolution and Environmental Biology, Columbia University, New York, USA (May 2006 expedition), expert in coral recovery and zooxanthellae genetics as related to resistance to climate change associated with warming sea conditions.

The IUCN red-listing workshops (A specific instrument in support of the CBD, described later) were further attended by:

Dr. Kent Carpenter, Old Dominion University and leader of the Global Marine Species Assessment co-led by ODU, IUCN and Conservation International

Dr. Caroline Pollock, IUCN Global Marine Species Assessment Programme Officer, Biodiversity Assessment Unit, IUCN Species Programme

Dr. Hector Guzman, Smithsonian Tropical Research Institute, Panama

Dr. Graham Edgar (see list above for details)

Dr. Jorge Cortez (see list above for details)

Dr. Peter Glynn (see list above for details). Unable to attend the workshop, but contributed to data compilation used in the proceedings.

Dr. Cleveland Hickman (see list above for details)

Dr. Terry Dawson (Project PI, Univ. of Edinburgh)

Stuart Banks, Angel Chiriboga (currently at Brown University), Mariana Vera, Fernando Pinillos, and other young researchers at the Charles Darwin Research Station, Galapagos.

2. Project progress

2.1 Progress in carrying out project activities

All field activities have been completed by the end of this year. This has included field expeditions 2 and 3, following the first undertaken last year. All expeditions have met or exceeded our expectations in terms of the number of participants, both stakeholders and research experts, and the amount of research mapping and surveying that was possible. To a large degree this was made possible by successful joint efforts to leverage additional funding to include more researchers on larger, more stable vessels. Important training and awareness raising workshops and meetings have been held with all main project partners, beneficiaries and authorities. Although we were unable to finalize a formal stakeholder survey regarding their knowledge, we are confident that the many events and activities that have been undertaken have greatly improved knowledge and concern for Galapagos corals. The project called for the installation of three fixed anchor moorings. Project partners successfully used this commitment to leverage a matching contribution of three additional moorings. All equipment has been purchased and is ready for deployment in the coming months. In part due to the efforts and results of this project, partners were able to secure additional funding to deploy a floating base in the northern islands to strengthen enforcement efforts, serve as a research platform and provide support for mooring maintenance. The monitoring protocol has been fully developed and implemented not only in Galapagos, but due to the extensive exchange program we were able to establish with other regional scientists and their institutions, the protocol has been replicated in five other regional sites: Malpelo and Gorgona (Colombia), Coiba (Panama), Machalilla on the Ecuadorian coast and Cocos Island (Costa Rica). The participatory protocol will be finalized in the coming months. A full-colour field guide to Galapagos corals has been finalized, used as the basis for training workshops and played a pivotal role in on-board training and research activities on field expeditions. An extensive workshop with stakeholder and the Park Service was held in January and was well-attended and taught by a range of professionals. Additionally, a technical diving course was held to ensure that dive guides and fishermen could receive the training required for deep water installation of the moorings. Several students have received training courses, training via exchanges to participate in other regional field campaigns and as part of their advanced studies (see table 2 below). Not only have Galapagos-based students benefited from the PI's and other experts participation on the trips, but UK-based students have finalized advanced degrees based on the field research in Galapagos. 5 scientific publications are underway and taken together will constitute a special edition of the journal 'Galapagos Research', and later refined with additional information as the field specimens and data are analyzed.

2.2 Progress towards Project Outputs

All outputs will be met or exceeded by project's end. This project has already greatly enhanced local, regional and international-level knowledge and appreciation for Galapagos highly threatened and unique coral reefs and associated fauna. Although it is always difficult to measure improvements in general ecological condition of an entire ecosystem in just a year or two, the coral areas are showing remarkable improvement that has surely been helped by the combination of increased awareness by stakeholders and interim measures by the Park Service to reduce anchoring in sensitive reef areas. Experience has shown, however, the moorings are much needed as some boats are still anchoring inappropriately. The presence of permanent moorings, the new floating base and a clear Park Service policy to use them is the only way to eliminate this highly damaging act. The output indicators were appropriate for their purpose and are reported against in annex 1. Some will be reported against in next year's report as mooring deployment and the participatory protocol implementation will occur in the coming months.

In terms of assumptions, most held well. Despite early indications that this year could have been an El Nino year which may have resulted in coral mortality, conditions did not warm to a level that produced effects that would have possibly overridden the coral recovery that has been observed on the field expeditions. Although ample participation by guides and fishermen in the workshops and field activities was secured, a generalized stakeholder survey did not prove feasible. However, we do not believe this has hindered our ability to state with confidence that perceptions, knowledge and concern for Galapagos corals has greatly improved due to project interventions.

2.3 Standard Output Measures

Table 1. Project Standard Output Measures

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	TOTAL
Training output 2	Postgraduate training leading to an MSc degree.		2			
Training output 4A/B	Specialist training in coral identification, reef assessment, ecological monitoring	3	3			
Training output 6a	Fishermen/dive guides receive training in pre-trip workshops, during research cruises and in participatory monitoring workshop. Importantly, a selection of the most proactive guides and fishermen received specialized, technical dive training (Nitrox) so that they will have the skills and expertise to participate in deep-water installation and maintenance of the moorings.	7	25			
Research output 8	PI field research, workshop and annual planning participation	7 weeks	7 weeks			
Research	Plans corresponding	3 (on-				

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	TOTAL
output 9	to emergent MPA zoning criteria- This work is ongoing. Specific plans are being prepared for anchor site zoning, but also a major rezoning proposal for Wolf and Darwin will be produced in year 3 of the project.	going)	3			
Research output 10	A pioneering field guide produced for Galapagos corals. Finalized in previous year.	1				
Research output 11a/b	3 peer-reviewed publications submitted with at least 1 accepted by project's end (year 3)					
Research output 12a/b	Databases- Coral database with associated data finalized.	2	1			
Research output 13b	Enhancement of CDRS coral species reference collection.		Dozens of new collections for CDRS reference collection.			
Dissemination output 14a	Local public conferences to disseminate research findings and collaborative methods.		2 public presentations, but 12 have been given on the trips, themselves in the on-board lecture series'			
Dissemination output 15a/b/c/d	Press release, newspaper coverage and radio commentary associated with widely attended stakeholder workshop held Jan. 18, 2007.		3			

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	TOTAL
Dissemination output 18c and 19c	Radio commentary provided in Galapagos by CI on main morning radio show.		1			
Physical output 20	Following purchased: Zodiac (\$6000), underwater camera equipment (\$7000), 6 Helix moorings (3 with project funds) and hydraulic installation equipment, floats, anchoring screws		8 (main capital items)			
Physical output 22	Multiple field plots over coral reef structures established in the northern islands- 3 fixed plots in Wolf, 2 in Darwin, 2 in Marchena and detailed surveys across more than 1800m ² of coral communities.		7			
New - Project specific measures	\$140,000 secured to replicate mooring placement in many other sites. Commitments from large tour operators for funds for very large moorings where big boats (over 50 passengers) anchor. Extensive inter-site collaboration and replication of monitoring efforts with researchers and managers at other Eastern Tropical Pacific sites (Malpelo, Coiba and Cocos) and international research institutions.		Many			

Table 2. Publications

Type *	Detail	Publishers	Available from	Cost £
(e.g. journals, manual, CDs)	(title, author, year)	(name, city)	(e.g. contact address, website)	
MSc thesis (Abstract*)	A Review of Marine Conservation along the Pacific coast in the Humbolt Current, South America: A Policy Analysis Approach, Bello, M., 2006.	University of Edinburgh, UK	University of Edinburgh, UK	
MSc thesis (Abstract*)	A 3-D depth and temperature spatial envelope to predict the present and future distribution of coral reefs around the Galapagos Islands, Jarvis, F., 2006.	University of Edinburgh, UK	University of Edinburgh, UK	
Brochure*	'Coral Habitat Mapping and Conservation', in Environmental Change and Sustainability at Edinburgh, School of Geosciences, 2006, Page 9-10.	School of Geosciences, University of Edinburgh, UK	School of Geosciences, University of Edinburgh, UK	
Brochure*	'Galapagos Islands' in The Edinburgh Earth Observatory, School of Geosciences, 2006, Page 11-12.	School of Geosciences, University of Edinburgh, UK	School of Geosciences, University of Edinburgh, UK	
Newsletter	'Extinct' coral species is rediscovered in the Galápagos Islands, Darwin News, Issue 6, March 2006, DEFRA	DEFRA UK	http://www.darwin.gov.uk/newsletters/	
Peer-reviewed journal manuscript	Reproductive ecology of the azooxanthellate coral <i>Tubastraea coccinea</i> Lesson	<i>Marine Biology</i>	Publisher Springer Berlin / Heidelberg ISSN 0025-3162 (Print)	

	1829 in the eastern Pacific: Costa Rica, Panama, and Galapagos Islands (Ecuador). V. Dendrophylliidae, 2007, (submitted). Authors: Glynn PW, Colley SB, Mate JL, Cortes J, Guzman HM, Bailey RL, Feingold JS & Enochs IC.			
Press Release	'Concern for corals unites GMR Stakeholders', (February 2007, Galapagos Conservation Trust website)	Galapagos Conservation Trust	http://www.gct.org/feb07_3.html	

2.4 Progress towards the project purpose and outcomes

The basis for a long term monitoring system within the sensitive and spatially restricted area of the last remaining hermatypic reef communities has been successfully implemented, and only with the baseline provided here (associated biodiversity, endorsed by a wide range of regional experts) through such a system to monitor change, can advocacy be improved for priority Galapagos MPA changes (within the framework of the GMR management plan). The “seeding” of mooring deployments are also being considered as templates for future installations across the GMR and within other MPAs in the ETP (e.g. Coco Island and Costa Rican coast). If periodicity in strong ENSO episodes follows the previous 2 events, it appears more likely that ameliorating the added level of human impact upon important resources such as Galapagos corals through fixed anchor deployments during those events will be particularly pertinent and important if we are to prevent local extinction of some species and trophic cascades across the marine community with the rapid loss of habitat forming species.

2.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

With an extensive species inventory informing a new IUCN formal red-listing evaluation process for Galapagos corals, appropriately designed monitoring across Galapagos coral communities, a framework in development for evaluating region wide ETP effects, low impact anchorages and partner institutions committed to incorporate the scientific outputs into the context of a global evaluation of GMR resources and management measures, project deliverables are expected to have long term impact directly through reduced bottom damage by boats, and indirectly through encouraging advocacy to place more appropriate management measures in those areas. Furthermore, as scientific evidence mounts that substantiates the high conservation value of these islands, arguments become strengthened for limiting extractive uses, which decrease the possibilities of sustainable use by the greater Galapagos community. The project has leveraged multiple additional donors that fund complementary actions aimed to decrease illegal activities in the area that negatively affect biodiversity and that undermine local governance. The project has been replicated at a larger scale in the Eastern Tropical Pacific

and catalyzed similar efforts at other sites by including researchers, both experts and students, to undertake similar initiatives in their home areas where corals are at risk.

Monitoring, evaluation and lessons

Local-based partners have met regularly to coordinate main project activities and to keep these on track and within budget. All partners have met during the research cruises to carefully evaluate progress and chart next steps. Information regarding indicators can be found in the sections above and in annex 1. In terms of lessons, perhaps the most important ones include:

- The added value from the additional efforts to raise complementary funding that allowed including more experts on higher quality vessels cannot be overstated
- The regional exchange of experts and students has produced greater than expected benefits
- Including formerly 'conservation-hostile' members of the fishing and guides sector was risky, but has proven highly effective in promoting better collaboration
- Using project funds to leverage additional commitments from the tourism sector to provide matching funds to buy more moorings proved easier than expected, demonstrating such 'seed' funding can be highly effective in catalyzing positive responses from others

3. Actions taken in response to previous reviews (if applicable)

Not applicable.

4. Other comments on progress not covered elsewhere

The journal 'Galapagos Research' has agreed to a special addition that will synthesize and summarize project advances between a wide range of collaborators and for a broader audience of stakeholders (Spanish and English). Coral monitoring has been incorporated into the global GMR coastal resource evaluation towards improved spatial optimisation of the Galapagos MPA and the quantitative outputs feed into a series of indicators designed to follow change in the GMR within the GNPS for management purposes.

Does the project face any particular risks?

Various – most related to the myriad assortment of problems associated with rapid human development within this important UNESCO World Heritage Site. This project was designed to mitigate and reduce those emerging risks (e.g. increased tourism-related anchor damage on corals). Lack of funding continuity for a long term monitoring incentive was originally anticipated, although it is recognised and hoped that the nature of this DI investment as a primer project focused on a high risk species group will set the stage for longer term funding that will ensure long-term implementation of the monitoring protocols.

5. Sustainability

After the May 2006 red listing workshop and follow up meetings in Costa Rica with regional experts, a revised red list for previously underrepresented coral (and macroalgae) marine

groups was prepared. The Galapagos endemics component has now been submitted as a priority, with 10 threatened coral species of the 93 expert reviewed and 90 assessed algae species, with eastern tropical species to follow. These important habitat forming species have never been included in any IUCN process beforehand and this process sets an important precedent towards their future protection. The importance of corals has been disseminated through involving key members of the Galapagos community (e.g. president of dive guide association, fishermen who have changed their activity to tourism etc) within the fieldwork component, and also in a didactic workshop in January 2007.

6. Dissemination

CDRS has a communications department which uses the information collected from various research themes for long-term impact in environmental education. The 3 Ecuadorian nationals trained in coral specific monitoring are now candidates for post graduate study due to the investment by local and invited experts and exposure to the international research conducted within and around this project. The scholarship awarded within this project, administered by the CDRS will ensure that the central climate and human impact research upon corals (vital to understanding the importance of reef systems) will receive continuity beyond the timeframe of the project.

7. Project Expenditure

8. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

[I agree for ECTF and the Darwin Secretariat to publish the content of this section.](#)

The project to date has been very successful in the discovery of potential new (both to science and to Galapagos) species, specifically:

A number of zooanthid species have been collected and documented for the first time in the Galapagos from the genera Hydrozoanthus, Antipathozoanthus, Parazoanthus and possibly Epizoanthus, although the latter may be an entirely new genus as yet undescribed. Other reef-building corals have been identified, which are new to Galapagos, include *Pocillopora effusus*, *Pocillopora inflata*, and *Pavona chiriquiensis*. In addition, a possible new Gorgonian of the genus *Pacifigorgia* (Octocorallia: Gorgoniidae) species has been collected, together with a new reef-building coral, *Leptoseris* sp. All collections are currently being prepared for systematic morphological and molecular analyses.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2006/07

Project summary	Measurable Indicators	Progress and Achievements April 2006 - March 2007	Actions required/planned for next period
<p>Goal: <i>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:</i></p> <ul style="list-style-type: none"> <i>*The conservation of biological diversity,</i> <i>*The sustainable use of its components, and</i> <i>*The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</i> 		<p><i>As a result of this project Galapagos' most important remaining coral reefs and associated fauna are better understood in terms of their composition and condition relative to historical baselines and in terms of how and where they must be protected to ensure persistence. They are better appreciated by main stakeholders in the dive tourism industry and fishermen, and management authorities are committed to taking actions to protect them. Healthier reefs translate into increased economic opportunity for these groups. All are now cooperating to install the moorings that have been purchased and to contribute to monitoring to ensure they serve their conservation</i></p>	<p><i>Installation of mooring buoys with participation of past research trip participants. Complementing mooring placement with the deployment of a floating base (with recently obtained funds from a new source) to ensure the moorings are properly used and maintained and to ensure other illegal activities that could impact reef areas do not occur. Undertaking an economic valuation of all activities in Wolf and Darwin to elaborate conservation measures that ensure ongoing benefits to users. Synthesis and dissemination of results in technical reports to inform management decisions, scientific publications and new proposals to secure additional funding.</i></p>

		<p><i>objectives. Importantly, the project has leveraged additional cash and in-kind contributions that will permit increasing the scale and impact of the project's main goals and replicating its methods in other sites both within and outside Galapagos.</i></p>	
<p>Purpose To assist Ecuador in protecting the last remaining extensive Galapagos coral reefs.</p>	<p>Amount of reef showing recovery from impacts originating from tourism and fishing, in particular those resulting from anchor damage.</p>	<p>Although final mooring installation will not occur until June '07, recommendations have been provided to the Park Service to mitigate user impacts on coral areas. Tour operators, guides and fishermen are better aware of the need to act more responsibly in terms of how and where they anchor. International experts with decades of experience working with Galapagos corals confirm that coral condition is recovering remarkably. Although this recovery cannot be uniquely attributed to this project, project measures have contributed in such a way that natural recovery has progressed beyond expectations of coral experts.</p>	<p>Installation of mooring buoys with participation of past research trip participants. Ongoing monitoring of reef condition to continue to track and document recovery.</p>
<p>Output 1. Improved baseline knowledge of northern GMR coral</p>	<p>1a. Number of species recorded at each site over current species lists 1b. Number of anchor sites for</p>	<p>1a. Although final taxonomic identifications and data tabulations are being undertaken now, the three research trips (two during this reporting period)</p>	

reefs.	<p>which coral distribution maps are produced</p> <p>1c. % of reefs in anchorage areas that are mapped and inventoried</p>	<p>have undoubtedly revealed species new not only to the focal islands of Wolf and Darwin, but new for Galapagos and several species new to science. At least one species of hard coral has been confirmed as new to science, and we expect new soft corals and zooanthid species have also been discovered.</p> <p>1b. 3 islands (Marchena, Wolf and Darwin) with each anchor site mapped and additional mapping of main coral formations in areas where anchoring is no longer permitted.</p> <p>1c. 100% of reefs in the anchor areas of the three islands have been mapped and inventoried.</p>
<p>Activity 1.1 Field research programme: trips to a) inventory and map corals, b) determine impact locations and baselines, c) determine sites for mooring deployment and d) identify parameters to monitor</p>		<p>During this reporting period 2 field expeditions were undertaken (May 2006 and March 2007). The three focal islands were mapped and inventoried on each trip. Anchor sites were evaluated and a technical report on coral condition with pre-mooring installation measures was provided to the Park Service to limit damage in the interim through management decisions on where and how boats could anchor. Bottom conditions and substrate types were analyzed to determine the best mooring system. Site selection was made and entered into a GIS map. A thorough coral reef-specific ecological monitoring protocol has been developed and implemented in transects and plots that are now established with permanent, fixed identification markers.</p>
<p>Activity 1.2 Stakeholder survey to establish baseline knowledge and identify project participants</p>		<p>1.2 A formal survey of the fishing and guiding sectors did not prove feasible, regular discussions were held with a representative sample from these groups. We are very confident that we were able to engage sector leaders and opinion-makers in the workshops and especially on the field expeditions themselves. In the case of the latter, the change in perception during and after the trips was evident. As one important example, on the most recent expedition a former fisherman-turned-guide that has been openly hostile to conservation efforts and organizations in the national and local press agreed to participate. He proved a very helpful field assistant,</p>

		underwater photographer and delivered a well-attended lecture regarding conservation problems and solutions on the last day of the trip.
Output 2. Reduced coral damage due to the use of permanent moorings	2a. Number of moorings deployed 2b. % of boats visiting moored sites using moorings 2c. Number of coral areas with visible impacts relative to baseline	2a. 6 complete sets for moorings installation have been imported into Galapagos and will be deployed in a joint effort to install a permanent floating base at the northern islands to provide enforcement there. This is anticipated for June/July 2007, but dependent on final refurbishment of the floating base. The 3 moorings budgeted in this project leveraged the donation of 3 additional ones from dive operators. 2b. All boats visiting the northern islands will be required to use the moorings when available or anchor away from coral sites. With 6 of them, most boats should be accommodated at most times, especially as itinerary management support is being provided to the Park to improve visitation policies and reduce overburdening sensitive sites. 2c. Dependent on results of 2a/b.
Activity 2.1 Mooring design and deployment		A careful analysis of site conditions, the fleet of user boats and available options revealed that the Helix System was the most appropriate to the demanding Galapagos conditions, would require least maintenance, and would produce the least impacts during installation.
Output 3. Knowledgeable stakeholders committed to participating in coral monitoring and conservation	3a. Level of knowledge about coral species relative to baseline established in year 1 3b. % of boats that return high quality monitoring data sheets 3c. Number of persons by sector involved in monitoring activities 3d. Number of students with advanced degrees	3a. More than 20 guides and fishermen have participated in workshops and on field expeditions. On both of this year's expeditions lecture series were given, which included 1 hour lectures and discussion on a wide range of conservation topics focusing on coral reefs and the marine environment. Full-day workshops were focused on these topics as well. The guides and fishermen that participated were influential 'catalysts' within their respective groups, which has produced an important multiplier effect. In terms of formal, scientific knowledge, as a result of the IUCN red-listing workshop held last May, stakeholders, managers and the international conservation and research community now has an official

		<p>red-listing status for all Galapagos, and indeed Eastern Tropical Pacific corals. Eventual downlisting of threat status would be perhaps the most rigorous and compelling measure of coral recovery.</p> <p>3b, 3c. Boats will begin implementing the monitoring protocol next year.</p> <p>3d. 2 students awarded MSc degrees.</p>
Activity 3.1 Scientific and participatory monitoring protocol development		<p>3.1 This year's 2 field expeditions with ample participation by international, regional and local experts resulted in finalizing the scientific ecological monitoring protocol. The participatory protocol will be distilled from this to ensure more frequent monitoring of more highly variable and frequently changing parameters.</p>
Activity 3.2 Colour field guide production covering the northern GMR corals including the participatory monitoring protocol and a mooring maintenance checklist		<p>3.2 The field guide has been produced and the participatory protocol and mooring maintenance checklist will be produced as addenda.</p>
Activity 3.3 Conduct a workshop with GNPS to train their staff and stakeholders in coral conservation, identification and application of the participatory monitoring protocol		<p>3.3. The January stakeholder workshop was attended by Park representatives, the March technical diving course was attended by guides and the forthcoming mooring deployment expedition will also have a training element.</p>
Activity 3.4 Scholarship student selection and thesis project development		<p>3.4 Two MSc students were recruited during the September 2006-August 2006 academic period, which has resulted in 2 successful projects and MSc awards .</p>
Activity 3.5 Produce scientific manuscripts for publication in high-profile peer-review journals		<p>3.5 One scientific paper has already been submitted for peer-reviewed publication and five other scientific articles are in preparation and will be submitted in preliminary form to jointly constitute a special edition of the journal 'Galapagos Research', which is peer-reviewed. These initial submissions will be refined with data that is generated in year 3 so that</p>

	they can be submitted to other international journals.
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Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: 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 <ul style="list-style-type: none"> • the conservation of biological diversity, • the sustainable use of its components, and • the fair and equitable sharing of benefits arising out of the utilisation of genetic resources 			
Purpose To assist Ecuador in protecting the last remaining extensive Galapagos coral reefs.	Amount of reef showing recovery from impacts originating from tourism and fishing, in particular those resulting from anchor damage.	CDRS and stakeholder monitoring program results integrated into GIS maps	Relatively stable climatic conditions, such that overwhelming environmental factors (such as strong El Niño) do not mask the benefits of project interventions.
Outputs 1. Improved baseline knowledge of northern GMR coral reefs 2. Reduced coral damage due to the use of permanent moorings 3. Knowledgeable stakeholders committed to participating in coral monitoring and conservation	1a. Number of species recorded at each site over current species lists 1b. Number of anchor sites for which coral distribution maps are produced 1c. % of reefs in anchorage areas that are mapped and inventoried 2a. Number of moorings deployed 2b. % of boats visiting moored sites using moorings 2c. Number of coral areas with visible impacts relative to baseline 3a. Level of knowledge about coral species relative to baseline established in year 1 3b. % of boats that return high quality	1. CDRS GIS maps and inventory lists 2a. GNPS records and photo-documentation 2b. GNPS records from dive guide reports 2c. Stakeholder monitoring reports 3a. Pre-study survey results 3b and 3c. Datasheets archived by GNPS and CDRS 3d. Student thesis	1. No assumptions 2,3. Cooperation from the tourism and fishing sectors in using moorings and in participating in workshops and subsequent monitoring

	<p>monitoring data sheets 3c. Number of persons by sector involved in monitoring activities 3d. Number of students with advanced degrees</p> <p>Further specific targets will be established by partners as a basis for the monitoring and evaluation program specified below.</p>		
<p>Activities</p> <ol style="list-style-type: none"> 1. Field research programme: trips to a) inventory and map corals, b) determine impact locations and baselines, c) determine sites for mooring deployment and d) identify parameters to monitor 2. Stakeholder survey to establish baseline knowledge and identify project participants 3. Mooring design and deployment 4. Scientific and participatory monitoring protocol development 5. Colour field guide production covering the northern GMR corals including the participatory monitoring protocol and a mooring maintenance checklist 6. Conduct a workshop with GNPS to train their staff and stakeholders in coral conservation, identification and application of the participatory monitoring protocol 7. Scholarship student selection and thesis project development 8. Produce scientific manuscripts for publication in high-profile peer-review journals 		<p>Activity Milestones (Summary of Project Implementation Timetable)</p> <ol style="list-style-type: none"> 1. First trip completed to DarwinWolf Islands by August 2005, second to Wolf/Darwin/Marchena/Genovesa by March/April 2006 and third by Dec 2006 (note slight timetable modifications from stage 1 application) 2. Stakeholder survey completed by July 2005 3. First mooring built by December 2005 and deployed by GNPS in April/May 2006, second by Dec 2006, third by May 2007 4. Scientific and participatory monitoring protocols finalized by May 2006 5. Field guide finalized by July 2006 6. Workshop conducted in August 2006 7. Student thesis completed by Dec. 2007 8. manuscripts accepted for publication 2006-2008. 	

Annex 3

Supplementary hard copy materials to be posted:

- 2 x MSc thesis abstracts
- 2 x University of Edinburgh Brochures
- 1 x Workshop (2007) materials
- 1 x Lecture series (18-25 May 2006)
- 1 x Lecture series (4-8 March 2007)

Checklist for submission

	Check
Is the report less than 5MB? If so, please email to Darwin-Projects@ectf-ed.org.uk putting the project number in the Subject line.	✓
Is your report more than 5MB? If so, please advise Darwin-Projects@ectf-ed.org.uk that the report will be send by post on CD, putting the project number in the Subject line.	
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	Yes
Have you completed the Project Expenditure table?	Yes
Do not include claim forms or communications for Defra with this report.	