Darwin Initiative Annual Report

Important note:

To be completed with reference to the Reporting Guidance Notes for Project Leaders: it is expected that this report will be about 10 pages in length, excluding annexes

Revised report 2013/14 extended to October 2014

1. Darwin Project Information

Project Reference	19-009
Project Title	Galapagos marine invasive species: prevention, detection and management
Host Country	Ecuador
UK contract holder institution	University of Southampton
Host country partner institutions	Charles Darwin Foundation (CDF), Charles Darwin Research Station, Galapagos
Other partner institutions	Galapagos National Park, Ecuadorian Navy: Instituto Oceanográfco de la Armada DIRNEA Dirección Nacional de Espacios Acuáticos AGROCALIDAD Agencia Ecuatoriana de Aseguramiento de la Calidad del Agrio
Darwin Grant Value	£ 251,560
Start/end dates of project	April 2012 – March 2015
Reporting period	April 2012- March 2013, Annual Report 2, extended to October 2014
Project Leader name	Dr Ken Collins
Project website	www.darwinfoundation.org/en/science-research/invasive-species/marine/ www.southampton.ac.uk/oes/research/projects/galapagos_marine_invasive_species_prevention_detection_and_management.page
Report authors, main contributors and date	Dr Ken Collins, University of Southampton Prof Terry Dawson, University of Dundee Stuart Banks, Charles Darwin Foundation, Galapagos 1 March 2014, Revised KC Nov 2014

This is a revised version of the original 2013/4 Y2 report which was written without the benefit of receiving reviews comments on the 2012/3 Y1 report. This revision addresses the reviewer's comments on both the 2012/13 and 2013/14. Since in March 2014 a number of project deliverables were behind schedule, this report includes subsequent activities up to October 2014.

2. Project Background

The marine ecosystems of Galapagos harbour unique biological communities and have a high incidence of endemic species (18.3%, Hickman 2009). Galapagos is a UNESCO world heritage site, renowned for its high biodiversity and extraordinary oceanographic features that provide a great variety of habitats in a unique environmental setting. Ecuador's investment in the protection and sustainable development of Galapagos has been very significant. However, due to exponential growth of tourism, maritime traffic and urban development, the sustainability of the archipelago and its unique ecosystems is at great risk. Recent assessments show that 45 marine species in Galapagos are now considered globally threatened and are included on the IUCN Red List.

Development in the archipelago is mostly oriented towards tourism, which is ship-based and growing at a rate of 14% per year. Around 240 (mostly foreign) vessels, visited Galapagos from 1997-2006. Five cargo ships from ports in mainland Ecuador supply the archipelagos ever growing population and tourists. The national and international maritime traffic acts as a potential vector for invasive species. As a result, the number of introduced terrestrial and marine species increased by an order of magnitude in the past 100 years (112 to 1321). Invasive species are considered as the second most important cause for biodiversity loss by the IUCN. While their impacts have been studied extensively in the terrestrial environment, effective quarantine protocols are now in place, few data is available for the marine realm. In fact several species with high invasive potential, such as the algae *Caulerpa racemosa* and *Asparagopsis taxiformis*, are already established. No data on their dispersion and competition with native species are available as yet, but the destructive potential of invasive species in general has been demonstrated extensively in marine ecosystems worldwide.

3. Project Partnerships

Fig.1. Acknowledgement slide from project presentation to Galapagos National Park

The host country leader is the Charles Darwin Foundation (CDF), Galapagos which both the UK project leader, Collins and the other UK partner, Dawson have successfully collaborated with previous DI projects:

1997-2000, 6174, Collins, Revision of the Galapagos Marine Management Plan

2005-2007, 14-048, Dawson, Galapagos Coral Conservation: Impact Mitigation, Mapping and Monitoring

The CDF project leader Banks, a former postgraduate research student of Collins was sent to Galapagos to complete the former DI project and was the CDF project leader for the latter. Banks has led the CDF marine programme since 2003. In 2008 Collins visited Banks/CDF to formulate an unsuccessful DI proposal that year by Collins & Dawson: Strengthening Galapagos Marine Reserve adaptive management through integrated MPA science. Collins and Dawson discuss the project and communicate routinely from the UK with Banks via email and Skype. Further regular communication is also maintained with Inti Keith, an Ecuadorian employed on the current project. In Feb 2013 she formally registered for a project linked PhD at the University of Dundee supervised by Dawson with Collins as an external supervisor.

CDF is working closely with the Biosecurity Agency for Galapagos, formerly AGROCALIDAD in charge of quarantine measures and now has greater autonomy. A strong alliance has been forged between CDF and Governmental partners in Ecuador. The Ministry of Environment has recently (October 2014) made CDF the exclusive administrator for a $2.8m grant from its National Invasive Species Fund.

The CMAR Marine Corridor project for the Eastern Tropical Pacific currently involves Costa Rica, Panama, Columbia, but Ecuador government is holding back. However within this CDF formed a technical committee for Mallpello, Gorgona, Cocos and Galapagos

CBD

CDF works closely with the National Park Service, operational arm of the Ministry of Environment in direct contact with the World Heritage Coordination Ministry for Ecuador. These agencies are responsible for addressing Ecuador's obligations under the CBD/CMS and CITES treaties, including information requests and scenario development. CDF routinely responds to questions on all three treaties. And is actively contributing to the ESBA (Ecologically Significant Biological Areas) dialogues set up jointly by UNESCO,IOC and OBDI.

4. Project Progress

Paid project staff are all based at CDF (Charles Darwin Research Station, Biomar, marine biology team) with the exception of circulation modellers, Dr Lian Xie and staff at the North Carolina State University (NCSU, $15,000, year 2, $14,000 year 3) with whom CDF have collaborated previously. The original proposal envisaged CDF sub-contracting NCSU in years 1 & 2. I decided that it would be more efficient to pay UCSU direct from Southampton (approved by Eilidh Young, Jan 14). Banks continued (until the end of March 2014) as the CDF project leader with Keith leading the field work team. Other team members are:

- Nathalia Tirado, ecologist, zooplankton specialist and marine collections curator, (curator of CDF marine collections also for GNP, recently moved to Quito but still working on database and collections)
- Jennifer Suarez, junior ecologist
- Marina Andres, project subsidized volunteer, Port authority data and monitoring
- Macarena Parra, support (with a primary interest in turtles)
- Roby Pepolas – diving officer and fish specialist
- Rosita Calderon, taxonomy + invasive species lists

There has also been input from Martin Kjellberg, database programmer working on the marine invasive database for future link up to a citizen science program and the online CDF Datazone, and Graciela Monsalves, science communicator. A principal target for this programme is the creation sensitivity layers GIS to make understanding and analysis of threats readily understandable and accessible to government authorities.

Over recent years the financial viability of the Charles Darwin Research Station has been precarious leading to the loss of many admin and scientific staff, including Banks in April 2014. His role at CDF has been taken over by Noemi Dozouville (financial overview) and scientifically, jointly by Keith and Priscilla Martinez. Martinenez was a key CDF member of the DI project (1997-2000) Revision of the Galapagos Marine Management Plan. She is now an independent consultant retained part time to support CDF with this current project. Banks is still based in Galapagos working with a number of regional NGOs and supported the North Carolina State University (NCSU) development of a HYCOM ocean circulation model through to completion in October 2013.

It was anticipated that there would be a number of Ecuadorian students working with the project. Funding to support students normally comes from the profits from the CDF shop. The income from the shop with an external manager was well below expectations so early in 2013 the contract was bought out and a new shop built, then finally opened in March 2014. This was immediately closed by local political pressure and has remained so ever since. Lengthy political and legal negotiations are in progress, but the net result has been that no funding for Ecuadorian students has been available through most of this project.

4.1 Progress in carrying out project activities

The project outcomes and activities are documented in Annexes 1 and 2.

The original DI funded Galapagos Reserve management Plan (1997-2000) established an extensive monitoring programme which is still running over 12 years later and has enable this project to hit the ground running with a comprehensive knowledge base of what species were established and which were more recent changes or introductions.

The monitoring database has been shared with the Galapagos National Park, a key element to the project's legacy

One useful development since the original submission of the proposal for this project is that following an international workshop in Australia in 2012, Banks & Dawson are working on 3000 site international database of marine surveys directly comparable to those undertaken in Galapagos. This will further help understand the ecological sensitivity of the species already present in the Galapagos marine ecosystem.

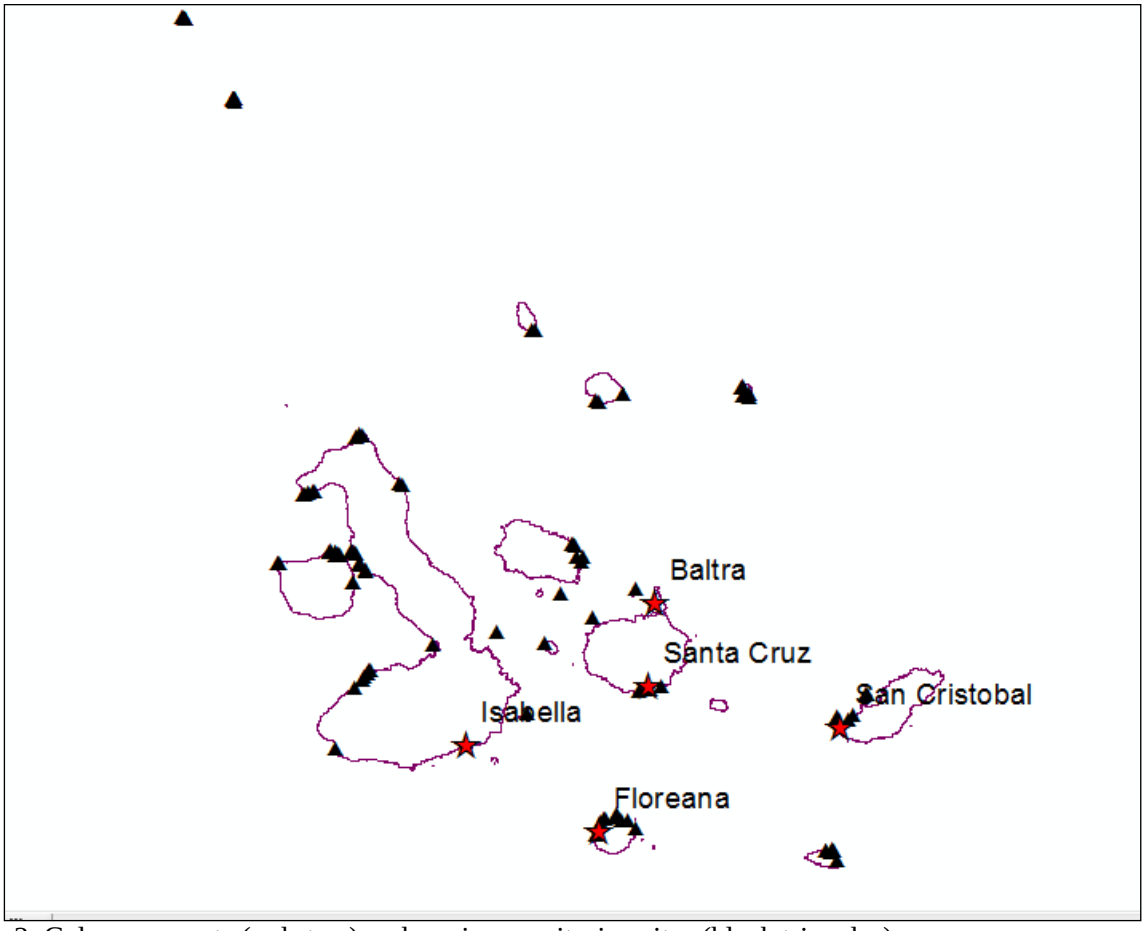

Fig.2. Galapagos ports (red stars) and marine monitoring sites (black triangles)

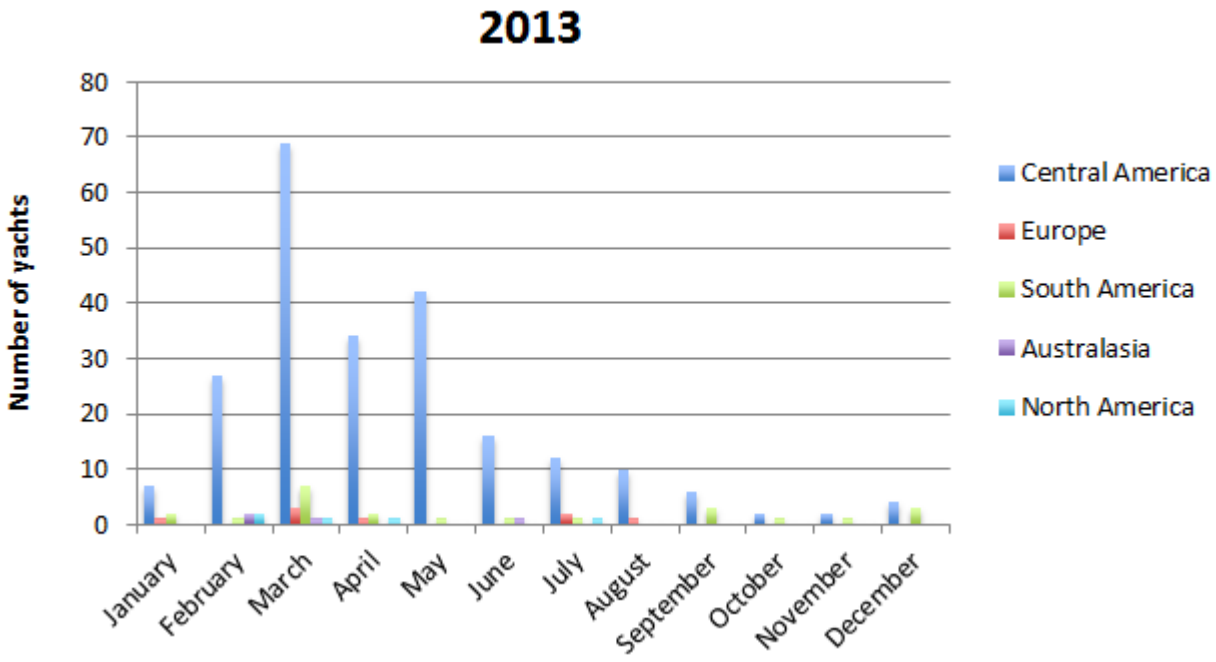

Fig.2 Source ports for yachts visiting Galapagos during 2013

In the second year of the project the team have continued to survey monitoring sites around the entire Galapagos archipelago. (see Fig.2)

In April-July 2013 ecological monitoring was undertaken to the far north and western part of the archipelagos (64 sites) with specific collections of marine algae and directed invasives species searches. Banks and Suarez prepared materials for an invasive species module of the Galapagos Naturalist Guide course by the Galapagos National Park 2013&4 which was delivered to >500 National Park guides, key to a successful early warning system.

Keith visited the UK September – December 2013 primarily to advance her PhD literature review at Dundee (Marine Invasive Species in the Galapagos Marine Reserve, MPhil to PhD upgrade Report). This was formally accepted in Jan 2014. Keith also worked with Collins in Southampton and together they met with the Galapagos Conservation Trust in London.

After meetings with ABG (Biosecurity Agency), Banks and Suarez ran a workshop in Guayaquil 12-16 Nov 2013, as part of training for their new personnel while also running inspections/ base line surveys of the estuarine communities existing in the thick mud around Ocean Store and the future quarantine dock facility. INOCAR, Wild-Aid and NAZCA are also participating. There was a follow up meeting with the Port directorate given the new role of MTOP (Ministry of Transport) regulating marine traffic (an area where they have as yet limited experience) to help reinforce the importance of biosecurity measures for the Islands, the new Marine Protected Areas along the coast of Ecuador and how to improve the registries/ coordination of data for marine traffic routes (a key requirement for risk assessment). A further meeting with INOCAR discussed support for future ABG inspections for marine invasives based in Guayaquil as well as advances in climate monitoring between the continent and the GMR.

In December 2013 Banks visited Dr Lian Xie, Department of Marine, Earth and Atmospheric Sciences, North Carolina State University (NCSU), USA to discuss our ocean circulation modelling requirements: the development of a HYCOM ocean circulation model in order to generate inputs for a particle tracking tool. The circulation and water structure data generated is needed for multiple applications. When coupled with habitat maps and life cycle information for the worst invaders of the Eastern Tropical Pacific it can help predict vector dispersal from maritime traffic routes and ports of entry. We also expect that it will have direct relevance for studies of other species of importance to the well-being of the Reserve (fisheries, nature tourism objective, habitat formers etc.). A contract between Southampton and Xie was exchanged in March 2013 and the final report with model scenarios delivered in October 2014.

Collins, Mallinson (Southampton) and Dawson (Dundee) visited Galapagos between 16 February and 6 March 2014 to participate in survey fieldwork with the CDF marine team and meet with Ecuadorian government project partners. The UK and CDF teams met with Galapagos National Park Director at HQ, Santa Cruz 18 Feb. and on Isabella 28 Feb 2014.

Through May-June 2014 Keith was retained by the National Park to lead the underwater evaluation of the ecological impact caused by the grounding of the M/V "Galapaface I" in Punta Carola, San Cristobal Island.

At the end of June 2014 Keith made a special trip to Darwin and Wolf to assess the numbers of Crown of Thorns starfish previously reported there.

Through summer 2014, Keith and Martinez continued training of National Park and Agency staff in marine invasive species survey techniques and identification

Keith visited UK August-October 2014 to participate in scientific meetings in Glasgow (3rd International Marine Conservation Congress) and Edinburgh (MASTS Marine Science and Technology Scotland) and further her PhD studies in Dundee and Southampton.

One presentation at the MASTS meeting was on controlling the importation of invasive species by a national regatta of 250 ships converging on the Clyde. The lessons learnt from this were immediately conveyed by Keith to the organisers of a similar Ecuadorian yacht regatta to Galapagos in September 2015. She has also advised on a policy with yachts with heavy fouling of their hulls, which are now required to remove themselves from the Galapagos Marine Park to clean their hulls.

Collins met with Swen Lorenz, Executive Director CDF in September and October 2014 to discuss the future of the Galapagos marine invasives programme.

4.2 Progress towards project outputs

Before the inception of this project there were no marine invasives species plans or activities. This project has:

- Identified what and where potential invasive species occur in the Galapagos.
- Shared this databases with the Government Agencies
- Identified which species are likely to arrive and if so, could have significant impact, i.e. risk categorisation.
- Produced training materials/courses and awareness raising materials
- Trained 560 Galapagos Natural Park, Navy and Biosecurity Agency staff as to their threat and how to identify them
- A reporting hotline has been established
- The Ecuadorian Government agencies and CDF have incorporated marine invasives into their operating plans
- The Ecuadorian Ministry of Environment has made CDF the exclusive administrator for a $2.8m grant from its National Invasive Species Fund.
- A quarantine dock has been established in Gyuaquil for all cargo shipping to Galapagos. The possibility of a similar “one stop” dock in Galapagos are being explored.
- A shipping/boat movement database has been produced
- A future climate scenario ocean current modelling for the Galapagos has been produced enabling risk scenarios to be produced.

The project outcomes and activities are noted in Annexes 1&2.

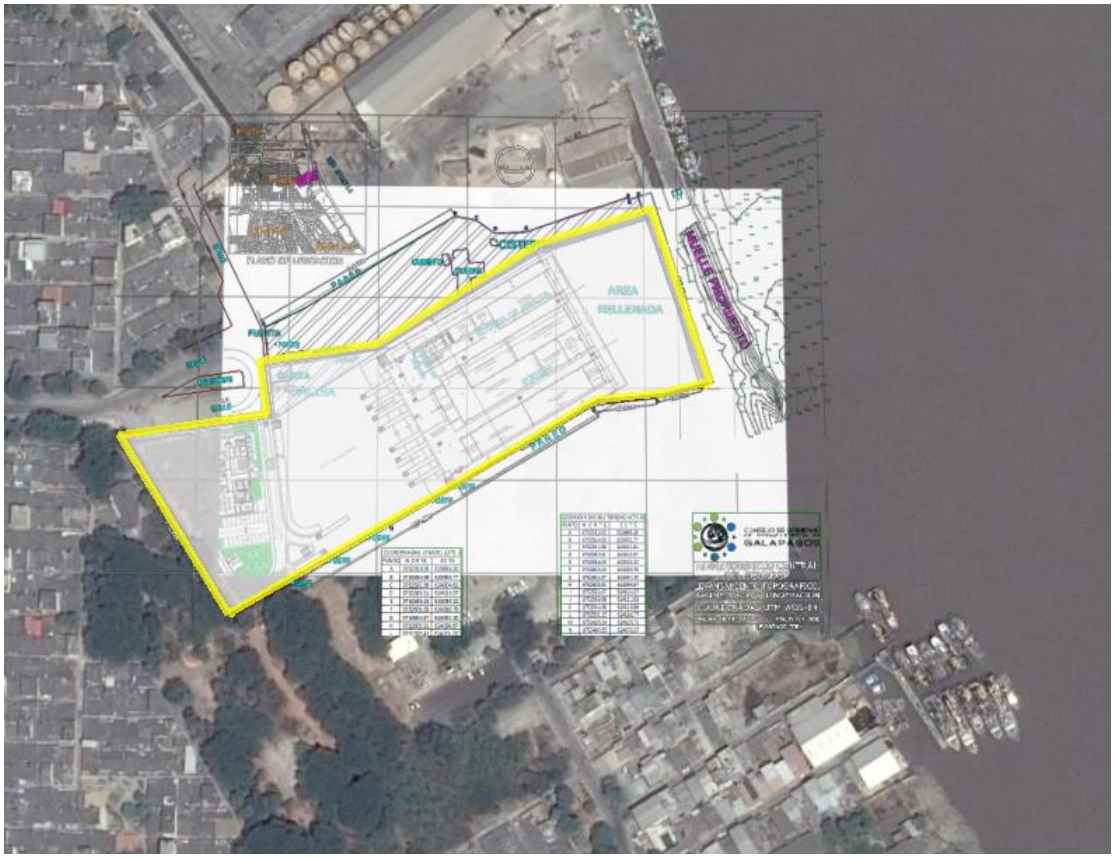

Fig.3 New Galapagos cargo ship quarantine dock Guayaquil, mainland Ecuador, opened 2014

4.3 Standard Measures

See Annex 2, Table 1. Project Standard Output Measures

Table 2 Publications

Type (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Poster abstract 8th International Conference on Marine Bioinvasions, Vancouver, British Columbia, Canada	Galapagos Marine Invasive Species Inti Keith, Stuart Banks, Ken Collins, Terrance Dawson 2013	University of British Columbia, Vancouver, British Columbia, Canada.		
Oral presentation abstract- 3rd International Marine Conservation Congress, Glasgow	Inti Keith Galapagos marine invasives: identification, prediction and control 2014		https://www.conbio.org/images/content_conferences/IMCC2014_speed_presentation_abstracts_29May14_for_posting.pdf	
Journal paper submitted to Pacific Conservation Biology Journal	Galapagos Marine Invasives – is there a problem? Inti Keith,Terence Dawson, Ken Collins 2014			

Reports

Inti Keith, Stuart Banks & Jennifer Suarez (2013) Especies Invasoras Marinas, Prevención, detección y manejo. Informe de avances del proyecto FCD-Darwin Initiative, Abril 2012- Mar 2013., Report to Galapagos National Park by the Charles Darwin Foundation, July 2013.

Eduardo Espinoza, Inti Keith (Charles Darwin Foundation), Freddy Narvaez (ABG), Juan Pablo Muñoz (USFQ). (2014) Evaluation of the ecological impact caused by the grounding of the M/V "Galapaface I" in Punta Carola on San Cristobal Island. Galapagos National Park Directorate Technical Report CUEM-MEM-2014, 6 June 2014,

Lian Xie and Bin Liu (2014) A modelled geospatial time-series for Ocean Circulation in the Eastern Tropical Pacific and Galápagos Marine Reserve region over past and future climate scenarios. Report to CDF & University of Southampton by the Coastal Fluid Dynamic Group, North Carolina State University. The modelling results (~1 TB) are hosted by a THREDDS data server (http://cfdl.meas.ncsu.edu:8080/thredds/catalog/etpgmr/). A NCSU graduate student is conducting more comprehensive validation of the model results as part of her thesis. These additional work will be shared with us when it is completed.

Stuart Banks (2014) Manual de monitoreo submareal ecologico: Una guía práctica para seguir la dinámica de las comunidades marinas de la Reserva Marina de Galápagos. Informe Técnico de la FCD, Fundación Charles Darwin, Puerto Ayora, Galápagos, Ecuador. pp. 143 *(GMR subtidal monitoring manual discusses the importance of the donors in seed funding, technical collaboration and wider leveraging of resources and interest in GMR science for conservation since 1997. The main audience is the National Park and Navy. Includes methods developed across 4 DI projects (GMR baseline 1997-2000; Corals 2004-2007, Marine invasives 2013-15 and the climate monitoring aspects of Hernan Vargas' Penguin assessments 2002-2005).*

Priscilla Martinez & Inti Keith (2014) Addressing the threat of Marine Invasive Species and possible severe El Niño event. Interim Report from the Charles Darwin Foundation to Galapagos Conservancy, September 1, 2014.

4.4 Progress towards the project purpose and outcomes

As explained in section 4.2, before the inception of this project there were no marine invasives species plans or activities. Now the government agencies are aware of the threat posed by marine invasives, which ones are there already, which could arrive and how, along with preventative measures. Extensive training has been given as well as wider awareness raising (further details in Section 9, Dissemination). Section 4.2 summarises the key achievements of this project.

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

This is a difficult answer to address because of the nature of this project which aims to develop mechanisms to forestall the introduction of marine invasives, thus technically blocking an increase in biodiversity which is far from desirable with the unique Galapagos marine ecosystem. Of course the whole point of highlighting marine invasives is that these could potentially oust native species causing a decline in biodiversity.

5. Monitoring, evaluation and lessons

Collins, Dawson and Banks are all experienced project managers with a combined track record of >£10m project value. The rationale behind the Collins and Dawson visit to CDF near the end of the first and second years was to review the project progression and plan ahead. Similarly Collins and Dawson's planned visit Feb/March 2015 will serve a similar function, strengthened by a planned international workshop. We maintain frequent contact (at least weekly by email) and especially through supervision of Keith's PhD (direct contact for 3-4 months each year) which reflects the overall aim of the project.

Participating in fieldwork, we are able to see directly the monitoring techniques being used, the results being entered into the CDF database and review results to date. Jenny Mallinson, with long term experience of the Galapagos has particular taxonomic expertise with hydroids, bryozoans and algae. Our evaluation is that the work is being carried out to a consistent and exemplary high standard, the standard being that required for leading peer review scientific journal publication. During each visit Collins and Dawson have met with key stakeholders: Sven Lorenz (Director of the Charles Darwin Research Station), the Director and staff of the Galapagos National Park, the local port Navy commanders and Biosecurity Agency team.

Admittedly the media activity has been low. At our review meeting in Galapagos in March we identified the need to address this. The International Workshop on Marine Bioinvasions of Tropical Island Ecosystems, at CDRS in February 2015 will provide the required end of project local dissemination and draw attention to the issues internationally, providing a clear trigger for press releases and publicity.

A number of sub-projects have been delayed:

(a) Ocean modelling scenarios by North Carolina State University was envisaged to be completed by the end of Year 2. Banks specifically visited NCSU in December 2013 to discuss and clarify our requirements. Southampton took over the sub-contract from CDF establishing a staged payment only after successful completion. The extreme complexity of the modelling meant that the work was not completed until October 2014.

(b) Delay with Output 2 (Risk assessment tools and rapid response protocols) – The protocol for assessment of ports and general monitoring are now well tried and there is a need to develop the pool of skilled personnel in Galapagos. The shipping movement from the mainland and between islands of the Galapagos database has required months of effort at Navy offices in the various ports transcribing the paper records to an electronic form. This task was much greater than originally envisaged. This and the modelling (see below) are key factors in the overall risk assessment.

A real test of the emerging rapid response protocol was provided by a cargo ship running aground off San Cristobal early May 2014. Inti Keith (CDF and PhD student linked to this project) led a survey team to inspect the vessel and two tug boats sent from the mainland. She was asked by the Galapagos National Park and Biosecurity Agency to remain there to assist with technical information on monitoring techniques of what to do before and after the possible sinking of the ship. The original plan was to tow it out of the marine reserve and allow it to sink beyond the 60mile boundary. However there was still cargo on-board and the bottom compartments had flooded causing cement and other cargo to be lost completely and impossible to remove.

(c) Socio-economic impact – Recognising the limited expertise within the team and approaching end of project, additional funding from the Galapagos Conservancy is being used to commission a study of the potential impact of marine invasives by Conservation International, Galapagos (Oct-Dec 2014) who have undertaken similar studies of terrestrial invasives in Galapagos and regionally.

The original intentions of the project and relatively straightforward outcomes still remain appropriate.

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

This revision and updating of the year 2 report plus accompanying Appendices (on DVD) are intended to address earlier reviewers comments.

7. Other comments on progress not covered elsewhere

The Charles Darwin Research Station financial difficulties were discussed in section 4.1. The 50th anniversary of the inauguration of CDF was on January 21st 2014. CDF have subsequently secured their largest grant ($2m from The Leona M. and Harry B. Helmsley Charitable Trust), the first ever grant from a billionaire philanthropist ($1.2m from Wijn and Pon) and a significant commitment for investing in the

CDF unique library ($1m over a number of years). The Ecuadorian Ministry of Environment has made the organisation the exclusive administrator for a $2.8m grant from its National Invasive Species Fund.

Keith is clearly highly valued by Galapagos agencies, as evidenced by her delivery of training courses and being ask to advice on the 2014 MV" Galapaface I" shipwreck. We regard Keith's completion of her PhD by March 2016 as key to securing the future of Galapagos marine invasives work. She is well on track having upgraded early from MPhil to PhD and with financial support could complete by early 2016. However this project finishes March 2015, so we have been making a number of recent bids for funding: Dawson's application for a Darwin Fellowship; Helmsley Foundation by CDF with the Scripps Institution of Oceanography and WWF Prince Bernhard scholarship for nature conservation.

One legacy project for long term monitoring is a recent co-operative fouling panel project in conjunction with Dr Linda McCann, Smithsonian Environmental Research Center, Tiburon, California.

8. Sustainability

The most surprising aspect of this project has been the early, wholehearted and enthusiastic adoption by the stakeholders, i.e. the full range of Ecuadorian government agencies. The very fact that AGROCALIDAD has been renamed and focussed as the Biosecurity Agency shows a strong government commitment to both terrestrial and marine invasives control. The exit strategy is the intention of this project to provide the monitoring and risk assessment tools.

9. Dissemination

The Darwin logo is used on all presentations, reports, posters.

Project activities are updated on the CDF website:
www.facebook.com/darwinfoundation
www.darwinfoundation.org/en/science-research/invasive-species/marine/

Close collaboration with the other institutions involved to produce a rapid response protocol applicable in case of invasive species detection within GMR. is in progress with an active programme of meetings and a gratifying amount of government enthusiasm. GNP has recently written marine invasives and climate change into their management plan. The Biosecurity Agency has included marine invasives into their operating plan for 2013 onwards.

Stakeholder meetings are taking place every 2 months along with training and awareness raising workshops. A marine invasives module is now included in the Galapagos Guide training course (involving >50 government agency staff and the 500 naturalist guides who lead 180,000 tourists/year)

There is now combined reporting hotline for marine invasives, strandings and wildlife help

Fig.3. Awareness raising poster showing existing (left) and potential (right) marine invasives

Several public meetings to describe the project have been held in Santa Cruz, Puerto Ayora and Isabella, Puerto Villamil. Collins gave a public lecture in Southampton 6 Jun 13

International scientific meetings

Keith presented a poster "**Galapagos Marine Invasive Species**" to the 8th International Conference on Marine Bioinvasions, August 20- 22, 2013, University of British Columbia, Vancouver, British Columbia, Canada. A key outcome from this has been the conception of International Workshop on Marine Bioinvasions of Tropical Island Ecosystems, Charles Darwin Research Station, Puerto Ayora, Galapagos, 24-27 February 2015.

Keith made an oral presentation to the 3rd International Marine Conservation Congress, Making Marine Science Matter, 14-18 August 2014, Scottish Exhibition & Conference Centre, Glasgow, Scotland, UK.

Dawson, Collins and Keith made oral presentations to the MASTS Annual Science Meeting 2014 Workshop: Marine Invasive Species: Prevention, Detection and Management Challenges, 3rd-5th September 2014 at Heriot Watt Conference Centre, Edinburgh.

10. Project Expenditure

Table 3. Project expenditure during the reporting period (1 April 2013 – 31 March 2014)

Current Year's costs	2013/14 Grant (£)	2013/14 Total actual Darwin Costs (£)	Variance (%)	Comments
Staff Costs			-15.0	Staff reduction
Overhead Costs			0.0	
Travel and subsistence			21.6	actual travel costs more than expected
Operating Costs			0.8	bank charges
Capital Items			0.0	
Others			30.4	studentship and modelling runs
Total				

Paid project staff are all based at CDF (Charles Darwin Research Station, Biomar, marine biology team) with the exception of circulation modellers, Dr Lian Xie and staff at the North Carolina State University (NCSU, $15,000, year 2, $14,000 year 3)

I discussed moving $29,000 with Elidh from the Staff costs budget administered by CDF to a direct payment by University of Southampton (UoS) to subcontractor, North Carolina State University (NCSU), USA. She approved this 7/2/14. The UoS contract with NCSU specified payments in 2 stages, $15K in 2012/3 and $14K on satisfactory completion in 2013/4. Since the original budget envisaged completion of the NCSU work by the end of 2012/13 this could have resulted in that project year underspend. To avoid this, UoS paid the equivalent sum in advance to University of Dundee for year 3 Inti Keith PhD fees. By the end of this project NCSU and Dundee will have been paid the sums as originally planned.

In June 2014 the Galapagos Conservancy awarded CDF $25,000 to support the marine invasives programme, especially the Feb 2015 international workshop. This is also funding a marine invasives socio-economic impact study by Conservation International, Galapagos (Oct-Dec 2014)

[NB from Eilidh: For clarification I discussed the movement of funds in GBP, and I think the date in yellow should read 2013/14}

11. 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 LTS and the Darwin Secretariat to publish the content of this section

These statements made in 2013 remain as pertinent as ever:

"*The most gratifying aspect of this project has been the wholehearted and enthusiastic adoption by the stakeholders: government agencies and NGOs*

The original DI funded Galapagos Reserve management Plan (1997-2000) established an extensive monitoring programme which is still running over 12 years later and has enable this project to hit the ground running with a comprehensive knowledge base of what species were established and what are more recent changes and introductions.

We are very fortunate to have recruited Inti Keith as the PhD student fully linked to this project. She is an Ecuadorian who has been working in the Galapagos for the past decade. Travelling around the Galapagos archipelago with her has made us aware of how widely she is known and respected. The relatively modest project investment in her PhD will pay enormous dividends in the future."

Through May-June 2014 Keith was retained by the National Park to lead the underwater evaluation of the ecological impact caused by the grounding of the M/V "Galapaface I" in Punta Carola, San Cristobal Island.

Invasive species awareness and survey training has been given to 500 Galapagos National Park guides as well as 50 government agency staff, key to establishing a successful early warning system.

Over the second year of the project, the number of agencies and collaborators has continued to grow (see Fig.1). The CDF is now strongly aligned with Governmental partners in Ecuador. The Ministry of Environment has made the organisation the exclusive administrator for a $2.8m grant from its National Invasive Species Fund.

Stuart Banks completed the Galapagos Marine Reserve sub-tidal monitoring manual (2014) which includes methods developed across 4 DI projects (GMR baseline 1997-2000; Corals 2004-2007, Marine invasives 2013-15 and the climate monitoring aspects of Hernan Vargas' Penguin assessments 2002-2005).

There will be an end of project International Workshop on Marine Bioinvasions of Tropical Island Ecosystems, Charles Darwin Research Station, Puerto Ayora, Galapagos, 24-27 February 2015.

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2013-14

Project summary	Measurable Indicators	Progress and Achievements April 2013 - October 2014	Actions required/planned for next period
Goal: *To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve* ⇒ The conservation of biological diversity, ⇒ The sustainable use of its components, and ⇒ The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources		Threats to biodiversity First step is checklist and verification no. of spp.	
Purpose Establish a baseline for marine invasive species in the Galapagos archipelago, and implement preventative, detection, control and mitigation measures within the new government biosecurity framework (Agrocalidad 2011-2015) and regional planning.	• Prevention and early detection monitoring plan accepted and implemented with collaboration of government agencies. • Increased knowledge on the presence, distribution of invasive species and their impacts upon native species and communities. • New records of invasive species in GMR restricted to early stage of appearance, long before definitive settlement happens and impact on ecosystems have started. • Government agencies (GNPS, Agrocalidad and INOCAR) have access to databases and risk assessment tools and are trained in their use.	Connections made incorporating knowledge into and informing government strategies Monitoring manual produced for the National Park and Navy All Ecuadorian government agencies have access to databases. Draft online marine invasive species web based database produced but not yet fully functional	Completion of marine invasive species web based database
Outputs **1.** A baseline compilation of historical records and updated information on marine invasive species in GMR and their distribution, from literature research and census/monitoring in ports of entry and the whole archipelago.	**1.1** GMR invasive species historical records in depth researched. **1.2** Invasive species monitoring plan for GMR and Galapagos main ports implemented. **1.3** Invasive baseline database updated and integrated into national GNPS/ local government database under development (online).	Historical records have been reviewed Port monitoring is in progress Government authorities have copies of the existing databases	make these available on-line

2. Marine invasive species risk assessment tools and rapid response protocols for their control/eradication for the GMR.	**2.1** Marine invasive species risk assessment tools (incoming ships classified into risk categories depending on their providence, sensitivity maps, oceanographic modelling and dispersal scenarios for potential invaders) for the GMR implemented. **2.2** Rapid response protocols finished and handed over to local authorities.	This is an ultimate aim of the project. Marine traffic database and ocean modelling scenarios completed. Socio-economic impact study in progress by Conservation International These have been developed in the 2 monthly government stakeholder meetings and workshops. The Ministry of Environment has made CDF the exclusive administrator for a $2.8m grant from its National Invasive Species Fund.	Completion of socio-economic study and risk assessment This is an iterative review process, for future management plans.
3. Community outreach program on invasive species and the threats they pose for the Galapagos marine ecosystems, including their active collaboration in the detection program.	**3.1** GMR invasive species identification guides produced and distributed. **3.2** 500 Naturalist guides and other GMR users informed and trained in the identification guides use through workshops. **3.3** Reporting hotline and procedures for new findings of invasive species established (mainly for guides). **3.4** Number of media dissemination (news articles, radio, TV interviews and websites).	Produced as laminated sheets A marine invasives module added to the Galapagos Guide training course (for 500 naturalist guides who lead 180,000 tourists/year) Up and running, combining marine invasive species, wildlife help/reporting and strandings Lower than anticipated, detailed under Project Standard Output Measures	Naturalist guides will inform toursits React to reports International conference, Feb 2015 will attract media coverage
4. Capacity building in local community: a) Key staff members of GNPS, Agrocalidad, and INOCAR trained in monitoring techniques for marine invasive species. Local students trained in scientific method and writing their thesis on marine invasive species topics.	**4.1** 9-12 staff members of GNPS, Agrocalidad, and INOCAR trained in monitoring techniques, and risk assessment and integrated in the implementation stage. **4.2** Three national bachelor students, one masters, and one PhD student with finished thesis on invasive species ready to graduate and orientated towards complementary positions in new government biosecurity initiative.	Numerous agency training courses delivered to all 500 National Park staff and guides, 60 staff in Biosecurity Agency and Navy Keith MPhil upgraded to PhD Lack of anticipated funding for Ecuadorian students due to closure of CDF shop. Lengthy political and legal negotiations are in progress, but the net result has been that no funding for Ecuadorian students has been available through most of this project	Completion of PhD by Feb 2016 Resolution not anticipated before end of project

Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
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.			
Sub-Goal: Minimise negative impacts of invasive species on marine biodiversity, ecosystem services and resilience of the Galapagos Marine Reserve (GMR).	• No. population impacts in GMR indicator species are attributable to invasive species. • No. Galapagos marine endemic or native species have been re-categorized to endangered status with invasive species being the cause. • Social, economic and environmental benefits derived from Galapagos natural wealth are not affected by marine invasive species.	• CDF Biodiversity assessment of the GMR reports. • CBD, CDF and GNPS reports. • IUCN red list data. • Social, economic and other relevant government reports in Galapagos.	
Purpose Establish a baseline for marine invasive species in the Galapagos archipelago, and implement preventative, detection, control and mitigation measures within the new government biosecurity framework (Agrocalidad 2011-2015) and regional planning.	• Prevention and early detection monitoring plan accepted and implemented with collaboration of government agencies. • Increased knowledge on the presence, distribution of invasive species and their impacts upon native species and communities. • New records of invasive species in GMR restricted to early stage of appearance, long before definitive settlement happens and impact on ecosystems have started. • Government agencies (GNPS, Agrocalidad and INOCAR) have access to databases and risk assessment tools and are trained in their use.	• Monitoring plan and protocol finished and agreed with local authorities. • Technical reports to the government agencies involved (GNPS, Agrocalidad and INOCAR). • Baseline report updated with new invasive species records and distribution maps. • Reports of training conducted. • Scientific publications.	The safeguarding of native and endemic species, local community livelihoods (tourism and fisheries), island food security and wellbeing also depend upon multiple socio-political and environmental (climatic) factors that will be recognised, but understood to be beyond the scope of the project.

Outputs **1.** A baseline compilation of historical records and updated information on marine invasive species in GMR and their distribution, from literature research and census/monitoring in ports of entry and the whole archipelago.	**1.1** GMR invasive species historical records in depth researched. **1.2** Invasive species monitoring plan for GMR and Galapagos main ports implemented. **1.3** Invasive baseline database updated and integrated into national GNPS/ local government database under development (online).	• Marine invasive species baseline database on-line. • CDF taxonomic on-line database updated. • Project monitoring reports. • Technical participatory workshops with government agencies reports. • National GNPS/local government on-line database (under development).	Coordination between key associates (Navy, Port Authority, National Park, etc.).
2. Marine invasive species risk assessment tools and rapid response protocols for their control/eradication for the GMR.	**2.1** Marine invasive species risk assessment tools (incoming ships classified into risk categories depending on their providence, sensitivity maps, oceanographic modelling and dispersal scenarios for potential invaders) for the GMR implemented. **2.2** Rapid response protocols finished and handed over to local authorities.	• Risk assessment report and tools (maps, dispersal scenarios, risk categorization for incoming ships). • Rapid response protocol document.	Counterpart (US NCSU/UK National Oceanographic Centre) with high resolution (4Km nested) Hybridised Coordinate Model (HyCom) provided for future development.
3. Community outreach program on invasive species and the threats they pose for the Galapagos marine ecosystems, including their active collaboration in the detection program.	**3.1** GMR invasive species identification guides produced and distributed. **3.2** 500 Naturalist guides and other GMR users informed and trained in the identification guides use through workshops. **3.3** Reporting hotline and procedures for new findings of invasive species established (mainly for guides). **3.4** Number of media dissemination (news articles, radio, TV interviews and websites).	• GMR invasive species identification guides. • Report of GMR users workshops and outreach activities conducted. • Reporting hotline files. • CDF and The Galapagos Conservation Trust websites, videos, newspaper articles, radio spots	Assumes an active interest and participation by local communities and GMR users, with special focus on naturalist and dive guides.
4. Capacity building in local community: b) Key staff members of GNPS, Agrocalidad, and INOCAR trained in monitoring techniques for marine invasive species. c) Local students trained in scientific method and writing their thesis on marine invasive species topics.	**4.1** 9-12 staff members of GNPS, Agrocalidad, and INOCAR trained in monitoring techniques, and risk assessment and integrated in the implementation stage. **4.2** Three national bachelor students, one masters, and one PhD student with finished thesis on invasive species ready to graduate and orientated towards complementary positions in new government biosecurity initiative.	• Training workshops reports and evaluation. • References to marine invasive species prevention, early detection and management plans in government agencies reports and programs involved. • Thesis documents or drafts.	Assumes the timely development of the new AGROCALIDAD Biosecurity Institute in the Islands. Trained staff remains active in relevant positions in government agencies.

Activities (details in workplan)

1.1 In depth review of scientific and specialized outreach literature to synthesize records of invasive species in the marine environment of the Galapagos in recent decades.
1.2 Review data of the CDF Ecological Monitoring Program of the last ten years to assess recent changes in species composition and the presence of invasive species.
1.3 Elaborate a marine invasive species monitoring plan and protocol for local authorities.
1.4 Carry out monitoring surveys in the 5 main ports of Galapagos twice a year, and in Puerto Ayora bimonthly, for higher temporal resolution.
1.5 Conduct yearly invasive species monitoring surveys throughout the GMR as part of the CDF Ecological Monitoring Program.
1.6 Determine the occurrence and spatial distribution of marine invasive species already established in Galapagos.
1.7 Establish a database with historical data and surveys results available to GNPS/ local government authorities.
1.8 Elaborate marine invasive species distribution maps in the GMR.

2.1 Elaborate a list of potentially invasive marine species in Galapagos through review of scientific literature and technical reports about potential invaders, including information provided by marine invasive species programs already established in the ETP region and expert workshops.
2.2 Elaborate a risk categorization for incoming ships, combining their providence and recent shipping route with identified hotspots of transmission and propagation of invasive species in the Eastern Pacific and elsewhere.
2.3 Elaborate sensitivity maps with spatial data on distribution of invasive species combined with traffic routes and density of maritime traffic within the GMR.
2.4 Develop ocean circulation and invasive dispersal models for the GMR.
2.5 Elaborate a risk assessment report.
2.6 Elaborate, in close collaboration with the other institution involved, a rapid response protocol applicable in case of invasive species detection within GMR.

3.1 Elaborate species identification guides for marine invasive species presents in ETP region especially for naturalist guides and tour operators and train them in their use.
3.4 Establish a reporting hotline and procedures for invasive species detections by naturalist guides to take advantage of their knowledge and year-round presence throughout the archipelago.
3.2 Organize public workshops for GMR users about marine invasive species in the main 4 population centres of the archipelago.
3.3 Elaborate annual outreach reports.

4.1 Training courses in marine invasive species identification, monitoring and database analysis for the technical staff of the three institutions involved: GNPS, Agrocalidad and INOCAR.
4.2 Organize of technical participative workshops with GNPS, Agrocalidad and INOCAR to inform about the progress of the project, advisement and results achieved so far.
4.3 Thesis projects carried out for three national students Bachelor and one national student PhD thesis on invasive species.

5.1 Elaborate an annual report to DI about the progress of the project and the results achieved.

Intended workplan for your project.

	Activity *PLEASE NOTE THAT THE PROJECT WOULD START 1APRIL 2012, QUARTERS COUNT FROM THAT DATE, FINISH 31 MARCH 2016	No of Months	Year 2+Q1/2 Y3 comments
1.1	In depth review of scientific and specialized outreach literature to synthesize records of invasive species in the marine environment of the Galapagos in recent decades.	4	Literature review complete for each of the established and potential invasives. This is the key introductory chapter to Keith's PhD
1.2	Review data of the CDF Ecological Monitoring Program of the last ten years to assess recent changes in species composition and the presence of invasive species.	4	Has been completed and is under continuous review.
1.3	Elaborate a marine invasive species monitoring plan and protocol for local authorities.	6	Monitoring manual produced. Plans in place for ports and general marine reserve monitoring working with Navy and Biosecurity agencies.
1.4	Carry out monitoring surveys in the 5 main ports of Galapagos twice a year, and in Puerto Ayora bimonthly, for higher temporal resolution,	30	Target ports: Baltra, Puerto Ayora, San Cristobal, Floreana, Puerto Villamil. Port. Settlement plate monitoring programme started with Smithsonian Environmental Research Center, Tiburon, California.
1.5	Conduct yearly invasive species monitoring surveys throughout the GMR as part of the CDF Ecological Monitoring Program.	6	An extensive marine reserve monitoring programme is in place (50m transects, covering fish, and benthic organisms) 102 sites have been examined this year
1.6	Determine the occurrence and spatial distribution of marine invasive species already established in Galapagos.	30	Completed to date. Continued general and specific monitoring surveys combined with reporting hotline
1.7	Establish a database with historical data and surveys results available to GNPS/ local government authorities.	9	Completed as a module within the CDF database, has been shared stand alone with the Park, Navy and Biosecurity agencies. On-line web version in beta format.
1.8	Elaborate marine invasive species distribution maps in the GMR.	12	GIS layers produced from above database
2.1	Elaborate a list of potentially invasive marine species in Galapagos after review scientific literature and technical reports about potentially invaders, including information provided by marine invasive species programs already established in the ETP region and expert workshops.	8	Master sheet prepared ID sheets & posters for guides and others prepared for outreach to disseminate information and raise awareness
2.2	Elaborate a risk categorization for incoming ships, combining their providence and recent shipping route with the identification of hotspots of transmission and propagation of invasive species in the Eastern Pacific.	9	Data base of national and international shipping port arrivals (2012-14) compiled

2.3	Elaborate sensitivity maps with spatial data on distribution of invasive species combined with traffic routes and density of maritime traffic within the GMR.	9	Planned based on data gathered to date
2.4	Develop ocean circulation and invasive dispersal models for the GMR.	12	Completed by North Carolina State University using the hybridised coordinate model funded by NASA (2004-2007 produced by University of Miami, North Carolina State University and University of North Carolina, Wilmington)
2.5	Elaborate a risk assessment report.	30	In progress, CI contracted to produce socio-economic impact report Oct-Dec 2014
2.6	Elaborate, in close collaboration with the other institution involved, a rapid response protocol applicable in case of invasive species detection within GMR.	9	Under constant review with active programme of meetings, strong government agency support. GNP and Biosecurity agency have included marine invasives in their operating plan. The Ministry of Environment has made CDF the exclusive administrator for a $2.8m grant from its National Invasive Species Fund. Marine Invasives are now high priority for endowment funds set up under GEF project through FEIG (Fondo de Especies Invasories Galapagos) based in Quito.
3.1	Elaborate species identification guides for marine invasive species presents in ETP region especially for naturalist guides and tour operators and train them in their use.	6	Drafts produced as laminated sheets. Used with marine invasives module established within Galapagos Guide training course (500 naturalist guides who lead 180,000 tourists/year)
3.2	Establish a reporting hotline and procedures for invasive species detections by naturalist guides to take advantage of their knowledge and year-round presence throughout the archipelago.	2	Established combined with existing wildlife help/reporting and strandings hotlines.
3.3	Organize public workshops for GMR users about marine invasive species in the main 4 population centres of the Archipelago.	6	Delivered at: Santa Cruz, Puerto Ayora; Isabella, Puerto Villamil; San Cristobal, Puerto Baquerizo Moreno.
3.4	Elaborate annual outreach reports.	3	Stakeholder meetings every 2 months with annual summary reports
4.1	Training course in marine invasive species identification, monitoring and database analysis for the technical staff of the three institutions involved: GNP, Agrocalidad and INOCAR.	6	Numerous courses in Galapagos and Guayaquil, reaching 560 staff across Park, Navy, Biosecurity agencies
4.2	Organize technical participative workshops with GNP, Agrocalidad and INOCAR to inform about the progress of the project, advisement and results achieved so far.	6	>2 meetings/month with each principal partner agencies (including the regular meetings, see 3.4)
4.3	Thesis projects carried out for three national students Bachelor and one national student PhD thesis on invasive species.	30	Keith PhD progressing well Closure of CDF shop cut off funding stream for Ecuadorian students

5.1	Elaborate an annual report about the progress of the project and the results achieved.	9	DI Year1, Year 2 and this revised Year 2 report with Appendix on DVD Reports to Galapagos government agencies

Annex 2 Section 4.3. Table 1 Project Standard Output Measures

Standard Measure	Description	Year 1	Year 2	Year 3	Total to date	Estimated Total
1A	Number of people to submit thesis for PhD qualification (in host country)	registered	Upgrade MPhil to PhD			1
1B	Number of people to attain PhD qualification (in host country)					
2	Number of people to attain Masters qualification (MSc, MPhil etc)	hopeful	See 1A			1
3	Number of people to attain other qualifications (Bachelors degree)	1	0			3
4A	Number of undergraduate students to receive training	4	3			3
4B	Number of training weeks to be provided	10	8			26
4C	Number of postgraduate students to receive training	1	1			2
4D	Number of training weeks to be provided	20	21			50
5	Number of people to receive at least one year of training (which does not fall into categories 1-4 above) Scientific divers group of CDF	3	2			4
6A	Number of people to receive other forms of education/training (which does not fall into categories 1-5 above) 9-12 Staff of GNPS, INOCAR/DIGMER, 3-5 volunteers	15	560			12-17
6B	Number of training weeks to be provided	3	22			8
7	Number of (ie different types - not volume - of material produced) training materials to be produced for use by host country (ID guides, dive and safety protocol, methods protocol, presentations for training purposes	4	6			4
8	Number of weeks to be spent by UK project staff on project work in the host country	9	9			20
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 (monitoring plan, rapid response protocols)	3 in draft	3 complete			2
10	Number of individual field guides/manuals to be produced to assist work related to species identification, classification and recording	1 draft	1			1
11A	Number of papers to be published in peer reviewed journals	0	0			2+
11B	Number of papers to be submitted to peer reviewed journals	0	0			4+
12A	Number of computer based databases to be **established** and handed over to host country	In progress	In progress			1
12B	Number of computer based databases to be **enhanced** and handed over to host country	1	1			2
13A	Number of species reference collections to be **established** and handed over to host country(ies)	1	1			
13B	Number of species reference collections to be **enhanced** and handed over to host country(ies) (integrated in the species collection of the CDF)	1	1			1
14A	Number of conferences/seminars/ workshops to be **organised** to present/disseminate findings	6	8	5		3

14B	Number of conferences/seminars/ workshops **attended** at which findings from Darwin project work will be presented/ disseminated.	14	1	3		3
15A	Number of national press releases in host country(ies)	0	3			3-5
15B	Number of local press releases in host country(ies)	5	3			12-15
15C	Number of national press releases in UK	1	0			1
15D	Number of local press releases in UK	1	0			1
16A	Number of newsletters to be produced	1 (GCT)	1			9
16B	Estimated circulation of each newsletter in the host country(ies)	?	?			national
16C	Estimated circulation of each newsletter in the UK	5000	5000			national
17A	Number of dissemination networks to be **established**	1				1 (local)
17B	Number of dissemination networks to be **enhanced/ extended**	1				1 (CDF)
18A	Number of national TV programmes/features in host country(ies)	0	0			1-2
18B	Number of national TV programmes/features in UK	0	0			1
18C	Number of local TV programmes/features in host country(ies)	1	0			4-6
18D	Number of local TV programmes/features in UK	0	0			1
19A	Number of national radio interviews/features in host county(ies)	1	0			4-6
19B	Number of national radio interviews/features in UK	0	0			1
19C	Number of local radio interviews/features in host country(ies)	1	0			9-12
19D	Number of local radio interviews/features in UK	0	0			1
20	Estimated value (£'s) of physical assets to be handed over to host country(ies)	~£10K	~£6K			~16K GBP
21	Number of permanent educational/training/research facilities or organisations to be established and then continued after Darwin funding has ceased	n/a	n/a			n/a
22	Number of permanent field plots to be established during the project and continued after Darwin funding has ceased	n/a	n/a			n/a
23	Value of resources raised from other sources (ie in addition to Darwin funding) for project work	£62K See note 2	£50K	£17K from GC		~130K GBP
New -Project specific measures						

Note 1. Managenent plans now including marine invasives: Revised Galapagos National Park management plan, National Territorial and the Biosecurity Agency operating plan

Note 2. £50K salary, cruises £12K,

Annex 3 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

This may include outputs of the project, but need not necessarily include all project documentation. For example, the abstract of a conference would be adequate, as would be a summary of a thesis rather than the full document. If we feel that reviewing the full document would be useful, we will contact you again to ask for it to be submitted.

It is important, however, that you include enough evidence of project achievement to allow reassurance that the project is continuing to work towards its objectives. Evidence can be provided in many formats (photos, copies of presentations/press releases/press cuttings, publications, minutes of meetings, reports, questionnaires, reports etc) and you should ensure you include some of these materials to support the annual report text.

Accompanying DVD:

19-009ReportY2cAppendices

Folder	Contents
Galapaface	Stranding of M/V "Galapaface I" in Punta Carola on San Cristobal Island
Galapagos workshop presentations	PowerPoint presentations – factsheets, impacts, shipping routes, terminology
Keith PhD	Literature review, Upgrade report
MASTS 2014	Marine Science Technology Scotland Workshop Marine Invasive Species: Prevention, Detection and Management Challenges, 3rd-5th September 2014, Heriot Watt. Key paper: Keith "MASTS_Edinburgh_Sep_2104.ppt"
Modelling	NCSU final report
Papers	Pacific Conservation Biology Journal and conference abstacts
Reports	Galapagos sub-tidal monitoring manual, Report to GC,
Trafico Maritimo	A database of marine traffic/port shipping arrivals, fishing boats/areas, photo database of boats, regulations. Key files: Graficos trafico maritimo.xls- analysis of where boats are from Seguimentos Embarcationes con Igot-U.xls – spreadsheet of boat traffic See summary with in Keith's presentation in MASTS2014
Training	Attendance sheets for training courses
Workshop 2015	International Workshop on Marine Bioinvasions of Tropical Island Ecosystems, announcements and poster

Checklist for submission

	Check
Is the report less than 5MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	x
Is your report more than 5MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	x
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	x
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.	x
Have you involved your partners in preparation of the report and named the main contributors	x
Have you completed the Project Expenditure table fully?	x
Do not include claim forms or other communications with this report.	