Submit by Monday 20 August 2012

DARWIN INITIATIVE APPLICATION FOR GRANT FOR ROUND 19: Post Project

Please read the Guidance Notes before completing this form. Where no word limits are given, the size of the box is a guide to the amount of information required.

Information to be extracted to the database is highlighted blue.

ELIGIBILITY

1. Name and address of organisation (NB: Notification of results will be by post and email to the named Project Leader in Question 8)

Name:	**Address:**
Dr John R Turner	**School of Ocean Sciences, College of Natural Sciences, Marine Science laboratories, Bangor University, Menai Bridge, Wales, UK. LL59 5AB**

2. Post Project title

Assuring Engagement in Cayman's Enhanced Marine Protected Area System
2b. Main project reference and title **18-016 Darwin Initiative to Enhance an Established Marine Protected Area System, Cayman Islands**

3. Project dates, duration and total Darwin Initiative Grant requested, matched funding

Proposed start date: 01 April 2013 Duration of project: 1.5 years End date: 30 Sept 2014					
Darwin request	**2013/14** **£131,053**	**2014/15** **£58,947**	**2015/16** **£**	**2016/17** **£**	**Total** **£ 190,000**
Proposed (confirmed and unconfirmed) matched funding as percentage of total Project cost: 69%					

4. Country(ies)

Which eligible host country(ies) will your Post Project be working in. You may copy and paste this table if you need to provide details of more than four countries.

Country 1: **Cayman Islands (UK Overseas Territory)**	**Country 2:**

5. Post Project Outcome

Define the outcome of the Post Project and explain how this links with the outcome from the Main Darwin project. This should be a summary statement derived from the answer given to question 25.

(max 100 words) 100

Individuals from across Caymanian society will benefit now and in future from the enhanced MPA system and therefore **support MPA implementation and operation**. **Understanding and acceptance** of management strategies combined with **modified behaviour** will **secure the sustainable use of resources for all**, and maximise the resilience of reef ecosystems to respond to threats **from invasive species and overexploitation**, providing long term protection of **biodiversity, personal income, property and economic activity**. The Post Project outcome will secure the Main Project outcome by **addressing recently identified issues** that could undermine the enhanced MPA. Success will be demonstrated in the **Caribbean region and beyond.**

6. Main Project Outcome

What have been the main outcomes (achievements) of the original project to date?

(max 300 words) 300

The Main Project Outcome was: '*A review of the effectiveness of the Marine Protected Area system of the Cayman islands in maintaining resilience of coral reefs and shallow marine ecosystems in response to direct human impact and climate change, and if appropriate, to provide the information base to extend the system to increase that effectiveness.'*

The main achievements of the original project have been:

(1) **Assessment of resilience:** reef health measured at 62 permanently established monitoring sites inside and outside of current MPA system, shows that *MPAs generally provide local resilience*. (Higher cover and coral recruitment, lower coral bleaching, disease prevalence and macroalgal cover).

(2) **Assessment of benefit:** overspill of fish into surrounding waters is evident at some MPA boundaries. Number, size and biomass of 53 target fish species is *greater in many MPAs than outside*, and proportions of herbivorous and carnivorous fish are more balanced. *Invasive lionfish threaten fish communities*.

(3) **Assessment of fisheries impact:** recreational, artisanal and illegal fishing are significant on Cayman reefs, and fishers exploit MPA boundaries. Fishing is an important part of Caymanian culture and understanding the incentives to fish legally and illegally must be included in conservation planning. *Fish spawning aggregation sites **(SPAGs)** have been identified as being vulnerable to overexploitation.*

(4) **Stakeholder consultation**, survey data and protected area planning tools have been used to **plan an enhanced MPA system which increases No-take protection from 15 to 50% of the shelf**, but provides access to fishable areas. A campaign of public awareness, education and consultation is maximising understanding and support for the new MPA system.

(5) **Wide and varied communication:** including 34 public events, 21 press articles, 24 TV and 5 radio programmes, 16 online items, 24 scientific papers, theses, reports and conference presentations and 10 other outputs (eg. school information packs, MPA promotions).

7. Biodiversity Conventions

Which of the three conventions supported by the Darwin Initiative will your Post Project be supporting? Note: projects supporting more than one convention will not achieve a higher scoring

Convention On Biological Diversity (CBD)	**Yes**
Convention on Migratory Species (CMS)	**Yes**
Convention on International Trade in Endangered Species (CITES)	**Yes**

7b. Biodiversity Conventions

Please detail how your Post Project will contribute to the objectives of the convention(s) your project is targeting. You may wish to refer to Articles or Programmes of Work here. Note: No additional significance will be ascribed for projects that report contributions to more than one convention

(Max 200 words) 200

This Post Project will address the **Strategic Goals and AICHI Biodiversity targets 2011-2020 for CMS and CBD** by contributing in part to each of these targets:

A1: value of biodiversity, A2: local development & poverty reduction, A3: incentives, A4: natural resource use / safe ecological limits.
B5: rate of habitat loss, B6: fisheries overexploitation, B9: control of invasive species. B10: integrity & functioning of coral reef ecosystems.
C11: 10% coastal/marine areas conserved, C12: threatened extinction improved.
D14: Essential ecosystem services restored, needs of local communities & poor, D15: Ecosystem resilience improved, restoration of at least 15% degraded ecosystems.
E17: Updated national strategy & actions plans, E18: traditional knowledge of local communities respected, E19: financial resources for strategic plan for biodiversity.

The project will also address **Goals 1-3 of the strategic vision of CITES** (especially Goal 1: implementation and enforcement).

There are some 36 endangered marine species in Cayman, including 3 species of turtles, 19 fishes (including 6 sharks & rays, 6 Grouper) and 12 corals. Many other species are vulnerable to over-extraction, impact of invasive species (especially lionfish) or habitat modification, due to development and climate change. Local communities have exploited fish SPAGs and this has proven to be unsustainable.

Is any liaison proposed with the CBD/CITES/CMS focal point in the host country?

☑ Yes ☐ No if yes, please give details: The host country partner, Department of the Environment (DOE) is the host country focal point, managing conservation (**CBD ratified 1994, CMS 1985, CITES 1979**); (RAMSAR 1979, CARTAGEN, 1986, MARPOL, 1988, UNCLOS, 1997, KYOTO 2007). **Cayman Marine Conservation Laws** protect or regulate most local marine life. It is illegal to disturb or remove any marine benthos unless licensed by Government. Extraction of all turtles is heavily regulated, and certain species of fish, and invertebrates (eg. all echinoderms) are on the protected species list. Popular food fisheries such as conch and lobster are strictly controlled via catch limits and closed seasons, and fishing using spear, fish-trap, and nets are heavily regulated. All Nassau grouper spawning aggregations are protected November-March. However, some species such as sharks, turtles, queen conch, and Nassau Grouper, are vulnerable due to illegal exploitation. Certain corals (eg. *Acropora* and *Dendrogyra*) are threatened from habitat modification, disease, and bleaching events. While the Marine Conservation Laws provide some protection for most fisheries, **they provide few restrictions on habitat modification** which is allowed through the licensing power of other government departments. **More integrated legislation is proposed under the National Conservation Law Bill.**

8. Principals in Post Project. Please identify and provide a one page CV for each of these named individuals. You may copy and paste this table if you need to provide details of more personnel or more than one project partner.

Details	**Project Leader**	**Project Partner 1 - Main**	**Project Partner 2**
Surname	Turner	Ebanks-Petrie	Byrne
Forename (s)	John	Gina	James
Post held	Senior Lecturer and Head Coastal Zone Management, Centre for Applied Marine Science	Director	Marine Science Program Manager
Institution (if different to above)	Bangor University	Cayman Islands Government	The Nature Conservancy, USA
Department	School of Ocean Sciences	Department of the Environment	Florida Keys Office
Telephone			
Email			

Details	**Project Partner 3 - Main**	**Project Partner 4**	**Project partner 5**
Surname	Semmens	Pattengill-Semmens	Barton
Forename (s)	Brice	Christy	Rob
Post held	Assistant Professor	Director of Science	Head of interactive
Institution (if different to above)	University of California, San Diego	REEF Key Largo, FL 33037 USA	BB&P
Department	Scripps Institution of Oceanography,	Pacific Office San Diego	n/a
Telephone			
Email			

9. Please list all the partners involved (including the Lead Institution) and explain their roles and responsibilities in the Post Project. Describe the extent of their involvement at all stages, including project development. This section should illustrate the capacity of partners to be involved in the project. Please provide written evidence of partnerships. Please copy/delete boxes for more or fewer partnerships.

Lead institution and website:	**Details (including roles and responsibilities and capacity to engage with the Post Project): (max 200 words) 182**
School of Ocean Sciences, Bangor University (SOS) http://www.sos.bangor.ac.uk	Research led university school providing academic input in survey design and analysis, marine field research, project co-leadership, financial management, monitoring and evaluation and research publication in high impact international scientific journals. The School has developed a working relationship with the Cayman Island Government Department of the Environment (DOE), and the Main Project arose from successful active research collaboration on monitoring coral reefs in the Marine Protected Area system. The Post Project will be led from Bangor (PI: Turner) and will employ one Darwin Project Support Officer (PSO) in Cayman to enhance capacity in DOE, with responsibility for field work planning, meetings organisation, project data management, outreach liaison, and output preparation. The project will also involve Bangor IT Research support from Worley, to write code for a digital application for smart phones for public outreach and engagement purposes, and iPad for field use by Enforcement Officers. Turner provides PhD supervision for a member of DOE (McCoy) and leads an international postgraduate Masters course in Marine Environmental Protection providing training and UK MSc project students to collaborate with DOE and assist in field research.

Partner Name and website where available:	**Details (including roles and responsibilities and capacity to engage with the Post Project): (max 200 words) 200**
Cayman Islands Government Department of the Environment (DoE) http://www.doe.ky/	The Department of the Environment is part of the Cayman Island Government Ministry of Health, Environment, Youth, Sports & Culture. DOE is the Government agency responsible for management and conservation of environment and natural resources, and plays a key role in liaising with government and stakeholder groups. DOE manages the MPA system and provides field operational capacity for research and enforcement: 13 staff in research and assessment (10 marine); 15 staff in enforcement and operations (10 Conservation/Marine Enforcement Officers); 3 administrative staff. DOE operates 14 boats and 1 enforcement jet ski, (with 1 of these a dedicated research boat) and 6 enforcement boats and the rest multiple use. DOE has the institutional and legal structure to implement the project in the field, but does not have the financial resources and research focus for scientific data collection beyond existing programmes of mandatory monitoring and enforcement. The Post Project involves 10 DOE staff on 10-100% time, of which 3 staff (Darwin Research Officer Fellows) > 50% time: McCoy 100%, Chin 75% and Gibb 50%). The Director (Ebanks-Petrie) and Research Director (Austin) co-manage the project, and Senior Research Scientist (McCoy) leads field research. All three have been instrumental in planning the Post Project.

Have you included a Letter of Support from this institution?	**Yes**

Partner Name and website where available: The Nature Conservancy, USA (TNC) Marine Science Program – Caribbean Challenge Florida Keys Office http://nature.org	**Details (including roles and responsibilities and capacity to engage with the Post Project): (max 200 words) 176** The Nature Conservancy is the leading US conservation organization working around the world to protect ecologically important lands and waters for nature and people. TNC's Caribbean Challenge Program aims to transform countries' national park systems and will triple global marine habitat under protection, setting aside almost 21 million acres of coral reefs, mangroves, sea grass beds and other important habitat for sea turtles, whales, sharks and other wildlife. TNC was a Main Project Partner, instrumental in providing training in resilience assessment and modelling MPA options, and will continue to have a major role in the Post Project, especially by helping develop the project as a national level demonstration project for climate change adaptation, and disseminating this knowledge throughout the Caribbean region. James Byrne (Marine Science Program Manager) will be involved in the design and implementation of all 5 themes of the post project, bringing in other TNC staff as necessary. Byrne's travel and subsistence costs during the project will be met by Darwin Initiative funds allocated to the host country, since TNC is a regional partner.
Have you included a Letter of Support from this institution?	**Yes**

Partner Name and website where available: Scripps Institution of Oceanography, University of California, San Diego, USA (SIO) http://sio.ucsd.edu/	**Details (including roles and responsibilities and capacity to engage with the Post Project): (max 200 words) 190** Scripps Institution of Oceanography is one of the oldest, largest, and most important centres for ocean and earth science research**,** education**,** and public service in the world. Research at Scripps Institution of Oceanography encompasses physical, chemical, biological, geological, and geophysical studies of the oceans and earth. Assistant Professor Dr Brice Semmens joins the Post Project as a new Darwin partner, but has had a long partnership with DOE to date, as principle investigator of the Grouper Moon Project, a multi-institution conservation project aimed at describing the spatial, demographic and numerical impact of spawning-site (SPAG) marine protected areas (MPAs) on endangered Nassau grouper in the Cayman Islands. This project involved monitoring space use through acoustic telemetry, characterizing demographic responses to MPAs through Leslie matrix analytic techniques such as sensitivity analyses, and characterizing the spatial aspects of fishing pressure through mark-recapture analysis. The research was explicitly designed to carry out a comprehensive assessment of the risks Nassau grouper face, and by implication the potential benefits provided by MPAs in the Cayman Islands and elsewhere. Semmens will bring his expertise to assist in the design and study of the multi-species fish spawning aggregations.
Have you included a Letter of Support from this institution?	**Yes**

Partner Name and website where available:	**Details (including roles and responsibilities and capacity to engage with the Post Project): (max 200 words) 190**
Reef Environmental Education Foundation (REEF) http://www.reef.org/about Grouper project: http://www.reef.org/programs/grouper_moon Lionfish project: http://www.reef.org/lionfish	The Reef Environmental Education Foundation REEF (founded 1990) mission is to conserve marine ecosystems for their recreational, commercial, and intrinsic value by educating, enlisting and enabling divers and other marine enthusiasts to become active stewards and citizen scientists. REEF links the diving community with scientists, resource managers and conservationists through marine-life data collection and related activities. REEF is a new partner for the Darwin Post Project, but has collaborated with DOE in Cayman since 2002 on the Grouper Moon project, to evaluate the potential for SPAG MPAs to recover Nassau grouper stocks. REEF developed a novel education program to coincide with the Grouper Moon Project, which included curricular materials and classroom lessons, as well as "meet the scientist" and "live from the field" sessions. REEF has worked with divers and dive operators, public aquaria, and various government departments on invasive lionfish, to enact rapid response protocol and removals and to assist with scientific investigations related to non-native marine species. REEF will assist in data collection on multispecies fish spawning sites and invasive lionfish culling, and will be involved in public outreach activities, specifically with diving tourism operators and in schools.
Have you included a Letter of Support from this institution?	**Yes**

Partner Name and website where available:	**Details (including roles and responsibilities and capacity to engage with the Post Project): (max 200 words) 114**
BB&P http://bbandp.com/	BB&P is a full-service brand and interactive communications agency providing integrated services to major brands internationally, and specialising in the Caribbean region. Founded in 1982, BB&P is based in George Town, Grand Cayman. Clients are supported with marketing strategy, brand development, interactive and digital production, mobile strategy, iPad, iPhone and android development and integrated communications campaigns. BB&P have been involved in local conservation strategies, including the campaign for Hog Sty Bay and the high profile Blue Iguana Conservation Project. BB&P will be involved in the design and implementation of the smart phone App and will generously donate development time to this Post Project theme, working with DOE and SOS Bangor IT research support staff.
Have you included a Letter of Support from this institution?	**Yes**

10. Have you provided CVs for the senior team including the Project Leader	**Yes (7 in total)**

TECHNICAL EXCELLENCE

11. Problem the Post Project is trying to address

Please describe the problem your Post Project is trying to address. For example, what biodiversity and development challenges will the Post Project address? Why are they relevant, for whom? How did you identify these problems?

(max 200 words) 200

The enhanced MPA faces 4 challenges, identified from field study and stakeholder interaction:

(1) **Invasive species control:** Lionfish culling programmes are believed to mitigate the impact of lionfish on reef-fish communities, but are resource intensive. Reduced sightings in culled zones may be due to lionfish learning to avoid divers, rather than culling being effective – in which case, resources could be better deployed.

(2) **Protection of fish spawning aggregations (SPAGs)**: Historically exploited by fishers, sites are now seasonally closed for fishing of Nassau grouper to allow stocks to recover. But, the sites appear important for 22 other species of reef fish potentially all year round. No-Take designation must be justified, and mitigated, due to displacement and possible non-acceptance amongst the poorest fishers.

(3) **Sustainability of concessions to fishers:** The enhanced MPA system provides fishing at MPA boundaries (Fig 1) opposite community boat-ramps, minimising fishers' fuel costs. But fish overspill from MPA must be monitored and adaptive management introduced if fishers are to benefit long-term.

(4) **MPA enforcement dilution:** Expansion of No-Take MPAs from 15% to 50% of the Cayman shelf requires an expansion in enforcement, but there are no resources to achieve this. **An innovative approach is planned to involve the public**.

12. New and additional work

Explain how gains from the Post Project work will be distinct and <u>additional</u> to those of the Main project. Show, where possible, how these gains require limited resources and could not be achieved without the funding.

(max 300 words) 300

The **Main Project** designed a new MPA system for Cayman, soon to be presented to the public in a second round of consultation, following which amendments, legislation and enforcement plans will be recommended to complete the project. **The gains of the Post Project** are solutions to **4 problems** that have become apparent during the Main Project, and require resources to fund work **following implementation** of the new MPA. **The problems have the potential to undermine the success of the new MPA system, and affect significantly the poorest in Caymanian society: (1) Invasive lionfish (*Pterois volitans*)** was not a problem when the original project was conceived. The abundance, distribution and impact of lionfish have since been examined and their growing population and impact on reefs is now apparent. DOE deployed its own resources into a culling programme. The Post Project will assess the effect of culling lionfish, utilising MPA zones. **(2) Fishing at SPAGs** rapidly decimates adult fish; 5 out of 6 aggregation sites of Nassau grouper have been lost, forcing seasonal closure of the last. Fishers now target other fish, **necessitating sustainable management**. The project will assess multi-species SPAGs by resourcing monthly in-water surveys after full-moon. (3) The project will resource surveys of **fish overspill into concessionary fishing areas ('slots')** between No-Take MPAs, since these allow fishing at the MPA boundaries, especially by the **poorest fishers who cannot afford boat fuel to fish further afield**. (4) Most illegal fishing occurs in highly populated districts, especially when work is scarce and meat expensive; and repeat offenders often do so to fuel drug and alcohol addictions. The economic downturn means that Government cannot resource an expansion in enforcement to match the expansion in MPAs, and therefore the **Post Project plans to resource an innovative solution to assist**

enforcement involving the general public.

13. Methodology

Describe the methods and approach you will use to achieve your intended outcomes and impact. Provide information on how you will undertake the work (materials and methods) and how you will manage the work (roles and responsibilities, project management tools etc).

(Max 500 words) 500

1. ***Hypothesis: lionfish in zones subject to culling have learnt to avoid divers***. A visual census of lionfish will be conducted on a timed search protocol at different times of day/dusk at 15 sites within zones where culling has been undertaken, and at 15 sites in a control zone (the No dive zone). The behaviour of lionfish in response to a diver's approach will be assessed and compared between zones. If lionfish avoid divers, then the resource intensive lionfish culling efforts will be reviewed. Work to be conducted by DOE/REEF/SOS.

2. ***Hypothesis: many species of reef-fish, other than Nassau grouper, aggregate to spawn at sites throughout the year, making them vulnerable to overexploitation by fishers*.** Monthly surveys after spring tides will be conducted at 6 known fish spawning aggregation sites all year round, and point visual census conducted. Numbers of species and individuals aggregating will be recorded and larval dispersal followed using 8 satellite tracked drifters. DOE/SIO/REEF/TNC/SOS.

3. ***Hypothesis: adult fish diversity, number, size and biomass will remain at MPA level in concessionary fishable areas between MPA zones.*** Visual census of fish will be conducted in winter and summer on 6 replicate 50m x 5m x 5m transects at 15m depth at 200m intervals from within MPAs across 6 fishing areas and into the next MPA. In addition, fishers utilising the areas will be interviewed to assess their catch. DOE/SOS/TNC.

4. ***Hypothesis: The general public will report MPA transgressions if they can do so conveniently and anonymously and can benefit directly from participation. Enforcement Officers can be better deployed if real time reporting is utilised***. A smart phone 'app' will be developed and provided free throughout Cayman. The app will provide: (i) a personal locator in relation to MPA boundaries, offering zone specific regulations/information; (ii) an interactive seafood guide to aid consumer choice in supermarkets and restaurants in the Cayman Islands – using the annually updated *Cayman Sea Sense* recommendations (http://www.nationaltrust.org.ky/index.php/what-we-do/cayman-sea-sense); (iii) a simple field guide for identification of common marine organisms; (iv) a function for reporting suspected offences with photo send option - the report will be logged in a database and an instant text message/email sent to Enforcement Officers; (v) a function to report marine sightings (eg. sharks, turtle nests, lionfish culled, bleaching events) with details of location – these would feed into a database and instant reports sent to Conservation Officers. A further development of the app approach is a field tool for Enforcement Offices based on wifi cellular iPads in waterproof housings, enabling immediate links to a database of license holders (eg of spear guns/fish-pots/lionfish spears/seine nets) with options for sending instant logs to the DOE database. Real time logging will negate the need for office-based logbook completion and licence checking, and free time for field presence. Managers can deploy Enforcement Officers more efficiently by assessing locations of suspected violation reports and data will be used for mapping and monthly reporting. The app will be developed by Bangor IT research support with BB&P (local company specialising in digital applications).

14. Are you aware of any other individuals/organisations/ projects carrying out or applying for funding for similar work? **✓ ☐ Yes ☐ No**

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

Numbers refer to approaches described above

(1) Over the past 4-5 years, research has been conducted across the Caribbean on invasive lionfish (eg Gulf and Caribbean Fisheries Institute (GCFI) with partners from REEF, NOAA, Florida Sea Grant, Smithsonian). Cayman DOE lead the Caribbean UK OTs in this work and are major contributors to the network. The Central Caribbean Research Institute (CCMI) have surveyed lionfish in Little Cayman, and report their findings to DOE who are responsible for coordinating the data and managing culling in the Cayman Islands. We are unaware of research investigating lionfish behaviour in response to divers and culling programmes, other than our own pilot work. **REEF (Pattengill-Semmens) will collaborate in this Post Project on the efficacy of invasive lionfish culling.**

(2) Since 2002, DOE, Oregon State University and REEF have developed a collaborative conservation programme on Nassau groupers (*Epinephelus striatus*) in the Cayman Islands. The project investigated the reproductive biology of remnant Nassau grouper stocks and implications for Cayman Islands MPA management, funded by the Lenfest Ocean Program at the Pew Charitable Trusts. The results of this research pertaining to MPA evaluation and enhancement have already fed into the Main Project. However, no research has been conducted on multispecies SPAGs in Cayman. Research is underway in Belize by the Wildlife Conservation Society on feeding associations between sharks and multi-species fish spawning aggregations. **The PI of this work (Semmens) has now moved to Scripps Institute of Oceanography, University of California, and will collaborate in this Post Project on multispecies SPAGs.**

(3) Assessing overspill from MPAs is an important area of current research around the world to demonstrate benefit and resilience, with good examples conducted by the by *ARC Centre of Excellence for Coral Reef Studies, James Cook University*. Further, studies of community based management, in which areas can be fished by the managing community (who also establish a No take zone), but are closed to outsiders, are not uncommon (eg. SOS Bangor working in Tonga). **However, this Post Project will uniquely demonstrate the value of relatively small fishable slots between Marine Reserves, provided to benefit impoverished fishers.**

(4) Bangor University (SEACAMS ICZM project) is conducting a research project in Wales to develop an app on a tablet platform for charter boat captains to report whale and dolphin sightings in a UK Special Area of Conservation for analysis by an NGO. **The app was developed in house by Bangor IT research support, and will provide some lessons and experience for the Post Project described here.**

15. Value for money

Please describe why you consider your application to be good value for money including justification of why the measures you will adopt will secure value for money?

(Max 250 words) 250

The additional work of the Post Project will add value to the Main Project because the **solutions proposed specifically address challenges that could potentially undermine the success of the new MPA system**; **a system developed through Interaction with stakeholders and the general public over 3 years at significant cost, and will ultimately improve the lives of all Caymanians**. DOE has skilled staff and facilities, but needs to **deploy these resources effectively to manage the MPA system**. For example, 2 staff are permanently deployed running the lionfish culling programme because it is believed that local culling operations are effective, protecting fisheries. **Potential overexploitation of SPAGs and fishing areas between MPAs will harm future fisheries and fishers income, and surveys**

now will provide information to ensure sustainable futures. Developing a smart phone **app is a cost effective 'one-stop-shop' type tool** which can deliver many functions for modest initial investment and development. **The app will serve as a means of public outreach, education, involvement and engagement**, potentially reducing the need for information and regulation brochures, and provide something new of wider value to users. **Enforcement will be more cost effective, with officers working more efficiently in the field and better able to respond to incidents, in turn providing a positive impression of enforcement action in view of the general public**. Managers working with real-time databases fed by data entry via tablets in the field should be able **to make savings by dropping subscriptions to satellite tracking services** installed in enforcement boats and vehicles.

16. Ethics

Outline your approach to meeting the Darwin Initiative's key principles for research ethics as outlined in the guidance notes.

(Max 300 words) 300

The Post Project will meet ethical and legal obligations of UK and Cayman by:

(1) An established partnership with Cayman Government, Department of the Environment, who will be the **host institution and the public profile of the project in the host country** at all times, while utilising **expertise from UK and other proven partners collaboration**.

(2) The Main Project has (and the Post Project will) take the stance that the **Marine Protected Areas of Cayman belong to the Caymanian people**, and that the projects actively seek and build upon the Caymanian vision of a **high quality marine environment for future generations**.

(3) The Darwin team has established meetings with the public in which we have balanced disseminating information from research with **listening to all members of the public and stakeholders**, including the youngest and oldest members of communities. **Traditional knowledge of the marine environment and fishing practice is being utilised alongside new research findings in MPA design, monitoring and implementation.**

(4) Questionnaires involving the general public will be **scrutinised by Bangor University Ethics Committee, and personal privacy respected**. The team endeavour to feedback findings to the general public and to **use information from across society fairly, respecting the views and backgrounds of individuals**. Reports and analysis of transgressions and incidents in MPAs will be treated with anonymity.

(5) **Research activities are risk assessed**, and relevant UK and Cayman regulations and Health & Safety Executive/Marine and Coastguard Agency **Approved Codes of Practice followed** for diving at work and boat operations.

(6) The Bangor University Research Ethics Framework and Ethical Policy (http://www.bangor.ac.uk/humanresources/policies/ethical%20policy.pdf) will be followed, together with the ***Code of Practice for the Assurance of Academic Integrity and Quality Assurance in Research***.

(7) **The Post Project aims to ensure sustainable use of biodiversity for present and future generations by improving people's lives**.

PATHWAY TO IMPACT

17. Legacy

Please describe what you expect will change as a result of this Post Project with regards to biodiversity conservation and poverty alleviation. For example, what will be the long term

benefits (particularly for biodiversity and poor people) of the Post Project in the host country or region and have you identified any potential problems to achieving these benefits?

(Max 300 words) 299

(1) **DOE will have the capacity to know whether resources are being used appropriately to manage invasive lionfish species and not directed at unachievable targets.** It is important that the behaviour of invasive species is understood, and changes in behaviour not misinterpreted (eg. as a reduction in numbers due to culling success). Invasive lionfish have the capacity to harm fisheries and fishers incomes (they reproduce prolifically, prey on >56 species, a dense population can devour >1,800 fish per km^2/year).

(2) Multi-species SPAGs will be protected at the appropriate time of year to ensure sustainable populations of fish to support the incomes of future generations of fishers.

(3) **Concessionary fishable slots between MPA boundaries will be managed to ensure that MPA overspill (or fish transfer between MPAs) is not overexploited, to ensure sustainable populations of fish to support the incomes of future generations of the poorest fishers who cannot access more distant fishing areas**.

(4) **To secure ownership of an enhanced MPA system by Caymanians, and encourage enjoyment by residents and visitors through active participation, engagement, awareness and education in the islands marine environment and conservation**. **Empowered stakeholders become responsible and share the benefits of an MPA**. Violations will reduce due to increased vigilance at local level and peer pressure, in turn benefiting communities and individuals, for illegal catches will not be used to fuel alcohol and drug addictions.

Potential problems: An MPA system must be designed for the long term, and some initiatives take time to work, potentially testing the patience of the general public, and those stakeholders facing most restriction. **DOE must maintain the capacity to regularly review MPA progress against scientifically collected data, and management must remain flexible, to balance biodiversity conservation and long term sustainable use with legal income generation by the most impoverished in society.**

18. Pathway to poverty alleviation

Please describe how your Post Project will benefit poor people living in low-income countries. Projects are required to show how positive impact on poverty alleviation will be generated from your project in low-income countries. **All projects funded under the Darwin Initiative in Round 19 must be compliant with the Overseas Development Assistance criteria as set out by the OECD.** The outcomes of your research must at the very least provide insight into issues of importance in achieving poverty alleviation.

(Max 300 words) 300

This Post Project follows an original project for research in a UK Overseas Territory. We understand that *'Defra remains committed to funding projects relating to the UK Overseas Territories where they are not eligible for DFID funding'*, and that for this round, the Darwin Initiative *'will accept applications for post project funding from closing or very recent projects even if they do not necessarily meet all the ODA requirements of a new main round project*.'

The population of Cayman is 57,000, with a labour force of 39,000, 4% unemployment, and 55% of the population are non-nationals. The National Assessment of Living Conditions in association with the Caribbean Development Bank calculated a poverty rate of 1.9% which is low compared to other Caribbean countries. **However, analysts recognise that this oversimplifies a complex issue.** Cayman has a high cost of living compared to many Caribbean countries, **making the situation more acute for those in poverty**. High salaries in the offshore service sector drive up housing costs and many in relatively low income jobs

cannot afford to buy or rent, and leave to settle in other countries with lower living costs. **This results in migrant workers moving from poorer Caribbean nations (eg. Jamaica) to take up vacant service jobs, living in conditions considered unacceptable by local people**. Migrants often fish to supplement their diets and incomes. Incident reports indicate that they are **more likely to fish illegally, often from the shore in an MPA, or using the shortest boat journey due to the high cost of fuel, targeting conch, lobster, parrot fish and occasionally turtle**. Unfortunately, some also fish illegally to fuel drug and alcohol habits, creating greater hardship and higher rates of crime in the region. **Fishing within legal catch limits in non-protected zones will allow impoverished people to supplement their diet.**

19. Exit strategy

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

(Max 200 words) 200

The stable end point of the Post Project will be an effective MPA system which involves the public in protecting biodiversity, and allows for the sustainable use of living resources and alleviation of poverty. This will be achieved by DOE having the knowledge to deploy resources most effectively to achieve research and monitoring, enforcement and outreach activities. The Post Project will *not stop* invasive lionfish, but it will determine if the culling is the **best use of DOE resources**. The project will provide data to **inform policy on SPAG sites** and seasonal closures, and it will have monitored the effectiveness of **concessionary fishing areas between MPAs for impoverished fishers**. The project will have used **innovative tools to engage more local people** while **maximising the effectiveness of enforcement resources in a significantly larger MPA**. The Darwin Project Support Officer will have **increased the local capacity** to reach this end point, supporting DOE staff. The Darwin Fellow is Caymanian and has a full time post in DOE, and junior staff will have received **training in monitoring and survey techniques**. SOS will continue to place MSc students in DOE to undertake research on issues identified by DOE, and **international partnerships will be established**.

HIGHLY DESIRABLE

20. Raising awareness of the potential worth of biodiversity

If your Post Project contains an element of communications, knowledge sharing and/or dissemination please provide a description of your intended audience, how you intend to engage them, what the expected products/materials there will be and what you expect to achieve as a result. For example, are you expecting to directly influence policy in your host country or is your project a community advocacy project to support better management of biodiversity?

(Max 300 words) 300

Central to this Post Project is **development of an innovative and interactive communication tool which not only raises the awareness of the worth of biodiversity, but also allows a wide spectrum of people on the islands to play an active part in protecting biodiversity.** The free app will be professionally designed **by a local company with conservation projects experience**. It will interest people by offering interactive, useful and entertaining information, such as a sustainable seafood guide to aid consumer choices in supermarkets and restaurants; a pictorial identification guide to marine species, highlighting those that are protected; a capability to display a users' position in relation to MPA zones and summarise regulations that apply there (eg. catch limits); and enable anyone to report observations of marine life (eg. turtle nesting) or report suspected illegal

activities anonymously, for immediate response by Enforcement Officers. **These functions will interest consumers, educators and school children, recreational and artisanal fishers, boat captains, pilots, divers, snorkelers, beachcombers – practically anyone in and around the Cayman islands' marine environment**. Smart phones are easily carried and people of most ages are now confident in using them in most environments; they are unique in 'satisfying the moment' in querying information or reporting observations. Reports will be automatically logged onto the DOE database, and alerts sent to relevant Conservation or Enforcement Officers. **Advantages include real time logging, and empowerment of the general public to engage in marine conservation research directly, and assist enforcement in safety**. **The data generated from a wide spectrum of people in the marine environment throughout the islands will provide DOE with an important collection of spatial and temporal information for conservation and protection, which it would otherwise never be able to resource.** Conventional outreach activities, proven in the Main Project, will continue with additional support from REEF partner.

21. Importance of subject focus for this project

If your Post Project is working on an area of biodiversity or biodiversity-development linkages that has had limited attention (both in the Darwin Initiative portfolio and in conservation in general) please give details.

Research supporting the establishment of MPAs to protect biodiversity from development and exploitation is not uncommon, **but assessing the effectiveness of specific measures, such as whether to cull invasive species; whether to close multi-species SPAG sites; and whether slots in MPAs can support sustainable fishing for impoverished fishers, are all new issues addressed in this Post Project.** The project will provide the **primary data from field survey** to understand the **link between biodiversity and management actions**. The enhanced MPA system provides a **natural laboratory for such studies** because the zoning scheme allows for **rigorous controlled experiments**, due to the demarcation of enforced Marine parks, No dive zones, No-take zones, and Fishing zones (Fig 1). **The data from these studies will form a sound basis for protecting biodiversity by focussing on issues where policy and management decisions can make a difference in resource deployment and the benefits of MPAs to local people.** Impoverished fishers will benefit from being able to fish to generate income and supplement diet, **without overexploiting the sources of stocks. Other stakeholders will be actively engaged in understanding and protecting biodiversity with a familiar tool used in a novel way in marine conservation**. Further development of this tool into a tablet based field system for real-time logging, data searching and response direction by Enforcement Officers **provides a valuable new tool for direct conservation action**. Caribbean reef ecosystems are degrading rapidly, but **Cayman is now internationally recognised as a locality where resilience is evident due to sound conservation measures.**

22. Leverage

a) Secured

Provide details of all funding successfully levered (and identified in the Budget) towards the costs of the project, including any income from other public bodies, private sponsorship, donations, trusts, fees or trading activity.

Confirmed:	
DOE staff salaries (x 10)	£235,767
TNC salary / staff time	£12,881
SIO salary / staff time	£12,927
REEF salary / staff time	£7108
DOE operations	£12,319
Bangor overheads	£38,094
DOE overhead	£67,602
BB&P app development staff time	£28,880

Total	**415,578**

b) Unsecured

Provide details of any matched funding where an application has been submitted, or that you intend applying for during the course of the project. This could include matched funding from the private sector, charitable organisations or other public sector schemes.

Date applied for	Donor organisation	Amount	Comments
In preparation (For 4 additional drifters & tracking)	Guy Harvey Ocean Foundation	£7,840	*High chance of success. Guy Harvey, a resident in Cayman, is personally interested in SPAGs, and has previously collaborated with Semmens & DOE*.
It is planned to make an approach to Mr Goronwy Cleaver, an Honorary Fellow of Bangor University; former Managing Director of Kroll, Cayman Ltd, and a former Chairman and Managing Partner of Ernst & Young in the Cayman Islands. Mr Cleaver has been supportive of the University's recently formed Law School, and it is hoped that we can interest him in marine environmental law such as Marine Protected Areas, National Conservation Bill, and Marine Conservation Law of the Cayman islands, to support longer term work.			

COMPLETING YOUR PROJECTS

23. What steps have been taken to ensure that project purpose and outputs of the Main project will be achieved within the original project term?

(max 200 words) 200

The Main Project is on target for completion by end of March 2013, with 5 out of 6 objectives now complete. A request to Cabinet for permission to begin the second round of public consultation has been made. The 5th Steering Group will meet in September to finalise plans for the last phase of the project, which include presentation of the new MPA system to the public, modification of plans based on feedback, redrafting of MPA legislation where appropriate, and development of signage and MPA brochures. A final Steering Group meeting is planned for March 2013. **The sub-goal has been achieved:** *To review the effectiveness of the Marine Protected Area system of the Cayman islands in maintaining resilience of coral reefs and shallow marine ecosystems in response to direct human impact and climate change, and if appropriate, to provide the information base to extend the system to increase that effectiveness*. **Acceptance and implementation of the enhanced MPA at a level of protection between 30 and 50% should achieve the purpose:** *to ensure coastal protection for human settlements and future tourism income by enhancing the protection of coral reefs thereby allowing rehabilitation of supporting ecosystems, through increased resilience to climate change.*

24. What will be the long term benefits of the Post Project in the host country or region and how will these help to strengthen the impact and legacy of your Main Darwin project? Have you identified any potential problems to achieving these benefits?

(max 250 words) 249

The long term benefit of the Post Project is to ensure that recently identified threats and issues do not undermine the effectiveness of the new enhanced MPA developed in the Main Project. The Post Project will conclude whether culling of invasive lionfish is an effective use of DOE resources. Experimental field data will **inform policy and management decisions** on whether SPAG sites require seasonal closures to protect fish stocks, and will monitor the effectiveness of concessionary fishable areas between MPAs, **designed to provide sustainable fishing opportunities for the poorest fishers**. Further, the project will have developed an interactive tool to engage the **public in marine conservation, and assist in enforcement**. An interactive tablet tool will increase the efficiency of Enforcement Officers working a larger MPA system. **The project will have demonstrated good practice across the Caribbean region and wider.**

Potential problems are:

(1) Public turn against enhancing the MPA and we fail to secure 30-50% of the shelf protected (*low risk*);

(2) Invasive lionfish populations exceed attempts to cull them, and decimate juvenile fish populations throughout reef and associated habitats (*medium risk*);

(3) Multi-species SPAG sites become fished out during current open seasons, prior to assessment (*low - medium risk*);

(4) Impoverished fishers overexploit the fishing slots between MPAs, and target the largest fish moving between MPAs (*medium - high risk*)

(5) The proposed DOE MPA app is abused by those intending to fish illegally – by falsely reporting incidents to divert Enforcement Officers away from illegal activities! (*low risk*).

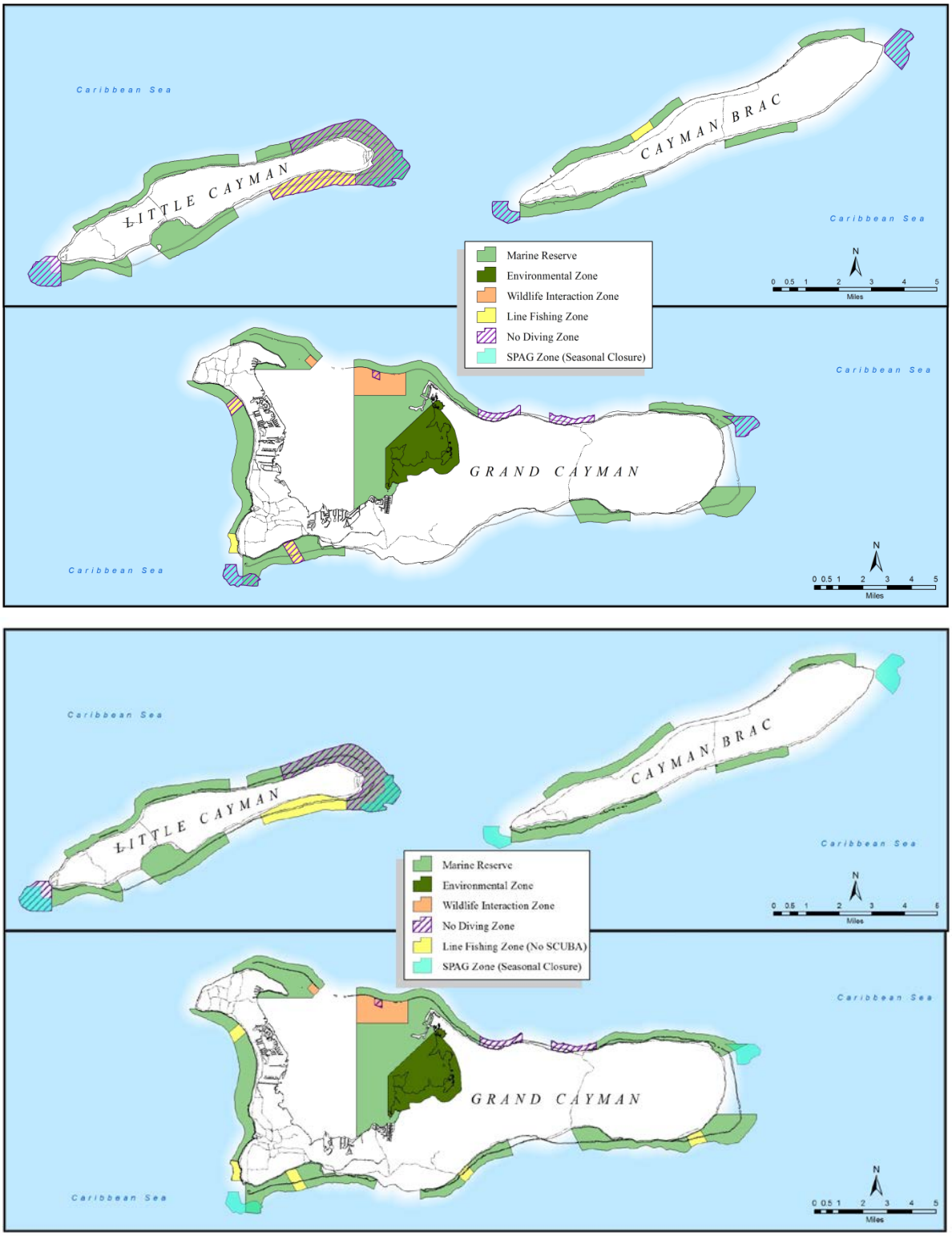

Figure 1: Maps of options under consideration for the new and enhanced Marine Protected Area System for the Cayman Islands, (covering 30-50% of the shelf) developed in the Main Project. No-Take marine reserves are in light green, and No-dive zones are hatched, known Fish spawning aggregation (SPAGs) sites for Nassau grouper are shown in blue and concessionary fishing areas in yellow and fishable areas as gaps between Marine Reserves Other zones are shown in the keys.

PROJECT MONITORING AND EVALUATION

MEASURING IMPACT OF THE POST PROJECT

25. LOGICAL FRAMEWORK

Darwin projects will be required to report against their progress towards their expected outputs and outcomes if funded. This section sets out the expected outputs and outcomes of your project, how you expect to measure progress against these and how we can verify this. Further detail is provided in Annex C of the guidance notes for Round 19 Main Project which you are encouraged to refer to. The information provided here will be transposed into a logframe should your project be successful in gaining funding from the Darwin Initiative. The use of the logframe is sometimes described in terms of the Logical Framework Approach, which is about applying clear, logical thought when seeking to tackle the complex and ever-changing challenges of poverty and need. In other words, it is about sensible planning.

Impact

The Impact is not intended to be achieved solely by the project. This is a higher-level situation that the project will contribute towards achieving. All Darwin projects are expected to contribute to poverty alleviation and sustainable use of biodiversity and its products.

(Max 100 words) 99

To maximise the resilience of reef ecosystems **by enforcing an enhanced Marine Protected Area system** (increasing No-Take area from 15% shelf to 30-50%), allowing the reef ecosystems to respond to **new threats from invasive species and continued threats from overexploitation and climate change**, thereby providing long term protection of **biodiversity, personal income, property and economic activity.** Fishing is recognised as cultural activity in Cayman, and of particular importance to **low income people**. The Post Project will build on the legacy of 25 years of Marine Parks, and **maintain Cayman as a Caribbean region and World leader in marine conservation**.

Outcome

There can only be one Outcome for the project. The Outcome should identify what will change, and who will benefit. The Outcome should refer to how the project will contribute to reducing poverty and contribute to the sustainable use/conservation of biodiversity and its products.

(Max 100 words) 100

Individuals from across Caymanian society will benefit now and in future from the enhanced MPA system and therefore **support MPA implementation and operation**. **Understanding and acceptance** of management strategies combined with **modified behaviour** will **secure the sustainable use of resources for all**, and maximise the resilience of reef ecosystems to respond to threats **from invasive species and overexploitation**, providing long term protection of **biodiversity, personal income, property and economic activity**. The Post Project outcome will secure the Main Project outcome by **addressing recently identified issues** that could undermine the enhanced MPA. Success will be demonstrated in the **Caribbean region and beyond.**

Measuring outcomes - indicators

Provide detail of what you will measure to assess your progress towards achieving this outcome. You should also be able to state what the change you expect to achieve as a result of this project i.e. the difference between the existing state and the expected end state.

Indicator 1	The efficacy of deploying resources on **culling the invasive lionfish** will be indicated by end of year 1 by **measuring significant differences in the density and avoidance behaviour** of these non-native species in culled areas compared to control zones where no culling or diving occurs in the MPA.
Indicator 2	The importance of **multi-species fish spawning aggregations (SPAG) sites to sustaining fisheries** will be indicated by **significant abundance of adult fish species other than Nassau grouper at SPAGs** at times of maximum concentration of gametes and dispersal (after full moon), compared to normal densities of adult reef fish species. **Closures will be introduced if necessary** to prevent the easy extraction of high numbers of reproductively active fish. **Consideration of fisher displacement into other areas and education regarding sustainable fishing will be made.**
Indicator 3	The **sustainability of fishing in concessionary fishing areas ('slots') between MPAs** will be indicated by the **sustained overspill of fish** from MPAs, and **evidence of catch of by impoverished fishers** using these areas as a means to supplement their diets at different times of year (summer and winter).
Indicator 4	**The interest, engagement and involvement of a wide spectrum of the public** in seeking information and reporting observations and MPA violations will be indicated by **many users submitting reports via a DOE MPA smart phone app** developed by the Post Project by the end of year 1 and evaluated in early part of year 2. **Increases in Enforcement Officer efficiency** in **safeguarding a larger MPA** will be **indicated by logging and searches completed using field digital tablets** (wifi enabled cellular iPads), displaying an advanced version of the app functions, resulting in **increased time spent in vigilance in field** and less time in the DOE office involved in administration.
Indicator 5	Findings and scientific results demonstrating the outcomes of the enhanced MPA will be **widely disseminated** continually in **local media**, and **throughout the Caribbean region** and **internationally** via regional and international conferences and peer reviewed scientific papers by the end of the project. **Cayman will continue to be recognised as a World leader** in MPAs and marine conservation.

Verifying outcomes

I**dentify the source material the Darwin Initiative (and you) can use to verify the indicators provided. These are generally recorded details such as publications, surveys, project notes, reports, tapes, videos etc.**

Indicator 1	Verified by invasive lionfish survey in at least 15 each of culled and control no-cull/no-dive MPA zones **providing primary data on lionfish density and behaviour by census data, observation, video.**
Indicator 2	Verified by primary data on **species identification, number and size of fish** at 6 SPAG sites recorded by **visual census, diver video, drop-down low light video, and tracking drifters from time and place of**

	spawning.
Indicator 3	MPA overspill into concessionary slots will be recorded by primary data on **fish species, number, size and biomass by visual census on 6 50m x 5m x 5m replicate transects at 200m intervals** across MPA boundaries at 6 slots, assessed in summer and winter**. Catch and fisher socio-economic data** will be recorded by interviews with fishers.
Indicator 4	Success of the DOE MPA app will be verified by **feedback from users, increased observations of marine life reported, and reports of violations and subsequent enforcement responses**. Success of the enforcement field iPad interactive tool will be verified by **feedback from Enforcement Officers and managers, logged data, time spent in field**.
Indicator 5	Dissemination verified at **local level** by TV broadcasts (Environment Breaks Series), DOE web/online video, already established Project Facebook page, Cayman Compass newspaper, school classroom events by DOE/REEF; at **regional level** by DOE/TNC/REEF participation in workshops and conferences (eg. Gulf & Caribbean Fisheries Institute conference), and **internationally** by DOE/SOS/SIO at International Marine Conservation Congress, Reef Conservation UK and European Reef Studies Symposium, and in 4 peer reviewed papers.

Outcome risks and important assumptions

You will need to define the important assumptions, which are critical to the realisation of the *outcome and impact* of the project. It is important at this stage to ensure that these assumptions can be monitored since if these assumptions change, it may prevent you from achieving your expected outcome. If there are more than 3 assumptions please insert a row(s).

Assumption 1	The MPA enhancement plan to increase No-Take protection from 15% to at least 30%, and preferably 50% of the shelf is implemented. (Currently awaiting Government permission for 2nd round of stakeholder and public consultation to present options). (Figure 1).
Assumption 2	Hurricanes and major bleaching events to do not destroy reef habitats at unprecedented levels and destroy MPA zones (Impact addressed in Darwin Project 14051: *In Ivan's Wake*).
Assumption 2	Invasive lionfish learn to avoid divers after experiencing culling attempts (Current Bangor MSc pilot project, 2012 suggests this is case).
Assumption 3	Multi-species SPAGs still exist and can be found at specific sites (22 species known to aggregate at Little Cayman spawning sites).
Assumption 4	Concessionary fishing areas are accepted and valued most by impoverished fishers (built into enhanced MPA design option at request of stakeholders).
Assumption 5	The concept of the app is grasped by the general public, and Enforcement Officers adapt to using the iPad tool in the field (Smart phones are ubiquitous in Cayman, and app use very popular).

Outputs

Outputs are the specific, direct deliverables of the project. These will provide the conditions necessary to achieve the Outcome. The logic of the chain from Output to Outcome therefore needs to be clear. If you have more than 3 outputs insert a row(s). It is advised to have less than 6 outputs since this level of detail can be provided at the activity level.

Output 1	DOE will have an **evidence based assessment of the response of invasive lionfish to culling**, to inform decisions on resource deployment in managing this new and serious threat. .
Output 2	**Multi-species SPAGs occur at specific sites and times, and can therefore be protected by seasonal or permanent closure to sustain fisheries**, provided that fishers are **educated** in the need for closure, **offered fishable sites**, and the **effects of displacement understood**.
Output 3	**Impoverished fishers supplement their diet by fishing in concessionary slots, without overexploiting these areas or MPA.**
Output 4	**The smart phone app increases public interest and support for the new MPA, empowering stakeholders, and increase enforcement efficiency of a larger area.**
Output 5	Findings disseminated at local, regional and international levels, and in the scientific literature **ensure that Caymanians are proud owners of their MPAs, and Cayman continues to be recognised as a regional and World leader in marine conservation, built on legacy of 25 years of marine protection**.

Measuring outputs

Provide detail of what you will measure to assess your progress towards achieving these outputs. You should also be able to state what the change you expect to achieve as a result of this project i.e. the difference between the existing state and the expected end state. You may require multiple indicators to measure each output – if you have more than 3 indicators please just insert a row(s).

Output 1: Evidence-based assessment of the response of invasive lionfish to culling	
Indicator 1	Lionfish density and behaviour surveyed in at least 15 each of culled zones and **control** no cull/no dive zones by end year 1
Indicator 2	Measured invasive lionfish density is significantly reduced by culling effort, and *not* by the species learning to hide when divers are present.
Indicator 3	Recommendation to DOE managers on resource deployment to manage invasive lionfish.
Indicator 4	Peer reviewed paper submitted on efficacy of lionfish culling.

Output 2: Protection of multi-species fish spawning aggregation (SPAG) sites	
Indicator 1	Species of fish other than Nassau grouper aggregating at 6 spawning sites around 3 islands after full moons, surveyed monthly for a year.
Indicator 2	Active multi-species SPAGs recognised by presence of large numbers and diversity of reproductively active fish species, measured by: species identified, size and number. Dispersal of gametes in water currents return to islands after approx 40 days; measured by deployment of up to 8 satellite tracked drifters.
Indicator 3	Policy recommendation on decision to close active multi-species SPAG sites to fishing; number of fishers potentially displaced and educated regarding sustainability, and fish other areas.
Indicator 4	Peer reviewed paper submitted on multi-species fish aggregation sites

Output 3: Sustainability of concessions to fishers	
Indicator 1	The size, number and biomass of 53 target fish species measured at intervals from within MPA and across 6 concessionary fishing areas into the next MPA on replicate transects at 15m depth, during winter and summer, will demonstrate sustained overspill and/or short term overexploitation. The primary data forms a basis for future long term monitoring.
Indicator 2	Legal catches, gear types and socio-economic backgrounds of fishers assessed by interview to document legal catch and to understand motivation for fishing in slots rather than fishable areas further offshore.
Indicator 3	Policy recommendations made on whether concessionary fishing slots are sustainable in short term, and assist impoverished fishers to supplement their diets
Indicator 4	Peer reviewed paper submitted on role of concessionary fishery areas adjacent to MPAs to support local community fishers

Output 4: Involving public in MPA/Increasing efficiency of enforcement	
Indicator 1	App designed and coded for different platforms of smart phone with locator function in relation to MPA zones; links to zone specific information (eg catch limits); sustainable fish consumer guide; link to identification guide of common marine species; observation and incident reporting capability logging into DOE database, and alerting Conservation/Enforcement Officers, by end year 1. Media launch with information on enhanced MPA. Feedback from users assessed and app updating protocol established.
Indicator 2	Advanced version of app developed for a waterproof housed wifi-enabled GPS cellular iPad tablet for use by 10 Enforcement Officers in field, with capability to log incidents, check database for permits granted, and log time and location. Feedback from officers and managers assessed for gains in efficiency and breadth of protection cover achieved.
Indicator 3	Enhanced interest and stewardship of marine environment by stakeholders evident in 2nd year; stakeholders furnish DOE database with reports of scientific interest, and report MPA violations. Enforcement Officers enabled to enforce a larger MPA system
Indicator 4	Peer reviewed paper submitted on use of innovative digital approach to public engagement in MPAs by end of project.

Output 5: Dissemination of results	
Indicator 1	Regular local outreach throughout project in a range of media, community and class work in schools and colleges to interest, engage and involve public by early year 2, establishing a vision for the marine environment in the future and MPA stewardship.
Indicator 2	Regional workshops (eg The Nature Conservancy reef resilience workshop) and meetings (eg Gulf and Caribbean Fisheries Institute) attended, and Cayman Island MPA outcome demonstrated to other Caribbean nations by end project.
Indicator 3	International symposia attended (International Marine Conservation Conference, European Coral Reef Studies Symposium) and scientific evidence supporting Cayman MPA issues reported by end of project,

	demonstrating Cayman as a world leader in marine conservation initiatives
Indicator 4	4 Peer review papers submitted in high impact international journals

Verifying outputs

Identify the source material the Darwin Initiative (and you) can use to verify the indicators provided. These are generally recorded details such as publications, surveys, project notes, reports, tapes, videos etc.

Indicator 1.1	Primary data from time-search surveys & video in cull zones and control no-cull/no dive MPA zones at 15 sites each
Indicator 1.2	Primary data from surveys, video as above
Indicator 1.3	Recommendation considered, DOE resource deployment changed
Indicator 1.4	Publication in peer review journal
Indicator 2.1	Monthly point visual census in water surveys over one year at 6 SPAGS
Indicator 2.2	Primary data from diver point visual census, diver operated video, low-light drop down video, tracks of dispersal recorded by 8 drifters from main aggregations
Indicator 2.3	Recommendation considered, active sites closed, fishers consulted
Indicator 2.4	Publication in peer review journal
Indicator 3.1	Primary data from in water surveys along replicate transects at 6 concessionary fishing area in winter and summer
Indicator 3.2	Socio-economic questionnaire/interviews with fishers
Indicator 3.3	Recommendation considered on efficacy of slots short term
Indicator 3.4	Publication in peer review journal
Indicator 4.1	Specification, design and coded Smart phone app & database
Indicator 4.2	Specification, design and coded iPad field tablet & database
Indicator 4.3	Database, logs, feedback reports
Indicator 4.4	Publication in peer reviewed journal
Indicator 5.1	Media: TV, radio, online (web, video, Facebook), newspaper reports, events, in classroom, unpublished MSc theses
Indicator 5.2	Regional workshop and meeting reports, presentations on web
Indicator 5.3	International conference proceedings, presentations on web
Indicator 5.4	Publications in peer review journals

Output risks and important assumptions

You will need to define the important assumptions, which are critical to the realisation of the achievement of your outputs. It is important at this stage to ensure that these assumptions can be monitored since if these assumptions change, it may prevent you from achieving your expected outcome. If there are more than 3 assumptions please insert a row(s).

Assumption 1	Public support enhancement of the MPA to secure 30-50% of the shelf protection
Assumption 2	Invasive lionfish populations do not exceed attempts to cull them, and do

	not decimate juvenile fish populations throughout reef and associated habitats
Assumption 3	Multi-species SPAG sites are not fished out during current open seasons, prior to assessment
Assumption 4	Impoverished fishers do not overexploit the fishing areas between MPAs in the short term, and do not target the largest fish moving between MPAs
Assumption 5	The app is not abused by those intending to fish illegally – by falsely reporting incidents to divert Enforcement Officers away from illegal activities

Activities

Define the tasks to be undertaken by the research team to produce the outputs. Activities should be designed in a way that their completion should be sufficient and indicators should not be necessary. Any risks and assumptions should also be taken into account during project design.

Output 1: Evidence-based assessment of the response of invasive lionfish to culling (DOE/SOS/REEF)	
Activity 1.1	Steering Group meeting and field survey detailed planning
Activity 1.2	Timed-search surveys of lionfish abundance and behaviour in at least 15 each culled and control non-culled/no dive zones around 3 islands at different times of day/dusk
Activity 1.3	Recommendations on efficacy of culling and resource deployment

Output 2: Protection of multi-species fish spawning aggregation (SPAG) sites (DOE/SIO/REEF/TNC/SOS)	
Activity 2.1	Point visual census survey at 6 SPAG sites around 3 islands, monthly after full moon, to record species, abundance, size, and use 8 drifters to track larval dispersal
Activity 2.2	Recommendations on need to close aggregation sites on spatial/temporal/permanent basis
Activity 2.3	Mitigate displacement (identify fishable sites) and educate fishers on sustainability

Output 3: Sustainability of concessions to fishers (DOE/SOS/TNC)	
Activity 3.1	Survey fish biomass amongst 53 target species at 6 fishable areas at 200m intervals between MPAs, in summer and winter, using 6 replicate 50 m x 5m x 5m transects at 15m depth at each site
Activity 3.2	Assess overspill and territoriality of fish at functional group and species level
Activity 3.3	Interview/questionnaire survey of fishers method, catch, & socio-economic background
Activity 3.4	Recommendations on efficacy and management of concessions

Output 4: Involving public in MPA/Increasing efficiency of enforcement (DOE/SOS)	
Activity 4.1	Specification of app requirements

Activity 4.2	Development of digital interface and codes
Activity 4.3	Development of DOE database
Activity 4.4	Launch of DOE MPA App in public domain, and assessment of interest and effect on assisting enforcement
Activity 4.5	Development and trial of wifi-enabled GPS cellular iPad interactive field tool for Enforcement Officers

Output 5: Dissemination of results (DOE/SOS/TNC/SIO/REEF)	
Activity 5.1	Modify policy and MPA design
Activity 5.2	School and community visits, media broadcasts
Activity 5.3	Present results at regional (Caribbean) and international coral reef, conservation and management conferences
Activity 5.4	Publish scientific papers in high impact international journals

This space intentionally left blank (project implementation timetable overleaf)

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

	Activity	No of Months (18)	Year 1				Year 2				Year 3			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
0.0	Steering Group Meetings, Marine Conservation Board Review, Darwin Initiative reporting, progress and evaluation	0.5	▪		▪		▪	▪						
Output 1	**Evidence-based assessment of the response of invasive lionfish to culling**													
1.1	Detailed planning of field surveys	0.25	▪											
1.2	Field survey lionfish in culled and control zones by day/dusk	1		▪	▪	▪	▪							
1.3	Make recommendations on efficacy of culling	0.25						▪						
Output 2	**Protection of multispecies SPA sites**													
2.1	Monthly field surveys of 6 SPAGs and track larval dispersal	2		▪	▪	▪	▪							
2.2	Recommendations on SPAG site closure on spatial/temporal/permanent basis	0.5						▪						
2.3	Mitigate displacement and educate fishers	0.5						▪						
Output 3	**Sustainability of concessions to fishers**													
3.1	Field survey 53 target fish in 6 fishable area slots between MPAs, in summer and winter	1.5		▪		▪								
3.2	Assess overspill and territoriality of species and functional groups	0.25			▪		▪							
3.3	Field survey fishers method, catch, & socio-economic background	0.5		▪		▪								
3.4	Recommendations on efficacy and management of concessions	0.25					▪	▪						
Output 4	**Involving public in MPA/Increasing efficiency of enforcement**													
4.1	Specification of app requirements	0.5	▪											
4.2	Development of digital interface and codes	2		▪										
4.3	Development of DOE database	1			▪									
4.4	Launch of DOE MPA App in public domain, and assessment of interest and effect on assisting enforcement	0.5				▪	▪	▪						

	Activity	No of Months (18)	Year 1				Year 2				Year 3			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4.5	Development and trial of Enforcement Officer field tablet	2			▪	▪								
Output 5	**Dissemination of results**													
5.1	Modify policy and MPA design	0.5					▪	▪						
5.2	School and community visits, Media broadcasts,	1	▪	▪	▪	▪	▪	▪						
5.3	Present results at regional (Caribbean) and international coral reef, conservation and management conferences	0.5			▪			▪						
5.4	Publish scientific papers in high impact international journals	2.5+ after					▪	▪						

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27. Project based monitoring and evaluation

Describe, referring to the Indicators above, how the progress of the project will be monitored and evaluated, making reference to who is responsible for the projects monitoring and evaluation. Darwin Initiative projects are expected to be adaptive and you should detail how the monitoring and evaluation will feed into the delivery of the project including its management. Monitoring and evaluation is expected to be built into the project and not an 'add' on. It is as important to measure for negative impacts as it is for positive impact.

The Post Project will follow **proven management model of the Main Project**, being managed by a Steering Group meeting biannually to plan broad level, evaluate progress, and agree recommendations on policy and MPA management: (Turner: Bangor,PI; Ebanks-Petrie: DOE Director, co-PI and Chair; Austin DOE Deputy/Research Director, Co-PI; McCoy: DOE Field research lead; Orr: DOE Chief Enforcement Officer; Byrne: Marine Science Manager, The Nature Conservancy, Co-I; Semmens, Scripps Institute of Oceanography, Co-I; Pattengill: Science Director REEF, Co-I; supported by Project Support Officer (PSO)).

Quarterly financial monitoring provided by Bangor University Finance Office. Annual evaluation by: Marine Conservation Board, who represent stakeholders in Cayman; Bangor Research and Innovation Office; Darwin Initiative reporting and peer review.

Project involves intensive period of 12 months primary data gathering and collation (Yr1-Q2 to Yr2-Q1), followed by period of analysis, policy formulation and recommendation (Yr2-Q2). Activities con-current rather than sequential, involving different teams. **Careful scheduling, with flexible provision** for bad weather, equipment or personnel downtime required (Yr1-Q1 and throughout).

Planning on weekly level undertaken at DOE research meetings lead by Austin, and on daily level by McCoy and PSO. Bi-weekly/often daily Skype meetings between Turner and McCoy/PSO, when Turner not in Cayman.

Each activity will begin with **intense period of planning, training, and evaluation** with the full team. Activities then run under direct management of McCoy with nominated *DOE personnel* (below), supported by PSO. Periods of intense study and supplementary investigation will involve Bangor postgraduate research supervised by Turner & McCoy; a **model proven successful** during the Main Project.

Output 1: Evidence-based assessment of response of invasive lionfish: surveys at rate of 2 days per week in culled and control zones across islands. Activity planned by *Johnson* with Pattengill of REEF, and involve *Gibb* & *Chin*.

Output 2: Protection of a multispecies SPAG sites: surveys at all sites initially, but probably focus on known active sites on Little Cayman. Surveys monthly in week after full-moon, and require experienced team due to conditions. Activity planned by Semmens (SIO) and involve *McCoy*, *Bush*, and *Gibb*.

Output 3: Sustainability of concessions to fishers: surveys taking 5 days per 'slot' site at 6 sites across 3 islands, together with fisher interviews. These surveys will be repeated in winter and summer. Lead by *McCoy*, involving *Blumenthal* and *Chin*.

Output 4: Involving public in MPA / Increasing efficiency of enforcement: continuously throughout Yr1, lead by Turner (Bangor), involving Worley (Bangor IT), *Olynik* (GIS & database), *Bothwell* & *Blumenthal* (public engagement) and *Orr* (enforcement). Team will specify app requirements in Yr1Q1 and BB&P will develop app in Q2-3 with implementation by Worley and *Olynik*, and evaluation in Yr2Q1-2.

Output 5: Dissemination of results: Bryne (TNC), *Ebanks-Petrie* and *Austin* will lead policy recommendations and MPA management implications supported by Turner (Bangor), Semmens (SIO), Pattengill (REEF), *McCoy and Bothwell*

Pattengill (REEF) and *Bothwell* will lead outreach, supported by *Blumenthal* and PSO.

Byrne (TNC) and *McCoy* will present at regional/Caribbean meetings, and Turner (Bangor), Semmens (SIO), *McCoy* & *Austin* at international meetings; **scientific publications will be collaborative.**

FUNDING AND BUDGET

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

NB: Please state all costs by financial year (1 April to 31 March) and in GBP. **Budgets submitted in other currencies will not be accepted.** Use current prices – and include anticipated inflation, as appropriate, up to 3% per annum. The Darwin Initiative cannot agree any increase in grants once awarded.

28. Value for Money

Please explain how you worked out your budget and how you will provide value for money through managing a cost effective and efficient project. You should also discuss any significant assumptions you have made when working out your budget.

(max 300 words) 300

The budget is based on realistic costs and efficiencies based upon our experience during the Main Project. This Post Project is an intensive field study across 3 islands in Cayman, by DOE assisted by international partners providing expertise, and the major costs are in travel (international flights, and regular local flights to the two smaller islands from Grand Cayman), subsistence and operating costs (boat and diving operations are expensive due to fuel, and minimum team size due to safety). Most expenditure is incurred by DOE in supporting field activities. DOE visits to sister islands cost less than full team visits, because staff can stay in DOE accommodation rather than tourist hotel accommodation. Subsistence rates used are local rates for government staff.

The host country organisation receives 38% of funding in yr1 and 24% in yr2 (but ratios do not include major cost (27%) of **Project Support Officer salary (a directly-incurred cost at Bangor University but post embedded fulltime in DOE Cayman to increase local capacity)**. **The Darwin funding is 31% of the total project cost, due to significant confirmed (98%) additional funding.** Latter includes partner salaries and overheads, part of operations costs (boat and diving preparation and maintenance), and a large proportion of Bangor overheads. Development of the interactive and digital app is being undertaken by BB&P, an integrated services company based in Grand Cayman, and they are providing significant staff time free of charge to do this (value £28,880). Additional funds are being sought for 4 more drifters and costs of satellite tracking from the Guy Harvey Ocean Foundation (http://www.guyharveyoceanfoundation.org/index.html).

Local costs will be managed by DOE according to **Cayman Islands government policy**, and claimed on a quarterly basis from Bangor University against invoices/receipts. Bangor Finance Office will manage and monitor the grant according to **strict financial regulations** (http://www.bangor.ac.uk/finance/pl/default.php.en).

29. What was the amount of funding for the Main Darwin Project?

	Total Project Costs £
Amount of Main Darwin Initiative project funding	273,914
+ Funding/Income from other sources	783,081
= Total Main project cost	1,056,995

FCO NOTIFICATIONS

Please check the box if you think that there are sensitivities that the Foreign and Commonwealth Office will need to be aware of should they want to publicise the project's success in the Darwin competition in the host country. ☐

Please indicate whether you have contacted the local UK embassy or High Commission directly to discuss security issues (see Guidance Notes) and attach details of any advice you have received from them.

Yes (no written advice) √☐ **Yes, advice attached** ☐ **No** ☐

CERTIFICATION 2013/14

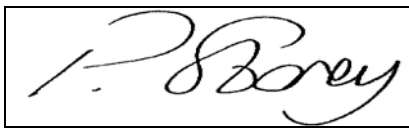
On behalf of the company of Bangor University

I apply for a grant of £190,000 in respect of **all expenditure** to be incurred during the lifetime of this project based on the activities and dates specified in the above application.

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

I enclose CVs for project principals and letters of support. Our last two audited /independently verified accounts and annual report can be found at: http://www.bangor.ac.uk/finance/bu/aa/default.php.en:

Name (block capitals)	Paul Storey
Position in the organisation	Accountant

Signed  **Date:** 20 August 2012

Post Project Application - Checklist for submission

	Check
Have you provided **actual start and end dates** for your Post Project?	√
Have you provided your **budget based on UK government financial years** i.e. 1 April – 31 March and in GBP?	√
Have you checked that **your budget is complete**, correctly adds up and that you have included the correct final total on the top page of the application?	√
Has **your application been signed** by a suitably authorised individual? (clear electronic or scanned signatures are acceptable)	√
Have you **included a 1 page CV for all the Principals** identified at Question 8?	√
Have you **included a letter of support from the main partner(s) organisations** identified at Question 9?	√
Have you checked with the FCO in the project country/ies and have you included any evidence of this?	√
Have you included a **copy of the last 2 years annual report and accounts** for the lead organisation? An electronic link to a website is acceptable.	√
Have you **read the Guidance Notes**?	√
Have you **checked the Darwin website** immediately prior to submission to ensure there are no late updates?	√

Once you have answered the questions above, please submit the application, not later than midnight GMT on Monday 20 August 2012 to Darwin-Applications@ltsi.co.uk using the first few words of the project title **as the subject of your email**. If you are e-mailing supporting documentation separately please include in the subject line an indication of the number of e-mails you are sending (eg whether the e-mail is 1 of 2, 2 of 3 etc). You are not required to send a hard copy.

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