

Darwin Initiative – Final Report

(To be completed with reference to the Reporting Guidance Notes for Project Leaders
(<http://darwin.defra.gov.uk/resources/reporting/>) -

it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)

Darwin project information

Project Reference	EIDPO027
Project Title	Reducing the impact of feral livestock in and around the Centre Hills
Host country(ies)	Montserrat, UK
UK Contract Holder Institution	Royal Society for the Protection of Birds (RSPB)
UK Partner Institution(s)	Food and Environment Research Agency (FERA)
Host Country Partner Institution(s)	Montserrat Department of Environment (DOE), Montserrat Department of Agriculture (DOA)
Darwin Grant Value	£144,236
Start/End dates of Project	1 st April 2009 – 31 March 2011
Project Leader Name	James Millett
Project Website	
Report Author(s) and date	Jeff Dawson, James Millett, Gerard Gray

1 Project Background

The Centre Hills of Montserrat are of global biodiversity importance, supporting many of the island's endemic species and provide environmental services, being the sole water catchment on Montserrat; providing protection from soil erosion, landslides and flooding and are an important nature tourism asset. Darwin Initiative project (Ref. 14-027) identified the threat of feral livestock on the Centre Hills and reducing their impact as a priority action. This project has developed a stakeholder led Feral Animal Action Plan; implemented control measures and monitored the effectiveness of these measures; trained DOE and DOA staff in monitoring techniques, the safe use of firearms and hunting; implemented measures to improve the management of farmed livestock.

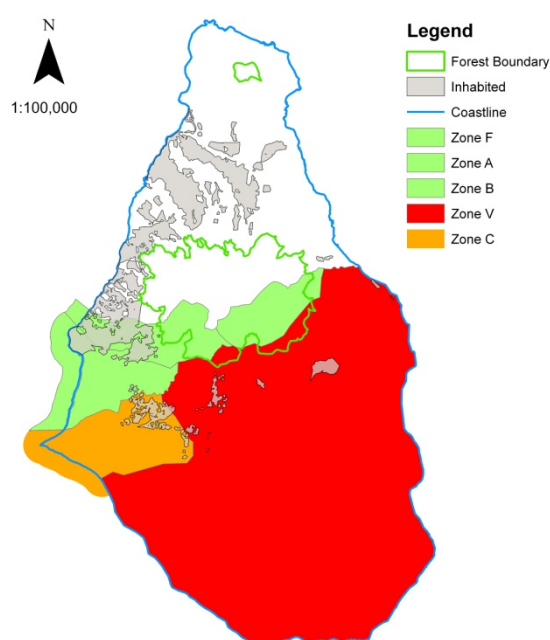


Figure 1 Map of Montserrat. Zones A, B, C, F and V are the land exclusion zone boundaries as set by Montserrat Volcano Observatory (MVO) and their current status. Green = unrestricted access; Orange = controlled daytime (08:00 – 17:00) access; Red = no access except for essential workers. The inhabited areas to the south located in Zones C and V are abandoned settlements and not inhabited.

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

The Defra Focal Point has been kept abreast of project developments and a key partner on the project is a part of the Defra family. The project did contribute to CBD target area, although Montserrat is not a signatory to the CBD. For estimated contributions to articles of the CBD please refer to Annex 3 of this report. Actions to control invasive alien species are a 'cross-cutting issue' of the CBD and Island Biodiversity is one of the seven thematic work programmes. Within this work programme the project particularly helped deliver the following goals:

Goal 1: Conservation of Island Biodiversity

Information on feral livestock distribution and density in and around the Centre Hills was collected using a network of infra-red game cameras. Started in July 2009 this information gave an indication of feral livestock numbers and activity, which helped guide the development of the Feral Animal Action Plan (FAAP) and appropriate control measures. Analysis of the data allowed the effectiveness of those control measures to be assessed and reviewed.

Information was also collated on farmed loose livestock throughout the course of the project from animal pound records, crop damage records and a series of livestock transects. The information collected by the project provides a very useful baseline against which management options for both feral and farmed loose livestock can be measured and assessed into the future. Ultimately this will aid Montserrat in reducing the impact of feral livestock on the Centre Hills helping conserve this area of global biodiversity importance.

Goal 3: Address the Threats to Island Biological Diversity

Feral and loose livestock (pigs, goats and cattle) had been identified as a threat during the original Darwin project. Assessment of public opinion showed 90% supported their removal if they were harming the environment. A stakeholder workshop carried out in February 2010 assessed various control and exclusion options resulting in the development of a FAAP. Ground hunting using firearms was agreed to be the most appropriate method of control for feral livestock. This would be done in association with measures to improve the management of farmed livestock thereby reducing the number of loose livestock and their recruitment to feral populations.

A Government led hunting programme was initiated in May 2010 and carried out during the remainder of the project period. Its effectiveness was assessed and subsequently reviewed at another stakeholder workshop in March 2011 along with the overall FAAP.

Changes to the legislation regarding the rearing of livestock have been recommended and are currently under review. Once in place these will aid an island wide tagging and registration scheme. Demonstration farms and associated tech-packs have been produced to show and train livestock farmers in semi-intensive rearing methods for sheep and goats.

Goal 5: Increasing capacities and financing for the implementation of the programme of work on island biodiversity

Staffs from the DOE and DOA have received training in various monitoring techniques including game cameras. Ten DOE and DOA staff have also received training in the safe use of firearms for the purposes of culling feral livestock from a qualified UK instructor. The training and skills developed by the local Montserrat hunting teams over the project course makes them suitable to act as trainers for other islands in the Caribbean region increasing the regional capacity in feral livestock control. The project has also increased the capacity locally through the procurement of equipment, including rifles which will increase the efficiency and effectiveness of the control programme.

The project also contributed to 2010 biodiversity targets, in particular, Goal 6 Control threats from invasive alien species specifically Sub-Target 6.2 Management plans in place for major alien species that threaten ecosystems, habitats or species and Goal 8 Maintain capacity of ecosystems to deliver goods and services and support livelihoods Sub-Target 8.1 Capacity of ecosystems to deliver goods and services maintained.

The project also contributed to Caribbean and UKOTs environmental commitments including:

Montserrat Environment Charter

Guiding Principle 7 seeks *“To safeguard and restore native species, habitat and landscape features, and control or eradicate invasive species”*. The Montserrat Government’s commitment to this is to *“Ensure the protection and restoration of key habitats, species and landscape features through legislation and appropriate management structures and mechanisms, including a protected areas policy, and attempt the control and eradication of invasive species”*. In turn, the UK has a commitment to *“Help build capacity to support and implement integrated environmental management which is consistent with Montserrat’s own plans for sustainable development”*.

St. George’s Declaration

Montserrat is a Member State of the St. George’s Declaration of Principles for Environmental Sustainability in the Organisation of Eastern Caribbean States (OECS), in which Principle 13 seeks to *“protect and conserve biological diversity”*. Member States are committed to *“developing, adopting and monitoring the implementation of comprehensive national policies and strategies...addressing the following sectors or issues: biodiversity protection;...protected area management”*, and, *“identifying and committing resources to strategies based on regionally acceptable standards and best practices and national targets, to:...reverse the reduction in extent of key ecosystems, including...forests; halt the loss of biological species”*. In order to work towards these goals and targets, Member States agree to implement actions to *“...eradicate or control the pathways of those [invasive alien organisms] which have been introduced or escaped”*.

Other Action Plans

Invasive species control is a key action in:

- the Centre Hills Management Plan for 2008–2010 (*“Action 2.3: Develop and implement a protocol for management of invasive species”*)
- the Montserrat Oriole SAP for 2010–2014 (*“Action 1.1: Control feral livestock”*)
- the Mountain Chicken SAP for 2007–2012 (*“Objective 3: Ensure that the impacts of Invasive Alien Species (IAS) do not prevent an increase in the mountain chicken population”* and *“Objective 4: reduce the impacts of habitat loss and habitat degradation on the mountain chicken population”*).

3 Project Partnerships

The RSPB was the lead UK institution. The RSPB is a part of the Birdlife International Network of NGOs in over 100 countries has been working in the UKOTs for over 15 years and supports a range of partners in the UKOTs to implement actions that contribute to territory, regional or international biodiversity and sustainable development targets. The Project has built on pre-existing partnerships between UK institutions and Montserrat based institutions, and developed new partnerships to draw on specialist expertise to meet the project requirements. The core project partner in Montserrat is the Ministry of Agriculture, Land, Housing and the Environment (MALHE) primarily Departments of Environment (DOE) and Agriculture (DOA) and in the UK the Food and Environment Research Agency (FERA). This partnership was formalised for this project by the signing of a Memorandum of Collaboration in 2009. Roles within the project are summarised as:

- The RSPB and has been working with partners in Montserrat since 1997. The RSPB was the project management unit for the project, coordinating over all activities and leading on reporting and budget management. RSPB staff provided management and training, guided a number of processes, supported further fundraising and provided co-finance for the project. The RSPB enhanced its capacity to support work in Montserrat and more widely in the UKOTs with the creation of a new position, a Partner Development Officer with a focus on the Caribbean OTs in 2009.
- DOE was the lead agency for the implementation of the project activities in Montserrat. This includes data collection, stakeholder engagement, public out reach and

implementing the agreed feral livestock control measures. DOE staff received training in the various monitoring techniques as well as in the use of firearms alongside DOA colleagues.

- DOA is the agency responsible for the provision of agricultural services, including crop and livestock, fisheries, agricultural policy guidance, legislative advice and compliance. During the first year of the project DOA played an important role in providing information and guidance on loose livestock (i.e. owned, free range livestock, not truly wild feral livestock) and veterinary advice. In the second year of the project DOA were responsible for the implementation of actions to strengthen policies on livestock management.
- FERA is the UK's lead agency on the management of non-native species with specific expertise and experience on research and management of feral pig populations. FERA led on the technical and scientific development of the project, including the development of monitoring systems, advising on control methodologies, the provision of training in the hunting of feral animals, statistical analysis of data, development of the feral livestock manual and the presentation of findings at international fora.

The roles of the partners were clearly laid out in the Memorandum. Each partner was able to contribute to the project using particular institutional strengths, i.e. project management, technical expertise and the UK institutions have been able to support the delivery results by the Montserratian partners.

A limited number of challenges arose during the project period all of which were successfully met. The first was that it was not possible to recruit a local project coordinator as initially envisaged, due to the small population size in Montserrat and the situation that staff with skills were already fully committed. A suitable candidate was identified by FERA who was employed from September 2009 to August 2010, with a subsequent project coordinator recruited by the project partners to oversee the project until the end.

The second was in ensuring hunting effort was sufficient to assess the effectiveness of control actions before the end of the project. Although DOE and DOA staff members had received firearms training in March 2010, a combination of a slow licensing process, staff availability and bad weather resulted in a lower than planned hunting effort. Consultation amongst the project partners concluded that the best solution was to bring in an external hunter to come and carry out hunting activities alongside local staff. Contact was made with Island Conservation (IC) who are active in the Caribbean Region and they agreed to assist and supplied the time of an experienced hunter who could come to Montserrat for a period of five weeks. This extra help proved invaluable to the project allowing a substantial hunting effort to be made prior to the hunting cessation period in January 2011.

Alongside the project partners effective working partnerships were developed with a number of other in-country institutions particularly during the implementation of the hunting programme. A number of trips were carried out in areas of the exclusion zone for which prior permission had to be obtained from the Montserrat Volcano Observatory (MVO), the Royal Montserrat Police Force (RMPF) and Disaster Management Coordination Agency (DMCA). Good relations were established between the project and these organisations which greatly smoothed the operational running of the hunting programme.

MVO provided clear and important advice on safe areas particularly during and after the volcanic activity of late 2009 and early 2010. Continuing from this the MVO gave permission to the DOE to enter Zone C and certain parts of Zone V in order to carry out culling activities. In addition they provided useful anecdotal evidence of feral livestock activity and numbers to the project coordinator from within exclusion zone areas that the project team were not able to access.

The RMPF provided invaluable assistance in facilitating the use of firearms for the project and with regard importing firearms into Montserrat, both for the contractor from IC and for the rifles and associated equipment purchased by the project for Government use.

Montserrat Utilities Limited (MUL) water division assisted with monitoring of feral livestock during their monthly spring checks.

A wider stakeholder group was been engaged through the project, in particular through the action planning process and project review. This included the Montserrat National Trust, a range of other Government Agencies including the Governor's Office, landowners, hunters and the farming community.

Communications and project management was undertaken through a variety of media with the Project Coordinator being the focal point. Contact with the UK partners was kept via almost daily email exchanges and regular (every 1 – 2 weeks) phone contacts. In addition weekly updates and monthly reports were submitted to all project partners. Monthly phone meetings were implemented except where visits to Montserrat by UK based staff made these unnecessary. Six visits to Montserrat were made over the course of the project by the UK partners:

- July 2009 for the start of the project (1x RSPB; 2x FERA staff),
- December 2009 to induce the new Project Leader to the project (2x RSPB),
- February 2010 to support the feral animal action planning workshop (1x RSPB; 2x FERA staff)
- March 2010 for firearms training (1x FERA staff).
- September 2010 (1x RSPB staff)
- March 2011 for the final workshop and review (1x RSPB; 2x FERA staff)

Locally a project steering group was established to review activities and advise the project implementers.

Other Collaboration:

The project has collaborated with an initiative in Anguilla to restore Dog Island by the removal of rats and feral goats, the Project Coordinator and a feral animal management specialist from FERA visited Anguilla in 2010 and undertook a feasibility study for the goat removal.

Partnerships Post Project

The RSPB is committed to continue to support partners in Montserrat and will fund or partially fund a project officer to support partners in Montserrat deliver conservation objectives (arrangements to be finalised). FERA will continue to provide technical advice under a follow up project.

4 Project Achievements

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

The project aimed to have a positive impact on an internationally important site for biodiversity through reducing the numbers of feral livestock.

The project has established an effective and sustainable management programme that will contribute to biodiversity conservation through reduced feral livestock populations, reduce conflicts between livestock farming and biodiversity management and to livelihoods through improved farming practices.

The Feral Animal Action Plan 2010 -15 has been agreed by the Government of Montserrat and this has been mainstreamed: actions have been adopted by GOM and additional funding has been secured to support feral animal control measures and expand the animal husbandry improvement programme. These actions are highly complementary to other ongoing plans, including the Species Action Plans for the Montserrat Oriole, Mountain Chicken and Montserrat Galliwasp and the Management Plan for the Montserrat Centre Hills.

4.2 Outcomes: achievement of the project purpose and outcomes

The project has achieved its purpose to establish a sustainable, locally managed programme to minimise the destructive impacts of feral livestock on the Centre Hills. The Government hunting programme is led by local fully trained firearm handlers with the assistance of local hunters.

Equipment purchased through the project will increase the efficiency of the hunting teams in carrying out their work.

The project has developed a locally agreed feral animal action plan with the involvement of a cross section of Montserratian stakeholders including Government, landowners, livestock owners, farmers and hunters. The importance of stakeholder involvement was highlighted in the previous Darwin Project (14-027) and having a locally agreed action plan is vital for the continued implementation and success of the project.

The FAAP was drafted in March 2010 and reviewed in February 2011 following a year of pilot control measures and the testing of the effectiveness of proposed actions. This Action plan has been adopted by the Government of Montserrat and the actions are included in the Departmental Business Plans. Further funding has been secured for the period 2011 – 13 from OTEP which will support control measures implementation and ensure that animal husbandry measures are co-financed

In terms of outcomes the main one is the development of a highly valuable best practice model for the management of loose and feral livestock in the Caribbean region which can be shared with other islands. The capacity now existing in Montserrat in terms of skilled and trained personnel who can act as trainers for others within the region. The hiring out of the Montserrat team is also a potential avenue for funds to help support the continued hunting programme within Montserrat.

4.3 Outputs (and activities)

The project has successfully achieved all outputs.

Output 1. Knowledge of existing feral livestock in and around the Centre Hills boundary is increased

The network of game cameras has been a big success in determining the distribution, activity and density index of feral livestock in and around the Centre Hills. Cameras were established at 33 locations over the course of the project (see Figure 2). Ten of these locations became inaccessible following volcanic activity (resulting in the cameras being destroyed) whilst another two had cameras stolen from them. Over the course of the project the game cameras were active for almost 8,000 camera days which was about 75% of the total time they were in the field and recorded 1,499 livestock visits.

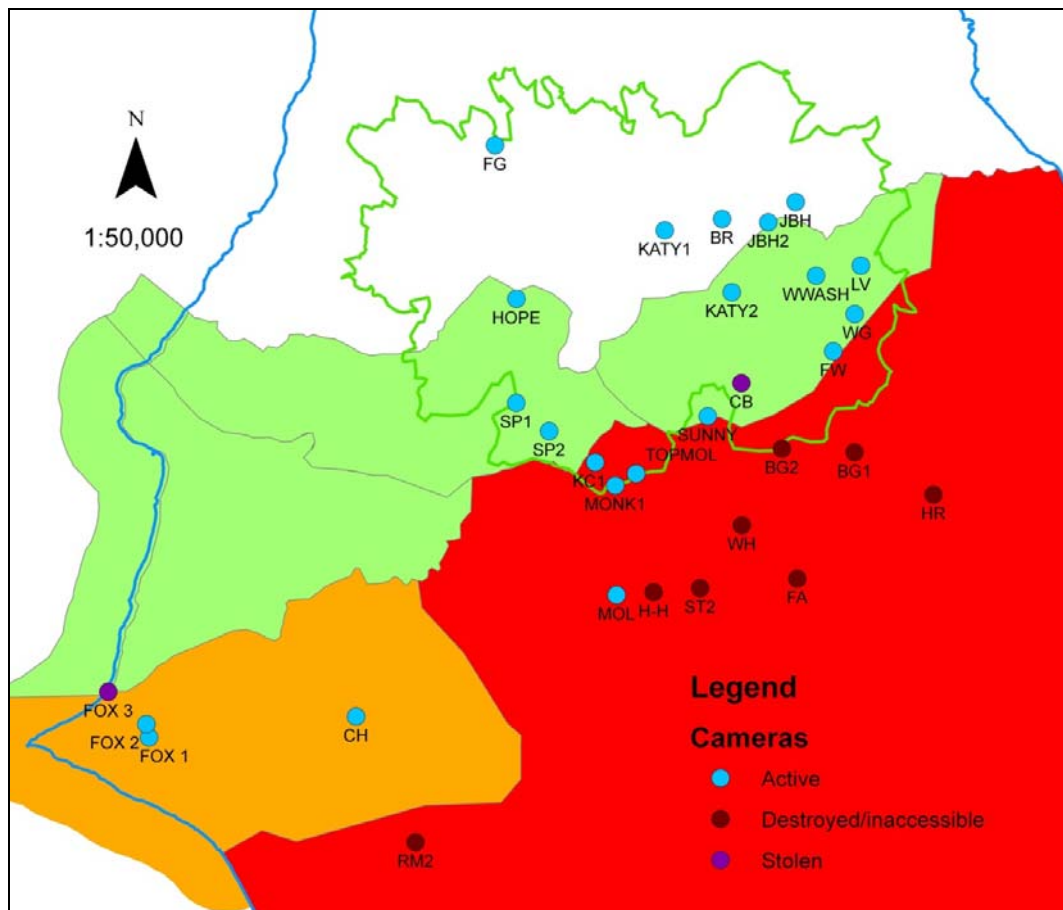


Figure 2. Map showing camera locations. Two cameras not shown are RM1 located next to RM2 and ST1 located near ST2. Both were destroyed by volcanic activity.

Prior to the project starting it was assumed that feral pigs were the most numerous feral livestock species. However, analysis of the preliminary camera data showed feral cattle to be a much bigger issue than previously thought especially in areas just south of the Centre Hills. Information gained from the camera network identified areas to be targeted during the hunting programme and enabled the effectiveness of the hunting programme to be assessed. In addition it provides a very useful baseline for future monitoring of feral livestock numbers. All data has been assimilated into GIS maps and a summary of the results of the camera monitoring were presented at both the February 2010 and March 2011 workshops.

The cameras, designed primarily for use in North America have suffered over the course of the project as a result of the climate and humidity on Montserrat. This mainly resulted in damage to the LCD displays which can be replaced in country but occasionally there were more serious electronic failures, increasing towards the end of the project. This however has not been a problem as the company Moultrie Feeders in the USA, have supplied the project with free replacement LCD screens as well as repairing or replacing broken cameras free of charge.

The Boar Operated System (BOS) was established in eight locations to identify pig group size and reproductive size. BOS is a targeted feeding system developed by FERA in the UK and has been used successfully in a number of locations in Europe. This was the first time that BOS had been tried in the tropics but was discontinued in early 2010 due to low visitation rates. This may have been due to a number of reasons. Firstly it may be that there is simply enough natural food available meaning that pigs are not attracted to the BOS. Secondly the bait used was unattractive to pigs although a couple of different baits were trialed. As feral pigs in Montserrat are very wary of people they may have avoided the BOS due to the human presence associated with them. It may also have been due to the BOS not being found by pigs although this is unlikely as cameras placed at the BOS sites still recorded pigs. It should also be noted that five of the eight BOS were also located in areas destroyed by pyroclastic flows.

Further to this, quantitative data on the loose livestock situation has been extremely informative. Feral populations are likely to be augmented by loose livestock and so monitoring loose livestock is key to the project goals. A series of livestock transects have been carried out

by car along the main road of the island recording numbers and rearing method of livestock (See section 4.3 Output 4). Collation of this data along with that from the animal pound and crop damage has enabled the project to establish a baseline by which any drives towards improved husbandry can be measured. Information on feral livestock has also been collected by water authority personnel during their monthly spring surveys. Between September 2009 and December 2010 these surveys found no evidence of livestock near the springs. Although training was given to water authority staff in October 2010 it may be that further training is required as it is not clear whether they are only recording animals seen rather than other signs such as tracks and scat.

Mapping of agricultural areas around the boundary of the Centre Hills was initiated in 2009 and carried on in 2010 using hand held GPS units. Mapping with the hand held units was not fully completed due to restrictions imposed by the volcano. The aerial photography is to be used to fully remap all land use areas on Montserrat, including agricultural areas. A delay in obtaining the aerial photography (it was finally obtained in February 2011) has meant all agriculture areas have not been mapped at EOP.

Output 2. Technical expertise is enhanced and new skills developed in the monitoring and control of feral livestock

Training sessions on monitoring with BOS and cameras; collection of biological data (age by tooth eruption, weight, sex, uterus checks for foetuses) were undertaken by FERA staff 19 – 31 July 2009. These involved sessions in both the classroom and field and were attended by 13 participants. Further on-the-job training has been given to MALHE staff and project assistants on camera monitoring, GPS use and data sheet recording. Training was given to staff of the utilities company to assess animal activity in water catchments in October 2009. In March 2010 ten DOE and DOA staff received firearms training and hunting training from the RMPF and Ray Ridley, a FERA firearms instructor (see output 5).

A local staff member presented posters at the Society for the Conservation and Study of Caribbean Birds (SCSCB) conference in Antigua July 2009 and at the International Wild Boar Conference in York, UK in September 2010.

Output 3. Options to control feral livestock in and around the Centre Hills are assessed

To ensure the decisions on control options were well informed, a public opinion survey that was undertaken with a local market researcher coordinating a team of surveyors that surveyed 375 households. The survey asked a range of questions relating to views on feral livestock and on meat consumption and an analysis was undertaken in time to be presented to the action planning workshop in February 2010. In addition, a desk review of feral animal control methods was also completed by FERA and used to inform participants at the action-planning workshop.

A stakeholder agreed Feral Animal Action Plan (FAAP) was drafted in February 2010. High quality inputs including expert advice on control methodologies, local research findings on feral animals and loose livestock, as well as on public opinions facilitated a workshop that was successful at achieving the objective and also garnered a high level of support, evidenced by high attendance over the three days (about 30 participants were present for all or most of the workshop and local staff reported the high attendance and quality of the workshop process).

During the workshop the following control options were assessed: trapping, snaring, ground hunting, aerial shooting, poisoning, Judas pigs and Mata Hari goats, non-lethal methods including fencing. Expert advice from FERA scientists concluded that exclusion using fencing was not feasible on Montserrat given the mountainous terrain and the very high maintenance costs. Total eradication was also deemed not to be feasible given the large proportion of the island (about 60%) that is within the exclusion zone. Two control methodologies were identified as being suitable: ground hunting and corral trapping.

The FAAP was reviewed and revised at the final project workshop on March 2011 following presentations on the results of the project. As with the previous workshop a variety of stakeholders were present to help successfully achieve this (29 attended the first day and 24 the second). Feedback from the final workshop can be seen in Annex A.

Output 4. Actions to control feral livestock in and around the Centre Hills are improved

The hunting programme was initiated on 27 May 2010 and ran until 18 December 2010 after which there was a six week cessation in Government led hunting until resumption on 31 January 2011. The schedule developed called for three hunting trips per week to be made. Each hunting trip consisted of one gunman (trained DOE/DOA staff member) and two local hunters with dogs (usually two). Each trip was recorded using a GPS unit so that hunting effort could be assessed along with details and GPS location of all animals culled. All data has been put into GIS maps.

A hunter, Nathan Fowler, from Island Conservation joined the hunting team for a five week period from 13 November – 19 December 2010 to assist with the hunting programme. During this period Nathan conducted 38 hunting trips which combined with DOE staff led trips meant a total 76 hunting trips carried out up to and including 18 December. These trips resulted in 233 feral animals culled including: 161 goats, 61 cattle, 10 sheep and 1 pig.

Analysis of the game camera data collected prior to hunting beginning and during the six week cessation period showed that there had been a significant reduction in the number of goats and cattle. It also showed a change in the behaviour of cattle in them becoming more nocturnal following the hunting period.

Examining the differences in animals culled between Nathan and DOE staff highlights a key factor in hunting success, namely the equipment used. Nathan used a .203 rifle and scope thereby giving him far greater range and accuracy than the solid slug shotguns used by the DOE gunmen. This is reflected in the numbers of goats shot by Nathan (116) and the DOE gunmen (45). To increase the efficiency and effectiveness of the hunting effort the project procured two .308 rifles with associated equipment and ammunition.

The number of pigs culled by the programme was surprising but may be accounted for by a number of reasons. Firstly, the highest densities of feral pigs recorded on camera were in areas to the south of the Centre Hills (in Zone V) where they breed and spend the day before making incursions into the forest at night, as evidenced by field signs and camera data. These are areas the hunting teams were not allowed to go as they are deemed too dangerous at present. Secondly, a large pig cull took place in 2003 which culled 195 pigs. This in combination with continuous recreational hunting by a small but dedicated local group of hunters may be suppressing the pig numbers actually within the Centre Hills. The third reason is that due to the amount of hunting pressure the feral pig population is under, those remaining have become even more wary making them even harder to track down. However, feral pigs are still breeding in areas of Zone V having been seen in fairly large numbers by MVO staff and one of DOE's lead hunters during helicopter flights over the exclusion zone. Given their high reproductive output it is likely that numbers seen within the Centre Hills would gradually increase without continued control.

In order to try and increase the number of feral pigs culled by the project the use of corral traps was agreed to be trialled. A suitable location was identified in the Foxes Bay area where a number of feral pig signs have been seen. It was hoped that this could be constructed and trialled before the end of the project. However, a delay in obtaining permission from the landowners (although in the exclusion zone all land is still privately owned) meant that it was not put in place until late March. It is now however in place and can be trialled by the DOE over the forthcoming months. If it proves to be successful further corral traps can be built in other locations showing high pig activity supported by the OTEP project.

The agricultural component of the project was led by the DOA. A demonstration farm project along with changes to the legislation and implementation of a tagging and registration scheme (see section 4.3 Output 5) aimed to improve livestock rearing methods thereby reducing the number of animals recruited to feral populations. In order to develop the demonstration farm project a consultant, was hired. The consultant made two visits to Montserrat. The first acted as a scoping visit to assess the situation on Montserrat after which he produced comprehensive technical guidance notes with regard the rearing of sheep and goats (see Annex F). His second visit was to implement the demonstration farms with two constructed at Barzy's and Gerald's (a private farmer). During this period the consultant gave training to c.25 farmers and 6 DOA staff in both a classroom and practical setting. The feedback from Dr. Selvyn Maloney who was

overseeing this component was that the farmers had been very keen to be involved and gained a lot from it.

Assessment of farmed loose livestock numbers was primarily done via livestock transects. These involved driving along the length of the main road in Montserrat (18km) recording livestock and their rearing method seen. In total 33 transects were carried out between September 2009 and February 2011.

Output 5. Policies on livestock management are strengthened

The project worked closely with the Royal Montserrat Police Force (RMPF) over clarifying the procedures on the use of firearms. Gun licensing is very strict on Montserrat especially given the issues with gun related crime on other Caribbean islands. As such those people to be trained in the safe use of firearms should be Ministry of Agriculture staff only. Training was carried out in March 2010 by Inspector Billy Darroux of the RMPF and Ray Ridley from FERA (See Annex A). Following the training, gun licences were issued by the RMPF.

Montserrat's existing livestock policy was reviewed by Dr. Nicholas Waldren the Chief Veterinary Officer at the DOA in June 2010 (See Annex F). The recommendations made were circulated amongst the DOA and Ministry at large for comment. As of March 2011 the recommendations made by Dr. Waldren have been submitted to the Legal Department for approval. Once approved, these legislative changes to the Animal Trespass and Pound Act will allow the implementation of measures to improve livestock farming methods on Montserrat.

Output 6. Awareness is raised on Montserrat and in the Caribbean about the impacts of feral livestock on biodiversity and livelihoods

Stephen Mendes (DOE) presented on spatial planning in the Centre Hills at the UKOCTF meeting in the Caymans in 2009 (Mendes, S. 2010. Montserrat Centre Hills Management Plan: an example of planning and implementing protected areas at a site scale. pp 221-225 in *Making the Right Connections: a conference on conservation in UK Overseas Territories, Crown Dependencies and other small island communities*, Grand Cayman 30th May to 5th June 2009 (ed. by M. Pienkowski, O. Cheesman, C. Quick & A. Pienkowski). UK Overseas Territories Conservation Forum <http://www.ukotcf.org/pdf/2009conf/ProcCay06Planning.pdf>.

Posters were prepared on the project and presented at three other international conferences over the course of the project:

- Antigua (July 2009) - Society for the Conservation and Study of Caribbean Birds (SCSCB) conference.
- Pensacola FL USA (April 2010) – International Wild Pig Conference
- York UK (September 2010) – International Wild Boar Conference

Local dissemination included press releases via Government newsletters or the one national paper the Montserrat Reporter. A total of six national press releases have been done:

- 23 July 2009 - Guide to the Centre Hills Launched; Government press release (www.gov.ms)
- 24 July 2009 - Reducing feral livestock in and around the Centre Hills; Government press release (www.gov.ms)
- 7 December 2009 - Darwin feral livestock project; The Montserrat Newsletter
- 5 February 2010 - Darwin feral livestock project; The Montserrat Reporter
- 5 March 2010 - Attacking feral animals and loose livestock; The Montserrat Reporter
- 10 March 2011 - Interview given to The Montserrat Reporter at the final workshop by the Project Coordinator for a future article

Radio on Montserrat is an important medium for communication to the general population. Nine radio broadcasts on popular ZJB radio have been done during the project:

- 22 July 2009 Feral livestock workshop opening
- 25 July 2009 - Darwin Feral livestock project

- October 2009 - Update on project and introduction to Project coordinator
- 22 – 24 February 2010 - Workshop advertised on Radio Montserrat and featured as a news item with participant interviews
- 24 February 2010 - Darwin Feral livestock project next steps, a 1hr phone in show 'the peoples show' featured the project
- 20 May 2010 – Communities diary notice broadcast for a week notifying the public about the start of hunting activities
- 22 May 2010 – Government press release regarding culling activities
- 29 November 2010 – Interview with Project Coordinator regarding the feral livestock project. Broadcast a number of times over the week.
- 2 March 2011 – Interview with Project Coordinator regarding the final workshop and its aims and objectives. Broadcast in the days preceding the workshop.

A number of articles have been posted on various websites during the course of the project:

- 24 July 2009 - Reducing feral livestock in and around the Centre Hills; Government press release (www.gov.ms) <http://www.gov.ms/?p=618>
- 4 January 2010 - press release on FERA's involvement in project) <http://www.fera.defra.gov.uk/showNews.cfm?id=418>
- 7 January 2010 - press release detailing what the project is about on the official Government of Montserrat Website <http://www.gov.ms/?p=1812>
- 30 January 2010 - more informal project overview on a forum style website all about Montserrat. This was to outreach to Montserradians living abroad at present and to give people an opportunity to comment on the project http://mnialive.com/home/index.php?option=com_content&view=article&id=240:darwin-feral-livestock-project&catid=64:mni-view&Itemid=158
- 5 February 2010 - Identical copy of general project overview that was published in the local newspaper http://www.themontserratreporter.com/index.pl/article_local?id=4556292
- 4 March 2010 - press release covering project workshop on Government website <http://www.gov.ms/?p=2043>
- 5 March 2010 - a workshop overview that was published in the local newspaper http://www.themontserratreporter.com/index.pl/article_local?id=4714526
- 31 January 2011 – Tackling the problem of feral livestock on Montserrat; post on the BirdLife Community website <http://www.birdlife.org/community/2011/01/tackling-the-problem-feral-livestock-on-montserrat/>
- 23 June 2011 An update on Montserrat's efforts to address the issue of feral livestock <http://www.birdlife.org/community/2011/06/an-update-on-montserrat%E2%80%99s-efforts-to-address-the-issue-of-feral-livestock/>

The original proposal to produce a manual on feral pig control has been broadened to incorporate goats, sheep, cattle and pigs. It is currently being published and will be available in August 2011. It will be disseminated and distributed as a PDF to relevant organisations in other Caribbean countries.

Throughout the course of the project both Project Coordinators and project staff have carried out a lot of face to face awareness with the general public regarding the project.

4.4 Project standard measures and publications

The project was successful at maintaining a high profile in the local media and resulted in two posters, one paper being presented at international conferences and one paper being published in a peer reviewed journal. See Annex's 4 and 5 for details.

4.5 Technical and Scientific achievements and co-operation

Technical cooperation was instrumental in the success of the project. FERA were the UK technical experts and advised on a range of methodologies to be trialled for the monitoring of feral animals, provided training in hunting and firearms use and facilitated the dissemination of project results. In addition the RSPB supported the provision of technical offices with previous experience to work with the Montserrat team.

The project trialled several livestock monitoring methods, identified an effective method for monitoring the density and distribution of feral livestock in and around the Centre Hills through the use of a game camera network (see section 4.3). Analysis of the information collected by the network allowed the effectiveness of the hunting programme to be assessed. This method of monitoring will enable regular monitoring of feral livestock populations and assessment of control options in future years. This was achieved by close working and cooperation between FERA as the project's technical advisor and the Montserrat based team. It is also important to note that staff from the project participated in an assessment of the feasibility of a goat eradication in Anguilla and in a one week workshop on mongoose and other invasive mammal species management in the British Virgin Islands.

By the EOP scientific outputs included one paper published, conference papers presented at international conferences and two posters presented. A further paper is in preparation based on the effectiveness of the hunting impact.

4.6 Capacity building

The capacity of Montserrat partners to sustainably manage feral livestock problems has been substantially increased, through the training of staff, the development of an action plan that has been adopted by the Government of Montserrat and by the strengthening of partnerships between UK and Montserrat partners.

DOE and DOA staff have received expert training in monitoring techniques and firearms handling and hunting techniques (see section 4.3). The training provided to Government staff will allow them to train others in these techniques and skills, ensuring capacity to carry out such monitoring and hunting programmes into the future. Elements of this training were provided by the RMPF and the relationship between DOE and the police has been strengthened. The DOE Technical Officer and one Forestry Officer were also trained in data management to ensure that future monitoring is recorded appropriately. The project also produced educational materials for farmers on semi intensive rearing systems. Training materials have also been produced on semi-intensive rearing systems as an alternative to the running of loose livestock

The project also provided equipment for hunting post project including protective equipment and rifles with accessories (noting these were acquired from co-finance funds). Two rearing units were also constructed for demonstration to farmers.

The Feral Animal Action Plan is key to the building of capacity; this provides a frame work for feral animal control for the next four years and has been mainstreamed in to Government work plans and has been awarded further funding, In addition the livestock policy has been reviewed and recommendations submitted to the Government on legislative changes.

The project has also developed the regional capacity in feral livestock management with respect of the Montserrat hunting team. It is anticipated that the Montserrat hunting team, using the knowledge and experience they have gained throughout the course of project can act as trainers and advisors for other Caribbean islands with regard feral livestock control and management reducing the need for further outside intervention.

4.7 Sustainability and Legacy

The project has a strong legacy and high sustainability though a number of measures, the FAAP has been adopted by the Government of Montserrat and integrated in to business plans, the local teams in DOE and DOA have been trained in hunting methodologies, firearms use, monitoring, data management and enhanced agricultural methodologies and external funding is in place to support the work programme over and above Government funding. The new project has maintained the partnership between the Government of Montserrat, FERA and the RSPB. In addition important equipment has been procured to implement the FAAP.

More over during the course of the project a Species Action Plan for the Mountain Chicken has been developed and the SAP for the Montserrat Oriole has been revised and the FAAP is an important component linked to these plans. During 2011 the Department of Environment (and other stakeholders in Montserrat) agreed a shared programme of work focussed on the management of threatened bird species and of Important Bird Areas (including feral animal management) and it has been agreed that the RSPB will programme the costs of at last half of a technical offer to the GOM (details to be finalised).

5 Lessons learned, dissemination and communication

The importance of accurate assessment and monitoring was highlighted in the findings of what feral livestock were most prominent (see section 4.3). One thing that became clear during the project is the need for the laws on farming livestock in the exclusion zones to be clarified. It is apparent that some people enter the exclusion zone illegally i.e. without prior permission and this in some respects affected the effectiveness of the hunting programme. The hunting teams did not shoot in some areas of Zone C due to the sensitivity of people keeping loose livestock there. This situation also prevented the hunting teams from working in an area of high goat densities in the east of the island for a 4 week period.

Legal clarification and the cooperation of the RMPF is required to ensure laws are upheld allowing the programme to work within areas of the exclusion zone in safety for all those concerned. This issue emphasises the importance of the farmed livestock component of the project. Once an island wide livestock tagging and registration scheme is implemented and enforced it will clear the distinction between loose and feral livestock. Essentially meaning any loose animal not tagged is considered feral and can be impounded or culled depending on its location.

The project has achieved a high level of awareness amongst wider population on Montserrat. People are aware of the issues with loose livestock and feral livestock, due to the social and financial implications such as crop damage. Whilst most people (c.70%) are not livestock owners, the remaining 30% do own livestock (although a very small percentage have large numbers) leading to competing interests. Many landowners are unhappy with loose livestock being run on their land whilst owners of loose livestock frequently feel they have lost their land and have not been compensated. Clear messages that the project is supporting better and more productive management of owned and the planned control of feral animals is important.

Target audiences have been engaged through the steering group, which has representatives from hunters, landowners, livestock owners, conservationists, public utilities and the DOA/DOE. An even wider group was invited to participate in the action planning and review processed to gain consensus on the way forwards. Other key target audiences engaged have been the Police and the Governor's Office. Wider dissemination in Montserrat has been undertaken through radio (a popular medium in Montserrat), newspapers, the internet and word of mouth.

The project has achieved a good international profile with presentations at four international conferences. The project has had enquiries from several Caribbean states and from as far away as Fiji indicating the genuine need for resources on feral livestock management. Representatives from St Lucia and Antigua participated in the workshops..

5.1 Darwin identity

The Darwin Initiative has been promoted in all press releases and radio interviews done throughout the project. The Darwin logo has been used prominently on all posters presented at international conferences and on project outputs. The vehicle used for all field work bears the Darwin logo and is recognised throughout the island. The Darwin Initiative is well known in Montserrat, as it has supported a number of projects that have been successful, engaged wide stakeholder groups and the general public.

6 Monitoring and evaluation

Project implementation was monitored at a number of levels. There were periodic reviews of progress throughout the project. Weekly updates by the Project Coordinator for DOE, DOA and the Project Manager and a more comprehensive monthly report were sent by the Project Coordinator to the Director of DOE, Project Leader and FERA scientists.

Teleconferences between the UK based project staff, Project Coordinator, DOE and DOA staff were held monthly where appropriate. Six visits were made to Montserrat by various UK project staff (see Section 3).

The logframe was revised at the 2010 Half-year report in order to make reporting clearer. Two indicators proved to no longer be suitable for measuring project results with the BOS system abandoned due to its ineffectiveness in Montserrat and first sub-goal indicator, *Populations of key species (mountain chicken, oriole) remain stable by the end of Y2* being revised. The population of mountain chickens collapsed following the result of a Chytrid (*Chytridiomycota*) and a large pyroclastic flow that affected the last known refugia of the population in early 2010 and was removed as an indicator. The population of the oriole was retained as an indicator and this is monitored annually by DOE staff. In March and April 2011 the RSPB worked with DOE to revise the monitoring of the Montserrat oriole and tested a new monitoring methodology. In previous years a single visit to pre established point counts has been used and analysed using distance methods, this was continued but three visits were made to allow the application of hierarchical models to estimate density. The oriole population is prone to fluctuations due to dry weather during the breeding season and ash fall, both have occurred during 2010. This demonstrated the difficulty of applying biological response indicators to this type of work, whilst feral animal populations will certainly result in the decline of threatened species through direct predation or the continued degradation of forest habitats, it would probably require longer term monitoring.

As the project has been implemented it has become apparent that the most suitable monitoring method is the number of animals recorded on game cameras. These are a practical monitoring tool and sensitive enough to detect changes in behaviour that could infer population changes using other methods, eg increased nocturnal activity in response to hunting would suggest lower population levels during foot patrols.

A household survey assessing public opinion on feral animals, loose livestock and meat consumption was undertaken in December 2009 and January 2010; this provided an important information base to developing the draft FAAP in March 2010 (see 6.1). Monitoring actions in terms of data collection are outlined in sections 3 and 4.

6.1 Actions taken in response to annual report reviews

As of March 2011 the recommendations made by the Chief veterinary officer have been submitted to the Legal Department for approval. Once approved, these legislative changes will allow the implementation of measures to improve livestock farming methods on Montserrat. These revisions particularly relate to the compulsory tagging of livestock to facilitate identification of owners. Further details of the policies reviewed and strengthened as part of the project are given in section 4.3 (Output 5) and Annex F.

The review suggested the consideration of an awareness outcomes and impacts - KAP analysis to assess what long term changes in public behaviour result from the project outreach. After discussion with the project team it was felt to be difficult to implement given the demands of other project activities. This would have required a follow up survey at the end of project which certainly would have yielded useful information. However, the initial survey was an expensive and time consuming exercise, the majority of respondents were in support of measures to manage livestock numbers and there was widespread public support of the work displayed over the course of the project. A KAP analysis of livestock owners would have been a valuable exercise, as this is the target group where behaviour change is required in order to meet the objectives of the FAAP, but this would have required inclusion in the original project concept and budget.

The sub-goal indicators were amended as part of the logframe revisions submitted to Darwin as part of the 2010 Half-year report. The use of Mountain chicken and Montserrat oriole as

response indicators to feral animal management actions are prone to influence by other factors. These are discussed in further detail Section 6.

Livestock barriers were considered as options for feral livestock control. Barriers were considered in the options assessment during the development of the FAAP and were felt to be limiting. Whilst this approach has been successful in the creation of mainland islands in New Zealand, the cost would have been high, and maintaining the barrier difficult in a tropical forest environment prone to cyclones and pyroclastic flows. However, barrier methods should be considered for smaller areas in the future. See Section 4.3 (Output 3) for details.

The exit strategy for the project is an important consideration and the project team have made efforts to develop this further. A more detailed sustainability plan and exit strategy was presented to Darwin in the 2010 Half-yearly report. The FAAP has been adopted and has been mainstreamed in to Government business plans, trained staff are in post and the project team is equipped. Importantly additional funding has been awarded to the Government that will allow the implementation of activities at a high level. In addition partnerships with the UK based partners have been strengthened. Efforts have also been made to link the FAAP with other plans such as the Montserrat Oriole SAP. However, this remains an important consideration and post project the FAAP will be further integrated into other plans including the Montserrat Centre Hills Management Plan revision and development plans. Also see Section 4.7. for further information.

7 Finance and administration

7.1 Project expenditure

Item	Budget	Expenditure	Variance
Rent, rates, heating, overheads, etc Communications			
Travel and Subsistence - International and Fieldwork travel and subsistence			
Operating Costs - Expenses with workshops (room rental, refreshments and materials); Clothing and minor equipment for field work; Consumables and huntings supporting team; printing (dog handlers)			
Capital Items/Equipment - Remote monitoring cameras - Boar Operated monitoring system - GPS & Computer - Hunting Equipment			
Others - Livestock demonstration project component (fencing, pasture improvement, training, shelter, consultant)			
Salaries - Dr Giovanni Massei Smith - Dr Sugoto Roy - Statistician - James Millett - Local Project Coordinator - Local Field Staff - Local surveyors			
Total			

*under-spend on equipment was due to the discontinuation of the expensive BOS system after the trial. Additional hunting equipment was purchased under the discretionary grant provided by FERA

7.2 Additional funds or in-kind contributions secured

The project was successful at raising co-finance over the projected amount. Staff time from five institutions was contributed to the project and in addition two discretionary grants were given. The RSPB supported the cost of a Montserrat project co-ordinator.

A further £15,000 of additional funding was secured from Defra in the financial year 2009-10 to run a five day firearms handling course and purchase two rifles and ammunition suitable for the humane culling and dispatch of feral livestock at greater effective range. The course was run jointly by the Royal Montserrat Police and a Firearms handler from FERA, and was attended by 11 staff from the Departments of Agriculture and Environment of the government of Montserrat.

Staffing Co-finance

	Role in Project
FERA	Technical Advisor
FERA	Technical Advisor
RSPB	Project Finance Manager
RSPB	Project Leader (UK until Dec 2009)
RSPB	Finance Support
RSPB	Project Leader Dec 09-EOP
IC	Secoded hunter
MALHE	Hunters
RMPF	Trainer (uncosted)

Cash Co-finance

RSPB	Discretionary Grant - Project Coordinator (Montserrat)
FERA	Discretionary Grant - training and equipment

Total Co-finance

Other Funds levered (not direct Co-finance)

OTEP Grant: FAAP implementation

Total funds levered

£144,900

7.3 Value of DI funding

This work is particularly important because it is focussed on Montserrat's primary biodiversity resource and contributes to existing plans and on going work including the Centre Hills management Plan, species recovery of the Montserrat Oriole, Mountain Chicken and Montserrat Galliwasp. The project has enabled the Government of Montserrat, RSPB and FERA to develop a model action plan and methodology for the control and management of feral livestock on small tropical islands. Without the grant it would have been impossible to initiate a structured and scientifically validated programme of work, involve UK partners, train staff and forge stronger links between Montserrat and the UK. The project has also been successful at leveraging co-finance during the implementation phase and raising funds for post project implementation.

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

Project summary	Measurable Indicators	Progress and Achievements April 2009 - March 2011
<p>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</p> <ul style="list-style-type: none"> • The conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources 		<p>Collaboration between UK Expertise and Montserratian based conservation practitioners has developed an effective methodology and programme for the long term management of feral animals in Montserrat (including training, equipping and resourcing post project) that will underpin key conservation actions including management of threatened species and management of the National Park.</p>
<p>Sub-Goal</p> <p>Support the conservation of biodiversity and improve livelihoods in and around the Centre Hills</p>	<ul style="list-style-type: none"> • Populations of key species (Montserrat oriole) remain stable by end of Y2 • Water quality does not deteriorate and supply remains at the same level by end of Y2 • Livestock management around the Centre Hills boundary is improved by end of Y2 	<p>Monitoring data from 2011 indicates that the Oriole population is currently showing a slight downwards trend and this is primarily driven by volcanic activity, however, actions underway that will prevent long-term degradation of forest habitat</p> <p>No deterioration in water quality reported from feral animal activity</p> <p>Evidence that livestock numbers have been reduced by hunting. Loose (owned livestock). However changes to the legislation need to be passed before the necessary measures i.e. tagging and registration, to enforce appropriate management before wide scale changes can be seen</p>
<p>Purpose</p> <p>A sustainable, locally managed programme to minimise the destructive impacts of feral livestock in and around the Centre Hills is established.</p>	<ul style="list-style-type: none"> • Number of sightings of feral livestock in the Centre Hills decreases by the end of Y2 • Catch per unit hunting effort decreases by the end of Y2 • Number of animals recorded on game cameras decreases by the end of Y2 	<p>Number of visits of goats and cattle recorded by game cameras significantly decreased at EOP against baseline established in Year 1</p> <p>Hunters report lower bags against time by EOP compared to start of hunting effort</p> <p>An action plan to manage feral animals is in place and resourced, actions included in Government Business Plans</p> <p>Changes to relevant legislation submitted</p>
<p>Output 1.</p> <p>Knowledge of existing feral livestock in and around the Centre Hills boundary is increased</p>	<ul style="list-style-type: none"> • Baseline assessment completed by end of Y1 • DOA and DOE use data to inform activities by end of Y2 	<p>Baseline information collected and collated on feral livestock activity, farmed loose livestock, animal pound and crop damage data.</p> <p>Information used to develop the Feral Animal Action Plan and its implementation by DOE and DOA.</p>

Activity 1.1 Build Boar Operating System (BOS) on Montserrat	Completed October 2009
Activity 1.2 Procure equipment	Completed 2009. Additional cameras sourced to replace those lost to volcanic activity. Firearms, ammo and associated equipment purchased February 2011.
Activity 1.3 Plan fieldwork (timing, recording sheets for transects, BOS & hunting)	Completed 2009/2010
Activity 1.4 Collect and store feral pigs (4)	Completed 2009
Activity 1.5 Test BOS monitoring	Completed but subsequently abandoned due to a number of factors including volcanic activity.
Activity 1.6 Agree system to map livestock and agricultural plots on Centre Hills Boundary	Completed 2009.
Activity 1.7 Survey existing public attitudes to pig consumption	Completed February 2010.
Activity 1.8 Survey existing livestock owners and numbers and complete livestock and crops map	Mapping of agricultural plots around Centre Hills initiated in 2009 and 2010. Incomplete due to restrictions on some areas from the volcanic activity. The Government GIS department have recently purchased 2010 aerial photography from which remaining agricultural areas can be accurately mapped.
Activity 1.9 Initiate camera game monitoring	Completed – began July 2009.
Activity 1.10 Desk review of pig and goat control methods	Completed February 2010
Activity 1.11 Submit paper on pig control methods	Completed 2010
Activity 1.12 Summarise data	Completed 2011
Activity 1.13 Draft demonstration project report	Demonstration project implemented by DOA in March 2011 and report in progress
Activity 1.14 Summarise results from monitoring	Completed – presented at final workshop March 2011
Activity 1.15 Workshop to present project results	Completed – final workshop March 2011

Output 2. Technical expertise is enhanced and new skills developed in the monitoring and control of feral livestock	<ul style="list-style-type: none"> • 10 persons trained by Y2 	Ten DOE/DOA staff members received firearms training. 13 DOE/DOA staff trained in the use of game cameras. 4 hunters trained in the use of GPS and data sheet recording.
Activity 2.1 Prepare training material		Completed July 2009
Activity 2.2 Training to deliver monitoring		Completed. Camera training July 2009, Firearms training March 2010
Activity 2.3 Training to collect biological data		Completed July and October 2009
Activity 2.4 Montserratian participation at International Wild Boar Conference		Completed. One local staff member presented a poster at the Society for the Conservation and Study of Caribbean Birds (SCSCB) conference in Antigua 2009 and a poster at the International Wild Boar conference in York UK in September 2010
Output 3. Options to control feral livestock in and around the Centre Hills are assessed	<ul style="list-style-type: none"> • Key stakeholders agree on preferred option to control feral livestock and sign off action plan 	Stakeholder participation at February 2010 workshop to decide control options and action plan. Stakeholder participation at March 2011 workshop to review the action plan.
Activity 3.1 Review report on the control and management of feral pigs and goats circulated		Completed
Activity 3.2 Stakeholder workshop to agree on control options		Completed February 2010
Activity 3.3 Feral livestock control action plan produced		Completed February 2010
Activity 3.4 Agree livestock demonstration project		Completed
Output 4. Actions to control feral livestock in and around the Centre Hills are improved	<ul style="list-style-type: none"> • Number of livestock registered has increased by end of Y2 • Actions identified in feral livestock action plan are undertaken by end of Y2 	Changes to the legislation are in the process of being made which will enable enforcement of registration measures Hunting programme initiated in May 2010. Corral trap being constructed to be implemented post project.
Activity 4.1 Actions implemented to control feral livestock		Completed – began May 2010

Activity 4.2 Complete analysis on control data		Completed 2011
Activity 4.3 Livestock demonstration project (fencing, tethering, fodder crops etc.) implemented		Completed March 2011
Activity 4.4 Rapid assessment of tethered livestock at start and end of project		Completed – began September 2009.
Output 5. Policies on livestock management are strengthened	<ul style="list-style-type: none"> • Review of existing policy completed by mid Y2 • Recommendations integrated into DOA and DOE business plans by end of Y2 	<p>Review completed and legislation changes in review.</p> <p>Follow on work funded from OTEP and DOE to implement the FAAP is integrated in to business plans</p>
Activity 5.1 Clarify procedures on use of firearms.		Completed 2010
Activity 5.2 Review existing livestock policy and prepare report with recommendations		Completed June 2010
Activity 5.3 Circulate draft livestock policy report and integrate recommendations into DOA		Completed
Output 6. Awareness is raised on Montserrat and in the Caribbean about the impacts of feral livestock on biodiversity and livelihoods	<ul style="list-style-type: none"> • 2 reports in media/yr • 2 updates posted on DOE website/yr • >3 islands receive copy of feral pig manual • Project is presented at 2 conferences by end of Y2 	<p>Six local paper and seven local radio reports.</p> <p>DOE website under construction.</p> <p>Manual changed to reflect all feral livestock not only pigs. Manual being prepared by NatureBureau to be distributed as a pdf.</p> <p>Project presented at 4 international conferences.</p>
Activity 6.1 Present project at Cayman Conference		Completed June 2009
Activity 6.2 2 press releases/yr		Completed in both years
Activity 6.3 2 radio interviews/yr		Completed in both years
Activity 6.4 2 project updates posted on DOE website/yr		Completed - updates on other websites e.g. FERA, Montserrat Reporter

Activity 6.5 Prepare feral livestock manual (ecology and control)	Completed March 2011
Activity 6.6 Feral pig manual is disseminated on Montserrat and to other Caribbean Islands	Completed March/April 2011
Activity 6.7 1 presentation/paper to international conference/yr	Completed in both years
Activity 6.8 Prepare poster on project	Completed 2009

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

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Goal: Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.</p>			
<p>Sub-Goal: Support the conservation of biodiversity and improve livelihoods in and around the Centre Hills</p>	<ul style="list-style-type: none"> • Populations of key species (Montserrat oriole) remain stable by end of Y2 • Water quality does not deteriorate and supply remains at the same level by end of Y2 • Livestock management around the Centre Hills boundary is improved by end of Y2 	<ul style="list-style-type: none"> • Montserrat biodiversity databases • MWU water quality reports • Rapid loose livestock assessment report 	
<p>Purpose A sustainable, locally managed programme to minimise the destructive impacts of feral livestock in and around the Centre Hills is established</p>	<ul style="list-style-type: none"> • Number of sightings of feral livestock in the Centre Hills decreases by the end of Y2 • Catch per unit hunting effort decreases by the end of Y2 • Number of animals recorded on game cameras decreases by the end of Y2 	<ul style="list-style-type: none"> • Forest patrol reports • Hunting records • Camera trap reports monitoring reports 	<ul style="list-style-type: none"> • Volcanic activity impacts on the forest are minimal • Hurricanes do not destroy island infrastructure
<p>Outputs 1. Knowledge of existing feral livestock in and around the Centre Hills boundary is increased</p>	<ul style="list-style-type: none"> • Baseline assessment completed by end of Y1 • DOA and DOE use data to inform activities by end of Y2 	<ul style="list-style-type: none"> • Centre Hills boundary map (crops, livestock areas) • Report on pig and goat control methods • DOA, DOE business plans 	<ul style="list-style-type: none"> • Human resource capacity is available on Montserrat to collect data

Project summary	Measurable Indicators	Means of verification	Important Assumptions
2. Technical expertise is enhanced and new skills developed in the monitoring and control of feral livestock	<ul style="list-style-type: none"> • 10 persons trained by Y2 	<ul style="list-style-type: none"> • Training certificates • Training reports 	<ul style="list-style-type: none"> • Persons are interested to undertake training on Montserrat
3. Options to control feral livestock in and around the Centre Hills are assessed	<ul style="list-style-type: none"> • Key stakeholders agree on preferred option to control feral livestock and sign off action plan 	<ul style="list-style-type: none"> • Workshop report • Feral livestock control plan 	<ul style="list-style-type: none"> • Continued co-operation between stakeholders
4. Actions to control feral livestock in and around the Centre Hills are improved	<ul style="list-style-type: none"> • Number of livestock registered has increased by end of Y2 • Actions identified in feral livestock action plan are undertaken by end of Y2 	<ul style="list-style-type: none"> • Livestock register • DOE/DOA monthly reports 	<ul style="list-style-type: none"> • Trained staff remain on Montserrat
5. Policies on livestock management are strengthened	<ul style="list-style-type: none"> • Review of existing policy completed by mid Y2 • Recommendations integrated into DOA and DOE business plans by end of Y2 	<ul style="list-style-type: none"> • Review of policy report • DOA business plan • DOE business plan 	<ul style="list-style-type: none"> • There is political will on Montserrat to improve livestock management
6. Awareness is raised on Montserrat and in the Caribbean about the impacts of feral livestock on biodiversity and livelihoods	<ul style="list-style-type: none"> • 2 reports in media/yr • 2 updates posted on DOE website/yr • >3 islands receive copy of feral livestock manual • Project is presented at 2 conferences by end of Y2 	<ul style="list-style-type: none"> • Newspapers, radio bulletins • Website hits 	<ul style="list-style-type: none"> • Media continue to support project

Activities

0. Memo of Collaboration signed, Identify local project co-ordinator, Monthly teleconference to discuss project progress, Plan stakeholder workshop, Establish Hunter group, Stakeholder workshop to agree workplan, Project Steering Committee established and meeting 2/year, Inform landowners of monitoring activity, Reports submitted to Darwin,
1. Build Boar Operating System (BOS) on Montserrat, Procure equipment, Plan fieldwork, Collect and store feral pigs, Test BOS monitoring, Agree system to map livestock and agricultural plots on CH boundary, Survey existing public attitudes to pig consumption, Desk review of pig and goat control methods, Draft demonstration project report, Summarise results, Workshop to present project results
2. Prepare training material, Training to deliver monitoring, Training to collect biological data, Montserratian participation at International Wild Boar Conference
3. Review report on the control and management of feral pigs and goats circulated, Stakeholder workshop to agree on options, Feral livestock control plan produced, Agree livestock demonstration project
4. Actions implemented to control feral livestock, Complete analysis on control data, Livestock demonstration project (fencing, tethering, fodder crops etc.) implemented, Rapid assessment of tethered livestock
5. Clarify procedures on use of firearms, Review existing livestock policy and prepare report with recommendations, Circulate draft livestock policy report and integrate recommendations into DOA
6. Present project at Cayman Conference, Produce press releases, Radio Interviews, Website postings, Feral pig manual, Dissemination of manual, Presentation of papers, Poster

Monitoring activities:

- Indicator 1 Populations of key species (Montserrat oriole) remain stable by end of Y2 – Collected annually by DOE. Analysis completed June 09, 10, 11
- Indicator 2 Water quality does not deteriorate and supply remains at the same level by end of Y2 – Collected annually by MWA (dates to be confirmed)
- Indicator 3 Livestock management around the Centre Hills boundary is improved by end of Y2 – Rapid assessment of number of tethered livestock at start and end of project
- Indicator 4 Number of sightings of feral livestock in the Centre Hills decreases by the end of Y2 – Collected weekly bi-monthly by forest patrols, Adhoc hunters
- Indicator 5 Catch per unit hunting effort decreases by end of Y2 – Hunter records collected continuously through project
- Indicator 6 Number of animals recorded on camera traps decreases by end of Y2 – camera trap monitoring before and after control action
- Indicator 7 Baseline assessment completed by end of Y1 – Camera trap summary report and presentation to workshop
- Indicator 8 DOA and DOE use data to inform activities by end of Y2 – DOE/DOA business plan (2011 onwards)
- Indicator 9 10 persons trained by Y2 – Workshop attendance lists and number of certificates issued
- Indicator 10 Key stakeholders agree on option to control feral livestock and sign off action plan – Workshop report (March 2010)
- Indicator 11 Number of livestock registered has increased by end of Y2 – DOA livestock register is updated by end of project (collect copy at start and end of project)

Indicator 12 Actions identified in feral livestock action plan are undertaken by end of Y2 – Updates provided in monthly reports, meetings and phonecalls (copies to be collected)

Indicator 13 Review of existing policy completed by mid Y2 – Report circulated October 2010

Indicator 14 Recommendations integrated into DOA and DOE business plans by end of Y2 - 2011 onwards

Indicator 15 2 reports in media/yr - newspaper reports and radio interviews collected

Indicator 16 2 updates posted on DOE website/yr – check website

Indicator 17 >3 islands receive copy of pig manual – distribution list (March 2011)

Indicator 18 Project is presented at 2 conferences by end of Y2 – Cayman UK OTEP conference (June 09) and International Conference on WildBoar UK (September 2010)

Activity	Who	Months	Year 1				Year 2			
			1	2	3	4	1	2	3	4
0. Project management arrangements in place and operational										
0.1 Memorandum of collaboration signed	RSPB	1,2	X							
0.2 Identify local project co-ordinator	RSPB,DOE	2	X							
0.3 Monthly teleconference to discuss project progress	RSPB, CSL, DOE, DOA	1 - 24	X	X	X	X	X	X	X	X
0.3 Plan stakeholder workshop	RSPB, CSL, DOE	2,3	X							
0.4 Establish hunter group	RSPB,DOE	4		X						
0.5 Stakeholder workshop to agree project workplan	RSPB, CSL, DOE	4		X						
0.6 Project steering committee established and meeting 2/year	RSPB, DOE	4,12		X		X				
0.7 Inform landowners of monitoring activity	RSPB, DOE	4, 12		X		X				
0.8 Report submitted to Darwin	RSPB	6,12,18, 26		X		X		X		X
0.9 Replaced by UK technical expert as project Coordinator										
1. Knowledge of existing feral livestock in and around the Centre Hills is increased										
1.1 Build Boar Operating System (BOS) on Montserrat	CSL, DOE	2,3	X							
1.2 Procure equipment	RSPB	1,2,3	X							
1.3 Plan fieldwork (timing, recording sheets for transects, BOS & hunting)	CSL	1,2,3	X							
1.4 Collect and store feral pigs (4)	DOE	1,2,3	X							

Activity	Who	Months	Year 1				Year 2			
			1	2	3	4	1	2	3	4
1.5 Test BOS monitoring	CSL, DOE	4		X						
1.6 Agree system to map livestock and agricultural plots on Centre Hills Boundary	RSPB, DOA	4		X						
1.7 Survey existing public attitudes to pig consumption	RSPB, DOA	5,6,7,8,9		X	X					
1.9 Survey existing livestock owners and numbers and complete livestock and crops map	RSPB, DOA	5,6,7,8,9		X	X					
1.10 initiate game camera monitoring	CSL, DOE	6		X	X	X	X	X	X	X
1.11 Desk review of pig and goat control methods	CSL	6,7,8,9,10		X	X	X				
1.12 Submit paper on pig control methods	CSL	8			X					
1.13 Summarise data	CSL	8			X					
1.14 Draft (farming) demonstration project report	RSPB, DOA	22								X
1.15 Summarise results from monitoring	CSL	23								
1.16 Workshop to present project results	RSPB, CSL, DOE, DOA	24								X
2. Technical expertise is enhanced and new skills are developed in the monitoring and control of feral livestock										
2.1 Prepare training material	CSL	3	X							
2.2 Training to deliver monitoring	CSL	4		X						
2.3 Training to collect biological data	CSL	4		X						
2.4 Montserratian participation at International Wild Boar Conference	RSPB, CSL	18					X			
3. Options to control feral livestock in and around the Centre Hills are assessed										
3.1 Review report on the control and management of feral pigs and goats circulated	CSL	11				X				
3.2 Stakeholder workshop to agree on control options	CSL, RSPB	12				X				
3.3 Feral livestock control action plan produced	CSL	12				X				
3.4 Agree livestock demonstration project	RSPB, DOA	12				X				
4. Actions to control feral livestock in and around the Centre Hills are improved										

Activity	Who	Months	Year 1				Year 2			
			1	2	3	4	1	2	3	4
4.1 Actions implemented to control feral livestock	CSL, DOE	13,14,15					X	X		X
4.2 Complete analysis on control data	CSL	16								X
4.3 Livestock demonstration project (fencing, tethering, fodder crops etc.) implemented	RSPB, DOA	13 - 24					X	X	X	X
4.4 Rapid assessment of tethered livestock at start and end of project	RSPB, DOA	4, 24		X	X	X	X	X	X	X
5. Policies on livestock management are strengthened										
5.1 Clarify procedures on use of firearms	RSPB			X						
5.2 Review existing livestock policy and prepare report with recommendations	RSPB, DOA	13 - 18					X	X		
5.3 Circulate draft livestock policy report and integrate recommendations into DOA	RSPB, DOA	19 - 21							X	
6. Awareness is raised on Montserrat and in the Caribbean about the impacts of feral livestock on biodiversity and livelihoods										
6.1 Present project at Cayman Conference	CSL, RSPB, DOE	3	X							
6.2 2 press releases/yr	CSL, RSPB, DOE	4, 12, 13, 23		X		X	X			X
6.3 2 radio interviews/yr	CSL, RSPB, DOE	4,12, 13, 23		X		X	X			X
6.4 2 project updates posted on DOE website/yr	DOE	4, 12, 13, 23		X		X	X			X
6.5 Prepare feral livestock manual (ecology and control)	CSL	18 - 22						X	X	X
6.6 Feral pig manual is disseminated on Montserrat and to other Caribbean Islands	CSL	23								X
6.7 1 presentation/paper to international conference/yr	CSL	4, 18	X					X		
6.8 Prepare poster on project	CSL	13					X			

Annex 3 Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use		Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring		Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	50	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation		Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity		Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	20	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness	10	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources		Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.

Article No./Title	Project %	Article Description
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information	20	Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Other Contribution		Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	
1b	Number of PhD qualifications obtained	
2	Number of Masters qualifications obtained	
3	Number of other qualifications obtained	
4a	Number of undergraduate students receiving training	
4b	Number of training weeks provided to undergraduate students	
4c	Number of postgraduate students receiving training (not 1-3 above)	
4d	Number of training weeks for postgraduate students	
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(ie not categories 1-4 above)	
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	27 (13 received training in game camera, BOS monitoring techniques; 10 received firearms training; 4 received on the job training in GPS and data sheets)
6b	Number of training weeks not leading to formal qualification	4 weeks
7	Number of types of training materials produced for use by host country(s)	2
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	15
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	1
10	Number of formal documents produced to assist work related to species identification, classification and recording.	
11a	Number of papers published or accepted for publication in peer reviewed journals	1
11b	Number of papers published or accepted for publication elsewhere	
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	

Code	Description	Totals (plus additional detail as required)
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	
13a	Number of species reference collections established and handed over to host country(s)	
13b	Number of species reference collections enhanced and handed over to host country(s)	
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	2
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	4
15a	Number of national press releases or publicity articles in host country(s)	6 (5 published pieces in the Montserrat Reporter, Government press releases, Montserrat Newsletter. Includes interview given to the Montserrat Reporter by the Project Coordinator at the final workshop 10 March 2011 for a future article)
15b	Number of local press releases or publicity articles in host country(s)	
15c	Number of national press releases or publicity articles in UK	3
15d	Number of local press releases or publicity articles in UK	
16a	Number of issues of newsletters produced in the host country(s)	
16b	Estimated circulation of each newsletter in the host country(s)	
16c	Estimated circulation of each newsletter in the UK	
17a	Number of dissemination networks established	
17b	Number of dissemination networks enhanced or extended	
18a	Number of national TV programmes/features in host country(s)	
18b	Number of national TV programme/features in the UK	
18c	Number of local TV programme/features in host country	
18d	Number of local TV programme features in the UK	
19a	Number of national radio interviews/features in	9

Code	Description	Totals (plus additional detail as required)
	host country(s)	
19b	Number of national radio interviews/features in the UK	
19c	Number of local radio interviews/features in host country (s)	
19d	Number of local radio interviews/features in the UK	
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	c.15000UKP
21	Number of permanent educational/training/research facilities or organisation established	
22	Number of permanent field plots established	
23	Value of additional resources raised for project	£144,900
Other Measures used by the project and not currently including in DI standard measures		

Annex 5 Publications

Type *	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Journal*	<i>Too many pigs? A review of methods to mitigate impact by wild boar and feral pigs</i> by Giovanna Massei, Sugoto Roy and Richard Bunting (2010)	Human-Wildlife Interactions (Accepted)		na
Poster*	<i>Reducing the impact of feral livestock in and around the Centre Hills</i> by Lloyd Martin, Giovanna Massei, Sugoto Roy, Sarah Sanders (2009)	SCSCB conference in Antigua 2009		na
Poster	<i>Feral pigs and volcanoes: a hot topic</i> by Richard Bunting, Giovanna Massei, Lavern Rogers-Ryan, Sugoto Roy and James Millett (2010)	2010 International Wild Pig Conference Pensacola FL		na
Paper	<i>Too many pigs? Population trends and control methods for wild boar and feral pigs</i> by Giovanna Massei (2010)	International Wild Pig Conference in Pensacola FL, 13 th April 2010.		na

Annex 6 Darwin Contacts

Ref No	EIDPO027
Project Title	Reducing the impact of feral livestock in and around the Centre Hills
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