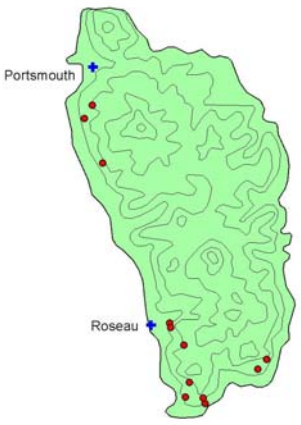
Darwin Initiative Annual Report

Darwin Project Information

Project Ref Number	13032
Project Title	Addressing a threat to Caribbean amphibians: capacity building in Dominica
Country(ies)	Dominica
UK Contract Holder Institution	Institute of Zoology, Zoological Society of London
UK Partner Institution(s)	Fauna & Flora International
Host country Partner Institution(s)	(1) Forestry and Wildlife Division & (2) Veterinary Services Division, Ministry of Agriculture and Environment, Commonwealth of Dominica
Darwin Grant Value	204,834
Start/End dates of Project	1st April 2005 – 31st March 2008
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	1st April 2006 – 31st March 2007; 2
Project Leader Name	Dr. Andrew Cunningham
Project website	www.mountainchicken.org
Author(s), date	Dr. Andrew Cunningham & Becki Lawson (IoZ), Mr. Eric Hypolite (FWD) & Dr. Reginald Thomas (VSD)

1. Project Background

Chytridiomycosis, a fatal fungal disease of amphibians, is considered to be one of the main causes of amphibian population declines and extinctions. It has low host specificity, infecting at least 14 families and 93 species on 5 continents and causing severe population declines in many of these, including a small number of global extinctions. During an FFI Darwin Initiative project on bushmeat utilisation on the Lesser Antillean island of Dominica, epidemic mortality of mountain chicken frogs (*Leptodactylus fallax*) was detected. Following the identification of chytridiomycosis as the cause of this mortality and its association with a catastrophic decline of the mountain chicken, it became clear that the conservation status of all amphibian species on Dominica needed to be investigated and the impact of chytridiomycosis on the island's native amphibian fauna needed to be identified and addressed. The urgent need for this project was initially raised by Government and non-Government bodies within Dominica.



Locations of mountain chicken mortality known to be caused by chytridiomycosis (red dots) and of main towns (blue crosses) on Dominica

2. Project Partnerships

Over the past year, the partnership between IoZ and the Dominica partners has developed satisfactorily. Expert visits continued from the UK to enhance training in the identification of cryptic species (FFI), amphibian population monitoring (FFI & IoZ) and epidemiological sample collection (FFI & IoZ). Additionally, two members of staff from the Dominica Government's Forestry & Wildlife Division visited the UK for training in amphibian husbandry. The latter will enhance the ability of Dominica to conserve the mountain chicken frog through maintaining animals in captivity (and away from the disease threat in the wild) and to initiate a captive assurance and breeding programme.

During year 2, Mr Eric Hypolite (FWD) undertook a prolonged period of absence for study leave, however, he was ably deputised for by Mr Arlington James and Mr Hypolite's absence had no impact on the progress of the project.

The partnerships within the UK have grown well over the past year: FFI has provided staff and expertise to the fieldwork aspects of the project; links with the London Zoo (ZSL) and the Durrell Wildlife Conservation Trust (DWCT) were strengthened and each of these organisations hosted the Dominica forestry officers for a week to provide animal husbandry training.

The biggest challenge within the partnership has been the loss of Dr Valarie Thomas to the project. Dr Valarie Thomas, a veterinarian with molecular training, had been appointed to the project to run the molecular diagnostic laboratory, including conducting the disease diagnostics and analyses. To do this, she underwent extensive training in the UK (at the IoZ) and by UK staff in Dominica in year 1. Unfortunately, having obtained these additional skills, Dr Valarie Thomas requested increased remuneration which we were unable to pay. She, therefore, left the project at the end of year 2. We are now trying to identify a suitable replacement.

The project partners in Dominica are within the same government ministry (Agriculture, Fisheries and the Environment) as the CBD focal point and there is regular and frequent communication between these departments. The latter has provided some basic equipment to the molecular diagnostic laboratory.

3. Project progress

3.1 Progress in carrying out project activities

Throughout year 2, the fieldwork component of the project has progressed well, with transect counts and amphibian sampling being carried out as planned. Twenty-two transects were visited every two months throughout the year. The transects are split between lowland areas (13 transects, each 250 m in length) where mountain chickens are/were known to exist and highland areas (9 transects, each 100 m in length) where the endemic tree frog *Eleutherodactlyus amplinympha* lives. There are three *Eleutherodactlyus* species on Dominica, but distinguishing between them can be extremely difficult and requires experience of habitat, call and behaviour. Nine of the lowland transects were already established by a previous FFI Darwin project and, prior to the chytridiomycosis epidemic, mountain chicken frogs were regularly sited along these transects. In year 2 of the current Darwin project, however, only one single mountain chicken frog was sited, even though the number of lowland transects was increased from 9 to 13.

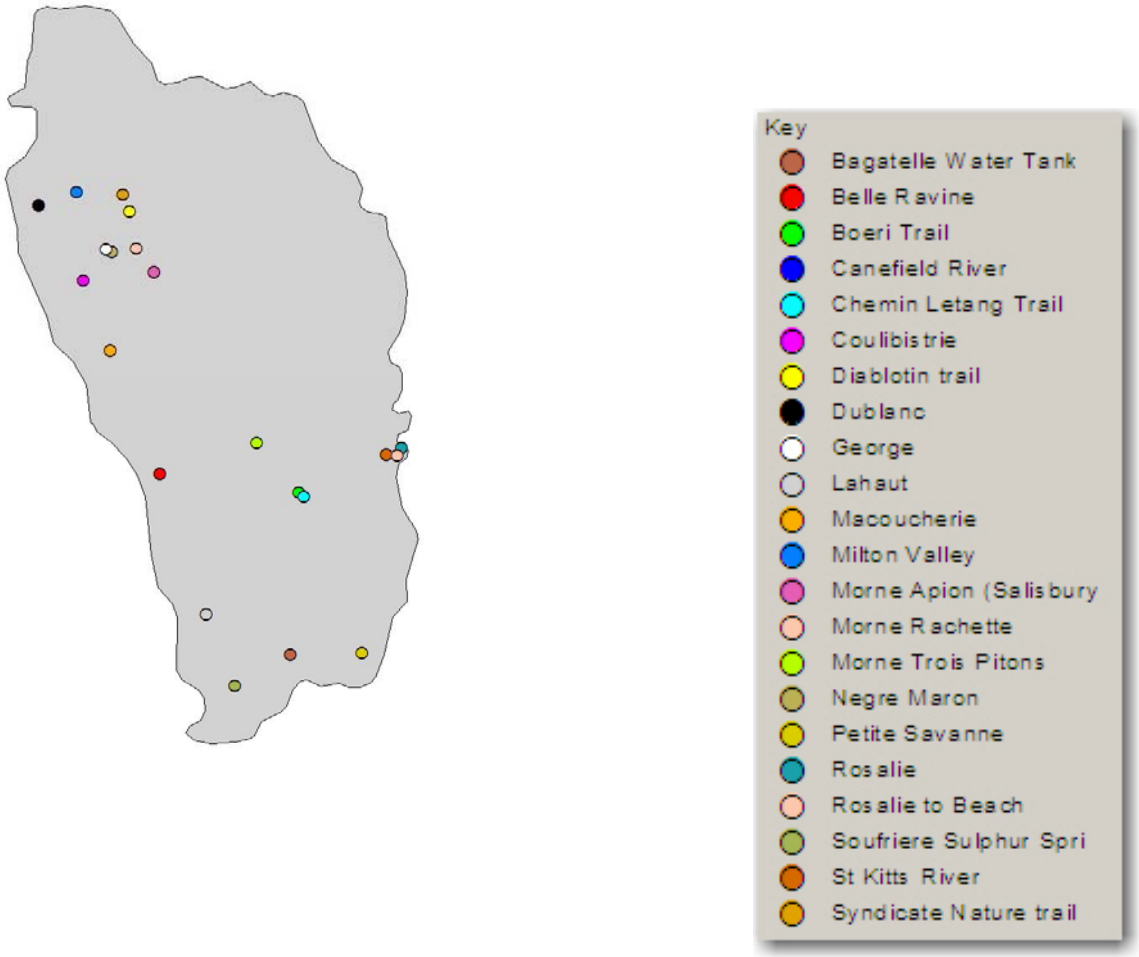


Figure 2. Map of Dominica illustrating the location of each of the amphibian population monitoring and chytridiomycosis surveillance transects.

Eleutherodactylid frogs remained common along all transects throughout the year, but four of the tree frogs swabbed from three transects gave positive results for *Batrachochytrium dendrobatidis* infection. These infected frogs had no outward evidence of disease, possibly indicating that tree frogs might be acting as reservoir species for *Batrachochytrium dendrobatidis* infection on Dominica.

During the summer period, an MSc student at IoZ conducted field research into the possibility of an environmental reservoir of infection. He collected soil samples and swabbed water pools within bromeliads along each transect in a systematic manner. Testing environmental samples is an expensive process as specialist kits are required to extract DNA before this can be tested for the presence of *Batrachochytrium dendrobatidis* using real-time PCR, so the number of samples tested was limited to five vegetation and five soil samples upland transect and to six vegetation and six soil samples per lowland transect. Additional funding for this work was provided by the Institute of Zoology, the student and the MSc course. Of 123 bromeliad samples tested, all were negative for the presence of *Batrachochytrium dendrobatidis*, but of 123 soil samples tested, one was positive for the fungus. Unfortunately, although identified as an urgent area for research by the workshop held in March 2006, the hypothesis that *Batrachochytrium dendrobatidis* might be spread within Dominica and to other islands by dirty footwear could not be tested as the Dominican authorities declined permission to carry out this aspect of the proposed study.

In addition to the research on chytridiomycosis in Dominica, as a follow-up from the results of the workshop held in March 2006, we developed a collaboration with DWCT and the Department of Environment in Montserrat to investigate the threat of chytridiomycosis to mountain chicken frogs on Montserrat. (The mountain chicken frog is known to occur only on Dominica and Montserrat; on the latter island it is threatened by habitat loss primarily due to volcanic activity.) This work, included taking skin swabs from mountain chickens (*n* = 319) and *B. marinus* (*n* = 45), and toe clips from *E. johnstonei* (*n* = 46) and testing these for the presence of *Batrachochytrium dendrobatidis*. Additionally, mountain chicken blood serum samples (*n* = 57) were tested for evidence of exposure to ranavirus (ranavirus disease is a major cause of amphibian mortality in some countries, notably the U.K. and the U.S.A.). No evidence of chytrid infection or of exposure to ranavirus was detected in any of the three amphibian species tested. (These results have now been published in a peer-reviewed journal.) Therefore, it seems likely that Montserrat is currently free from chytridiomycosis, highlighting the requirement of a Caribbean-wide plan to mitigate the impact of the disease in this region (such a plan is one of the planned outputs of this current Darwin project).

During Year 2, Dr Frank Clarke (FFI) re-visited Dominica to conduct follow-up training and supervision for amphibian population monitoring. This work included a refresher course on amphibian monitoring techniques and chytridiomycosis surveillance; the training comprised both classroom and field components. Frank Clarke also carried out an evaluation of the work progress, including an evaluation of the transect survey databases (transect description and transect survey) to ensure correct data collection and entry and suitable archiving of survey reports. Where missing data were identified, these were collated where possible.

Three of the 12 high altitudinal transects failed to be monitored at regular intervals due to logistical difficulties in reaching and/or walking them at night. Attempts were made, therefore, to identify and establish replacement upland transects, but finding suitable sites that would meet with FWD compliance for two-monthly surveys proved not to be possible. The final number of high altitude transects remains at nine.

Dr. Clarke accompanied FWD officers during their regular survey transects to supervise the work, provide additional training as necessary and amend protocols as required. Importantly, in addition to assessing that all FWD staff assigned to the amphibian project were competent in conducting surveys and in catching, handling and swabbing frogs, Dr. Clarke also ensured that disinfection protocols and other biosecurity measures were fully adopted. All transect locations have been mapped and paper and electronic copies of these have been provided to FWD staff and to the VSD Molecular Laboratory. Copies are also held at the Institute of Zoology in London.

As the different eleutherodactylid species are difficult to distinguish in the field, we investigated the potential use of sound recording equipment in the field. The idea being that we would record anuran calls during the transect surveys which could then be used as a tool for *Eleuthrodactylus* species identification. This work is on-going, but following initial indications that distinguishing between calls also would be difficult, this part of the study is now beginning to reap beneficial results. In addition to literature reviews, calls from known *Eleuthrodactylus* species in captivity have been recorded and analysed using specific software for comparative purposes.

In March, two staff from the Government of Dominica's Forestry and Wildlife Division (FWD), visited the UK for training in the principles and practices of amphibian husbandry, focusing on the specialist requirements of the mountain chicken, *Leptodactylus fallax*. The primary goal of this training visit was to increase relevant FWD staff knowledge and skills in preparation for the captive breeding project for *L. fallax* at the botanical gardens, Roseau. The Dominican staff were (1) Forester I Randolph Winston and (2) Forestry Worker Lenis Bruno.

Initially, they were given training in general principles and practice of amphibian husbandry techniques at the Zoological Society of London under the supervision of Richard Gibson, Curator of Herpetology, ZSL. Following this, specific training in general mountain chicken

husbandry, health monitoring and identification techniques, and breeding invertebrates for live amphibian food, was provided at the Durrell Wildlife Conservation Trust (DWCT) under the supervision of Dr Gerardo Garcia, Head of Herpetology.

One of the main goals of the project is the establishment of an international captive breeding programme for the Dominican mountain chicken in order to assure the continued survival of the species should the entire wild population be extirpated. The involvement of Dominica in this captive programme is regarded as crucial, as it will help to ensure the Dominican government becomes part of the solution to this extinction crisis, fully buying-in to the future assurance of the survival of the mountain chicken, and is not considered as just a by-stander or as part of the problem. Unfortunately, bureaucratic issues have delayed the construction of the captive breeding facility in Dominica, although the architect's plans and costings have now been approved by the Cabinet.

Despite this delay, two Dominican FWD staff were identified as being responsible for the captive care of the mountain chickens and they were given advanced training in the UK (see above). Also, husbandry guidelines (see attachment) for the keeping of mountain chickens were produced for the project by London Zoo and Jersey Zoo.

The delay to the construction of the captive breeding facility in Dominica had a knock-on effect in delaying planned visits to Dominica by UK (IoZ) staff to conduct training and to assist with the establishment of a captive population of frogs. This led to a smaller than anticipated number of weeks of UK staff time spent in Dominica during year 2, although airplane tickets were purchased (and held over), so there was no budgetary impact from this alteration in the planned timing of visits. It is anticipated that there will be no overall change to the number of visits or to the training given during the course of the project.

A particular issue with regards to the keeping of mountain chickens in captivity is that of food. Mountain chickens have voracious appetites. The commonly cultured *Gryllus* spp. crickets used by zoos throughout the world cannot be used in Dominica as escapees are certain to occur and this would lead to the introduction of alien (and potentially highly destructive) invasive species onto the island. It is heartening, therefore, to be able to report that the culture of locally-caught gryllid crickets which was set up during the first year of the project continues to be active. This culture is currently being maintained at a low level, awaiting the construction of the captive breeding facility. In the meantime, attempts are being made to speed up a rather prolonged hatching-to-maturity period through the use of higher temperatures, improved nutrition and decreased stocking densities.

In addition to our attempts to culture crickets as a food source in Dominica, Jersey Zoo has been attempting to train its captive Montserratian mountain chickens to take dead food. If this technique proves possible, it promises to greatly reduce the costs and increase the ease of keeping mountain chickens in captivity within Dominica.

Public education continued throughout year 2, with radio and television articles and with FWD staff giving talks at schools. The latter is being done as part of an existing schools outreach programme whereby every school in the country is visited by FWD staff to teach the pupils about wildlife conservation. During these visits, each pupil is given one of the project's educational leaflets (see attachment). The children take these leaflets home to their parents and this has been found to be one of the most effective ways of increasing public awareness across the island. Also, educational posters informing visitors about the issue of chytridiomycosis and mountain chicken conservation have been placed at each port of entry in Dominica. Additional dissemination of the results of this project has occurred at a ZSL symposium in London and at the annual conference of the European Association of Zoos and Aquaria in Spain.

3.2 Progress towards Project Outputs

Output 1. Current extent and impact of chytridiomycosis on Dominica established and future impacts and routes of spread predicted.

Further training of 13 Dominican Forestry staff in disease surveillance and amphibian population monitoring techniques. This is four more members of staff than anticipated.

The final number of transects for amphibian monitoring and disease surveillance stands at 12 lowland and 9 upland. These are being visited satisfactorily every two months.

- The number of mountain chicken frogs detected along transects is extremely low (only one sighting and a small number of aural detections during year 2), indicating that the impact of chytridiomycosis on this species is severe. The impact, if any, on eleutherodacytlid frogs currently appears to be negligible or low, but further work is continuing in this area.

Environmental monitoring for *Batrachochytrium dendrobatidis* has taken place and shown that the fungus can be detected at low prevalence within the environment. It is not known if viable (infectious) fungus is present in the environment, however, or, if it is, how long it might remain infectious. This is an area requiring further research.

A computer database of transect monitoring results has been established and is being satisfactorily maintained by the FWD staff.

- A computer database of *Batrachochytrium dendrobatidis* PCR results has been established and is being satisfactorily maintained by the VSD staff.

- This output is on target to be achieved by the close of the project.

Output 2. Diagnostic capacity for chytridiomycosis detection established on Dominica.

The infrastructure (a well-equipped molecular diagnostic laboratory in Roseau) was established in Year 1. The addition of a real-time PCR machine for more-rapid and sensitive diagnostics and to enable in-country environmental sampling is desirable. We are actively seeking funding for such a machine (which costs in the region of £30,000).

A Dominican veterinarian (Dr. Valarie Thomas) was trained in molecular diagnostic techniques in Year 1. Unfortunately, Dr. Valarie Thomas left the project at the end of Year 2. We are actively seeking a replacement molecular biologist. Ideally we wish to replace Valarie Thomas with another Dominican national, but those identified as having some training in molecular biology work in the USA or Europe (there being no molecular biology laboratory in Dominica other than the one set up by the current Darwin Initiative project). This is a major challenge to the success of the project, but highlights the urgent requirement for molecular biology capacity building within Dominica.

- This output was achieved, but with the loss of Valarie Thomas, further capacity building is required. Ideally more than one person will be trained, but this will prove to be difficult. This output should be achieved by the close of the project.

Output 3. Capacity for mountain chicken captive breeding programme established on Dominica.

- Forestry and veterinary staff have been trained in basic biology, reproduction and captive husbandry of the mountain chicken by Richard Gibson (London Zoo), Kevin Buley (Chester Zoo), Gerardo Garcia (Jersey Zoo) and Jay King (University of St Louis, Missouri) – these being the only people to have successfully bred this species in captivity.

- Further training of two FWD staff in amphibian husbandry (and cricket culture) was conducted at London Zoo and Jersey Zoo in the UK.

- Mountain chicken husbandry guidelines have been produced.

- An international "studbook" to ensure optimal captive husbandry and management of captive populations of Montserratian and Dominican mountain chickens has been set up between London Zoo, Chester Zoo, Jersey Zoo, Jay King and the Governments of Montserrat and Dominica.

- A native Dominican gryllid cricket (a staple diet of the mountain chicken in the wild) has been successfully cultured over several generations. Four Dominican staff have been trained in captive cricket husbandry and culture techniques in Dominica and two of these staff have received additional practice and training in cricket culture in the UK.

Architects drawings and construction company costings have been approved by the Dominican government Cabinet. The facility is due to be constructed during the summer of 2007.

- Despite the delayed construction of the captive breeding facility, we anticipate that this output will be achieved by the close of the project.

Output 4. Management Plan to minimise the spread and impact of the disease in the Caribbean produced and disseminated.

- A four day international workshop, with 26 attendees from the Lesser Antilles, was held in Dominica in March 2006 to develop a draft Management Plan to minimise the spread and impact of the disease in the Caribbean produced and disseminated. This draft plan (see attachment) has now been written up and disseminated amongst all attendees and representatives of additional Caribbean countries for comment.

- This output is on target to be achieved by the close of the project.

Output 5. Participants from six countries able to implement Management Plan.

- Although this output will not be realised until the end of the project, the international workshop held in Dominica to devise a draft management plan produced a great deal of enthusiasm from within and beyond Dominica for this output to be successful. Additionally, work on disease threats to mountain chickens in Montserrat has engendered additional enthusiasm for implementing controls to maintain the apparent chytridiomycosis-free status of this island.

- This output is on target to be achieved by the close of the project.

Output 6. Fundraising strategy developed

- The Dominican Ministry of Agriculture and Environment has agreed to fund the continued running and staffing of the molecular diagnostic laboratory beyond the project period. It is intended that the laboratory will develop diagnostic capacity for agricultural purposes in addition to continuing to conduct chytridiomycosis diagnostics.

- In addition, agreement has been reached with the Dominican government for the captive breeding facility to include an educational visitor attraction for which it is anticipated that tourists will be charged an entrance fee to help fund the continuation of the project. This will also provide a much-needed additional tourist attraction for Roseau.

- Discussions are on-going with the National Bank of Dominica (which uses the mountain chicken as its logo) for sponsorship of the project.

- Although delayed, this output is still on target to be achieved by the close of the project.

None of the outputs have been modified over the past year and there have been no changes in the output level assumptions.

3.3 Standard Output Measures

Table 1 Project Standard Output Measures

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	TOTAL
6a	Number of people who received training in amphibian population monitoring and disease surveillance; in captive husbandry and breeding of mountain chickens, in culture of captive crickets; in disease risk assessment and mitigation, and/or in chytridio-mycosis detection and diagnostics	40	15			
6b	Number of training weeks provided	16	5			
7	Number of different types of training materials	1	2			

	produced for use by host country		
8	weeks spent by UK project staff on project work in host country(s)	21	6
11a	Number of papers published in peer reviewed journals		1
11b	Number of papers submitted to peer reviewed journals	1	1
12	Number of computer based databases established and handed over to the host country.		2
14a	Number of conferences/seminars/ workshops organised to present/disseminate findings	2	1
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work were presented/ disseminated.	4	2
15a	Number of national press articles published in host country	5	
15c	Number of national press releases or publicity articles in UK	1	2
15d	Number of local press releases in UK		1
17a	Number of dissemination Networks established		1
17b	Number of dissemination		1

	Networks enhanced/ extended		
18a	Number of national TV programmes/features in host country(s)	6	1
19a	Number of national radio interviews/features in host country(s)	5	
21	Number of permanent educational/training/research facilities established for continuation after Darwin funding has ceased	1	No additional facilities
22	Number of permanent field plots established during the project and to be continued after Darwin funding has ceased	24	No additional field plots
23	Value of resources raised from other sources for project work	36,800	14,175

Table 2 Publications

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Training manual*	Training manual on amphibian population survey techniques and disease screening for chytrid surveillance in Dominica. B. Lawson & F. Clarke 2005	Zoological Society of London, London	Dr. Andrew Cunningham, Institute of Zoology, Regent's Park, London NW1 4RY a.cunningham@ioz.ac.uk	N/A
Husbandry Guidelines*	Mountain chicken husbandry guidelines. R. Gibson & K. Buley 2006	Zoological Society of London, London	Dr. Andrew Cunningham, Institute of Zoology, Regent's Park, London NW1 4RY a.cunningham@ioz.ac.uk	N/A
Published journal article*	Garcia, G., Cunningham, A. A., Horton, D. L., Garner, T. W. J., Hyatt, A., Hengstberger, S., Lopez, J., Ogrodowczyk, A., Fenton, C. & Fa, J. E. (2007) Mountain chickens *Leptodactylus fallax* and sympatric amphibians appear to be disease free on Montserrat. *Oryx* **41,** 398-401. 2007	Cambridge University Press, Cambridge	Dr. Gerardo Garcia, Durrell Wildlife Conservation Trust, Les Augres Manor, Trinity, Jersey JE3 5BP, U.K. gerardo.garcia@durrell.org or Dr. Andrew Cunningham, Institute of Zoology, Regent's Park, London NW1 4RY a.cunningham@ioz.ac.uk	N/A
Workshop proceedings*	*Draft* chytridiomycosis management plan for the lesser antilles region: minimising the risk of spread, and mitigating the effects, of amphibian chytridiomyosis.	Zoological Society of London, London	Dr. Andrew Cunningham, Institute of Zoology, Regent's Park, London NW1 4RY a.cunningham@ioz.ac.uk	N/A

	A. A. Cunningham & B. Lawson 2006			
MSc Thesis*	Caribbean chytrid: the threat posed by chytridiomycosis to the mountain chicken (*Leptodactylus fallax*) and other amphibians endemic to the Lesser Antilles D. Horton 2005	University of London, London	Tony Sainsbury, MSc Course Director, Institute of Zoology, Regent's Park, London NW1 4RY tony.sainsbury@ioz.ac.uk	N/A
MSc Thesis*	Chytridiomycosis in the Caribbean: Informing risk assessments and mitigating actions E. Pini 2006	University of London, London	Tony Sainsbury, MSc Course Director, Institute of Zoology, Regent's Park, London NW1 4RY tony.sainsbury@ioz.ac.uk	N/A

3.4 Progress towards the project purpose and outcomes

The project continues to make good progress towards its ultimate goals. There have been some hitches, such as the loss of our project-trained molecular diagnostician and delays to the construction of the captive breeding centre, however we are confident that these will be overcome and will not be detrimental to the overall project outcomes by the close of the project.

The purpose level assumptions continue to hold true. Countries within the Lesser Antilles, and most particularly Dominica, remain committed to the CBD. Also, there is good political stability, enabling the strategy to be implemented. On this last point, the original named project partner within the VSD (Dr. J. C. McIntyre) was appointed as the Dominican Minister of Agriculture and the Environment shortly before the project began and he has been in this position since. Therefore, the project has been well received at the highest levels of government in Dominica.

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

The project has led to an increase in awareness of amphibian biodiversity, amphibian conservation and the threat of chytridiomycosis, both within Dominica and within several other Caribbean Islands, most notably Montserrat and Grenada. Whilst this increased awareness is primarily amongst forestry and/or wildlife staff, it is also notable amongst the public and politicians in Dominica and Montserrat.

The issue of disease as a threat to wildlife is now high on the agenda of government veterinary staff in Dominica and, through discussions and presentation at meetings amongst their counterparts from other islands in the region, these staff have been increasing awareness within veterinary departments in other Caribbean islands. It seems that amphibian

conservation is now on the agenda in the Caribbean, whereas prior to the project, this taxon received little or no attention, even from the wildlife conservation professionals in the region.

It is hoped that this increased awareness will eventually be translated into conservation actions and, ultimately, to a positive impact on amphibian biodiversity conservation in the Lesser Antilles. The final workshop of the current project will be an important milestone in this regard.

Monitoring, evaluation and lessons

The effectiveness of the project is evaluated with every visit by UK staff to Dominica. Also, our Dominican partners monitor the project outputs and report these regularly via email to the UK. A one-day evaluation meeting was held by staff from the UK Partners in November 2006 in order to evaluate the progress of the project to date, to identify any areas requiring modification and to plan for the forthcoming year. Apart from the delayed construction of the captive breeding centre, the only area of concern was the difficulty in distinguishing between different eletherodactylid species. At this meeting, plans were made to investigate the use of sound recording equipment to assist with this task.

Quality control measures for the molecular diagnostics laboratory include the running of positive and negative controls with each PCR run and the analysis of duplicate samples in the UK to ensure consistency of results between the two laboratories.

FWD staff are evaluated at least annually by UK staff. These assessments involve both theoretical (classroom) and in-the-field evaluations of ability of each member of staff working on the project.

The IoZ project co-ordinator receives verbal (and occasionally written) reports from other UK trainers on the progress of training and the abilities of each Dominican staff member.

The principal indicators of achievement are (1) the number of amphibian monitoring and disease surveillance transects successfully completed during every two-month cycle, and (2) the number of samples successfully processed in the molecular diagnostic laboratory. These are frequently monitored and any difficulties (e.g. purchase of suitable reagents, equipment failures) are discussed and remedies jointly sought between the Dominican and UK staff.

The principal lesson leaned during year 2 is to try not to rely on single individuals for key tasks (e.g. molecular diagnostics). This is, however, difficult as there is no available budget to employ more than one person on this task and no potential part-time assistants could be identified. This is an area that requires further exploration once a suitable replacement for Dr. Valarie Thomas is found.

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

The review of last year's annual report was very positive and was welcomed by the project partners. The reviewer noted an end date of 2007, but that project activities extended until 2008. This was due to an error arising from the fact that the start of the project had been delayed by one year due to DI financial constraints: the end date of the project is in 2008. The reviewer noted that educational materials were produced in English and suggested that these be produced also in Creole. This point was discussed with the project partners in Dominica. It is their opinion that, although Creole is widely spoken in Dominica, few people can actually read this language. Television and radio articles about the project have been broadcast in both English and Creole, so this helps to target the Creole speaking community on Dominica.

The reviewer suggested that one of the project personnel should visit neighbouring islands to help disseminate the message about the threat of chytridiomycosis and to encourage the establishment of an active regional conservation network. Although this has not been

specifically done (mainly due to time and budgetary restrictions), project personnel from the VSD and FWD have raised the issue at regional meetings with their counterparts from neighbouring islands. Also, the Dominican Minister of Agriculture and Environment has discussed the issue at a regional ministerial meeting. This is an action that we will continue to bear in mind and will try to pursue if required (e.g. if the number of persons responding to invites to the final workshop is low and does not adequately cover the region).

The reviewer raised the idea of sampling healthy amphibians for chytridiomycosis during the bi-monthly surveys. In fact, this is a core component of the work programme – and has been since the start of the project.

As requested by the reviewer, copies of the training manual on amphibian population survey techniques and disease screening for chytrid surveillance and of the MSc thesis on the risk assessment of the spread of chytridiomycosis in the Caribbean have been attached to this report. A copy of a second MSc thesis, on environmental sampling for *Batrachochytrium dendrobatidis* (listed in Table 2 and discussed in 3.1 above) also has been attached.

5. Other comments on progress not covered elsewhere

The project design has not changed over the past year. Significant difficulties, and the steps taken to overcome them, have been discussed above. The project is at risk if a replacement molecular biologist is not found or if the captive breeding centre is not constructed.

6. Sustainability

The project has a high public and political profile within Dominica. This has been promoted via a public education campaign (including leaflets and posters) and via UK staff visits being highlighted on television and radio programmes. The Dominican Ministry of

The Dominican government has agreed to fund the continued running and staffing of the molecular diagnostic laboratory beyond the project period. It is intended that the laboratory will develop diagnostic capacity for agricultural purposes in addition to continuing to conduct chytridiomycosis diagnostics. Also, the Dominican government has agreed that the captive facility will include an educational visitor attraction for which tourists will be charged an entrance fee to help fund the continuation of the project. (It is anticipated that the centre will be free to Dominican nationals and used as an educational facility for schools.) These two agreements provide a strong basis for an exit strategy and provide evidence for interest in maintaining the capacity for biodiversity conservation within Dominica that has been established by this project.

7. Dissemination

See 3.1, 3.2, 7 & Annex 1.

8. Project Expenditure

Please expand and complete Table 3.

Table 3 Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)

Highlight any agreed changes to the budget and explain any variation in expenditure where this is +/- 10% of the budget.

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

I agree for ECTF and the Darwin Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here)
In this section you have the chance to let us know about outstanding achievements of your project over the year that you consider worth highlighting to ECTF and the Darwin Secretariat. This could relate to achievements already mentioned in this report, on which you would like to expand further, or achievements that were in addition to the ones planned and deserve particular attention eg in terms of best practice. We may use material from this section for various promotion and dissemination purposes, including e.g. publication in the Defra Annual Report, Darwin promotion material, or on the Darwin website. As we will not always be able to ask projects on an individual basis for their consent to publish the content of this section, please note the above agreement clause.

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

Project summary	Measurable Indicators	Progress and Achievements April 2006 - March 2007	Actions required/planned for next period
Goal: *To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve* *The conservation of biological diversity,* *The sustainable use of its components, and* *The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources*		Amphibians had not been regarded as important component of biodiversity within Dominica or other islands in the Lesser Antilles prior to this project. The workshop in March 2006 greatly improved this situation amongst the islands represented at the workshop. Findings from this project have led to a greater appreciation of amphibian conservation by public and politicians in Dominica and to the prospect of increased legal protection of *Leptodactylus fallax* in Dominica.	*(do not fill not applicable)*
Purpose To develop strategies and capacity to minimise the impact and spread of chytridiomycosis within Dominica and other Caribbean islands.	Government of Dominica endorses and participates within in-country capacity building. Representatives of at least 6 Caribbean States endorse and agree to implement the Management Plan to minimise the spread and impact of chytridiomycosis.	Extent and impact of chytridiomycosis on Dominican mountain chicken population established. Infection of sympatric (potential reservoir) species detected. Draft workshop proceedings to develop a chytridiomycosis management plan for the Lesser Antilles region produced and circulated	Continued amphibian population monitoring and conducting disease surveillance, as planned. Hiring a replacement molecular biologist within Dominica. Development of within-Dominica captive breeding programme and establishment of an international (safety-net) aspect to this programme.

		for comment.	Final workshop in March 2008 to develop the final plan for chytridiomycosis mitigation throughout the Lesser Antilles region.
Output 1. **Current extent and impact of chytridiomycosis on Dominica established and future impacts and routes of spread predicted.**	International and scientific community endorses the research results.	Extent and impact on mountain chicken population in Dominica established as severe, although final analyses await the end of the three-year monitoring period. Understanding the impact, if any, on other amphibian species in Dominica also requires analyses of data once the three-year data collection period has been completed.	
Activity 1.1. Signed Memorandum of Understanding		Memorandum of Understanding signed	
Activity 1.2. Amphibian population monitoring and disease surveillance within Dominica; environmental sampling within Dominica		One scientific paper submitted, one MSc thesis published; continued amphibian population monitoring and disease surveillance; additional environmental sampling would be desirable; similar work is required on other Caribbean islands (but falls outwith the scope of the current Darwin Initiative project).	
Activity 1.3. Chytridiomycosis status of other Lesser Antilles islands established; risk assessment conducted to establish routes of spread.		One scientific paper published, one MSc thesis published	
Output 2. **Diagnostic capacity for chytridiomycosis detection established on Dominica.**	Equipped diagnostic laboratory and trained staff on Dominica. Diagnostic results produced and these verified by international scientific community.	This output had been completed until the trained member of staff left the project. Despite this set-back, progress is likely to be on target by the time the project closes. The indicator is appropriate.	

Activity 2.1. Diagnostic laboratory to be built and equipped.		Diagnostic laboratory built and equipped.
Activity 2.2. A member of staff trained to conduct molecular diagnostics to a high level of competency		Staff member appropriately trained, but this person has since left the project. Identifying, hiring and training a replacement member of staff is a priority.
Output 3. **Capacity for mountain chicken captive breeding programme established on Dominica.**	Presence of captive breeding facility and trained staff on Dominica.	Progress is delayed, but still on target to be completed by the end of the project. The indicator is appropriate.
Activity 3.1. Staff training in mountain chicken husbandry		Staff trained in mountain chicken husbandry
Activity 3.2. Staff training in live food (cricket) culture		Staff trained in live food (cricket) culture
Activity 3.3. Establish culture of native Dominican crickets which is capable of providing a constant supply of mountain chicken food.		Culture of native Dominican crickets established, although not yet capable of supplying a constant supply of mountain chicken food. Further work on improving the husbandry and nutrition of the crickets is on-going.
Activity 3.4. Construction of a captive breeding centre for mountain chicken in Dominica.		Construction has been delayed, but the captive breeding centre is expected to be completed during the summer of 2007.
Output 4. **Management Plan to minimise the spread and impact of the disease in the Caribbean produced and disseminated.**	Plan developed and produced collaboratively by participating Caribbean states (10 participants); media events; educational material; popular and scientific publications.	Progress is on target. The indicator is appropriate.

Activity 4.1. Hold draft plan workshop to introduce the problem of chytridiomycosis and the concept of a regional control and mitigation plan to representatives from a range of Lesser Antilles islands.		Draft plan workshop held in March 2006.
Activity 4.2. Publish proceedings of Draft plan for comment and circulation.		Proceedings of draft plan published and circulated.
Activity 4.3. Hold a final plan workshop in 2008 with representatives from a range of Lesser Antilles islands.		Final plan workshop to be held in March or April 2008.
Output 5. **Participants from six countries able to implement Management Plan.**	10 staff from 6-8 countries trained in mitigation of disease spread and impact; email network created.	Progress is on target. The indicator is appropriate.
Activity 5.1. See 4.1.		
Activity 5.2. See 4.3.		
Output 6. **Fundraising strategy developed**	Strategy agreed	Progress is delayed, but still on target to be completed by the end of the project. The indicator is appropriate.
Activity 6.1. Obtain Dominican government support for the continuation of the project.		The Dominican Ministry of Agriculture and Environment has agreed to fund the continued running and staffing of the molecular diagnostic laboratory beyond the project period. It is intended that the laboratory will develop diagnostic capacity for agricultural purposes in addition to continuing to conduct chytridiomycosis diagnostics.

Activity 6.2. Include a visitor attraction in the captive breeding facility, to enable people to see mountain chickens and to learn about the mountain chicken and the threats to amphibian fauna in the Lesser Antilles region.	Agreement has been reached with the Dominican government for the captive facility to include an educational visitor attraction for which tourists will be charged an entrance fee to help fund the continuation of the project. (It is anticipated that the centre will be free to Dominican nationals and used as an educational facility for schools.)
Activity 6.3. Sponsorship to be sought from the business community.	Discussions are on-going with the National Bank of Dominica (which uses the mountain chicken as its logo) for sponsorship of the project. Other businesses are also being approached for sponsorship of the project.

Annex 2 Project's full current logframe

Project summary	Measurable indicators	Means of verification	Important assumptions
Goal: *To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve* • *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*			
Purpose *To develop strategies and capacity to minimise the impact and spread of chytridiomycosis within Dominica and other Caribbean islands.*	*Government of Dominica endorses and participates with in-country capacity building. Representatives of at least 6 Caribbean States endorse and agree to implement the Management Plan to minimise the spread and impact of chytridiomycosis.*	*Signed Memorandum of Understanding*	*Countries retain commitment to CBD.* *Sufficient political stability to implement strategy.*
Outputs			

Current extent and impact of chytridiomycosis on Dominica established and future impacts and routes of spread predicted.	*International and scientific community endorses the research results.*	*Annual reports; four peer-reviewed scientific papers published and submitted to Darwin Initiative.*	
Diagnostic capacity for chytridiomycosis detection established on Dominica.	*Equipped diagnostic laboratory and trained staff on Dominica. Diagnostic results produced and these verified by international scientific community.*	*Annual reports; media releases file; results published in peer-reviewed scientific papers.*	
Capacity for mountain chicken captive breeding programme established on Dominica.	*Presence of captive breeding facitility and trained staff on Dominica.*	*Annual reports; media releases file.*	*Dominican mountain chickens are not extirpated by chytridiomycosis before facility is stocked.*
Management Plan to minimise the spread and impact of the disease in the Caribbean produced and disseminated.	*Plan developed and produced collaboratively by participating Caribbean states (10 participants); media events; educational material; popular and scientific publications.*	*Management Plan documentation published and submitted to Darwin Initiative; Media releases file; project web site report; copies of all publications sent to Darwin Initiative.*	*Participating Caribbean Governments maintain collaboration.*
Participants from six countries able to implement Management Plan.	*10 staff from 6-8 countries trained in mitigation of disease spread and impact; email network created.*	*Correspondence; Participants attendance & assessment record; Training reports.*	
Fundraising strategy developed	*Strategy agreed*	*Strategy on file at ZSL, FFI & Dominican Government.*	
Activities	***Activity Milestones (Summary of Project Implementation Timetable)***		

Conservation and Research programme	*Year 1: PCR diagnostic laboratory on Dominica established, equipped and functioning; building of captive-breeding facility underway; transects identified and monthly amphibian monitoring and surveillance begun; possible modes and routes of spread to other islands identified and mitigating measures identified.* *Year 2: Captive-breeding facility built and stocked with at least 50 mountain chicken frogs; international captive breeding programme established; measures put into place to minimise the risk of chytridiomycosis spreading to other Caribbean islands.* *Year 3: Extent of spread of chytridiomycosis on Dominica established; impact of disease on amphibian fauna established; captive-breeding attempts for mountain chickens begun; further mitigation against the spread of chytridiomycosis identified and enacted in light of project results.*
Training programme	*Year 1: One member of VSD staff trained in PCR diagnostic techniques in the UK; 3 members of VSD staff trained in diagnostic techniques in Dominica; 3 members of FWD staff trained in mountain chicken captive husbandry and breeding techniques; 9 members of FWD staff trained in amphibian population monitoring and disease surveillance; Training workshop held with at least 10 participants from 6-8 Caribbean islands.* *Year 2: Three members of VSD staff given further training in PCR diagnostic techniques on Dominica; 3 members of FWD staff completed further training in mountain chicken captive husbandry and breeding techniques.* *Year 3: Training workshop held on addressing the threat of chytridiomycosis to the Caribbean with at least 10 participants from 6-8 Caribbean islands.*
Management plan development	*Year 1: Draft management plan to counter threat of chytridiomycosis to Caribbean amphibian fauna produced.* *Year 3: Final management plan to counter threat of chytridiomycosis to Caribbean amphibian fauna published and disseminated to governments of participating, and other, Caribbean islands.*
Communication and project dissemination	*Year 1: Public awareness educational material produced and disseminated within Dominica; communication and surveillance network between Caribbean islands developed; project website launched; dissemination through popular and scientific media.* *Year 2: Continuation of project website and communication network; dissemination through popular and scientific media and through public awareness educational material.* *Year 3: Continuation of project website and communication network; dissemination through popular and scientific media; revised public awareness educational material produced and disseminated within Dominica and the Caribbean; ten representatives of other Caribbean islands able to put into place amphibian population monitoring and chytridiomycosis surveillance programmes on their own islands.*
Project sustainability	*Year 3: Fundraising strategy developed; funding obtained for sustainability of diagnostic laboratory, captive-breeding programme and for amphibian monitoring and surveillance on Dominica.*

Annex 3 onwards – supplementary material (optional)

1. Mountain chicken husbandry guidelines

2. Public education leaflet

3. Draft chytridiomycosis management plan for the lesser antilles region: minimising the risk of spread, and mitigating the effects, of amphibian chytridiomyosis.

4. Horton, D. (2005) Caribbean chytrid: the threat posed by chytridiomycosis to the mountain chicken (*Leptodactylus fallax*) and other amphibians endemic to the Lesser Antilles. MSc Thesis. University of London.

5. Pini, E. (2006) Chytridiomycosis in the Caribbean: Informing risk assessments and mitigating actions. MSc Thesis. University of London.

6. Training manual on amphibian population survey techniques and disease screening for chytrid surveillance in Dominica.

7. Garcia, G., Cunningham, A. A., Horton, D. L., Garner, T. W. J., Hyatt, A., Hengstberger, S., Lopez, J., Ogrodowczyk, A., Fenton, C. & Fa, J. E. (2007) Mountain chickens *Leptodactylus fallax* and sympatric amphibians appear to be disease free on Montserrat. *Oryx* **41,** 398-401.

Checklist for submission

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