



**Enabling the people of Montserrat to conserve  
the Centre Hills**

# First Annual Report



Submitted by



**The Royal Society for the Protection of Birds  
in partnership with:**



Ministry of Agriculture,  
Housing, Lands and  
Environment



April 2006

## **ENQUIRIES CONCERNING THIS REPORT**

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**April 2006**

Cover Images, clockwise from top left:

Montserrat Galliwasp (C McCauley)

Collecting botanical samples in the Centre Hills (A McRobb)

Project team map reading (C McCauley)

Katy Hill (741m), highest peak in the Centre Hills (C McCauley)

# Darwin Initiative

## Annual Report

### 1. Darwin Project Information

Project Ref. Number	14-027
Project Title	<i>Enabling the people of Montserrat to conserve the Centre Hills</i>
Countries	<i>UK, Montserrat</i>
UK Contractor	<i>The Royal Society for the Protection of Birds</i>
Partner Organisations	<i>Ministry of Agriculture, Lands, Housing and Environment; Montserrat National Trust; Montserrat Tourist Board; Durrell Wildlife Conservation Trust; Royal Botanic Gardens-Kew</i>
Darwin Grant Value	£160,900
Start/End dates	01 <sup>st</sup> May, 2005 – 31 <sup>st</sup> March, 2008
Reporting period and annual report number	01 <sup>st</sup> May 2005 – 31 <sup>st</sup> March, 2006 <i>Annual Report 1</i>
Project website	<i>www.malhe.gov.ms/centrehills</i>
Authors, date	<i>Carole McCauley, Stephen Mendes, Sarah Sanders</i> 30 April 2006

### 2. Project Background

Montserrat is located in the Lesser Antilles chain approximately 27 miles southwest of Antigua. The island is about 102km<sup>2</sup> in size. Recent volcanic activity since 1995 has significantly changed the landscape of Montserrat. The former capital of Plymouth was destroyed by volcanic activities, and sections of the city, and indeed many villages, rivers, and pastures, lie beneath meters of ash and rock.

Today, over 60% of the island is contained within an Exclusion Zone, which is off limits to human activity. The island's population, which was over 12,000 in the early 1990s, shrunk to less than 2,000 during massive evacuations during the peak of the volcanic crisis in 1997. Many have since chosen to return, however the population of 4,500 today is growing quite slowly.

The impacts on the natural environment have been devastating. As a result, Montserrat's Centre Hills (1,400 ha) have become of increased global biodiversity importance, supporting many of Montserrat's key endemic species. Volcanic activity destroyed almost all the forests of the southern Soufriere Hills, resulting in the total loss of about 60% of Montserrat's forest ecosystem. The Centre Hills now holds much the largest intact forest area remaining on Montserrat. It is the last viable enclave for most of the island's wildlife, including those of global conservation concern, including the critically threatened Montserrat Oriole *Icterus oberi*, Montserrat Galliwasp *Dipoglossus montisserrati*, and Mountain Chicken *Leptodactylus fallax*. The Centre Hills forests also provide essential environmental goods and services to the people of Montserrat. They are the main water catchment area on the island and provide protection from soil erosion, landslides and flooding during severe weather events.

Despite this importance, the Centre Hill forests are currently in relatively poor ecological health, due to a combination of historical factors and increasing pressure as the island's infrastructure is rebuilt in the North. Historically the area was cleared for plantations so most of the forest is secondary. Non-native species such as rats and pigs have been introduced. These are having a catastrophic impact on the ecology of the forest, and are major predators of native wildlife;

little is known of the impacts of alien plant invasives, but they are known to be widespread. The Centre Hills now provides the sole water supply for the people on Montserrat and there is substantial water abstraction for human use, which may be adversely affecting forest ecology.

There are several barriers to be overcome if successful management of the Centre Hills is to be achieved: Little is known about the status and distribution of some taxa, so there is an urgent need to assess the current status of the remaining biological resources; The protection status of the Centre Hills is unclear. Conflicts have arisen over the Centre Hills Forest Boundary and people are not aware of their rights and responsibilities; There are few persons on the island with the technical skills to take forward conservation work; There are a range of stakeholders involved in the management of the Centre Hills but communication between them is poor.

There remain serious economic issues and shortfalls as the government has focused initial efforts on rebuilding basic infrastructure such as housing and public works. Increasingly, effort is being made to expand economic investment and growth across a variety of sectors including agriculture and tourism. The Government of Montserrat envisages nature tourism as a major future source of income, and hope that the Centre Hills will play a key role in this. This potential is not yet developed.

### **3. Project Purpose and Outputs**

See logical framework attached as Annex 1.

The overall goal of the project is to conserve the biodiversity of the Centre Hills Forest Reserve for present and future generations. The purpose of the project is therefore to strengthen the capacity of the people of Montserrat so that they are better able to take targeted action to do this. The outputs of the project are:

1. Knowledge of the ecology and socio-economic use of the forest is available to guide management of the Centre Hills.
2. Participatory management plan is produced for the Centre Hills
3. Technical and professional skills to conserve, manage and restore the Centre Hills are strengthened on Montserrat
4. Significant progress is made towards establishing the Centre Hills as Montserrat's first Protected Area
5. Appreciation of the Centre Hills forest and an awareness of its value is increased locally and internationally
6. Programme of work to manage the Centre Hills is started

#### *Modifications to original plan*

Darwin is informed of two amendments to the operational plan in the half yearly report. These were:

- The biological assessment has taken longer than originally planned so most fieldwork will now be completed by March 2006. This is in time for the management plan workshop, which will take place in September 2006. As there is very little information available on the plants of the Centre Hills, the botanical collection will continue until March 2007.
- Instead of recruiting a part time forest ecologist to advise on the research of ecological processes in the Centre Hills the project agreed instead to draw on the expertise provided by the project collaborators, led by Dr Geoff Hilton, RSPB. It will enhance project activities as the funding allocated for 2005 – 2006 will be used to support a GIS specialist at RBG Kew to prepare a habitat map for the Centre Hills.

#### 4. Progress

This is the first year of the project. There is a long history of collaboration between the international and local partners, which recently identified the long-term strategic need to secure the conservation of the Centre Hills for the future. RSPB staff visited Montserrat in September 2004 to develop the project with key stakeholders.

A summary of progress towards achieving outputs is included in the logical framework attached as Annex 1. The first twelve months of the project have gone well and the project milestones identified for this period have largely been achieved. Project staff are appointed, an office established and most of the activities planned for the first field season of the project have been carried out.

The major achievements and methodologies for each output are summarised below. Where applicable, a description of any differences between the proposed and actual activities is provided.

1. Knowledge of the ecology and socio-economic use of the forest is available to guide management of the Centre Hills
  - In terms of the biological assessment, extensive field surveys have been carried out on plants, herptiles, birds, insects, and bats over the past year (see Annex 5 for initial results from the biological assessment). This has involved staff from the Forestry Department, Durrell Wildlife Conservation Trust, Montana State University, South Dakota State University, and project staff. The international partners are primarily providing technical scientific expertise to local partners who implement the work in the field. As previously mentioned, the biological assessment has taken longer than planned so most fieldwork will be completed by March 2006. The results will be included in a report that is currently being drafted by DWCT. As there is very little botanical information available about the Centre Hills, Kew will continue botanical collections until March 2007.
  - The research into ecological processes is being led by an RSPB ecologist rather than a consultant. It is focusing primarily on the impact of rats, but also investigates the impact of other invasive species and forest hydrology. Various methodologies have been tested in the field, and a final protocol is being implemented by project staff (see Annex 6). The two major aspects of this work include a rat ecology study to determine feeding, breeding, and distribution patterns, and a rat control experiment, which aims to provide data on the impact of rats on other species and the forest ecosystem in general.
  - A vegetation map for the Centre Hills is currently under preparation by a GIS expert at Kew and will be available for the workshop in September 2006.
  - The socioeconomic assessment includes primary data from a variety of sources and secondary information provided by written records, stakeholders, and other relevant persons. Tailored surveys – designed to gather information about knowledge, attitudes, values, and behaviours – are being employed with targeted primary sources including farmers, livestock tenders, hunters, tourists, and the general public (see Annex 7 for survey questionnaires). Secondary source information has come from a review of historical records and interviews with a variety of key informants such as statisticians, extension officers, community and political leaders, land owners, etc. This data will be analysed and reported on by the Project Manager and Counterpart Project Manager in Year 2.
2. Participatory plan is produced for the Centre Hills
  - The Memorandum of Collaboration (see Annex 10) was signed by all project partners, which solidifies the commitment and contributions of all involved.
  - Letters (see Annex 9) have been sent by the Ministry of Agriculture, Lands, Housing and Environment to all parties owning land within the existing forest boundary. Although it has not yet been determined whether this will evolve into a national park boundary, it is an important step in formally soliciting the input and support of land owners towards the project's goal. Although the government has the right to declare and manage a protected area, there are several local issues in play that make having contented land owners on

board a primary goal of the project and an integral part of the process. This may sound somewhat insignificant, but it was only through the efforts of this project that a list of these land owners was first produced! Therefore, it is a milestone that land ownership issues can now be officially and comprehensively addressed.

3. Technical and professional skills to conserve, manage and restore the Centre Hills are strengthened on Montserrat
  - Two local field officers began work in October 2005 and the Counterpart Project Manager began work part time in November 2005 and full time as of January 2006. Training and skills transfer have been a major component of Year 1, with Forestry Department and project staff receiving training through participation in workshops and conferences, field deployment, and other on-the-job experiences.
  - Equipment has been procured including computers, furniture, office supplies, GIS software, microscope, digital camera, and a variety of field safety and collecting gear.
  - Local GIS efforts have been enhanced through a formal collaboration with the Physical Planning Unit. This has involved sharing of resources and expertise, increased field data collection capacity, and a general willingness to mutually develop environmental features of the national GIS. As a result, local agencies will be better able to utilise advanced GIS features and create materials locally.
4. Significant progress is made towards establishing the Centre Hills as Montserrat's first Protected Area
  - Legal issues are being investigated, and a single land ownership map has been produced and overlaid with the existing "layers" such as water courses, the current forest boundary, and trails. The partners agreed that the project needed to supplement available resources in order to deal with the complexities of developing an effective legal framework under which protected area management and biodiversity conservation could be addressed. As a result, a comprehensive legislative and review process is scheduled to begin early in Year 2 with additional funds secured from the Overseas Territories Environment Programme (OTEP). This will include extensive consultations with land owners, resource users and managers, political and community leaders, and the general public.
5. Appreciation of the Centre Hills forest and an awareness of its value is increased locally and internationally
  - Local media has been widespread, and Montserrat's newspaper and radio station have enthusiastically opened their arms to the project. Staff and partners regularly appear on radio programmes and in the local news (see Annex 4 for media coverage). The project has also received attention throughout the region and in the UK through BirdLife Caribbean, the UK Overseas Territories Conservation Forum, and media produced by RBG-Kew. The first project newsletter (Annex 8) was distributed widely and received with much enthusiasm to over a thousand people. Numerous outreach presentations were made on Montserrat, and the project was used as an effective "conservation case study" in a seminar to MSc students at the University of Exeter, run by the project leader. The project's website is in development, and will be launched in May 2006. Two partners participated actively at the Society for the Conservation and Study of Caribbean Birds conference in August 2005.

### *Difficulties encountered*

There were no significant difficulties encountered during the year. The biggest setback was the delay in the official start-date of the Counterpart Project Manager, which was held up due to bureaucratic difficulties in getting the individual transferred from one Ministry to another, and then seconded to the project so that the individual would not lose any pension benefits. This was surmounted, and has secured the Counterpart Project Manager's long-term interests.

Other difficulties have included delays in getting equipment cleared from Customs and the inability to rely on email as a primary means of communication among local partners. This has been addressed via following up with phone calls and in-person meetings.

#### *Project design enhancement*

The design of the project has been significantly enhanced by the addition of Overseas Territories Environment Programme (OTEP) funds and a more comprehensive workplan to address the legislative review and consultation process activities. Ensuring a viable legal framework will contribute to the long-term sustainability of the project, particularly with regard to protecting the interests of stakeholders such as land owners and those involved with agriculture and tourism.

#### *Timetable for next reporting period*

A timetable for the next reporting period is presented as Annex 2.

### **5. Actions taken in response to previous reviews (if applicable)**

Not applicable.

### **6. Partnerships**

#### *Collaboration between UK and local partners*

The collaboration between the UK and host country partners has been excellent. A Memorandum of Collaboration (Annex 10) was signed by all partners at the start of the project that outlines the roles and responsibilities of partners to the project.

There have been significant advantages by involving a range of international partners in the project as it has meant that a range of expertise could be drawn upon for the biological assessment.

The other major success has been the strong relationship between the Project Manager (provided by a UK partner but based in Montserrat) and the local Counterpart Project Manager. There has been a great emphasis on the transfer of project management skills in this relationship, as well as nurturing the “team” spirit and fostering synergies between all six of the UK and local partners.

A Memorandum of Collaboration was established between the project and the Physical Planning Unit on Montserrat to outline the nature of collaboration to enhance the national GIS through the provision of technical training to project partners and staff. The GIS Unit, located within this agency, is particularly pleased to have the first real project whereby persons outside the unit are gathering field data to add to the national system (as opposed to the translation of existing data into digital format, which is largely what they have done since the Unit’s inception several years ago). Appreciation for this was expressed openly by the GIS Unit Director during a recent training workshop. This collaboration is an indication that local agencies will be able to substantially enhance the national GIS for use in environmental and other applications.

#### *Collaboration outside of the project*

The project is collaborating with one similar project on Montserrat. The Montserrat National Trust is the recipient of an OTEP grant to improve the national botanic garden. Both the Darwin Centre Hills Project and the Botanic Garden projects have benefited since both have enabled expertise from Kew Gardens to spend significant time in Montserrat advising on many plant-related matters that are of interest to in-situ and ex-situ conservation, environmental education, and habitat management. It is planned that the improved botanic garden design will showcase endemic species of the Centre Hills, address the threats that many invasive species have on naturally occurring plant communities, and encourage the propagation of native species for horticultural purposes.

The project has benefited from experience and dialogue with the BVI National Parks Trust. The Project Manager and RSPB's Project Leader were able to spend a week in the BVI in September 2005 observing a Darwin-funded planning workshop on the island of Anegada. Subsequent discussions have been held regarding the way in which the BVI has worked to improve legal frameworks for protected area management via an OTEP grant.

The two project Field Officers each spent a week in Antigua in November/December 2005 taking part in biological survey work. This was part of the Environmental Awareness Group's Offshore Islands Conservation Programme, which has been funded through the Darwin Initiative (via Fauna & Flora International), British High Commission, and other agencies. This particular project involves some of the same UK-based field staff that have worked in Montserrat, and there are clear and tangible benefits in sharing resources and experiences with Montserrat's closest island neighbours.

Finally, the project has had preliminary discussions with the Trinidad-based Caribbean Natural Resources Institute, which should soon be contracted to provide support for the public consultation activities of the legislative review process. This well-known and well-established regional NGO has vast experience working to develop civil society capacity to effectively manage and utilise natural resources within the Caribbean.

## **7. Impact and Sustainability**

Since the eruption of the volcano, the need to conserve and manage the Centre Hills has been a priority for the Montserrat Government. It is a key component of the National Tourism Strategy and Plan (2003) and Montserrat Oriole Species Action Plan (2004). Project activities are currently being included in the development of the National Environmental Management Strategy, which is an output of an Organisation of Eastern Caribbean States initiative to align regional environmental legislation.

Surveys are underway to assess the knowledge, attitudes, and behaviours of 1) farmers and livestock tenders, 2) hunters, 3) tourists, and 4) the general public, to advise partners and policy-makers about land use patterns and public opinion related to the environment. Equally significantly, the results of these surveys will advise on the development of an outreach strategy, which will employ varying methodologies and approaches adapted to address the needs of varying audiences. Identifying gaps and needs will help to identify key themes and topics for an outreach strategy as well. For example, although farmers may have historically been sceptical about conservation efforts, they are now showing signs of interest with regard to learning about more cost-effective and sustainable forms of rat control, which is a key ecological interest of the Centre Hills Project. Therefore, an outreach activity aimed at targeting farmers with messages pertaining to invasive mammals is likely to be identified as a priority.

The Forestry Department have taken ownership over bird and mountain chicken monitoring efforts – after having had extensive field training with staff from RSPB and DWCT in the past year and prior to this project. These are a good indication that there is local capacity to take forward the long-term field activities arising from the management plan.

The long-term exit strategy will be discussed at the September planning workshop. However, consideration is already been given to how the work will be carried on in the future. The development of a national Environment Unit is being planned on Montserrat, which will hopefully provide for protected area staff in addition to Forestry and Environment officers. A long-term trails/tourism strategy has been identified as a pressing need for partners to consider. The enhanced legislative review activities should ensure a stronger legal framework through which regulations and enforcement strategies will be developed and managed.

## **8. Outputs, Outcomes and Dissemination**

We are on target to meet all the project outputs except 8, because we are no longer employing a forest ecologist. However, under this output we can include the additional time (18.5 weeks) that was not included in the original project proposal provided by a range of experts from Kew.

In 1 year we have already exceeded the following outputs: 15A, 15C, 16B, 16C, and 19A.



There has been extensive media coverage in Montserrat via the local newspaper and radio. Additional awareness has been raised locally and in the UK via the dissemination of the project newsletter. UK partners have been able to highlight the project through their own media efforts and through related groups such as the BirdLife Caribbean network. See Annex 4 for a complete list of media and copies of printed material. It is planned that dissemination will continue into the future through Caribbean-wide e-groups, new partnerships locally and regionally, and strong relations with local media. It is not expected that these activities will be costly, though printing costs will be included in the budget of whichever agency is eventually granted authority over protected areas.

**Table 1. Project Outputs (According to Standard Output Measures)**

Code No.	Description	Year 1 total	Year 2 total	Year 3 total	Year 4 total	Total
6A	25 people to receive training	11	--	--	--	11
6B	23 training weeks to be provided	21	--	--	--	21
7	1 Monitoring Protocol	1	--	--	--	1
	1 Project leaflet	0	--	--	--	0
	1 Educational materials pack	0	--	--	--	0
	1 Project poster to promote the Centre Hills	0	--	--	--	0
8	Geoff Hilton (RSPB) = 27 weeks	9	--	--	--	9
	Sarah Sanders (RSPB) =15 weeks	5	--	--	--	5
	Colin Clubbe (Kew) = 10 weeks	4.5	--	--	--	4.5
	Martin Hamilton (Kew) =	6.5	--	--	--	6.5
	Kew Experts =	8	--	--	--	8
	Project Manager = 77 weeks	30	--	--	--	2
	Forest Ecologist = 24 weeks	NA				NA
	Durrell Experts = 45 weeks	45				45
	Kew GIS Expert = 4 weeks	4				4
9	1 Management plan for the Centre Hills	0	--	--	--	0
10	1 Guide to the Centre Hills	0	--	--	--	0
11B	1 Summary report biological assessment	0	--	--	--	0
	1 Summary report of social, cultural and economic assessment	0	--	--	--	0
	1 Summary report of consultation process	0	--	--	--	0
	1 scientific paper to be submitted to a peer reviewed journal on impact of invasives on forest ecology of Centre Hills	0	--	--	--	0
12A	1 Plants of Montserrat specimen database established	1	--	--	--	1
12B	1 Plants of Montserrat specimen database handed over to Montserrat	0	--	--	--	0
	1 Computer database handed over to Montserrat	0	--	--	--	0
13A	1 Plant herbarium reference collection established (ongoing)	1	--	--	--	1
14B	2 – representation at 2 international conferences	1	--	--	--	1
15A	6 - At least two national press releases per year on Montserrat	8	--	--	--	8

15C	3 - At least one national press release in the UK per year	4	--	--	--	4
16A	3 – One newsletter to be produced per year	1	--	--	--	1
16B	500 of each newsletter circulated on Montserrat	600	--	--	--	600
16C	50 of each newsletter circulated in the UK	525	--	--	--	525
17A	The Montserrat Biodiversity e-group will be strengthened	1	--	--	--	1
19A	6 - At least two national radio interviews in Montserrat per year	10	--	--	--	10
20	£31,500 worth of computer, equipment etc. to be handed over	0	--	--	--	0
22	12 permanent monitoring plots	0	--	--	--	0
23		£16,609	--	--	--	£16,609
		£106,028	--	--	--	£106,028
		£22,250	--	--	--	£22,250
		£1,140	--	--	--	£1,140
		£500	--	--	--	£500
		£15,000	--	--	--	£15,000

**Table 2: Publications**

Type *	Detail	Publishers	Available from	Cost £
*newsletter	Newsletter, Centre Hills Project, December 2005	Centre Hills Project, Montserrat	<a href="http://www.malhe.gov.ms/centrehills">www.malhe.gov.ms/centrehills</a> in website section called "Press Gallery"	Free

## 9. Project Expenditure

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

Item	Budget <sup>(1)</sup>	Expenditure	Balance
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## **10. Monitoring, Evaluation and Lessons**

### *Monitoring and evaluation*

The project has made significant progress towards achieving the quantitative output goals set out at the start, and has overachieved in several outputs (as per Table 1). The project employs three full-time Montserratians and regularly engages many more representing over a dozen local organisations. Efforts are highlighted in local media several times a month.

Project managers regularly reported to the project leader, project steering committee, and advisory groups. Feedback from these groups was acted on accordingly. A written summary of key meetings is circulated to all steering committee members and contributes towards an informal “written history” of the progress of this process.

An e-group was established to facilitate written communication between members of the steering committee. Based on feedback from committee members, the e-group has been an effective means of keeping persons abreast of project implementation. However, email has been a highly effective means of soliciting feedback and dialogue from overseas partners, whereas in-person meetings have been most effective in terms of involving local partners in two-way exchange. The project staff have adapted to the various communication “preferences” to maximise partner involvement and input.

There have been a few informal “subcommittees” established, comprised of project staff and steering committee members, to facilitate decision-making and planning in key areas, including legal issues, tourism and trails, socioeconomics, and biological work. An outreach/education subcommittee will convene shortly. The willingness of partners and committee members to participate in project planning and monitoring has been enhanced by involving persons in discussions relevant to their interest/expertise rather than having frequent plenary meetings of the entire steering committee.

Partners have been in contact with other regional organisations and projects to solicit input on best practices and experiences of similar projects. These include lessons from legislative review, demarcation, public consultation, and conflict management from colleagues at the BVI National Parks Trust, Antigua’s Offshore Islands Conservation Project, Island Resources Institute, Caribbean Natural Resources Institute, and the Organisation of Eastern Caribbean States’ Protected Areas and Associated Sustainable Livelihoods (OPAAL) project. Additional research and technical advice has been solicited via an IUCN-supported socioeconomic assessment programme, the Florida Keys National Marine Sanctuary’s well-documented protected area planning process, and educational research expertise from the Florida Institute of Technology. The scientific partners have also benefited from consultation with colleagues around the globe, particularly on the design of the rat control experiment protocol. Soliciting

information, and likewise sharing of this project's experience, is critical in the support and enhancement of project effectiveness and alignment with international best practices.

The project leader visited Montserrat three times to review progress. Appraisals were given to the Project Manager and Counterpart Project Manager. A detailed project management workplan for Year 2 was put together in March based on an analysis of the status of objectives and performance.

#### *Lessons learned and incorporation into future plans*

Certain activities took longer and/or were more complicated than expected. The socioeconomic research protocol needed extra time for extensive consultation on content and criterion for conducting research. In general, conducting research on people is more time-consuming than originally anticipated, but data will still be available in time for reporting at the September planning workshop. Some historical land use data is no longer available in print due to documents being lost during the volcanic crisis.

Herbarium training in the UK did not take place due to local staff not being recruited in time for the Kew deadline, however local staff have received extensive on-the-ground training from Kew personnel.

Existing private land disputes exist, which goes to show that conflict over such issues can be significant even in a relatively small place. Special effort is being made to inform and include land owners in the process.

It was determined that the legislative review process needed greater attention and funding, which was leveraged through OTEP. A comprehensive effort to review and revise relevant environmental legislation will begin in May.

Existing partner expertise was utilised rather than hiring a separate forest ecologist as it was deemed more effective in the long-term. Local expertise can often be leveraged with a little effort rather than sending people abroad for training. For example, the GIS department was able to provide better-than-expected support in terms of data manipulation and software, even though local data collection skills are weak.

Partner communications are open and flowing. However, extensive follow-up, and in-person meetings, are often required to see through critical decisions. Special attention is given to the specific communication "preferences" under which each partner operates most effectively.

In terms of administrative issues, it is no surprise that on a small island, some equipment is often more difficult, expensive, and tedious to source and import. Most of the equipment has already been procured, so this should not be a major problem in the future.

#### **11. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 word maximum)**

In June, a species of bat previously thought to be extinct in Montserrat was recorded. In early 2006, the endemic galliwasp lizard was sighted on four occasions. This species is thought to have a highly restricted range on Montserrat, and its elusive nocturnal behaviour has meant that it has only been spotted a handful of times by forest rangers and scientists over the past decade. Two out of three plant species thought to be endemic to Montserrat were identified at multiple locations in the field in since November. The status of the third endemic is not known as it was previously recorded only in an area that is not accessible at this time due to volcanic activity.)

Forest ranger James "Scriber" Daley and project Field Officer Calvin "Blacka" Fenton gave three very well-received presentations on Montserrat oriole research at the Society for the Conservation and Study of Caribbean Birds conference in Guadeloupe in August.

A GIS map of land ownership in and around the Centre Hills was finally generated after much collaboration with the Physical Planning Unit and Lands & Survey Department. Previously, this data was not available in digital form, and involved the translation of cadastral maps of varying scales into the national GIS. This data can now be viewed with some of the existing data such as the location of the current forest boundary, elevation gradient, and biodiversity survey points. This greatly facilitates capacity for land owner education and participation in the management planning process.

A team from the BBC have made a visit to Montserrat to collect media for their second series entitled "A Year at Kew". This series expands viewers' perceptions beyond the Kew gates and offers a look at some of the successful conservation projects that are supported by Kew around the world. The Montserrat connection highlights not only Kew's involvement in plant assessments, but also the valuable links that this research has towards the development of Montserrat's Botanic Garden.

Finally, the receipt of a competitive OTEP grant to supplement resources for the legislative review process is a clear indication of the project's perceived value and importance. In particular, this has significantly sparked the attention of political leaders on Montserrat as to the need for and potential offered by effective environmental legislation.



## Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2005/2006

Project summary	Measurable Indicators	Progress and Achievements April 2005-Mar 2006	Actions required/ <i>planned for next period*</i>
<p><b>Goal:</b> 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</p> <ul style="list-style-type: none"> <li>• The conservation of biological diversity,</li> <li>• The sustainable use of its components, and</li> <li>• The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</li> </ul>			
<p><b>Purpose</b> The people of Montserrat are better able to take targeted action to conserve the Centre Hills Forest Reserve for present and future generations</p>	<ul style="list-style-type: none"> <li>– Centre Hills are designated a Protected Area by end of Y4;</li> <li>– Actions in management plan are initiated and led by local team from Y3;</li> </ul>	<ul style="list-style-type: none"> <li>– Not immediately applicable, however activities are on target to meet these goals in a timely manner</li> </ul>	
<p><b>Outputs</b> 1. Knowledge of the ecology and socio-economic use of the forest is available to guide management of the Centre Hills</p>	<ul style="list-style-type: none"> <li>– Management plan by end of Y2 integrates conservation of species and habitats and socio-economic needs;</li> <li>– All key stakeholders support scientific and socio-economic basis for management plan by end of Y2</li> </ul>	<ul style="list-style-type: none"> <li>– Biological assessment completed for insects, reptiles, amphibians, reptiles, birds; in progress for plants</li> <li>– Ecosystem profile maps in preparation</li> <li>– Ecological assessment protocol developed, work beginning</li> <li>– Socioeconomic data collection in progress, including surveys pertaining to agriculture, tourism, and general public perceptions</li> </ul>	<ul style="list-style-type: none"> <li>– Socioeconomic research protocol took longer than expected to develop due to need for extensive consultation on content and criterion for conducting research</li> <li>– Inclement weather and terrain within the forest can sometimes be constraining factors</li> <li>– Existing partner expertise was utilised rather than hiring a separate forest ecologist as it was deemed more effective in the long-term</li> <li>– Local capacity to collect and manipulate new data in GIS was less than expected and a larger learning curve is being addressed</li> <li>– <i>Biological monitoring/surveys to be carried out in collaboration with Forestry</i></li> </ul>

Project summary	Measurable Indicators	Progress and Achievements April 2005-Mar 2006	Actions required/ <i>planned for next period*</i>
			<i>Department</i> – <i>Ecological research work to continue throughout the year</i> – <i>Socio-economic surveys to be analysed</i>
2. Participatory management plan is produced for the Centre Hills	<ul style="list-style-type: none"> <li>– 2 stakeholder workshops (Y1&amp;2);</li> <li>– All key stakeholders sign up to management plan by Y2</li> <li>– All key stakeholders renew their commitment to the implementation of the plan at the end of the project (Y3)</li> </ul>	<ul style="list-style-type: none"> <li>– Key informant interviews underway to advise on land use and other issues</li> <li>– Consultation plan developed for key stakeholders</li> <li>– Key stakeholder consultations underway</li> <li>– Review of historical land use data and existing management frameworks underway</li> <li>– Memoranda of Collaboration signed between key project partners and collaborators</li> </ul>	<ul style="list-style-type: none"> <li>– Extensive follow-up, and often in-person meetings, are often required to see through critical decisions</li> <li>– Lack of background information on land use and other factors due to losses from volcanic crisis</li> <li>– <i>Planning workshop to be held in Sept 06</i></li> <li>– <i>Numerous consultations to be held with variety of stakeholder groups</i></li> <li>– <i>Biological and socioeconomic assessment reports to be completed</i></li> <li>– <i>GIS maps to be completed</i></li> <li>– <i>Draft management plan to be developed</i></li> </ul>
3. Technical and professional skills to conserve, manage and restore the Centre Hills are strengthened on Montserrat	<ul style="list-style-type: none"> <li>– All key stakeholders participate in 2 training workshops during Y1 &amp; 2;</li> <li>– 2 staff receive training in UK by Y2;</li> <li>– 10 local persons involved in fieldwork Y1 – Y3;</li> <li>– Database established by Y2;</li> <li>– Local person employed as project manager or co-project manager (Y1 – Y3)</li> <li>– Funding applications submitted by Y3</li> </ul>	<ul style="list-style-type: none"> <li>– Training and equipment needs assessment carried out</li> <li>– Eleven persons received training in areas such as ecological fieldwork, socioeconomic data collection, GIS, and project management</li> <li>– Three local, full time staff employed</li> <li>– 1 application successfully submitted to OTEP for funding</li> </ul>	<ul style="list-style-type: none"> <li>– Herbarium training in UK did not take place due to local staff not being recruited on time; however local staff have received training on-the-ground in plant conservation techniques from RBG-Kew; additional regional training opportunities have and will be utilised to improve staff and partner skills</li> <li>– Equipment sometimes hard, expensive, and tedious to source and import</li> <li>– Local expertise can often be leveraged with a little effort rather than sending people abroad for training</li> </ul>



Project summary	Measurable Indicators	Progress and Achievements April 2005-Mar 2006	Actions required/ <i>planned for next period*</i>
			<ul style="list-style-type: none"> <li>– <i>Prepare to hand over project management to Counterpart Project Manager</i></li> <li>– <i>Training (GIS, fundraising, ecological fieldwork, herbarium, project management) given to local staff</i></li> <li>– <i>1 funding application submitted to OTEP</i></li> </ul>
4. Significant progress is made towards establishing the Centre Hills as Montserrat's first Protected Area	<ul style="list-style-type: none"> <li>– Draft legislation approved in principle by key stakeholders at end of Y3;</li> <li>– Proposed Protected Area contains representative examples of all key habitats and species for which the Centre Hills are important f</li> </ul>	<ul style="list-style-type: none"> <li>– Funding secured from OTEP for comprehensive legislative review process</li> <li>– Private and public lands within existing forest boundary identified and land owners contacted</li> <li>– Current boundary under review for possible alteration</li> </ul>	<ul style="list-style-type: none"> <li>– Legislative review process much more complicated than originally planned</li> <li>– Conflict over issues such as land ownership can be significant even in a relatively small place</li> <li>– Existing private land boundary disputes exist</li> <li>– <i>Legislative review, consultations, and revision to take place</i></li> </ul>
5. Appreciation of the Centre Hills forest and an awareness of its value is increased locally and internationally	<ul style="list-style-type: none"> <li>– No. of tourists visiting Centre Hills increases by 10% during the project;</li> <li>– &gt;60% of tourists express satisfaction with visit;</li> <li>– Final project survey compared to initial project survey shows increased awareness amongst local people;</li> <li>– Increased local media coverage of the Centre Hills;</li> <li>– No. of website hits increases</li> </ul>	<ul style="list-style-type: none"> <li>– General knowledge survey underway</li> <li>– Tourist satisfaction surveys underway</li> <li>– Extensive local and international media coverage, including newsletter distribution</li> <li>– Website in development in April 2006</li> <li>– Numerous outreach presentations made in Montserrat</li> <li>– Participation by staff and partners at SCSCB conference in Guadeloupe</li> </ul>	<ul style="list-style-type: none"> <li>– Socioeconomic data collection is time-consuming and potentially costly</li> <li>– Difficult to get press releases out in the UK (i.e., only bad news makes the news!)</li> <li>– <i>Website, leaflet, poster, and two newsletters to be completed</i></li> <li>– <i>Continued press to local and int'l media</i></li> <li>– <i>Outreach strategy to be developed</i></li> <li>– <i>Teacher materials and workshop to be developed</i></li> </ul>

Project summary	Measurable Indicators	Progress and Achievements April 2005-Mar 2006	Actions required/ <i>planned for next period*</i>
6. Programme of work to manage the Centre Hills is started	<ul style="list-style-type: none"> <li>– Boundary is demarcated on the ground by end of Y3;</li> <li>– 2 significant conservation interventions in the management plan are begun by end of Y3;</li> <li>– 90% of first year of annual workplan is completed on schedule by end of Y3</li> </ul>	– Not applicable until Year 3, however activities are on target to achieve this goal on time	– N/A

*\*Actions planned for next period in italics, lessons learnt in non-italicised font*

## Annex 2 – Workplan for 2005/6

Activity		Partner	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07
1.	<b>Knowledge of the ecology and socio-economic use of the forest is available to guide management of the Centre Hills</b>													
1.3	Project Steering Committee Meetings	CM, SM												
1.5	Undertake biological assessment	RY												
1.5.1	Plants (Kew)	CC, MH												
1.6	Produce habitat map (Kew)	CC			Draft			Final						
1.7	Summary report of biological assessment	RY												
1.8	Develop computer database (biological data)	RY, GH, CC												
1.9	Research ecological processes impacting Centre Hills	GH, CC, RY												
1.9.1	Hydrology	GH												

Activity		Partner	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07
1.9.2	Rat removal experiment (monitoring impacts on vegetation & insects)	GH												
1.9.3	Rat ecology (diet, abundance & distribution, reproductivity)	GH												
1.9.4	Invasive mammal sign	GH												
1.1	Train field workers to continue research	GH, RY, CC												
1.11	Undertake social, cultural and economic assessment	CM, SM												
1.11.1	Agricultural surveys	SM												
1.11.2	General public surveys	CM												
1.13	Summary report of social, cultural and economic assessment and consultation process	CM												
1.14	Recruit volunteer to collect and map data on land use, trails etc.	SS, CM												
1.15	Land use, trails etc. mapped (GPS)	CM												

Activity		Partner	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07
2	<b>Participatory plan is produced for the Centre Hills</b>													
2.2	Implement consultation process (meeting with communities, key landowners etc.)	CM, SM												
2.3	Map existing Centre Hills Boundary (GPS)	CM												
2.3	Review and agree Centre Hills boundary													
2.4	Prepare for management plan workshop (recruit facilitator, organise venue, workshop pack etc.)	CM, SM, SS												
2.4	Management Plan Workshop - Identify and agree management zones with local people (conservation, restoration, ...)	CM, SM												
2.5	Complete management plan	CM, SM												
2.6	Circulate Plan to Project Steering Committee and key stakeholders													
2.8	Seek and secure resources for implementation	CM												
3	<b>Technical and professional skills to conserve, manage and restore the Centre Hills are strengthened on Montserrat</b>													

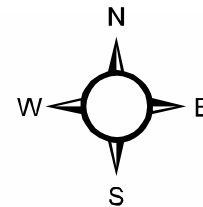
Activity		Partner	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07
3.3	Herbarium training in Montserrat	CC												
3.4	Project Management Training Puerto Rico	CM												
3.5	Project proposal submitted to OTEP (take forward work in Centre Hills)	CM, SM												
3.5	Mentor counterparts	CM												
4	<b>Significant progress is made towards establishing the Centre Hills as Montserrat's first Protected Area</b>													
4.1	Recruit legal consultants	CM												
4.2	Review existing legislation	CM												
4.3	Consult with stakeholders (3 rounds of public meetings)	CM												
4.4	Draft revised legislation	CM												
4.5	Outreach to decision makers	CM												

Activity		Partner	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07
5	<b>Appreciation of the Centre Hills forest and an awareness of its value is increased locally and internationally</b>												<i>It is really encour</i>	
5.2	Conduct tourist satisfaction surveys	CM												
5.4	Produce project leaflet to promote Centre Hills	SS, CM		Draft to RSPB			Publi shed							
5.5	Produce project poster to promote Centre Hills	SS, CM		Draft to RSPB			Publi shed							
5.6	Develop outreach strategy	CM, SM												
5.7	Make presentations to schools and others	CM, SM												
5.6	Teacher workshop to produce educational materials	SM												
5.7	Production educational materials/pack	SM												
5.8	A guide to the Centre Hills published	SS, CM, MTB						Form TBD						
5.9	Media Campaign (radio, newspapers)	CM,SM												

Activity		Partner	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07
5.10	Newsletters	CM, SM												
5.11	Conferences	SS, CM												
6	<b>Programme of work to manage the Centre Hills is started</b>													
6.1	Develop programme of work (based on management plan)	CM, SM												
6.4	Monitor key biodiversity (birds, plants, mountain chicken)	GH, RY, CC												
6.4.1	Birds	GH												
6.4.2	Mountain Chicken	RY												
6.4.3	Plants	CC												



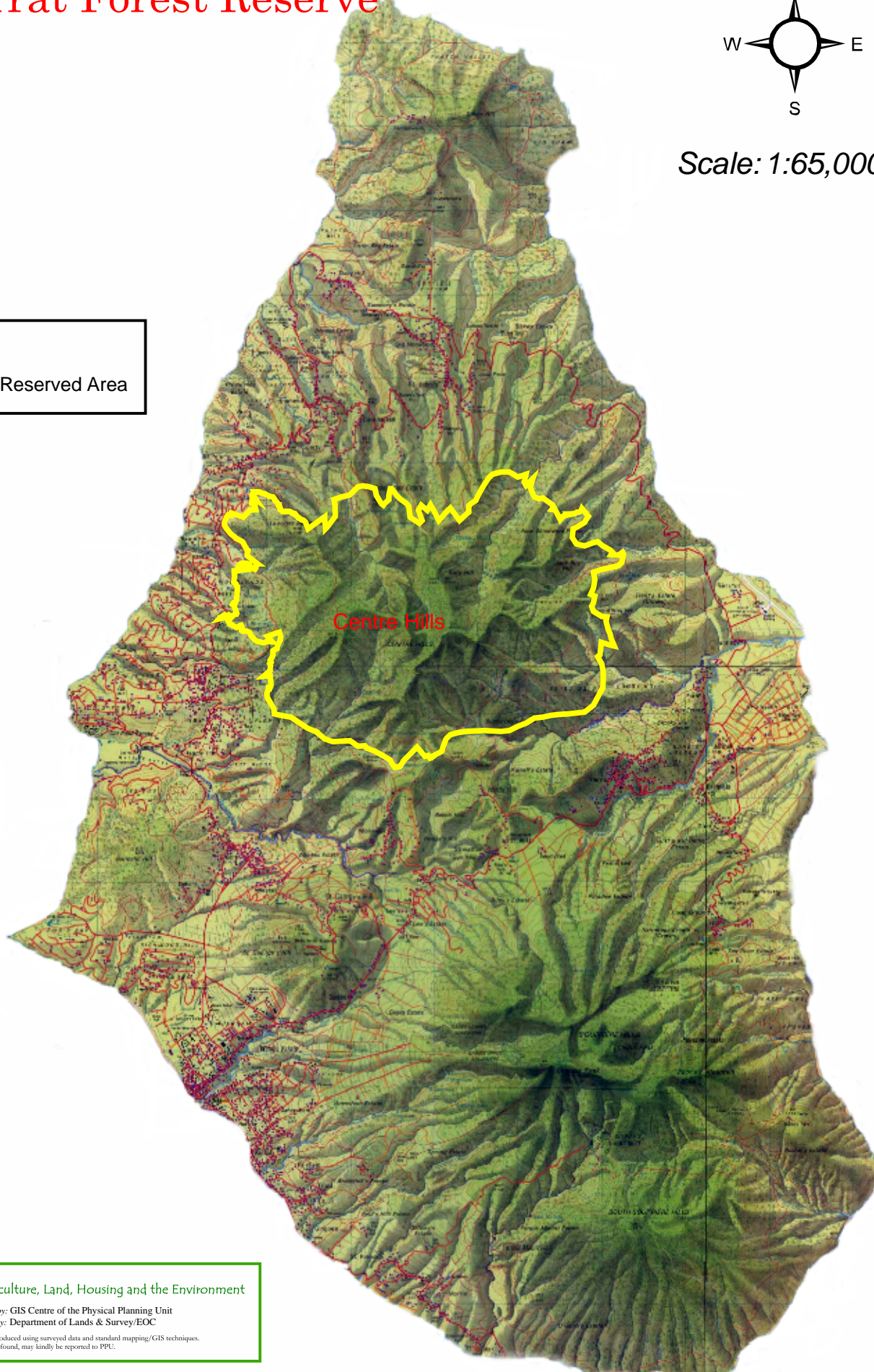
# Montserrat Forest Reserve



Scale: 1:65,000

## Legend

 Forest Reserved Area



Ministry of Agriculture, Land, Housing and the Environment

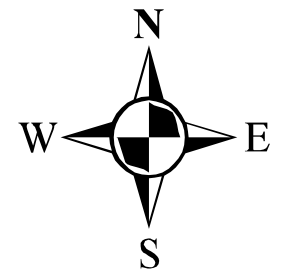
Map produced by: GIS Centre of the Physical Planning Unit

From the data provided by: Department of Lands & Survey/EOC

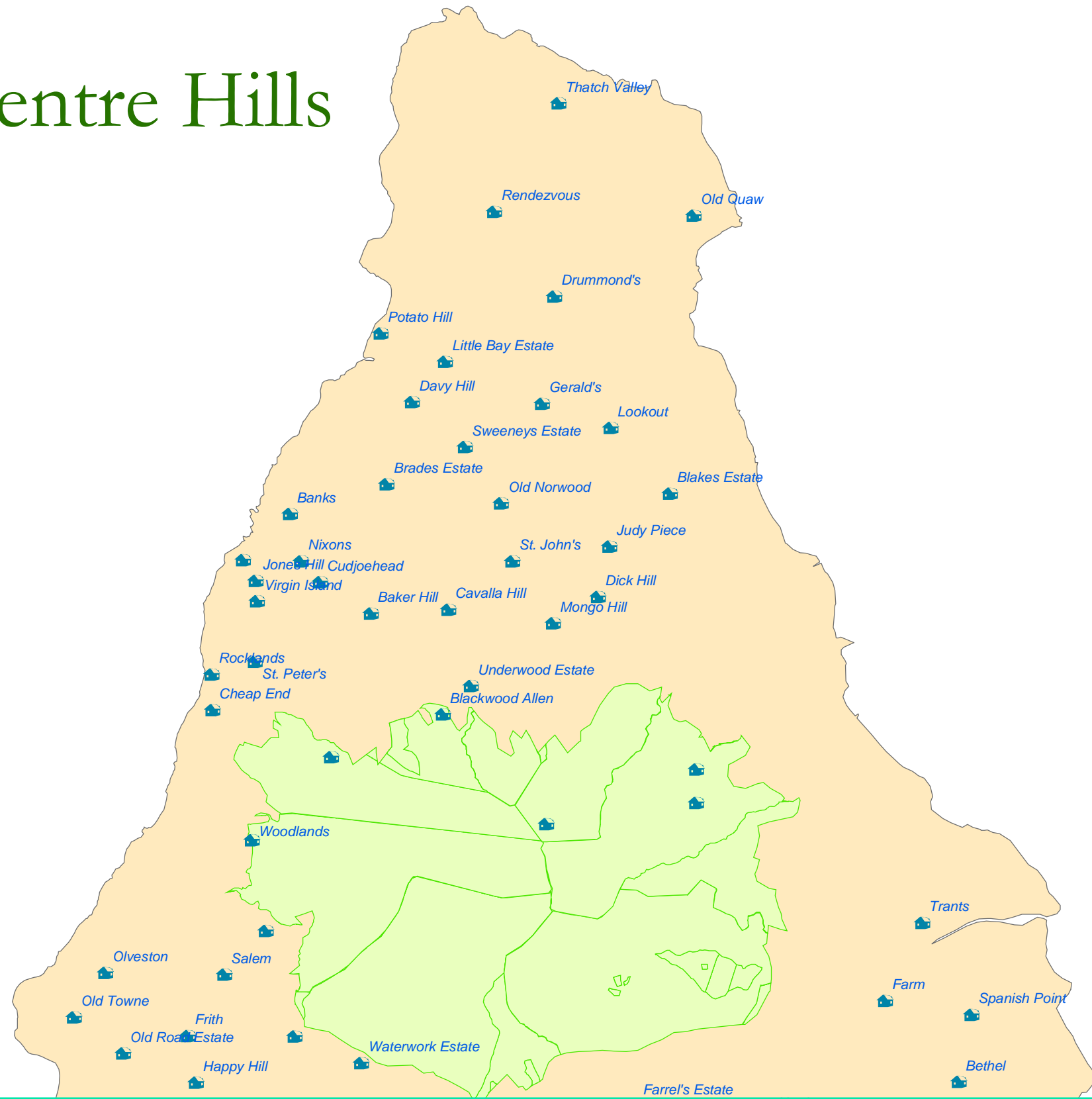
Note: This map has been produced using surveyed data and standard mapping/GIS techniques. Data discrepancies, if found, may kindly be reported to PPU.

## Existing Centre Hills Forest Boundary

# Montserrat Centre Hills

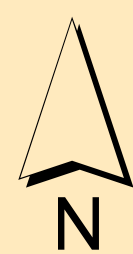
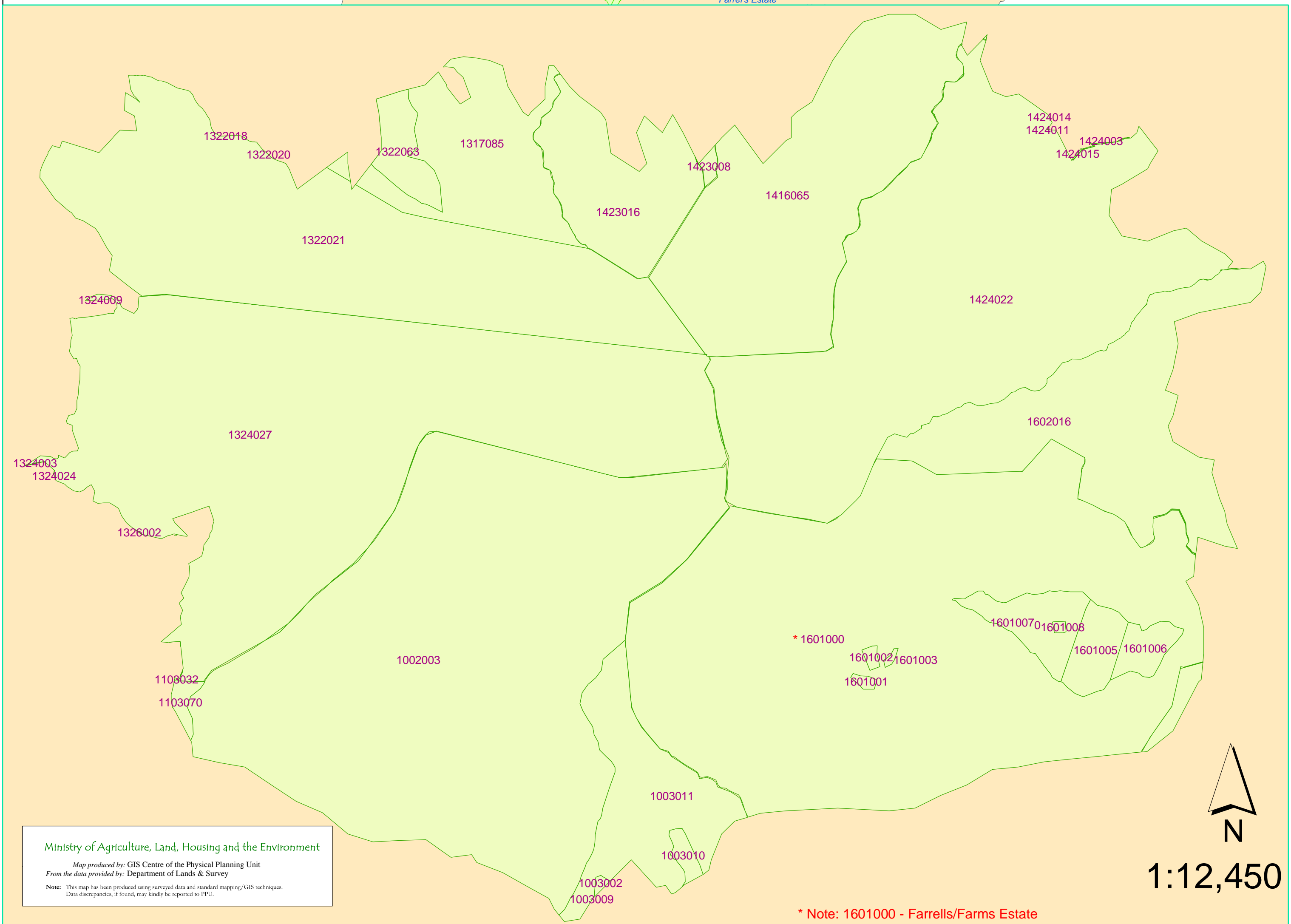


1:42,000



**Legend**

- Village Name
- Parcels\_in\_Forest



1:12,450

Ministry of Agriculture, Land, Housing and the Environment  
 Map produced by: GIS Centre of the Physical Planning Unit  
 From the data provided by: Department of Lands & Survey  
 Note: This map has been produced using surveyed data and standard mapping/GIS techniques.  
 Data discrepancies, if found, may kindly be reported to PPU.

\* Note: 1601000 - Farrells/Farms Estate

## Land ownership within current forest boundary

## **Annex 4 – Press releases (available hard copies of printed media attached)**

### **Project newsletter**

- 600 copies distributed locally (hard copy)
- 525 copies distributed in the UK (hard / electronic copy)

### **Local newspaper/television**

- Montserrat Reporter, June 10, 2005
- Montserrat Reporter, August 26, 2005
- Montserrat Reporter, October 7, 2005
- Montserrat Reporter, November 18, 2005
- The Montserrat Newsletter, Sept/Oct 2005 (Governor's Office publication)
- PTV – (local cable TV) news spot, January 12, 2006
- Montserrat Reporter (galliwasp), January 27, 2006
- Montserrat Reporter (ecol assmt), January 27, 2006
- Montserrat Reporter, March 10, 2006

### **Local radio (ZJB Radio)**

- Studio interview, September 23, 2005 (SS, CM, CG)
- Rose Willock show, November 19, 2005 (CC, CG)
- Studio interview, November 24, 2005 (CM, MH, SE)
- Rose Willock show, December 10, 2005 (CM, LM, JD, JG)
- Studio interview, January 18, 2006 (SM, GH)
- Studio interview, February 1, 2006 (JD, AO, LM)
- Studio interview, February 3, 2006 (CC, EF, SH, JS)
- Call-in programme with St. Thomas radio station, March 4, 2006 (CM)
- Interview at MNT, early March (EF, SM, MH, SB, SR)
- Studio interview, early March 2006 (MH, SR, SB)
- News interview, March 14, 2006 (CM, SS, SM)

### **International media**

- BirdLife Caribbean newsletter, May 2005
- BirdLife Caribbean newsletter, December 2005
- Kew Scientist, October 2005
- Kew Gardens brochure

## **The Montserrat Centre Hills biodiversity assessment: progress update, March 2006**

### **Aims**

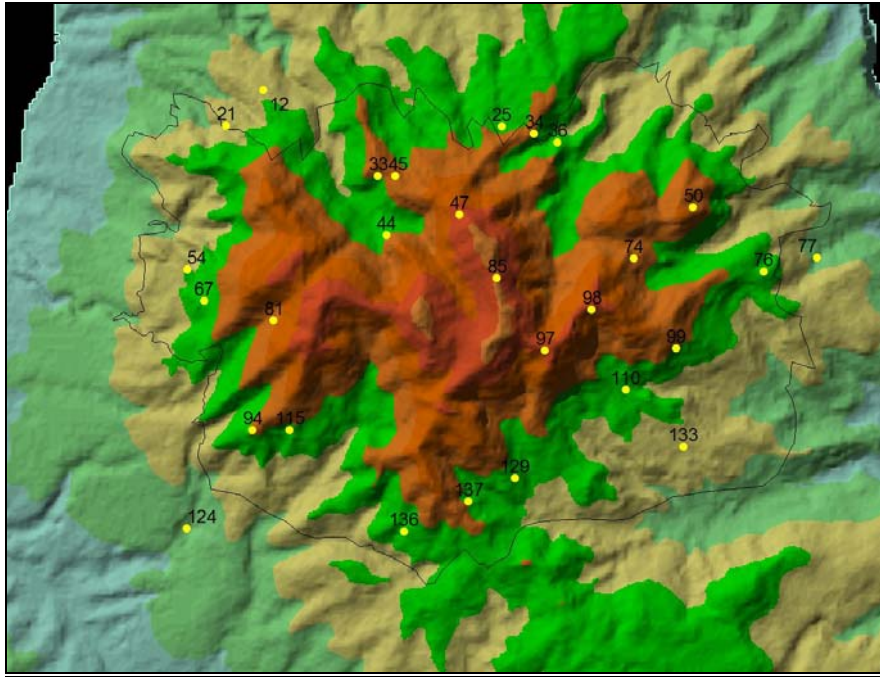
The aim of the assessment is to compile an inventory of the fauna and flora of key taxa within the Centre Hills region of Montserrat, to map spatial patterns of biodiversity and to investigate the abundance and distribution of species of conservation or management concern. The work is being conducted by a team of local and international experts, including the Montserrat Department of Forestry, Royal Society for the Protection of Birds, Royal Botanic Gardens Kew, South Dakota and Montana State Universities and co-ordinated by the Durrell Wildlife Conservation Trust. An assessment of the threat posed by exotic mammals and plants to native biodiversity will also be made. Ultimately, the biodiversity assessment will inform the design and development of a management action plan for the Centre Hills.

### **Design**

A network of 30 sample points has been established throughout the Centre Hills (see Fig. 1), which were allocated randomly (chosen at random from the RSPB grid of points used for bird monitoring) but stratified by altitude to ensure sampling is representative of the range of habitats found within the area. At each sample point, data are being collected on species richness and abundance within a range of taxonomic groups: plants, amphibians, reptiles, birds, and bats. Due to logistical difficulties, insects and invasive mammals were sampled using different sampling designs (discussed below). A suite of survey techniques was used by the field teams, details of which are given below for each individual taxonomic group. In combination with historical and ad hoc data collection, this will allow us to compile an inventory of the fauna and flora of the Centre Hills, map spatial patterns of biodiversity to identify important habitats and sites, and investigate the abundance and distribution of key species. This assessment represents the start of an ongoing programme of biodiversity monitoring as part of the Darwin Initiative funded Centre Hills Management Plan project.



**Fig. 1.** Design of the Montserrat Centre Hills biodiversity assessment (sample points and the Centre Hills boundary are shown)



## Taxa surveys

### Plants

- **Methods:** A 20m x 20m plot was established at each sample point in which the following variables were recorded:
  - species at canopy/understorey/ground layer/climbers/epiphytes
  - canopy height & cover
  - lat/long position, slope, aspect, & altitude
  - evidence of invasive species (e.g. pigs)
- Voucher herbarium specimens were collected as necessary and a series of photographs were taken to the north, south, east, & west of each sample point. A qualitative assessment of the abundance of the recorded species was carried out. Ad hoc collection and recording of species of conservation and management (i.e. invasive exotics) interest was also carried out during fieldwork. Key habitats and sites of interest were also visited, to target endemic species or unusual plant communities.

- **Results:** The first botanical survey was carried out in November 2005 at the end of the wet season. A second survey is currently (March 2006) underway during the dry season, to increase the chances of recording plant species that are in flower or fruiting which weren't during the first survey. Data from the botanical surveys are being compiled and specimens processed to produce species lists and to quantify species richness at each sample point. Targeted searches of sites of interest found two single island endemic species, the orchid, *Epidendrum montserratense*, and the "privet", *Rondeletia buxifolia*. A third single island endemic species, *Xylosma serratum*, has yet to be recorded in the Centre Hills. This is worrying as the only previously known location now lies under pyroclastic flow. A vegetation map is currently under construction by the GIS specialist at Kew and will be finalised once the second botanical survey has been completed which will provide the necessary ground truthing data. A species list is currently being compiled. To date, the list contains 875 species from flora accounts and recent collections.

### Insects

- **Methods:** The logistical difficulties of sampling insects meant that the main survey design could not be followed given the resources and time available. Therefore a design was implemented primarily to estimate species richness in the Centre Hills region. A suite of insect collection and survey techniques was used at four sampling sites in the Centre Hills. These sites were subjectively chosen on the basis that they were thought to support high levels of species richness.
- **Results:** Samples are currently being analysed by Mike Ivie and his team at Montana State University and therefore no results are available at this time. However, preliminary results suggest that the insect families sampled thus far are highly species rich within the context of insect biodiversity in the Eastern Caribbean region.

### Amphibians and reptiles

- **Methods:** At each sample point a 100m line transect was established, which was surveyed for amphibian and reptile species both during the day and at

night. Targeted searches of sites that have historically supported two thought to be extremely rare species (*Diploglossus montisserrati* and *Mabuya*) were made.

- **Results:** The first and second phase surveys have now been carried out and the data await analysis. In total eight (of a total of ten species known from Montserrat) species of reptile and three (of a total of three) species of amphibian have been recorded during the surveys and targeted searches, including three separate observations of the critically endangered galliwasp *Diploglossus montisserrati*. There are concerns that this species may be on the verge of extinction with only a few confirmed sightings of the galliwasp made over the past few decades. Therefore, three sightings of this species within a few weeks provides real hope that the galliwasp exists in numbers greater than was previously thought and that conservation action can be implemented to improve its long term chances of survival.

### Birds

- **Methods:** 'Forest bird monitoring programme', based on a network of 47 sample points (including the 28 biodiversity assessment points) at which point counts have been carried out on 26 occasions between December 1997 and March 2006. Additional point-counts have been carried out during three 'full censuses' conducted in December 1997, 1999 and 2004, at these 47 points, and a further 102 points, creating an extensive grid over the entire Centre Hills.
- **Results:** Absolute abundance estimates for all resident forest bird species, based on distance-sampling point-counts, have been produced. Statistically inferred spatial abundance patterns of forest bird species, based on these geo-referenced point-counts and the modelled bird-altitude and bird-habitat associations have also been produced. These data will be used to quantify spatial patterns in avian diversity to identify important sites for birds in the Centre Hills and to assess diversity in the regional context. They will also be used to quantify the distribution and abundance of key species of conservation concern and/or national importance to Montserrat.

## Bats

- **Methods:** Bats were sampled at 20 of the 28 sample points using mist-netting (six nets were placed at each point) and acoustic surveying. All bats caught in mist nest were identified, weighed and measured before being released.
- **Results:** The bat survey was completed in June and July 2005 by joint team from Montserrat Forestry Department, South Dakota State University and Durrell Wildlife Conservation Trust. All ten species of bat known to have historically occurred on Monserrat were caught during this survey, including an endangered species (*Chiroderma improvisum*) not recorded for over 20 years on Montserrat and only known from a handful of specimens and an endemic sub-species (*Sturnira thomasi vulcanensis*) thought to be extinct. Data are currently being analysed to map spatial patterns in abundance and diversity.

## Invasive species

- **Methods:** Snap-trapping lines were established along a selection of 12 ghauts (ravines) and trails distributed throughout the Centre Hills. Each snap trapping line was made up of 20 trap stations, each 25m apart and containing four snap traps. Each trapping line was run for three days. The number of brown and black rats caught was recorded as well as ancillary data on habitat and altitude. A second method of placing a system of rat chew-sticks at the 28 biodiversity assessment points was also carried out, to provide data on the presence of rats at these points.
- **Results:** Indices of abundance (i.e. number trapped per unit effort) of both black and brown rats varied widely throughout the Centre Hills, by as much as an order of magnitude. Black rats in particular, appeared to exist in some sites at very high densities. Data analysis revealed that numbers of black rats appeared to be positively related to the number of exotic fruiting trees in the immediate vicinity. Brown rats were also positively associated with exotic fruiting trees but negatively associated with altitude, i.e. were more abundant at lower altitudes. Data from the chew sticks revealed that rats were present throughout the Centre Hills, even at the highest altitudes on the tallest peaks. This research strongly suggests that due to their extensive distribution and



high density, invasive rat species pose a real threat to native flora and fauna of the Centre Hills.

### **Output**

We plan to produce a full project report by the 1<sup>st</sup> June 2006 that will document the abundance and species richness of all key taxa mentioned above and spatial patterns of biodiversity in the Centre Hills. A further output will be a database that can be amalgamated into the biodiversity database, (set up by the RSPB) already installed in the Montserrat Forestry Department, and also linked to a GIS to facilitate the interpretation of spatial patterns. Presentations will be made at the management planning workshop to be held in September 2006 to communicate the results of the biodiversity assessment to all stakeholders.

## Rat control experiment

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## *Aim*

To experimentally test the effect of rats on biodiversity in the Centre Hills

## *Experimental design*

There will be an experimental area in which we reduce rat numbers, and control area(s) in the wider Centre Hills in which we do not reduce rat numbers. There will be a pre-intervention period of several months, during which we do not reduce rats. Then we will knock rat numbers down in the intervention area, and maintain control over a period of several months or more. We will compare biodiversity in the experimental and control areas, before and after the intervention. We will therefore be able to test for changes in biodiversity between treatment areas, and over time.

### **1. Experimental area**

This is the area in which we will attempt to knock down rats for a period of one year or more, to test the effect of rat abundance on biodiversity.

The chosen area is centred on Fogarty Spring. It follows the forest boundary north from the point at which it crosses the path leading to the Fogarty Catchment. The forest-boundary heads directly uphill to the watershed ridge between Fogarty (=Bunkum River) and Soldier Ghaut, and then turns east, uphill along the ridge. The forest-boundary continues to mark the edge of the experimental area, until the former turns sharply downhill into Soldier Ghaut. At this point, the boundary of the experimental area turns in the opposite direction, and circles above Fogarty Spring and the head of Jackie's Ghaut, traversing some very steep ground at about 400-450 m asl, heading south-west and then west and north-west, before emerging onto the ridge down to the Lawyers Mountain trig point. From the Lawyers trig point, the boundary of the experimental area follows the top of the ridge that separates the Bunkum River watershed from the Cassava Ghaut watershed, as far down as the point where the forest boundary crosses the ridge. At this point, the boundary turn right and northwards, and follow the forest boundary across to Jackie's Ghaut, and then to Fogarty Catchment, to join up with the start.

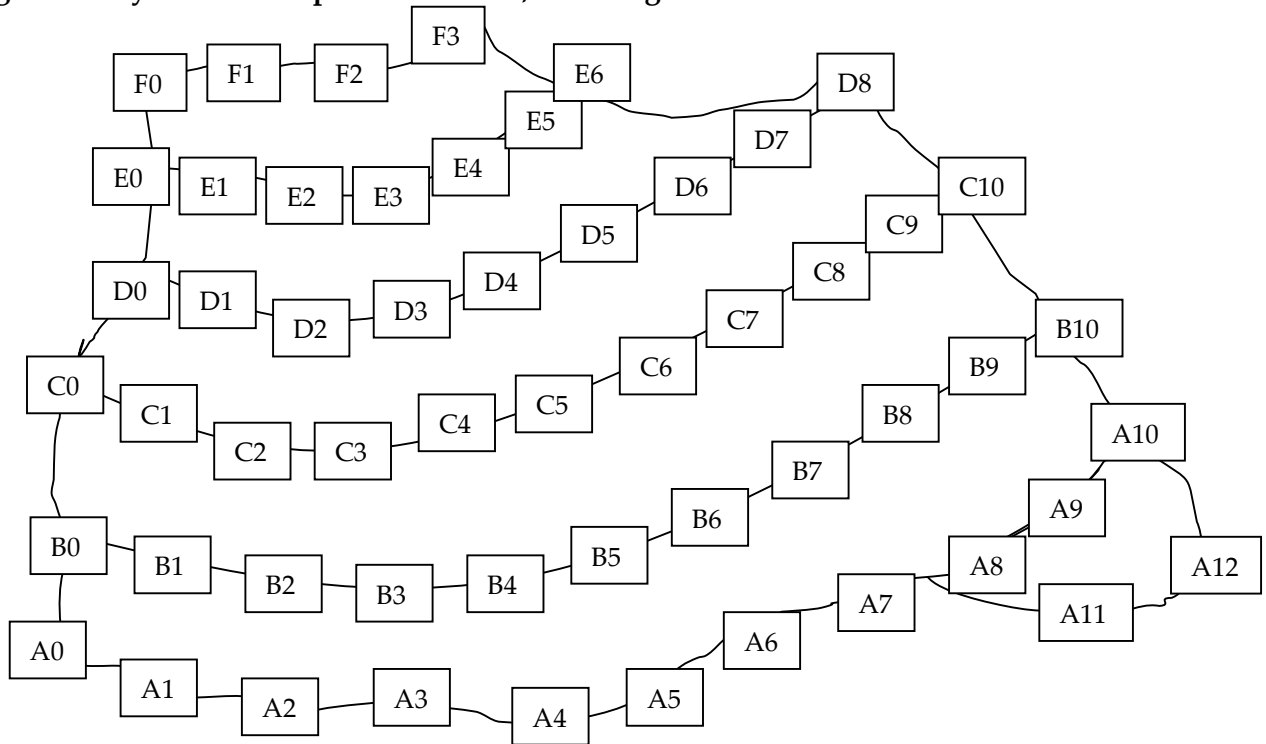
### **2. Setting out the grid in the experimental area**

The rat knock-down work will be based on a 50 x 50 m grid, across the whole experimental area (fig 1). Bait stations, traps etc. will be placed at the intersections of the grid, and around the boundary of the experimental area. We can also use the grid intersections (hereafter referred to as 'grid stations') as useful references when doing the biodiversity measurements.

There are ca.25 perimeter grid stations, and ca.50 interior grid stations. In order to mark the 50 m grid, a 25m grid was laid across the whole area, and intersections marked with flagging tape.

Each control station is be coded, so that it can be identified in the field, and samples/observations spatially referenced.

**Fig 1. The layout of the experimental area, and the grid stations**



### **3. Control areas**

These are areas in which we will not knock down rat numbers, and will serve as a comparison with the experimental area.

Two areas that are adjacent, and at similar altitudes (ca. 270-450 m asl) to the experimental area (EA) were chosen as control areas. These are Soldier Ghaut/Baker Hill to the north of the EA, and Cassava Ghaut to the south.

The boundaries of these areas were defined using flagging tape markers, and a number of sampling stations/transect lines were set up within them, for collection of biodiversity data.

## *Data collection: measuring biodiversity*

### **Insects**

#### **1. Pitfall traps**

These are useful for measuring the crude abundance of some types of terrestrial insect. The larger terrestrial insects are quite likely to be affected by rat predation.

A pitfall trapping trial during Jan 2006 was not highly successful: the traps only caught a small number of insects, most of which were small. There were no beetles and the like, which is unusual. On the other hand, it was very wet weather, and the whole forest seemed to be unusually lacking in insects, so it may have been an unusually bad time. It is normal for catches to be very low in rainy weather.

#### **Method**

We will run 10 transect-lines of 10 pitfall traps in the CA and 10 transect-lines in the EA's (aim for five in each, but if it is difficult to find five good locations in Baker Hill/Soldier Ghaut then use more in Cassava). Each transect-line in the EA starts at a control station, and run towards the next control station in the same row (see table below). They are marked with yellow flags, each of which is labelled with the code for that pitfall trap/home.

<b>Experimental Area Insect Transects</b>		
<i>Insect study line</i>	<i>Start point</i>	<i>End point</i>
EA T1	B1	B2
EA T2	D1	D2
EA T3	E2	E3
EA T4	C3	C4
EA T5	B4	B5
EA T6	B8	B9
EA T7	C7	C8
EA T8	D6	D7
EA T9	E4.5	E5.5
EA T10	A7	A8

<b>Control Area Insect Transects</b>		
<i>Insect study line</i>	<i>Start point</i>	<i>End point</i>

CA T1	Cassava Tracking Tunnel transect A, stations A2-A3 (coming down trail from Lawyers to Mansipote Tree)	
CA T2	Cassava Tracking Tunnel transect A, stations A8-A9 (along Mt Chicken transect between Mansipote and C8 oriole territory)	
CA T3	Cassava Tracking Tunnel transect B, stations B6-B5 (along Dry Green Ghaut)	
CA T4	Cassava Tracking Tunnel transect B, stations B3-B2 (along Dry Green Ghaut)	
CA T5	Cassava Tracking Tunnel transect C, stations C8-C9 (ridge between bananas and Gun Hill)	
CA T6		

CA T7		
CA T8		
CA T9		
CA T10		

Pitfall traps are placed 5-m apart along the transect-line (doesn't have to be absolutely precise). In the CA, the transect lines should be similar to the EA, but exact orientation does not matter. They should be widely spread through the CA.

The traps will be deployed for 1 week at a time. The EA traps and the CA traps must be deployed during the same week, so that we get consistent weather conditions. Aim is to run three sampling sessions before the rat knock-down.

Pitfall traps are placed into the ground. It is very important that the lip of the trap is flush with the ground or slightly below it. If it is raised above the ground level, insects will avoid the trap. Also, make sure that the surrounding earth runs right up to the lip of the trap – there should not be a gap between the trap and the soil.

Use the screw-lids of the traps as a lid for the trap, to keep most rain and falling leaves off. Support the lid slightly (e.g. 1 cm) above the trap lip, using either small twigs or pieces of wire as supports.

Each trap should be filled to approximately one third full with liquid. The liquid should be approximately half antifreeze, half water. The idea of the antifreeze is to prevent it all evaporating, and becoming dry (because then the insects will escape). It is difficult to predict how much antifreeze/water we will need. If you find that there are no evaporation problems at all, you could reduce the amount of antifreeze. If you get evaporation problems, increase the amount.

After 1 week, collect the traps. Screw on the lids, label them carefully, and return them to the lab. Labels on traps and vials should include: Date of deployment. EA or CA. Transect-line number. Number of trap within the transect-line. E.g. you might have a label which is: 25/03/06-EA-TL3-TR5 – which would be a trap deployed on 25<sup>th</sup> march 2006, in the EA, in transect line 3, trap number 5. The traps and vials must be labelled in pencil as well as marker pen, because the antifreeze will dissolve the pen if it leaks or spills at all.

Once the traps are in the lab, transfer the insects in the trap into a carefully labelled small vial with 70% alcohol.

We will identify and count the insects later on in the project.

The traps can then be put back out in the field for the next trapping session.

## **Equipment**

### *For deploying pitfalls:*

1. Pitfall traps & lids
2. Flagging tape
3. Marker pens x2
4. Antifreeze and water mixture. If setting up 100 traps, need 3 litres.
5. Trowel for digging holes

## 6. Tape measure

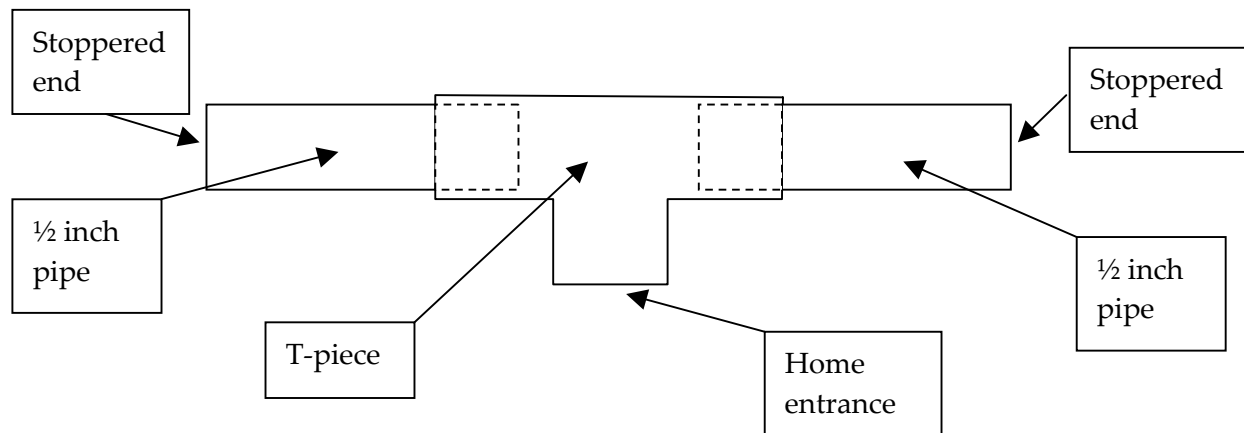
### *For collecting pitfalls:*

1. Large bag/rucksack for carrying traps back to lab
2. Marker pens, pencils and sticky labels for labelling the traps.

## 7. Insect Homes

We will also deploy 'insect homes', which are t-pieces of plastic plumbing pipe, into which two 3-inch lengths of  $\frac{1}{2}$  inch plastic plumbing pipe are inserted. Each length of pipe is stoppered with duct tape, giving a single entrance, leading to a blind-ending tube (fig 2)

**Figure 2. Diagram of an insect home**



At each pitfall trap location (see above), deploy one insect home in a tree/bush, and one on the ground (this will require a total of 400 traps). Label the home according to the area (CA or EA), transect line (1-10) and trap-station (1-10), and trap-location (tree or ground). Place a few dead leaves and a bit of soil in them, and leave them for a week.

The homes will be checked three times during the pre knock-down phase. They can be left permanently in place in-between checks. At each check, open the tubes up, and collect any insects that are found inside. Place them in small vials in alcohol, and bring them back to the lab. One vial for each home that has an insect(s). Label the vials while in the field, with the same label as the home, plus the date. Return the vials to safe storage in the laboratory.

As well as collecting all the insects that can be collected, it is very important to record while in the field, whether each home was occupied or not. Use the data-sheet provided.

## Equipment

### *For deploying homes*

1. T-pieces and tubes (2 per T-piece)



2. Duct tape
3. Marker pen for labelling each home

***For collecting homes***

Vials (enough for all the tunnels)

70% alcohol

Marker pen and pencil, sticky labels.

Field data-sheets and clipboard

**Herptiles**

We will count the herptiles (reptiles and amphibians) using the standard 100 m walked transects that Durrell Wildlife Conservation Trust have used for the Montserrat Biodiversity Assessment.

***1. Method***

Two observers conduct the counts. They walk slowly, searching as they go, and recording all reptiles/amphibians that they detect. The recording is divided into 25 m sections along the transect. The transects are 100 m long. They run between stations on the bait grid, going along a 'row'. The grid station markers will therefore be used to identify the start, 50 m point, and the finish. The 25 m grid (see above) will indicate the 25 m and 75 m points. It will probably be useful to use the same points that are used for the insect transects, because that way you can use the 5-m yellow flagging tapes as a guide to where to walk.

Experimental Area Herptile Transects		
Herptile study line	Start point	End point

--	--	--

Control Area Herptile Transects		
Herptile study line	Start point	End point


--	--	--

Each 25 m section should be covered in 10 minutes. Take 40 minutes to complete the whole route. If you reach the end of a section in less than 10 minutes, do not go back, or you might 'double-count' animals. However, try to adjust your speed, so that you don't move too fast.

The observers should walk approximately 2 m apart (i.e. if both people stretched out their arms, they would be able to touch hands). They should maintain this distance throughout the transect. They should walk side-by-side throughout the transect – don't let one person move ahead or behind, or the transect will start to vary in width, and be non-straight.

Tree-frogs and dwarf geckos should **only** be recorded if they are **within** the reach of the observers. i.e. the observers are side-by-side and about 2 m apart. If they stretch out their 'outer' arm, they can reach a further 1 m approx. Therefore, their arm-reaches cover a total width of 4 m. Tree-frogs and dwarf geckos that are outside this 4 m wide band should be ignored. Do not leave the straight route to get closer to them.

All other reptiles/amphibians should be counted, however far away they are. This means mountain chickens, *Ameiva* ground-lizards, racers, anoles, woodslaves, galliwasp, coffin-borers, iguanas.

Both people should be searching. One person carries the data-sheet, and the other person calls out animals that they see.

Counts need to be done in the day time and then at night. We should wait to do them in good weather – never do them in bad weather (strong rain and wind).

## **2. Number of routes and frequency of counts**

Do eight transect routes in the experimental area, and eight routes in the control areas on each sampling occasion (four in each CA, unless it is hard to get four routes in Baker Hill). Each transect needs to be done at day and at night. The day-time transects should be done after the cool of the dawn, but before the day becomes very hot, in order to get the most active period for the animals. Generally, this is between 08:00 –12:00 hours. The night transects should be completed between 19:00 –22:00 hours.

The routes in the control areas need to be permanently marked, so that repeat visits can be made. If they are repeats of the DWCT routes, that is good.

Don't do all the experimental area transects first, and all the control area transects second, or the other way around. Mix them up.

We should aim to have two or three sampling occasions before the rat knock-down.

## **Mountain chickens**

We will use standard mountain chicken transect methods in the experimental area and the control areas, like the ones used for the Centre Hills mountain chicken monitoring programme.

We can also use data from the long-term mountain chicken monitoring programme to help the analysis.

### **1. Method**

*Within experimental area:* Three new transects have been placed in the EA: Fogarty catchment, Jackie's Ghaut, and Lawyers. They are 100-150 m in length.

*In control areas:* One new transect has been placed in Baker Hill, and we will use the existing transect in Soldier Ghaut. In Cassava, we will use the existing Upper Cassava transect and a new transect in dry green ghaut.

Methods are as for the normal chicken monitoring programme: walks to be done at night, with detailed recording of weather conditions. A new data-sheet has been produced – use this, not the existing data-sheet used for the chicken monitoring programme. The transects are divided (and marked on the ground) in 10-m sections. When chickens are detected, the 10-m section in which they were found will be recorded. In addition, size, sex and condition of all animals that can be captured will be recorded.

We aim to do two sampling occasions along all routes before the rat knock-down.

## **Birds**

### **1. Breeding success**

If rats are a major cause of breeding failure, we would expect an instant response to reducing rat numbers. Therefore, we will monitor breeding success in experimental areas and control areas during 2006 and 2007.

Mainly we will aim to determine the breeding success of all the oriole nests in the EA and the CA. In addition, the success of the nests of other species, especially Forest Thrush, will be determined wherever possible.

Mark with flagging-tape, and record all nests. Make repeated visits to them as often as possible (every 4-7 days if possible), to check their success. Record nest success, and cause of failure wherever possible, using the two data-sheets provided.

Notice in the bird nest record datasheet that there is an option for filling in "either fledged or failed". This is because you may arrive at a nest to find that it is no longer active, with no chicks present, but you cannot tell whether it successfully fledged or was predated. Sometimes you will know that they can't have fledged, because the chicks would have been too young. Sometimes you will see the fledglings. However, on other occasions, you will not be sure which it is, so circle "either fledged or failed"

Give each nest a unique code, based on the species 4-letter code (MTOR, FOTH etc), the year, the site and the number. For example, if you discover three FOTH nests in Baker Hill during 2006, the first one would be called: FOTH-06-BH-1, the second would be FOTH-06-BH-2 and the third would be FOTH-06-BH-3.

## **Plants**

We aim to find out whether there is a change in plant communities after knocking down rats. RBG-Kew will help to decide what exactly we will measure, and how it can be measured. However, I think we will want to base it mainly on measuring changes in ground cover (i.e. how much of the soil surface has herbaceous plants on it) and seedling numbers/size/identity.

We will want to make lots of quick and easy measurements, repeated at regular time-intervals, in the experimental and control areas.

I think that repeated visits to the same measurement plots will be the best approach, since there is a lot of small-scale variation in the forest vegetation. Repeated measures at the same sites will allow us to remove this variation from the analysis.

The measurement plots within the experimental area can be based on the control stations (e.g. one plant measurement plot at each control station).

RBG-Kew to test the measurement methods with the fieldwork officers during their visit, and decide on a final protocol, after discussion with GH.

## ***Monitoring rat numbers***

It will be important to determine whether we have actually reduced rat numbers successfully during the experiment, and by how much.

The rat monitoring should however be non-lethal, because we don't want to reduce rat numbers in the control areas, or 'interfere' with the experiment.

The tracking tunnels have worked extremely well during pilot studies. I therefore propose that we stick with this method.

### **Where to deploy tunnels**

Tracking tunnels are set out in lines of 10, with tunnels 50 m apart.

Within the experimental area, we will set out tunnels on a grid system. However, we don't want the tunnels to be at the same site as the control stations, because we might be knocking the rats down harder around the control stations than in the experimental area as a whole. We will therefore use the same 'lines' across the site as for the control stations, but we will put the tracking tunnels half-way between the control stations on each line (on the 25-m grid). Therefore we will have about 50 tracking tunnels in the experimental area.

We will set up 5 tracking tunnel lines (ie a straight line of 10 traps at 50 m) spacing in the control areas. It doesn't matter exactly where these are, as long as they are well spaced out among the various control areas. They can be in fairly easy to access areas, such as along paths, but they must be at approximately the same altitude as the experimental area.

Each tunnel needs to be labelled with its unique number.

- In the experimental area, the tunnels will be set up based on the grid stations, but with the tunnels set half way between the grid stations. We therefore label the tunnel that is placed on the 25-m mark halfway between C0 and C1 as C1, and the tunnel that is halfway between C1 and C2 as C2 and so on.
- In the control areas, the labels are as follows:
  1. Transect A: Cassava Ghaut, following the trail from Lawyers down to the Mansipote, and then up the Mountain Chicken transect towards the C8 oriole territory.
  2. Transect B: Cassava Ghaut. From the C4 oriole territory at the top of Dry Green ghaut, down to the bottom of Dry Green Ghaut (stations B1-B7), then turn right over the ridge and down towards the main path (B8-B9), crossing the path just before the mansipote, and heading up the opposite hillside (B10)
  3. Transect C: from the top of the big banana plantation (oriole territory C1.5), head directly up the hill behind (C1-C3). Near the top of the hill, when the Control Area flags are reached, turn left across the hillside, following the marker flags (C4-C6); Then return to C3, and head up to the Gun Hill ridge, and then turn right along it (C7-C10).
  4. So, for example, a Control Area tracking tunnel might be labelled “CA A2”, meaning CA for Control Area, A for the transect it is on, and 2 for the number of the station on that transect.

### **Design of the tunnels**

Base: ½-1 inch thick wood, of any quality, cut to 535 mm x 100 mm.

Cover base with a polythene sheet, to stop the ink running into the wood from the sponge.

Put in the ‘base-dividers’ – strips of plastic that separate the paper and the sponges.

Build the walls and roof. These will be made from a sheet of corflute, folded into three. Needs to 615 mm x 350 mm, to allow an overhang at the ends to keep rain out, and a bit of overhang at the sides, so that it can be attached to the wooden base.

The food colouring will be put onto 4 mm thick sponge sheets, which are placed in the central section of the tunnel.

Rodent footprints will be recorded on sheets of absorbent paper (175 x 95 mm), one at each end of the tunnel.

### **Running the tracking tunnels**

Just before going into the field to deploy the sponges, place them all into a sealed plastic bag with the food colouring, and squish them around, before and while going into the field. This would save carrying food colouring into the field; would mean that there is no risk of running out of food colouring half way along the tunnel-line; would mean that all sponges have a pretty equal amount of colouring on them.

The dye used so far is red food dye, E124. The New Zealanders recommend E123 (Amaranth – also red). I guess almost any food colour would work. So far it has been diluted at 1:3 with water. Possibly, we could make it quite a lot more dilute than this, and it would still work well – try experimenting a little.

The sponges and papers should be put in the tunnels in late afternoon/early evening. Place one sponge into each tunnel, and a sheet of paper at each end. Make sure that the papers are well short of the end of the tunnel, or they will absorb water if it rains.

We will have to be careful of the sponges drying out before the rats can leave their footprints. Check very carefully on the first one or two sampling occasions, to see if the sponges are dry when collected. If they are, then it would be a good idea to add a small amount of antifreeze to the colour solution and/or deploy them quite late in the evening, and/or use more liquid.

Place a blob of peanut butter on the tunnel roof, above the sponge.

They should be collected next day (doesn't have to be early in the morning).

Each paper should be written on, **in pencil**, as you take it out of the tunnel with:

- The tunnel code (see above)
- The date

Remove the sponges also, to prevent the rats chewing them.

**Always** write on the top side of the paper (NOT the side facing the wooden base).

Take a paperback book or something like that into the field, and place the papers between the pages. This will help to keep them separate (so that footprints aren't printed from one sheet to another), and dry them out. Place them in the book in the order in which they are collected. This helps to correct any mistakes in labelling etc.

Also note whether there are any other signs, especially faeces in the tunnel. Faeces can identify the rat species, so write down which species it seems to be from ( I have supplied you with photos of the appearance of brown and black rat faeces.

Fill in the supplied data-sheet as you move along the tunnel-line.

Check the rodent identification on when you get back to the office. In particular, check for mouse prints, which are less obvious than rats (especially if there has also been a rat in the tunnel). It is quite likely that mouse numbers will increase after the rat knock-down. If this happens, it will be important to know about it, so it is very important to record all signs of mice in the tunnels, both **before** and **after** the knock-down.

When you return to the office, spread the papers out to dry. When they are fully dry, store them in a folder, somewhere safe and well-organised!

Leave the tunnels in place in the field continuously.

## *Rat knock-down*

We aim to achieve a very large reduction in rat numbers in the experimental area, and maintain low numbers for the duration of the experiment. This will almost certainly not be 100% removal, but it does not need to be.

We will test the effect of the rat reduction on biodiversity, but also we will try to learn about the effectiveness and cost of rat control methods, and any undesired effects.

The probable method will be to initially poison the rats with Brodifacoum in bait stations, and then to periodically snap-trap them. A further pulse of Brodifacoum may be needed at a later stage.

This means that Brodifacoum will not be in continuous use, greatly reducing any worries about non-target impacts. Snap-trapping is labour intensive, which is unfortunate, but we already know the non-target risk is very low, and it can always be quantified.

I would prefer to be able to deploy arboreal snap-traps in tunnels, and bait stations in trees, and we therefore need to do some pilot work to allow us to do this.

## *Rat ecology research*

### **Aims**

1. Determine the seasonal pattern of rat activity
2. Determine the seasonal pattern of rat breeding & reproduction
3. Determine rat diet, and how it varies seasonally

### **Methods**

#### **Summary:**

Rat trap-lines are run in a set of different parts of the Centre Hills, repeated at regular intervals through the year. Killed rats are measured, sexed, and stomach contents are analysed.

#### **Deploying the traps**

Set two traps in each trap-station; place trap-stations 25 m apart in a straight trap-line. Oil the metal parts of all the traps with something tasty like cod liver oil (not a mechanical lubricant).

Place twenty stations in each trap line.

Place traps on the **ground only**.

Use peanut butter mixed with oats as bait. Buy a large amount of one particular brand at the start, and then **keep using that same brand**. Note down what the brand was.

Use the same-sized blob (approximately) at all times.

Place the traps inside weldmesh tunnels. Ensure that the trap is well back away from the tunnel entrance. This prevents any birds etc. setting the trap off while standing outside and 'leaning-in'.

**Fix the entrance of the tunnel to the walls of the tunnel**, by tying with twisty-wire, or cable-ties. The entrances had been opened in some of the traps during January 2006, by either the rats or cats; this increases the risk of non-target capture.

Cover the tunnel with dead leaves.

Mark each station with flagging tape. Write the number of the station on the flagging tape.

Attach a small piece of flagging tape to each tunnel, identifying it individually. For example, the two tunnels set on the Jack Boy line at station 6 (125 m) would be labelled JB 6.1 and JB 6.2 respectively.

Set traps on day 1, and visit them the following day at approximately the same time. When you re-visit the traps, re-set them for the next 24 hours. Repeat this again, so that the traps are set for three consecutive 24 hour periods.

Leave the tunnels in place in between trapping occasions, but remove the traps.

#### **Trap-line locations and dates**

Run one line in Gun Hill, an area with high rat abundance (in 2005) and high fruit tree abundance. Choose an area for the trap-line that is fairly close to fruit trees.



Run one line in Jackboy, at high altitude; this is an area with fairly natural forest, and few fruit trees, agricultural plots or bananas.

The trap-lines should be run for three consecutive days every 10 weeks.

Replace the peanut butter after two nights, or less if there is a problem with ants, or bait is getting too wet or too dry. Although this means that it takes longer, we have to make sure that the bait is still attractive to the rats every night that we set the traps. If the bait is dry, soggy, or partially eaten by ants it will definitely be less attractive.

If possible, set both trap-lines on the same day. If this is not possible, then run them as close together in time as possible.

Try to avoid setting the trap-lines if the weather forecast is for a lot of rain.

### **Explanations & background**

The ground traps have a risk of catching herptiles as non-targets. However, the herptiles are predominantly nocturnal, so the trap is no more risky at day than at night (probably less so). There is little chance of a bird going into the tunnels, especially if we cover them over with some vegetation, to make them darker and more 'tunnel-like'. The tree traps have a risk of catching birds as non-targets, and this risk is almost exclusively during the day.

We have tried to set traps at dusk, and spring them at dawn, to avoid bird bycatch. However, this is inconvenient. It means coming out of the forest in the dark, especially if the trap-line is in a remote place, and coming in at dawn the next day. It means that it is not possible to run a large number of traps on one night.

The ground traps do catch approximately equal numbers of both rat species, so we don't need tree traps in order to obtain a good sample size.

### **Things to develop & test**

I would like to develop a tree-trap in a tunnel, because we know that is a good place to catch black rats. I have discovered that tree-traps placed vertically on a tree trunk will also catch black rats effectively – they do not need to be on horizontal branches. I therefore think it might be possible to place the traps in a weldmesh tunnel, and strap this onto a vertical trunk. So, first strap the tunnel to the trunk (doesn't have to be completely vertical) using a couple of pieces of string, strapping etc. Then place the trap in the tunnel, and somehow tie it to the trunk also, by passing the string through the holes in the weldmesh and round the trunk. You'll probably need a couple of pieces of string to tie the trap on, one for each end of the trap, not just the one piece that we currently have on each trap. I don't know whether it would be best to put the entrance at the top or the bottom – try either. If testing this out, don't do it in one of the experimental areas, or the control areas, or the rat ecology study areas. May be best to try Hope.

### **Collecting the rats and the data**

Fill in the data on what happened at each trap as you walk along the trap-line (see data-sheet).

Each rat that is killed will be measured, dissected etc. Ensure that you know which rat is which, as you carry them along the line. Tie a little label round its foot as you get it out of the trap, and write on it the number of the trap that it came from.

When all the rats along the line have been collected, they should be measured and examined, and all data filled in on the data-sheet.

Collect the stomach contents into one of the small vials, in 70% alcohol.

Label the vial with the number of the rat. Use a permanent marker pen. In addition, attach a small sticky label to the vial, and write the number of the rat on it in pencil. (alcohol dissolves ink, so if any alcohol gets spilled around the vial, you will lose the permanent marker.

Collect a few pieces of fur from the flank, and a claw from each rat, and place in a small, sealable polythene bag. Label the bag with the rat's number.

The dead rats should be buried underground in the Centre Hills, well away from any streams. The hole must be deep enough that rats cannot excavate and get at the bodies.

Store the stomach contents in a single, safe, well labelled place.

At the end of a three night trapping session, take the traps back to the office. Clean and re-oil them.

## **Equipment**

1. Weldmesh tunnels. Take a few more than you need, just in case any break. 40 tunnels are needed per trap line.
2. Snap-traps. Use the Victor traps. Take a few more than you need, just in case any break. 40 traps are needed per trap line. Oil them with cod liver oil.
3. Crunchy peanut butter. Always use the same brand. Don't mix with oats.
4. Spare string. Carry some good quality nylon string, in case any extra is needed.
5. Flagging tape
6. Permanent marker pens. Take two, in case one stops working.
7. Tie-on tags for labelling rats while you carry them around
8. Sticky labels for vials (or you can stick the labels on the vials before you go into the field)
9. Pencils
10. Small, sealable plastic bags for fur/claws
11. Small vials for stomach contents
12. Bottle of 70% alcohol
13. Dissection kit: needle, tweezers, scissors, measuring tape, callipers.
14. Data recording sheets
15. clipboard

16. GPS
17. Gloves – take medical gloves and kitchen gloves.
18. Sponge for wiping dissection kit and gloves with disinfectant
19. Disinfectant for wiping dissection kit and kitchen gloves
20. Disinfectant for washing hands at the end of the work
21. Safe, waterproof container for carrying the dissection kit and other equipment in the field.
22. Safe, waterproof container for carrying the hygiene equipment (disinfectant, sponge, gloves) into the field.
23. Waterproof bag to carry samples back from the field in
24. Trowel to dig a hole to bury the rats in.

### **Risk Assessment**

- See attached document on rat health and safety procedures.

## Rat trap-line data-sheet

Trap-line:			Date traps set:		
<b>Overnight weather:</b>					
Wind <i>(circle the correct one)</i>	Very strong	Strong	Moderate	Weak	none
Rain <i>(circle the correct one)</i>	Heavy	Moderate	Little	None	
<b>What happened to trap:</b>					
Station number	Trap number	Was trap sprung? <i>(Y or N)</i>	Was bait gone? <i>(all, some, none)</i>	What species was in trap?	Rat number
1	1				
1	2				
2	1				
2	2				
3	1				
3	2				
4	1				
4	2				
5	1				
5	2				
6	1				
6	2				
7	1				
7	2				
8	1				

8	2				
9	1				
9	2				
10	1				
10	2				
11	1				
11	2				
12	1				
12	2				
13	1				
13	2				
14	1				
14	2				
15	1				
15	2				
16	1				
16	2				
17	1				
17	2				
18	1				
18	2				
19	1				
19	2				
20	1				
20	2				

Giving the rat number:

1. Location G=gun hill, F=fairy walk, J=jackboy
2. date (day, month)
3. number of rat (start counting from the first rat extracted)

*e.g. the first rat caught at Gun Hill on 16<sup>th</sup> March would be: G-1603-1; the third rat caught at Fairy Walk on 7<sup>th</sup> June would be: F-0706-3.*

<b>Rat number:</b>											
<b>Body size</b>											
Head-body length (mm)		Tail length (mm)		Right ear length (mm)		Right hind-foot length (mm)		Weight (g)		Was rat wet when weighed (Y/N)	
<b>Sex &amp; breeding status</b>											
Sex (circle the correct one)	male	female	unknown								
If female: (circle the correct one)	virgin		pregnant		lactating		Has bred but not pregnant or lactating				
If male: (circle the correct one)	Testes in scrotum (visible)			Testes in abdomen (not visible)							
<b>Colour of:</b>											
Fur on back/sides				Guard-hairs			Top of hind-feet			belly	
Ear (circle the correct one)	hairy		hairless								
Stomach sample taken (Y/N)				Fur and claw sample taken (Y/N)							

Good morning/afternoon. My name is \_\_\_\_\_ and I am conducting a survey on behalf of the Centre Hills Project. The survey will inform us about land use patterns in and around the Centre Hills, which includes areas where farming and livestock production are taking place. The results of the survey will be shared with the general public over the coming year. Your participation in the survey would be greatly appreciated. This is an anonymous survey, and your name will not be recorded. I will ask questions and write down your response, and the survey should take approximately 15-20 minutes to complete. Are you willing to participate?

1a) Do you tend livestock in or around the Centre Hills area? **Yes** **No**

1b) Do you practice farming in or around the Centre Hills area? **Yes** **No**

**QUESTIONS FOR LIVESTOCK TENDERS**

2a) How many of each type of animal do you tend? **Sheep** \_\_\_\_\_ **Cattle** \_\_\_\_\_ **Pig** \_\_\_\_\_ **Goat** \_\_\_\_\_  
**Donkey** \_\_\_\_\_ **Fowl** \_\_\_\_\_ **Horse** \_\_\_\_\_

2b) On average, what percentage are housed and what percentage are tethered? **Housed** \_\_\_\_\_%  
**Tethered** \_\_\_\_\_%

2c) Where are they housed/tethered? \_\_\_\_\_

2d) What is the approximate acreage of land where the livestock roam? \_\_\_\_\_

**QUESTIONS FOR FARMERS**

3a) What do you farm? **Banana** \_\_\_\_\_ **Eggplant** \_\_\_\_\_ **Plantain** \_\_\_\_\_  
**Butternut** \_\_\_\_\_ **Herbs** \_\_\_\_\_ **Pumpkin** \_\_\_\_\_  
**Cabbage** \_\_\_\_\_ **Lettuce** \_\_\_\_\_ **Season pepper** \_\_\_\_\_  
**Carrot** \_\_\_\_\_ **Melon** \_\_\_\_\_ **Spinach** \_\_\_\_\_  
**Cassava** \_\_\_\_\_ **Okra** \_\_\_\_\_ **Sweet pepper** \_\_\_\_\_  
**Christophene** \_\_\_\_\_ **Onion** \_\_\_\_\_ **Sweet potato** \_\_\_\_\_  
**Corn** \_\_\_\_\_ **Papaya** \_\_\_\_\_ **String beans** \_\_\_\_\_  
**Cucumber** \_\_\_\_\_ **Other (list):** \_\_\_\_\_  
**Dasheen** \_\_\_\_\_

3b) How many acres do you farm? \_\_\_\_\_

3c) Where do you farm? **Duck Pond** **Blakes** **Molyneux** **Dyer Piece** **Olveston Mountain**  
**Waterworks** **Baker Hill** **Baker Hill** **Other** \_\_\_\_\_

3d) How many others farm the same plot or tend the same livestock as you? \_\_\_\_\_

3e) How long have you been farming or tending livestock at this location? \_\_\_\_\_

3f) What method of farming do you use primarily? **Manual** **Mechanical** **Both**

3g) Do you practice any of the following soil conservation techniques? **Contour cropping** **Strip banding**  
**Contour drains** **Terracing**  
**Other** \_\_\_\_\_

3h) If you use any fertilisers, what types and how often? **Frequency:** \_\_\_\_\_  
**Types:** \_\_\_\_\_  
 \_\_\_\_\_

3i) If you use any pesticides, what types and how often? **Frequency:** \_\_\_\_\_  
**Types:** \_\_\_\_\_  
 \_\_\_\_\_

3j) How comfortable are you in the application of chemicals? **Very comfortable** **A little uncomfortable**  
**Somewhat comfortable** **Very uncomfortable**

3k) How do you dispose of waste on your farm? \_\_\_\_\_  
 (trash, plant material, cuttings, etc.) \_\_\_\_\_

3l) Please indicate how much of a problem you think the following animals are and what impact they have.

Animal	Very bad problem	A little problem	Not a problem	Unsure/ don't know	Description/nature of impact
<b>Pig</b>					
<b>Sheep</b>					
<b>Goat</b>					
<b>Horse</b>					
<b>Donkey</b>					
<b>Rat</b>					
<b>Cattle</b>					
<b>Pearly eyed thrasher</b>					
<b>Agouti</b>					
<b>Iguana</b>					
<b>Other</b> _____					

3m) Please describe any measures that you take to \_\_\_\_\_  
 reduce the impact of animal pests on your farm. \_\_\_\_\_



**QUESTIONS FOR BOTH LIVESTOCK TENDERS AND FARMERS**

4a) In an average year, which months/seasons do you farm or tend livestock? \_\_\_\_\_

4b) In an average season, how many days per week do you farm or tend livestock? \_\_\_\_\_

4c) In an average week, how many hours per day do you farm or tend livestock? \_\_\_\_\_

4d) When you aren't farming/tending livestock, what other things do you do to earn money? \_\_\_\_\_  
 \_\_\_\_\_

5a) Please describe land ownership for the land that you tend/farm. **Own it myself**      **Government owned**      **Privately owned**

5b) If you are not the land owner, do you pay rent to use it?      **Yes**      **No**

5c) If you do not own the land, what type of agreement do you have with the land owner allowing you to farm?      **Written**      **Verbal**

6a) In what ways does your farming or tending of livestock have an impact on your surroundings (environment)? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

6b) Over the past 10 years, what changes have you seen in the land around where you farm? \_\_\_\_\_  
 \_\_\_\_\_

7a) How often have you engaged in the following activities?

Activity	Past month	Past year	Past 5 years	> 5 years	Never
Been invited to take part in a meeting relating to agriculture					
Attended a meeting relating to agriculture					
Been visited by an Extension Officer where I farm/tend livestock					
Visited a MALHE official to discuss something relating to my farm/livestock					
Received equipment or materials from MALHE					

7b) To what extent are you satisfied with the level of support that MALHE provides to you?      **Very satisfied**      **Somewhat satisfied**  
    **A little dissatisfied**      **Very dissatisfied**

- 7c) To what extent are you familiar with the Centre Hills Forest Reserve? **I know all about the Forest Reserve**  
**I've heard of it, but don't know much about it**  
**I didn't know there was a Forest Reserve**
- 7d) To what extent are you familiar with the regulations related to farming in Montserrat? **I am very familiar with the regulations**  
**I know a little, but not much, about the regulations**  
**I didn't know there were any such regulations**
- 7e) To what extent are you satisfied that the law is protecting the health of your surroundings? **Very satisfied** **Somewhat satisfied**  
**A little dissatisfied** **Very dissatisfied**
- 7f) What changes, if any, would you like to see in the way that your surroundings are protected (e.g., plants, animals, soil, water, etc.) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 8a) What percentage of your crops/livestock are sold/used at home? **Sold** \_\_\_\_% **Home** \_\_\_\_%
- 8b) When the crops are in production, how often do you sell? \_\_\_\_\_
- 8c) When the crops are in production, where do you sell? \_\_\_\_\_
- 9a) When you are farming/tending livestock, how much do you earn (net) in an average month? **\$0 - \$499** **\$500 - \$999**  
**\$1,000 - \$1,499** **\$1,500 - \$1,999**  
**\$2,000 - \$2,499** **\$2,500 or more**
- 9b) Given the costs and income, which statement best describes how you feel about the business? **I make a high profit** **I barely make ends meet**  
**I make some profit** **I am actually losing money**
- 9c) In an average year, how much of your income comes from farming and/or tending livestock?  $\frac{1}{4}$  or less  $\frac{1}{4}$  to  $\frac{1}{2}$   
 $\frac{1}{2}$  to  $\frac{3}{4}$   $\frac{3}{4}$  to all
- 9d) Including yourself, how many people in your household are supported by income generated by farming and/or livestock? \_\_\_\_\_ **Adults (18 and older)**  
\_\_\_\_\_ **Children (under 18)**
- 9e) What costs are associated with each of the following? **Transportation** \_\_\_\_\_ **Tools** \_\_\_\_\_  
**Fertilizer/pesticides** \_\_\_\_\_ **Seeds/plants** \_\_\_\_\_  
**Irrigation** \_\_\_\_\_ **Labour** \_\_\_\_\_  
**Other (state what)** \_\_\_\_\_
- 10a) Do you have any other comments you would like to make? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Thank you for your time and participation!*

[Ensure that subject is 18+, resident in Montserrat for > 6 months/year, and has not completed the survey already.]

[Good morning/afternoon. My name is \_\_\_\_\_ and I am conducting a survey on behalf of the Centre Hills Project. The survey will inform us about Montserrat residents' knowledge and attitudes pertaining to the natural environment in Montserrat. The results of the survey will be shared with the general public over the coming year. Your participation in the survey would be greatly appreciated. This is an anonymous survey, and your name will not be recorded. I will ask questions and write down your response, and the survey should take approximately 15-20 minutes to complete. Are you willing to participate?]

Interview date: \_\_\_\_\_ Interview start time: \_\_\_\_\_

1) **In your own words, please describe where are the Centre Hills?** \_\_\_\_\_  
 \_\_\_\_\_

[Interviewer to identify to the interviewee the extent of the Centre Hills on the map provided.]

2) **To what degree do you feel you have a deep appreciation for the natural environment)?**

A great degree                      A moderate degree                      A slight degree                      Not at all

3) **Which statement best describes how much you feel you know about the following terms?**

Subject	I know nothing	I know a little	I know a fair amount	I know a lot
a) The natural environment				
b) Forests				
c) Wildlife				
d) Wetlands				
e) Watersheds				
f) Biodiversity				
g) Conservation				
h) Global warming				
i) Invasive species				
j) Pollution				
k) Protected areas				
l) Ecotourism				
m) Endangered species				
n) Sustainability				

4) **In your own words, please describe what you believe a National Park is?** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

5) **What do you feel are the two main threats to the natural environment in Montserrat?** 1.) \_\_\_\_\_  
 2.) \_\_\_\_\_  
 \_\_\_\_\_

6) **Please identify what responsibility each group has for managing the natural environment in Montserrat?**

Group	Major responsibility	Some responsibility	No responsibility
a) MALHE			
b) Montserrat Tourist Board			
c) Montserrat National Trust			
d) Private landowners			
e) Businesses			
f) Residents			

7) Please identify the following plant/animal? [show photo] If yes, where have you seen it?

<i>Species</i>	<i>List named response or "Unsure"</i>	<i>If seen, list location</i>
a) Female oriole		
b) Cane toad		
c) Male oriole		
d) Galliwasp		
e) Bananaquit		
f) Mountain chicken		
g) Endemic orchid		

8) Please indicate how much of a problem you think the following animals are to the natural environment.

<i>Animal</i>	<i>Very bad problem</i>	<i>A little problem</i>	<i>Not a problem</i>	<i>Unsure</i>
a) Agouti				
b) Cat (wild/feral)				
c) Cattle				
d) Donkey				
e) Goat/sheep				
f) Iguana				
g) Pig (wild/feral)				
h) Rat				
i) Thrasher (thrush)				
j) Wild fowl				
k) Dog				
l) Other _____				

9) How would you describe the condition of the following natural resources in Montserrat?

<i>Resource</i>	<i>Good</i>	<i>Fair</i>	<i>Poor</i>	<i>Unsure</i>
a) Beaches				
b) Coral reefs				
c) Forests				
d) Mountains				
e) Rivers/ghauts				
f) Springs				
g) Wetlands				
h) Wildlife				

10) Please identify how often you generally do the following (on average):

<i>Activity</i>	<i>Daily</i>	<i>Weekly</i>	<i>Monthly</i>	<i>Yearly</i>	<i>Never</i>	<i>Other (when and/or what frequency?)</i>
a) Hunt mountain chicken in the Centre Hills						
b) Hunt crayfish/riverfish in the Centre Hills						
c) Hunt other animals in the Centre Hills						
d) Farm crops in or near to the Centre Hills						
e) Tend livestock in or near to the Centre Hills						
f) Collect fruits for personal consumption in the Centre Hills						
g) Collect fruits for selling in the Centre Hills						
h) Take a hike/walk in the Centre Hills						
i) Guided a hike for money in the Centre Hills						
j) Have a picnic with family/friends in the Centre Hills						
k) Participated in a club outing in the Centre Hills						
l) Camping overnight in the Centre Hills						
m) Orienteering/scouting in the Centre Hills						
n) Observe wildlife (e.g., birdwatching) in the Centre Hills						
o) Collect materials for crafts from the Centre Hills						
p) Collect wood for furniture from the Centre Hills						

<i>Activity</i>	<i>Daily</i>	<i>Weekly</i>	<i>Monthly</i>	<i>Yearly</i>	<i>Never</i>	<i>Other (when and/or what frequency?)</i>
q) Collect wood for charcoal / firewood from the Centre Hills						
r) Collect wood for fish pots from the Centre Hills						
s) Collect plants for the garden from the Centre Hills						
t) Collect plants for medicinal purposes from the Centre Hills						
u) Used plants for medicinal purposes from the Centre Hills						
v) Work (other than agriculture/tourism) in the Centre Hills						
w) Eaten sea turtle eggs or meat from a beach or the sea						
x) Eaten mountain chicken						
y) Other reasons _____						

11) If you have eaten mountain chicken, where did you get it? \_\_\_\_\_

12) If you have eaten mountain chicken, how much did you pay for it (give unit, e.g., per frog, per dinner plate, etc.)? \_\_\_\_\_

13) If you collect materials for crafts, what types of things do you collect? \_\_\_\_\_

14) If you collect or use medicinal plants, what plants and for what purposes? \_\_\_\_\_

15) Where does pipe water come from? \_\_\_\_\_

16) Please respond to the following statements:

<i>Statement</i>			
	<i>Y</i>	<i>N</i>	<i>U</i>
a) There are currently protected areas in Montserrat.			
b) There are laws regulating farming.			
c) There are laws regulating hunting.			
d) There are laws regulating livestock production.			
e) There are laws regulating trail guiding.			
f) There are laws regulating building in the forest.			

<i>If yes do you feel the laws are adequate?</i>		
<i>Y</i>	<i>N</i>	<i>U</i>

17) Please indicate which response best describes your perceptions:

<i>Statement</i>	<i>SA</i>	<i>A</i>	<i>D</i>	<i>SD</i>	<i>U</i>
a) I feel that I am familiar with the Centre Hills Project.					
b) People generally obey laws that protect the natural environment.					
c) Laws that protect the natural environment are adequately enforced.					
d) I've been involved in making decisions about how the natural environment is managed.					
e) The Centre Hills are important to the economic future of Montserrat.					
f) Litter is a big problem in Montserrat.					
g) In my opinion, Montserrat needs a National Park.					
h) In order to protect nature, some parts of Montserrat should be completely off-limits to people.					
i) It's okay to remove certain plants and animals if they are causing harm to the natural environment.					
j) More hiking trails are needed in Montserrat.					

<i>Statement</i>	<i>SA</i>	<i>A</i>	<i>D</i>	<i>SD</i>	<i>U</i>
k) Montserrat should be promoted as an ecotourism destination.					
l) Outside human settlements, livestock should be allowed to graze anywhere there is food for them to eat.					
m) Protecting the natural environment <u>should be</u> a priority in Montserrat.					
n) Protecting the natural environment <u>is</u> a priority in Montserrat.					

18) Participant gender (circle one)

Male

Female

19) What is your residency status? (circle one)

Montserrat citizen

CARICOM

Non-CARICOM

20) Including yourself, how many people live in your household? \_\_\_\_\_

21) What is your age?

18-24

25-39

40-54

55-69

70 or older

22) How long have you lived in Montserrat?

> 1 year

1-5 years

6-10 years

11-20 years

20+ years

Whole life

If lived away from Montserrat, how many years \_\_\_\_\_

23) Where do you live?

North (north/east of Caines/Collins River)

Centre (Caines/Collins River to Soldier Ghaut)

South (south of Soldier Ghaut)

24) What is the highest level of education that you have completed?

None

Primary

Secondary (O-level)

Pre-University (A-level, vocational)

University (Associate, Bachelors)

Higher degree

Other (please identify) \_\_\_\_\_

25) What is your total household income per month?

Less than \$500

\$500-999

\$1,000-2,499

\$2,500-4,999

More than \$5,000

26) Is there anything else that you would like to say?

\_\_\_\_\_

\_\_\_\_\_

[Interviewer to thank subject for his/her participation.]

Interview end time: \_\_\_\_\_

Good morning/afternoon. My name is \_\_\_\_\_ and I am conducting a survey on behalf of the Centre Hills Project. The survey will inform us about land use patterns in and around the Centre Hills, which includes areas where hunting is taking place. The results of the survey will be shared with the general public over the coming year. Your participation in the survey would be greatly appreciated. This is an anonymous survey, and your name will not be recorded. I will ask questions and write down your response, and the survey should take approximately 10-15 minutes to complete. Are you willing to participate?

1a) Do you hunt in or around the Centre Hills area? **Yes** **No**

2a) Where do you hunt? \_\_\_\_\_

2b) How many of each do you catch per month? **\_\_\_ Agouti (Wild Rabbit)**  
**\_\_\_ Pigs**  
**\_\_\_ Goats**  
**\_\_\_ Cattle**  
**\_\_\_ Mountain Chicken**  
**\_\_\_ Iguana**  
**\_\_\_ Birds (list \_\_\_\_\_)**

2c) When do you hunt? **i. Time of day** \_\_\_\_\_ **ii. Days per week** \_\_\_\_\_ **iii. Months per year** \_\_\_\_\_

2d) How many people besides yourself do you usually hunt with: \_\_\_\_\_

3a) What methods of hunting do you use? **Shooting** **Spear** **Snare** **Sling shot**  
**Use of dogs** **Catch by hand** **Traps** **Other** \_\_\_\_\_

4a) Rate how abundant the following are in the area that you hunt, both in the present and past 10 years.

Animal	Very abundant	Abundant	Somewhat scarce	Scarce	No change		Significant increase	Slight increase	Slight decrease	Significant decrease	No change
	CURRENT SITUATION						PAST 10 YEARS				
Agouti (wild rabbit)											
Pigs											
Goats											
Cattle											
Mountain Chicken											
Iguana											
Birds											

5a) Where do you do your slaughtering? \_\_\_\_\_

6a) How do you dispose of your waste? **Garbage** \_\_\_\_\_ **Animal waste** \_\_\_\_\_

7a) Please describe land ownership for the land where you hunt. **Own it myself** **Government owned** **Privately owned**

7b) If you are not the land owner, do you pay rent to use it? **Yes** **No**

7c) If you are not the owner of the land, what type of agreement do you have with the land owner allowing you to farm? **Written** **Verbal**

8a) To what extent are you satisfied with the level of support that MALHE provides to you? **Very satisfied** **Somewhat satisfied**  
**A little dissatisfied** **Very dissatisfied**

- 8b) To what extent are you familiar with the Centre Hills Forest Reserve? **I know all about the Forest Reserve**  
**I've heard of it, but don't know much about it**  
**I didn't know there was a Forest Reserve**
- 8c) To what extent are you familiar with the regulations related to hunting in Montserrat? **I am very familiar with the regulations**  
**I know a little, but not much, about the regulations**  
**I didn't know there were any such regulations**
- 8d) To what extent are you satisfied that the law is protecting the health of your surroundings? **Very satisfied** **Somewhat satisfied**  
**A little dissatisfied** **Very dissatisfied**
- 8e) What changes, if any, would you like to see in the way that your surroundings are protected (e.g., plants, animals, soil, water, etc.) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 8f) Do you feel that the Centre Hills area should be protected? **Yes** **No**
- 9a) What percentage of your catch is used at home and what percentage is sold? **% Home** \_\_\_\_\_  
**% Sold** \_\_\_\_\_
- 9b) If you do sell **i. Where do you sell?** \_\_\_\_\_  
**ii. How much do you sell (#s or lbs)** \_\_\_\_\_  
**iii. How often do you sell ?** \_\_\_\_\_
- 9c) How much money do you make by hunting in an average month? **\$100- \$499** **\$500- \$999**  
**\$1000 - \$1499** **\$1500- \$1999**  
**Over \$2000**
- 9d) What other sources of income do you have? \_\_\_\_\_
- 9e) What percentage of your income comes from hunting **1/4 or less** **1/4 - 1/2**  
**1/2 - 3/4** **3/4 - All**
- 9f) How many people in your house hold are supported by the income generated by hunting \_\_\_\_\_ **Adults (18 and older)**  
\_\_\_\_\_ **Children (under 18)**
- 10a) Do you have any other comments you would like to make? \_\_\_\_\_  
\_\_\_\_\_

*Thank you for your time and participation!*



Dear Visitor – This anonymous survey will inform about recreational activity patterns on Montserrat. The results of the survey will be used in the development of a management plan for the Centre Hills. Your participation is greatly appreciated. Please take a few moments to complete the survey and drop it in the designated box. Thank you.

- 1.) How many people are travelling in your party? \_\_\_\_\_
- 2.) Where do you live right now? Circle one. USA UK Canada Other \_\_\_\_\_
- 3.) How many days did you stay in Montserrat? \_\_\_\_\_
- 4.) Please tick the appropriate boxes explaining your reasons for coming to Montserrat.

<i>Activity</i>	<i>Major reason for coming to Montserrat</i>	<i>Minor reason for coming to Montserrat</i>	<i>Did not factor into my decision</i>
Natural environment			
Hiking			
Visit friends/family			
Family/friend recommendation			
Uncrowded destination			
Snorkeling/SCUBA diving			
Volcano viewing			
Wildlife viewing			
Other _____			

- 5.) What sources of information were important in your decision to come and planning for your trip to Montserrat?

Poster, magazine, brochure       Newspaper       Internet  
 Guide book       TV/Radio       Friends/family  
 Previous visit       Other (please list) \_\_\_\_\_

- 6.) Please tick all that apply to describe what activities you engaged in during your stay.

Hiking       Wildlife viewing  
 Snorkelling/SCUBA diving       Going to the beach  
 Sailing       Visit to Montserrat National Trust  
 Visit to MVO       Visit to Daytime Entry Zone  
 Shopping       Other: \_\_\_\_\_

- 7.) If you spent any time hiking during your visit, which trails (or what area) did you visit? Please tick all that apply.

Rendezvous       The Cot  
 Oriole Walkway       Blackwood Allen  
 Runaway Ghaut       Duberry/Cassava  
 Katy Hill       Other: \_\_\_\_\_

- 8.) If you did hike, how did you hear about hiking opportunities? Please tick all that apply.

Montserrat National Trust       Taxi driver/tour guide  
 Brochure       Guide book  
 Family/friends       Other (please state who or where)  
 Internet      \_\_\_\_\_  
 Montserrat Tourist Board

- 9.) Did you hire a trail guide? Yes \_\_\_ No \_\_\_

– If so, where did you hire your trail guide? \_\_\_\_\_  
 – If you paid a fee for your trail guide, what was the cost per person? US\$ \_\_\_\_\_

- 10.) On a scale of 1 to 4, please rate your expectations (before arriving) and satisfaction (at the end of your visit) for the following:

Activity	Expectation before arrival	Satisfaction upon departure
	1 = Expected high standard 2 = Expected moderate standard 3 = Expected somewhat poor standard 4 = Expected terrible standard N/A = Not applicable	1 = Very satisfied 2 = Somewhat satisfied 3 = Somewhat dissatisfied 4 = Very dissatisfied N/A = Not applicable
Opportunity to view wildlife		
Abundance of wildlife		
Sense of being in a pristine environment		
Access to trails (roads, parking)		
Condition of trails		
Difficulty of trails		
Interpretation (signs, maps, leaflets)		
Interaction/knowledge of trail guide		
Value for the price of trail guide		
Presence of parks or protected areas		
Cleanliness of natural areas		
Safety of the hiking experience		

- 11.) Please make any specific comments or recommendations based on your ratings above:

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- 12.) Given the natural environment, what sorts of recreational services and/or facilities would you use in a national park in Montserrat?

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- 13.) How much would you be willing to pay for entrance to a national park in Montserrat if it contained the amenities you have listed above? Please tick one.

- |  |  |
|--|--|
| <input type="checkbox"/> Would not be willing to pay | <input type="checkbox"/> US\$20 person/day           |
| <input type="checkbox"/> US\$5 person/day            | <input type="checkbox"/> US\$25 person/day           |
| <input type="checkbox"/> US\$10 person/day           | <input type="checkbox"/> More than US\$25 person/day |
| <input type="checkbox"/> US\$15 person/day           |  |

***Thank you for your participation. Please come again!***

Montserrat Tourist Board  
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 Brades, Montserrat, West Indies  
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January 2006

# Montserrat Centre Hills Project

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**2005 Milestones**

- June
  - Bird surveys
  - Reptile/amphibian surveys
  - Project launch
  - Steering Committee meets
- July
  - Bat surveys
  - Bird presentation at SCSCB meeting in Guadeloupe
- August
  - Insect surveys
- September
  - Project Manager starts on Montserrat
  - Steering Committee meets
- October
  - Field Officers appointed
  - Bird surveys
- November
  - Kew Gardens team visits
  - Plant surveys start
- December
  - Counterpart Project Manager appointed

## *An Overview of the Project*

The Centre Hills Project (CHP) was launched in June 2005. It aims to enable the people of Montserrat to conserve the Centre Hills. Since volcanic activity has devastated most of the southern forests and mountains, the Centre Hills have become the last remaining habitat for numerous threatened species. These include the Montserrat oriole, “mountain chicken” frog, galliwasp lizard, and the endemic Montserrat orchid.

In addition to supporting ongoing ecological assessment work, the project aims to inform decision makers and partners about the social and economic interests of the

Centre Hills. An assessment of values and attitudes will provide information that will be useful in minimising potential human conflicts.

Investigating the impact of activities such as agriculture, hunting, and tourism, as well as gathering information about land ownership, are important aspects of this effort as well.

An outreach programme will target diverse audiences of resource users, decision makers, and the general public. A legislative review process will ensure that legal frameworks are adequate to effectively address conservation and protected area management.

Much of the project is funded

by the Darwin Initiative, a biodiversity conservation scheme of the UK Government’s Department of Environment, Food, and Rural Affairs. Additional funding and in-kind support comes from the six partner agencies.

The project is coordinated by the Royal Society for the Protection of Birds. Other partners are the Montserrat National Trust; Montserrat Tourist Board; Ministry of Agriculture, Lands, Housing, and Environment; Durrell Wildlife Conservation Trust; and Royal Botanic Gardens-Kew. Additional research is contributed by teams from South Dakota State University and Montana State University.

## *GIS a Big Part of the Work*

The CHP team are utilising Global Information System (GIS) technology in management planning. Working in collaboration with the government’s Physical Planning Unit and other partners, the team will fully integrate all new data with existing systems so that other interested agencies may benefit as well. GIS provides layers of information about the

environment. This can be both scientific information (e.g., vegetation maps, spring locations, oriole nesting sites) as well as social data (e.g., land ownership, farms, hiking trails).

This information can be combined to give decision makers a clearer visual appreciation of Centre Hills resources and potential conflicts arising from their use.



*CHP staff and partners examine aerial photos of the Centre Hills*



## Meet the Team



*Centre Hills Project Staff  
(from L to R): Stephen Mendes,  
Calvin "Blacka" Fenton, Jervaine  
Greenaway, Carole McCauley*

The Centre Hills Project staff are now on board and are based out of the Montserrat National Trust office in Olveston.

Project Manager Carole McCauley is serving an 18-month contract to establish the project on the ground in Montserrat. A dual national of the UK and USA, Carole has experience working on similar environmental projects in Antigua and the USA, and is

close to completing an MSc in Environmental Education from the Florida Institute of Technology.

The rest of the team are Montserratians who are serving contracts through the end of the project in 2008. Counterpart Project Manager Stephen Mendes brings almost 20 years of teaching experience to the project and is excited to meet the challenges of this appointment. Field Officer

Calvin "Blacka" Fenton has been working with biodiversity assessment projects in the Centre Hills for over five years. Field Officer Jervaine Greenaway is a newcomer to environmental work but is already showing great promise as a young conservationist.

The team works closely with staff from partner and other agencies. The public are invited to stop by the office anytime to say hello!

## Editorial: We All Need This

**"Stakeholders" are people who make direct use of a natural resource as well as people whose actions may affect the resource. This includes individuals, businesses, government agencies, and communities.**

"What's all the fuss about? Is the oriole more important than me? Wouldn't this money be better spent on social needs? I have never even been there, so why should I care about the Centre Hills? In fact, where are the Centre Hills?"

From just about anywhere on Montserrat, the Centre Hills are right next to you, above you, all around you. Everyone

is a stakeholder in this process. Even if one has never set foot inside the forest, it still provides goods and services that keep people healthy.

Consider the source of Montserrat's clean drinking water. The quality of the air. The rich soils. The home of the national bird and flower. The paying visitors who come and see such a lush and unique

place. Consider the stunning vistas one sees, is sometimes enveloped in, while driving up and down the island.

Would Montserrat be Montserrat without these things? These plants and animals AND people? We are the caretakers of the land for the time that we are here. Our great-grandchildren deserve this. We need this, all of us.

## Biodiversity Assessment

A biodiversity assessment is currently being conducted in the Centre Hills. Durrell Wildlife Conservation Trust, is coordinating this effort, with specific taxonomic expertise provided by international partners.

A network of 28 sample points has been established throughout the Centre Hills,

which were allocated randomly but stratified by altitude to ensure sampling is representative of the range of habitats found within the area. At each sample point, data are being collected on species richness and abundance within a range of taxonomic groups: plants, insects, amphibians, reptiles, birds, bats, and invasive mammals.

Along with historical and ad hoc data collection, we are compiling an inventory of Centre Hills flora and fauna, mapping biodiversity spatial patterns to identify important habitats and sites, and investigating the abundance and distribution of key species. A long-term monitoring protocol will be recommended from this current work.

Photo: A. McRobb



*Philemon "Mappie" Murraine of the  
Montserrat National Trust collects  
plants with Kew team members Colin  
Clubbe and Martin Hamilton*



## Socioeconomic Assessment

The CHP is currently involved in setting up a socioeconomic monitoring programme to formally document the nature and extent of human activity in the Centre Hills.

Socioeconomic information is used to identify trends on social and economic characteristics, human activity, and perceptions about the environment and its management. It can also help to identify sources of human

conflict over resource use and management.

Combined with information gathered in the ecological assessment, this research will inform stakeholder groups, decision-makers, and the general public as to threats and problems in the Centre Hills. It will provide a springboard for seeking solutions and opportunities for more effective use and management of natural resources.

The process can also inform decision-makers about the effectiveness of existing management frameworks from the perspective of people who are affected by these legal arrangements.

Surveys are currently being carried out to measure and describe the extent of human activity and to gauge public perceptions and values about the Centre Hills.

**Socioeconomic information relates to the value that people put on a resource. This includes cultural, scientific, medicinal, economic, religious, aesthetic, recreational, and other values relating in some way to our well-being.**

## Outreach and Education

There is a large education component in the CHP. In particular, there is a strong interest in reducing potentially harmful behavior through an effective outreach programme.

Environmental education focuses not only on enhancing human understanding of the problems and issues in managing natural resources, but also in providing opportunities for people to

participate in decision-making and hands-on experience.

To maximise participation, the outreach programme tailors educational approaches to specific audiences. Targeted audiences include politicians, community groups, land owners, tour guides, farmers, hunters, students, teachers, and the general public.

Educational materials will be

developed, including posters, leaflets, a website, and a field guide. Word will also be spread verbally through radio programmes, television, and community meetings.

Public consultation will be held regularly and often to provide citizens with the opportunity to learn and provide feedback in the development of a management strategy for the Centre Hills.



Field Officer Jervaine Greenaway (centre), along with Forestry Officers James "Scriber" Daley (left) and Lloyd Martin (right) appear on Radio Montserrat to discuss the Christmas biking programme

## Legislative Review

Existing legislation for conservation and protected area management pre-dates the volcanic activity that devastated so much of Montserrat's natural environment. It does not consider a wide variety of recent scientific data that pertain to local species and habitats of special concern. It does not address potential

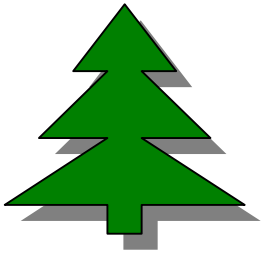
threats from expansion of human activity in the north from resettlement. Existing legislation does not always include "best practices" recommended and/or required by global frameworks under which Montserrat is obligated.

The CHP is currently seeking additional funding to hire an environmental legal consultant to carry out a legislative review,

conduct a needs assessment, and to draft/revise legislation that effectively addresses local environmental needs. Draft legislation will be presented to the Attorney General's Office for review and submission to the Executive and Legislative Councils. There will be extensive public consultation during this process to ensure that all interests are considered.



## Christmas Hikes



The Centre Hills Project staff and Forestry Officers put on a series of educational hikes over the Christmas period. These were aimed at getting people into the hills to see the unique

wildlife and habitats first-hand. Persons were given the opportunity to hike the Oriole Walkway, Blackwood Allen trail, and The Cot trail. The hikes were promoted

extensively on Radio Montserrat. Despite it being the Festival season, even the early morning hikes were well attended by people of all ages.

## Partners and Staff on the Move



*Calvin "Blacka" Fenton (above) recording snake data on a training visit on Antigua's Offshore Islands Conservation Project*



*Carole McCauley and Sarah Sanders participating in foraging sea turtle monitoring in Anegada, BVI*

### Guadeloupe

The 15<sup>th</sup> Meeting of the Society for the Conservation and Study of Caribbean Birds was held in August. Representing the Montserrat Oriole Emergency Conservation Program were James "Scriber" Daley, Calvin "Blacka" Fenton, and Richard Allcorn.

The team gave two presentations. The first, titled "Conserving the Centre Hills Forest: Reducing the Risk of Extinction of the Montserrat Oriole in the Wild", dealt with the conservation research and the future implications for the forest.

The second was a more technical presentation submitted as "Population Census and Monitoring of a Critically Endangered Bird Under Difficult Conditions" reporting on the development and efficacy of the census techniques employed on Montserrat. In an informal evening session, the new DVD, "Searching for the

Montserrat Oriole", was also enjoyed by many.

### Anegada, BVI

The RSPB was invited to facilitate a protected area planning workshop on Anegada in the British Virgin Islands in September. Also a Darwin-funded project, the Anegada team is employing a similar approach to management planning as the CHP. Thus it was a logical opportunity for CHP Manager, Carole McCauley, to observe the process and receive some training. She was accompanied by several UK colleagues, including the primary RSPB liaison to the CHP, Sarah Sanders, International Officer for Overseas Territories.

The workshop aimed to bring stakeholders, scientists, and decision-makers together to discuss research findings, human values and interests, and management arrangements in Anegada. A framework for the new management plan was developed, as well as a tentative timetable for

implementation. A similar workshop will be held in Montserrat in September 2006.

### Antigua

In December, Field Officers Calvin "Blacka" Fenton and Jervaine Greenaway each spent a week working on the Offshore Island Conservation Project in Antigua.

Hosted by the Environmental Awareness Group and led by Field Officer Ingrid Sylvester, the two participated in the census of the critically endangered Antiguan racer snake on Green Island.

The survey techniques employed are similar to those used to monitor wildlife in Montserrat. Spotting and catching snakes is tricky business, but Jervaine and Blacka were rewarded with the experience of interacting with these extremely rare animals. Snakes were tagged, measured, weighed, and inspected before being released.

Camping overnight is rarely required in Montserrat survey

## Annex 9 – Copy of Letter Sent to Land Owners Within Existing Forest Boundary

March 13, 2006

Ref: MALHE

Name  
Address  
Town

Dear \_\_\_\_\_,

On behalf of the Government of Montserrat (GOM) and the Centre Hills Project (CHP), I am writing to inform you of work taking place in the Centre Hills which may include activity on private land registered in your name. As you may be aware, the Ministry of Agriculture, Lands, Housing, and Environment (MALHE) has responsibility over the management of forest resources and wildlife in Montserrat. This is articulated in the “Forestry, Wildlife, National Parks, and Protected Areas Act” (2002). This includes portions of the Centre Hills which are currently designated as Forest Reserve (Crown land) or Protected Forest (private land).

Enclosed you will find a newsletter which summarises the key activities of the CHP. A critical component of the CHP’s approach is in soliciting the participation of stakeholders in the planning process. Among others, private land owners are clearly an important stakeholder group. Consultations will be held over the next two years to bring together various interest groups to provide information, share concerns and interests, and to comment on proposed management strategies. Note that the CHP aims to ensure that the most effective and enforceable legislation is in place to protect the social and ecological interests of the Centre Hills.

In the meantime, ecological assessments are taking place within the Centre Hills. In collaboration with the Forestry Department, project partners and CHP staff are conducting research on wildlife throughout the Centre Hills. Authority to carry out such work on public and private lands is articulated in the previously cited national legislation. Attached you will find a tentative workplan which outlines the work taking place.

You will be invited to take part in the consultation process over the next two years. In the meantime, if you have concerns or questions about this nature or location of CHP work, please contact Carole McCauley or Stephen Mendes at:

Centre Hills Project  
c/o Montserrat National Trust  
Olveston, Montserrat  
664-491-3088  
darwin@candw.ms  
[www.malhe.gov.ms/centrehills](http://www.malhe.gov.ms/centrehills) (as of April 2006)

Your support and cooperation in this initiative of national significance is most appreciated.

Sincerely yours,

Miss Lynette Farrell  
Acting Permanent Secretary

## ANNEX 9 (ATTACHMENT TO LAND OWNER LETTER)

### TENTATIVE LIST OF CHP FIELDWORK IN THE CENTRE HILLS AREA

Activity	Description	Anticipated timeframe
Oriole survey	– Oriole sample points	– Annually in March
Non-oriole bird survey	– Non-bird sample points	– Biannually in May and November
Mountain chicken survey	– Mountain chicken sample points	– Biannually in May and November
Reptile/amphibian survey	– Biodiversity assessment sample points	– February/March 2006
Vegetation survey	– Biodiversity assessment sample points	– Quarterly through September 2006
Invasive mammal survey	– Rat abundance survey – Anecdotal reporting of presence of pigs, goats, sheep, cattle	– Quarterly – Ongoing
Forest reserve boundary clearing	– Maintenance of forest boundary	– Annually in July/August
Mapping of extent of agriculture	– Demarcate extent of agricultural activities using GPS	– February to September 2006
Mapping of trails	– Demarcate extent of footpaths and trails using GPS	– February to September 2006