Darwin Initiative – Final Report

*(To be completed with reference to the Reporting Guidance Notes for Project Leaders (http://darwin.defra.gov.uk/resources/reporting/) - it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin project information

Project Reference	17-006
Project Title	Bushmeat hunting in Madagascar: linking science, policy and local livelihoods
Host country(ies)	Madagascar
UK Contract Holder Institution	School of the Environment, Natural Resources and Geography, Bangor University
UK Partner Institution(s)	
Host Country Partner Institution(s)	Madagasikara Voakajy Department of Water and Forests, Ecole Supérieure des Sciences Agronomiques (ESSA-Forêts), University of Antananarivo Ministry of the Environment and Forests Institut Pasteur Madagascar (IPM) Conservation International Madagascar
Darwin Grant Value	£299,860
Start/End dates of Project	1 May 2009 to 30 April 2012
Project Leader Name	Julia P G Jones
Project Website	http://www.madagasikara-voakajy.org/
Report Author(s) and date	Julia P G Jones, Roma Randrianavelona, Julie Hanta Razafimanahaka, Richard Jenkins, (July 22 2012)

1. Project Background

For decades, species-based conservation efforts in Madagascar have paid little attention to the issue of hunting as a pressure on native wildlife. Despite numerous accounts of hunting wild animals in Madagascar over this period, there was no systematic effort to determine the extent and impact of bushmeat hunting. Madagasikara Voakajy, a Malagasy association that the Darwin Initiative helped to create in 2005, began to investigate bushmeat use in 2007 and quickly discovered widespread evidence of the consumption of protected and game species. Madagasikara Voakajy then sought appropriate technical expertise from Bangor University to assist the development of its bushmeat work.

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

This project contributed directly to two Focal Areas of the 2010 CBD Biodiversity Targets ('Promote sustainable use' and 'Protect the components of biodiversity'). Efforts to support community management of game species and their habitats contributed to Goals 1 (Target 1.2) 2 (Targets 2.1 & 2.2) and 4 (Targets 4.1 & 4.2). This project also supported the cessation of illegal hunting, thereby further contributing to Targets 3.1 and 4.1. The work is also aligned closely with the more recent 2020 Aichi strategic goals, including (i) address underlying causes of biodiversity loss by mainstreaming biodiversity across government and society and (ii) reduce direct pressure on biodiversity and promote sustainable use.

The project greatly increased the capacity of the main host country partner, Madagasikara Voakajy (MV) in assessing and addressing bushmeat hunting and has allowed MV to expand its role of advising the government and providing policy-relevant research helping the government meet its CBD commitments. Crucially, the partnership with BU developed new techniques for assessing bushmeat consumption and MV are now a well-established Malagasy NGO with recognised capacity in bushmeat and sustainable livelihoods.

The CBD Focal Point for Madagascar was closely involved in this project. We organised at least two meetings each year to discuss our results and we also provided a technical summary for the SBSTTA 14 meeting in Kenya in 2010.

Although CBD was the main focus of the project, a major output was a published review of the wildlife legislation in Madagascar in relation to global conventions of which Madagascar is a signature including both CMS and CITES (Rakotoarivelo et al. 2011).

3. Project Partnerships

The project was initiated by Madagasikara Voakajy who originally approached BU to request involvement. All partners were involved in project planning and decision making (though this was led by MV with help from BU while other partners played a lesser role).

The partnership between MV and BU was close throughout the project (see Fig 1). Richard Jenkins was based in Madagascar for all but the last two months of the project, whilst Aidan Keane spent two months in Madagascar over two visits and PI Julia Jones made annual visits (four in total). There were also regular visits by MV staff and students to BU (Julie Razafimanahaka using DI funds, Sariaka Rakotomamonjy, Tokiniaina Hobinjatovo and Radosoa Andrianaivoarivelo funded by the Cambridge Student Conference of Conservation Science). Perhaps the main change by year three was MV's main focus shifted to raising new project funding to sustain the bushmeat team beyond April 2012 thus ensuring the project's legacy. MV were successful in getting funding (independently) for new bushmeat work in year 3, BU was deliberately not closely involved but provided support and advice where it was requested by MV.

An MOU was developed between MV and ESSA-Forêts, MV and BU and between MV and Institut Pasteur de Madagascar.

Fig 1: Core members of the Darwin Initiative bushmeat project with the project mascot 'Lenary' after the successful final workshop to develop a national bushmeat strategy held at the end of the project.

The main lesson learnt about partnerships was that close communication (especially spending time together at least early on) is vital for building a strong effective partnership. Strengths of the project were:

- Lots of movement between the two main partner institutions, and open minded positive attitudes and enthusiasm for the project from both sides.
- The core partnership was small (just MV and BU) but the wider project involved a larger range of partners. This small core facilitated the building of close strong relationships and was very effective.

Our main challenges from the perspective of building and maintaining an effective partnership was:

- Balancing the research-conservation interface. Although peer-reviewed scientific publications are not read widely in Madagascar (even in academic and conservation circles) the publicity obtained by publishing in a highly rated journal generates very useful kudos and lends weight to other communication activities. BU rated publication as very important and wanted a lot of staff time on both sides to go into this. Whereas this was a lesser priority for Mv staff.
- BU's focus was this project's duration (3 years) and achieving concrete and measurable impacts in this timeframe. MV, especially towards the end of the project, were increasingly concerned about sustainability of the work after the project ended.

4. Project Achievements

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

Biodiversity impact: The project aimed to have a positive impact on biodiversity through reducing unsustainable and illegal exploitation of wild animals. The desired end point of this project is an improved state for biodiversity and the research and publications were an essential step on the road towards this. We would argue that our research and communication of the results resulted in a national and international scale impact. Madagascar now has a national bushmeat strategy as a direct result of this project. In the recent IUCN assessment of lemur status (July 2012 in Antananarivo), bushmeat was given far higher attention than previous such efforts and species which we highlighted as suffering heavy hunting were upgraded in status (e.g. the Indri moved from endangered to critical). Of course turning such changes into increased targeted action on the ground is also essential. The poor political situation nationally means that providing clear leadership on bushmeat or enforcement of wildlife laws is not a national government priority. We suggest that through raising awareness of the issue we have improved things relative to where they would be in the absence of this project BUT that this effect may be being swamped at the national scale by the negative trend in environmental law enforcement.

During the lifetime of the project, activities at a number of sites (mostly in the Alaotra-Mangoro region) were aimed at directly reducing the illegal consumption of lemurs locally. These activities included both those to increase interest in and positive attitudes towards lemurs (community meetings, school activities and cultural festivals) as well as those aiming to improve awareness of the wildlife laws and enforcement of those laws (wide dissemination of our observations of illegal hunting to those in positions of authority and local people, ensuring the law was widely known and understood using both meetings and producing and distributing a poster BU_7). Overall we believe that the combined effect of these activities has probably had impact in reducing hunting of protected species at local scale although this is extremely difficult to quantify.

We were also actively engaged in issues surrounding sustainable management of game species (particularly tenrecs and fruit bats). We believe the communication campaign targeted at reducing hunting of pregnant females and young, and the work to support establishment of local laws (dina) protecting bat roosts, should have a direct impact on local management of these species.

Social impact: *Positive:* The communities in western Madagascar where there was high interest in improving management of tenrecs have benefited socially from the project. The project gave the opportunity for elders with concern about the erosion of traditional

management to have their voices heard (through radio programmes etc). The cultural festivals were enjoyed by communities. *Negative:* There was always a risk that by raising awareness of illegal activities (e.g. lemur hunting), our work could have a very negative impact on some individuals or whole communities. To minimise this risk we did not reveal specific villages where work was done and protected individual's and village's anonymity in pictures and text. Our aim was that although we would support increased enforcement of the wildlife laws at the national scale, we felt it was vital to avoid any disproportionate impacts on our participating communities or local collaborators. We have monitored this as closely as possible and so far do not believe there have been negative impacts on communities or individuals.

4.2 Outcomes: achievement of the project purpose and outcomes

The project has achieved its purpose (improved capacity within Madagascar, in terms of scientific and socio-economic understanding, applied to improving the management of harvested endemic species and to reducing pressure on illegally hunted species) and made excellent progress in capacity building and catalysing stakeholder engagement in bushmeat issues.

Capacity within Madagascar, post-project, in terms of scientific and socio-economic understanding of bushmeat hunting is much higher than it was in 2009. MV's Malagasy scientists have the capacity to use the methods they developed (with BU's scientists) to continue this research and monitor trends. Our communication of these results locally, nationally and internationally has resulted in much greater engagement with the issue by NGOs, extractive industry and the government. These organizations regularly conduct activities that could reduce illegal bushmeat hunting if the issue were on the agenda which we believe it now is. The seven Malagasy students who completed their studies as part of this project have either obtained employment where they can apply understanding of the bushmeat issue or continued in education.

Knowledge: We have published four papers which significantly increase the body of knowledge with respect of drivers of bushmeat hunting, the state of Malagasy hunting laws, how to assess bushmeat hunting and how to monitor the impacts of hunting on wild lemur populations. We have a number of other studies at various stages of progress towards publication and others which resulted in communication locally to increase understanding but which we will not go on to publish. As well as this scientific knowledge, the government of Madagascar, conservation professionals nationally and internationally and civil society in Madagascar are much more aware of bushmeat as an important threat in Madagascar and are discussing it in public fora. An example of how bushmeat hunting in Madagascar is now on the agenda for international conservation bodies is the text of Motion 62 submitted to the IUCN World Conservation Congress (to be held in Korea in September 2012) which draws attention to hunting and other increased threats to Madagascar's biodiversity and requests support from the IUCN partners. Part of the text reads '*Since 2009, evidence is accumulating of additional unsustainable levels of hunting of numerous species, in particular the larger ones, for commercial purposes. The lack of law enforcement has meant that this is also happening on a large and unprecedented scale inside protected areas.*' [Motion 062 Safeguarding Madagascar unique natural heritage].

Change in behaviour: We carried out a detailed evaluation of the efficacy of one of our education campaigns (among children and their parents in an area we found particularly high rates of illegal hunting of threatened species). We were able to demonstrate that attitudes and knowledge were positively changed by our campaign (and this was measurable a year later) but it is not possible to evaluate how this translates to changes in behaviour (Fig 2, Rakotomamonjy in prep).

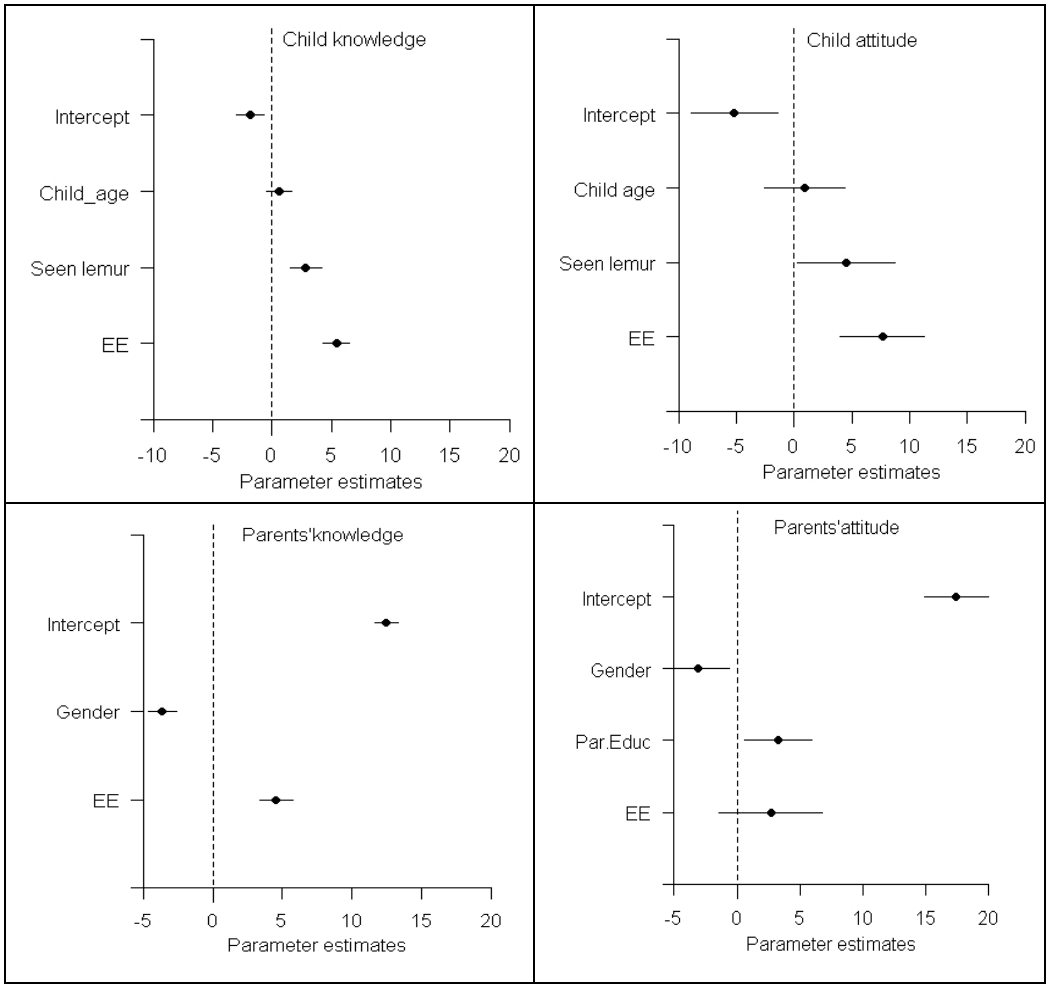

Fig 2: The results of a general linear model to investigate the effect of environmental education on the knowledge of and attitudes towards lemurs by children (n=126) and their parents (n=88) a year after the education occurred, accounting for other variables. Environmental education had a strong effect of children's knowledge and attitudes. It had a positive effect on parents' knowledge but no measurable effect on parents' attitudes (though these were quite high even in the absence of environmental education). For more details see Rakotomamonjy et al in prep.

Social networks: Work we have done with communities has strengthened traditional management of natural resources by incorporating these traditions into legally recognised 'dina'. This, and other work with elders to give them a platform to communicate their knowledge and understanding of traditional management has strengthened social systems which could improve local management (of tenrecs and fruit bats).

Ongoing funding: MV now has the capacity to assess levels of bushmeat consumption and drivers in a scientifically rigorous manner. This in itself is a major achievement. For MV to be able to use this capacity it needs donors to recognise the value of, first, knowing the patterns in bushmeat use and, then, monitoring how it changes following intervention. The high profile publication of the research results generated by this project have, and will continue, to help MV raise the profile of bushmeat hunting in Madagascar and they have had some success in raising funds to continue this work. Fund raising however remains an ongoing challenge.

4.3 Outputs and Activities

Output 1 Review of vertebrate species that are listed as game under Malagasy law with respect to their distribution, biology, status and the extent to which they are hunted

We conducted a review (literature based with a series of stakeholder consultations and seminars) of game species exploitation and hunting law. The output was eventually published with two people from the Ministry of Environment and Forests as co-authors (Rakotoarivelo et al 2011). The review revealed that wildlife legislation in Madagascar is relatively good but could be improved. For example there is confusion about the legality of selling species legally hunted as 'subsistence' and some anomalies of classification (eg *Pteropus rufus* is a game species yet classified as Vulnerable by IUCN).

Output 2 Determine the factors that influence patterns of exploitation

The factors that influence patterns of exploitation of bushmeat are complex. We carried out a significant study looking at the role that socio-economic status, taste preferences and traditional taboos play in driving bushmeat consumption and using this information to develop recommendations to address the problem. The study provides strong evidence that protected species are widely eaten (Fig S1 NB supplementary material is included in annex 7), particularly in rural areas with 95% of people having eaten at least one game species and 45% having eaten protected species. However, we also found that generally bushmeat is not a preferred meat relative to domestic meat (Figure S2). Traditional taboos (fady) offer protection for some protected species (Figure S3) but unfortunately these are rapidly breaking down, particularly in areas where illegal gold mining is causing rapid social change.

We suggest that because bushmeat is seen as an inferior substitute to domestic meats, efforts to increase the supply of domestic alternatives will reduce the exploitation of bushmeat. We also stress the importance of enforcement of wildlife laws to protect threatened species, particularly in regions undergoing rapid social change. This work was published in the open access journal *PLoS One* in December 2012 (Jenkins et al. 2011) and attracted significant international attention (Fig 3).


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Eroding taboos see lemurs end up on dinner tables

By Mark Kinver and Victoria Gill
Science reporters, BBC News and Nature

The erosion of traditional cultural taboos in Madagascar has led to an unsustainable number of lemurs being killed for bushmeat, a study suggests.

Locals revered the primates, believing that the animals were family ancestors, but the influx of outside influences has seen a breakdown in these views.

Some species do not reach maturity for up to nine years and produce offspring once every two or three years.

The findings appear in the Public Library of Science (PLoS) One journal.

A survey of locals' eating habits by researchers from Bangor University in Wales, and the Malagasy NGO Madagasikara Voakajy showed that hunting of protected species in eastern Madagascar was increasing.

The erosion of fady (taboo) traditions has led to an increase in lemurs being killed for bushmeat


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Falling Taboos Put Lemurs on the Menu in Madagascar

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Bats Catch Mating Flies in the Act

Selfish Sheep Seek the Center

At a recent ceremony in a small village in eastern Madagascar, a group of concerned elders presented a request to their ancestors. Would the ancestors please lift the taboo against hunting and eating lemurs? After all, a growing number of young people in their society were already flouting the traditional beliefs, illegally hunting endangered species such as the giant indri and eating their meat as a cheap bar snack. This breakdown of societal taboos against lemur hunting, a study now shows, combined with weak enforcement of wildlife laws, is contributing to a rise in illegal lemur poaching in the country.

Conservation scientist Julia Jones of Bangor University in the United Kingdom first became interested in the issue while working on wild game management in eastern Madagascar. She was "shocked" to find that many people in small towns and rural areas, who sometimes have difficulty raising farm animals, were turning to lemur meat as a protein substitute—despite the fact that killing lemurs is well known to be

ENLARGE IMAGE

Don't eat me. The endangered indri is among the lemurs being hunted in Madagascar. A poster reads: "These animals are our wealth, not meat."

Fig 3: Jenkins et al (2011) was widely covered by media around the world including BBC online, Science, the Daily Mail and the New York Times. For a full list see Annex 5 (publications).

Output 3: Determine the extent of hunting and impact on their populations for game and protected species **NB change from initial logframe: 'Determine the impact of hunting for species that make important contributions to rural livelihoods' approved by Darwin in Y2.**

We had envisaged explicitly assessing hunting impact of some species through harvesting models but felt that the uncertainties which would result due to lack of fundamental understanding of species population dynamics meant this was not a good use of project resources. In addition the work done in Y1 showed how important illegal hunting was in Madagascar and we felt there was a great need for us to expand the project to explicitly include quantification of the extent of this problem to prompt policy change and engagement from NGOs and civil society.

We determined the extent of hunting for a range of game and protected species.

<u>Illegal bushmeat (protected species)</u>

Extensive household interviews, interviews in schools, interviews with restaurant owners and market stall holders were carried out in 6 regions of Madagascar in Y1 and Y2 of the project to investigate the extent of bushmeat hunting. Such interviews are difficult as the illegal nature of some bushmeat hunting means people may not be willing to reveal their involvement in hunting and so are not appropriate everywhere. We therefore also used logbooks where trusted members of certain communities were encouraged to record when bushmeat species were brought into the village or bought or sold. This provided us with worrying estimates of lemur

hunting in one region of Madagascar (Table S1) as written up in Jenkins et al. 2011 (see Fig 4). We also developed a specialist technique adapted from public health science (the Randomised Response Technique) and used this to investigate the extant of hunting of number of protected species in Madagascar (Razafimanahaka et al. in press).

Fig 4: During this project we uncovered very worrying levels of hunting of protected and globally threatened species such as the Indri. We developed specialist methods such as the Randomised Response Technique for asking questions about such illegal behaviour.

We carried out 1851 household using RRT and direct questions in east and west Madagascar to investigate the prevalence of bushmeat hunting in areas exposed to conservation interventions and those not exposed. RRT increased the estimate of the extent of bushmeat hunting (over that from direct questions) and revealed very worrying levels of hunting of protected species (Fig 5).

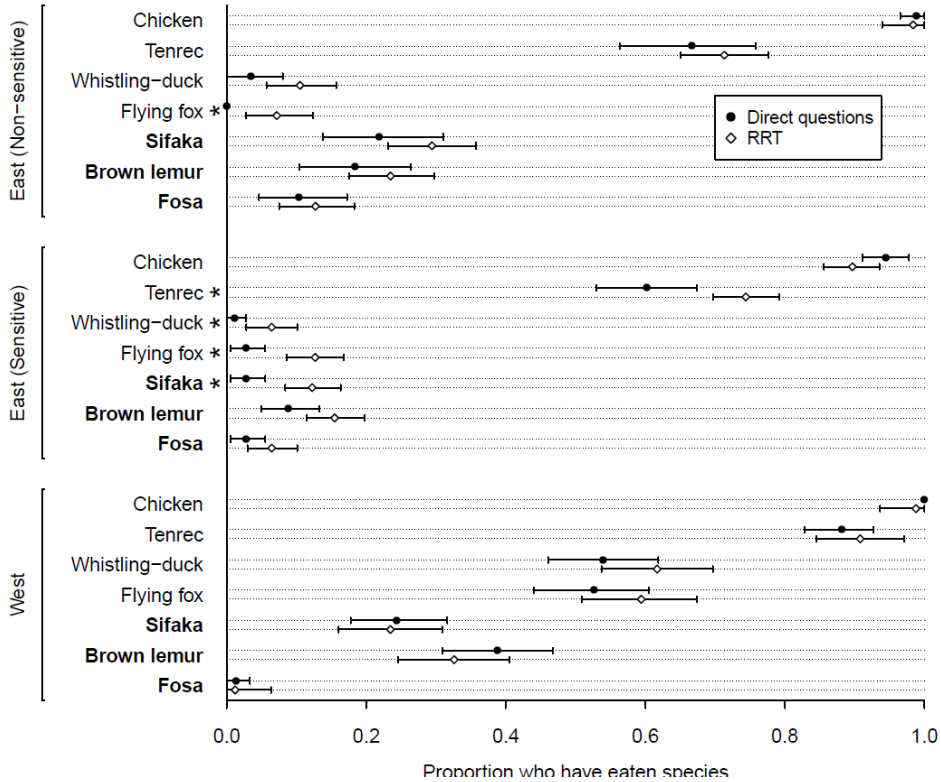

*Fig 5: Estimated proportion of respondents who had consumed each species in the last year in sensitive sites surrounding the protected area in eastern Madagascar (Andasibe and Ambatovola, n=761), a non-sensitive commune in eastern Madagascar (Lakato, n=442) and communes in western Madagascar (Mahabo and Ampanihy, n=371). Points show the mean estimates from direct questions (filled circles) and RRT (open squares) and whiskers show the 95% confidence intervals derived from bootstrap resampling. Species in bold are protected under Malagasy law, * indicates that the estimates derived from the two methods differ significantly at the 5% level. Full details in Razafimanahaka et al. in press.*

We assessed the extent of consumption of eight species around the Ambatovy nickel mine (with matched funding from the mine). 264 RRT interviews were conducted in communities around the mine and a further 176 in communities where the mine is thought to have no direct influence and 96 mine employees who return to the village each night. This work revealed worrying levels of hunting around the mine and in the control area but suggested hunting was lower among mine employees and in the area under the mine's influence. Part of the reason for the reduction we suggest is due to increased knowledge (and risk of enforcement) of anti-hunting laws around the mine. This work is submitted for publication in Animal Conservation (Keane et al in prep).

To know the impact of hunting on lemurs, it would be useful to have a robust method for monitoring changes in lemur population over time or differences between sites exposed to different levels of hunting. There is a rapidly growing literature on the potential value of occupancy modelling (which depends on simple presence/non-detection data and so is low cost) for monitoring trends in wild species but the approach has not yet been used on forest primates despite the apparent value of the approach. MV is very concerned about lemur hunting in the new protected areas which they are involved in managing (particularly Mangabe). We decided that it would be a valuable use of project resources to carry out a pilot to investigate the potential of occupancy modelling. We visited 40 randomly chosen 200m by 200m squares 3 times and noted the presence or non-detection of 5 species of lemur (and evidence of illegal mining). Because of very different detectactability and occupancy for different species (Figure S4), designing an optimal study design which suits both Indri and brown lemur is challenging (Fig S5). However we have developed a method for optimizing the design of such a survey to monitor trends in a range of species with different detectability/occupancy (S6). This is published in Animal Conservation (Keane et al. 2012).

Following requests from partners in Madagascar we extended our work determining the extent of hunting to include the critically endangered Alaotra gentle lemur *Hapalemur alaotrensis* and big-headed turtle *Erymnochelys madagascariensis*.

Common tenrec (*Tenrec ecaudatus) Game*

The common tenrec consistently featured as the most commonly consumed bushmeat in both eastern and western Madagascar in our bushmeat interviews. In Y1 we piloted methods for estimating population size of tenrecs with the aim of building a sustainable harvesting model and using this to investigate optimal ways of managing the harvest. As described in the Y1 report, we had very little success. We decided to redirect effort away from demonstrating unsustainable harvesting through ecological surveys and modelling, towards documenting community's experience of changes in tenrec availability. A pilot project conducted inY1 revealed that people reported growing commercial demand, and were concerned about resource availability. Regional stakeholders encouraged us to repeat the research in other sites within Mahabo District. Accordingly, the new research in February and March 2011 was located in three other Fokontany: Mahabo, Bepea and Andoviana. This revealed that hunting was unsustainable and that there had been a break downin traditional management over time (e.g. hunting prergant females and young tenrecs). These results were widely disseminated and resulted in a publicity campaign in Menabe (see below).

The Madagascar rousette *(Rousettus madagascariensis) Game*

We started a mark recapture study in Y1 of this project to estimate basic population parameters for this small endemic fruit bat which is widely hunted. We made five visits to 3 roosts (2 visits were funded by different money). 2,183 uniquely identified bats were captured, of which 448 were subsequently recaptured. Only 115 individuals were recaptured two or more times. A major activity of the second year was modelling this data. We used a 'robust design' which makes it possible to estimate the degree of temporary emigration and immigration into the population. We found that there are extremely high levels of movement between roosts: a bat has a 75% chance of changing roosts between capture occasions. However, we found relatively few bats in one roost and captured in another roost within our study area (Figure S6), suggesting that bats are moving extensively around unsurveyed roosts. We also found that bats are extremely trap shy; probability of recapture is 10 time slower than the probability of initial capture. These two factors (high degree of movement to unmonitored roosts and very low capture and recapture probability) make it difficult to estimate population parameters accurately

and called into question the value of building a population model at the scale planned so we abandoned this planned output in Y2 of the project (in discussion with Darwin). We still aim to publish the results from this research which will be beneficial to the bat ecology community as there are few mark and recapture studies of fruit bats. The publication will also include estimates of population size at these roosts, how they vary over time and how simple visual counts compare to the much more expensive estimates of population size from mark recapture. The mark recapture at these roosts was carried out alongside an on-going engagement by MV with surrounding communities to create new protected areas and the information we have about how roosts are connected to other roosts in the area was be fed back to the communities.

Output 4 Recommendations for revisions to national legislation prepared with the Malagasy government

These recommendations were made; the review we conducted Rakotoarivelo et al 2011 was co-authored with government employees and we presented the recommendations clearly at a number of stakeholder meetings with government representatives. However given the political situation in Madagascar there was little appetite from stakeholders to revise the national legislation and given low enforcement and increasing environmental crime, changes in the law are not a priority for addressing unsustainable and illegal hunting.

Output 5 Assess the knowledge of rules concerning hunting of wild species among relevant groups

We carried out quite extensive research into the knowledge of wildlife laws among conservation officials in Tana and elsewhere in the country (Fig 6). The results were presented to stakeholders in a number of meetings in 2010. The low level of understanding even of the laws surrounding lemur hunting was identified as an important issue and the project produced thousands of posters and stickers (endorsed by the Ministry of the Environment and Forests- see BU_7) to inform people about the law and the official sanctions. Further work around a large commercial mine (Ambatovy) in Y2 confirmed the generally low level of understanding of wildlife law and provided some evidence that increasing knowledge of the law may reduce hunting. The mine is using these results to inform their environmental education programme.

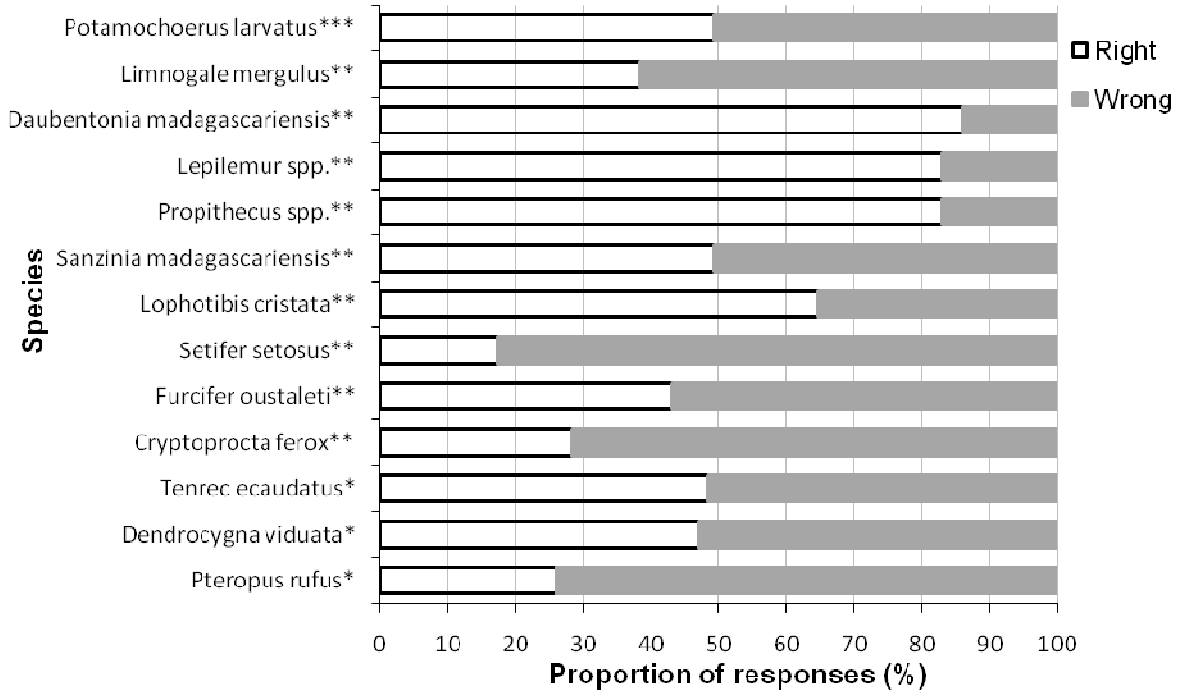

Fig 6: Proportion of respondents who able to place the species into the correct legal category (Game, ** Protected and *** Pest). This revelas very poor knowledge of the legal classification of some species such as the fruit bat* Pteropus rufus *and the tenrec* Setifer setosus*.*

In Lakato commune (a remote commune seldom visited by outsiders), our field work (under output 3) uncovered particularly worrying levels of hunting of the endangered Indri. We held a

stakeholder meeting in Moramanga in August 2010 to present the results. The level of lemur hunting that we demonstrated was surprising to many of the workshop participants, not least because the indri (the largest extant lemur) is supposedly protected from hunting by a strong fady. The workshop produced a series of actions and the project was able to immediately meet the needs for an awareness drive to remind, or inform, local people of the sacred and protected status of indri in Lakato. We created an indri mascot, called Lenari, to be the ambassador of this initiative (Fig 7) and organised lemur conservation events in primary schools which included cultural festivals (competitions among the school children to perform songs or dances on a lemur theme).

Figure 7: The project mascot 'lenary' engaging children in Lakato commune and project member Victor Rakotomboavonjy distributing out poster about lemur hunting laws.

We also found that it was very hard for those directly involved in conservation to access information on the countries wildlife laws. Therefore we published the review of laws (output 1) in an open access French language journal (Rakotoarivelo et al. 2011) and distributed this as widely as possible among conservation bodies and the authorities in Madagascar.

Output 6 Greater recognition of traditional knowledge incorporated into regional policy

The project supported two Malagasy DEA students to conduct research on the importance of tenrec meat for local livelihoods, perceived trends in the availability of tenrecs over time and the role of traditional taboos (fady) in tenrec hunting in western Madagascar (2009-2011). Both revealed that tenrecs were widely believed to be in decline and that a breakdown in the traditional forms of hunting was a major contributory factor. In 2011 the project organised a workshop in Mahabo to present the research results to local and regional stakeholders. There was broad acceptance of both the results (i.e. declining tenrec populations) and their interpretation (increasing demand and denudation of traditions governing hunting) and stakeholders requested an awareness raising campaign. In 2011 the project began a campaign to remind people of the traditional fady for tenrecs, which prohibited hunting in a certain period and discouraged the killing of pregnant and baby tenrecs. Working with Radio Magneva and Feon'i Menabe we made weekly broadcasts between September 2011 and February 2012. The radio programmes included community elders talking about the history of the taboos and hunters talking about trends in availability of tenrecs (Fig 8). A poster (Fig 8, BU_8) was also produced and distributed in prominent locations within the villages and village meetings and school visits were also carried out. We worked with other partners in the region to ensure these concerns about tenrecs made it into the text of a formal 'dina' (traditional rules that obtain approval by the district court and enter law) being developed in the region. The dina contains the words '*And. 41: Tsy azo atao ny mamono na mihaza trandraka tohitra (bevohoka) na mitarika anaka. Azo atao kosa ny mihaza trandraka efa mira vata na efa lehibe*' ie *Pregnant and lactating tenrecs cannot be hunted. Tenrecs can be hunted when they reach the adult size*. The locally agreed fine is 50,000 Ariary (ca. £17).

Fig 8: To raise awareness of the serious downward trends in tenrec availability and the breakdown in traditional management of the highly valued game species, the project made weekly broadcasts on local radio in the Menabe region in collaboration with local elders and tenrec hunters. We also produced and distributed a poster linking hunting of young tenrecs or lactating females with the decline.

In Anosibe An'Ala, the project supported communities in developing and getting approval for a dina (traditional rules that obtain approval by the court and enter law). The dina was based on traditional rules concerning the management of natural resources and targeted three new protected areas in the district. These new protected areas were created essentially for the protection of fruit bat roosts. The dina has different sections on hunting, stating that hunting is not allowed within the new protected areas (*And.21: Tsy azo atao ny mihaza, mamandrika, mamono, maka na mivarotra ireo biby sy vorona ao anaty faritra arovana vaovao*), the fine for hunting or killing a protected species is 200,000 Ariary, and that for hunting or killing a game species within the strict conservation area is 100,000 Ariary (And. 39).

Output 7 Analysis of the risk of disease transfer from humans eating bats (Nipah and Corona viruses)

Bats are known as potential reservoirs of zonotic viruses. These viruses (e.g. Lyssavirus-rabies group, paramyxovirus-includes measels and coronavirus-the group containing SARS) are spread by direct contact or indirectly (feces, urine, contaminated fruit, etc.) from an infected animals. In humans, some of these bat born viruses (e.g. Nipah and Hendra) are known to cause serious illness or death and the frequent consumption of bats in western Madagascar may pose a risk. We sampled bats in Mahabo, Anosibe An'Ala and Mahajanga districts and samples of blood, saliva, feces and urine were collected (see Fig 9). Viral detections were performed using PCR. A total of 221 individuals of four species were screened and coronavirus detected. There is ongoing work to determine the level of threat this represents.

Figure 9: Felicien Randrianandrianina taking blood samples from fruit bats for analysis by Institute Pasteur.

Output 8 Malagasy masters students (five in total) graduated (Diplôme d'Etude Approfondies) and trained in the skills needed to undertake applied research in conservation science. Six undergraduates undertaking work experience with MV.

Six DEA (MSc equivalent) students and one Ingéniorat student (undergraduate) supported by the project have already graduated and three DEA students are writing up (see Table 1). Nine further Malagasy students did work experience with the project.

Table 1: List of students supported by the project, their thesis topic, and data their degree was awarded

Students	Degree	Topic	Date
Mirana Lolontiana Rajaonera	DEA ESSA	Disponibilite et consommation de *Tenrec ecaudatus* dans le fokontany de Manamby commune d'Ampanihy, district de Mahabo, région Menabe	20-dec-10
Voahirana Claudia Randriamamonjy	DEA ESSA	Connaissance des lois et règlements sur la chasse et la faune sauvage par les acteurs environnementaux dans la ville d'Antananarivo	31-jan-11
Cynthia Raveloson	DEA ESSA	Caractérisation de l'exploitation de *tenrec ecaudatus* à Mahabo (district Mahabo-région Menabe)	28-oct-11
Sariaka Rakotomamonjy	DEA ESSA	Importance de la sensibilisation sur le comportement des étudiants et de leurs parents envers les lémuriens Cas des populations riveraines de la Nouvelle Aire Protégée de Mangabe	23-nov-11
Fetra Arivony Rakotondrazanany	DEA DBA	Evaluation de l'efficacité de la méthode de Capture Marquage-Recapture pour estimer la taille de la population d'*Hipposideros commersoni* dans trois grottes de Mitsinjo, Mariarano, Mahajanga II	20-jul-11
Van't Acyl Marie Joseph Randrianarison	Ingéniorat ESSA	Etude de la diversité et de la disponibilité de sources de protéines animales dans la région Menabe	16-jun-10
	DEA ESSA	Caractérisation de la filière Radaka dans les Hautes Terres Centrales malgaches	In process
Mananjara Willy Sylvio	DEA	Impacts biologiques et économiques de la collecte de *Mantidactylus grandiederi* (Amphibien Mantillidae) dans le District de Moranaga: cas d'Alakambato et Andranomandry	02-jul-10
Eunicia Mamilaza Lidwine	DEA	Evaluation de pression et menace sur le tortue d'eau douce Erymnochelys dans le Lac tseny de la région Sofia"	In process
Nomenjanahary Lalaina Arivony	Doctorat en Vétérinaire	Detection des Lyssavirus chez les Megachiropteres Malgache	In process

4.4 Project standard measures and publications

See Annexe 4 and 5

4.5 Technical and Scientific achievements and cooperation

A significant amount of time during the first two years of the project was dedicated to data collection and analysis. The project used a wide range of approaches in 18 districts of Madagascar (see Fig 10). Obtaining information on bushmeat consumption in Madagascar is particularly challenging but we were able to test (St John et al. 2011) and then adapt some emerging approaches to learn about peoples' diet and illegal hunting behaviour even in

circumstances where enforcement efforts were high (Razafimanahaka et al. in press). We also reviewed Malagasy wildlife law (Rakotoarivelo et al. 2011) and carried out an in-depth analysis of drivers of bushmeat hunting in one region (Jenkins et al. 2011). While trying to understand the impacts of lemur hunting in the field, we tested the potential of occupancy modelling for monitoring animal populations (Keane et al. 2012): the 1st application of this method to forest primates.

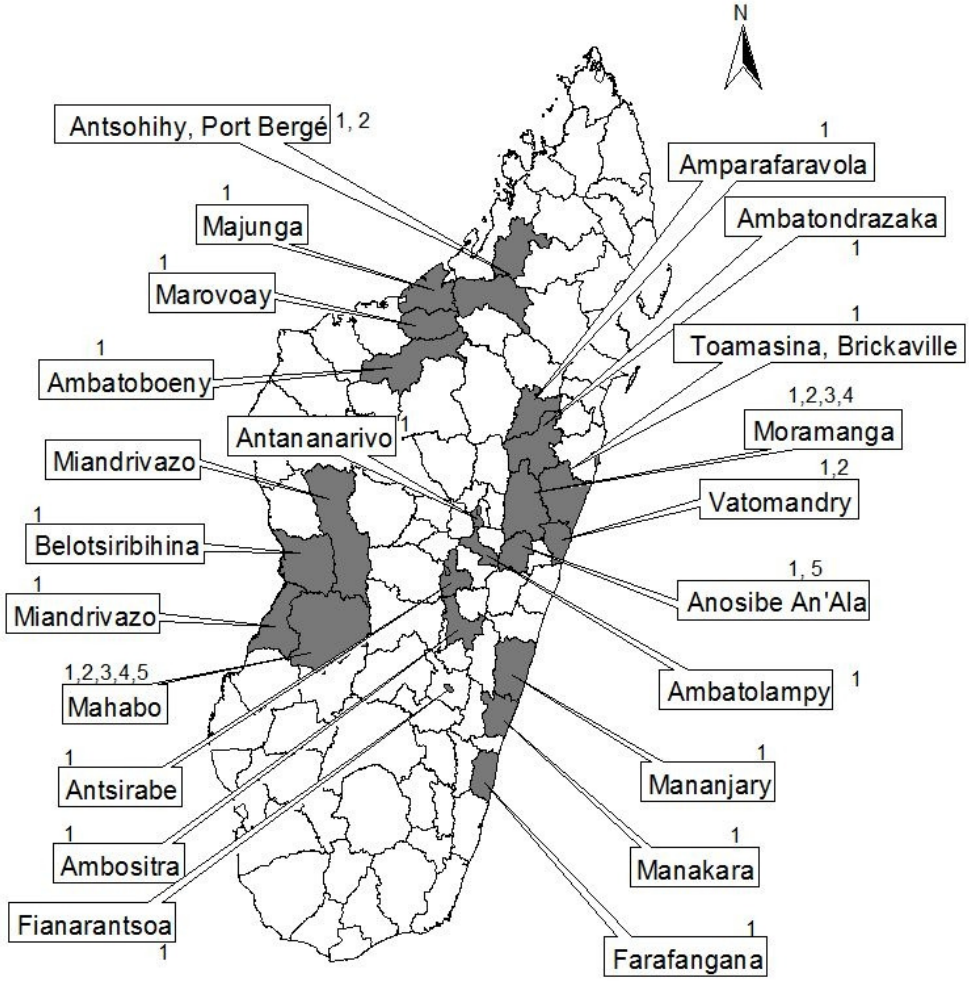

Fig 10: Map of districts in which the project team was active. Numbers refer to the different method 1: Interviews questionnaires n: 5131 [(Formal household questionnaires: 1145; Informal discussion: 181; RRT questionnaires: 2380; Law awareness questionnaires: 62; School questionnaires: 875; hunter questionnaires: 110; market questionnaires: 66; Restaurants: 262] 2: Logbook n: 221; 3: Transect survey n: 31; 4: Plot survey n: 63; 5: Individual capture n: 34 T. ecudatus*, n: 2183 R. madagascariensis.*

The project has so far produced five peer-reviewed publications all of which are attached in the evidence supplied with this report (BU_1-5):

Razafimanahaka, J. H., Jenkins, R. K. B., Andriafidison, D., Randrianandrianina, F., Rakotomboavonjy, V., Keane, A. & Jones, J. P. G. (2012) Novel approach for quantifying illegal bushmeat consumption reveals high consumption of protected species in Madagascar. Oryx. in press

Information on the extent of bushmeat hunting is needed to assess the likely impact on hunted species, to provide information on the opportunity cost to local people of conservation, and to judge the efficacy of interventions at reducing pressure. However, where hunting is illegal, or socially unacceptable, respondents may not answer honestly to direct questions about hunting or consumption of bushmeat. We adapted a specialized method for investigating sensitive behaviours (the Randomized Response Technique, RRT) and questioned 1,851 people in Madagascar about their consumption of six species, using either RRT or direct questions. For most species at most sites RRT and direct questions returned similar estimates of the proportion of the population who had consumed bushmeat in the previous year. However, RRT resulted in significantly higher estimates of bushmeat consumption in communities surrounding

a protected area, where conservation activities made such questions sensitive. RRT has been predominately used in Europe and the USA; we demonstrate that it can provide a valuable approach for studying rule-breaking among people with poor literacy in low income countries. Between 12 and 33% of people across our sites had eaten brown lemur (*Eulemur* spp.), and 12–29% had eaten sifaka (*Propithecus* spp.) in the previous year. These results add to the growing body of evidence that hunting of protected species in Madagascar is a serious problem requiring urgent action. Conservation interventions to tackle bushmeat hunting will make questions about hunting or consumption more sensitive, increasing the need for researchers to use appropriate approaches for asking sensitive questions.

Jenkins, R.K.B., Keane, A., Rakotoarivelo, A.R., Rakotomboavonjy, V., Randrianandrianina, F.H., Razafimanahaka, H.J., Ralaiarimalala, S.R. and Jones, J.P.G. (2011) Analysis of patterns of bushmeat consumption reveals extensive exploitation of protected species in eastern Madagascar. *PLoS ONE* 6: e27570.

Understanding the patterns of wild meat consumption from tropical forests is important for designing approaches to address this major threat to biodiversity and mitigate potential pathways for transmission of emerging diseases. Bushmeat consumption has been particularly poorly studied in Madagascar, one of the world's hottest biodiversity hotspots. Studying bushmeat consumption is challenging as many species are protected and researchers must consider the incentives faced by informants. Using interviews with 1154 households in 12 communes in eastern Madagascar, as well as local monitoring data, we investigated the importance of socio-economic variables, taste preference and traditional taboos on consumption of 50 wild and domestic species. The majority of meals contain no animal protein. However respondents consume a wide range of wild species and 95% of respondents have eaten at least one protected species (and nearly 45% have eaten more than 10). The rural/urban divide and wealth are important predictors of bushmeat consumption, but the magnitude and direction of the effect varies between species. Bushmeat species are not preferred and are considered inferior to fish and domestic animals. Taboos have provided protection to some species, particularly the Endangered Indri, but we present evidence that this taboo is rapidly eroding. By considering a variety of potential influences on consumption in a single study we have improved understanding of who is eating bushmeat and why. Evidence that bushmeat species are not generally preferred meats suggest that projects which increase the availability of domestic meat and fish may have success at reducing demand. We also suggest that enforcement of existing wildlife and firearm laws should be a priority, particularly in areas undergoing rapid social change. The issue of hunting as an important threat to biodiversity in Madagascar is only now being fully recognised. Urgent action is required to ensure that heavily hunted species are adequately protected.

Rakotoarivelo, A.R., Razafimanahaka, J.H., Rabesihanaka, S., Jones, J.P.G. and Jenkins, R.K.B. (2011) Lois et règlements sur la faune sauvage à Madagascar: Progrès accomplis et besoins du futur. *Madagascar Conservation and Development* 6: 37-44.

In many countries wildlife species are threatened by hunting for meat or collection for the pet trade. Wildlife laws which control where these activities can occur, limit the timing of exploitation, or provide strict protection for some species are therefore an important component of the conservation strategy. However it is important that these wildlife laws reflect the ecology and threat status of the species concerned, and that they are aligned with any relevant international conventions. In this article we discuss the legal framework for exploiting and protecting tetrapod species in Madagascar. We review the 2006 update to wildlife legislation with respect to international treaties, other national legislation and the IUCN Red List of Threatened Species. We also present a summary of the different categories of hunting (sport, commercial, scientific, and subsistence) and the control of hunting in protected areas. Madagascar has a sound legal framework for the use and protection of wildlife and the classification of species into protected, pest and legally hunted is clear and mostly fits well with the species' classification according to the IUCN Red List and CITES. A revision of the protected species list managed is needed however to (i) include marine mammals that are protected by fisheries law and the Convention on Migratory Species and to (ii) better reflect the rights of people whose livelihoods rely heavily on the income or protein derived from hunting

animals. Renewed effort to communicate and enforce wildlife legislation is needed, especially regarding the illegal hunting and export of protected species. This would also support the ongoing initiative to expand the protected area system and could be integrated into a revised National Biodiversity Strategy and Action Plan that Madagascar should produce for 2011 - 2020 as part of its commitment to implementing the Convention on Biological Diversity.

Keane, A., Hobinjatovo, T., Razafimanahaka, H.J., Jenkins, R.K.B. and Jones, J.P.G. (2012) The potential of occupancy modelling as a tool for monitoring wild primate populations. *Animal Conservation* in press

Primates are a global conservation priority, with half of known species considered threatened with extinction. Monitoring trends in primate populations is important for identifying species in particular need of conservation action, and evaluating the effectiveness of interventions. Most existing primate survey methods aim to measure abundance. However obtaining estimates of abundance with acceptable precision to detect changes in population is often expensive and time consuming. Evidence from other taxa suggests that estimating occupancy (the proportion of the area used by the species) may be less resource-intensive yet still provide useful information for monitoring population trends. We investigate the potential of occupancy modelling for monitoring forest primates using a case study of three species of diurnal lemurs in the eastern rainforest of Madagascar. We estimated detectability and occupancy from a survey with three visits to 30 sites. Our estimates suggest that precision in occupancy estimates would be maximised by visiting a larger number of sites (therefore with limited repeat visits) for *Indri indri*, whereas the optimal monitoring design for *Eulemur fulvus* and *Propithecus diadema,* which showed very low detectability in our surveys, involves more frequent visits to fewer sites. Power analyses suggested that a meaningful reduction in occupancy could be detected with reasonable effort for easily detected species, but the method may prove impractical for more cryptic species. Primates pose a number of practical challenges for occupancy modelling, including choosing appropriate survey designs to satisfy closure assumptions. We suggest that if these issues can be overcome, occupancy modelling has the potential to become a valuable addition to the monitoring toolbox for the study of forest primates.

NB This last paper does not concern bushmeat hunting in Madagascar but the paper grew out of the work we were doing in the DI grant and essentially was another forum in which to test the approaches we were developing. In turn the analysis we did for this project informed what we later did in Madagascar.

St John, F.A.V., Edwards-Jones, G., Keane, A., Jones, L., Yarnell, R.W. and Jones, J.P.G. (2012) Identifying indicators of illegal behaviour: carnivore killing in human-managed landscapes. *Proceedings of the Royal Society B* 279: 804-812.
Managing natural resources often depends upon influencing people's behaviour, however effectively targeting interventions is challenging because those involved in harmful behaviours may be unwilling to identify themselves. Non-sensitive indicators of sensitive behaviours are therefore needed. Previous studies have investigated people's attitudes, assuming attitudes reflect behaviour. There has also been interest in using people's estimates of the proportion of their peers involved in sensitive behaviours to identify those involved, since people tend to assume that others behaviour like themselves. However, there has been little attempt to test the potential of such indicators. We use the randomised response technique (RRT), designed for investigating sensitive behaviours, to estimate the proportion of farmers in north-eastern South Africa killing carnivores, and use a modified logistic regression model to explore relationships between our best estimates of true behaviour (from RRT) and our proposed non-sensitive indicators (including farmers' attitudes, and estimates of peer-behaviour). We estimate that one-fifth of farmers killed leopards in a year. Farmers' attitudes towards carnivores, question sensitivity, and estimates of peers' behaviour, predict the likelihood of farmers killing carnivores. Attitude and estimates of peer-behaviour are useful indicators of involvement in illicit behaviours and may be used to identify groups to engage in behaviour-change interventions.

Two further papers are submitted or close to submission (please contact julia.jones@bangor.ac.uk for details).

Keane, A., Razafimanahaka, J H., Ramahavalisoa, B., Randriamamonjy, V.C. Jenkins, R.K.B., Jones, J.P.G. The influence of a major mining project on consumption of bushmeat species in Madagascar (submitted to Conservation Letters).

Rakotomamonjy, S.N. Williams, S., Razafimanahaka, J.H. & Jones, J.P.G. (in prep-see BU_6) The effects of environmental education on children and parents' knowledge and attitudes towards lemurs. To be submitted to Journal of Environmental Education. This work formally reviews the effectiveness of the extensive environmental education campaigns carried out as part of this project in changing knowledge and attitudes (see Fig 11).

Fig 11: Environmental education was carried out in schools in the Alaotra-Mangoro district of eastern Madagascar with the aim of increasing students (and their parents') knowledge about lemurs, the laws which govern hunting, and to improve attitudes towards lemurs.

4.6 Capacity Building

MV instigated the project because it recognized its own, plus the wider, need to build capacity in researching and dealing with the use of bushmeat in Madagascar.

Scientific skills development: This project has developed a suite of methods that will allow MV and others to monitor the use of bushmeat in the future. Building MV staff and student skills in research design, sampling and advanced analytical methods was a fundamental part of the project and has provided the MV staff with a unique capacity in Madagascar. This includes the ability to run mixed models, occupancy models and simulations (e.g. to generate error bars in RRT calculations) in the open source programming language R, and analyse mark and recapture models (using open source programme MARK). MV staff and students have also been involved in every stage of the process of publishing results in peer reviewed journals. Aidan Keane (an expert in research design and statistical modelling) spent 2 months in Madagascar running workshops and directed training to increase research and scientific capacity in MV. Julia Jones gave a series of five lectures on each of her first two visits open to staff and students at MV as well as partner organisations about broader issues in conservation science. Tokiniaina Hobinjatovo, Radosoa Andrianaivoarivelo Sariaka Rakotomamonjy spent three weeks each in BU receiving intensive training in data analysis (travel and subsistence funded Cambridge Conference on Conservation Science). Julie Razafimanahaka travelled to the UK on Darwin funds to carry out some detailed data analysis and present project results at the British Ecological Society conference.

Capacity building of Malagasy students: The project maintained a close working relationship with Department of Water and Forests, Ecole Supérieure des Sciences Agronomiques (ESSA-Forêts). Eight students from its DEA (Diplôme d'Etudes Approfondies-MSc equivalent) programme conducted research projects on bushmeat under the supervision of MV and BU staff. One student did a DEA with our project from Department of Animal Biology, University of Antananarivo and a student was able to use the samples collected for virus analysis for his doctorate thesis in the vet department (ongoing). As well as generating new and valuable knowledge, students have had great success in obtaining employment e.g. in the Ministry of Environment and Forests or opportunities for further study. MV also provided work-experience

for nine undergraduate students from ESSA as part of the project. Julia Jones gave well attended lectures at the University of Antananarivo to students in both ESSA-Forêts and Animal Biology.

Institutional capacity: The project raised MV's capacity and profile among the conservation organizations in Madagascar and internationally. Outputs of the project made the headlines of national newspapers, and were also highlighted in the international media. MV was also invited to give a plenary talk during the EU funded international conference HUNT in Spain in March 2012. The legacy of this higher profile (and improved skills) is improved capacity to obtain funding to tackle bushmeat hunting as an issue in Madagascar. When the project started, a team of four scientists and two field assistants were involved in the project. Currently, MV has eight scientists and six field assistants who improved their skills in designing, implementing and reporting research on the bushmeat hunting issue.

4.7 Sustainability and Legacy

The capacity built within Madagascar during this project is very likely to endure. MV personnel (including former students) are now developing new projects based on skills learnt, and are giving recommendations to partners on how to tackle the issue. The latest output of the project (completed in May 2012) is a national strategy to tackle illegal hunting of protected species that was elaborated with the government, universities and conservation NGOs. The strategy will be endorsed by the government and will be made available to all partners by the end of August. An international meeting was held in Antananarivo in July 2012 to conduct red listing for all Madagascar's lemurs (attended by Julie Razafimanahaka of this project). We feel the high profile given to bushmeat as a threat (including in international press coverage of the meeting (e.g. Richard Black writing for the BBC), is part of our project's legacy.

MV will continue working with ESSA-Forêts (their academic leaders are involved in guiding MV and MV regularly train students and employ recent graduates) and with the Ministry of Environment and Forestry (through carrying out and communicating policy-relevant research and providing expert advice), and Conservation International, at their focal sites. Contacts with IPM will be maintained, especially on the publication of the results. BU and MV are working together again already on a funding proposal to ESPA (NERC/ESRC/DFID funding).

MV has built new partnerships in Wales as a result of this project. Madagascar has a long history of linkages with Wales and though this project MV has been able to capitilize on this history and build so helpful funding links in Wales. In 2012 The National Zoo of Wales started a collection of lemurs and wanted to build links with an in situ conservation project to conserve lemurs in Madagascar. They chose MV's bushmeat work in Mangabe forest as their in situ conservation project and they will raise awareness of this project and raise funds for them for five years. The Waterloo Foundation (based in Cardiff) gave MV £170,000 to fund its protected area work for the next 3 years.

5. Lessons learned, dissemination and communication

Lessons Learned: There has been a tendency for NGOs to use information on illegal bushmeat hunting to support their fund raising (shocking pictures of dead lemurs attract attention), rather than to consider carefully the drivers, and possible solutions, of the problem on the ground. We are encouraged by the success in getting bushmeat more clearly on the national and international agenda but whether this will translate to concrete action is difficult to assess. Whilst the Malagasy government was supportive throughout the project, the political upheaval in January 2009 deprived the country of the necessary leadership, funding and international support required to tackle major environmental issues. MV is well placed to keep bushmeat hunting on the agenda in Madagascar but political stability is needed for real lasting impact.

Local dissemination: We have held at least 23 dissemination events to local stakeholders or the general public. For a full list please see Table S2 (in Annex 7) at the end of this report. We also used radio to disseminate project results in the Menabe region (weekly broadcasts of a recorded show on 2 radio stations for 4 months and a live broadcast on one).

Dissemination to national/regional conservation professionals or decision makers: The project has made at least 21 presentations to national decision makers (Tabe S2) and has had good coverage in the national media (see Annex 5).

Dissemination internationally: Project team members have made a total of 22 international presentations to NGOs, scientific conferences, government agencies and university seminar series in the UK, France, Switzerland, New Zealand and Spain (see Table S2). The project has also made a real effort to get media coverage and this has paid off with extensive media coverage (including New York Times, Daily Mail, Science Magazine, front page of the BBC Online-see Annex 5 for details).

Dissemination is on-going. With each paper we publish we will do a press release. Project members will continue to present results at national and international conferences for at least another year. MV are being increasingly approached to comment on bushmeat issues by national and international journalists.

5.1 Darwin Identity

We produced large cloth banners with the DI logo that were used during workshops, conferences, presentations to stakeholders, school events and village festivals. We produced DI stickers that we put on each item of equipment purchased with the project funds (Fig 12). During presentations related to the project, DI funding was always promoted and the logo presented. DI is also acknowledged in all our publications and in most media reports about the project.

Fig 12: Darwin's logo was widely used by the project, on posters, t-shirts, banners used at public events and on stickers on project equipment.

The bushmeat hunting project was the largest by far project of Madagasikara Voakajy's Sustainability and Outreach programme. DI were the biggest funder (by a long way) but we were successful in obtaining matched funding from other sources and so these funders were also acknowledged.

The Darwin Initiative has had a very prominent place in Malagasy conservation over the last few years, especially since 2005 when MV was founded. We expect most conservation organisations in Madagascar, especially those who regularly work with MV, are familiar with the logo and understand the DI at least in outline. Villagers in the areas MV work will be familiar with the logo but may not understand the aims of the programme.

6. Monitoring and Evaluation

Changes in project design: The project initially planned to focus on improved management of 'game' species ie bushmeat species which can be legally harvested under Malagasy law but many of which seemed likely to be being overexploited (threatening species and local livelihoods). However as the project went on we uncovered more and more worrying evidence of extensive and intense hunting of legally protected species, many of which are already known to be globally threatened due to habitat loss. Our partners and other stakeholders in Madagascar were very keen for us to refocus and the core project team also felt this was needed given the circumstances. Therefore in Y2 of the project we shifted focus slightly and made some changes to our log frame which we explained in the Y2 report. The changes were generally an increase in remit (i.e. including more assessment of the extent of illegal hunting). However we dropped one activity (to construct a population model of important game species to investigate what level of hunting would be theoretically sustainable) as felt that the uncertainties in population structure, even given our detailed field work, meant this would not be a valuable use of resources.

Logframe-based monitoring and evaluation: The logframe monitoring approach was helpful throughout the project; we referred back to it at all project management meetings. The indicators we developed were helpful. However we didn't use the logframe in communicating with partners as it was more for internal project management than wider dissemination.

External evaluation: The project's progress was presented to MV's board of trustees each year. This committee is made up of seven senior Malagasy conservation scientists (Nanie Ratsifandrihamanana, Herilala Randriamahazo, Joelisoa Ratsirarson, Daniel Rakotondravony, Jonah Ratsimbazafy, Michèle Andrianarisata, Chantale Andrianarivo). Their input was invaluable for guiding us and suggesting opportunities and approaches. Four papers have been subject to peer review. All went on to be published in the journals which they were submitted to, a very good record reflecting the quality of the research. The project has made seven presentations at international scientific meetings and 4 national scientific meetings and had excellent feedback (which in some cases influenced how we developed the research).

6.1 Actions taken in response to annual report reviews

The review to our Y1 report was very helpful and we discussed it in detail between MV and BU. Some of the comments were quite technical and referred to reporting but we shared the more general comments wider within our partnership. The reviewer asked for more clarity on whether we would continue tenrec surveys. It was not finally decided when we wrote the report but after reviewing the data and discussing our priorities for the next year we decided instead to focus on socio-economic assessments of the harvest. This was explained in Y2 half year report. They also asked us to improve the way in which we reported activities and outputs and the presentation of the finances. We addressed these in the Y2 annual report.
We didn't receive any comments on our Y2 annual report.

5. Finance and administration

5.1 Project expenditure

This will be submitted late as the financial manager is off sick. This was agreed with Eilidh Young in advance.

5.2 Additional funds or in-kind contributions secured

During this project MV secured extensive matched funding to help with field work costs. The value of the staff capacity (both within MV and BU) which was devoted to bushmeat studies, design, implementation and analysis was recognised by funders and partners which made it easier for MV to raise this money. There were great synergies between this raised money and the DI funding as we were able to achieve much more than would otherwize have been possible. MV received annual grants of £10k from the Rufford Foundation to support work on lemurs and bushmeat. Conservation International supported the project through three small grants worth a total of £19,445, which was £12,445 more than was confirmed (£7k) in the original budget). A grant from the Ambatovy Minerals mining company (Sherritt International) provided the project with £24,116 additional funds in 2011. During this project, MV received also £13,567.90 from Disney Wildlife Conservation Fund and £19,087 from British Ecological Society. MV obtained a three year grant worth £170k from the Waterloo Foundation to establish seven new protected areas in eastern Madagascar towards the end of the project. This involves some limited directed work on bushmeat but the design of MV's interventions with communities is informed by the bushmeat work. Therefore MV were successful in raising a total of £276,00 in matched funding over the course of the project. However £100,000 is for ongoing work. We estimate that approximately £90,317 was specifically for bushmeat work.

IP provided staff time and salaries as matched funding (the DI funding was spent on consumables to analyse samples).

BU provided matched funding in the form of staff time and overheads

5.3 Value of DI funding

DI funding enabled MV to establish a team of committed and competent scientists to focus wholly on the bushmeat. It meant that MV was the only Malagasy organisation committed to researching bushmeat and developing ways of addressing the problems. Without the DI grant MV would have maintained its bushmeat focus but would have been far less effective and productive. It would not have developed RRT for use in the Malagasy context, nor would it have published so many publications and those they did would have been in lower impact journals, generating less publicity. In short, the DI funding enabled MV to advance from a bit-part player to a leader in bushmeat issues in Madagascar.

IPM were able to obtain samples from 4 bat species (some never before sampled for viruses) from difficult to reach areas of Madagascar. They carried out useful screening which has spurred new research into the coronavirus risk from bats in Madagascar.

ESSA-Forêts are the leading academic department dealing with natural resource management issues in Madagascar. The project allowed them to provide excellent opportunities for eight of their very able students to complete DEA and nine undergraduate students to get excellent work-relevant work-experience.

Conservation International greatly value the research, especially that concerning lemur hunting. They have used this in the recent IUCN red-listing meeting they organised.

DI funding enabled BU to apply technical skills and knowledge in research design and data analysis to a really vital conservation issue. The applied research we have carried out is valued by BU (as shown by the prominence given to the project on the BU website and in the annual report see BU_9).

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

Project summary	Measurable Indicators	Progress and Achievements	Actions required/planned for next period
Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve ● The conservation of biological diversity, ● The sustainable use of its components, and ● The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources		**Conservation of biological diversity:** Activities aimed at reducing the illegal consumption of protected bushmeat (especially lemurs) lemurs took two forms: a) Those to increase interest in and positive attitudes towards lemurs b) Those aiming to improve awareness of wildlife laws and enforcement of those laws. We also carried out a whole suit of activities which culminated in the development of a national bushmeat strategy. **Sustainable use:** We carried out research to evaluate the trends in valued game species (particularly tenrecs) and fed this back to the community and provided a forum to discuss the results and their meaning. This resulted in widespread support for the idea that traditional management (fady preventing hunting of pregnant or lactating females) should be resurrected where possible. Dinas were established (local rules formalised into the legal system) and widespread increased awareness. .	(do not fill not applicable)
Sub-goal: Madagascar's hunted endemic species more sustainably managed	Revised legal framework for sustainable hunting of game species Sustainable and legal exploitation of wildlife for food explicitly considered in management plans of new protected areas Traditional rules (dina) receiving regional recognition	We provided recommendations to the government but the political situation meant there was little appetite for revising the wildlife laws. Seven management plans (to be finalised by September) directly influenced by the project explicitly consider hunting Dina have been developed in two areas of Madagascar with support from this project.	
Purpose Improved capacity within Madagascar, in terms of scientific and socio-economic understanding, applied to improving the management of harvested endemic species and to reducing pressure on illegally	Policies developed, advocated and implemented to improve management of bushmeat; Exploitation of game species included within	National bushmeat strategy developed which incorporates the scientific and socio-economic understanding developed by the project; Policies and actions developed by a major mining company to improve management of bushmeat; NGOs slower to react but nevertheless engaged; Exploitation of game species and conservation of protected species included within draft management plans of seven new protected areas (will be finalised by September 2012); Traditional management of game species (particularly tenrec) widely discussed in a public	Promote and look for funds and partnerships to help implement the national bushmeat strategy

hunted species.	management plans of new protected areas; Traditional management given greater recognition; Students in a position to be recruited to responsible positions; MV able to attract funding in the future and influence policy;	forum in Menabe region. The break down in traditional taboos concerning lemur hunting discussed regionally within Madagascar and given huge international attention. Graduates from the project employed by MV, Malagasy government and in further education; Skills of MV (and partners) in carrying out rigorous bushmeat research developed Modest post-project funding obtained to continue working on bushmeat	
Output 1 Review of vertebrate species that are listed as game under Malagasy law with respect to their distribution, biology, status and the extent to which they are hunted	1.a Report (French & English) 1.b Peer-reviewed publication 1.c Seminar to discuss results	• Review completed and draft results presented to stakeholders in two seminars • Increased understanding of the situation in Madagascar ensured we were well placed to design our project. • Although we didn't produce a specific report from this output, the results of this review were included in the publications and reports produced for stakeholders	
Activity 1.1: collate available data on hunted species in Madagascar 1.2: conduct a review of hunting and its impact on animals in Madagascar 1.3: present the results to the Malagasy authorities responsible for managing wildlife and hunting		Detailed literature review completed in Y1, contributed to the design of the project and to the framing of publications and other communications the project produced. We gave presentations at the national and regional level within Madagascar throughout the project communicating these findings.	
Output 2 Determine the factors that influence patterns of exploitation	2.a Field data collected and analysed (copies of data, student theses, publications)	• Better understanding of the drivers of exploitation(e.g. taste preference, secondary impact of illegal mining, lack of alternative meats) obtained at key study sites and is being used to inform the direction and content of future conservation work • Main research output was in open access journal PLoS One (Jenkins et al. 2012) and another paper from this output is in preparation (Keane et a;. in prep). • This work was also presented at workshops and seminars in Madagascar and at international conferences and received considerable press attention. • The understanding of why people eat bushmeat has fed into the national bushmeat strategy developed by the Malagasy government as part of this project.	
Activity: 2.1 Confirm the location of case-study areas and inform local stakeholders, 2.2: Develop and refine methodology, 2.3: training of project personnel, 2.4: field data collection		Case study areas were chosen based on the literature review, MV's own experience and advice from stakeholders. Methodologies were developed and tested in Y 1 (and to a lesser extent Y2) of the project. Training included training in research ethics. There was extensive field data collection in all 3 years (but slightly less in Y3)	
Output 3 Determine the extent of	3.a Data collected on	• Alarming insights into the extent of hunting on protected species obtained	

hunting and impact on their populations for game and protected species	extent of hunting of protected species, methods established to monitor trends in harvested species (lemurs), hunting levels and biological parameters analysed and published	alongside evidence for worrying declines in legal game species because of over-hunting. • Project results are being used to advocate greater enforcement of wildlife legislation and application of traditional forms of harvest and management; • Three scientific papers published that provide key methodological advances to the study of bushmeat (Razafimanakhaka et al. in press, St John et al 2011) and monitoring impacts of hunting on forest primates (Keane et al. 2012)	
Activity 3.1 Identify key species for advanced study on life history and hunting, 3.2: Field data collection, 3.2: Analysis and report writing.		We identified two species *Rousettus madagascariensis* and *Tenrec ecudatus* for detailed study of population dynamics (both are heavily hunted game species but poorly known biologically). Extensive data was collected in Y1 and Y2 but we abandoned efforts to discover biological parameters for tenrec in Y1 due to technical challenges. We have some interesting life history information on *R. madagascariensis* which we plan to publish (Andrianaivoarivelo et al in prep). Detailed studies on the extent of hunting carried out for many legally protected species in 6 regions of Madagascar. Data analysed, presented to stakeholders and either published or submitted for publication.	
Output 4 Recommendations for revisions to national legislation prepared with the Malagasy government	4.a Report in French and English produced for the government (national and regional) containing recommendations 4.b Meetings/small workshops held with key staff of relevant government departments	• We conducted a detailed review of the hunting and wildlife legislation • Draft publication circulated to stakeholders before submission to a journal; • Malagasy government personnel co-authored the publication in the journal Madagascar Conservation and Development; • Paper published in December 2010 in French with and English abstract http://www.journalmcd.com/index.php/mcd/article/view/283 • Recommendations provided to the Malagasy government during seminars and in published format	
Activity 4.1: Prepare report, 4.2: present to stakeholders		All activities for this output were complete. However the recommendations are unlikely to result in change to the law immediately due to the sensitive political situation in Madagascar at present.	
Output 5. Assess the knowledge of rules concerning hunting of wild species among relevant groups	5.a Data collected on knowledge of hunting rules and socio-economic predictors of this knowledge in two regions of Madagascar	• Assessments consistently showed that peoples' knowledge of the rules concerning wild species was poor (e.g. Rakotomamonjy et al in prep) and there is some circumstantial evidence (Keane et al in prep) that improving this can reduce illegal hunting.	
Activity 5.1: Training of project personnel, 5.2: field data collection, 5.3. Analysis and report writing		Voahirana Randriamamonjy and Sariaka Rakotomamonjy both did some research for this as part of their Diplôme d'études approfondies (DEA) thesis research. Both were awarded	

		DEAs (2010 and 2011 respectively). Data on the state of knowledge among local people in their zones of intervention was presented to stakeholders including a mining company (Ambatovy) and an international conservation NGO (Durrell Wildlife).	
Output 6. Greater recognition of traditional knowledge incorporated into regional policy	6.a Local management of hunted populations (eg local *dina* to protect bat roosts, *fady* governing timing of hunting) recorded and given regional recognition	• Although the project uncovered significant desire to restore protective fady, it may only be feasible in a few cases. The best candidate for supporting sustainable management using traditional management rules is the common tenrec as it is traditionally fady to kill pregnant and lactating female tenrecs in most of the western part of Madagascar (particularly Menabe). We promoted this fady by giving elders and concerned hunters the chance to talk on the radio about it and produced posters. • In Menabe, statements on traditional tenrec hunting rules are included in the regional dina. This has not been officialized yet but the ministry of environment in Menabe are leading the process • A Dina was elaborated for the management of three new protected areas in Anosibe An'Ala stating rules about hunting. This dina has been submitted to the court in Moramanga, has been approved and is currently posted on the court wall to receive feedbacks from the general public before official signature.	
Activity 6.1 Meetings with governmental and traditional authorities in study areas		Stakeholder meetings in two regions of Madagascar (Alaotra-Mangoro in the east and Menabe in the west) discussed traditional management of species to (i) prevent illegal hunting of indri lemurs and (ii) return to traditional methods of harvesting tenrecs. Site-based local dinas are being developed in a number of sites managed by MV. Using the results of research collected in this project, specific clauses within each dina, and actual forest management zones, will reflect existing legal and illegal forms of hunting.	
Output 7. Analysis of the risk of disease transfer from humans eating bats	7.a Biological samples collected and analysed 7.b Results communicated to national government on risk level and avoidance 7.c Dissemination plan to hunters designed and implemented with national government	• Three fruit bat and one insectivorous bat species, totalling 292 individuals, were sampled during the project by joint teams from MV and Institut Pasteur. • The Institut Pasteur screened 221 the fruit bat samples for Lyssavirus, Paramyxovirus and Coronavirus • Lyssavirus and Paramyxovirus were not found in the samples. Coronavirus was found in 30 samples. • A representative of the Institute Pasteur participated in a stakeholder workshop organised by the project and gave a presentation about fruit bats and diseases (including preliminary results of the screening)	
Activity: 7.2 Training for blood sampling, 7.2: collecting blood samples, 7.3: screening for viruses 7.4: Reporting to authorities		All activities were completed satisfactorily. IPM are continuing to use the samples we collected in this project for future research (characterising the coronavirus found, screening the West Nile Fever).	
Output 8. Malagasy masters students graduated (Diplôme d'Etude Approfondies) and trained	8.a Student proposals 8.b Student field project data	• Project students were enthusiastic and respond well to the challenges of working on bushmeat.	

in the skills needed to undertake applied research in conservation science. Six undergraduates undertaking work experience with MV	8.c Student theses 8.d Student graduation certificate 8.e Government staff involved in project e.g. as external examiners\	• They produced some excellent thesis-all are available from MV. • Graduated students have gone on to jobs with the government, MV or further education.	
8.1 Recruit Malagasy research students, 8.2 Malagasy students masters courses, 8.3 Malagasy students masters research projects, 8.4 Malagasy 3rd year students work experience		Six Malagasy Diplôme d'études approfondies (DEA) students were recruited during the course of the project and the project sponsored their university fees. Eight Malagasy Diplôme d'études approfondies (DEA) students conducted research on topic that focussed on bushmeat supervised by the project and using project field resources (including the six mentioned above). Six of these graduated and two are finishing their studies (will submit in September 2012). Nine 3rd year university students from the University of Antananarivo were embedded in MV as part of their professional placement. They attended lectures by Julia Jones when in Tana and project meetins and so learnt a lot about bushmeat issues.	

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

This shows the logframe presented in the application with additions made in Y2 highlighted in yellow.

Project summary	**Measurable Indicators**	**Means of verification**	**Important Assumptions**
Goal: Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.			
Sub-Goal: Madagascar's hunted endemic species more sustainably managed.	Revised legal framework for sustainable harvesting of game species Sustainable and legal exploitation of wildlife for food explicitly considered in management plans of the new protected areas	Copies of research outputs (reports and papers). Agenda, meeting records and management plans. Evidence from outputs of workshops and government committees	

	Traditional rules (*dina*) receiving regional recognition	Copies of *dinas* signed by traditional authorities and government officials	
Purpose Improved capacity within Madagascar, in terms of scientific and socio-economic understanding, applied to improving the management of harvested endemic species and to reducing pressure on illegally hunted species.	Policies developed, advocated and implemented to improve management of bushmeat Exploitation of game species included within management plans of new protected areas Traditional management given greater recognition Students in a position to be recruited to responsible positions MV able to attract funding in the future and influence policy	Project reports, management plans for new protected areas, student records and theses, MV annual report	Sustainable exploitation of natural resources remains a national priority. New protected areas allow the harvest of game species. Communities agree to develop and implement harvest plans for game species
Outputs 1 Review of vertebrate species that are listed as game under Malagasy law with respect to their distribution, biology, status and the extent to which they are hunted	1.a Report (French & English) 1.b Peer-reviewed publication 1.c Seminar to discuss results 1.d National-level government involvement	Copies of reports, publication, seminar and workshop attendance record and agenda	Government representatives are available and willing to engage
2. Determine the factors that influence patterns of exploitation	2.a Field data collected and analysed	Copies of data, student theses, publications	Cooperation of the general public
3. Determine the extent of hunting and impact of hunting for species that make important contributions to rural livelihoods,	3.a Data collected on extent of hunting of protected species, methods established to monitor trends in harvested species (lemurs), hunting levels and biological parameters and analyzed and published	Copies of data, student theses and publications	Cooperation of the general public, field logistics allow planned data to be collected

4 Recommendations for revisions to national legislation prepared with the Malagasy government	4.a Report in French and English produced for the government (national and regional) containing recommendations 4.b Meetings/small workshops held with key staff of relevant government departments	Reports and meeting records	Assumes that our research does find some areas which need revision
5 Assess the knowledge of rules concerning hunting of wild species among relevant groups	5.a Data collected on knowledge of hunting rules and socio-economic predictors of this knowledge in two regions of Madagascar	Copies of questionnaires, data, student thesis and publication.	Willingness to participate in the surveys among local people
6. Greater recognition of traditional knowledge incorporated into regional policy	6.a Local management of hunted populations (eg local *dina* to protect bat roosts, *fady* governing timing of hunting) recorded and given regional recognition	Signing of locally agreed *dina* with regional recognition.	Support of local communities, that appropriate *dinas* and fady are operating in the study area (preliminary data suggests they are)
7. Analysis of the risk of disease transfer from humans eating bats (Nipah and Corona viruses)	7.a Biological samples collected and analysed 7.b Results communicated to national government on risk level and avoidance 7.c Dissemination plan to hunters designed and implemented with national government	Publication, copies of meeting records with government, evidence of the dissemination plan implemented (radio broadcast, posters)	Institute Pasteur continues to be independently funded, government dissemination plan only required if risks are detected

8. Malagasy masters students (five in total) graduated (Diplôme d'Etude Approfondies) and trained in the skills needed to undertake applied research in conservation science. Six undergraduates undertaking work experience with MV	8.a Student proposals 8.b Student field project data 8.c Student theses 8.d Student graduation certificate 8.e Government staff involved in project e.g. as external examiners	Copies of theses, certificates and lists of external examiners/advisors, work experience reports	That high quality masters candidates can be found who want to undertake projects in line with the priorities of the project, that undergraduates want to undertake the work experience offered.
Activities (details in work plan) 1.1 Collate all available data on biology, conservation and legislation pertaining to hunted species in Madagascar 1.2 Conduct a review of hunting and its impact on animals in Madagascar 1.3 Present results to the Malagasy authorities responsible for managing wildlife and hunting 2.1 Confirm location of case-study areas and inform local stakeholders 2.2 Develop and refine methodology 2.3 Training of project personnel (including local associations) to standardise methods 2.4 Field data collection (markets, households, hunts) 3.1 Identify key species for advanced studies on life history and hunting 3.2 Field data collection 3.3 Analyses, report writing 4.1 Prepare report based on 3.0 4.2 Present results to stakeholders 5.1 Training of project personnel to standardise methods 5.2 Field data collection 5.3 Analyses, report writing 6.1 Meetings with governmental and traditional authorities in study areas 7.1 Training for project personnel to sample and preserve fruit bats 7.2 Sample (blood) collection 7.3 Screening for viruses 7.4 Reporting to authorities 8.1 Recruit Malagasy research students 8.2 Malagasy students masters courses 8.3 Malagasy students masters research projects 8.4 Malagasy 3rd year students work experience			

3. Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use		Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	0	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	30	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation	0	Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity	40	Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures	0	Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	20	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness	5	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts	0	Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources	0	Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.
16. Access to and Transfer of Technology	0	Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information	5	Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training

		and surveying programmes and local knowledge
19. Bio-safety Protocol	0	Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Other Contribution	0	Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

4. Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
2	Number of Masters qualifications obtained	06 (2 in progress*) - Fetra Rakotondrazanany - Willy Mananjara Sylvio - Voahirana Randriamamonjy - Mirana Rajaonera - Cynthia Raveloson - Sariaka Rakotomamonjy - Acyl Randrianarison* -Eunicia Mamilaza*
3	Number of other qualifications obtained	03 -Accredited 5-day GIS course for Malagasy students -Acyl Randrianarison (Ingénieur Agronome) -Lalaina Arivony Nomenjanahary (Docteur Vétérinaire)
4a	Number of undergraduate students receiving training	09 - Olivia Clarisse - Faramamindrainy Razafimahatratra - Avo Félicia Rabibisoa - Jessica Raharimalala - Lovasoa Christine - Hervé Ranoarison Mahafaka - Lovasoa Razanamahandry - Fiononantsoa Razafimahaleo - Rivosoa Rakotoson
4b	Number of training weeks provided to undergraduate students	27 Three weeks per student
4c	Number of postgraduate students receiving training (not 1-3 above)	02 -Sariakanirina Rakotomamonjy had 3 weeks additional training in BU (after MSc finished) -Radosoa Andrianaivoarivelo had 3 weeks training towards his PhD in BU
4d	Number of training weeks for postgraduate students	6 weeks total-NB this is different from their qualifications listed above
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	04 -Tokiniaina Hobinjatovo (3 weeks in BU) -Julie Hanta Razafimanahaka (Kinship Fellow & Aidan in MV) - Felicien Randrianandrianina (Aidan in MV) - Voahirana Randriamamonjy (Aidan in MV) - Ralisata Mahefatiana (Aidan in MV) - Randrianavelona Roma (Aidan in MV) - Rakotoarivelo Andrinajoro (Aidan in MV)
6b	Number of training weeks not leading	32 person weeks of training received over a

	to formal qualification	period of 16 weeks
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	67 -Aidan Keane: 8 -Julia Jones: 8 -Richard Jenkins: 51
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	01 Strategy to stop illegal hunting of protected species in Madagascar
11a	Number of papers published or accepted for publication in peer reviewed journals	05 PLOSONE Animal Conservation Oryx MCD Proceedings of the Royal Society B
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	Database on bushmeat hunting using the randomized response technique Capture-recapture data of the Commerson's leaf-nosed bat at three caves in Anjohibe area over four capture sessions in 2010 and 2011
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	MV hold an extensive data base of the project's data which acts as an invaluable base line for future work on bushmeat in the country.
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	56 (please see Table S2 in Annex 7 for full details)
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work presented/ disseminated.	11 (see Table S2 for details) HUNT (EU Hunting conference-Spain) British Ecological Society annual meeting (UK) Society for Conservation Biology (New Zealand) Cambridge Student Conference of Conservation Science (UK) X3 BioEcon (Switzerland) Colloque conjoint de Parasitologie / Vet 2011, Antananarivo (Madagascar) Colloque International des Jeunes Chercheurs du RIIP, Paris, (France) Biodiversity day (Madagascar) Environment day (Madagascar)
15a	Number of national press releases or publicity articles in host country(s)	09 Midi Madagasikara Inona no Vaovao La Vérité L'Express de Madagascar Gazetiko Environnement Madagascar Newsmada. Les actus de Madagascar La Gazette de la Grande Ile
15c	Number of international national press releases or publicity articles	14 (NB includes online coverage) See publication and publicity list below (NB includes Daily Mail, New York Times and Science Magasine
15d	Number of local press releases or publicity articles in UK	Press releases by Bangor University (see website) X4 The Daily Post (print) X2 Gwlog (Welsh language newspaper) X1

16a	Number of issues of newsletters produced in the host country(s)	Songadina n°9 and 12 (Conservation International's newsletter)
16b	Estimated circulation of each newsletter in the host country(s)	1500
16c	Estimated circulation of each newsletter in the UK	Darwin Initiative Newsletter X3 IUCN Sustainable Use and Livelihoods Specialist Group
18d	Number of local TV programme features in the UK	The project was mentioned in a brief feature on Wales Today and Julia Jones interviewed
19c	Number of local radio interviews/features in host country (s)	Radio Feon'I Menabe Radio Magneva
19d	Number of local radio interviews/features in the UK	Julia Jones was interviewed on good morning wales
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	£5,800 1 motorcycle, 04 laptops, 02 desktops
23	Value of additional resources raised for project	£276,217.5 Conservation International - £19,445.77 Ambatovy Minerals SA- £24,116.83 British Ecological Society - £19,087 Disney Wildlife Conservation Fund -£13,567.90 Rufford Foundation - £30,000 The Waterloo Foundation - £170,000 NB not all was exclusively for bushmeat work over the course of this project. We estimate this to be approximately £90,000
Other Measures used by the project and not currently included in DI standard measures	Prominence on twitter	PI Julia Jones is active on twitter and used twitter to disseminate important project events or findings internationally. When the PloS One paper was published it 'took the twittersphere by storm' in the words of BU Vice Chancellor. The most high profile tweet was from Helen Clark ex PM of New Zealand.

5. Publications

*=included with this report

Type * **(eg journals, manual, CDs)**	**Detail** **(title, author, year)**	**Publishers** **(name, city)**	**Available from** **(eg contact address, website)**	**Cost** **£**
Journal*	Analysis of patterns of bushmeat consumption reveals extensive exploitation of protected species in eastern Madagascar. Jenkins, R. K. B., A. Keane, A. R. Rakotoarivelo, V. Rakotomboavonjy, F. Randrianandrianina, H. J. Razafimanahaka, S. R. Ralaiarimalala, and J. P. G. Jones. 2011.	PLoS ONE 6:1-12	http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0027570r	0
Journal*	Lois et règlements sur la chasse a Madagascar: Progrès accomplis et besoins du futur. Rakotoarivelo, A. A., H. J. Razafimanahaka, S. Rabesihanaka, J. P. G. Jones, and R. K. B. Jenkins. 2011.	MCD 6 (1) : 37-44	http://www.journalmcd.com/index.php/mcd/article/view/283/236	0
Journal*	Novel approach for quantifying illegal bushmeat consumption reveals high consumption of protected species in	Oryx in press		Contact JPGJ

	Madagascar. Razafimanahaka H.J., Jenkins R.K.B., Andriafidison D., Randrianandrianina F., Rakotomboavonjy V., Keane A., Jones J.P.G. 2012.			
Journal*	The potential of occupancy modeling as a tool for monitoring wild primate populations. Aidan Keane., Tokiniaina Hobinjatovo., Hanta. J. Razafimanahaka., Richard K. B. Jenkins., Julia P. G. Jones. 2012	Animal Conservation.	http://onlinelibrary.wiley.com/doi/10.1111/j.1469-1795.2012.00575.x/full	0
Journal*	St John, F.A.V., Edwards-Jones, G., Keane, A., Jones, L., Yarnell, R.W. and Jones, J.P.G. (2012) Identifying indicators of illegal behaviour: carnivore killing in human-managed landscapes.	Proceedings of the Royal Society B **279**: 804-812.	http://rspb.royalsocietypublishing.org/content/early/2011/07/21/rspb.2011.1228.abstract	Contact JPGJ
National press	Gidro, fanihy sy ny tariny, Atahorana ho lany tamingana vokatry ny fihazana. 2011.	Gazetiko (print and online)	http://www.gazetiko.mg/gazetiko/index.php?option=com_content&task=view&id=18552	0
National press	Comment les lémuriens finissent dans les assiettes. 2011.	Environnement Madagascar (print and online)	http://environnementmadagascar.blogspot.com/	0
National press	Espèces endémiques en voie de disparition : La chasse en est une des causes. 2011.	Newsmada. Les actus de Madagascar	http://www.newsmada.com/especes-endemiques-en-voie-de-disparition-la-chasse-en-est-une-des-causes/	0
National press	La faune sauvage de Madagascar: Menacée par la chasse. 21 décembre 2011.	La Gazette de la Grande Ile (print and online)	http://www.lagazette-dgi.com/index.php?option=com_content&view=article&id=18253:la-faune-sauvage-de-madagascar-menacee-par-la-chasse&catid=42:societe&Itemid=57	0
National press	Madagasikara Voakajy : Nampidirina ao amin'ny dinan'ny "VOI" ny fihazàna. 19 décembre 2011.	Inona no Vaovao (print only)		Contact JPGJ
National press	Faune sauvage : la chasse constitue une menace. 20 décembre 2011.	La Vérité (print only)		Contact JPGJ
National press	Faune sauvage : menacée par la chasse. 20 décembre 2011.	Midi Madagasikara N°8622 (print only)		Contact JPGJ
National press	Biodiversité : Les makis massacrés	L'Express de Madagascar N°5268 (print and online)	http://www.lexpressmada.com/5268/biodiversite-madagascar/35844-les-makis-massacres.html	0
National press	Animaux sauvages : 95% des personnes enquêtées les consomment. 24 mai	La Gazette de la Grande Ile	http://www.lagazette-	0

	2012.	(print and online)	dgi.com/index.php?option=com_content&view=article&id=22337:animaux-sauvages-95-des-personnes-enquetees-les-consomment&catid=45:newsflash&Itemid=58	
International press	Eroding taboos see lemurs end up on dinner tables. Mark Kinver and Victoria Gill. Dec 15 2011.	BBC News online	http://www.bbc.co.uk/news/science-environment-16138206	0
International Press	Madagascar's lemurs sacred no more. Dec 15th 2011	New York Times	http://green.blogs.nytimes.com/2011/12/15/madagascars-lemurs-sacred-no-more/	0
International Press	Scientists discover why lemurs are dying out in their native Madagascar – they're being eaten as bar snacks. December 16th 2011	Daily Mail (print and online)	http://www.dailymail.co.uk/news/article-2075029/Scientists-discover-lemurs-dying-native-Madagascar--eaten-bar-snacks.html	0
International Press	Endangered lemur hunting prevalent in Madagascar despite local taboos, laws	Plos One blog	http://blogs.plos.org/mitsciwrite/2011/12/14/endangered-lemur-hunting-prevalent-in-madagascar-despite-local-taboos-laws/	0
International Press	Scientists discover threatened lemurs being killed for bar snacks. Dec 2011	Western Mail (print) and Wales online	http://www.walesonline.co.uk/news/wales-news/2011/12/19/scientists-discover-threatened-lemurs-being-killed-for-bar-snacks-91466-29975824/	0
International Press	Falling taboos put lemurs on the table. Dec 2011	Science (AAAS)	http://news.sciencemag.org/sciencenow/2011/12/falling-taboos-put-lemurs-on-the.html	0
International press	Madagascar - Comment les lémuriens finissent dans les assiettes. 16 décembre 2011.	Slate Afrique	http://www.slateafrique.com/79485/madagascar-le-lemurien-chasse-mange-menace	0
International press	Cultural shifts in Madagascar drive lemur-killing. Jeremy Hance. 15 dec 2011.	Mongabay	http://news.mongabay.com/2011/1215-hance_lemur_taboo.html	0

International press	Lemurs on the Menu in Madagascar. 2011.	TUMBLR	http://www.tumblr.com/tagged/lemurs	0
International press	Madagascar Wildlife Facing Threat Of Illegal Hunting. 16 décembre 2011.	REDORBIT	http://www.redorbit.com/news/science/1112441908/madagascar-wildlife-facing-threat-of-illegal-hunting/index.html	0
International press	Erosion of traditional 'taboos' threatens Madagascar's lemurs -hunting of protected species increasing. 15 décembre 2011.	Sci Guru. Science news	http://www.sciguru.com/newsitem/11788/Erosion-traditional-taboos-threatens-Madagascar-s-lemurs-hunting-protected-species-increasing	0
International press	Llanelli's Richard Jenkins helps lemur-Blog 3. 06 mars 2012.	Size of Wales	http://more.sizeofwales.org.uk/index.php/2012/03/llanellis-richard-jenkins-helps-lemurs-blog-3/	0
International press	La chasse menace les lémuriens. 11 july 2012.	Océan Indien. Le Quotidien de la Réunion (print)		Contact JPGJ
International press	Madagascar: 15% des espèces de lémuriens sont en voie de disparition à cause de la pauvreté grandissante. 11 july 2012.	RFI	http://www.rfi.fr/afrique/20120710-madagascar15-especes-lemuriens-sont-voie-disparition-cause-pauvrete-grandissante	
BU Press release	Erosion of traditional 'taboos' threatens Madagascar's lemurs. 2011.	School of Environment, Natural Resources and Geography. Bangor University	http://www.bangor.ac.uk/senrgy/full.php.en?text=true&nid=6261&tnid=6261	0
BU Press release	Bangor University helps government of Madagascar develop a strategy to tackle bushmeat hunting. 30 mai 2012.	Bangor University news	http://www.bangor.ac.uk/cns/newslist.php.en	0
BU Press release	Bangor University working with Malagasy scientists to tackle bushmeat hunting in Madagascar.	Bangor University news	http://pages.bangor.ac.uk/~afs403/	0
BU TV	Video of Julia Jones discussing lemur hunting issue	Bangor TV	http://www.bangor.ac.uk/bangortv/lemurs.php.en	0

6. Darwin Contacts

Ref No	
Project Title	Bushmeat hunting in Madagascar: linking science, policy and local livelihoods
UK Leader Details	
Name	Julia P G Jones
Role within Darwin Project	PI
Address	School of Environment Natural Resources and Geography, Thoday Building, Deniol Road, Bangor University
Phone	
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Partner 1	
Name	Julie Hanta Razafimanahaka
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Email	
Partner 2	
Name	Bruno Ramamonjisoa
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Role within Darwin Project	Project partner
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Email	
Partner 3	
Name	Jean-Michel Héraud
Organisation	Institut Pasteur de Madagascar
Role within Darwin Project	Project partner
Address	BP 1274, 101 Antananarivo, Madagascar
Fax	
Email	

7. Supplementary figures for the report

Referred to in the text above

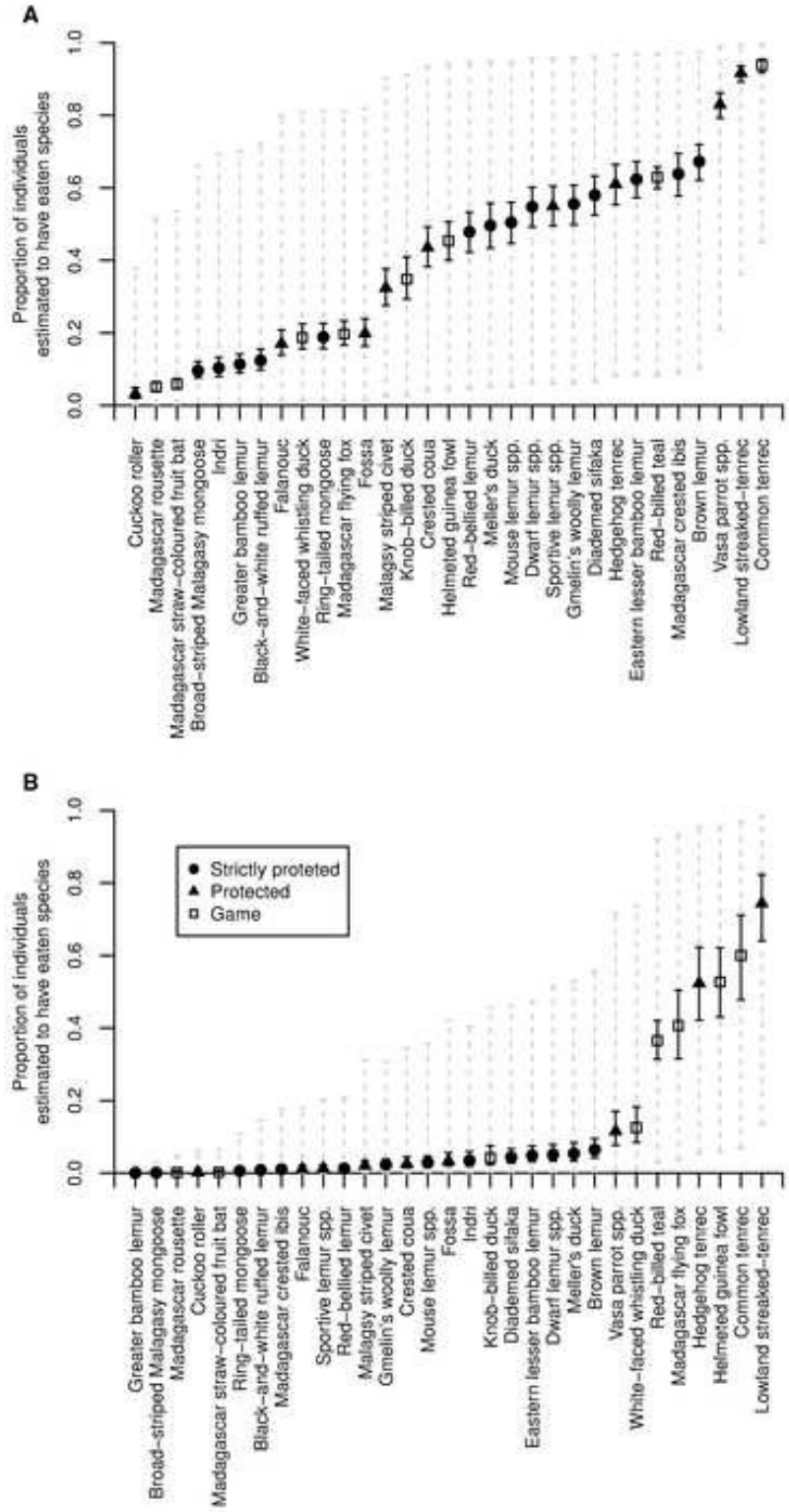

Fig S1. Estimated proportion of individuals who report that they have ever consumed a sample of 31 species classified as strictly protected, protected or game under Malagasy law. The two scenarios, illustrate the variability between species, and between types of household (A; rural living in single-roomed house, B; urban living in a house with 3 or more rooms). Points indicate the mean of predictions, solid vertical black lines indicate the variability in prediction attributable to parameter uncertainty, while grey dashed lines indicate the range of variability attributable to additional heterogeneity between respondents. See Jenkins et al. 2011 for more details.

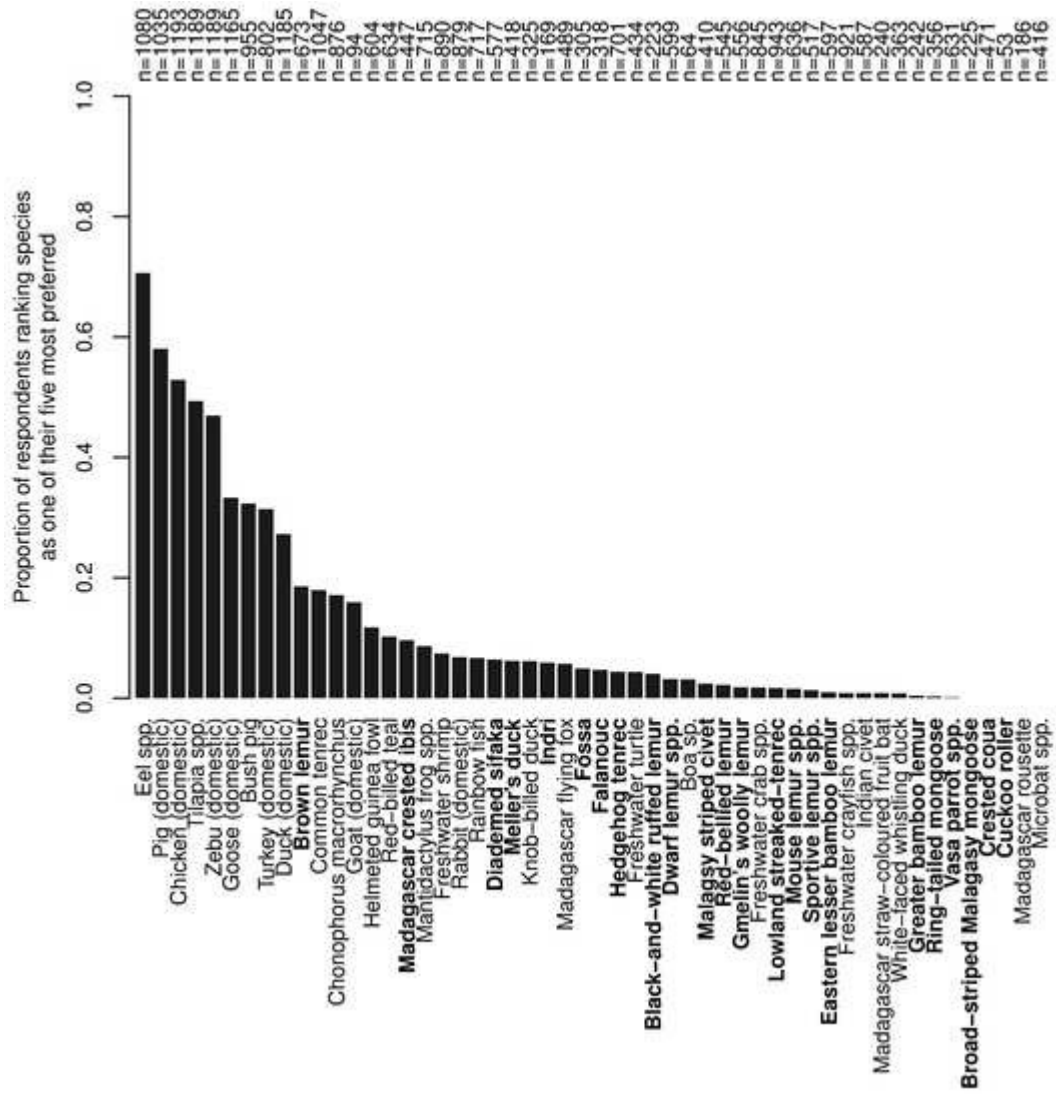

Fig S2. Ranking of species according to respondents' expressed preferences for meat. Bold species names indicate species that are strictly protected or protected under Malagasy law. n is the number of respondents who had eaten the each species. See Jenkins et al. 2011 for more details.

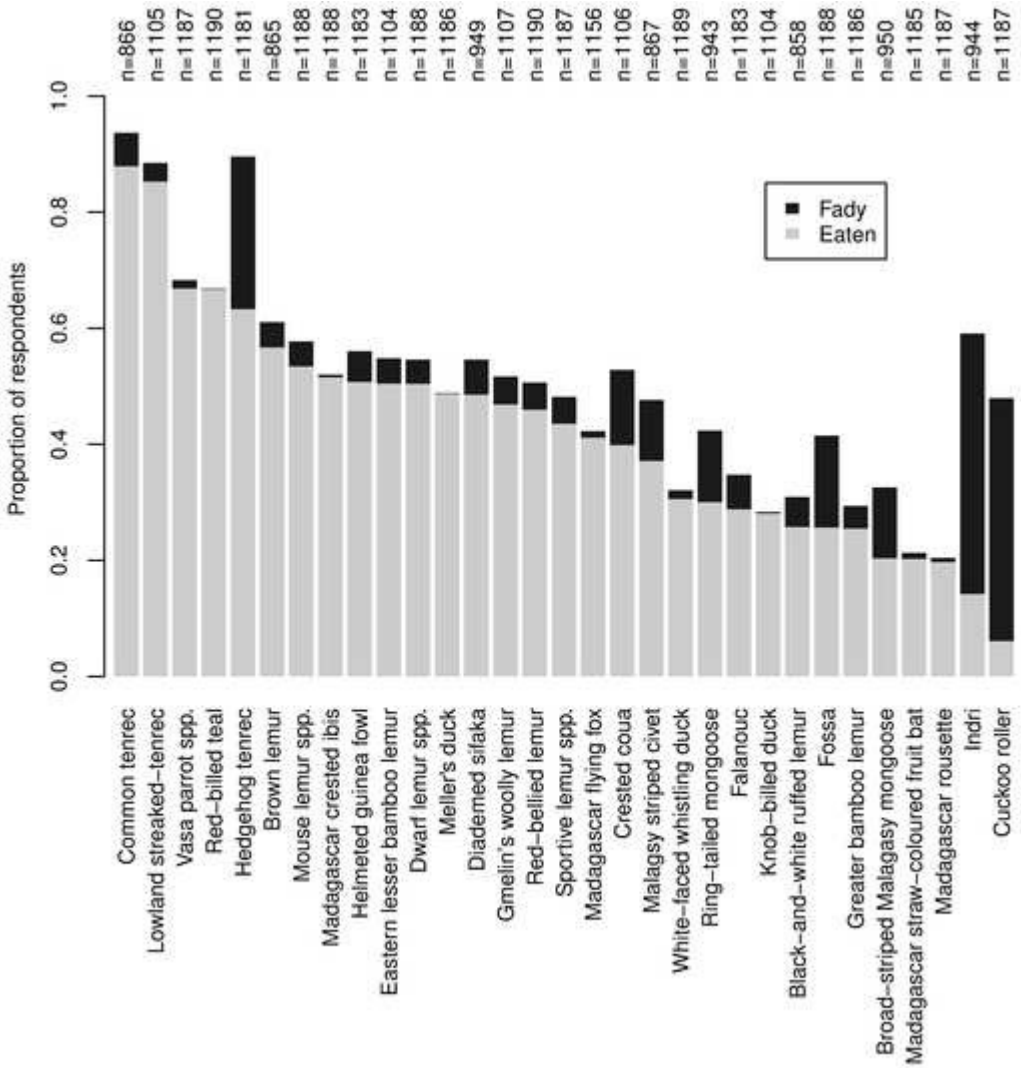

Fig S3. Proportion of respondents who reported that they were taboo (fady, black bars) for strictly protected or protected species, ordered by the proportion of respondents who have ever eaten the species in question (grey bars). The height of the black bars therefore represents the maximum difference in consumption that could be attributable to taboos for each species. n is the number of respondents who answered questions about each species. See Jenkins et al. 2011 for more details.

Table S1: A summary of the numbers of lemurs observed as food, for sale or transported through nine towns and villages four communes by 13 monitors in the Alaotra-Mangoro Region, eastern Madagascar. The duration of the observation period varied between villages (given in brackets after the location) but the total effort was 135 observation months (From Jenkins et al. 2011)

	Village 1 (21 months)	Town 1 (18 months)	Town 1 (16 months)	Town 1 (10 months)	Village 2 (12 months)	Village 3 (12 months)	Village 4 (12 months)	Village 5 (5 months)	Village 5 (4 months)	Village 5 (6 months)	Village 6 (7 months)	Village 7 (6 months)	Village 8 (6 months)	**Total (135)**
Propithecus	11	18	17	6	5	0	1	8	0	4	28	4	19	**121**
Indri	96	42	21	20	3	0	18	4	6	5	8	4	6	**233**
Hapalemur	0	0	0	0	1	0	1	0	0	1	1	0	0	**4**
Avahi	7	17	0	4	1	1	1	0	0	0	2	0	0	**33**
Cheirogaleus	5	1	0	0	3	0	0	0	0	0	0	0	9	**18**
Microcebus	0	0	0	0	1	0	0	0	0	0	0	0	6	**7**
Eulemur	3	6	1	2	5	0	1	2	0	2	2	0	24	**48**
Varecia	5	0	2	0	0	0	0	0	0	0	0	0	2	**9**
Lepilemur	0	0	0	0	0	0	0	0	0	0	0	4	6	**10**
	127	**84**	**41**	**32**	**19**	**1**	**22**	**14**	**6**	**12**	**41**	**12**	**72**	**483**

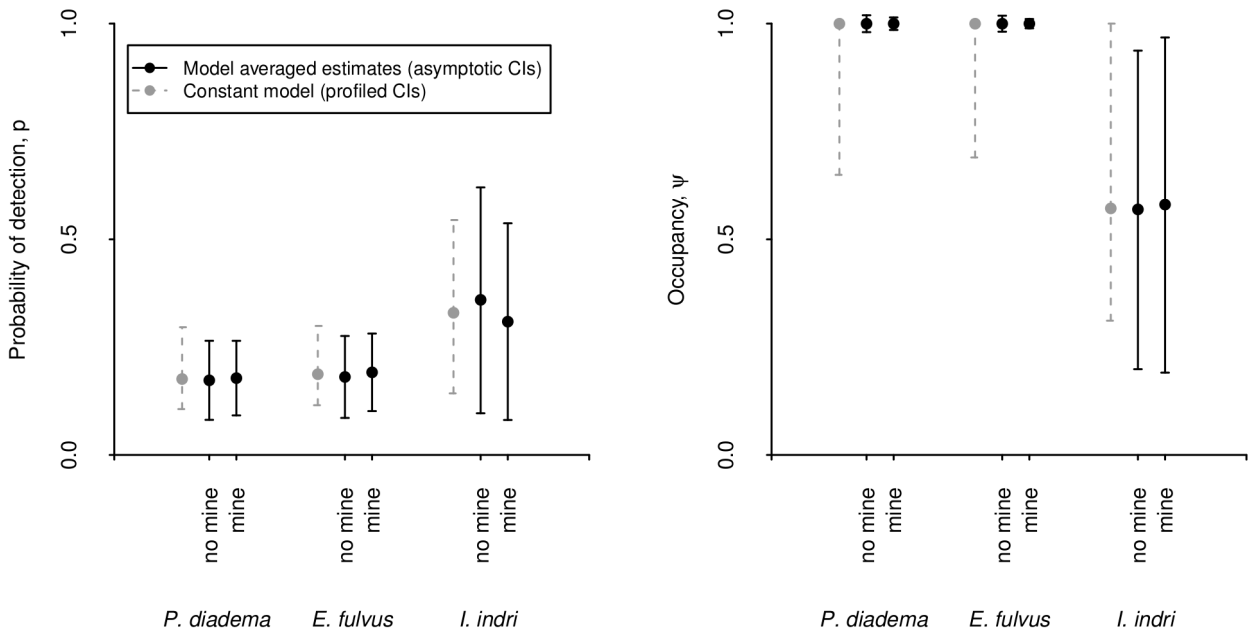

Fig S4. Estimates of probability of detection and occupancy for three species of lemur. Points indicate the maximum likelihood estimate and lines indicate 95% confidence intervals around those estimates. Black points/lines correspond to model-averaged estimates, with confidence intervals calculated using asymptotic assumptions. These assumptions may be unreliable for parameter estimates at the boundary (e.g., the estimates of occupancy for P. diadema *and* E. fulvus*). Grey points/lines correspond to estimates from the single best-fitting model for each species, with confidence intervals calculated from likelihood profiling. See Keane et al. in press*

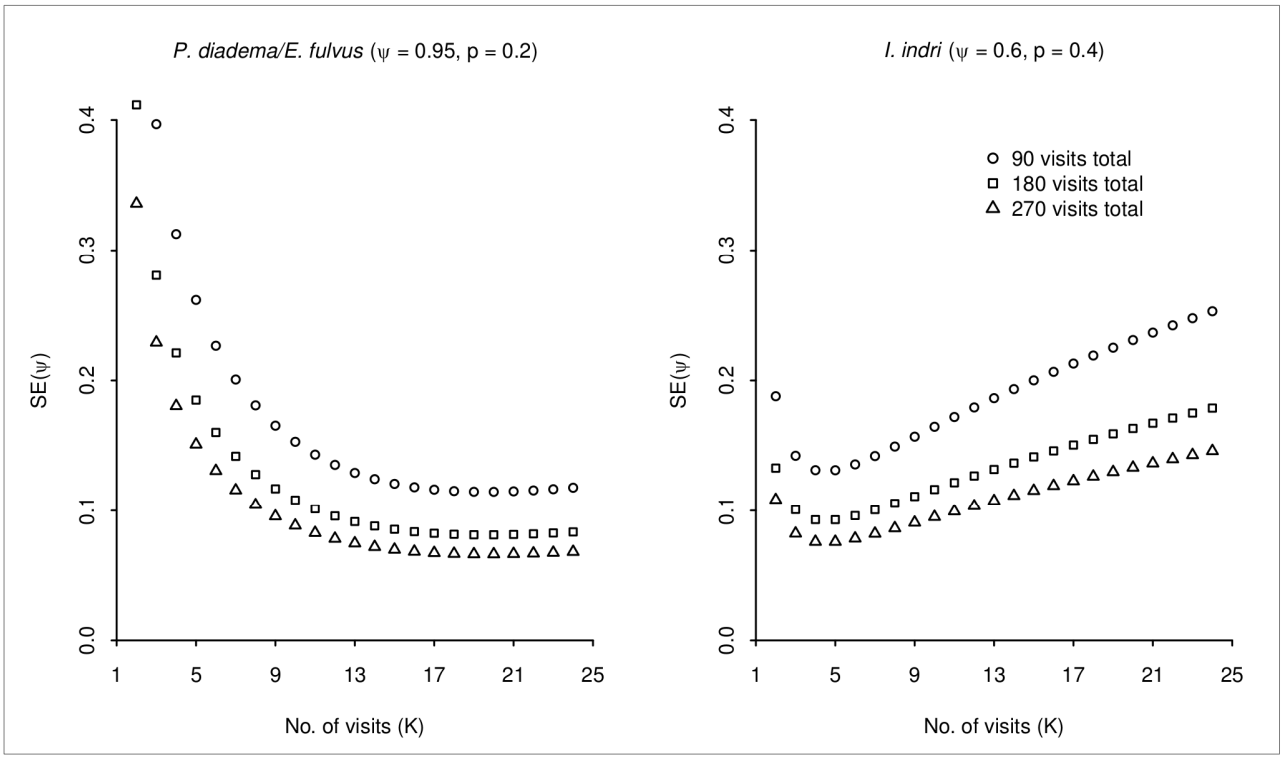

Fig S5. Predictions of the precision of estimates of occupancy that can be obtained for three lemur species, based on asymptotic assumptions. Three levels of total effort are shown, each representing the total number of site-visits that are made (i.e., number of sites x number of visits per site). See Keane et al. 2012

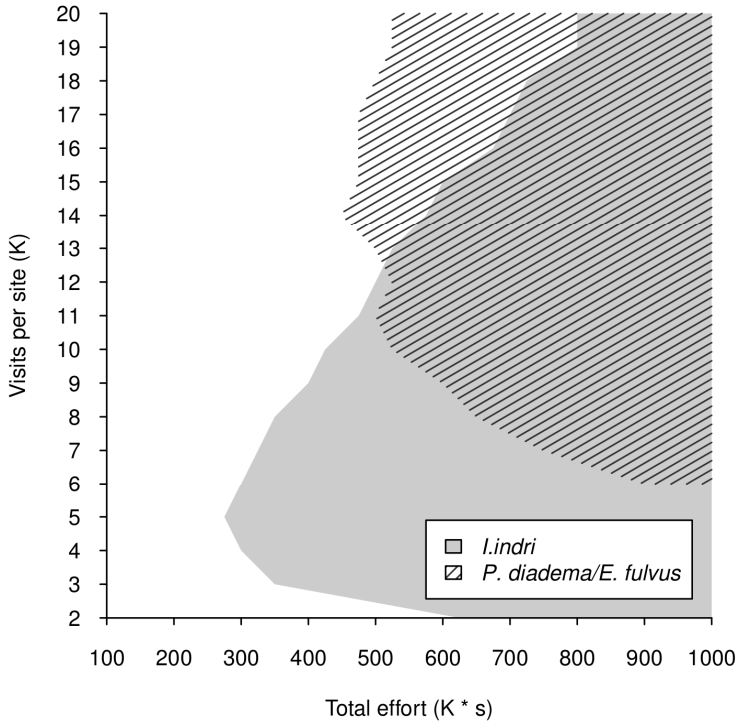

Fig S6. Total amount and distribution of survey effort required to achieve an acceptable level of power (≥ 0.80) to detect a decline of 0.3 in the occupancy of lemur populations (α = 0.05). The area shaded light grey indicates survey designs which produce acceptable power for I. indri (ψ = 0.6, p = 0.4), while the hatched area indicates survey designs which produce acceptable power for P. diadema/E. fulvus (ψ = 0.95, p = 0.2). See Keane et al. 2012

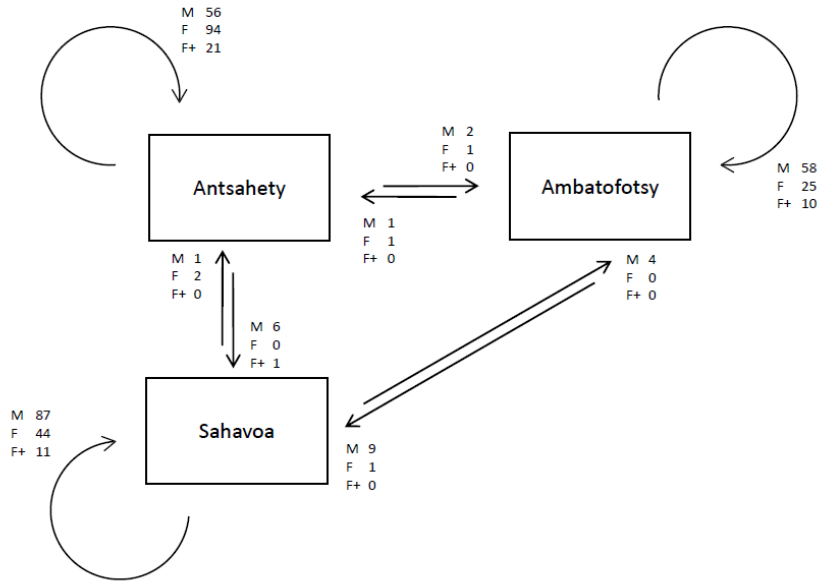

Fig S7: A schematic of the three Rousettus roosts where we carried out mark and recapture. The number of transitions between an individual bat being caught and recaptured which involved no movement between roosts (curled line returning to the site) or a movement between two roosts are shown. M refers to males, F to females and F+ to pregnant females.

Table S2: Full list of dissemination activities in Madagascar and overseas (NB most audience numbers are an estimate only)

Country	Place	Date	Type of dissemination	Events/Occasions	Target audience	Audience	Person leading
Madagascar	Moramanga	01/07/09	Presentation	Meeting about hunting in which project staff presented the results of their survey work.	Conservational International and Ministry of Environment and Forests	10	Julie Razafimanahaka
Madagascar	Ambatovy Mine, Moramanga	28/08/09	Presentation	Meeting with Ambatovy Projet (AP) mine about hunting in which project staff presented the results of their survey work and discussed the role of the extraction industry in the bushmeat crisis in Africa.	representatives of MV, the mine and local NGOs	15	Félicien Randrianandrianina
Madagascar	ESSA, Antananarivo	19/9/2009	Presentation	lecture	students and staff	40	Julia Jones
Madagascar	Morondava	25/09/09	Presentation	Stakeholder workshop in which project staff presented the results of their survey work and legislation review to regional stakeholders	Madagascar National Parks, Ministry of Environment and Forests (Antananarivo and Morondava offices), mayors and local community leaders	34	Julie Razafimanahaka
Madagascar	Ankatso, Antananarivo	September 2009	Presentation	Lecture	Students in ESSA Forêts, DBA	40	Julia Jones
Madagascar	Antananarivo	16/12/09	Presentation	Partner workshop where the general project Darwin Initiative objectives and preliminary results were presented	representatives of WWF, CI, the University of Antananarivo, and the Ministry of the Environment and Forests	15	Richard Jenkins
Madagascar	MEF Nanisàna, Antananarivo	24/02/10	Presentation	meeting for the project team to deliver the results of the legislation review	Representatives of government, international and national NGOs and	20	Ministry of Environment and Forests

					hunting groups.		
Madagascar	Moramanga	02/03/10	Presentation	Stakeholder workshop in which project staff presented the results of their survey work and legislation review to stakeholders in Moramanga District	stakeholders in Moramanga District	20	Julie Razafimanahaka
Madagascar	Ambatondrazaka	09/04/10	Presentation	Meeting to present the project's bushmeat results to regional stakeholders	Regional stakeholders and partners	20	Julie Razafimanahaka
Madagascar	Anosibe An'Ala	13/04/10	Presentation	Meeting to present the project's bushmeat results to regional stakeholders	Regional stakeholders and partners	28	Julie Razafimanahaka
Madagascar	MEF Nanisàna, Antananarivo	06/05/2010	Presentation	Results restitution: preliminary results from the bushmeat studies	National partners	20	Julie Razafimanahaka
Madagascar	Tsimbazaza parc, Antananarivo	25/05/2010	Presentation	International day of biodiversity	Public	100	Félicien Randrianandrianina
Madagascar	Tsimbazaza parc, Antananarivo	24-26/05/10	Stand, poster	International day of biodiversity	Public	500	Julie Razafimanahaka
Madagascar	Mont Carmel, Moramanga	04-05/08/2010	Presentation	Workshop for results restitution	regional and local authorities, all stakeholders working on environment conservation, local communities	60	Julie Razafimanahaka
Madagascar	Moramanga	05-06/08/2010	Presentation	Regional workshop on bushmeat to present the results about lemur hunting to stakeholders from a single commune (Lakato)	Local partners	40	Julie Razafimanahaka
Madagascar	Port Bergé	16/06/10	Presentation	Meeting to present the project's bushmeat preliminary results to regional stakeholders in the Sofia Region and to inform about	Local partners	28	Julie Razafimanahaka

				the general work of MV and its partners.			
UK	Chester Zoo	June 2010	Presentation	Meeting: UK 'Madagascar Voakajy's work to tackle bushmeat hunting in Madagascar'	Conservation professionals	20	Richard Jenkins
UK	FFI, Cambridge	June 2010	Presentation	Meeting: UK 'Madagascar Voakajy's work to tackle bushmeat hunting in Madagascar'	Conservation professionals	30	Richard Jenkins
Madagascar	Ankatso, Antananarivo	September 2010	Presentation	Lecture	Students ESSA Forêts and DBA	40	Julia Jones
Madagascar	EPP Mangabe, Moramanga	10/12/2010	Presentation	Environmental education session	villagers and local communities	79	Tokiniaina Hobinjatovo
Madagascar	Antananarivo	16/12/10	Presentation	Meeting to present the results bushmeat and other activities to key stakeholders and project partners	National partners and NGO	8	Richard Jenkins
Madagascar	Port Bergé	04/02/2011	Presentation	Regional workshop on bushmeat	Local partners	30	Julie Razafimanahaka
Madagascar	Meeting room (Catholic), Mahabo	16 to 17 February 2011	Presentation	Workshop for results restitution	Local authorities, Forest conservation leader, conservation professionnaliste, VOIs, hunter, bushmeat seller	36	Félicien Randrianandrianina
Madagascar	Port Bergé	03-04/04/11	Presentation	Meeting to present the results bushmeat and other activities to key stakeholders in the Sofia Region	Regional partners and NGO	39	Julie Razafimanahaka
Madagascar	Moramanga	07/04/2011	Presentation	Regional workshop on bushmeat	CI team	10	Julie Razafimanahaka
UK	Cambridge	April 2011	Poster	SCCS	UK students Cambridge	200	Tokiniaina Hobinjatovo

UK	Bangor University	April 2011	Presentation	lecture	Bangor University students	60	Tokiniaina Hobinjatovo
Madagascar	DBA, Antananarivo	16/06/2011	Presentation	lecture	students	50	Julia Jones
Madagascar	ESSA, Antananarivo	17/06/2011	Presentation	lecture	students	50	Julia Jones
Madagascar	MNP Andasibe	23/08/2011	Presentation	Workshop for results restitution	MNP staff, CIREF	15	Julie Razafimanahaka
Antananarivo	MV office, Antananarivo	08/09/2011	Presentation	Results restitution	Aspinall team	4	Julie Razafimanahaka
UK	Sheffield	12/09/2011	Presentation	British Ecological Society: 'Analysis of bushmeat consumption reveals extensive exploitation of protected species in Madagascar'	Conservation professionals	50	Julie Razafimanahaka
UK	Chester Zoo	15/09/2011	Presentation	Activities and results presentation: 'How Malagasy wildlife are threatened by hunting'	Conservation professionals	15	Julie Razafimanahaka
Madagascar	Ambatovy mine	20/09/2011	Presentation	Results restitution	Mine Staff	5	Voahirana Randriamamonjy
UK	Bangor University	27/09/2011	Presentation	'Novel methods for quantifying bushmeat hunting in Madagascar	Students Bangor University	30	Julie Razafimanahaka
Switzerland	Geneva	September 2011	Presentation	BioEcon conference: 'Developing novel methods for assessing illegal behaviour in conservation: bushmeat hunting, poaching and illegal fishing'	Conservation professionals	50	Julia Jones
UK	London	October 2011	Presentation	ZSL conference: UK 'An overview of bushmeat consumption in Madagascar	Students: Institute of Zoology Annual Research Conference	50	Aidan Keane

New Zealand	Auckland	December 2011	Presentation	Society for Conservation Biology: 'Drivers of bushmeat hunting in Madagascar'	Conservation professionals	50	Aidan Keane
UK	UK	09/10/2011	Presentation	Activities and results presentation	SOW team	15	Julie Razafimanahaka
Madagascar	Radio station (Feon'i Menabe), Mahabo	09/10/2011	Live broadcast	Weekly environment live broadcast	Local authorities, Public (Men, Women and young)	Radio audience in Menabe	Félicien Randrianandrianina
UK	Cambridge	10/10/2011	Presentation	'Analysis of bushmeat consumption reveals extensive exploitation of protected species in Madagascar'	FFI: Conservation professionals	20	Julie Razafimanahaka
UK	London	13/10/2011	Presentation	Imperial College Conservation Science: What drives bushmeat hunting in Madagascar?	Students	20	Julie Razafimanahaka
Madagascar	Antananarivo	25/10/2011	Presentation	Colloque conjoint de Parasitologie / Vet 2011, Antananarivo (Madagascar)	Students	50	IPM
France	Paris	4/11/2011	Presentation	Colloque International des Jeunes Chercheurs du RIIP, Paris, (France)	Students	25	IPM
UK	East Anglia	13/10/2011	Presentation	'What drives bushmeat hunting in Madagascar? What can we do about it'	Students School of Biological Sciences, University of East Anglia	40	Julie Razafimanahaka
Madagascar	EPP (Manamby), Mahabo	14/10/2011	Poster and audio	Consultation of the school: poster presentation and receptivity recording for radio broadcast.	Students	120	Félicien Randrianandrianina
Madagascar	Public place in Manamby, Mahabo	14/10/2011	Poster and audio	Consultation: public listening of an audio prerecorded story (sketch, folclorical stories) about tenrec and elders storie recording.	Communities leader, local communities (Men, Women and young)	250	Félicien Randrianandrianina
Madagascar	EPP (Andoviana), Mahabo	16/10/2011	Poster and audio	Consultation of the school: poster presentation and receptivity recording for radio	Students	50	Félicien Randrianandrianina

				broadcast.			
Madagascar	Public place in Andoviana, Mahabo	16/10/2011	Poster and audio	Consultation of the people: public listening of an audio prerecorded story (sketch, folke law stories about tenrec and elders storie recording.	Communities leader, local communities (Men, Women and young)	100	Félicien Randrianandrianina
Madagascar	Public place in Bepeha, Mahabo	18/10/2011	Poster and audio	Consultation of the people: public listening of an audio prerecorded story (sketch, folclorical stories) about tenrec and elders storie recording.	Communities leader, local communities (Men, Women and young)	150	Félicien Randrianandrianina
Madagascar	EPP (Mahabo)	20/10/2011	Poster and audio	Consultation of the school: poster presentation and receptivity recording for radio broadcast.	Students	120	Félicien Randrianandrianina
Madagascar	Radio station (Feon'i Menabe), Mahabo	October 2011 to February 2012	Audio	Recorded broadcast (Frequency of twice a month)	Local authorities, Public (Men, Women and young)	Radio audience in Menabe	Félicien Randrianandrianina
Madagascar	Radio station (Magneva) Morondava	October to December 2011	Audio	Recorded broadcast (Frequency of once a month)	Local authorities, Public (Men, Women and young)	Radio audience in Menabe	Félicien Randrianandrianina
Madagascar	Communes in Menabe	October 2011	Poster	Local awareness sessions	Public, Students	250	Félicien Randrianandrianina
Madagascar	DWCT Ampasanimalo, Antatanarivo	07/12/2011	Presentation	Results restitution	DWCT team	10	Manjakarivo Randrianarisoa
Madagascar	MV office, Antananarivo	16/12/2011	Presentation	Press conference about RRT and Hunting (Plos One article)	National press	12	Julie Razafimanahaka
Madagascar	Hotel Panorama, Antananarivo	13/01/12	Presentation	Meeting to present the results bushmeat and other activities to key stakeholders and project partners	National partners and NGO	20	Richard Jenkins

UK	UCL, London	February 2012	Presentation	Anthropology Department: 'How much do you hunt? Quantifying illegal bushmeat hunting in Madagascar'	Students and staffs	30	Julia Jones
UK	Bangor	March 2012	Presentation	Meeting: 'Developing novel methods for assessing illegal behaviour in conservation: bushmeat hunting, poaching and illegal fishing'	Students and staffs, Environment Centre Wales, Bangor	40	Julia Jones
UK	Imperial College London	March 2012	Presentation	British Ecological Society Tropical Ecology group annual meeting: 'What tropical ecologists can learn from the social scientists and we can learn from them'	Students and staffs,	40	Julia Jones
Spain	Ciudad Real	March 2012	Presentation	HUNT conference (EU): The challenges of investigating and tackling bushmeat hunting in Madagascar'	Conservation professionals	100	Hanta Julie Razafimanahaka
Madagascar	Commune Beparasy, Moramanga	05-07/03/2012	Presentation	Public meeting for results restitution	villagers and local communities	200	Tokiniaina Hobinjatovo
UK	Cambridge	April 2012	Presentation	SCCS: 'Evidence for the effectiveness of environmental education of changing attitudes towards and knowledge of lemurs among children and their parents'	Students	200	Sariaka Rakotomamonjy
UK	Countryside Council for Wales	April 2012	Presentation	Seminar: 'Evidence for the effectiveness of environmental education of changing attitudes towards and knowledge of lemurs among children and their parents'	Staffs	30	Sariaka Rakotomamonjy

UK	Bangor University	April 2012	Presentation	Seminar: 'Evidence for the effectiveness of environmental education of changing attitudes towards and knowledge of lemurs among children and their parents'	Students	60	Sariaka Rakotomamonjy
UK	York University	May 2012	Presentation	Seminar: 'Understanding bushmeat hunting in Madagascar'	Students and staffs	40	Aidan Keane
Madagascar	OLEP Ambatobe, Antananarivo	23/05/2012	Presentation	National workshop for bushmeat strategy	National/international partners	30	Roma Randrianavelona
Madagascar	Ankatso, Antananarivo	24/05/12	Presentation	Lecture	Students ESSA Forêts and DBA	50	Julia Jones
Madagascar	Centre Victoire Rasoamanarivo, Ambatondrazaka	07/06/2012	Presentation	World Environmental Day celebration	regional and local authorities, all stakeholders working on environment conservation, local communities	600	DREF
Madagascar	Carlton Hotel Anosy, Antananarivo	09/07/2012	Video on lemurs	National workshop for Lemurs conservation strategy	conservation professionals	150	Julie Razafimanahaka
Madagascar	Port Bergé	20/07/2012	Presentation	Workshop for results restitution	Local partners and fishermen	36	Willy Sylvio Mananjara

List of evidence submitted

Other supplementary material (available to download from http://pages.bangor.ac.uk/~afs403/evidence Y3.zip as a zip file

Project code	Description
BU_1	Rakotoarivelo et al 2011
BU_2	Jenkins et al 2011
BU_3	Razafimanahaka in press
BU_4	Keane et al 2012
BU_5	St John et al 2011
BU_6	draft Rakotomamonjy et al 'The effects of environmental education on children and parents' knowledge and attitudes towards lemurs'
BU_7	lumur hunting poster
BU_8	tenrec management poster
BU_9	Combined pdf showing articles and newsletters about the project (especially those not easily available online)