

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	15-026
Project Title	The Bornean Wild Cats and Clouded Leopard Project
Host country(ies)	Malaysia
UK Contract Holder Institution	Global Canopy Programme, Oxford
UK Partner Institution(s)	Wildlife Conservation Research Unit, University of Oxford. Royal Society South East Asian Rainforest Research Project
Host Country Partner Institution(s)	Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah
Darwin Grant Value	£ 229,744
Start/End dates of Project	1 st June 2006 -15 th November 2009
Project Leader Name	Katherine Secoy
Project Website	www.borneanwildcat.blogspot.com www.globalcanopy.org/main.php?m=116&sm=141&t=1
Report Author(s) and date	Joanna Ross, Andrew Hearn, Katherine Secoy and Henry Bernard. February, 2010

1 Project Background

Of the five wild cats found on Borneo two are Endangered and two Threatened, yet they remain some of the least known of the world's wild cats. Knowledge regarding their ecology is essential to enable the development of effective conservation management decisions. This project has provided unprecedented baseline data regarding Bornean felid status, ecology and behaviour. Capacity for felid-focused research, and awareness of the Bornean felids, have been raised in Sabah, Malaysia. Data will be fed into a recommendation report which will provide the grounding for a wild cat action plan for Sabah.

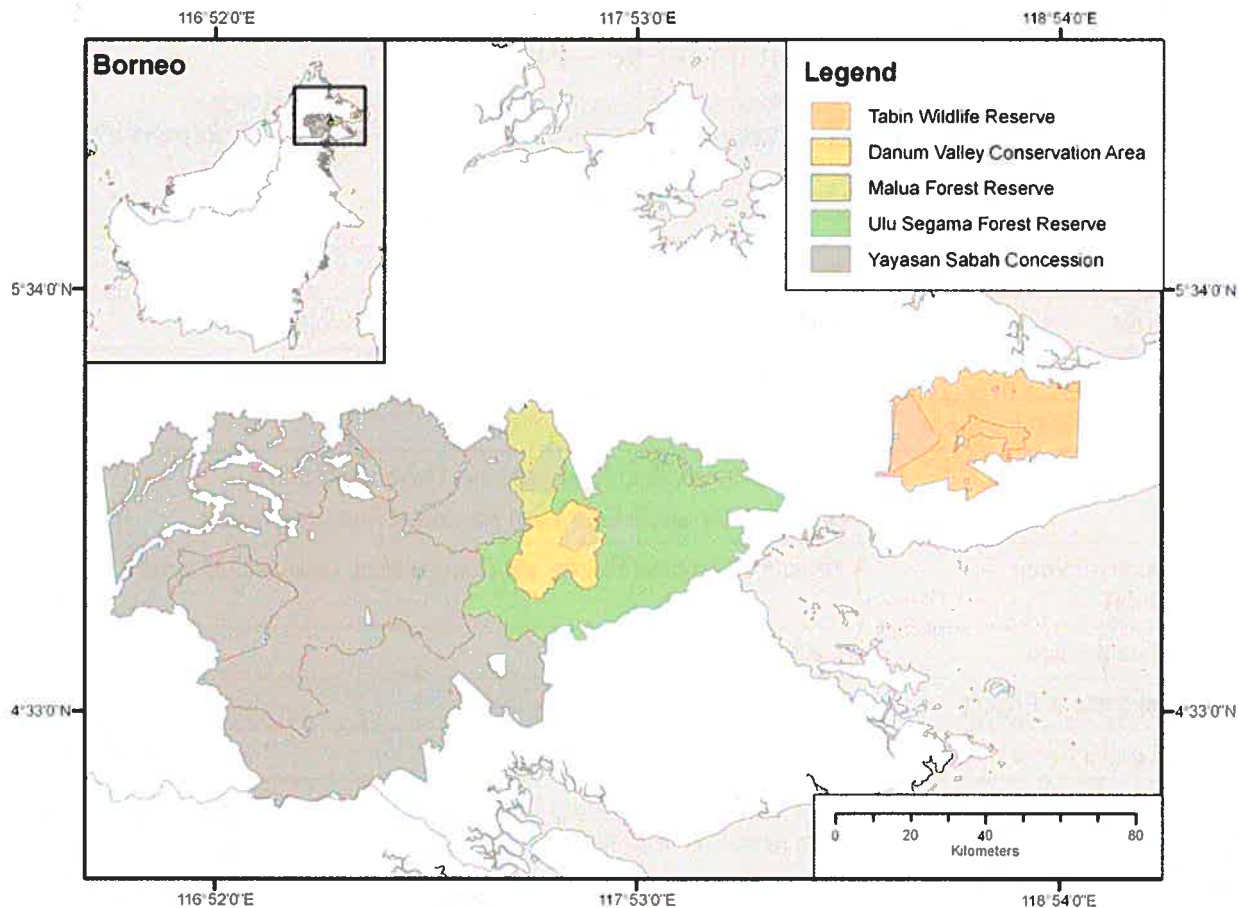


Figure 1. Map of the study sites within Sabah, Malaysia. Shaded polygons within the study represent the five areas surveyed by camera traps

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

This project helped the host country to fulfil its obligations under the CBD by specifically addressing the following CBD articles:

Article 7. Identification and Monitoring: especially “Identify and monitor components of biological diversity, particularly those requiring urgent conservation” and “identify processes and activities that have adverse effects”. New data on threatened Bornean wild cats’ distribution and conservation status were acquired. The project developed a monitoring protocol and established a benchmark for a long-term monitoring program for wild felids in Sabah, and provided preliminary evidence for the adverse effects of hunting, and forest management and conversion on these species. Presence/absence, relative abundances and effects of forest management were also obtained on a range of threatened non-felid species. Findings have and will be disseminated to relevant stakeholders.

Article 8. In-situ Conservation: Project findings highlight the high conservation value of selectively logged forests throughout Borneo for Bornean felid conservation, and provide definitive evidence for the importance of key protected areas (Danum Valley Conservation Area, Tabin Wildlife Reserve) and forest reserves (Ulu Segama, Malua) to this threatened guild of felids.

Article 12. Research and Training: Specialist mammal specific research techniques, such as camera trapping, carnivore live capture and radio tracking were developed and implemented; courses were attended by 63 Malaysian undergraduates and five ITBC staff members. A trainee counterpart benefited from three years on the job training, and a three month scholarship at the WildCRU in Oxford, and is now reading for a PhD on Bornean felid conservation genetics.

Article 13. Public Education and Awareness: Awareness of Bornean felids was raised, both locally, through the production and display of information posters, training courses, and presentations at various events, and internationally, through publications and conference presentations and the workshop.

Article 17. Exchange of Information: The project jointly hosted an inaugural wild cat workshop which provided a forum for the exchange of information pertaining to Bornean felid research and forest management, and resulted in the creation of a series of resolutions pertaining to wild cat conservation in Sabah.

The project addressed the following 2010 biodiversity target, **Goal 2. Conservation of species**, and also addresses the CBD thematic programme of '**Forest Biodiversity**'. Copies of the final recommendation report will be sent to the CBD focal point for Malaysia based at the Ministry of Natural Resources and the Environment.

3 Project Partnerships

Project partnerships with our principal partners, the Institute of Tropical Biology and Conservation (ITBC), Universiti Malaysia Sabah, and with the Sabah Wildlife Department (SWD), were largely formed as a result of a recognised need, by our partners, for Bornean wild cat information. Through early discussions it became apparent that these organisations regarded the lack of information pertaining to the Bornean wild cats as an impediment to designing effective conservation programmes for these species. Further discussions during the DI funded scoping/pre project visit revealed that there was lack of training in certain specialist mammal research techniques in Sabah and that there is a low awareness of the Bornean wild cats and associated conservation issues amongst the local population.

The partnership between the Global Canopy Programme (GCP) and the (ITBC) remained consistently strong throughout the duration of the project. Assoc. Prof. Dr. Abdul Hamid Ahmad now succeeded Professor Maryati Mohamed as Director of the ITBC. As a mammal specialist, Professor Hamid has shown strong support for the project and the ITBC continued to play an important role in implementing the training courses and with the general facilitation of the project. Throughout the project our main partner at the ITBC has been Dr Henry Bernard, who has provided invaluable logistical support and technical advice, and was instrumental in the development and delivery of the training courses. ITBC selected a graduate candidate, Daniel Pamin, to work as a trainee counterpart, who is now reading for a PhD at the ITBC focusing on Bornean felid conservation genetics. Three ITBC 'Conservation Biology' undergraduates undertook their BSc research projects under the project, and an MSc candidate is now developing a felid-focused research proposal in collaboration with the ITBC/Dr. Henry Bernard and the PIs. Further details of these capacity building/education elements are described in section 4.6.

Throughout the project's lifetime interest in Bornean felid conservation has become noticeably higher amongst host country organisations. The partnership with the Sabah Wildlife Department (SWD) has strengthened since the project's inception, and we receive continued support from the Department's Director, Laurentius Ambu, who is now working with the PIs to develop collaborative future research on the Bornean felids in Sabah in collaboration with the ITBC (see section 4.7). Senior SWD veterinarian, Dr. Senthival Nathan, worked with the PIs and project veterinarians on the development of an appropriate felid live-capture and immobilisation protocol. The SWD provided significant in-kind funding in the form of donated animal-processing equipment and veterinary drugs. SWD are also currently (Jan 2010) developing an exhibition entitled "Cats of Borneo" for which Bornean felid photographs and ecological/behavioural information have been provided by the PIs. To the benefit of the project, and at their request, the SWD hosted the project workshop alongside the GCP, ITBC and the Wildlife Conservation Research Unit (WildCRU), Oxford University (details in section 4.3, output 1). SWD maintain their support of the project PIs and are working alongside them to develop a felid/carnivore survey of one of the key areas of Sabah under their management, the Lower Kinabatangan floodplain. The PIs are also currently working alongside the SWD in the production of further wild cat education boards that the SWD intend to fund for distribution within their existing education programme.

The partnerships with Yayasan Sabah and the Royal Society's South East Asian Rainforest Research Project (SEARRP) also remain strong, with both providing excellent logistical support at the Danum Valley Field Centre. The SEARRP provided field assistants, invaluable advice, and were instrumental in facilitating the smooth running of the training courses at Danum. In addition, SEARRP provided considerable financial support to our field activities, funding the accommodation and subsistence costs of a number of our volunteer field assistants and veterinarians and also providing funds to the three students from the ITBC which enabled them to conduct their BSc project field work at Danum under the supervision of the PIs.

Project scientific advisor, Professor David Macdonald, Director of WildCRU, Oxford University, UK, provided sound scientific guidance throughout the duration of the project. In March 2007 Professor Macdonald visited Danum Valley

Field Centre and returned to Sabah again in November 2009 to chair the dissemination workshop. The PIs spent several months, both during and at the end of the project, analysing data and working alongside Biologists at the WildCRU centre at Tubney House. The PIs have been working closely with Professor Macdonald to develop and secure funding for the continuation of our Bornean felids conservation efforts in Sabah, and in the development of two DPhils for the PIs (see section 4.7). The WildCRU provided supplementary funding on several occasions (see section 7.2).

The relatively new partnership with the Sabah based NGO, Hutan, developed further over the last year of the project. The PIs provided advice to HUTAN regarding camera trapping methodology and, in collaboration with the Danau Girang Field Centre (Cardiff University) and the SWD, the PIs assisted with the launch of a new camera-based pilot carnivore survey in the Lower Kinabatangan floodplain. One Hutan staff member received training on the final project training course. Hutan will be one of the main recipients and distributors of the educational story book (see section 4.3 output 3). Data from the project's activities in the Tabin Wildlife Reserve will be used in a new Hutan/SWD project researching banteng (IUCN: Endangered) in Sabah. The large camera trapping effort that we have expended over different areas of Sabah, in particular, in Tabin Wildlife Reserve has revealed good location data regarding these endangered cattle that will now contribute to this new project. Data from the project have also fed into the World Wild Fund for Nature (WWF) collaborative project with the SWD Sumatran rhinoceros (IUCN: Critically Endangered) project as we have been able to provide specific location information pertaining to rhino presence in both Danum Valley Conservation Area and Tabin Wildlife Reserve.

An additional partnership has emerged with the Clouded Leopard Project (CLP) based at Point Defiance Zoo, Tacoma USA. The CLP has contributed funds to the project and is now collaborating in the delivery of wild cat specific education initiatives. The CLP provided several significant grants, principally to fund additional and replacement camera traps (see 7.2). Working alongside Karen Povey, President and CEO of the CLP, the PIs assisted with the adaptation of an illustrated – clouded leopard focused - educational storybook for a Malaysian audience (see section 4.3: output 3.).

4 Project Achievements

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

This project has made a positive impact on biodiversity by substantially increasing the potential for the improved protection of Borneo's wild cats in Sabah. This has been achieved by raising host country interest and capacity to conduct Bornean felid focussed research and by substantially adding to the knowledge base of one of the world's least known felid guilds, thus contributing to the establishment of effective conservation strategies. This project has also established an important benchmark in the conservation of Sabah's wild cats and will serve as a foundation for a long-term conservation programme for wild cats across Borneo. By proxy, wild cats, especially the clouded leopard, act as umbrella species and through their effective conservation, a wide array of biodiversity is automatically protected.

4.2 Outcomes: achievement of the project purpose and outcomes

The purpose of the project was "*To attain greater knowledge of the ecology of the Bornean wild cat species, to increase awareness of these felids and to enhance capacity for future research, so increasing the potential for the improved protection of Borneo's wild cats*".

Prior to the commencement of this project, virtually no information was known about the wild cats of Borneo. Now the project is concluded we have substantially more information regarding Bornean felid status, ecology, responses to habitat modification and threats, from five different areas in Sabah. These data, including the first insights into how forest management practises may be impacting wild cat populations, are being used to provide recommendations to the Sabah Wildlife Department (currently in production), and used to improve existing conservation and management strategies. The awareness of these felids has been raised, both locally, through the display of information posters, the training courses and presentations at various events, and internationally, through publications and conference presentations. Host country capacity for future mammal and felid-focused research has been substantially increased, and a strong collaborative network on wild cat conservation in Sabah and Borneo has

been forged. We therefore conclude that this project has increased the potential for the improved protection of Borneo's wild cats, and thus we were successful in achieving the project's purpose.

4.3 Outputs (and activities)

Output 1. Bornean wild Cat workshop and Recommendation Report:

A fundamental output of this project is the production of a recommendation report to the Sabah Wildlife Department and other relevant host country institutions. This report will be largely based on the findings from the field research, which are currently being analysed, and from discussions during the project workshop (discussed below). The report is still in production, and we have requested, and been granted, permission to delay the completion until three months following the deadline for submission of this Final Report. The report is expected to be completed by 15th May, which is in-line with our stated intention of distributing to target institutions within six months of project completion.

The project dissemination workshop entitled 'First Steps towards the Conservation of Wild Cats in Sabah' was successfully held on the 4th – 5th November 2009, at the Lembah Impian Resort, Kota Kinabalu, Sabah. The workshop was attended by 27 delegates including representatives of Yayasan Sabah (Sabah Foundation) and Sabah Wildlife, Forestry and National Parks Departments, in addition to Malaysian and International scientists and representatives of local and international conservation NGOs. To the benefit of the project, and at their request, the SWD hosted the workshop alongside the GCP, ITBC and the WildCRU. SWD Deputy Director, Augustine Tuuga, gave the welcoming/introductory speech and Professor David Macdonald chaired the meeting. I State Tourism, Culture and Environment Assistant Minister, Datuk Ellron Alfred Angin, opened the two-day event, helping to draw media attention to the workshop. Furthermore, this was the first ever workshop to focus on Bornean wild cats and thus received significant local and international attention. In addition to providing a platform to disseminate the findings from the Darwin project key workshop objectives were to: (i) bring together key stakeholders to discuss the conservation needs of the Bornean Wild Cats in Sabah; (ii) collate all available information regarding the ecology and conservation status of the 5 species of Bornean wild cat, with a specific focus on populations in Sabah; (iii) Identify current gaps in the knowledge base regarding Bornean Wild cats and formulate future strategies to address these gaps; (iv) To identify the first steps towards a Wild Cat Action Plan for Sabah. All of day one and the morning of day two were devoted to presentations regarding the current knowledge of Bornean wild cat ecology and conservation needs. The remainder of day two was devoted to a discussion session, which culminated in the drafting of a series of resolutions. Supplemental funding for the event was provided by the Sabah Wildlife Department and the ITBC. A full report is included in Annex 7.

Output 2. Training in Mammal field research techniques:

The mammal field research techniques training courses were attended by a total of 67 Malaysian and one Chinese scientist, including 63 ITBC undergraduates and five ITBC staff members, exceeding our planned total of 60 students and the training of two trainers (see section 4.7; Annex 8). The courses were taught primarily by both principal investigators, with substantial input from our ITBC counterpart, Dr. Henry Bernard. During the final two training courses Daniel Pamin (the trainee counterpart from ITBC) taught the camera trapping module and developed and presented an additional lecture on conservation genetics (his chosen topic for his PhD). The courses covered basic techniques for surveying for mammals, such as sign surveys, camera trapping, live trapping and radio tracking, and provided an introduction to the use of multivariate statistics). As planned, Daniel received 3 years on the job training, and additional training from the WildCRU in Oxford (further details in 4.6).

Output 3. Development and production of wild cat education materials:

The project met and indeed exceeded its planned targets for the production and dissemination of wild cat specific education materials. Unique, high quality camera trap images of each of the five species of Bornean wild cat were utilised in the production of Bornean wild cat focused education boards. The boards present basic ecological information regarding each species, written in both English and Malaysian. Six education boards were produced, five of which are currently on display at a number of research centres and tourist attractions in Sabah, including the Danum Valley Field Centre, Borneo Rainforest Lodge, Lok Kawi Wildlife Park, and the Tabin Wildlife Reserve.

These sites enjoy high visitation rates are frequented by both local and international tourists, scientists and students. A sixth education board was presented and displayed at a small primary school, situated in an oil palm plantation which was the focus of one of our camera surveys, and was instrumental in educating and forging a friendly relationship with local inhabitants. In addition, the SWD will use this poster as part of their forthcoming (Feb 2010) wild cat exhibition and also have expressed an interest in funding the publication and distribution of these posters in large (several thousand) numbers. The PIs continue to work closely with SWD officers to produce these.

An additional, unplanned educational output as a result of this project was the assistance with the production of a beautifully illustrated – clouded leopard focused - educational story book, entitled the Clouded Leopard's Secret (Annex 9). Originally written for a Thai audience by Karen Povey of the CLP, the PIs were requested to assist with the adaptation of the book for use in Sabah and Malaysia. We worked with Karen in a primarily facilitating role, initially gauging interest in the book, identifying target audiences and encouraging partnerships with host country organisations. PIs also commented on required changes to the text to ensure its appropriateness for a Malaysian audience and provided technical material for the inclusion in the artwork. The Malaysian translation was completed by Dr. Henry Bernard. Several local based organisations will be incorporating this book into their existing environmental education programmes including the ITBC, SWD and HUTAN. After a short delay due to final reviews of both language versions the book is now ready for printing and will be distributed in Sabah during the first half of 2010.

Output 4. Hunting/environmental awareness survey:

Despite some initial setbacks regarding the implementation of the awareness survey this was conducted in October 2009 (Annex 10). The number of respondents was significantly lower than hoped for, presumably as a result of the sensitive nature of the survey. The main aims of the survey were to investigate local people's knowledge and perceptions about Bornean wildlife and to try to gain an insight into illegal hunting of wild cats and their prey. Hunting is completely prohibited in the government managed Forest Reserves of Sabah, which constitute the majority of the remaining forests in this state, yet hunting by locals is believed to be commonplace. Anti-poaching patrols conducted by the Wildlife and Forestry Department personnel, with occasional assistance from the large conservation NGO, the WWF, routinely survey the forests for illegal hunting activities. These organisations are, unfortunately, limited in their capacity to effectively survey the extremely large forest reserves, which often are devoid of drivable roads and cover terrain that is difficult to traverse. Consequently, the resultant prosecution of poachers is relatively infrequent. Nevertheless, local people are wary of discussing such activities with outsiders. Staff members at the ITBC, who have undertaken numerous sociological surveys within rural areas of Sabah, advised that the questionnaire surveys would be best undertaken by a local student, to help allay fears resulting from an outsider asking sensitive questions. As a result, the surveys were led by a recent Conservation Biology graduate from the ITBC, Gilmore Bolongon, who had experience of similar surveys during his undergraduate research. This approach may indeed have helped, but a number of respondents preferred not to discuss anything animal related, and the number of respondents remained small overall. Nevertheless, the questionnaire survey was successful in providing some very useful information on illegal hunting and perceptions and attitudes towards wildlife by rural people in Sabah (see section 4.5).

4.4 Project standard measures and publications

See Annex 4

4.5 Technical and Scientific achievements and co-operation

We used camera trapping and radio tracking approaches to reveal the conservation status, activity, spatial ecology and responses of Bornean felids to habitat modification. Data continue to be analysed, and conclusions drawn, but a number of key findings are already clear, and presented below. We expect core findings to be published in a minimum of three peer-reviewed papers, in journals such as Biological Conservation, Oryx and IUCN Cat News, with additional papers stemming from the extensive camera trap based non-felid data sets. Along with data regarding felid species, information about many other species was also obtained from the camera traps. Over 40,000 wildlife photographs were obtained in total, including some very rare and seldom seen species such as otter civets, banteng, Sumatran rhinoceros, Storm's stork and Bulwer's pheasant (Annex 11). These data have been submitted

as reports to the authorities (SWD, Forestry Department, Yayasan Sabah and Malua Biobank Management Committee) relevant to each area and highlight the conservation value of these forests, despite the fact that some have been logged. Logging has now ceased in the Ulu Segama and Malua Forest Reserves and these data are therefore directly helping to inform the next steps in the management of these areas; a first step in the management of protected areas is to determine the species that are utilising the area and camera trap data is an excellent way to do this.

We used photographic capture–recapture surveys to successfully estimate Sunda clouded leopard populations in two contiguous Forest Reserves experiencing different levels of anthropogenic management and provided tentative evidence for a reduction in density associated with recent logging and higher poacher activity. We developed a camera-trapping protocol suitable for the densely vegetated forest in Sabah which can, and indeed is, being adapted to similar forest regions throughout Borneo. This study has also established an important benchmark as a foundation for a long-term monitoring program for clouded leopards and other threatened felids in Sabah. Camera surveys revealed that all five members of the Bornean felid guild can be found in selectively logged forest, further highlighting the conservation importance of this habitat, but that oil palm plantations may be avoided by all felids apart from the more abundant leopard cat. We tagged the first ever Sunda clouded leopard, and in combination with the extensive camera data, conducted the first study on this felid's spatial ecology and activity. We captured and tagged nine leopard cats, and are currently analysing the data to determine leopard cat density, activity, range size and overlap.

The research efforts were led by the Principal Researchers, Joanna Ross and Andrew Hearn, who both developed the field methodologies and led research teams in the field. Daniel Pamin was involved in all levels of the research, including planning, assistance in the field, and data analysis over the three years. In total, over 20 Malaysian staff members were employed at different periods to assist with the data collection, the majority stemming from the SEARRP, but with significant inputs from ITBC graduates and undergraduates. Additional assistance was provided by three UK volunteers and three international vets. Core scientific advice was provided by Professor David Macdonald, with additional advice being sought from our collaborator, Dr. Henry Bernard, project leader Katherine Secoy and several leading conservation biologists.

Bornean Felid Habitat Use and Abundance

Camera trap surveys were conducted within five study sites, each exposed to different land management practices (Fig. 1). Sites consisted of three contiguous forest areas, including two commercial forests: the Ulu Segama (20-30 year post selectively logged forest undergoing rehabilitation) and Malua (1 year post selectively logged) Forest Reserves, and an adjacent area of primary forest, the Danum Valley Conservation Area and Palum Tambun Watershed Reserve. Vegetation, topography and soil chemistry across the three study sites is similar, yet each area has been subjected to different management strategies and exposed to varying levels of hunting, and thus provide a unique opportunity to investigate responses of Bornean felids to anthropogenic habitat modification and associated activities. A fourth study site, the Tabin Wildlife Reserve (20-30 year post selective logging), is surrounded almost entirely by agricultural plantations, and thus provides an opportunity to investigate Bornean felid responses to the combined effects of logging and fragmentation. A fifth study site, an oil palm plantation adjacent to the Danum Valley, operated by the Danum Palm Company, was used to investigate to what extent mammals use oil palm and to estimate leopard cat density.

A six-month pilot survey of the primary and logged forests of the Danum Valley Conservation Area/ Palum Tambun and Ulu Segama Forest Reserve, respectively, was used to investigate felid photo-capture success and different camera placement methodologies. Based on observations from this trial period, subsequent camera surveys were tailored to produce estimates of Sunda clouded leopard density based on a capture-recapture analytical framework, previously applied to closed populations of Tigers and other individually identifiable felids. Within the Ulu Segama Forest Reserve, an effective sampled area of 165.51 km² yielded a Sunda clouded leopard density estimate of 7.85 ± 1.79 (standard error) clouded leopards per 100 km², whereas in the Malua Forest reserve, an effectively sampled area of 230.58 km² yielded a density estimate of 4.77 ± 2.00 clouded leopards per 100 km². An effective survey area of (164.06 km²) in the Danum Valley Conservation Area, yielded insufficient photo captures to enable capture-recapture analyses. A minimum density of 1.21 clouded leopards per 100 km² was estimated, although this likely significantly underestimates actual population density. Thus this study provides the first robust density estimates for any Sunda clouded leopard population, and although inconclusive, provides the first evidence that recent logging and elevated hunted levels may have a detrimental effect on clouded leopard abundance.

The surveys were also used to assess relative abundance (photo capture rates) of the other four members of the Bornean felid guild. Our surveys captured an unprecedented number of positive Bornean felid photo captures,

including some of the first photographs, and indeed the world's first ever video, of the Bornean bay cat. Leopard cats were found to be abundant in all disturbed habitats, but marbled cat, flat-headed cat and bay cat were all found to be relatively rare (see figure 2). As a fish specialist the flat-headed cat is closely associated with rivers; forest close to rivers was included during this project, however, all of the survey areas were above 100 m asl (although the forest is classed as lowland rainforest) suggesting that this felid has very specific habitat requirements. It is the more low lying areas that are affected first by anthropogenic modification and therefore, a large proportion of suitable habitat has already been converted. This is exemplified by the fact that the flat-headed cat was only photo captured on one occasion, highlighting the critical status of this endangered felid.

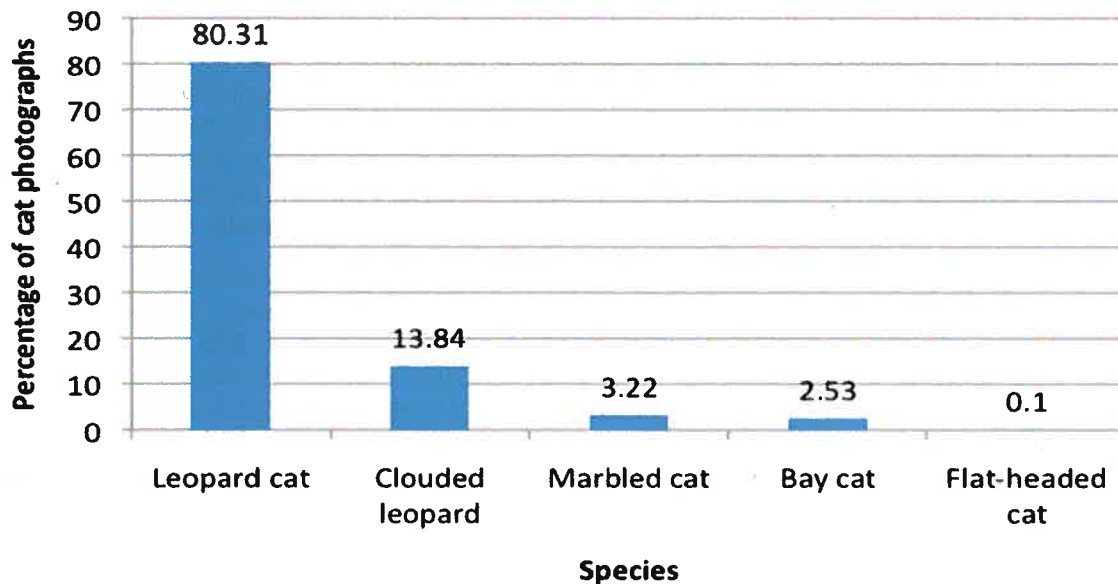


Figure 2. The number of photographs of each cat species, expressed as percentage of the total number of cat photographs

It was discovered that all five felid species can be found in selectively logged forest, highlighting the conservation importance of these resources. A camera survey of the oil palm plantation provided evidence that of the five Bornean felid species only the leopard cat is able to persist in this highly modified and increasingly widespread environment (see figure 3). We are currently analysing data regarding leopard cat density using capture recapture methodology, but preliminary results suggests that this felid can be found at exceptionally high density in comparison to other felids worldwide. Our preliminary survey results were the core data used to assess the global status of our five focal wild cat species during the IUCN Red List workshop in 2007 (Annex 12). Both PIs are members of the IUCN Cat Specialist Group and once data are fully analysed, we plan to include the final findings in the next species assessment.

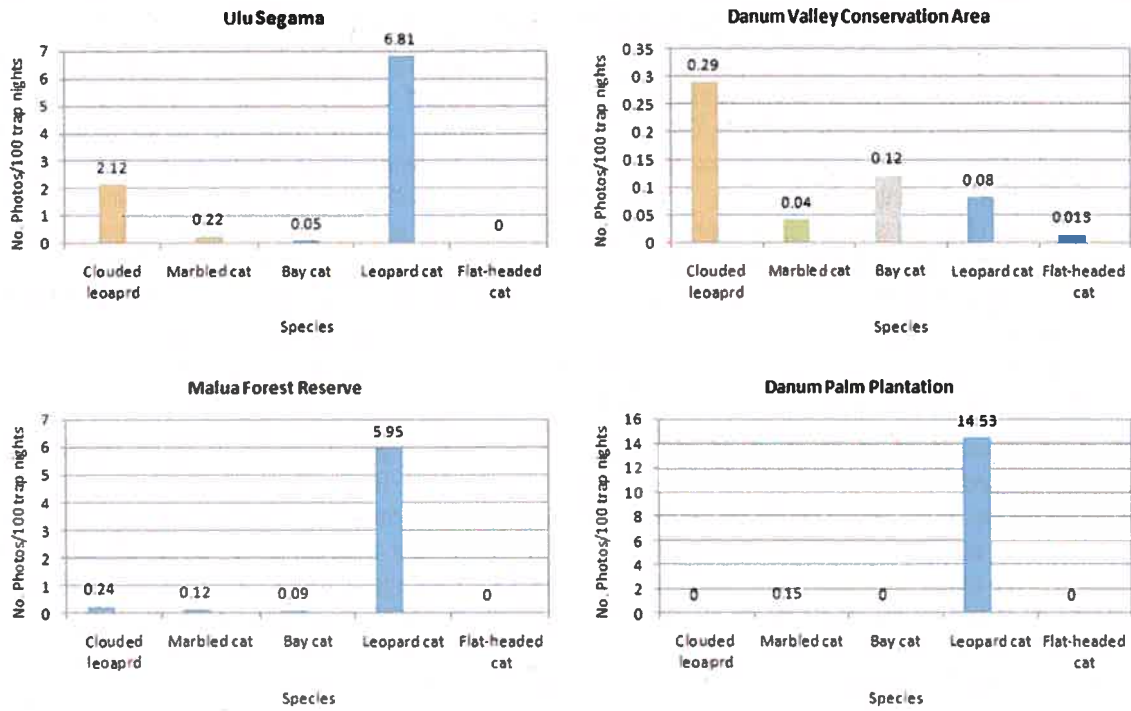


Figure 3. The relative abundance of Bornean felids in different survey areas, expressed as number of photographs/100 trap nights. Data from Tabin are still being analysed and not thus presented here.

Activity Patterns

The camera data has provided the first evidence that both the marbled cat and bay cat exhibit diurnal activity patterns in contrast to the predominantly nocturnal activity patterns of the clouded leopard, and leopard cat, figure 4. This previously unknown evidence of temporal segregation within the guild suggests the cats exploit different prey bases, which could have consequences for management as it must be ensured that sufficiently different prey are conserved to support the entire guild. *within the Bornean felid guild*

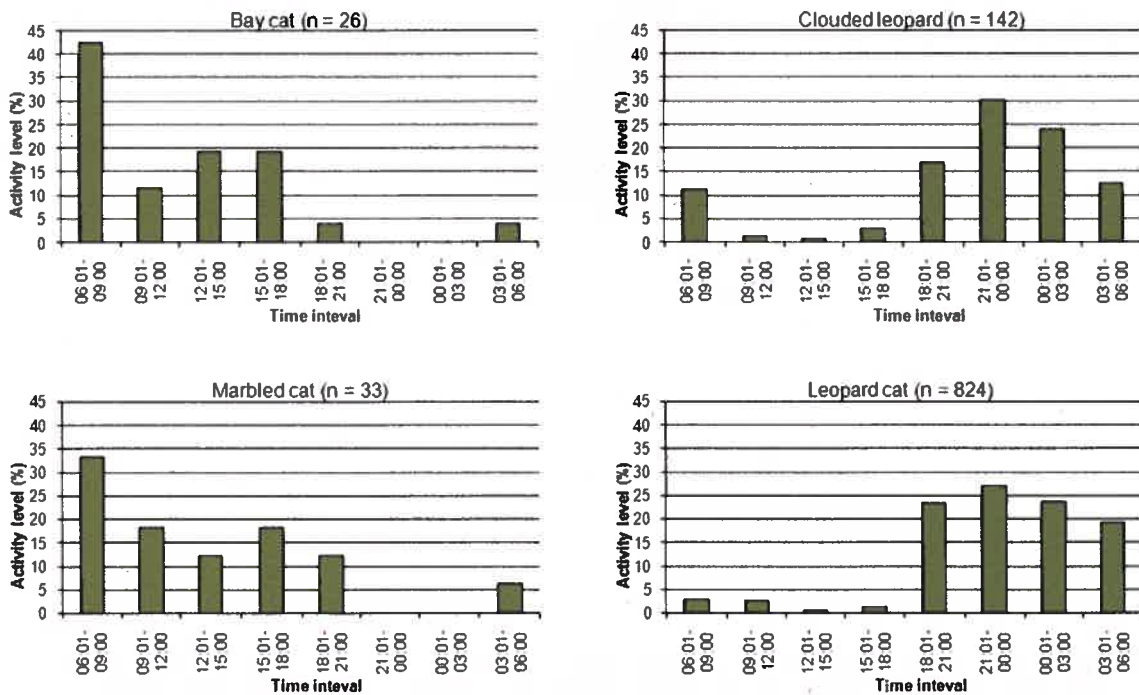


Figure 4. Bornean felid activity patterns. Evidence for interspecific temporal segregation

Bornean Felid Spatial Ecology

We attempted to live trap Bornean felids with the intention of attaching radio collars and investigating Bornean felid spatial ecology. The protocols for the live trapping programme, including trap design, anaesthetic agent and method of delivery of the anaesthetic for each target species were developed by the principal researchers in close collaboration with the vet from Sabah Wildlife Department. Each project vet also approved the trapping protocol prior to trapping commencing. There were two main blocks of live trapping: April-June 2008 and January-March 2009 totalling 5.5 months of intensive trapping. Thirty live traps were used of varying size and with various different baits; each trap was checked at least once every 24 hours. Trapped cats were assessed initially by the project vet and, if deemed suitable for anaesthetisation and collaring, were processed as quickly as possible and released when the vet judged all reflexes to have returned to normal. All non-target animals were checked for trap injuries and released when it was confirmed that they were free of injuries. Prior to the trapping commencing in earnest, a female clouded leopard was successfully trapped and collared on 31st January 2008. The remainder of the trapping sessions resulted in the trapping and collaring of nine leopard cats, six males and three females.

We employed standard methods of ground-based triangulation to determine point locations of tagged animals using telemetry receivers and hand-held, directional, three-element Yagi antennas. Radio telemetry error was assessed by estimating the location of 30 radio transmitters placed by another person within the forest. To estimate home range size radio-fixes were obtained at intervals of at least 24 hours to ensure data independence. To enable comparison of estimates of home range with those obtained from other studies home-range size was calculated using 50%, 95% and 100% minimum convex polygon estimators (MCP) and the 50% and 95% fixed-kernel estimator using Ranges VI software. Point location data for individual Sunda clouded leopards derived from the preliminary and closed camera surveys in the Ulu Segama FR will be used to calculate naïve or minimum home range estimates for individuals photo-captured at >3 locations; range sizes are presented as 100% MCPs. Home ranges derived from both methodologies will be used to investigate intra and intersexual and conspecific range overlap. Daily movements of the tagged animals will be calculated by measuring the linear distance between consecutive daily locations.

Results from Clouded Leopard Radio Tracking: We used 36 radiolocations to provide the first estimate of range size for any Sunda clouded leopard. Range size over the three month period was 22.6 km² (95% MCP) and 16.1

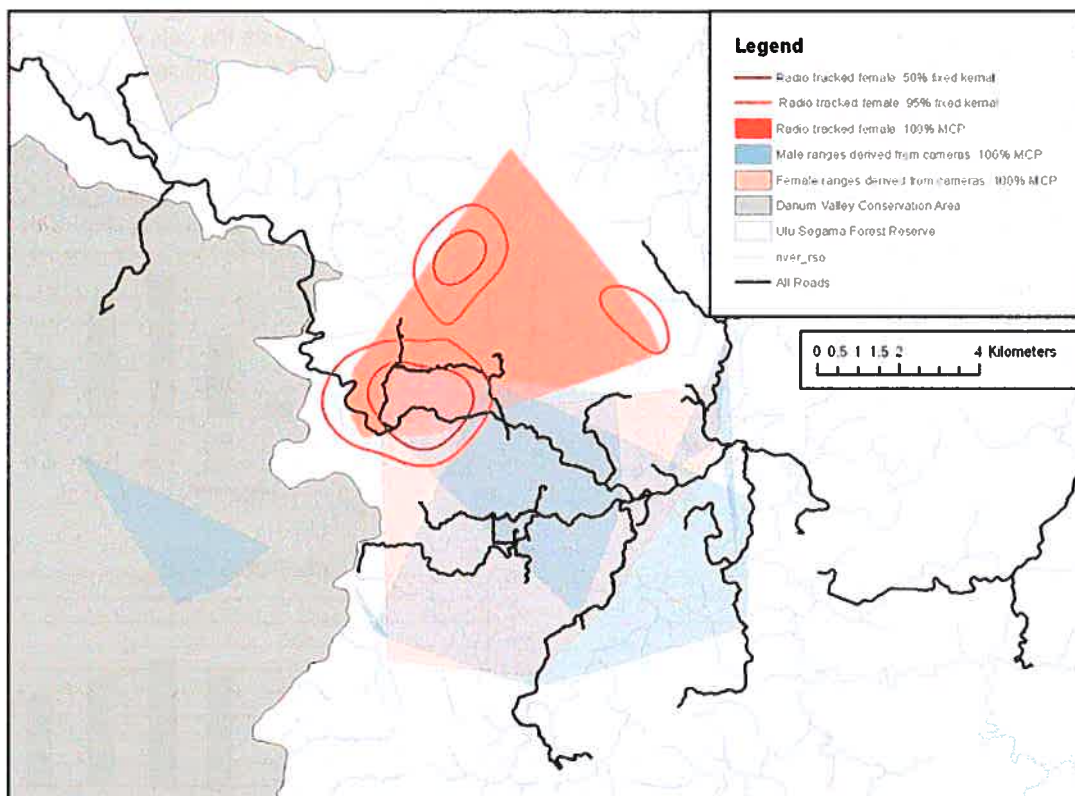


Figure 5. Examples of home ranges for the Sunda Clouded Leopard, derived from both camera trapping and radio tracking data. Camera trap data is expressed as 100% MCPs and radio tracking data as both 100% MCP and 95% and 50% fixed kernel estimators.

km² (95% fixed kernel) and core range use was 5.2km² (50% MCP) and 5.4 km² (50% fixed kernel). The female was located on 22 consecutive days and showed movement on all days. Distances between consecutive daily locations averaged 797 m ±142 m SD, range 97 – 3,042 m. Naïve range sizes derived from point location data from the camera survey in the Ulu Segama were also calculated for 3 individuals in which >6 locations were obtained (2 males, 1 female). Such naïve range estimates will likely underestimate true range size, but given the paucity of such information regarding spatial ecology of this species they are welcome nonetheless. Overall, range sizes (100% MCP) varied from 20.6 – 45.1 km². Both camera trap and telemetry derived home range data were used to investigate range overlap between individuals. Extensive conspecific and intraspecific overlap was apparent.

Results from Leopard Cat Radio Tracking: Data from the collared leopard cats revealed an average home range of approximately 3km², with old logging roads being an important habitat feature, although forest some distance from the roads is also frequently used; primary forest was used by one focal male. We found that males are characterised as being more closely associated with roads and adjacent habitats than females. Interestingly, two of the leopard cats shifted in range by about 25 km and established stable ranges in an adjacent oil palm plantation. This suggests that larger areas of forest may be important for leopard cats than suggested by their small body size and short-term radio tracking data. Data also suggest that leopard cats may have a fairly high mortality rate. Five of the nine collared cats were killed during the study. Two were hit and killed by cars on the main logging road, two were eaten by pythons and one appeared to have been killed by an unidentified predator, their remains and still-functioning collars being regurgitated, so enabling us to find them.

Awareness Questionnaire

In response to Darwin reviewer concerns, the questionnaires were developed under advice from Dr. Maggie Redshaw, a social scientist from Oxford University and staff from ITBC who had undertaken this type of questionnaire survey previously. It was advised that the best approach would be to employ a student undertake the questionnaires and Gilmore Bolongon, a recent graduate from ITBC with previous experience of social surveys undertook the interviews. No direct questions regarding hunting were asked (see Annex 10) however, it was found that local people were, nonetheless, rather suspicious and were very reluctant to speak about wildlife and as a result only 12 interviews were completed, out of 97 people approached. Nevertheless, some useable data were collected from two villages, one in east Sabah and one in west Sabah.

It was found that 82% of interviewees could recognise and name the clouded leopard when shown photographs. Ninety percent of people could recognise and name the marbled cat, 80% were able to name the leopard cat, however for the bay cat only 30% of interviewees were able to recognise and name the animal and only 20% could name the flat-headed cat. Eighty percent of people reported having seen a marbled cat, 70% a leopard cat, 25% a flat-headed cat, 18% a clouded leopard and only 10% a bay cat. The leopard cat was the only cat that was reported to be seen often and was also the only cat reported to have been sighted in the last year. It appears that the clouded leopard is perceived as dangerous; two interviewees identified the clouded leopard as a dangerous animal, along with sun bears and elephants and 63% of people said they would run away from clouded leopards, marbled cats and bay cats. One person said they might shoot a clouded leopard if they saw one; however there was no evidence from these interviews that cats are targeted by hunters. When asked about animals that cause problems in the village nobody identified any of the cats; 90% of people mentioned that macaques are problematic as they damage crops and 40% of interviewees thought that bearded pigs were a nuisance. One person mentioned the common porcupine as being problematic and one person said that Malay civets take the chicken's eggs. 10% ?

10% of
12 respondents
= 1 person

When asked if they had ever heard of animals being hunted 60% of people said they had, the remaining 40% said they were not sure or did not want to answer the question. Of those who admitted they knew about hunting 87.5% said that animals were hunted for food only, although selling the meat and medicine (rhino horn) were also mentioned.

The questionnaire also aimed to investigate general awareness of conservation and issues such as animals becoming extinct. Interviewees were asked if they learned about conservation or wildlife when they were younger, 60% said they did, but when asked to elaborate it became apparent that they were not taught these issues at school or through any formal programme, but learned about the local, common wildlife through other villagers or family members. Only two people said their children learn about conservation; one of these said their children only learn about these issues from the television. Over half of the people interviewed (57.1%) did not know if their children were taught about conservation.

Everybody questioned understood the concept of extinction and 100% of interviewees said that it does matter if animals become extinct. When asked why it matters 70% of people said that they do not want their children to grow up without seeing wildlife, or only being able to see animals in photographs.

When asked if they would like to be able to use the forest near their village 100% of people said they would like to be able to, with the collection of food plants being the most common reason with 50% of interviewees stating this as the reason for wanting to use the forest. Collecting food in general was mentioned by 40% of people; hunting animals, collecting medicinal plants and enjoying nature were also given as reasons for using the forest. Only 2 people said that some areas of forest should be completely protected with no access, the majority of people (80%) did not agree with this.

4.6 Capacity building

One of the most successful outputs of this project has been the raising of capacity for mammal and in particular, Bornean felid research. The ITBC provide excellent training in Conservation Biology through their BSc programme, however, discussions with our partners at the ITBC revealed that there was a need for training in specialist mammal research techniques such as mammal carnivore live trapping, radio tracking and camera trapping, and that research on many of the threatened, non-primate Bornean mammals by Malaysian scientists remains uncommon, despite the urgent requirements for such studies, due to large-scale habitat conversion. The training courses were thus aimed to address these training requirements for ITBC undergraduates, but also to raise the profile of the conservation needs of the threatened Bornean mammals and to stimulate interest in studying these species. We met and indeed exceeded our intended number of course attendees (see 4.3. output 2). The course was well received by course participants and ITBC staff, and aspects of the course will continue to be taught by the ITBC (see 4.7). Questionnaires presented to course participants suggest that attitudes towards studying mammals were changed positively (Annex 8) and indeed, several students who have attended this course have gone on to study for a higher degree or are now employed in an associated field. These include Ridzwan Bin Ali who is currently employed by ITBC as a primate researcher and looking to pursue a Masters degree at Oxford Brookes University, UK. Christopher Wong attended the first training course and after graduating from Universiti Malaysia Sabah was successful in securing a position with WWF Malaysia to work on their tiger project. Esther Lonnie is currently completing a Masters by research at ITBC with small mammals being the focus of her research. Three course attendees undertook their BSc research projects under the project.

Capacity for mammal field research at the ITBC has also been enhanced through 'on-the-job' training of two ITBC graduates. Project trainee counterpart, Daniel Pamin, benefited from three years 'on-the-job' training and worked on all aspects of the project, from project planning, assistance in the field, and data analysis. Daniel's position led to his enrolment in a PhD programme at ITBC, with links to both WildCRU and Cardiff University, studying Bornean felid conservation genetics. The project provided a scholarship for Daniel to attend parts of the Postgraduate Diploma in International Wildlife Conservation Practice at WildCRU, Oxford University. During this time Daniel attended the following classes: Using ArcGIS v9.2 to manage, display, interrogate and combine spatial data sources; Understanding and working with projections, coordinate systems & datums; Downloading remotely sensed data from www.landcover.org; Population viability analysis using Vortex; Home range analysis using Ranges 7 and received guidance and advice regarding his PhD research from scientists at both WildCRU and Cardiff University. In 2009 Daniel put his training in camera trapping methodology to good use by assisting Dr Henry Bernard in a study that is using camera traps to investigate Bornean mammal use of forest fragments in an agricultural landscape. A second ITBC graduate, Gilmoore Bolongon, received five months training in camera trapping and has shown a strong commitment to continuing wild cat research in Sabah (see section 4.7). In addition, two Royal Society research assistants were employed on a long-term basis under the project and gained valuable field skills in radio tracking, live trapping, camera trapping and mammal identification. These skills will be of benefit to future researchers conducting similar research at Danum Valley Field Centre.

4.7 Sustainability and Legacy

Conservation in Malaysia suffers from an image problem; often the most promising students leave the field in search of greater financial incentives. Our training initiatives have helped to encourage future conservation biologists into this neglected field and have increased capacity for mammal field research in Malaysia. The impacts of the training course will endure as the ITBC have chosen to incorporate core aspects of our training course into their existing BSc

syllabus, and equipment and course materials, including PowerPoint presentations, handouts and our mammal field sign guide (Annex 13) to mammal footprints, have been donated to the department to facilitate this. Awareness and interest in the Bornean felids has been increased at both the local and international level through the dissemination of project activities and through our environmental education materials. Our host country partners, in particular the ITBC and SWD, will continue to utilise and further develop our educational materials, thus ensuring the legacy of these initiatives. Since the project's inception the SWD has become increasingly engaged in wild cat conservation efforts. It is noteworthy to highlight that the SWD will shortly host a wild cats exhibition in Sabah, in which the wild cat posters will be used. Our pioneering research has been instrumental in determining the conservation status of these species at the local and international level, and will help guide future changes to forest management practices in Sabah, and these changes will continue to benefit Borneo's felids.

Our project partners are now committed to working towards the conservation of the Bornean felids in Sabah. Thus, a lasting legacy of this project will be the subsequent creation of several collaborative Bornean felid focused conservation and research initiatives, with which both PIs will be closely involved. Several initiatives are in development but all will be based around a core programme led by the WildCRU in close collaboration with the SWD, ITBC, HUTAN, Danau Girang Field Centre and SEARRP, entitled the 'Bornean Clouded Leopard Programme'. Thus all current project staff and project equipment will continue to be used in this collaborative effort. Core funding, amounting to US\$ 230,000, has already been secured for this effort and the associated costs of a DPhil at Oxford University for one of the PIs. It is envisaged that Gilmore Bolongon (see 4.6) will undertake his MSc by research at the ITBC in collaboration with the new felid programme.

Lastly, this project has gathered some of the world's first, and arguably finest, images of the Bornean wild cats. These images have been, and will continue to be used in books, magazines, education materials and other initiatives that highlight the conservation concern of this unique guild of felids.

5 Lessons learned, dissemination and communication

Some very valuable lessons were learned during the course of this project, both with respect to the development of appropriate scientific methodologies as well as social, cultural and political aspects of working in a foreign country. We choose to focus on one of the world's least studied and particularly difficult to study mammalian guilds, and consequently we encountered a steep learning curve with regard to the development of appropriate and effective survey methodologies. Field surveys frequently took significantly longer than anticipated to complete, primarily due to the difficulties associated with working in rain forest (e.g., camera malfunctions, equipment damage from elephants and sun bears, and inclement weather). Over the course of the project we have successfully developed effective survey methodologies such as optimum camera placement in different habitats, the level of intensity required to obtain useful results and techniques to protect cameras from elephants, all of which are of value for future research and for other researchers. Despite both PI's having experience of conducting similar projects in adjacent countries (Brunei, Kalimantan (Indonesia)) we underestimated the amount of time that would be required to gain the trust and be accepted by the key Government partners, this led to a significant delay in the commencement of the live trapping programme. We believe we now have a strong relationship with the Sabah Wildlife Department which will be invaluable in the continuation of this work by the PIs.

Information from the project was disseminated through the final workshop (4th - 5th November 2009) and also, once complete, through the recommendations report. The target audience for the dissemination was mainly SWD and ITBC; however, other interested parties were also included such as HUTAN and WWF. We continue to collaborate with SWD to produce more education boards and on their upcoming exhibition "Cats of Borneo" (see question 3). Following project completion at least five papers submitted to peer reviewed journals will also act to continue dissemination of information.

5.1 Darwin identity

The Darwin logo was used on all materials, education boards, presentations and publicity articles; the logo is also on the project vehicle. For those articles or interviews produced externally the Darwin name was always mentioned or provided as the main funder. There have been many Darwin projects within Sabah indeed, our collaborators within

the ITBC have been involved with several DI projects and also the SWD have been involved with previous DI projects and are very aware of the Darwin Initiative.

6 Monitoring and evaluation

Project Purpose: The reviewer of the second Annual Report raised concerns as to whether the purpose of the project would be met by project closure. The original project purpose stated *"to better protect Borneo's wild cats through increased knowledge, greater awareness and enhanced research capacity"*. After liaising with the project's Science Advisor, Professor David MacDonald, the project purpose was changed to: *"to attain greater knowledge of the ecology of the Bornean wild cat species, to inform the establishment of effective conservation strategies, to increase awareness of these felids and to enhance capacity for future research so increasing the potential for the improved protection of Borneo's wild cats"*. It was thought that the project's outputs had the potential to improve the protection of the Bornean cats as opposed to directly resulting in their better protection. Furthermore, the revised purpose better reflected our most fruitful output, that being the unprecedented acquisition of knowledge regarding Bornean felid ecology. This change was detailed in the half year report 2008 and was approved by the Darwin Secretariat.

Questionnaire Survey: The questionnaire survey to investigate any threat to the cats from hunting was changed slightly to a more general environmental and wildlife awareness survey in order to remove the emphasis from hunting elements, as advised by our host country partners. This was deemed more appropriate as interviewing people about illegal activities is a very sensitive subject. The change also allowed people's perceptions and any impact on livelihoods to be investigated. This change was also detailed in the half year report 2008.

Project Timing: There were also some minor changes regarding the timing of certain activities. This flexible approach was essential to cope with unexpected impediments to progress such as a broken generator at Danum Valley Field Centre which resulted in the postponement of the third field course. In addition, inclement weather, equipment damage from animals and equipment theft were all aspects that required slight changes to be made to the project timetable. The live trapping programme was delayed due to the SWD requirement for a veterinarian to be present during all chemical immobilisations of the cats and associated difficulties of finding a vet able to devote a significant amount of time to the project. The survey of Tabin Wildlife Reserve (surrounded by oil palm plantations) was re-scheduled to be the last survey site due to fears of equipment theft, which would have impacted severely on project activities had this happened at an earlier stage in the project.

Use of Logframe: Throughout the project the logframe indicators were invaluable to monitor project progress and to keep the project focused on the overall purpose with clear targets to aim for. The annual reports and reviewing process also helped to evaluate project progress.

GCP Evaluation: Throughout the life of the project, progress was continually evaluated within the GCP by the submission of monthly update reports from the PIs to ensure activities were on track and the project was within budget. Meetings were held between the PIs and scientific advisor Professor David Macdonald whenever the PIs were in the UK to ensure the science remained strong. Regular meetings and email contact between the PIs and Dr. Henry Bernard at ITBC, to discuss findings and next steps also ensured the project maintained its focus.

All issues raised in response to reviews of the annual reports have been responded to by the time and manner requested by the reviewer. Dr. Henry Bernard always has always provided input into each report and publication and therefore each resulting review is also sent to him, so keeping him involved in all aspects of the project.

Changes to the Original Stage 2 Budget

Over the project period the following was agreed with the Darwin Initiative Secretariat.

- £ was moved from Workshop and Conferences to Capital Items
- £ was moved from FY 06/07 to FY 09/10
- £ was moved from FY 08/09 to FY 09/10
- 63 young scientists were trained during the training courses, we had planned to train 60. Therefore £ was moved from training courses to the final dissemination as this latter was under-budgeted. Both these sections were in the same DI category.

7.2 Additional funds or in-kind contributions secured

Additional Funds Raised for the Project

Wild About Cats

International Trust for Nature Conservation

WildCRU, University of Oxford

Sherbourne School

Point Defiance Zoo

ITBC Finance for the Recommendations Workshop

Total Additional Funds Raised

Additional In Kind support

ITBC Support for Training Courses

Mr Glen Reynolds

Professor Maryati Mohammed and

Assoc. Prof. Dr. Abdul Hamid Ahmad

Mr Wong Siew Te

SWD Vet

Donation of veterinary equipment

Volunteer work

Transport to and from KK for students

£ (minimum)

Total In Kind Support

7.3 Value of DI funding

This project would not have been possible without the funding from Darwin Initiative. Although additional funding was also made available to the project, these funds were relatively small and funded extra and replacement equipment, mainly replacement camera traps. It was the Darwin funding that allowed the core of the project to become a reality, covering expenses in addition to equipment, such as field assistants' salaries and in-country accommodation.

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

Project summary	Measurable Indicators	Progress and Achievements June 2009- November 2009	Actions required/planned for next period
<p>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</p> <ul style="list-style-type: none"> • The conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources 		<p>To date over 35,000 photographs of wild cats and other seldom seen species have been obtained from palm plantations and forests under a range of different forest management regimes. These data are enabling us to draw tentative conclusions regarding the conservation status and effects of different forest management techniques on the felid and mammalian fauna of Bornean forests. The radio tracking data has provided novel information regarding felid home range size and habitat use. Together, these data will feed directly into a recommendations report for the SWD to help in the development of their conservation efforts.</p>	<p>(do not fill not applicable)</p>
<p>Purpose</p> <p>To attain greater knowledge of the ecology of the Bornean wild cat species, to inform the establishment of effective conservation strategies, to increase awareness of these felids and to enhance capacity for future research so increasing the potential for the improved protection of Borneo's wild cats.</p>	<ul style="list-style-type: none"> • New informative data regarding Bornean wild cat ecology, response to habitat alteration & threats from hunting in Sabah. • Students trained in mammal field techniques • Bornean wild cat education materials produced & utilised in environmental education programmes. 	<ul style="list-style-type: none"> • Camera surveys were completed in 5 different areas including primary forest, logged forest and oil palm plantation. These data are unprecedented and have provided much needed information regarding wild cat densities and responses to habitat alteration. Data from 10 radio collared animals have provided a valuable insight into home range sizes and habitat requirements of the felids. • 63 students were trained in field research techniques • Bilingual education boards were produced and displayed at key locations. A guide to mammal footprints was produced for use on the training courses. The project also aided the development of an educational, illustrated clouded leopard focused story book. 	<p>Within 3 months the data will be fully analysed and incorporated into the recommendations report and presented to the Sabah Wildlife Department</p>
<p>Output 1. A report providing recommendations for a Bornean Wild cat Action Plan for Sabah and a project dissemination workshop</p>	<ul style="list-style-type: none"> • Report peer reviewed & publication date established. Report distributed to target institutions/bodies within 6 months of project completion. 	<p>The report will be largely based on the results from the field research programme. Over the course of the project more data were gathered than anticipated and consequently more time is needed to analyse these fully. Nonetheless we are still on target to have the report finalised and distributed within 6 months of project completion (by 15th May 2010). This indicator is still appropriate</p>	

<p>Activity 1.1 Field research programme</p>	<p>17,000 camera trap nights resulted in over 35,000 photographs of wildlife. We developed a camera-trapping protocol and used photographic capture-recapture surveys to successfully estimate Sunda clouded leopard populations in two contiguous Forest Reserves experiencing different levels of anthropogenic management and provided tentative evidence for a reduction in density associated with recent logging and higher poacher activity. Our surveys revealed that all five members of the Bornean felid guild can be found in selectively logged forest, further highlighting the conservation importance of this habitat, and found that oil palm may only be a suitable habitat for leopard cats. We tagged the first ever Sunda clouded leopard, and in combination with the extensive camera data, conducted the first study on this felid's spatial ecology and activity. We captured and tagged nine leopard cats, and are currently analysing the data to determine leopard cat density, activity, range size and overlap. This study has also established an important benchmark as a foundation for a long-term monitoring program for clouded leopards and other threatened felids in Sabah</p>
<p>Activity 1.2 Wild cat Action Plan recommendation report</p>	<p>Data are currently being analysed to feed into the recommendation report, which will be distributed to the Sabah Wildlife Department and other interested parties within 6 months of project completion, as planned. These data will also be submitted as scientific papers to peer reviewed journals, at least 3 papers will be submitted within 1 year of project completion, as originally planned.</p>
<p>Activity 1.3 Project dissemination workshop</p>	<p>The inaugural international workshop on the Bornean Wild Cats was held on the 4th - 5th November 2009 and was attended by 28 scientists and stakeholders. The workshop culminated with a resolutions document agreed upon by all delegates, which highlights the main current threats to wild cats in Sabah and mitigating actions.</p>
<p>Output 2. Training in Mammal field research techniques, resulting in increased human capacity in Malaysia for mammal field studies.</p>	<p>63 students were trained in total during the field courses. Daniel Pamin received 3 years on-the-job training as the project trainee counterpart. This indicator is still deemed appropriate.</p>
<p>Activity 2.1. Field courses in mammal field research techniques.</p>	<p>A total of 63 students and 2 trainers were trained during 4 weeks of training courses. Daniel Pamin and Dr. Henry Bernard each taught significant aspects of the later courses and the course has now been amalgamated with the existing fieldwork module as part of the undergraduate Conservation Biology course. 2 students who attended the second course are now pursuing Masters, Ridzwan Bin Ali who is currently employed by ITBC as a primate researcher and looking to pursue a Masters degree at Oxford Brookes University, UK. Esther Lonnie is currently completing a Masters by research at ITBC with small mammals being the focus of her research.</p> <p>Daniel Pamin received 3 years training and is now competent in all research aspects covered by the project, including project planning and data analysis</p>
<p>Activity 2.2. WildCRU scholarship</p>	<p>As planned, Daniel Pamin benefited from an academic visit to WildCRU from July to October 2009, a slightly longer visit than originally planned. During this visit he was able to attend part of the new postgraduate diploma in Wildlife Conservation Practise. Daniel also took advantage of this visit to arrange a meeting at Cardiff University to further discuss his PhD research with molecular ecologist Professor Mike Bruford.</p>

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

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Goal:</p> <p>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</p> <ul style="list-style-type: none"> the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources 			
<p>Purpose</p> <ul style="list-style-type: none"> To attain greater knowledge of the ecology of the Bornean wild cat species, to inform the establishment of effective conservation strategies, to increase awareness of these felids and to enhance capacity for future research so increasing the potential for the improved protection of Borneo's wild cats. 	<ul style="list-style-type: none"> New, constructive data regarding Bornean wild cat ecology (including greater knowledge of habitat requirements and range), response to habitat alteration, & threats from hunting in Sabah. Data regarding the presence of rare species in the Conservation Area will help to maintain its protected status and thereby the continued protection of many species ITBC students trained in mammal field techniques – the next generation of decision makers and the people most likely to take roles in the SWD. Feedback from training course regarding changed perceptions and attitudes Bornean wild cat education materials produced & utilised in environmental education programmes. <p>Greater awareness of the threats</p>	<ul style="list-style-type: none"> Partner institution reports. Final & annual project reports and feedback from dissemination workshop. 	<ul style="list-style-type: none"> Sufficient numbers of wild cats can be filmed/ photographed, trapped, collared & successfully tracked Recommendations read by relevant stakeholders & changes implemented where necessary. <p>Evidence is collated of hunting pressures.</p>
<p>Outputs</p> <ul style="list-style-type: none"> A report providing recommendations for a Bornean Wild cat Recommendation Report for Sabah and a project dissemination workshop Training in mammal field research techniques, 	<ul style="list-style-type: none"> Report peer reviewed & publication date established. Report distributed to target institutions/bodies within 6 months of project completion. Minimum of 60 Malaysian students & 	<ul style="list-style-type: none"> Reviews & feedback on recommendation report from peers and host country collaborators. Min. 2 peer reviewed papers published in scientific journals within 1 year of project end. Field course manual, participants attendance 	<ul style="list-style-type: none"> Research project is completed and data analysed. Stakeholders attend project dissemination workshop. Sufficient numbers of students show an

<p>resulting in increased human capacity in Malaysia for mammal field studies.</p> <ul style="list-style-type: none"> • Wild cat specific education programme, aimed at schools, communities & tourists, for use in DVFC environmental education centre, & 2 major tourist facilities in the region: Borneo Rainforest Lodge & Tabin Wildlife Resort. • Report on the threats from hunting & trade on wild cat populations in & surrounding Tabin Wildlife Reserve. 	<p>scientists, including 2 trainers, successfully trained during field course. 1 individual to receive 3 years on the job training and 2 month WildCRU scholarship.</p> <ul style="list-style-type: none"> • Bornean wild cat education materials produced using clouded leopard as a flagship species & displayed at target institutions, & utilised in environmental education programmes. • Number of participants in communities surrounding Tabin Wildlife Reserve successfully interviewed. 	<p>records & feedback assessment</p> <ul style="list-style-type: none"> • Posters, handouts, guides, & new wild cat photos. Partner institution reports. • Hunting reports produced at end of year 3 	<p>interest in attending the course, & continue in the field of ecology</p> <ul style="list-style-type: none"> • School groups continue to visit DVFC & utilise the educational materials. Tourists continue to visit Borneo Rainforest Lodge & Tabin Wildlife Resort. • Communities co-operate with us & our local collaborators during the questionnaire survey.
<p>Activities</p> <ul style="list-style-type: none"> • Field research Programme • Project dissemination workshop • Field courses in mammal field research techniques. • Development / production of wild cat education materials & implementation of environmental education programme. • Wildlife Conservation awareness and hunting survey in communities surrounding the TWR. 	<p>Activity milestones (summary of project implementation timetable)</p> <ul style="list-style-type: none"> • Yr 1: Preliminary camera survey of DV & Ulu Segama; clouded leopard density survey Ulu Segama. Yr 2. Clouded density survey DV and Malua. Phase 1 of live-trapping programme & tracking programme. Yr 3. Completion of Malua survey; survey of oil palm plantation and Tabin. Continuation trapping & tracking programme. Long-term mammal monitoring programme established. • Relevant stakeholders and project partners invited to attend workshop in Kota Kinabalu, Sabah during November 2009 • Total of four 5-day field courses held during years 1, 2, and 3, resulting in 63 students and 2 trainers trained. Yr 3. Course materials handed to ITBC, and course elements incorporated into ITBC field course. • Yr 1: Project specific posters produced and displayed at ITBC, and International wild cat conference in Oxford. Yr 2: Wild cat specific, dual language, information posters, produced & displayed at multiple Sabah sites. Yr 3. Assisted with adaptation of an illustrated –clouded leopard focused –educational storybook for a Malaysian audience. Assisted with SWD wild cat exhibition. • Yr 1-2. Development of questionnaire design and approach; Yrs 1-3: ad-hoc accumulation of information regarding hunting/poaching in Sabah. Yr 3: implementation of questionnaire survey at three Sabah sites. Data analysed and report finalised and distributed to target institutions/bodies within 6 months of project completion 	<p>Assumptions</p> <ul style="list-style-type: none"> • Sufficient numbers of wild cats can be filmed/ photographed, trapped, collared & successfully tracked. • Key stakeholders attend workshop. • Sufficient numbers of students/scientists attend the course. • Sufficient data & wild cat photos are obtained for incorporation in environmental education materials • Communities co-operate with us & our local collaborators. 	

<p>Output 3. Wild cat specific education programme, aimed at schools, communities & tourists, for use in DVFC environmental education centre, & 2 major tourist facilities in the region: Borneo Rainforest Lodge & Tabin Wildlife Resort.</p>	<ul style="list-style-type: none"> Bornean wild cat education materials produced using clouded leopard as a flagship species & displayed at target institutions, & utilised in environmental education programmes. 	<p>Rather than re-invent the wheel we decided to produce cat specific materials that could feed into existing education programmes within Sabah. These consisted of education boards for display at key locations, photographs of cats and other wildlife and wild cat focused ecological information. In addition, through collaboration with the CLP both PIs guided the development of a clouded leopard focused educational children's story book. The indicator remained appropriate throughout the project.</p>
<p>Activity 3.1 Development / production of wild cat education materials & implementation of environmental education programme.</p>	<p>implementation of</p>	<p>Bi-lingual education boards depicting the 5 species of wild cat using the more superior camera trap photographs and with basic ecological information about each species were donated for display at Danum Valley Field Centre, Borneo Rainforest Lodge, Tabin Wildlife Reserve, Lok Kawi Wildlife Park, ITBC and Danum Palm School.</p> <p>Photographs of wildlife were also made available to Yayasan Sabah for the production of educational posters and for staff training and also photographs and information were provided to SWD for an exhibition entitled Cats of Borneo.</p> <p>The clouded leopard focused story book will be incorporated into, and utilised by, education programmes run by ITBC, HUTAN and SWD</p>
<p>Output 4. Report on the threats from hunting & trade on wild cat populations in & surrounding Tabin Wildlife Reserve</p>	<ul style="list-style-type: none"> Number of participants in communities surrounding Tabin Wildlife Reserve successfully interviewed. 	<p>This was met with a somewhat briefer survey than planned. The survey was designed to include people's knowledge and perceptions of wildlife rather than focusing only on hunting issues.</p> <p>This indicator is still appropriate.</p>
<p>Activity 4.1 Hunting survey in communities surrounding the Tabin Wildlife Reserve.</p>	<p>surrounding the Tabin Wildlife Reserve.</p>	<p>The survey was carried out in October and November 2009 in 2 villages in Sabah: Lituk Pulau and Garama. The survey was carried out by a student from ITBC as this was deemed the most appropriate approach by all parties involved in the planning of this survey. However, the villagers were still suspicious of partaking in the survey and for this reason the number of respondents was rather low, with 12 villagers agreeing to the interviews.</p>



Annex 3 Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use	0	Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	40	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	20	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	0	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	10	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts	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.

Article No./Title	Project %	Article Description
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	5	Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	1 – Daniel Pamin, Malaysian, is due to submit his PhD thesis on the conservation genetics of Borneo's wild cats in 2010. Daniel's PhD was funded externally, but a significant amount of his data collection was done while a trainee under the current DI project
4a	Number of undergraduate students receiving training	60 Malaysian and 1 Chinese undergraduate students from ITBC completed the training course
4b	Number of training weeks provided to undergraduate students	A total of 4 training weeks were completed
4c	Number of postgraduate students receiving training (not 1-3 above)	2
4d	Number of training weeks for postgraduate students	1 week
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(ie not categories 1-4 above)	3 people. Daniel Pamin received 3 years on-the-job training and 2 Royal Society Research Assistants, Remmy Murus and Sajaril Utung each received 1.5 years on-the-job training
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	5 people. Gilmore Bolongon an ITBC graduate has received 5 months on-the-job training and Jasmi Joroh a local villager has received 6.5 months training. 3 research assistants: Azlin Sailim, Anthony Frederick and Yoksan Julbit from Royal Society each received 3 months training in camera trapping
6b	Number of training weeks not leading to formal qualification	11 training weeks for trainee counterpart Daniel Pamin at Oxford University
7	Number of types of training materials produced for use by host country(s)	2: 1 field guide: "A Guide to some Bornean Mammal Footprints" Lecture handouts to accompany each lecture on the training course
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	30 weeks in 06/07. 48 weeks in 07/08. 48 weeks in year 08/09. 24 weeks in year 09/10. Total 150 weeks
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	1 The recommendations report, once finalised, will provide guidelines for a species management plan
10	Number of formal documents produced to assist work related to species identification, classification and	20 copies of "A Guide to some Bornean Mammal Footprints"

Code	Description	Totals (plus additional detail as required)
	recording.	
11a	Number of papers published or accepted for publication in peer reviewed journals	3 papers in press. Wilting <i>et al</i> "Modelling the species distribution of flat-headed cats (<i>Prionailurus planiceps</i>), an endangered South-East Asian small felid" Hearn <i>et al</i> Sabah Wildlife Department hosts Inaugural Bornean Wild Cat Workshop in Sabah Ross <i>et al</i> Observations of marbled cat in the Ulu Segama Forest Reserve, Sabah, Malaysia
11b	Number of papers published or accepted for publication elsewhere	
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	1 workshop jointly organised with ITBC and SWD 4 th – 5 th November 2009, specifically to disseminate findings from the DI project.
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/disseminated.	6 in total. Poster presentation at the Felid Biology and Conservation Conference 17 th - 21 st September 2007, Oral presentation at the Borneo Species Workshop 6 th - 7 th December 2007. 4 oral presentations at seminars at Danum Valley for visiting university groups and researchers
15a	Number of national press releases or publicity articles in host country(s)	1 "Cat Women" Discovery Channel magazine, September 2009 (Annex 14)
15b	Number of local press releases or publicity articles in host country(s)	6 "Image of another rhino captured" Daily Express September 2008 "Wild Cats Study in five Sabah Areas" Daily Express 5 th November 2009 "UK's funding for Sabah Supersedes all Others" Daily Express November 2009 "Conservation of Sabah wild cats critical" The Borneo Post November 2009. Chinese Newspaper, name of article and newspaper unknown. November 2009. (see annex 14 for examples)
15c	Number of national press releases or publicity articles in UK	6 "Borneo Free" Sunday Telegraph 7 th July 2007 "Saving the World's most recently discovered cat species" Mongabay 10 th April 2008 "World's first Video of the Elusive and

Code	Description	Totals (plus additional detail as required)
		Endangered Bay Cat" Mongabay 5 th November 2009 "Palm Oil Threatens Borneo's Rarest Cats" Mongabay 4 th November 2009 "Bornean Wild Cat and Clouded Leopard Project" Darwin Initiative Eleventh Annual Report
15d	Number of local press releases or publicity articles in UK	6 Canopy Fellows Newsletter GCP Annual Report (See annex 14)
18a	Number of national TV programmes/features in host country(s)	2 Interview for Radio Television Malaysia, July 2007 Documentary filmed by Malaysian company SMprod. This is due to be aired in July 2010
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	£
23	Value of additional resources raised for project	
Other Measures used by the project and not currently including in DI standard measures		