

Darwin Initiative Annual Report

Darwin Project Information

Project Ref Number	17-024
Project Title	Securing human–elephant co-existence in Sumatra
Country(ies)	Indonesia
UK Contract Holder Institution	North of England Zoological Society (NEZS; Chester Zoo)
Host country Partner Institution(s)	Wildlife Conservation Society – Indonesia Program (WCS)
Other Partner Institution(s)	Government of Republic of Indonesia, Department of Forestry, Directorate General of Forest Protection and Nature Conservation ('PHKA').
Darwin Grant Value	£285,350
Start/End dates of Project	1st April 2009 – 31st March 2012
Reporting period and annual report number:	1st April 2009 – 31st March 2010 Annual Report No. 1
Project Leader Name	Alexandra Zimmermann
Project website	N/A
Author(s) and main contributors, date	Donny Gunaryadi, Nick Brickle, Martin Tyson, Simon Hedges, Alexandra Zimmermann ; 21 April 2010.

1. Project Background

Throughout their range, Asian elephants are in decline due to poaching, habitat loss, and human–elephant conflict (HEC). All of these threats are apparent on the Indonesian island of Sumatra, one of the most important areas for Asian elephants outside of India.

The current status of most elephant populations on Sumatra is unknown. However, we do know that many of the remaining elephant populations are threatened. Our project focuses on identifying those elephant populations where conservation action will make the most difference, not the likely 'lost causes', and then implementing measures to protect them, while simultaneously improving farmers' food security and livelihoods by reducing the impact of HEC, which will foster goodwill towards protected areas.

We are addressing these pressing needs by conducting a three-year Sumatra-wide elephant survey and threat mitigation project. We are building on the experience gained during the extensive previous work on HEC reduction, rural livelihood protection, and elephant population monitoring conducted by project co-leaders, Zimmermann and Hedges, in Assam and Sumatra respectively. Specific project objectives are:

- i. identify key elephant populations and HEC "hotspots" using a combination of desk-based map studies and field work, including MIKE-approved survey methods based on dung counts and innovative faecal DNA capture–recapture methods (see Hedges & Lawson. 2006. Dung Survey Standards for the MIKE Programme. CITES/MIKE Central Coordinating Unit, Nairobi, Kenya);
- ii. protect these key Sumatran elephant populations by promoting measures to reduce HEC, poaching, and habitat loss while working with communities to protect local peoples' crops using both novel and proven methods; and

- iii. build capacity by PHKA staff in: (a) the design and conduct of elephant surveys using modern peer-reviewed sampling-based survey methods approved by CITES/MIKE; (b) the implementation of an HEC, poaching, and habitat loss reduction strategy, using methods that have proven effective elsewhere; and (c) provide opportunities for Indonesian conservation biologists to study for graduate degrees in the UK.

2. Project Partnerships

The following partnerships have been active during this reporting period:

- ***Government of Republic of Indonesia, Department of Forestry, Directorate General of Forest Protection and Nature Conservation ('PHKA')***

PHKA is responsible for managing and protecting national parks, nature reserves, and protection forests in Indonesia. As the lead national agency responsible for elephant conservation, PHKA are the target of much of the capacity building work and are participants in the project's surveys, human–elephant conflict mitigation activities, and law enforcement activities. During this project period we have conducted training to assist the Indonesian Government meet its obligations to the CITES / Monitoring the Illegal Killing of Elephants (MIKE) programme.

- ***Wildlife Conservation Society – Indonesia Program (WCS)***

WCS is the key in-country partner providing local knowledge technical advice, project field staff, and general facilitation. In addition to its Memorandum of Understanding with Chester Zoo, WCS holds an MOU with PHKA under which it conducts applied conservation projects in collaboration with PHKA, and advises on the conservation of endangered species and the development of wildlife management strategies.

- ***Local Government and local communities***

We have worked closely with the District Authorities (local government) and local community groups in all target sites to discuss human–elephant conflict reduction work and our other proposed elephant conservation activities.

Collaborating projects and partners

We have worked closely with Chester Zoo's Darwin Project (16-007) "Building Capacities for human–elephant conflict mitigation in Assam" to share knowledge of community-based conflict mitigation and livelihoods approaches. In Sumatra we have worked closely with other, more localized, HEC mitigation projects in Sumatra run by partners including WWF, Fauna & Flora International (FFI), and the International Elephant Foundation (IEF) again to share knowledge and to promote a common approach to reducing HEC in Sumatra.

3. Project progress

3.1 Progress in carrying out project activities

Activities in this period closely followed the planned project timetable. A summary of progress against each planned activity for this period is shown below:

- ***Desk-based map study to identify priority sites for elephant population survey and HEC assessments (Activity 1.1) (Map shown in Appendix 1 of this report)***

Project staff led and participated in the IUCN/SSC Asian Elephant Specialist Group "HEC Mitigation Workshop" in July 2009, during which all Asian elephant populations were mapped and a core (or high priority) set of populations for conservation action was identified using primarily biological criteria. For Sumatra, the mapping was based on a

combination of analyses of vegetation cover from satellite imagery, formal dung-count based surveys, plus occupancy and questionnaire survey data. Participants also identified land which may act as linkages between known populations, and areas where the species might be restored in future. Preliminary maps were developed before the workshop, and then refined at the workshop. The participants identified a core (or priority) set of populations for conservation action followed a set of adopted rules as follows:

- Include at least 1 population in every range State (a political, not biological value);
- Include all subspecies;
- Include all populations known or suspected to contain >100 elephants per Global 200 Ecoregion/Biome (or include the 2 largest populations if none >100);
- Include at least 2 populations per Global 200 Ecoregion/Biome;
- Include all Confirmed Range polygons that are contiguous to the polygons selected using the above rules.

Using these rules gave a set of populations that:

- Encompass 53 Asian elephant populations including nine on Sumatra;
- Represent 50% of the current Confirmed, Possible, and Recoverable range of Asian elephants;
- Represent approximately 75% of the global population of Asian elephants;
- Represent 22 ecological settings (Global 200 Ecoregions) occupied by Asian elephants;
- Includes all 13 Range States and all three elephant subspecies.

These populations can be thought of as a core, or minimum, set of populations that will need to be conserved if the conservation community is to be able to say that it has fulfilled the biological components of the vision statement. In Sumatra nine priority populations were identified (shown in Appendix 1). These priority populations include the two CITES MIKE sites (Bukit Barisan Selatan NP and Way Kambas NP). Of the 43 Sumatran elephant populations which existed in the 1980s only a maximum of 25 still exist in 2010, and only nine were considered priorities by the rules applied above.

- ***Deployment of elephant population and HEC survey teams in areas identified as priorities (Activity 1.2)***

Our survey teams have begun fecal DNA based capture–recapture surveys in the two Sumatran MIKE sites, Bukit Barisan Selatan NP and Way Kambas NP, which were also identified as priority populations for the conservation of Asian elephants on Sumatra during the desk-based priority-setting activity described above. The elephant populations in these two national parks were previously surveyed in 2001 (BBSNP) and 2002 (WKNP) and those surveys produced the first estimates of elephant population size for Southeast Asia to be based on peer-reviewed sampling-based methods, which satisfied the assumptions of the models used. The repeat surveys initiated under this project will allow us to identify whether the elephant populations in these two important national parks are declining, stable, or increasing and thus for the effectiveness or otherwise of conservation interventions to be assessed. Again, this is the first time in Southeast Asia that such monitoring has been conducted for elephant populations and the work is also helping the Indonesian Government authorities meet their obligations to the CITES MIKE programme.

Our survey teams have also carried out rapid assessment surveys in Northern Riau, South Sumatra, and Jambi this year. In Riau, we used standard occupancy survey methods to conduct surveys in 25 grid cells of 17km x17km and in addition the survey team interviewed 542 local people during a parallel questionnaire survey. In South Sumatra, we are still conducting occupancy surveys in 56 grid cells and have to date completed 243 questionnaires. In Jambi, we begin work by deploying the questionnaire survey in four areas, with 318 completed questionnaires to date.

Questionnaire surveys provide local information about elephant presence and particularly about the likely level of HEC in areas where elephants still occur and thus facilitate more detailed (non-questionnaire) follow-up work. Occupancy surveys provide track- and other sign-based data on the geographical distribution of species as well as covariate data on vegetation and human activities that might affect the elephant populations. The combined occupancy/questionnaire survey have so far identified 18 conflict hotspots in Lampung, South Sumatra, Bengkulu, Jambi, and Riau provinces. HEC mitigation work has already begun at eight of these and they will continue to be the focus of HEC mitigation work in Year 2 and Year 3.

- ***HEC reduction plans and guidance handbooks prepared for HEC hotspots (Activity 2.1).***

We are in the process of developing a guidance manual for HEC mitigation, which has been drafted in the Indonesian language. The content of the manual is based on several years of experience of mitigating HEC in both Indonesia (WCS) and India (NEZS). We are currently in discussions with experienced editors to refine the text in order to optimise the effectiveness of information transfer to the target audience (mostly farmers, but also government officials and other conservation bodies). We have contacted several graphic artists to commission ideas for cartoon graphics for the book, in order to increase its accessibility for people with reading difficulties. The manual will be completed early in Year 2.

- ***HEC reduction plans implemented at HEC hotspots (Activity 2.2)***

We have conducted HEC mitigation work in eight identified HEC hot spot areas (see section 1.2 above) and implemented community-led HEC mitigation strategies around Way Kambas and Bukit Barisan Selatan National Parks in Lampung and Bengkulu Provinces (these activities are described in Hedges & Gunaryadi (2010) paper in *Oryx*, see Table 2). As part of work our teams are continuing to monitor HEC incident rates to allow us to assess the effectiveness of the HEC mitigation measures we have promoted. We monitored HEC rates around WKNP to assess the effectiveness of our mitigation trials. In 2009, farmers at 20 villages voluntarily adopted the methods that had been used at the conventional site, but not the chilli-and-sirens site (see Hedges & Gunaryadi 2010), and were able to repel 361 out of 447 (81%) attempted elephant raids. This work will be expanded to priority hotspots identified during survey work (detailed above).

- ***Law enforcement patrols by PHKA and WCS–IP staff in key/priority sites (Activity 3.1)***

In this period we have provided training to National Park staff, local government staff, and local NGOs in law enforcement patrolling methodologies at the priority site of Way Kambas National Park (see details below under Activity 4.1). This will be followed up shortly by a repeat training in a second priority site (Bukit Barisan Selatan National Park). As part of both initiatives, we have instigated measures to monitor the patrolling effort – using CITES MIKE-approved methods – at both sites and to provide follow-up support. These measures are intended to ensure knowledge gained during the training is put to use. We will continue to promote the adoption of systematic and effective patrolling with key sites across Sumatra. In Year 2, we will focus on Bukit Barisan Selatan and Gunung Leuser National Parks.

- ***Deployment of Wildlife Crimes Unit staff throughout Sumatra (Activity 3.2)***

Our Wildlife Crime Unit (WCU) is supporting the work of the Indonesian law enforcement authorities by providing information and advice on the investigation and prosecution of wildlife crime cases. The unit has created a network of ‘community wardens’ and informants that monitor and investigate suspected wildlife crime cases at markets, shops, and transport hubs across Sumatra and nearby areas of Java. The process of expanding

and strengthening this network is ongoing, but it has been successful in bringing a number of cases into the justice system. In the last year, this network has result in nine cases involving 15 suspects. One case has already resulted in a successful prosecution for illegal wildlife trading (a case involving a variety of species) and four more cases are still in prosecution. This brings the total number of cases investigated by the Wildlife Crime Unit since January 2008 up to 30 (involving 40 suspects) with an arrest to prosecution rate of 60% (against a national average of 5% in wildlife crime cases). During this project period we have received no credible reports of wild elephants being deliberately poached in southern Sumatra, however we received reports of four elephants being killed in central Sumatra (in Riau Province). We have also received information regarding the alleged sale of elephant ivory, one such case led to the arrest of five suspects in Bengkulu. In these cases, it is usually not clear how long the ivory has been in the traders' possession, or where it was obtained from. In another incident in August 2009, a captive elephant at Way Kambas was poisoned and the tusks removed. This case is still being investigated.

- ***Workshops and 'on-the-job' training in CITES MIKE approved standard elephant population monitoring methods, HEC assessment and reduction methods, and law enforcement and law enforcement monitoring (Activity 4.1)***

PHKA staff (both from National Parks and Natural Resource & Conservation Offices), local government staff (from the regional forestry department offices - Dinas Kehutanan), international NGOs (including staff from ZSL, WWF, FFI, and the International Rhino Foundation), and local NGOs have been trained in questionnaire and occupancy surveys using a "hands-on" approach through participating in surveys with our teams. In total, around 65 people have been trained in this way, including 18 staff from PHKA, 10 team members from local universities, 17 drawn from local NGOs, 19 recruited from local communities, and 1 staff member from local government.

To increase the technical skill levels and effectiveness of law enforcement staff, we conducted a major training course for 31 participants (drawn from PHKA, local government and collaborating local NGOs) at the end of Year 1, in which expert trainers working for WCS's regional team in Asia conducted a 9-day intensive course at Way Kambas, which aimed to establish effective multi-party patrolling systems, with data recorded using the MIST protocol and entered into a central MIST database as per CITES MIKE requirements. Early in Year 2, we will carry out a similar process for the government and NGO staff who patrol in Bukit Barisan Selatan NP, and then later in Gunung Leuser National Park in Aceh.

- ***Public awareness and information dissemination activities in support of protected areas and elephant conservation (Activity 4.2)***

During this project period we have sought to disseminate awareness and educational material in support of elephant conservation during all appropriate project activities. To date, awareness material disseminated includes: banner posters (on five different themes related to HEC mitigation); a large billboard poster (one unit, related to implementing CITES/MIKE law enforcement monitoring requirements); posters (1000 units, related to HEC mitigation methods); leaflets (1000 units, related to HEC mitigation methods), and T-shirts (50 units, related to implementing CITES/MIKE law enforcement monitoring methods). In addition, the project has been reported in local media on three occasions (newspaper and local radio), and national media on one occasion.

- ***Training in HEC reduction methods provided for villagers in HEC “hotspots” at participatory mini-workshops at the district and site levels (Activity 4.3)***

We have held two one-day workshops near Way Kambas National Park, during which a total of 99 villagers were introduced to the need for elephant conservation and the law relating to wildlife and protected species, and then trained in the simple community-based methods which have been successful in the areas with the highest levels of HEC (Hedges & Gunaryadi 2010; see Table 2).

In addition, we have held small meetings with farmers in affected communities (approximately 200 people in total during seven two-day workshops) to discuss factors such as crop planning and seasonal raiding periods, personal safety and collaborative methods for both deterring elephants from entering crops and ways to safely drive them back into the forest. We have arranged practical demonstrations or visits to Way Kambas to see these community-based HEC mitigation methods in action. Furthermore, we link the problem of elephant raiding to habitat loss and the issue of encroachment so the villagers understand some of the reasons why elephants raid crops.

We are in discussions with the Ministry of Forestry to increase the involvement of WKNP staff in conflict response and control, aided by financial support from the local government. We have presented our results and recommendation to local government in Lampung through a one day workshop in October 2009 (23 participants), and have provided training in alternative livelihoods that can assist in HEC mitigation in Lampung through a three-day workshop in December 2009 (47 participants).

These training activities will be continued in other areas of Sumatra throughout the project, and will be supplemented shortly with the addition of the Indonesian language training and resource manual that is being developed under Activity 2.1 (discussed above).

- ***Indonesian student attends UK university (Activity 4.4)***

This activity is planned for Year 2. A candidate has been selected and the process of application has begun.

- ***Sumatran Elephant Management Plan written in collaboration with PHKA and other in-country partners (Activity 4.5).***

This activity is not due to be completed until the third year of the project, when all data from the project are available. The Range-wide Priority-setting workshop (detailed under Activity 1.1) has provided a basis for the development of a management plan for Sumatran elephants, and this will be updated as results of the results of further survey work, HEC, law enforcement, and conflict mitigation work become available.

3.2 Progress towards Project Outputs

- Survey data on elephant distribution and status and HEC levels produced and disseminated (including to the CITES/MIKE Secretariat).***

This output seeks to generate baseline data on elephant population distribution and status for all Sumatran provinces by end of Year 3. We are making good progress towards this objective, as described in detail above in Section 3.1, Activity 1.1 and 1.2.

- Human–elephant conflict reduced and farmers’ livelihoods improved.***

This output seeks to create reduction plans and guidance material produced for 20 HEC “hotspots” by end of Year 2 and then extended to 30 by end of Year 3. At each site we are seeking significant reductions in measured crop raiding rates and improved harvest rates at the majority of the HEC “hotspots”. We are moving towards this target, having already identified 18 conflict hotspots in the southern Sumatran provinces of Lampung,

South Sumatra, Jambi, Riau, and Bengkulu (Activity 1,2); having refined our approaches to promoting safe conflict mitigation (Activity 2.2), and having almost completed the production of guidance and education material to promote safe conflict mitigation more widely (Activity 2.1). In the coming year, HEC mitigation work will be rolled out to these conflict hotspots, while the field survey will continue to identify further priority areas in central and northern Sumatra.

iii. *Illegal killing and capture of elephants and other illegal activities (especially encroachment) in key areas reduced.*

By the end of Year 3, the project seeks a significant reduction in elephant deaths due to illegal activities, a significant reduction in illegal captures of elephants, and a significant reduction in indices of illegal activities in key elephant areas. To date we have concentrated on collecting baseline data that will allow us to assess the impact of our measures to reduce illegal killing and capture of elephants. In areas of southern Sumatra in which we have concentrated over Year 1 we have received no credible evidence of either the illegal killing of wild elephants, or their capture. We have however received reports of illegally traded ivory (of unknown origin), and there has been one incident of captive elephants illegally killed. We will seek to investigate both during Year 2.

iv. *Improved capacity for cooperative management of Sumatran elephant conservation and HEC reduction by the Indonesian Government and local NGOs.*

By the end of Year 3, we intend that at least 150 PHKA staff will have been trained in technical aspects of elephant survey design and implementation, at least 600 villagers from 30 HEC “hotspot” villages trained in sustainable HEC reduction methods, and an Indonesian student will have completed a UK-based MSc program. We have made significant progress towards meeting these targets in Year 1. To date, we have formally trained 31 Indonesian field staff from the Forestry Department, Local Government, and local NGOs in law enforcement and monitoring techniques, and established a plan within Way Kambas National Park to carry out co-ordinated patrolling and to store the information obtained in a central database. We have provided ‘on the job’ training to 65 people drawn from PHKA, local government, local universities, and local NGOs in survey methodologies and have provided HEC mitigation to over 369 participants from affected communities, PHKA, and local government. In total, we have delivered 942 person-training-days in formal training and an un-quantified number in on-the-job training.

3.3 Standard Measures

Progress against Project Standard Outputs Measures is shown below in Table 1. Publications during this reporting period are shown in Table 2.

Table 1: Project Standard Output Measures

Code	Description	Total to date (Y1)	Y1 planned	Total planned
2	Number of people to attain Masters qualification (MSc, MPhil etc)	0	0	1
6A	Number of people to receive other forms of education/training (which does not fall into categories 1-5 above)	465	170	520
6B	Number of training weeks to be provided	188 ^x	50	150
7	Number of training materials to be produced for use by host country	9	1	3
8	Number of weeks to be spent by UK project staff on project work in the host country	4	2	6

9	Number of species/habitat management plans (or action plans) to be produced for Governments, public authorities, or other implementing agencies in the host country	0	0	1
11A	Number of papers to be published in peer reviewed journals	1	1	≥3
11B	Number of papers to be submitted to peer reviewed journals	1	1	≥3
12A	Number of computer based databases to be established and handed over to host country	1	1	2
14A	Number of conferences/seminars/ workshops to be organised to present/disseminate findings	12	10	30
14B	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	2	2	≥3
15A	Number of national press releases in host country(ies)	1	0	3
15B	Number of local press releases in host country(ies)	2	0	3
15C	Number of national press releases in UK	0	0	2
17B	Number of dissemination networks to be enhanced/ extended	2	1	3
19A	Number of national radio interviews/features in host country(ies)	0	0	1
19C	Number of local radio interviews/features in host country(ies)	1	0	3
20	Estimated value (£'s) of physical assets to be handed over to host country(ies)	£1,251*	£6,737	£20,329
23	Value of resources raised from other sources (ie in addition to Darwin funding) for project work	£66,429	£53,300	£159,900

^x Person/weeks

* See notes under Section 4, below

Table 2: Publications

Type	Detail	Publishers	Available from	Cost £
Journal:	Hedges, S. & Gunaryadi, D. 2010. Reducing human–elephant conflict: do chillies help deter elephants from entering crop fields? <i>Oryx</i> . 44 (1), pp139–146.	Cambridge University Press	www.cambridge.org and from the authors (who are project staff)	Subscription

3.4 Progress towards the project purpose and outcomes

The project purpose is to identify key elephant populations on Sumatra, assess their status using CITES/MIKE survey methods; protect these key populations from poaching, habitat loss/degradation, and human–elephant conflict (HEC) while improving farmers' livelihoods; and to train Indonesian nationals in HEC mitigation methods. The major project outcomes, and progress made against them, are as follows:

- i. **Map showing all extant elephant populations on Sumatra, with indicators of population size, extent of HEC, and threat level.**

The initial map (based on the desktop exercise, Activity 1.1) has been completed and is included as Appendix 1. As the field survey continues throughout Year 2 and Year 3 this map will be updated.

ii. Majority of villages in HEC “hotspots” report major reduction in levels of HEC.

During this project period conflict mitigation work has been implemented most extensively in southern Sumatra. To date, where HEC methods have been rigorously promoted, local farmers have been successful in safely repelling around 80% of crop raiding attempts (Activity 2.1 & 2.2). In Year 2 and Year 3 we will attempt to replicate this success in conflict ‘hot spots’ identified by the ongoing surveys (Activity 1.1 & 1.2).

iii. Law enforcement reports show reduced rates of illegal killing and habitat encroachment.

Our law enforcement efforts in collaboration with the Indonesian authorities continue to identify, arrest, and prosecute illegal wildlife traders and hunters, and to maintain an unrivalled arrest to prosecution rate. In areas of southern Sumatra in which we have concentrated over Year 1 we have received no credible evidence of either the illegal killing of wild elephants, or their capture.

iv. Large cohort of Indonesian staff trained in CITES/MIKE survey and law enforcement methods, and HEC assessment & mitigation.

We have formally trained 31 Indonesian field staff from the Forestry Department, Local Government, and local NGOs in law enforcement and monitoring techniques, and established a plan within Way Kambas National Park to carry out co-ordinated patrolling and to store the information obtained in a central database. We have provided ‘on the job’ training to 65 people drawn from PHKA, local government, local universities, and local NGOs in survey methodologies. We have provided HEC mitigation training to over 369 participants from affected communities, PHKA, and local government. In total, we have delivered 942 person-training-days in formal training and an un-quantified number in on-the-job training.

v. Sumatran elephant management plan drafted.

This activity is not due to be completed until the third year of the project, when all the data from the project are available. The Range-wide Priority-setting workshop (detailed under Activity 1.1) has provided a basis for the development of a management plan for Sumatran elephants, and will be updated as the results of further survey, law enforcement, and HEC work become available.

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

The project is making solid progress towards its goals to reduce the threats to elephants in Sumatra and to reduce the impact of human–elephant conflict on both elephants and affected farmers, to the benefit of both. During this first year, we have laid a strong foundation on which to build increasing our impact on mitigating human–elephant conflict in particular by identifying conflict hotspots, refining our approach to promoting the mitigation of conflict, and by producing training and education material aimed at local farmers. Rolling out our work to new conflict affected regions will be a focus in Years 2 and 3. In addition, survey work initiated in year 1 will help the Indonesian Government meet its obligations under the CITES MIKE program and forms the first-ever repeat population survey based monitoring program for Southeast Asian elephants – a program that will allow the effect of conservation interventions to be assessed using data on elephant population trend.

4. Monitoring, evaluation, and lessons

Project monitoring is based on the logframe (included as Annex 2). To date this has proved an effective tool to track project progress. Some adaptive management has been required as the implementation of project activities confronts changing local conditions or assumptions. One example is that we requested a budget carryover request, which resulted from a shift in proposed timing of elephant dung DNA-based population surveys (part of activity 1.2), itself resulting from a longer period than anticipated devoted to rapid assessment surveys (needed to identify sites for the more detailed and more costly DNA-based surveys) and a longer than anticipated period identifying a suitable laboratory within Indonesia to conduct the analysis. Both of these factors are now fully addressed and the dung surveys have begun. As a consequence of this change, the objectives, activities, and measurable deliverables from the log-frame remain unchanged, as does the overall budget and the allocation of funds to activities/cost categories. The change simply changes the timing.

The expenditure of funds against the project budget has also been carefully tracked (expenditure to budget is given below in Section 9). While overall expenditure was on target against the predicted budget (as amended by the carryover request), and on target within most account categories (including salaries, travel etc), larger than anticipated variances are apparent in other account categories, such as equipment and supplies. These generally result from an under- or over-estimation of the actual costs in the original budget, for example in equipment, where the cost of equipping field teams to undertake CITES/MIKE approved survey methods was under-estimated, and supplies, where the cost of HEC mitigation assistance was over-estimated. In this latter example, we consider this to be a good thing, in that it effectively means that local affected villagers have been motivated to contribute their own funds to HEC mitigation measures and have shown less reliance on project funding. This in turn will allow us to extend our HEC mitigation measures in Year 2 and Year 3 from that originally planned.

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

Not applicable.

6. Other comments on progress not covered elsewhere

None.

7. Sustainability

Two key elements of sustainability are being addressed by this project. The first is the development of strong linkages between government agencies and NGOs who are working to protect Sumatran elephants and their habitats. By training all of these people in survey work, law enforcement, and mitigation methods we will build a Sumatra-wide base of motivated and skilled field staff who can act together to manage elephant issues and conservation.

The second aspect of sustainability is to demonstrate the use of successful low-cost methods, such as community-led mitigation work, to local governments so that they will not consider using harmful methods such as elephant capture or translocation to deal with HEC, but instead provide funding for community-based local activities. Our work around WKNP has shown that local governments are willing to help fund mitigation scheme when presented with convincing data about their effectiveness.

8. Dissemination

This project has been implemented in close coordination with the Indonesian Department of Forestry. As a result project findings have been disseminated to the key government partner on a continual basis. This includes the findings of the desk-top study of elephant status and distribution in Sumatra and the range-wide priority setting exercise (indeed Indonesian Government staff participated in that study), the formal proceedings of the CITES/MIKE law enforcement training, and general advice on conflict mitigation approaches. The advice on conflict mitigation has also been widely circulated among affected local governments, local villages, and local NGOs. We are now in the process of developing a guidance manual for HEC

mitigation, which has been drafted in the Indonesian language. The manual will be completed in the first half of Year 2 and disseminated widely to conflict affected communities.

9. Project Expenditure

Project expenditure during the reporting period (Defra Financial Year 1 April 2009 to 31 March 2010). See notes under Section 4 above on budget variances. The column 'Budget' is based on the proposal budget, as amended by the accepted Budget Change Request (approved by DEFRA 18th February 2010). All costs are shown in GBP.

Item	Budget	Expenditure	Variance
Rent, rates, heating, overheads etc			
Office costs (incl. postage, telephone, stationery)			
Travel and subsistence			
Printing			
Conferences, seminars, etc			
Capital items/equipment: Project vehicle			
Capital items/equipment: GPS equipment			
Capital items/equipment: Walky-talky			
Capital items/equipment: Digital camera			
Capital items/equipment: Camping equipment			
Capital items/equipment: Notebook computer			
Other: Crop raiding alarm systems construction			
Other: Chilli deterrents			
Other: Watchtowers & maintenance			
Other: Crop raiding noisemakers			
Other: Insurance			
Other: Faecal DNA lab costs			
Other: MIKE Training			
Other: HEC reduction training/demonstration			
Other: LEM trainer			
Salary: Finance Assistant			
Salary: Project Manager (Tyson)			
Salary: Field Coordinators			
Salary: Assistant Field Coordinator			
Salary: GIS Technician			
Salary: Technical Advisor (N. Andayani)			
Salary: Field surveyors/assistants			
Salary: Admin assistant			
Salary: Project executant			
TOTAL			

Annex 1: Report of progress and achievements against Logical Framework for Financial Year: 2008/09

Project summary	Measurable Indicators	Progress Apr 2008 - Mar 2009	Actions 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 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>			
<p>Purpose:</p>			
<p>To identify key elephant populations on Sumatra, assess their status using CITES/MIKE survey methods; protect these key populations from poaching, habitat loss/degradation, and human–elephant conflict (HEC) while improving farmers’ livelihoods; and to train Indonesian nationals in HEC mitigation methods and CITES/MIKE survey methods to help the Government of Indonesia meet its obligations under CITES and the CBD.</p>	<p>a. Map showing all extant elephant populations on Sumatra, with indicators of population size, extent of HEC, and threat level; b. Majority of villages in HEC “hotspots” report major reduction in levels of HEC; Law enforcement reports show reduced rates of illegal killing and habitat encroachment; c. Large cohort of Indonesian staff trained in CITES/MIKE survey and law enforcement methods, and HEC assessment & mitigation; d. Sumatran elephant management plan drafted.</p>	<p>a. The initial map has been completed. This is included as Appendix 1. b. Conflict mitigation work has been implemented most extensively in southern Sumatra. Where HEC methods have been rigorously promoted, local farmers have been successful in safely repelling around 80% of crop raiding attempts. c. Our law enforcement efforts in collaboration with the Indonesian authorities continue to identify, arrest, and prosecute illegal wildlife traders and hunters, and to maintain an unrivalled arrest to prosecution rate. d. In total we have delivered 942 person-training-days in formal training and an un-quantified number in on-the-job training.</p>	<p>a. As the field survey continues through Year 2 and Year 3 this map will be updated. b. In Year 2 and Year 3 we will attempt to replicate this success in conflict ‘hot spots’ identified by the ongoing survey (Activity 1.1 & 1.2). c. Continue to expanding and strengthen the anti-wildlife crime network and its effectiveness. d. We will continue our comprehensive capacity building program throughout Year 2 and Year 3. Focusing in particular on HEC mitigation methods at newly identified priority conflict hotspots.</p>
<p>Output 1.</p>			
<p>Survey data on elephant distribution and status and HEC levels produced and disseminated (including to the CITES/MIKE Secretariat).</p>	<p>a. Baseline data on elephant population distribution and status for all Sumatran provinces available by end of year 3 (ca. 2 provinces per year).</p>	<p>We are making good progress towards this objective, as described in detail below under Activity 1.1 and 1.2.</p>	<p>Field surveys will continue in Year 2 (occupancy, questionnaire, and fecal DNA-based). Further HEC hotspots will be identified and follow-up mitigation work initiated.</p>
<p>Activity 1.1: Desk-based map study to identify key (priority) survey sites for elephant population and HEC assessments.</p>		<p>Completed. Nine priority populations identified, including the two existing CITES MIKE sites (Bukit Barisan Selatan and Way Kambas National Parks).</p>	<p>Field-based checking and revision if/as necessary.</p>

Project summary	Measurable Indicators	Progress Apr 2008 - Mar 2009	Actions planned for next period
Activity 1.2: Deployment of elephant population and HEC survey teams in areas identified under Activity 1.1		Completed rapid assessment surveys (occupancy and questionnaire) in Riau, South Sumatra, and Jambi provinces. Survey team interviewed 1,103 local people during questionnaire survey. 18 conflict hotspots identified and HEC mitigation work began at eight. Intensive fecal DNA based surveys have begun at two priority sites (Bukit Barisan Selatan and Way Kambas National Parks, which are MIKE sites).	Field surveys will continue in Year 2 (occupancy, questionnaire, and fecal DNA-based). Further HEC hotspots will be identified and follow-up mitigation work initiated.
Output 2.			
Human–elephant conflict reduced and farmers’ livelihoods improved.	HEC reduction plans and guidance material produced for 20 HEC “hotspots” by end of year 2, revised and extended to 30 by end yr 3; Significant reduction in measured crop raiding rates and improved harvest rates at the majority of the HEC “hotspots”.	We are moving towards this target, having already identified 18 conflict hotspots in the provinces of Lampung, South Sumatra, Jambi, Riau, and Bengkulu (Activity 1.2); having refined our approaches to promoting safe conflict mitigation (Activity 2.2), and having almost completed the production of guidance and education material to promote safe conflict mitigation more widely (Activity 2.1).	In the coming year HEC mitigation work will be rolled out in the priority conflict hotspots identified to date, while the field survey will continue to identify further priority areas in central and northern Sumatra.
Activity 2.1: HEC reduction plans and guidance handbooks prepared for HEC “hotspots”		We are in the process of developing a guidance manual for HEC mitigation, which has been drafted in the Indonesian language.	The manual will be completed early in Year 2 and disseminated widely to affected communities, national parks, provincial nature conservation agencies, and local government.
Activity 2.2: HEC reduction plans implemented at HEC “hotspots”		We have conducted HEC mitigation work in eight identified HEC hot-spot areas, and have implemented community-led HEC mitigation strategies in two priority areas, including Way Kambas and Bukit Barisan Selatan National Parks.	We will continue to target HEC mitigation work in hot-spot areas, and to develop HEC mitigation strategies for such areas that are also identified priority sites.
Output 3.			
Illegal killing and capture of elephants and other illegal activities (especially encroachment) in key areas reduced.	<ul style="list-style-type: none"> a. Significant reduction in elephant deaths due to illegal activities. b. Significant reduction in illegal captures of elephants. c. Significant reduction in indices of illegal activities in key elephant areas. 	To date we have concentrated on collecting baseline data that will allow us to assess the impact of our measures to reduce illegal killing and capture of elephants. In areas of southern Sumatra in which we have concentrated over Year 1 we have received no credible evidence of either the illegal killing of wild elephants, or their capture. We have however received reports of illegal traded ivory (of unknown origin), and there have been incidents of captive elephants illegally killed. We will seek to investigate both during Year 2.	Continue to expanding and strengthen the anti-wildlife crime network and its effectiveness.

Project summary	Measurable Indicators	Progress Apr 2008 - Mar 2009	Actions planned for next period
Activity 3.1: Law enforcement patrols by PHKA and WCS–IP staff in key/priority sites.		In this period we have provided training to National Park staff, local government staff, and local NGOs in law enforcement patrolling methodologies in one priority site (Way Kambas National Park). This will be followed up shortly by a repeat training in a second priority site (Bukit Barisan Selatan National Park). As part of both initiatives we have instigated measures to monitor the patrolling effort at both sites and to provide follow-up support. These measures are intended to ensure knowledge gained during the training is put to use.	We will continue to promote the adoption of systematic and effective patrolling in key sites across Sumatra. In Year 2 we will focus on Bukit Barisan Selatan and Gunung Leuser National Parks.
Activity 3.2: Deployment of Wildlife Crimes Unit staff throughout Sumatra		Our Wildlife Crime Unit is supporting the work of the Indonesian law enforcement authorities by providing information and advice on the investigation and prosecution of wildlife crime cases. In the last year, this network has result in nine cases involving 15 suspects. One case has already resulted in a successful prosecution for illegal wildlife trading (a case involving a variety of species) and four more cases are still in prosecution. We have received information regarding alleged sale of elephant ivory, one such case led to the arrest of five suspects in Bengkulu. In another incident in August 2009 a captive elephant at Way Kambas was poisoned and the tusks removed. This case is still being investigated.	Continue to expanding and strengthen the anti-wildlife crime network and its effectiveness.
Output 4.			
Improved capacity for cooperative management of Sumatran elephant conservation and HEC reduction by the Indonesian Government and local NGOs.	By end of Year 3: 150 PHKA staff trained in technical aspects of elephant survey design and implementation; 600 villagers from 30 HEC “hotspot” villages trained in sustainable HEC reduction methods; Indonesian student completes UK-based MSc by end of year 3.	To date we have formally trained 31 Indonesian field staff from the Forestry Department, Local Government and local NGOs in law enforcement and monitoring techniques, and established a plan within Way Kambas National Park to carry out co-ordinated patrolling and to store the information obtained in a central database. We have provided ‘on the job’ training to 65 people drawn from PHKA, local government, local universities, and local NGOs in survey methodologies and have provided HEC mitigation to over 369 participants from affected communities, PHKA, and local government. In total, we have delivered 942 person-training-days in formal training and an un-quantified number in on-the-job training.	We will continue our comprehensive capacity building program throughout Year 2 and Year 3. Focusing in particular on HEC mitigation methods at newly identified priority conflict hotspots.
Activity 4.1: Workshops and ‘on-the-job’ training in CITES MIKE approved standard elephant population monitoring methods, HEC assessment and reduction methods, and law enforcement (including related to habitat loss) and law enforcement monitoring (LEM) provided for PHKA staff and newly hired WCS–IP project staff at national and provincial levels.		We have provided on-the-job training to around 65 people in survey methodologies, including 18 staff from PHKA, 10 team members from local universities, 17 drawn from local NGOs, 19 recruited from local communities, and 1 staff member from local government. In March 2010, we provided formal training to 31 participants from PHKA, local government, and collaborating local NGOs in law enforcement effectiveness and patrolling methodologies compliant with CITES MIKE requirements.	We will continue to provide on-the-job training opportunities throughout all project activities. We plan to repeat formal law enforcement monitoring and patrolling training initiatives within two additional priority sites in Year 2.

Project summary	Measurable Indicators	Progress Apr 2008 - Mar 2009	Actions planned for next period
Activity 4.2: Public awareness and information dissemination activities in support of protected areas and elephant conservation.		Awareness material disseminated includes: banner posters (five themes related to HEC mitigation); a large billboard poster (one unit, related to implementing CITES/MIKE law enforcement monitoring requirements); Posters (1000 units, related to HEC mitigation methods); leaflets (1000 units, related to HEC mitigation methods); and T-shirts (50 units, related to implementing CITES/ MIKE law enforcement monitoring). In addition the project has been reported in local media on three occasions (newspaper and local radio), and national media on one occasions.	We will continue to produce and distribute public awareness and educational resources and so seek increased media coverage of the project in the local, national and international media.
Activity 4.3: Training in HEC reduction methods provided for villagers in HEC “hotspots” at participatory mini-workshops at the district and site levels.		We have held two one-day workshops near Way Kambas National Park, during which a total of 99 villagers were introduced to the need for elephant conservation and the law relating to wildlife and protected species. We have held small meetings with farmers in affected communities (approximately 200 people in total during seven, two-day workshops) to discuss factors such as crop planning and seasonal raiding periods, personal safety and collaborative methods for both deterring elephants from entering crops and ways to safely drive them back into the forest. We have arranged practical demonstrations or visits to Way Kambas to see these community-based HEC mitigation methods in action. We have presented our results and recommendation to local government in Lampung through a one day workshop in October 2009 (23 participants), and have provided training in alternative livelihoods that can assist in HEC mitigation in Lampung through a three-day workshop in December 2009 (47 participants).	HEC reduction training activities will be continued in other areas of Sumatra throughout the project, and will be supplemented shortly with the addition of the Indonesian language training and resource manual that is being developed under Activity 2.1.
Activity 4.4: Indonesian student attends UK university		Not implemented until second year. Process of application already begun.	This activity will be completed in Year 2.
Activity 4.5: Sumatran Elephant Management Plan written in collaboration with PHKA and other in-country partners.		This activity is not due to be completed until the third year of the project, when all data from the project are available.	The Range-wide Priority-setting workshop has provided a basis for the development of a management plan for Sumatran elephants and will be updated as results of the results of further survey work, law enforcement, and conflict mitigation work become available.

Annex 2: Project's full current log-frame

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:			
To reduce the threat to Asian elephants in Sumatra from human–elephant conflict, illegal killing, and habitat loss and to build capacity in the agencies responsible for elephant management especially with respect to CITES and CBD.	Reduction in illegal killing and captures, and habitat loss; reduced rates of human death and injury resulting from conflict; reduced crop raiding rates and improved rural livelihoods in conflict areas. Baseline surveys completed at key elephant sites across Sumatra to facilitate future population monitoring.	The project will establish the systems required to monitor elephant populations and assess the short and long term impact of human–elephant conflict and other threats to Sumatra's elephants. Currently no such system exists.	
Purpose:			
To identify key elephant populations on Sumatra, assess their status using CITES/MIKE survey methods; protect these key populations from poaching, habitat loss/degradation, and human–elephant conflict (HEC) while improving farmers' livelihoods; and to train Indonesian nationals in HEC mitigation methods and CITES/MIKE survey methods to help the Government of Indonesia meet its obligations under CITES and the CBD.	<ol style="list-style-type: none"> 1. Map showing all extant elephant populations on Sumatra, with indicators of population size, extent of HEC, and threat level. 2. Majority of villages in HEC "hotspots" report major reduction in levels of HEC. 3. Law enforcement reports show reduced rates of illegal killing and habitat encroachment. 4. Large cohort of Indonesian staff trained in CITES/MIKE survey and law enforcement methods, and HEC assessment & mitigation. 5. Sumatran elephant management plan drafted. 	<ol style="list-style-type: none"> 1-2. Dung count and faecal DNA based capture–recapture surveys; sampling-based HEC incident rate surveys; sampling-based measures of crop harvest rates; questionnaire based surveys in villages; and District Forestry Dept reports. 3. Law enforcement monitoring (LEM) reports, habitat encroachment data forms, and carcass report forms. 4. Reports on workshops; workshop and on the job training participants' evaluation forms. 5. Management plan disseminated 	<ol style="list-style-type: none"> 1. Government policies (especially forestry, agriculture, and law enforcement) remain supportive of species conservation, protected area management, and wildlife crime prevention. 2. Goodwill between PHKA, WCS-IP, and NEZS maintained for project duration.
Outputs:			
1. Survey data on elephant distribution and status and HEC levels produced and disseminated (including to the CITES/MIKE	1. Baseline data on elephant population distribution and status for all Sumatran provinces available by end of year 3 (ca. 2 provinces per year).	1. Site-based and annual survey reports, academic papers in peer-reviewed journals, presentations at national and international	<ol style="list-style-type: none"> 1a. Goodwill between PHKA, WCS-IP, and NEZS maintained for project duration. 1b. Survey teams and PHKA trainees remain available for project duration.

Secretariat).		conferences, plus occasional popular media articles.	
2. Human–elephant conflict reduced and farmers’ livelihoods improved.	2a. HEC reduction plans and guidance material produced for 20 HEC “hotspots” by end of year 2, revised and extended to 30 by end yr 3. 2b. Significant reduction in measured crop raiding rates and improved harvest rates at the majority of the HEC “hotspots”.	2a. Agreements and HEC reduction plans and guidance handbook checked and approved by village and provincial authorities. 2b. Sampling-based surveys of HEC rates and crop harvest yields.	2. Co-operative relations between villagers and NEZS, PHKA, and WCS-IP can be developed and maintained to ensure effective and coordinated HEC reduction teams in all provinces.
3. Illegal killing and capture of elephants and other illegal activities (especially encroachment) in key areas reduced.	3a. Significant reduction in elephant deaths due to illegal activities. 3b. Significant reduction in illegal captures of elephants. 3c. Significant reduction in indices of illegal activities in key elephant areas.	3. Wildlife Crimes Unit reports plus site-based and annual survey reports, academic papers in peer-reviewed journals, presentations at national and international conferences.	3a. PHKA, law enforcement agencies, journalists, and local NGOs remain supportive of Wildlife Crimes Unit. 3b. Goodwill between PHKA, WCS-IP, and NEZS maintained for project duration.
4. Improved capacity for cooperative management of Sumatran elephant conservation and HEC reduction by the Indonesian Government and local NGOs.	4a. 150 PHKA staff trained in technical aspects of elephant survey design and implementation by year 3. 4b. 600 villagers from 30 HEC “hotspot” villages trained in sustainable HEC reduction methods by end of year 3. 4c. Indonesian student completes UK-based MSc by end of year 3.	4a. PHKA training workshop reports; evaluation of trainees’ performance. 4b. Report on, and evaluation of, cooperative village training mini-workshops. 4c. Successful completion of a UK-based MSc by Indonesian student associated with the project.	4a. Adequate numbers of Indonesian government and local NGO trainees are available to form elephant and HEC survey teams. 4b. Adequate numbers of villagers available and willing to participate in HEC reduction training workshops. 4c. Student performance on MSc course reaches required standard.
Activities:			
1.1	Desk-based map study to identify key (priority) survey sites for elephant population and HEC assessments (Output 1), following training under Activity 1.1.		
1.2	Deployment of elephant population and HEC survey teams in areas identified under activity 2.1 (Output 1).		
2.1	HEC reduction plans and guidance handbooks prepared for HEC “hotspots” (Output 2).		
2.2	HEC reduction plans implemented at HEC “hotspots” (Output 2), following training under Activity 1.2.		
3.1	Law enforcement patrols by PHKA and WCS–IP staff in key/priority sites (Output 3), following training under Activity 1.1.		
3.2	Deployment of Wildlife Crimes Unit staff throughout Sumatra (Output 3), following training under Activity 1.1.		
4.1	Workshops and ‘on-the-job’ training in CITES MIKE approved standard elephant population monitoring methods, HEC assessment and reduction methods, and law enforcement (including related to habitat loss) and law enforcement monitoring (LEM) provided for PHKA staff and newly hired WCS–IP project staff at national and provincial levels (Output 4).		
4.2	Public awareness and information dissemination activities in support of protected areas and elephant conservation.		
4.3	Training in HEC reduction methods provided for villagers in HEC “hotspots” at participatory mini-workshops at the district and site levels (Output 4).		
4.4	Indonesian student attends UK university (Output 4).		
4.5	Sumatran Elephant Management Plan written in collaboration with PHKA and other in-country partners.		

Monitoring activities:

1. Dung count and faecal DNA based capture–recapture population surveys to provide baseline data against which all interventions can be assessed.
2. Remote sensing based monitoring of elephant habitat.
3. Sampling-based HEC incident rate surveys, sampling-based measures of crop harvest rates, questionnaire based surveys in villages, and District Forestry Dept reports against which HEC reduction interventions can be assessed.
4. Compilation of law enforcement monitoring reports, habitat encroachment data forms, and carcass report forms.
5. Workshop and ‘on-the-job’ training participants’ evaluation forms to allow us to monitor progress with our training and capacity-building aims.

Annex 3: Onwards – supplementary material (optional but encouraged as evidence of project achievement)

Appendix 1: Map of priority sites for Asian Elephant conservation in Sumatra (see under Activity 1.1 for further details).

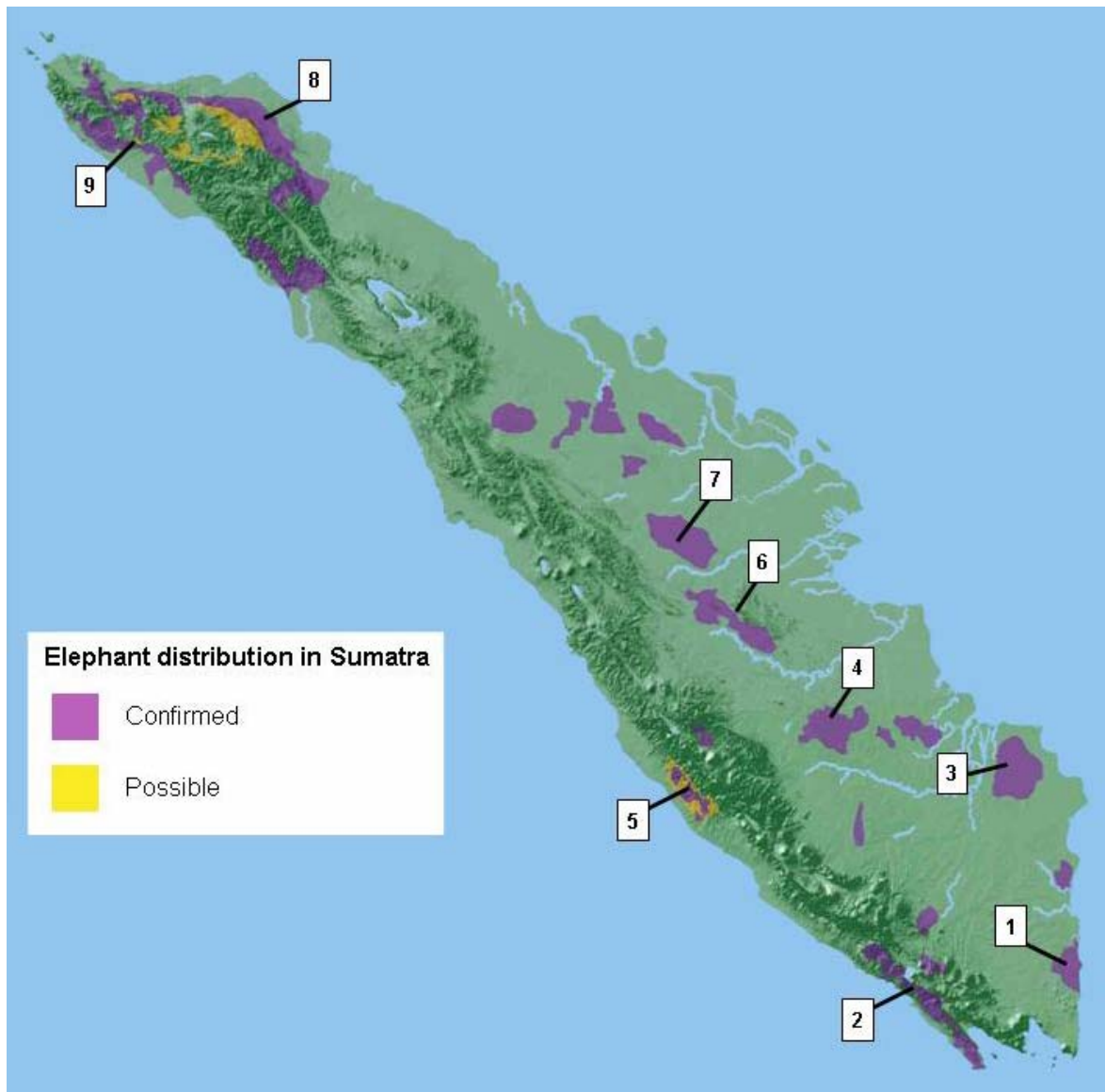


Table legend for map of priority sites for Asian Elephant conservation in Sumatra:

No	Location	Province	Questionnaire By	Year	Occupancy By	Year	Elephant 2008
1	Way Kambas	Lampung	WCS	2010	WCS	2009	Confirmed
2	North -South Barisan Selatan	Lampung	WCS	2002	WCS-RPU	2006-2008	Confirmed
3	Padang Sugihan	South Sumatra	WCS	2009	WCS	2009	Confirmed
4	Air Kepas	South Sumatra	REKI	2008	REKI-ZSL	2006	Confirmed
5	Sungai ipuh	Bengkulu	FFI	2008	FFI	2008	Confirmed
6	Southern Riau	Riau	ZSL-FZS-PKHS	n/a	ZSL-FZS-PKHS	2006-2008	Confirmed
7	South Central Riau	Riau	WWF	2009	WWF	2009	Confirmed
8	Eastern Aceh	Aceh	YLI-WCS	n/a	YLI-WCS	2009	Confirmed
9	Western Aceh	Aceh	FFI	n/a	FFI	2008	Confirmed

Appendix 2: Project staff Simon Hedges and Donny Gunaryadi presented a spoken paper on human–elephant conflict mitigation at the Society for Conservation Biology Annual Conference in Beijing, China, July 2010.

Abstract:

REDUCING HUMAN–ELEPHANT CONFLICT: THE NEED FOR EVIDENCE-BASED APPROACHES

Simon Hedges and Donny Gunaryadi

Species conservation should be based on good science and reliable evidence: too often this is not the case. While there is a growing appreciation of the dangers of making interventions without evidence of their effectiveness, this appreciation is growing too slowly and is failing to have sufficient impact on conservation practice, even for high profile species such as elephants. Human–elephant conflict (HEC) is one of the most serious threats to elephants in Asia and Africa and can cause major economic losses for farmers. It is now widely accepted that effective and sustainable reduction of crop damage by elephants requires small-scale community-based methods for repelling elephants, but there are surprisingly few tests of such methods' effectiveness. From Oct 2005 to May 2007, we tested a community-based crop guarding system using traditional tools at 3 HEC “hotspots” around Way Kambas National Park in Indonesia. In the three tests, elephant raids were repelled on 91% (52 out of 57), 88% (156 out of 178), and 80% (16 out of 20) of occasions. These results suggest that guarding using traditional tools can substantially reduce HEC. In attempting to compare our results to those from other projects in Indonesia and elsewhere, we were hindered by an apparent lack of evidence and we call for better reporting of what works, and what does not, so that best practice methods can be identified more readily and unsuccessful or unsustainable methods are not continually promoted.

Keywords: Mammal Conservation, Sustainable agriculture, Ecosystem / conservation area management

Checklist for submission

	Check
Is the report less than 5MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	yes
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Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	yes
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	no
Have you involved your partners in preparation of the report and named the main contributors	yes
Have you completed the Project Expenditure table fully?	yes
Do not include claim forms or other communications with this report.	