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Abstract: Only a few of the protected areas in Lao PDR are large enough to contain habitat and prey to maintain viable populations of tigers. This project is centered in the Nam Et Phou Louey (NEPL) National Protected Area (NPA), the second largest protected area (4200 km²) in the country, which is believed to have an internationally important tiger population. Our GIS analysis of the site indicates that the NPA spans three provinces and six districts and encompasses about 103 villages (Figure 1). The NPA has reported a relatively high incidence of wildlife attacks, presumed to be tiger, on domestic livestock in villages within the protected area. With this project, we are following up on the recommendations of early WCS surveys in the NPA in 1998 to work with district staff and villagers to reduce domestic livestock predation by wildlife. NEPL NPA is the site of an IUCN Integrated Conservation and Development Project that aims to address both poverty alleviation and wildlife conservation. They have a critical need for accurate data on tiger and prey populations and on tiger depredation of domestic livestock in order to develop realistic wildlife management strategies. This purpose of this project, funded by the National Fish and Wildlife Foundation Exxon/Mobil Save the Tiger Fund (NFWF/STF), is to assess the status of tigers and prey as well as incidents of large carnivore depredation of livestock in the NEPL NPA. The objectives of the project include: 1. Gather baseline data on the status of tigers and prey; 2. Strengthen the long term monitoring program of tiger and prey in the Nam Et Phou Louey NPA; 3. Train provincial and district field staff to gather data on incidents of livestock depredation while exploring the utility of testing a pilot compensation scheme; and, 4. Improve response of provincial and district field staff to incidents of tiger depredation of domestic livestock in villages around the NEPL NPA. During the first six months of the project (please see previous report submitted to NFWF/STF), the Lao Program team worked with Drs. Margaret Kinnaird and Tim O'Brien of the WCS Indonesia program to hammer out the experimental design of the field surveys in Lao; identified the five sites to be sampled for tigers within Nam Et Phou Louey; arranged for the Lao survey team leaders to receive the necessary training in tiger ecology and camera trapping methods; and began the process of collecting data on the history of large carnivore depredation of livestock. This report details accomplishments during the second six months of the project, and represents the final report on this first year of the project.

**Survey, Assessment and Conservation
of the Indochinese Tiger (*Panthera tigris corbetti*)
in Lao PDR – Year I**

Final Report
August 2003

A report to the
National Fish and Wildlife Foundation Save the Tiger Fund

From the
Wildlife Conservation Society

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Mr. Kahmphui Senemanyphanh Huamouang District
Mr. Khamphane Souvanphone Viengthong District
Mr. Anong Uthaiheuang Xam Nua District
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INTRODUCTION

Only a few of the protected areas in Lao PDR are large enough to contain habitat and prey to maintain viable populations of tigers. This project is centered in the Nam Et Phou Louey (NEPL) National Protected Area (NPA), the second largest protected area (4200 km²) in the country, which is believed to have an internationally important tiger population. Our GIS analysis of the site indicates that the NPA spans three provinces and six districts and encompasses about 103 villages (Figure 1). The NPA has reported a relatively high incidence of wildlife attacks, presumed to be tiger, on domestic livestock in villages within the protected area. With this project, we are following up on the recommendations of early WCS surveys in the NPA in 1998 to work with district staff and villagers to reduce domestic livestock predation by wildlife. NEPL NPA is the site of an IUCN Integrated Conservation and Development Project that aims to address both poverty alleviation and wildlife conservation. They have a critical need for accurate data on tiger and prey populations and on tiger depredation of domestic livestock in order to develop realistic wildlife management strategies.

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RESULTS

Objective 1: To gather baseline data on the status of tigers and prey.

Activity 1a. Train and equip a Lao field survey team

In January, our Lao field survey team leaders (Chanthavy Vongkhamheng and two Nam Et Phou Louey protected area staff) attended a five-day training course in tiger ecology and camera trapping methods in Thailand with Dr. Tony Lynam. In February, our field research equipment (camera traps, GPS, compasses, and camping equipment) arrived in Laos and was inventoried. We also made our final preparations for the field survey training and first field sampling session.

In early March, Arlyne and Chanthavy led a seven-day training course in Nam Et Phou Louey NPA for the field survey team, which included 10 men from villages in the NPA and two Lao military officers. The training covered tiger ecology, GPS and map reading techniques, field survey design, camera trap use, and data form accuracy to record camera trapping and vegetation / human use assessment at camera trap sites. Tiger survey team trainers from the WCS Thailand program, Mr. Thongbai and Mr. Pawing, led the camera trap training section of the course.

Activity 1b. Intensive sampling of Block 1 on Phou Louey mountain

Phou Louey (Phou = mountain) is the highest peak in the protected area (2257 m. a.s.l.) (Figure 1). Although extremely rugged terrain, we chose to sample this area first because it was familiar to many of the new field survey members, had held tiger sign in the past, and was believed to be an area rich in large mammals. From March 10-30 (21 days), the field survey team deployed 49 cameras (1 camera failed to operate) at 25 locations in a 100 km² sampling block on Phou Louey. Cameras (1 pair, with the exception of one location) were randomly deployed in each 4 km² block of the 100 km² sampling area (Figure 2), using camera trapping site selection methods similar to that used by WCS tiger surveys in Sumatra (O'Brien, et. al., 2003). Cameras were collected over a nine-day period at the end of April. The cameras operated 24 hours per day for an average of 29 days per camera, and a total of 1,425 trap days. During this period, we photographed two individual tigers (see attached photos) with an average of 356 trap days per tiger photo (four tiger photos taken).

In addition to tigers, our camera trapping results included an impressive array of 16 species of carnivores (Table 1). Leopards were the most common carnivore, found at 44% of trap locations. Eight of the carnivores were the first documented records (based on a photo or visual sighting) for the species in the protected area. Six of the species are little known in Lao PDR. There have been few recent records of back-striped weasel, *Mustela strigidorsa* or spotted linsang, *Prionodon pardicolor*, and no recent field sightings of Owston's civet, *Hemigalus owstoni* in the country (Duckworth, et. al. 1999; Duckworth, 1997). Although marbled cat, *Pardofelis marmorata* is not well known and listed as globally data deficient, it is notable that it was recorded at 24% of trap locations (n=25). The presence of hog badger, *Arctonyx collaris* at 40% of trap locations suggests that this species is relatively common in the sampling area despite being listed as little known in most locations in Lao PDR.

Ungulates known to occur in Nam Et Phou Louey Protected Area that are likely tiger prey species (sambar deer, *Cervus unicolor*; gaur, *Bos gaurus*; southern serow, *Naemohedus sumatraensis*; and wild pig, *Sus scrofa*) were found in relatively low numbers (0-3 trap locations). Other smaller prey items, macaques, *Macaca sp.* and muntjacs, *Muntiacus sp.*, were distributed more widely (9-14 trap locations). This first camera trapping sample provides preliminary evidence that a lack of large prey items may underpin the reported problem of large carnivore depredation of livestock in the

protected area. Our earlier GIS analysis indicated that two villages located only 10 km. east of the sampling block report having 200-300 head of large livestock in 2001 that are released to graze in the protected area during the monsoon season (Figure 2). In September, we will analyse this further when we map the locations of village reports of large carnivore depredation of livestock in the six districts of the NPA over the last ten years, data which was collected by our district depredation response teams from May-July. The Department of Forestry has invited us to give a seminar on our preliminary findings in Block 1 in September.

Activity 1c. Data entry

Camera trap photos: In July and August, we entered all camera trap photos from Block 1 into our tiger survey Access database. We recorded information on site, camera number, film number, GPS location, date and time camera set, date and time camera retrieved, to calculate total trap nights. For each roll of film, we recorded frame number, frame date, frame time, and frame object/s.

Vegetation and human use: We are now entering and analysing vegetation and human use data collected within a 10-meter radius of each camera trap location. The data includes stem count of trees greater than or equal to 10 cm dbh, stem count of saplings less than 10 cm dbh, canopy cover (measured with a densiometer), horizontal understory cover (measured with a 16 m² understory sheet), presence / absence of rattan and bamboo, and characteristics of understory, ground cover and disturbance based on Webb, et. al. (1976). We intend to use these measurements to group camera locations by common habitat features, using principle components analysis to describe the feature of each habitat class. The results will be used to examine relative abundance of tigers and their prey by habitat class.

Activity 1d. Pre-survey of next sampling blocks: Phou Phasiphou and Phou Jae

In June and July, five members of our field survey team and two military officers conducted preliminary surveys in two sampling blocks to disarm large mammal explosive traps. While setting cameras in March inside sampling block 1 on the north side of Phou Louey mountain, we found three trip wire explosive traps set for killing large mammals. Villagers and government staff said traps are opportunistically set by some villagers to collect tiger and gaur bones that can be traded to Vietnamese buyers. They reported that poaching has increased since 2002 when the IUCN ICDP project in the NPA closed due to lack of donor funding. Since these explosive traps pose a threat to the safety of our field survey team, we have worked with local authorities and the military to eliminate this problem before setting out cameras again in October at the end of the monsoon season.

Phou Phasiphou is the block in the northwest of our study area (Figure 3). The area is a high elevation grassland that is now located outside of the NPA but has been recommended by the province for inclusion in the NPA because of the good population of guar and other large ungulates. Phou Jae is in the northeast of the NPA. This is a rugged area and difficult to access but it holds the last remaining population of Asian elephant in the NPA and previously had reliable records of rhino. We believe it may still be an important area for many large mammals, including tiger.

Objective 2: To strengthen the long term monitoring program of tiger and prey in the Nam Et Phou Louey NPA

We will begin the long term monitoring program at the end of the second year of our pilot tiger project in NEPL NBCA, after we have the results of the tiger and prey surveys that we are conducting in years one and two.

Objective 3: To train provincial and district field staff to gather data on incidents of livestock depredation while exploring the utility of testing a pilot compensation scheme

Activity 3a. Train six district depredation response teams to collect data large carnivore depredation of livestock in the NEPL NPA

In April, Arlyne and Chanthavy trained staff from six District Forestry offices in the NPA in response to new reports of large carnivore depredation of livestock. At this phase in the project, the main objective of the response teams is to gather data on incidents of livestock depredation that can be used to understand depredation problems and investigate the utility of a compensation scheme.

In the the training, officers were taught to use a standardized data form, GPS, and vegetation sampling equipment to record the farmer's name, husbandry methods, and number of livestock owned; age, sex, and size of livestock killed; and approximate time of kill (if known). At the kill site, officers will record the kill location and distance from village; habitat type, understory density, and distance from water or open grassland (factors found to be a predictor of large carnivore kills by Karanth and Sunquist (2000)). If the kill is still visible, officers will record distance of drag, size and location of puncture marks on neck or nape, size of carnivore tracks or scats, and make a plaster cast of the tracks if possible.

We also reviewed the standardized data form that officers are using to collect historic data on large carnivore depredation in villages in their district that have reported loss of livestock over the last ten years. Using this form, officers collect information from farmers who have lost livestock to large carnivores, recording location of the kill as well as distance from the village, the year and month of the kill, the species, sex and age of the livestock lost, the evidence used to confirm the identity of the predator, the number of tiger killed in response to livestock loss, the authority who gave approval to kill the tiger, and methods used to do so.

After the classroom training, we field tested the data collection methods with the district officers at Ban Sanom village in the NPA, a community that had recently reported livestock lost to large carnivores. In the village, we saw a small buffalo that had survived one of the attacks with puncture marks on the neck. We simulated a kill site and practiced the current depredation data collection. We met with village leaders and farmers and completed the historic depredation form recording depredation events over the last ten years in the village.

Activity 3b. Collect information on large carnivore depredation of livestock in NEPL NPA over the last ten years

From May to July, district depredation response teams completed collection of information on large carnivore depredation of livestock over the last ten years in 33 villages in six districts (Viengthong, 11; Viengkham, 5; Et, 5; Phonexai,5; Xam Neua,4; Huamouang, 3) . In July and August, Mr. Phimphet, the NEPL NPA coordinator of the depredation response teams, collected the completed forms and entered the data into Excel spreadsheets for analysis. We will conduct the analysis and summarise results in September.

Objective 4: To improve the response of provincial and district field staff to incidents of tiger depredation of domestic livestock in villages around the NEPL NPA

Activity 4a. Respond to new incidents of tiger depredation of domestic livestock.

Since the training for depredation response teams in April, there has been one report of tiger depredation in Viengthong district. Mr. Khamphan, the Viengthong district officer responded to the incident and completed the current depredation dataform with the farmer who lost the livestock.

Other Activities

- Coordinated monthly meetings with Mr. Phuvong, chief of the Nam Et-Phou Louey National Protected Area to review workplan, budget, and financial reports.
- Chanthavy, Arlyne, and Mike attended and presented papers at annual meeting of the Society for Conservation Biology in Duluth, Minnesota in June 2003. Chanthavy presented a poster on his MSc thesis, "Participatory biodiversity monitoring in the Nam Et-Phou Louey National Protected Area, Lao PDR."
- Arlyne and Chanthavy met with Mr. Phuvong on August 8, 2003 to review field team pre-survey and district depredation response team progress and prepare a workplan for the next quarter.
- From August 25-30, 2003, Chanthavy met with Mr. Phuvong and Mr. Phimphet in NEPL NPA to check and compile data collected by six district depredation response teams.

Schedule of activities to be completed in next 12 months

Activities to Complete	Time Frame
Tiger, Prey and Habitat surveys	
Complete analysis of Block 1 data; Prepare equipment and materials for field surveys	September 2003
Sample Block 2; data entry	October-November 2003
Sample Block 3; data entry	December 2003-January 2004
Sample Block 4; data entry	February-March 2004
Sample Block 5; data entry	April – May 2004

Data analysis and write up of results	June-August 2004
Tiger Depredation Assessment and Response	
Analysis of historic depredation data	September 2003
Ongoing response to new depredation events	September 2003-August 2004
Preliminary workshop with Depredation Working Group to review results of historic depredation study	October 2003
Workshop with Depredation Working Group to review depredation results and camera trapping results to design pilot compensation scheme	June 2004

Problems that threaten the success of the project

1. Delays in funding at the start of the project delayed equipment purchase until February, late in the dry season of Year 1 of this project. Consequently, we were only able to get the field survey teams trained and one sampling block surveyed before the start of the monsoon season in June. Therefore, Year 2 will be focused on completing the sampling of the remaining four blocks.
2. Given the rugged geographic terrain of the NPA, it took one week longer than expected (21 days rather than 14) to get cameras set up in the first sampling block. Therefore, our budget for field surveys was greater than expected. Future sampling sites will be equally as rugged as the first sampling block, but our field survey team is now more experienced and should be able to shorten the set up period.
3. The presence of explosive traps for killing large mammals in the NPA is a major concern to the safety of the field survey team. To deal with this, we have held meetings with local authorities and the military. Some field survey team leaders and the military are doing pre-surveys with villagers in sampling sites to disarm explosive traps before the remainder of the survey team follows to deploy cameras.
4. Over the past four months, there have been sporadic insurgency attacks on buses along paved roads in northern Laos that lead from Vientiane to the Nam Et Phou Louey NPA. This has restricted us to plane travel with supplies from the capitol to provincial airstrips closer to the field site. At this point, these attacks have not stopped our access to the field site or delayed implementation of fieldwork.

Conclusions

During the first year of the Lao PDR pilot tiger survey assessment project, the team successfully laid the project's foundation, through careful planning with other WCS scientists and training of national staff. With NFWF/STF funding, they trained 22 national project staff and government counterparts to conduct tiger and prey surveys; initiated the first systematic research on tiger depredation of livestock in the country; identified two individual tigers with their newly designed and implemented field sampling protocol; and met with high-level authorities at the provincial, district, and national levels to discuss tiger status and management issues. As this is the first government-sanctioned tiger conservation effort in Lao, it is critical that the second and final year of this discovery phase of the project be completed in order to move on to the ultimate conservation recovery goals of the program. The project team looks forward to continuing the project in the year ahead.

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Arlyne Johnson and Chanthavy Vongkhamheng training at Nam Et Phou Louey
Credit: Arlyne Johnson/WCS



Chanthavy explaining about GPS at the Nam Et Phou Louey training
Credit: Arlyne Johnson/WCS



Chanthavy posed while explaining on the map
Credit: Arlyne Johnson/WCS



Chanthavy and Phothong installing the camera trap.
Credit: Chanthavy Vongkhamheng/WCS



Arlyne and Chanthavy demonstrating mapping at the NEPL training – March 2003
Credit: Arlyne Johnson/WCS



Arlyne training the field survey team in mapping at NEPL – March 2003
Credit: Chanthavy Vongkhamheng/WCS



Marbled cats photographed in NEPL Block 1. The marbled cat is quite rare and very little is known about it throughout its range.

Credit: WCS Lao Program



Owston's palm civet photographed in Block 1 of NEPL. This is the first live record of this species in Lao PDR; all other records are from dead market animals.

Credit: WCS Lao Program



The first of two tigers recorded in Block 1 sampling area of NEPL – March-April 2003.
Credit: WCS Lao Program



The second of two tigers recorded in Block 1 of NEPL – March-April 2003.
Credit: WCS Lao Program



Survey team posed before entering the forest
Credit: Chanthavy Vongkhamheng/WCS



Survey team posed inside the forest
Credit: Chanthavy Vongkhamheng/WCS



NEPL field training by Chanthavy.



More field training at NEPL by Chanthavy



Collecting deprecation data in village
Credit: Arlyne Johnson/WCS



Depredation team training

Credit: Arlyne Johnson/WCS



Depredation team training II
Credit: Arlyne Johnson/WCS

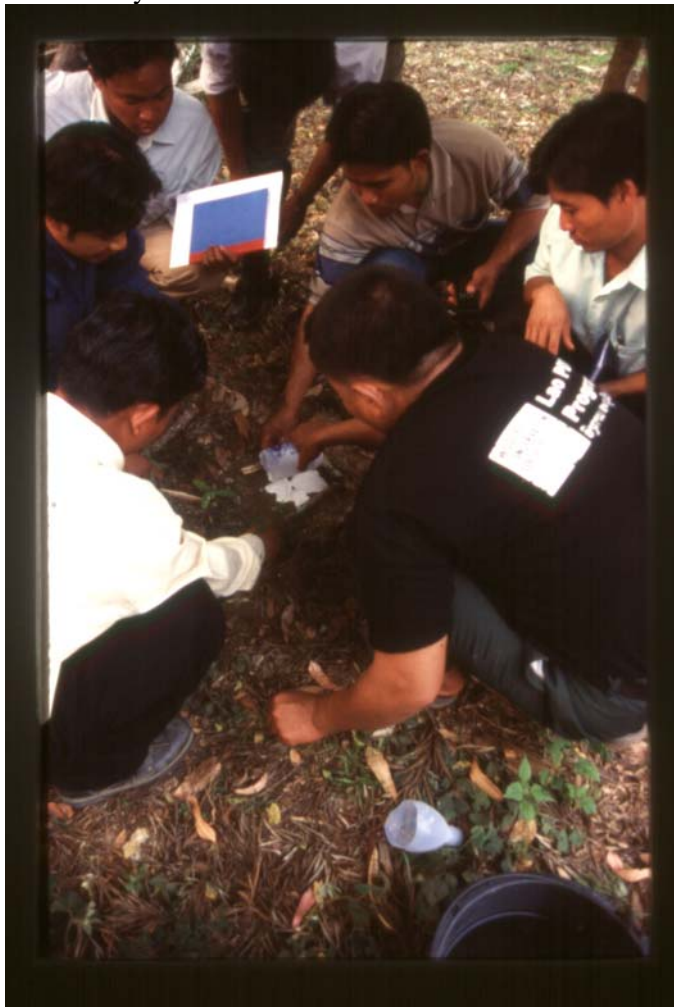


Figure 1. Nam Et Phou Louey National Protected Area spans three provinces and six districts in Lao PDR.

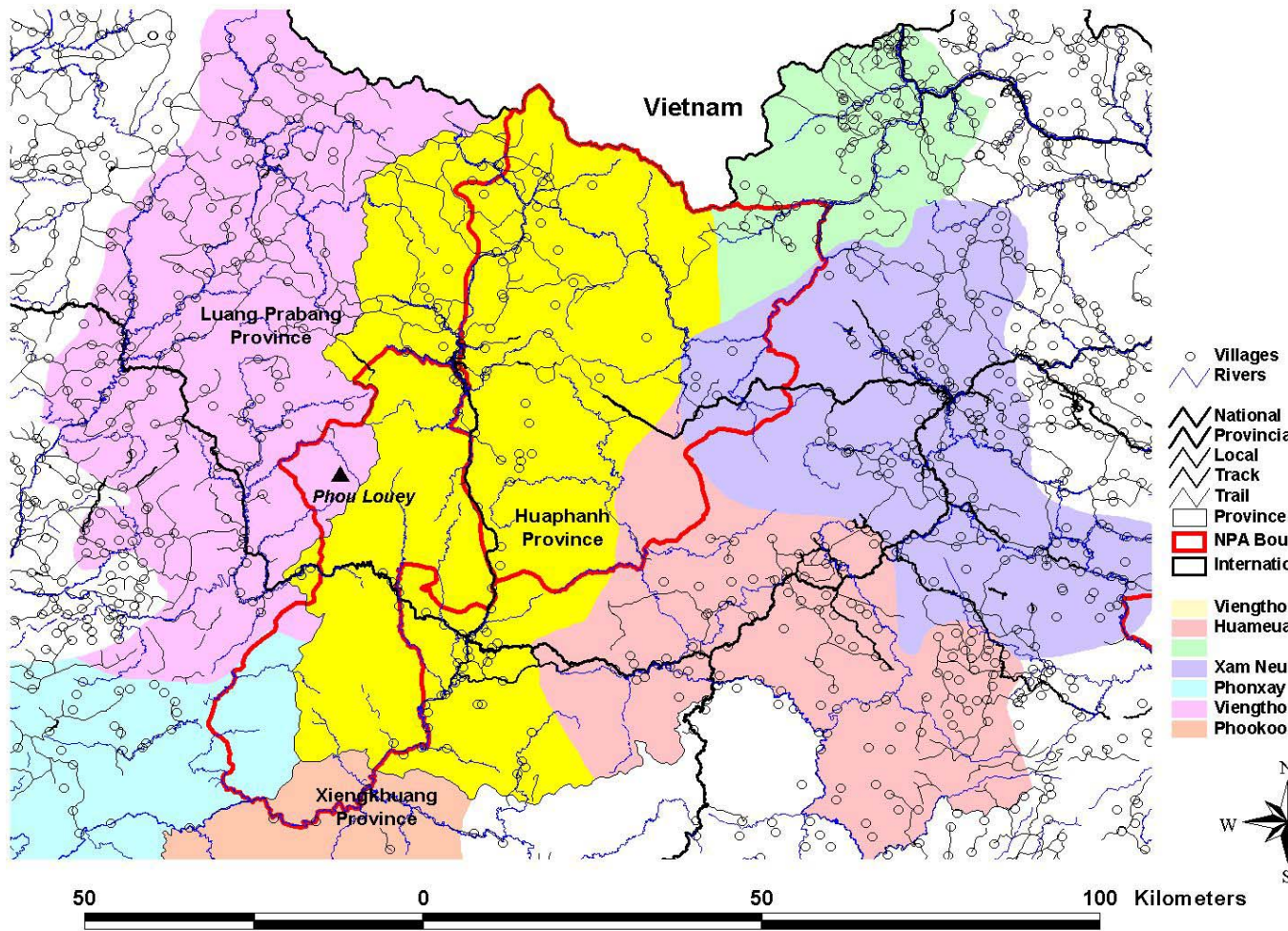


Figure 2. Location of Phou Louey sampling Block 1 in the Nam Et Phou Louey NPA, Lao PDR.

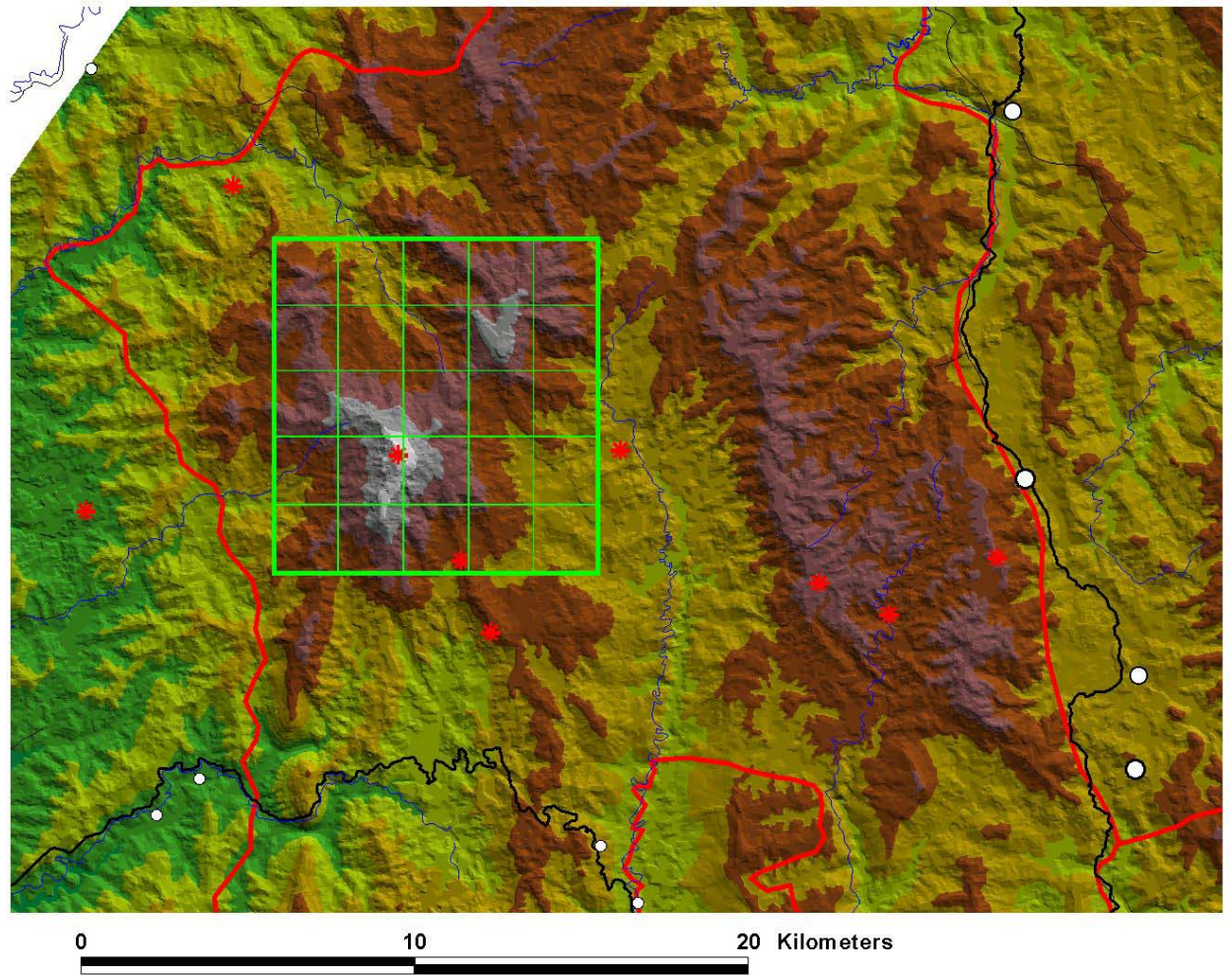
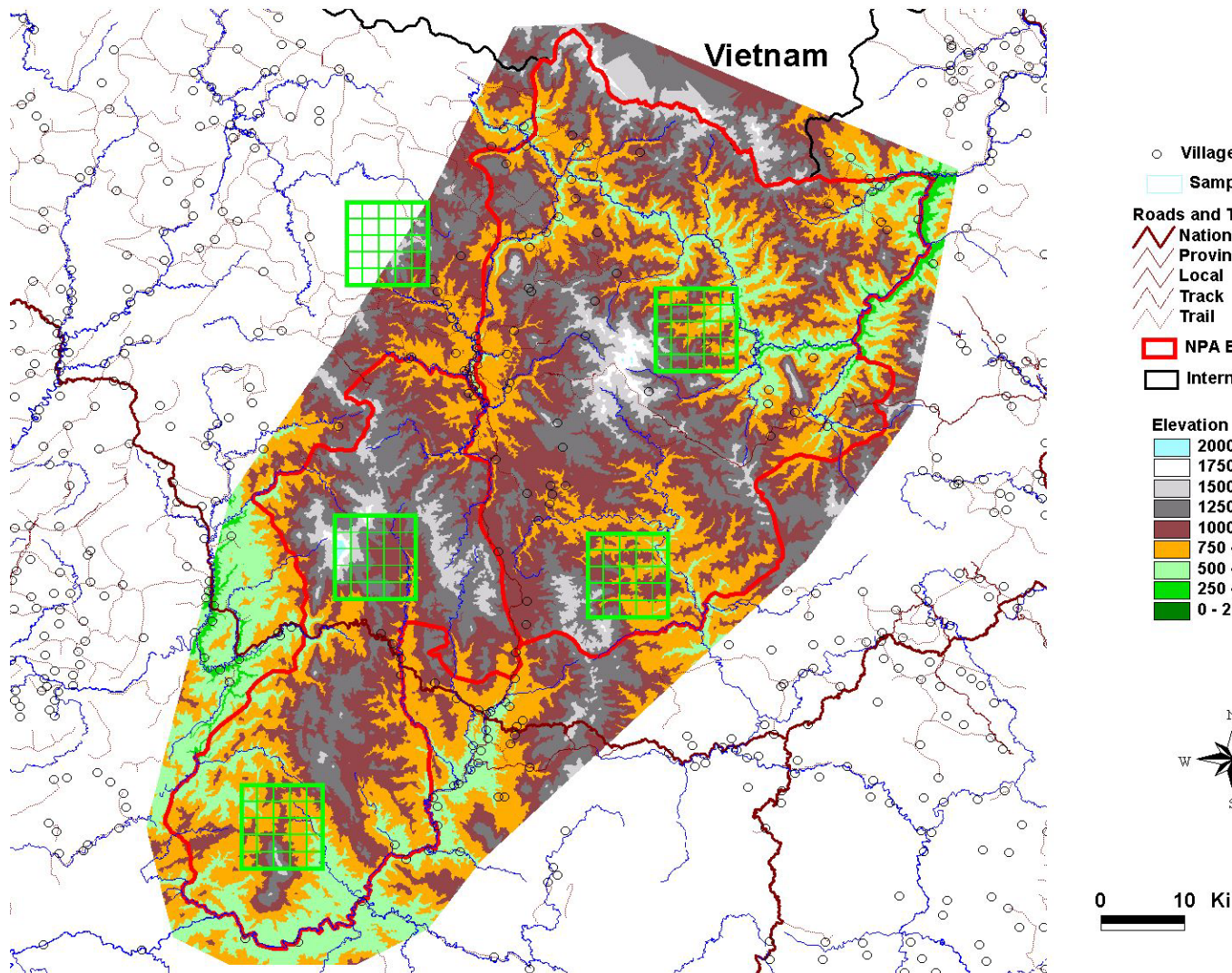


Figure 3. Five sampling blocks in the Nam Et Phou Louey NPA. Phou Phasiphou is located in the far northwest and Phou Jae in the far northeast.





Mr. Rot Bunthoeun, a new member of the tiger team, conducting the 2nd hunter interview that was designed to determine the feasibility of hunters being hired as wildlife rangers.



Mr. Omalis reviewing the names of large mammals using the 36 species photo album.



A hunter, an interpreter who is knowledgeable of the local area and Mr. Sin Polin, head of the Preah Vihear TCO demarcate the hunters “home range” (the area he normally uses for hunting).



Mr. Kry Masphal, head of the Mundulkari TCO interviewing a local hunter.



Sun Hean leading the October training workshop. The participants included the 6 member tiger team, the 3 provincial officers who joined the project and are stationed at the 3 TCOs, 2 members of the USFWS elephant project.

Nam Phon, second from the right, is Peter Cutter's assistant. When they are in the field Pete and Nam Phon each lead a survey team of rangers. When they arrive at one of the 5 northern protected areas in the Western Forest Complex, the chief of the protected area assigns a team of rangers to work with him. Here Nam Phon is briefing a group of rangers on her team. Pete has already participated in a series of training workshops so when he is assigned a team of rangers he usually already has work with some of them.



This adult female gaur that was killed by a tiger. Recent research by has shown that near Kao Nang Rum Research Station banteng is the major prey in the diet of tigers.



Peter Cutter training rangers in map reading and UTM coordinate system.



The Royal Forest Department occasionally provides logistical help. This helicopter flight helped to lay out a survey route in Huai Kha Khaeng Wildlife Sanctuary.



Peter Cutter takes a plaster cast of a tiger track to use as a teaching tool in the ranger workshops conducted as a part of RFDse Western Forest Project.



Peter and his team spent the night camping in the mouth of a cave in Thung Yai Wildlife Sanctuary.



A ranger showing the tiger field team the remains of a poachers camp.



Peter Cutter conducting an interview with Mong villagers in Unpang Wildlife Sanctuary.



An old left rear track of a tiger. Peter Cutter measures and takes a GPS location of all sign encountered on field surveys.



A camera trap photo of banteng taken in bamboo forest cover.

