



Tiger Surveys in Northeastern Cambodia: Training and Initial Survey

Submitted to:

National Fish and Wildlife Foundation (NFWF)

WWF Conservation Program in Cambodia

Phnom Penh, Cambodia

October 1999

I. Executive Summary

Seven government and NGO representatives from Cambodia participated in a training course on Tiger Survey Techniques in May 1999 held at Kao Yai National Park, Thailand. The course was organized as a collaborative effort between the World Wide Fund for Nature (WWF) and the Wildlife Conservation Society (WCS) and funded in-part by the National Fish and Wildlife Foundation (NFWF) based in the United States. The training course was followed by an initial two-week survey for tiger presence in Virachey National Park, Cambodia. This initial survey allowed the Cambodian participants to apply their newly acquired-skills while receiving follow-up, on-the-job training from the workshop instructors.

During this survey, 11 camera traps were set in the area of Phnom Veal Thom, in the center of Virachey National Park, in northeastern Cambodia.¹ The cameras were collected after a period of 45 days and the film was processed. During the final week of July, the findings of the survey were discussed and the results were shared with senior government officials in the Ministry of Environment (MoE) and the Ministry of Agriculture, Forests and Fisheries (MoAFF). While the photographs did not reveal the presence of tiger in the survey area at that time, 18 animal species were identified, including Leopard, Clouded Leopard, Malaysian Sun Bear, and Sambar Deer.

The training course and the follow-up survey were extremely important for the future of conservation work in Cambodia. The Cambodian participants in the training course were able to develop a theoretical understanding of the ecology of tigers and the factors that threatened their survival while gaining practical skills in survey techniques. As the participants came from field-level and central-level postings within two separate ministries, this knowledge is spread widely rather than being housed within a single operational unit. In addition, the participants were all mid-level officials with a background in training and a fair amount of management responsibility within their respective units. This provides a foundation for subsequent follow-up training courses that can be conducted in Cambodia, in the Khmer language, specifically targeting junior staff members. Furthermore, by conducting this survey within Virachey National Park, Cambodia's largest protected area and one in which WWF is actively supporting other conservation activities of the government, important information was provided that will lead to better management decision-making. Finally, the training-cum-survey generated a great deal of interest in the local press and within the upper echelons of central government. This demonstrates an emerging political will that will be instrumental to advancing conservation work in the country.

WWF, WCS, and Royal Government of Cambodia (RGC) line ministries are pleased with the progress of this initial activity and anticipate building on the experience to develop a national conservation strategy for tiger in Cambodia over the next few years.

II. Introduction

Lately, the conservation status of rare and endangered species such as Tiger, Leopard, Bear, Banteng, Gaur, and Elephant (not to mention the Kouprey) have received an increasing amount of attention across a broad spectrum of society. In mainland Southeast Asia, the status of the region's large mammals, and as with much of the rest of its biological diversity, is unknown. Historical information and recent reports suggest that populations of large mammals are still present in significant numbers. However, these populations are thought to be declining due to hunting pressures and current forest management practice. Before taking steps toward

¹ Please refer to Appendix I

enhancing conservation systems, responsible officials should be aware of the population size and, more importantly population and demographic trends for the species requiring protection as well as the status of habitats.

The tiger is one of the world's largest carnivores and a global icon for wildlife conservation. It is also one of the most critically endangered species on Earth at the present time. Habitat loss and fragmentation and the hunting of tigers and their prey species have caused a marked decline in numbers. In Cambodia, where basic information on tiger status and distribution is completely lacking, careful planning must be done to allow tigers to survive in landscapes increasingly dominated by humans. But planning should be based on accurate knowledge of the status, distribution and threats to tigers across the landscape, and in particular within protected areas which provide core refuge

To gain such knowledge, however, the Royal Government of Cambodia (RGC) must first develop its own ability to design field surveys and analyze data. In a country with severe capacity constraints, the importance of this first stage of human resource development cannot be overlooked. As with all its activity in Cambodia, WWF has sought to combine formal training with on-the-job training. Such an approach builds both skills and confidence among participating staff members while laying the foundation for the long-term technical capacity needs of the country's conservation community.

III. Project Elements

The Tiger Survey in Northeastern Cambodia: Training and Initial Survey project was one of the major activities conducted by WWF during the 1998-1999 dry season in Cambodia. It was organized and managed cooperatively with the Wildlife Conservation Society (WCS). Funds generously provided by the National Fish and Wildlife Foundation (NFWF) were matched with those from other WWF sources in carrying out the 4 components of the project. Specific components included:

A. Training:

A two-week training session, conducted between 3-13 May 1999 and organized by WCS was held in Khao Yai National Park, Thailand. WWF sponsored the participation of 7 Cambodian government officials in this course. The objectives of the course were as follows:

1. to understand the ecological requirements of tigers and the reasons for their decline;
2. to review the evidence showing where tigers now exist in Southeast Asia and identify areas where the status of tigers is unknown;
3. to learn field techniques available for census tigers and their prey species;
4. to develop proficiency in evaluating and interpreting field data for tigers; and
5. to examine the options for monitoring and protecting for tigers in reserves.

The course was targeted towards wildlife protection and protected areas staff from key government agencies and NGOs who currently have responsibility in assisting conservation activities. Cambodian participants were selected based on specific job responsibilities, previous experience in conservation-oriented training programs, demonstrated leadership potential that would assist in doing subsequent trainings in Cambodia, and proficiency in English. Cambodian participants were as follows:

1. Lay Khim, Chief of Protected Areas Office, Department of Nature Conservation and Protection, Ministry of Environment
2. Net Neath, Technical Staff, Protected Areas Office, Department of Nature Conservation and Protection, Ministry of Environment

3. Men Soriyun, Technical Staff, Wildlife Conservation Office, Department of Forestry, Ministry of Agriculture, Forestry and Fisheries
4. Keo Onalliss, Technical Staff, Wildlife Conservation Office, Department of Forestry, Ministry of Agriculture, Forestry and Fisheries
5. Koy Sokha, Deputy Director of Ratanakiri Provincial Environment Department, Director of Virachey National Park
6. Tep Boren, Director of Research Section, Virachey National Park
7. Seng Teak, WWF Program Coordinator in Cambodia

A more detailed report on this training course can be found in Attachment II.

B. Field Exercise

A follow-up field survey, in the vicinity of Phnom Veal Thom in Virachey National Park was conducted during the period 23 May-5 June. The tiger survey team was comprised of 2 staff from the Wildlife Protection Office, Department of Forestry, Ministry of Agriculture, Forestry and Fishery, 4 staff from Virachey, 3 staff from Wildlife Conservation Society (WCS), Thailand, and 1 journalist. The team was led by Dr. Antony J. Lynam, Director of Wildlife Conservation Society-Thailand Program. The field survey provided the trainees with the opportunity to apply the knowledge and skills gained from the classroom within a supervised environment. In this sense, participants increased their skills in the use of topographic maps, compasses, and global positioning system (GPS) and the interpretation of track and sign information. In addition, the team set a total of 11 camera traps in a variety of sites within the survey area.

Phnom Veal Thom is a natural grassland which appears to have been little disturbed by humans except for infrequent burning. Natural corridors and remnants of evergreen forest which link the grassland with streams and gullies below the plateau were observed and identified as important sites for wildlife. Despite a number of logistical constraints, adverse weather conditions and persistent threat of a cholera outbreak in the area, the team traveled a distance of 42 kilometers in the protected area on this investigation. This trip represented the first time that a formal survey has been conducted within the confines of the national park.

A detailed report on this field exercise can be found in Attachment III.

C. Camera Trap Retrieval

From 30 June – 9 July, a total of 10 people including 1 person from Provincial Agriculture Department, 1 person from Wildlife Protection Office, Department of Forestry, 5 park rangers, 1 person from WWF-Cambodia, 2 persons from WCS-Thailand spent 10 days in the forest to retrieve the cameras that were set the previous month. Although confronted with poor weather and difficult access to the area, the team was successful in gathering all 11 camera traps and everybody returned to the provincial capital of Ban Lung safely.²

The team learned a lot from this experience, particularly about preparation and planning for field expeditions, the application of basic field skills, and the importance of flexibility and adaptability when working in difficult conditions. This exercise and the previous one in which the traps were set, provided valuable information to the protected area staff and staff from central government agencies about the fundamental elements of biological research.

A detailed report on this field exercise can be found in Attachment IV

² Unfortunately, one camera was completely damaged due to flooding and two other cameras were partially flooded which affected the operations of the infrared system and the removal of the film.

D. Data Analysis

A 2-day workshop on initial data analysis of the field results was conducted for the tiger survey team in Phnom Penh, from 27-28 July, 1999. Below is the result of camera traps photos and the capture rate:

Picture of Animal	Number of Picture	Capture Rate
1. Leopard	1	0.002
2. Clouded Leopard	1	0.002
3. Leopard Cat	1	0.002
4. Asian Dhole	3	0.007
5. Malay Sunbear	1	0.002
6. Small Indian Civet	3	0.007
7. Common Palm Civet	1	0.002
8. Wild Boar	38	0.093
9. Lesser Mouse Deer	1	0.002
10. Common Muntjac	9	0.022
11. Sambar	5	0.012
12. Malayan Pocupine	2	0.004
13. Pig-tailed Macaque	2	0.004
14. Pheasant Species	14	0.030

The capture rate = Number captured/Number trap nights; (the total number of trap nights for 11 cameras was 410).

The team spent time analyzing this data and discussing what it means and, perhaps more importantly, what it does not mean. The fact that tigers were not present in the survey area at this time was not entirely surprising as tiger sign was not readily evident during the field exercises. The team did discuss the reasons for these findings and came up with the following possible explanations:

- the density of tiger remains low;
- sampling time too short;
- sampling area was too small;
- not enough prey species evident to support tiger population
- area is disturbed by human activities (hunting, collecting NTFP, etc.)
- habitat was too dense
- complicated topography perhaps unsuitable for the tiger

As with any survey project, the lack of a positive identification was an important indicator for the staff and this type of information will have implications in designing subsequent surveys and ultimately, in developing a tiger conservation strategy for the protected area.

Upon completion of the analysis workshop, a de-briefing session was held with senior staff from both the Ministry of Environment and the Ministry of Agriculture, Forests, and Fisheries. Staff members were pleased to learn about the results of the survey, and although photographs of tiger were not available, they did express a great deal of interest in the human resource development elements of the project. This is a very important finding as it indicates a path that the conservation community can follow in trying to further encourage the development of political will for conservation efforts in Cambodia to take hold.

IV. Potential Next Steps/Future Activities

This project generated a lot of enthusiasm and interest. Cambodian government officials recognize the tiger as a species under a great deal of pressure in what was once a system of intact habitat. They also recognize that as a keystone species, the existence of tiger is a good indicator of the health and vitality of its ecosystem. There seems to be an opening that conservation organization should seize. Priority areas for future work include the following:

A. Training:

Now that a cadre of staff members with training and field experience exists, there is an opportunity to use these staff members as trainers in a subsequent training session modeled on the Khao Yai program. This training course should be conducted in Cambodia, in the Khmer language by the existing team with oversight and guidance provided by WWF and WCS. One possible outcome of this would be a dedicated team of tiger surveyors drawn from the two key ministries and perhaps the Royal Agricultural University.

B. Follow-up surveys in Virachey

The initial survey in Virachey National Park was limited in scope, both in time and space, covering only a fraction of this vast park. Thus, the information gleaned from this survey is by no means indicative of the status of tigers in the park, nor in northeastern Cambodia. Additional surveys are clearly needed to ascertain the status of tigers and their prey species, but the important outcome of this initial training and survey is that the trainees from the central department and from the park now have a field experience and the equipment necessary to continue survey work with limited oversight from international experts.

C. Additional Surveys

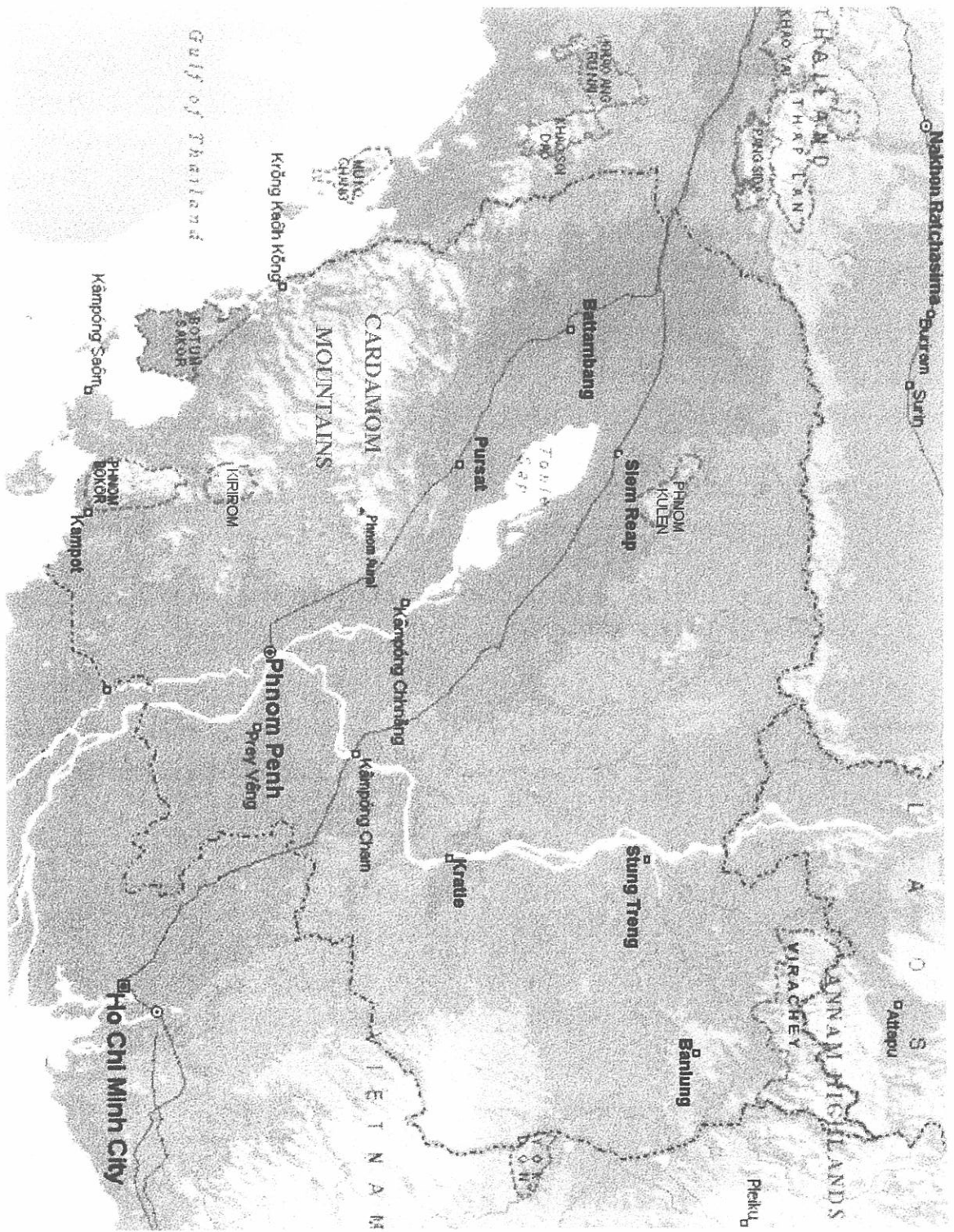
If a training program is designed as suggested above, additional survey work, undertaken as part of this program or shortly thereafter can be launched in other areas of the country with suitable habitat. The two most promising areas include other areas in northeastern part of the country, and the southwest, defined by the Cardomom Mountains.

D. National Strategy

After another field season which encompasses theoretical and practical training and additional field surveys, there may be sufficient information available and appropriate skills "in-house" for the development of a comprehensive tiger action strategy for Cambodia. Such a strategy would guide the international community and the government in the application of financial and technical resources for the foreseeable future.

Appendices:

- I. Map of Project Area
- II. Detailed Report: Khao Yai Training
- III. Detailed Report: Field Exercise
- IV. Detailed Report: Camera Trap Retrieval
- V. Detailed Report: Data Analysis
- VI. Financial Report



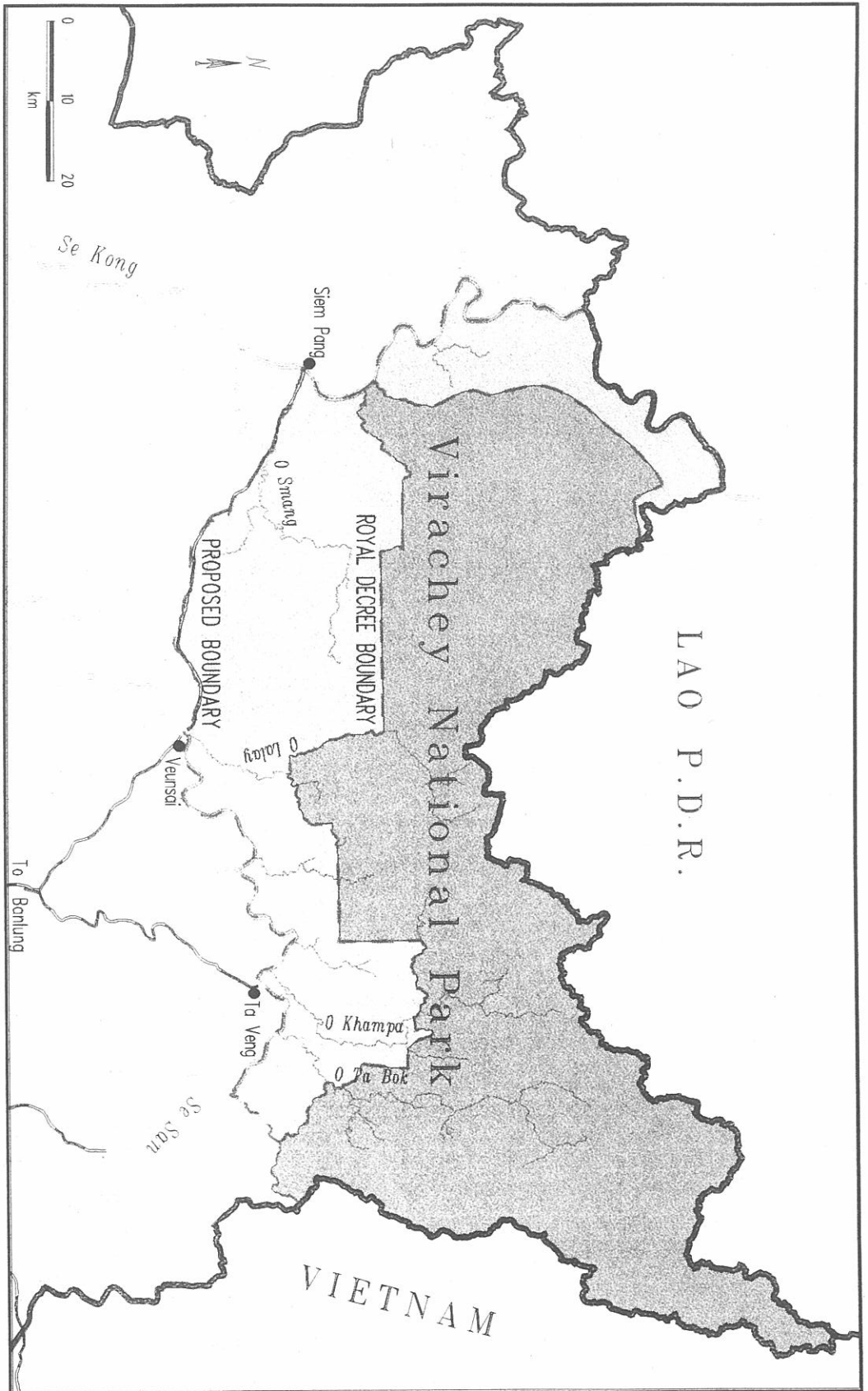
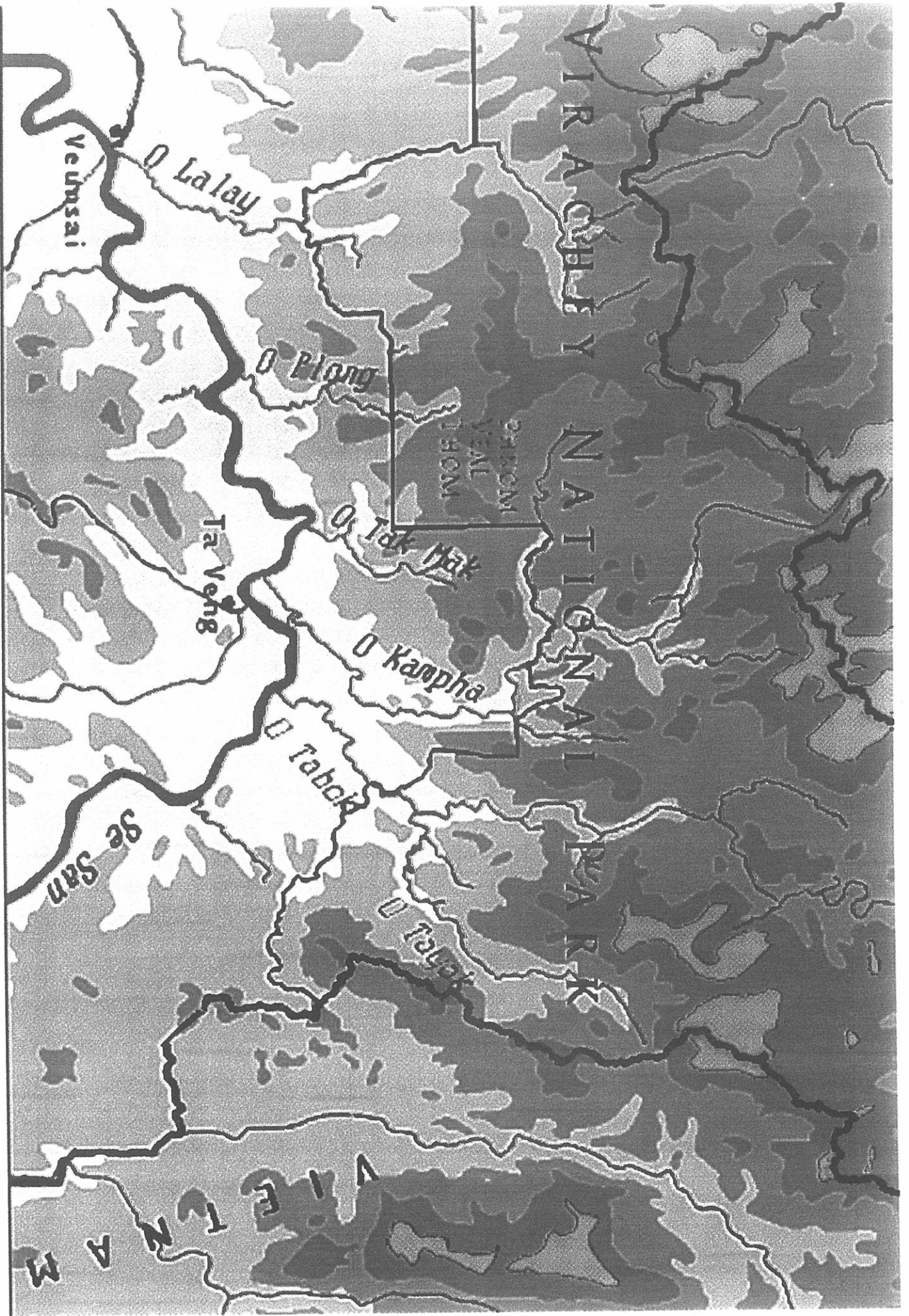


Figure 1. Cambodia's Virachey National Park, showing the boundary as originally drawn in the 1993 Royal Decree on Protected Areas, and the proposed boundary change. Portions of the light shaded area may be considered buffer zone, but much of the area is considered priority conservation zone, because of the value of habitat for certain threatened and endangered large mammals.





REPORT ON TIGER SURVEY AND CONSERVATION TRAINING COURSE
KHAO YAI TRAINING CENTRE, THAILAND
MAY 3-13TH 1999

Identifying and defining the limits and sizes of remaining tiger populations, and those of their prey, is necessary for the effective management and preservation of the species in Southeast Asia. From May 3-13th 1999, Dr Antony J. Lynam, Director of Thailand Programmes for the Wildlife Conservation Society, provided a training course in tiger survey and conservation techniques for seven staff of the Cambodian Ministries of Environment, and Fisheries and Forests, 4 staff of the Royal Thailand Forest Department, and 7 observers from local Thai wildlife NGO's. Training expenses for the Cambodian participants were provided by WWF – Species Programme and the "Save The Tiger Fund", administered by the US National Fish and Wildlife Foundation. Training for Thai-based participants was supported by the WCS – Indochina Tiger Conservation Programme. The training facility at Khao Yai was provided by the Royal Forest Department of Thailand (RFD) in accordance with an existing MOU for wildlife training between RFD and WCS – Thailand Programme.

The motivations for the training course were;

- to understand the ecology of tigers and the reasons for their decline;
- to review the evidence showing where tigers now exist in Southeast Asia and identify areas where the status of tigers is unknown;
- to develop proficiency with the field techniques available for surveying or censusing tigers and their prey species;
- to learn skills in interpreting and evaluating field data for tigers;
- to examine the options for monitoring and protecting tigers in reserves and outside of reserves.

The course was divided into two sections; 4 days of classroom based instruction followed by 5 days of fieldwork during which the concepts learnt in class were applied in practice. A training handbook was produced to serve as a guide to the topics that were presented during the training. Topics taught and discussed in class ranged from the philosophy of tiger conservation, tiger ecology, identifying and characterizing potential tiger areas, assessing available information on tiger distributions, track and sign, direct survey methods, interpreting and reporting survey results, to monitoring and protecting

tigers. In addition to the handbook, materials provided to participants were a collection of relevant papers and articles pertaining to tiger ecology, conservation and research, and a tiger bibliography. A number of visual aids including videos and maps were used during classroom instruction. The trainees were assessed on their participation in classroom activities, and during a field survey exercise.

This was only the second time in Southeast Asia that a training curriculum dedicated specifically to tiger field survey methods and conservation was presented to government wildlife and forestry staff. The curriculum was based on a tiger survey training given in Myanmar by Dr Lynam and Dr Alan Rabinowitz in December, 1998. The Khao Yai course focused on advanced field techniques and assessment of wild tiger populations, including the use of up to date survey design principles and methods, including camera-trapping. Some of the more recent and problematic concepts about assessing tiger conservation status in unknown areas were discussed at length:]

- Tiger tracks are easily distinguishable from leopard (*Panthera pardus*) tracks.
- Individual tigers can be identified and counted by their distinctive tracks.
- Information from local or indigenous people can give a realistic picture about the status and number of tigers in an area.
- Tiger populations can be defined by a coarse filter assessment of remaining habitat and historical information.

To address these and other concepts, participants were taken through the process of assessing and interpreting the provisional evidence for tigers from habitat models and interview surveys, to defining tiger populations on the ground via sign and camera-trap surveys, and planning for their protection in the future. Recently compiled maps showing the confirmed and provisional tiger distributions in protected areas and other forest complexes in Cambodia and Thailand's Eastern Forest Complex were used to exemplify this process. The maps were developed by WCS Landscape Ecologist, Dr Eric Sanderson.

The maps serve as a template showing the known tiger areas and gaps where knowledge of tigers is lacking or inconclusive. These maps provide a roadmap for future activities that will focus on defining tiger priority areas, including transboundary forests, in the two neighboring countries. In the field, instruction was given towards the careful observation, recording and interpretation of tracks and other sign, and the collection of information on presence-absence and relative abundance of tigers and their prey species.

A field survey was conducted as part of the training. The survey focused on an area in the center of the park where reports of tigers have been concentrated in recent years. The survey involved 2 days devoted to sign searches, followed by 2 days of establishing camera-traps for a 1 month long survey.

Results of the survey will provide valuable information on the status of tigers and other wildlife species for this core area of the park.

All participants were carefully chosen for the training. As an instructor I felt that the participants were highly motivated individuals, and appropriate for this kind of training given their direct responsibilities in documenting, managing and monitoring wild tiger populations. The combination of classroom instruction of theory and concepts, followed up by practical exercises provided a complete training experience. The Thai and Cambodia participants also benefited from the exchange of knowledge and experiences. The sharing of knowledge between the two groups was an important part of the training.

Both Thailand and Cambodian governments are committed to efforts to conserve wild populations of tigers. Ongoing efforts to document tiger populations in Thailand will in the future involve each of the 4 Thai participants, all of whom are based in areas targeted for tiger surveys, and the observers from local NGO's. WCS and WWF are keen to support activities geared towards refining proposed tiger priority areas in Cambodia. The first of these exercises will be a field assessment for tigers in Virachey National Park, a proposed medium-priority area for tigers in north-eastern Cambodia. This will involve all the Cambodian officials who attended the training. They will conduct the survey under guidance from WCS – Thailand staff, and with the support of local park staff. The participation of local people in this survey effort is seen as critical to the success of the field survey, and in future monitoring and awareness activities for tigers in and around the park.



**PRELIMINARY REPORT ON
TIGER SURVEY AND CONSERVATION TRAINING
VIRACHEY NATIONAL PARK,
RATTANAKIRI PROVINCE, CAMBODIA
MAY 18th-JUNE 1st, 1999**

1. INTRODUCTION

During May, 1999, a field reconnaissance and survey for tigers and other large mammals was conducted in Virachey National Park, Rattanakiri Province, Cambodia. The objectives of this exercise were: (1) to provide staff of the Ministry of Environment and Agriculture, Fisheries and Forests with an opportunity to apply techniques of tiger survey, including use of camera-traps, learnt during a training exercise in Thailand in a field situation in Cambodia, (2) to explore and survey an area of forest inside Virachey National Park for tigers and other large mammals, and (3) to involve local villagers, national park staff and other government staff in a collaborative field conservation exercise. This preliminary report details aspects of the training and logistics associated with the field exercise. Results of the survey will be reported separately after camera-traps established in the field are retrieved, films processed and data analysed.

2. PLANNING AND PREPARATION

On May 18th, 1999 staff of the Wildlife Conservation Society – Thailand Program and Thailand Society for the Conservation of Wild Animals; Dr Tony Lynam, Tim Redford and Tongbai Charoendong, travelled to Phnom Penh to meet with WWF – Cambodia and WCS – Cambodia staff, and to begin planning for the survey with staff of the Ministry of Environment and Ministry of Agriculture, Fisheries and Forests. Prior to arriving in Cambodia, the objectives, personnel and logistics for the survey and a possible site for the survey were discussed in Thailand. In Phnom Penh, further planning using topographic maps of Virachey National Park was done. Camera-traps and other equipment for the survey were loaned by the WCS – Thailand

Programme, and were taken ahead to the park headquarters in Banlung by Keo Ommalis and Men Soriyun (WPO) on May 19th.

WCS staff and WWF – Cambodia Technical Advisor, Mr Andy Maxwell travelled to Banlung on May 20th at 1045hrs. Mr Chris Fontaine (Associated Press) attended the survey to provide press coverage. They were met by Virachey National Park Director, Mr Koy Sokha and his Research Director, Mr Tep Boren both of whom had attended the training in Thailand. Mr Sokha had prepared detailed maps showing recent tiger sightings and sign observations. Tigers have been reported from three watersheds O Smang, O Lalay, and O Tapok in the last 5 years. Two of these areas were distant from the edge of the park and not possible to survey within the 7 day time-frame available. The third area was accessible but frequented by local villagers and hunters from Vietnam, and therefore not a desirable area for the survey given the risk of theft of camera-traps. It was decided to mount a survey in a fourth area to the north of Taveng, including a high elevation grassland called Phnom Veal Thom which is drained by the O Tak Mak and O Banpong. This area is in the southern central section of the park. A previous reconnaissance in January, 1999 revealed signs of wild cattle, sambar and pig and unconfirmed tracks of large cat (tiger or leopard) (A.Maxwell personal communication) thus warranting closer investigation for tigers and their prey species.

After an overnight stay at the Mountainview Guesthouse, food and other supplies were purchased at the local market, and the field team travelled to Taveng substation on May 21st arriving at 1530hrs. There, field clothes purchased in Thailand were distributed to the 35 field staff of Virachey National Park. Six guards and four local village headmen were selected to join the field team.

5. SURVEY IMPLEMENTATION

On Day 1 of the survey (May 22nd) the team of 17 departed Taveng by boat at 0700hrs arriving at a hilltribe village on the O Tak Mak (UTM 0723667E 1559715N) where a local guide was located and joined the survey team. The team left on foot at 0915hrs passing through cultivated areas of Brow and Krueng hilltribes along the O Tak Mak for most of the day. After passing through the last hilltribe settlement at UTM 0721405E 1561878N the habitat changed to mixed evergreen/bamboo forest. The first day's camp was made on a small tributary of the O Tak Mak

at UTM 072640E 1563866N. Other than domestic pig and dogs, no sign of large mammals was seen during the first day of the survey. During Day 2, the team walked north up onto a high ridge and thereafter had to slog through dense bamboo thickets to cross over a high peak and down into the northern reaches of the O Tak Mak watershed. During the day a Black-shanked duoc langur was sighted at UTM 0720062E 1564525N. The animal was apparently sick and was lying on a rock. Other than this only tracks of wild pig were detected along the route travelled. Camp was made at UTM 0719197E 1567721N. On Day 3 of the survey it was discovered that the food supplies would not last for more than 2 days at the current rate of consumption. It was decided that 7 rangers and local villagers should return to Taveng to allow for the completion of the survey by the rest of the team. The group split, and the remainder of the field team progressed through dense bamboo thickets towards a camp on a stream below Phnom Veal Thom at 400m asl.

Prior to the survey, a plan had been made to place camera-traps within each 1 km grid of a 20 square kilometre plot running in a north-south direction. The density of the vegetation encountered along the route had not been anticipated and with 4 days of supplies for the survey remaining it was decided to instead place camera-traps in representative habitats along defined animals and streams along the route of travel to Phnom Veal Thom. With this survey design, the first camera-traps were established on Days 3 and 4 of the survey in a valley south of Phnom Veal Thom. On Day 4, the team ascended to Phnom Veal Thom (elevation >700m asl) and camped on a hill overlooking the centre of the grassland at UTM 0717220E 1571005N. Phnom Veal Thom is a natural grassland which appears to have been little disturbed by humans except for infrequent burning. Natural corridors and remnants of evergreen forest which link the grassland with streams and gullies below the plateau were explored and camera-traps placed in several of the forest remnants. Some old hunting camps were found but there were otherwise no recent signs of human presence.

Day 5 was spent setting camera-traps in dry dipterocarp forest adjacent to Phnom Veal Thom where signs of gaur and sambar were found. The team then descended from the plateau to the southwest and camped along the O Banpong (UTM 0715248E 1566529N). During Days 6 and 7, the team walked south along the O Banpong along a hunter's trail, placing a single camera-trap on this route. The team walked out of the forest to reach Banpong Village where

they were met by Virachey NP staff, and travelled by boat 2hrs to Veunsai substation. WWF – Cambodia Technical Advisor Andy Maxwell met the team and drove the team back to Banlung. There the field team debriefed the park chief, Koy Sokha, and returned to Phnom Penh on 29th May.

The team walked over 42km during the survey. Sign of wildlife was recorded along the route and 11 camera-traps were established at 10 locations; 4 in the O Tak Mak watershed, 5 on Phnom Veal Thom and one in the O Banpong watershed. Only one confirmed sign of large cat (tiger or leopard) was recorded along the route, being a scratch on a tree. Notably common large mammals in the study area were wild pig and Red-cheeked gibbons (*Hylobates gabriellae*). The latter species was recorded calling on 5 of 7 days during the survey from widely distant parts of the study area, suggesting the species is widespread in the area. The camera-traps will be left in place for 1 month, after which they will be retrieved by a team consisting of WCS – Thailand staff, rangers from Virachey NP, WPO staff, and members of the training team from the Ministry of Environment who could not attend the initial survey.

6. PROGRESS OF TRAINING

Three of the seven trainees who attended the tiger survey training in Thailand attended the survey in Virachey National Park. The three individuals, Men Soriyun and Keo Omallis (WPO) and Tep Boren (MoE) showed aptitude and skill in their participation in planning and execution of the survey. Additionally, the field exercise reinforced the need for logistical planning in a remote study area. All three are proficient in identifying large mammal sign and in the understanding and use of camera-traps. They should be encouraged to participate in further tiger survey activities. Four participants of the Thailand training did not participate in the Virachey survey because they were asked to participate in a regional wildlife trade workshop run by WWF - Cambodia. It is important that these individuals; Seng Teak, Lay Khim, Net Neath (Ministry of Environment) and Koy Sokha (Virachey NP) participate in the camera-trap retrieval exercise (below) or at least be a part of the planning for this trip so that they get the first-hand experience in locating and taking down the camera-traps. Only with this field experience will they truly appreciate the effort required to conduct this kind of survey.

5. TECHNICAL DIFFICULTIES EXPERIENCED DURING SURVEY

As with any field survey in a new area, logistical difficulties were experienced on the present exercise which could be avoided during the follow-up camera-trap retrieval exercise or on future surveys at Virachey NP. Recommendations are detailed below.

- 5.1 Cholera outbreak - prior to the survey, a cholera outbreak occurred in several areas in Rattanakiri Province including Banlung, Taveng and Veunsai Districts where the survey team visited. Had the field team leaders been informed of this in Phnom Penh, precautions could have been taken to avoid the possibility of infection e.g. vaccinations. We consulted with Dr Gerry Pais, of Health Unlimited, a medical NGO based in Banlung, and were prescribed doxycycline and oral rehydration salts in case of infection.
- 5.2 Food supplies - For future surveys we recommend purchasing food supplies e.g. dried meats and vegetables, in Phnom Penh since those available in Banglung were inadequate or unavailable.
- 5.3 Personnel – rangers at Virachey NP are physically able to conduct remote field work but have little experience with this kind of field work. Having prepared what we thought were adequate field rations, we found it necessary to downsize the field team to conserve these rations after less than economic consumption of food during the initial few days of the survey. Some basic training needs for Virachey rangers include field craft, techniques of collaboration and planning for fieldwork.
- 5.4 Habitat maps – in planning the exercise, the team would have benefited from the use of recent habitat maps or remote sensed imagery. Topographic maps aided the survey design but information on habitat types was not available, and the survey execution was slowed as a result.

6. CAMERA-TRAP RETRIEVAL

A return visit to the study area will be made during the first week of July, 1999, in order to retrieve the camera-traps. The field team should consist of the three trainees who attended the first survey, and the four trainees who were unable to attend this exercise due to other commitments. In addition to the trainees, suitable personnel should attend the survey to provide technical support, including individuals familiar with the survey route. It is recommended that

two WCS staff; Tongbai Charoendong and Tim Redford, and at least two Virachey rangers who participated in the camera-trap setting exercise be part of the field team. Following the camera-trap retrieval exercise, films should be sent to a reliable photographic laboratory in Bangkok for processing. WCS – Cambodia Country Programme Coordinator Colin Poole can arrange this. Once the films are developed, a short 2-3 day workshop should be held in Phnom Penh , run by Tony Lynam, and involving all the participants of the tiger training, in the compilation and analysis of data from the camera-traps, and to develop a final project report from the survey. This could be done at the end of July or the first week of August, 1999.

Antony J. Lynam PhD
Indochina Tiger Program Coordinator
Wildlife Conservation Society
P.O. Box 170
Laksi, Bangkok
Thailand 10210
Tel/Fax: +66-2-574-0683

10th June, 1999



**PRELIMINARY REPORT ON
TIGER SURVEY AND CONSERVATION TRAINING
VIRACHEY NATIONAL PARK,
RATTANAKIRI PROVINCE, CAMBODIA
CAMERA RECOVERY EXERCISE
JUNE 28TH – JULY 11TH, 1999**

At the end of May 1999 as an extension of the tiger training course for Cambodian officials concerned with wildlife and protected areas a field exercise in the use of camera-traps was conducted. These cameras were placed in Virachey National Park in North-East Cambodia, with the aim of giving the staff experience in the use of this equipment and the nuances of organising and conducting a field trip. After a period of one month the cameras need recovering to allow analysis of data collected.

INTRODUCTION:

During May 1999 seven Cambodian government officials participated in a training course at Khao Yai National Park at the regional training centre. The course was specifically aimed at tiger conservation and how this charismatic species could be utilized as a resource to assist in the protection of other species and protected areas.

After the Thailand section of the course was completed the participants returned to Cambodia and a field survey was conducted, led by Dr. Antony Lynam. This involved a week-long expedition into Virachey National Park to a core area that encompassed several habitat types. Cameras were positioned at strategic places to record what species of wildlife are present. It was hoped that tigers, if present in the park, would be photorecorded.

Conditions in the park on this initial survey proved much more difficult than expected. There was high rainfall, seeded bamboo lying horizontally, few trails, fragmented forests, long distances and the usual rainy season insect problems. This complicated the survey but didn't prevent 11 cameras being positioned for a one-month period.

To assist with the recovery two WCS staff returned to Virachey during June and July to work with the park staff and Phnom Penh officials.

IMPLEMENTATION:

Having experienced the conditions in the park preparations for the camera recovery were started in Bangkok a few days prior to the return to Cambodia. Medical and logistical supplies were sourced and certain dry food-stuffs were purchased from a cash and carry outlet as they were much cheaper.

Once in Phnom Penh further provisions were bought, as many items suitable for longer field trip are not available in Ban Lung, the provincial town of Ratanakhiri

WCS staff **Thongbai Charoendong** and **Tim Redford** liased with **Seng Teak** (WWF/Ministry of Environment) and **Men Soriyun** (Wildlife Protection Office, Ministry of Forests and Fisheries) in the organisation of the field trip prior to departure for Ban Lung.

28/6 Meeting at the WWF office in the Ministry of Environment between the above mentioned persons discussed actual preparations for the field trip, who would be involved and how it would be conducted. Maps were copied showing camera locations and a provisional plan was drawn up on who would collect which cameras. Eventually it was decided that due to their relative proximity the field staff would only separate into two groups for one days collection and the whole process would take seven days. It was hoped as we knew what to expect and exactly where to go it wouldn't take that long, but extra time was built in to compensate for any unforeseen circumstances. Maps were copied so that each member of the field team would have a copy in case of separation from the group.

Some recommendations were made to the officials on how the staff should conduct themselves during the period in the field, such as more emphasis on team work and group involvement in the camera recovery.

The officials in the field team included the following persons;

Koy Sokha ~ Director of Virachey National Park, Protected Areas Dept', Ministry of Environment

Seng Teak * ~ WWF/Ministry of Environment

Men Soriyun * ~ Wildlife Protection Office, Ministry of Forests and Fisheries

Thep Boren ~ Director of Research, Virachey National Park, Protected Areas Dept', Ministry of Environment

All four of the above had participated in the Thailand section of the training and two (*) of the above had been on the initial placing of the cameras in Virachey.

Others members of the team were;

Heng Neathmony ~ Regional Forest Official for Ratanhkhiri, Ministry of Forests and Fisheries

Sieng Bokham ~ Ranger, Virachey National Park

Na Kampong ~ Ranger, Virachey National Park

Poy Pot (Bun Pot) ~ Ranger stationed at Koh Pong, Virachey National Park

* Three of the above had also been on the initial placing of the cameras.

Unfortunately three of the officials that had been to Thailand were unable to attend this camera recovery section.

30/6 A domestic flight to Ban Lung was taken by the WCS and Phnom Penh. Virachey staff met them at the airport and we went to the Mountain View II Guest House where we had a meeting to discuss preparations. Present were all above officials with the exception of two rangers. All agreed to the plan and certain dry provisions were bought at Ban Lung Market.

1/7 Early morning wet provisions (meat and vegetables) were bought in Ban Lung market and we drove to Vieng Sai about 30km from Ban Lung in the WWF/Virochey NP Toyota Hilux. We only required one vehicle for provisions as some staff were due to meet at the park office in Vieng-sai.

From the park office we proceeded in two boats to the largely deserted village now named Koh Pong. This took about three hours in open boats. Here we met the local ranger and we decided to hire two villagers to assist carrying the food. These villagers proved very good trackers and knew a route to Phnom Veal Thom where several cameras had been placed. Overnight in a deserted community house (after evicting the local livestock). Rained overnight and the river rose by approximately two metres.

2/7 Started preparing at 5.45 am and eventually left at 9.00 am. This first day required quite a lot of arranging and everyone had to assist carrying food. Most people overweight packs but much of the food was fresh and would be used within the first two days lightening their packs.

The first three hours of the walk from Koh Pong to the park is through paddy fields. These were all flooded to a depth of about 30 cms which slowed down the pace. Passed familiar land marks from the previous exit of the survey such as the felled 'Tabac' tree and the large tree cut down to catch pangolins. We reached our last campsite from the previous trip by 12.30 pm and lunched there. Continued a short distance to the first camera. As we have to return this direction we decided to change the film and batteries and leave the camera working until our return in a few days. Saw many Gaur tracks about fifty metres before the camera on a trail leading in from the East. The camera-trap had only taken six actual pictures in the one month period we decided to cut down the picture lapse to one minute.

When we continued the route became quite difficult. Things have changed considerably in one month, the undergrowth has grown by at least a metre. Reached the river by 4.00pm and set the first camp about 30 metres downstream from a large set of rapids.

Overnight a large storm started, by 1.00 am it was noticed that the water level of the river was rising quickly. Everybody had to grab their belongings and move further up the bank. Some items were lost as the river eventually rose five metres above its normal level. Food was swept away, a hammock, shoes, and a tarpaulin roof. It took about two hours to re-establish the camp higher up the bank during which two staff, Boren and Kampong were separated from the main group.

Such a rise in the river should have been anticipated, as it is the rainy season and the camp positioned accordingly. The water level dropped by the morning but remained more than a metre higher than normal. This changed our plans as the several river crossings needed in following the villagers route to Phnom Veal Thom would have been impossible.

3/7 Gibbons were heard calling about half a kilometre south of camp 1. They called from 5.40am for 20 minutes. (UTM 48P 0714296 1652087)

Slow start to the days hiking as all in camp needed to dry clothes that had been soaked the previous night. A discussion between Sohka, Teak, Soriyun, Thongbai and myself agreed that using the normal route was out of the question. We decided that we would travel directly East up the slope to Hill 600 (UTM 48P 0716045 1562321). This proved an arduous climb but it was well worth it due to the abundance of sign on the trail following the ridge (48P 0715860 UTM 1562832). There were many hoof tracks and faeces from Gaur and a lesser degree wild boar. Gaur were heard crashing through the undergrowth. During a walk covering about three kilometres we only saw one sign of humans, a mark carved into a tree that could have been several years old. Views from this ridge were excellent and it could be an ideal position to roughly mark out forest types as the bamboo for example could be clearly differentiated from the evergreen along the riverine valleys.

The evenings camp was on a small stream in-between hills 600 and 65. The small valley was all bamboo although further down to the North-west was evergreen.

4/7 Gibbons heard again this morning. There were in the trees North-West of the camp (UTM 48P 0715659 1563566) Called for about fifteen minutes 5.35 – 5.50am.

Walked back up to the ridge, very steep climb not really a route to be followed again but again one on the top many sign of Gaur, Pig and this time Sambar as well. Along the top of Hill 65 (UTM 48P 0715949 1564423) there were many fruit trees such as fig, also there was an abundance of wild banana that was fruiting. Wild Boar tracks being the most common. A tree that had been opened by a bear looking for honey was observed. Hill 65 is capped with bare rock and a difficult place to ascend from with back packs, a walk back to a more gentle slope or stream would probably be the safest way down. Whilst on the top of Hill 65 two male Wreathed Hornbill flew over.

Over the last two days it has continued to rain almost non-stop, at some points very heavily. The river would not be a good choice to gain access to Phnom Veal Thom during this weather.

5/7 Gibbon calling for ten minutes 5.45. Location about one kilometre north of the camp (48P 0715236 UTM 1565179). Started at about 8.30 am.

The flood from a few days ago has opened a trail next to the main river which allowed fairly easy walking. Many trees and bamboo had been laid flat and a layer of sand covered everything. Many fresh pig sign in the soft sand. Eventually we came across the main trail to Phnom Veal Thom (PVT). Walking very easy although quite tiring as it is all uphill. Eventually came out onto the grasslands at about 3.30 pm (48P 0715828 UTM 1569923). It was decided that we would camp by the stream next to camera-trap CV10-.

6/7 Heard the gibbon again, this time about one kilometre south of the camp (48P 0716826 UTM 1570358).

It was decided here that the group would split into two teams of five, with one ranger and one villager left at the camp. Team I to collect the PVT cameras and Team II to collect those in the valley South-west of the grasslands. Team I consisted of Sokha, Teak, Soriyun (he was the only original official that helped place the cameras a month ago) Mony and Bokham, Team II consisted of Boren, Bunpot, a villager, Thongbai and myself.

We left at 9.00am, Team one were finished by 1.30 and team II by 5.00pm

During the Team II collection we walked downhill through the forest where the gibbons were seen last visit (48P 0717520 UTM 1570555). This forest faces South-East and has a high canopy, about 30-40 metres as it is in a stream valley. The villager with us reported the trees were mostly 'Malva' nut trees and that the villagers regularly come to this area to collect. 1998 being the last big harvest that seems to occur in 6-7 year cycles.

The cameras were found easily although CV2- had been completely flooded, probably during the storm a few days ago.

On the walk back up the hill to PVT a small group of Douc Langurs were seen. It is thought they were black-shanked, as the colour on the hind legs were not so obvious as it would be if they were red. There were also many pig-tailed macaques in the same area. That means three species of primates sharing that stream valley.

A whole day without rain.

7/7 Last night we camped at the same location and planned a 7.00am start to allow a large section of the walk out to be completed in a day. The early start was achieved and a fast pace allowed us to reach the waterfall (UTM 48P 0714979 1564868) by 11.45. After this point at least eight river crossings were necessary to reach the camp 1 site. The river was still deep and for several crossings we needed to swim across. Our back-packs were put in large black bags and floated over. Again the storm from a few days ago made the going easier as many riverside shrubs had been laid flat. The trail through this section not obvious and a guide was needed.

At 3.00pm we reached the campsite. Some members of the team decided to try and make Koh Pong before dark and a quick pace was needed. By 4.00 pm I suffered an injury to my leg which involved a trapped nerve so I was unable to continue. Sokha and Kompong were there as well as Soriyun. We decided to spend an extra night in the forest. The others continued on their way to Koh Pong and reached there at about 7.30 pm.

8/7 Heard a lone male gibbon calling at 5.15 am calling for 30 minutes about eight hundred metres South East of the camp (48P 0714915 UTM 1559410) No female joined in the call.

We walked down to Koh Pong in the morning and were met halfway by the two villagers and Bunpot who had been sent by Sokha to assist us. It took two and a half hours to walk back through the very flooded rice fields. The locals were planting paddy rice in almost all the cultivated fields. Once back we had a half hour break before we took the two boats down to

Vieng-sai. The journey back along the very flooded Tonle san river just took one and a half hour as we were going with the flow. The river was within 2 metres of the top of the bank, an increase of about 4 metres from a month ago.

The journey back to Ban Lung took an hour and a half. Passing by logging concession areas belonging to 'Hero' company from Taiwan. Back in Ban Lung we stayed at the Ban Lung Guest House for one night.

9/7 Return flight to Phnom Penh

10/7 Met with Jack Hurd the WWF representative in Phnom Penh.

OBSERVATIONS AND RECCOMENDATIONS:

This second trip was as difficult as the placement of the cameras if not more so. However experience and pre-planning insured we were better prepared. Much of the dried food needed for longer field surveys is not available in Ban Lung market, or the price is double Bangkok or Phnom Penh. Where possible advance purchase of food should be considered.

Most of the field staff were lacking experience in basic fieldcraft. The flooding of the camp proved this as some rangers chose to set their hammocks just fifty centimetres above normal river level. They were lucky to have escaped without injury. Some basic training would assist further surveys run more smoothly.

The forest was extremely wet and the high humidity affected some cameras despite each having a silica gel sac inside. A short break in the surveys until the weather improves would benefit the cameras and insure a longer life. These cameras were taken into air-con for one night after the survey, which helped, and indeed one with a faulty rewind returned to normal. Three cameras were broken and taken back to Bangkok for repair. These were a second with a faulty rewind [#3], one that didn't function from the beginning [#5] and one that was completely flooded by the stream [#1]

Many of the participants were lacking basic equipment and what they had was unsuitable for the harsh conditions of a field trip. During the last trip for example two people caught malaria. If they had had proper hammocks with sewn-in mosquito nets this may have been prevented. The WHO in Phnom Penh also has a free service where nets can be

impregnated with a mosquito repellent. Back-packs were too small and the only bush knives were those brought from Bangkok. The officials didn't have water filters and had to rely on boiled water which wasn't always possible during the day. Not everybody had a compass, which could have proven a problem should they have become separated. Perhaps several sets of field equipment could be assembled and stored in the WWF Phnom Penh office for future use.

There is still even after two field trips a lack of teamwork. There needs to be more involvement of all in the field and local knowledge brought into use more often. Safety should be more of a consideration and emphasis placed on prevention rather than cure.

These field trips are costly to conduct and so as much information as possible should be accumulated. More use of sign data forms, not just the occasional remark in a notebook which tends to get forgotten about. All data should be provided to the park concerned, much could be gleaned from a field trip debrief at the park offices.

Tim Redford

Technical Advisor

Wildlife Conservation Society

P.O. Box 170

Laksi, Bangkok

Thailand 10210

Tel/Fax: +66-2-574-0683

July 1999



**REPORT ON
TIGER SURVEY AND CONSERVATION TRAINING
WORKSHOP ON DATA ANALYSIS,
PHNOM PENH, CAMBODIA**

JULY 27 –28TH, 1999

A two day workshop was held in Phnom Penh to collate, analyse and discuss the results of the training in which Cambodian trainees participated in Thailand and Cambodia. The workshop was also an opportunity to review the various components of the tiger surveys associated with both training exercises, and discuss how they contribute to the overall results, and the future of a possible Cambodian national tiger conservation programme.

The workshop began by considering the importance of mapping the route of a survey, taking waypoints at camera-trap locations and knowing how to plot waypoints on standard 1:50,000 series topographic maps. Using waypoints taken from a GPS, the distance travelled on a route was calculated. Using waypoints plotted on a map, and a measuring wheel, distances were physically measured and compared with those calculated from the GPS. It was determined that the survey team setting camera-traps at Virachey had walked a survey route at least 40 km long. The accuracy of measuring distance travelled using both methods has several sources of error and the implications of these were discussed.

In most cases it is not possible to estimate populations sizes of tigers and large mammals from direct counts because they are rare and difficult to see. However, counting tracks and sign along routes planned for camera-trap surveys can provide information on mammal relative abundance. During the Virachey exercise, time-limitations, dense habitat and unfamiliarity with the terrain meant that few records of track and sign were collected. Using data collected during a tiger survey at Khao Yai, the participants were shown how indices of abundance can be obtained from track and sign data e.g. Encounter Rate = No. sign detected/ No. hours searched or No. sign detected/ No. kilometres walked. The assumption is that the index is related in some monotonic fashion to the population size of a species. The participants were shown how abundance of large mammals can be compared directly between

species and between study sites using indices derived from track and sign. Searches for track and sign can be done quickly and should be conducted as part of any field survey exercise.

One of the most convincing and motivating results of the survey at Virachey were the photorecords coming from camera-traps. Films taken from the field were processed at a reliable laboratory in Bangkok, and contact sheets made. Using contact sheets, it is possible to estimate the abundance of different mammals as Capture Rate, $CR = \text{No. photocaptures} / \text{No. trapnights sampled}$. The participants spent the afternoon of the first day, and the morning of the second day analyzing abundance information from two camera-trap surveys; one at Khao Yai in which the participants helped setup camera-traps during the May training exercise, and the Virachey survey in June. Eleven and thirteen large mammal species were recorded from these respective surveys, and the abundance of each species calculated from photorecords. The participants were particularly interested in learning how to analyze the camera-trap data, and are now proficient with the interpretation of this kind of survey data.

Reporting of the results of a wildlife survey is a critical final exercise that often is not done completely or accurately. Time was spent discussing how the results of the Virachey survey could be presented, how the data related to the original objectives, how to describe the methods, and what was the significance of the data, and the limitations for its use. While tigers were recorded from the Khao Yai survey, tigers were not recorded at Virachey. The group was asked to explain what the absence of tigers meant. Tigers could have been absent from the study area, or could occur at low density. Tigers could be reduced or absent due to direct hunting and other human disturbance, or from lack of prey. The absence of tigers is real data as would be its presence if detected. Further monitoring of Phnom Veal Thom would establish whether tigers occasionally use the area or are truly absent.

Using the GIS maps prepared from information on forest cover, protected areas, interview and direct survey methods, the extent of our knowledge of tiger distributions was reconsidered. The Virachey exercise showed clearly that tigers are not in all places where habitat appears suitable. This means that estimates of tiger populations which involve extrapolating tiger densities to entire forest complexes and the entire available habitat for a country will likely overestimate the true numbers. The participants were asked what they consider were the future priorities for tiger conservation in Cambodia. It was decided that further monitoring needs to be done at Phnom Veal Thom, and other parts of Virachey National Park, and that unconfirmed reports of tigers from interview surveys need to be

investigated with field surveys for track and sign, and camera-traps. A clear priority is to assess tiger status and distribution in protected areas in Cambodia's southwest: Phnom Bokor, Kirirom and Aural, and areas of forest concession linking Kirirom and Aural. The participants considered that it was equally important to consider both protected areas and forests outside of protected areas for tigers. A comprehensive program of tiger assessment was considered necessary to fully understand the situation for tigers and to develop management priorities.

On 29th July, Jack Hurd, Colin Poole, Tony Lynam and members of the training group met with Undersecretaries of State for the MoE and MAFF. The Undersecretaries were debriefed on the outcome of the training, and results from the Virachey survey. We were all encouraged that the two Ministries consider tiger conservation a top priority activity and are prepared to commit staff time and efforts to a larger programme which might lead on from this first training activity and culminate in the drafting of a National Tiger Action Plan (NTAP). Hurd, Poole and Lynam, and Seng Teak discussed the logistics of how such a tiger conservation programme might evolve, who would be involved and how it might be supported. Both WWF and WCS are committed to working together with the two Ministries to make such a programme work.

In conclusion, the tiger conservation training provided to the Cambodian participants involved a month of classroom and field instruction spread over a 3 month period. This was the most comprehensive training specifically for tigers ever provided for Southeast Asian nationals. It involved a week of instruction concerning the theory of tiger ecology and conservation, survey principles and techniques, and was followed by practical on-the-job instruction in field techniques in two known tiger areas in two countries. The follow-up workshop was a particularly critical final section of the training. The exercise has served a number of purposes very well. Firstly, it succeeded in the translation of skills and knowledge to a small group of highly motivated Cambodian government staff each of whom in some way are responsible for implementing tiger related conservation activities. Secondly, it tested a new curriculum for training Asian nationals in advanced techniques of tiger conservation. Thirdly through the training, it was possible to glean information on the status of tigers and other wildlife from two areas in Thailand and Cambodia considered to be potentially important for tigers. Fourthly, the training and surveys generated considerable local and international public interest through various media reports (Associated Press, Phnom Penh

Post, Cambodia Daily). Finally the exercise has prepared the ground for a broader tiger conservation programme which the Cambodian government and international conservation agencies have demonstrated a commitment to jointly develop and implement. To this end, WWF, WCS, MoE and MAFF are currently working together to develop a proposal to seek funding for a 3 year tiger conservation programme from the EXXON/Save The Tiger Fund.