

Taman Negara (Malaysia) Field Study

Ecology and Population Status of Tigers in a Primary Rainforest of Peninsular Malaysia

Semi-annual programmatic report submitted to the Save the Tiger Fund

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Captured simultaneously from both sides of a trail on 11 August 2001

PROJECT PERSONNEL

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EXECUTIVE SUMMARY

A large tract of contiguous forest in north-central Malaysia with a core protected forest, Taman Negara National Park (4,343 km²), offers the best chance for long-term persistence of the tiger in Malaysia. Yet even in this Peninsular Malaysia's only National Park, ecological data on the tiger and its prey community are lacking. The primary goal of this project is thus to gather baseline ecological information on tiger and prey in Taman Negara, using sampling-based population estimation techniques with camera traps. The specific objectives are: 1) to develop and refine the sampling techniques necessary to estimate the density of tigers and abundance of prey species, 2) to estimate population size of the tiger and the prey biomass, 3) to investigate the tiger ecology in relation to the habitat integrity, and 4) to improve the local capacity in sampling techniques so that the monitoring of the tiger population in the park can be continued. The project primarily uses infrared camera-trapping systems to identify species and individual tigers.

In cooperation with the Department of Wildlife and National Parks Peninsular Malaysia (Perhilitan), the data collection started at Merapoh, Pahang, on the remote western side of Taman Negara in November 1998. The refinement of the sampling technique and data collection in Merapoh were completed in May 2000 and the field operation was transferred to the second sampling site, Kuala Terengan, near the park headquarters in Kuala Tahan, Pahang. In January 2001 the field operation was moved from the second site to the last sampling site, Kuala Koh, Kelantan, on the northern boarder of Taman Negara. The 34-month field study was completed in August 2001.

We are in the last phase (data analysis) of this 5-year project. During some 13,808 trap-nights we collected 4,536 wildlife photographs, among which 1.3% (n=61) were of tigers. The photographs documented 55 vertebrate species. Rare species such as dhole (*Cuon alpinus*) and storm's stork (*Ciconia stormi*) were documented for the first time from Taman Negara. Selected preliminary results are presented in this report.

Data analysis and drafting the dissertation will be the priority for the next 6 months. If time remains, a public presentation in Malaysia and a workshop for Perhilitan staff will be considered. Next year Kawanishi will briefly visit the USA to finalize the dissertation and publications and complete the requirement for Ph. D. at University of Florida. Kawanishi will then return to Malaysia to continue the collaboration with Perhilitan on tiger research and conservation in Malaysia.

PROGRESS AND ACCOMPLISHMENTS (June – November 2001)

The last grant proposal submitted to the Save the Tiger Fund on June 1 2001 included a progress report up to the date. Thus the period covered in this report is from 1 June to 30 November 2001. This period covered two phases of the project:

Phase II (June - August, 2001): Field work

Phase III (September – November, 2001): Initial Data Analysis

The 34-month fieldwork was completed at the end of August. Most of September was spent on data entry, maintenance of vehicles and camera-trap equipment, cleaning and vacating field stations, sending out thank-you letters. Data analysis began in October by first looking at scat samples. The progress is discussed in the chronological order below and some of the preliminary results are included at the end.

Wildlife Conservation Society tiger workshop in Thailand and Dr. Sunquist's visit to Malaysia

In June Kawanishi was invited to participate in the Wildlife Conservation Society Tiger Workshop in Thailand for 9 days. During this time, the fieldwork was carried out by the field crew without her supervision. All necessary data were collected in her absence. Following the workshop, the project advisor, Dr. Melvin Sunquist visited Malaysia for 9 days. Together we met with project partners (Perhilitan and WWF-Malaysia) to discuss the future plans for this project and for the collaborative research efforts for conservation of tigers in Malaysia. We then visited the field site. Dr. Sunquist met with the field crew and majority of the Perhilitan key personnel who had provided support to the project, and then inspected some of the camera-trap sites. Back in Kuala Lumpur we discussed the approach to the next phase of the project. He took 84 samples of suspected *Panthera* scats to the USA for a molecular analysis.

Renewal of the research pass

The Economic Planning Unit in the Prime Minister's Department Malaysia granted a renewal of the annual research pass to Kawanishi at the end of July.

Completion of the fieldwork

The 34-month field sampling effort was completed at the end of August. Our target was to expend comparable camera-trapping efforts at all three sample sites, with minimum of 4,000 trap nights at each site. This goal was met in August. The second field assistant's contract ended in July and he had to return to his permanent job. An appointment of a Perhilitan ranger, Mr. Malek Sahak, to the project as the main trakker/trekker also expired in August. The August fieldwork was thus partially supported by three additional volunteers.

September: wrapping-up month

All camera-trapping related data were entered into computer and photographs were organized in albums. The rest of data entry was done in November. We cleaned up and vacated the field stations. Basic furniture was moved backed to the first field station that was renovated with WWF-Netherlands funding in 1999. This building was originally a property of Perhilitan, and thus was returned back to Perhilitan with donation of the furniture for future researchers in

Taman Negara. The 4WD project vehicle on loan from WWF-Malaysia was returned. All the camera traps were cleaned. Working CamTrakker units were donated to Perhilitan Taman Negara and Perhilitan Pahang with a hope that the monitoring and research of wildlife in Taman Negara would be continued using the standardized method. Over 3 dozen members of Perhilitan staff, local villagers, and students were trained on the sampling technique under this project. All TrailMaster units were shipped back to University of Florida.

Scat Analysis

Subsamples of more than 100 suspected *Panthera* scats, including some collected on plantation roads outside Taman Negara, were washed and processed so that only hairs and bones remain. Hair samples from potential prey animals were collected from Perhilitan mini zoo in Pahang and Perhilitan museum in Kuala Lumpur to form a reference collection. About 90% of the 89 samples looked at so far have been identified to at least a genus level except for reptiles, birds, and mice. An arrangement is being made with the National Zoo, where a former field assistant works, to collect hairs of a black panther (*Panthera pardus*), dhole (*Cuon alpinus*), and a dusky langur (*Trachypithecus obscurus*) to complete the reference collection. The scat analysis, including the molecular analysis, should be completed within this year.

Publications and exposure

Two minor papers were submitted, accepted, and in press during this reporting period. These are:

- Kawanishi, K., M. Sunquist, and O. Sahir. In press. Malayan Tapir (*Tapirus indicus*), far from extinction in a Malaysian rainforest. Tapir Conservation (IUCN/SSC Tapir Specialist Group) 11.
- Kawanishi, K. In press. Standardized data management system for camera-trapping studies in Malaysia. *J. Wildlife and Parks (Malaysia)*.

Requests for presentations were made by Japan International Cooperation Agency (JICA) - Malaysia Office, University Putra Malaysia, and Zoo Negara (National Zoo). Kawanishi took the first request and postponed the latter two until the completion of the data analysis next year. Copies of our project overview, published in *Cat News* (Kawanishi *et al.* 2001), plus updated information were translated into Japanese by volunteers and handed out to participants as supplementary information. The presentation took place in Kuala Lumpur on November 13 for about 40 delegates from JICA and Japanese Embassy.

In addition, the primary field assistant, Song Horng Neo-Liang, gave a presentation on the project in Mandarin at the Malaysia scout group annual assemblage. The audience was comprised of Chinese-Malaysian students with various age groups, ranging from grade school to senior high school.

Capacity building

A protocol written by Kawanishi, entitled *Standardized Data Management System for Camera-trapping Studies in Malaysia*, was accepted by Perhilitan and now is In Print for the next issue of *The Journal of Wildlife and Parks*. The implementation of the protocol will require a workshop and a manual written in Malay, and Kawanishi has been requested by Perhilitan to assist in these related activities. This will be realized next year when the dissertation is completed.

Together with the Director of Perhilitan Division of Management Information System, Kawanishi assisted in finalizing a grant proposal to the Environmental System Research Institute Conservation Program for upgrading Perhilitan's GIS application software. The software was to be used for the analysis of this study and for management of Perhilitan's national wildlife database. The Director, who has no full-time staff under him, however, became extremely busy, then in October he was transferred to the Perhilitan's parent Ministry. The MIS lost its only full-time staff, and is currently non-existence. This sub-activity is thus postponed indefinitely.

Various requests have been made by Perhilitan research officers to Kawanishi to assist them in analyzing existing data and in designing future research on various species. Due to time constraints, she could only attend to a few of the most pressing requests. She was also invited to give a mini-lecture on population sampling design at a Division of Research internal meeting where officers and directors discussed the annual research plans.

When the analysis is completed in 2002, a workshop for the Perhilitan staff will be conducted on data entry, management, and analysis technique. At that time Kawanishi will present the results of the study and make recommendations for tiger management in Taman Negara. Then, based on the outputs, we will plan the future direction for the tiger conservation in Malaysia. Kawanishi hopes to continue her collaboration with Perhilitan on the research and conservation of the tiger and its landscape in Malaysia.

Selected preliminary results

Table 1 summarizes the sampling efforts and camera-trapping results at the three sample sites. A trap night is a 24-hour period during which a camera trap was functional. A total of 13,808 trap nights were expended with 4,192, 4,830, and 4,786 trap nights at each of the three sites. Some 4,536 wildlife photographs were collected and 1.3% ($n=61$) of the total photographs were of tigers. A total of 16 individual tigers were captured in a total sampled area of approximately 600 km². The actual population estimates and effective trapping areas (thus densities) are yet to be computed. We are currently experimenting with different mark-recapture population estimation models and numbers of occasions for the computation of the population estimates.

A total of 55 vertebrate species, including 2 reptilian, 12 avian, and 41 mammalian species, were detected. The only medium to large terrestrial mammal known to occur in Taman Negara that was not camera-trapped in this study was the Sumatran rhinoceros (*Dicerorhinus sumatrensis*). We have records of tracks and feces of this critically endangered species, but the animals eluded camera traps. Figure 1 shows the cumulative number of species camera trapped at the three study sites. While the species curves for all vertebrate species appear to be still increasing, the species curves for mammals are reaching an asymptote somewhere between 30 and 35 species. This number would be increased only by chance captures of small mammals such as rodents. Therefore, if the sampling had continued, the species curves of vertebrate species might have increased more likely by non-mammalian species.

All photographs of sambar deer *Cervis unicolor* ($n=320$), barking deer *Muntiacus muntjac* ($n=554$), and tapir *Tapirus indicus* ($n=539$) were examined closely in an attempt to identify individuals based on sex, body markings, antlers, and scars. Individual identification was

possible only with sambar stags based on the antlers. There appear to be enough data that we might be able to derive a population estimate of the male sambar deer, using Program NOREMARK (White 1996).

Attempts were made to draw inference on relative abundance of large mammals based on camera-trap data. Relative Abundance Index (RAI) of species was calculated using:

$$RAI = \sum_{i=1} d_i X 100 / \sum_{i=1} tn_i,$$

where i is a trap location, d is a detection and tn is a trap-night at i th location. To minimize the effect of activity level on number of photographs and to standardize the analytical procedure, we define 'detection', a unit of observation, as more than one photograph of a species per trap night per camera-trap location (see Kawanishi *et al.* 1999 for details). Figure 2 shows combined RAI of all three study sites. Among carnivores sun bear (*Helarctos malayanus*), Malay civets (*Viverra zibetha*), and leopards appear to be most abundant. Among ungulates, barking deer, wild boar (*Sus scrofa*), and tapir appear to be most abundant. The RAI data require further examination on several accounts: 1) assumptions and limitations using RAI; 2) the site differences; 3) effects of group size; 4) sampling bias (e.g., trail related and passive vs. active infrared camera traps); 5) relation between RAI of human and human activity data collected separately during surveys; and 6) relation among absolute abundance estimates (for tigers and possibly sambar deer), the RAI based on camera-trapping data, and RAI based on track-counts data.

Other data such as of track counts, human disturbance, and camera-trapping performance have not been analyzed yet. This and the spatial analysis using GIS will be the priority for the next 6 months.

PLANNED ACTIVITIES FOR THE NEXT 6 MONTHS

1. Complete data analysis.
2. Submission of a draft of the dissertation to committee members.
3. Public presentation at a local University and National Zoo.
4. Internal presentation at Perhilitan possibly followed by a workshop on the data entry, management, and analysis technique. The workshop should also include a discussion on the implementation of recommendations made in this study and what's needed to be done next to implement the national tiger conservation strategy.

Note: the timing of the activities 3 and 4 largely depend on completion of the activities 1 and 2.

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REFERENCE

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- Kawanishi, K., M. Sunquist, and O. Sahir. 2001. Tiger research in Taman Negara National Park, Malaysia. *Cat News* 34: 7-9.
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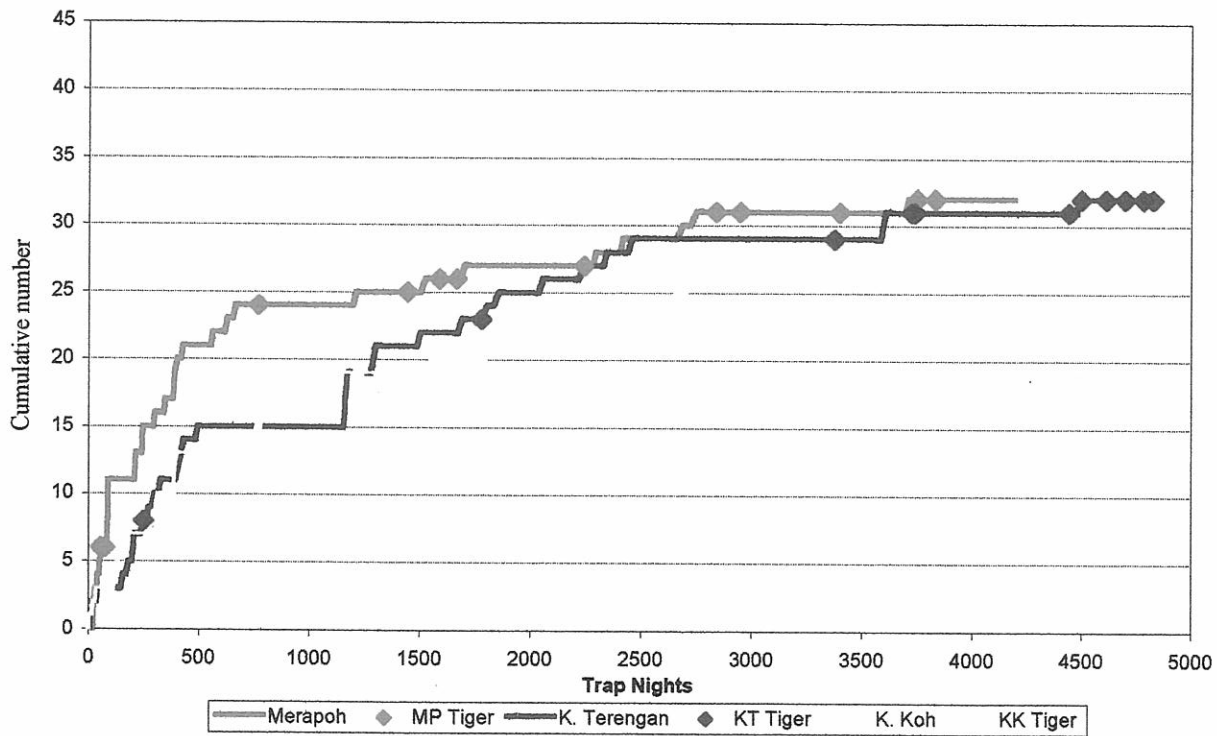
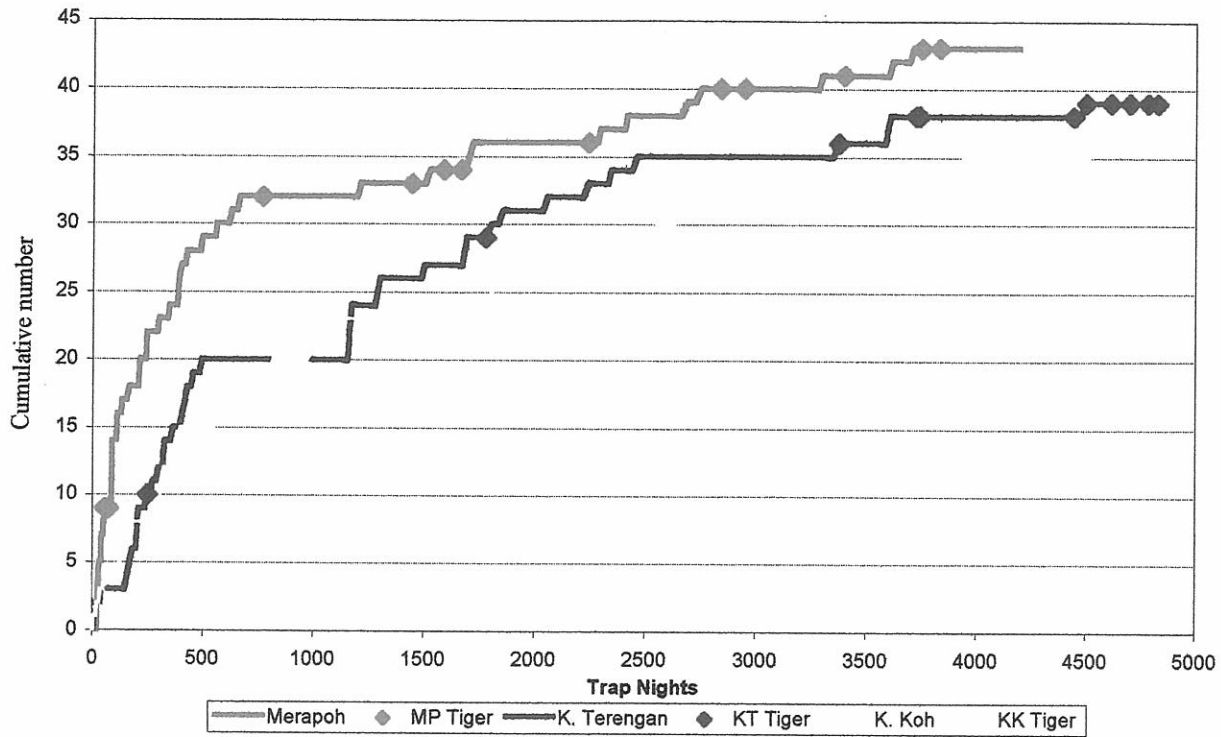


Figure 1. Cumulative number of vertebrate species (above) and mammalian species (below) photographically captured with camera traps as a function of 24-hr trap nights from April 1999 to August 2001 in Merapoh, Kuala Terengan, Kuala Koh, Taman Negara National Park, Malaysia. The filled diamonds indicate tiger captures, excluding duplicates of the same individuals captured within one trap night.

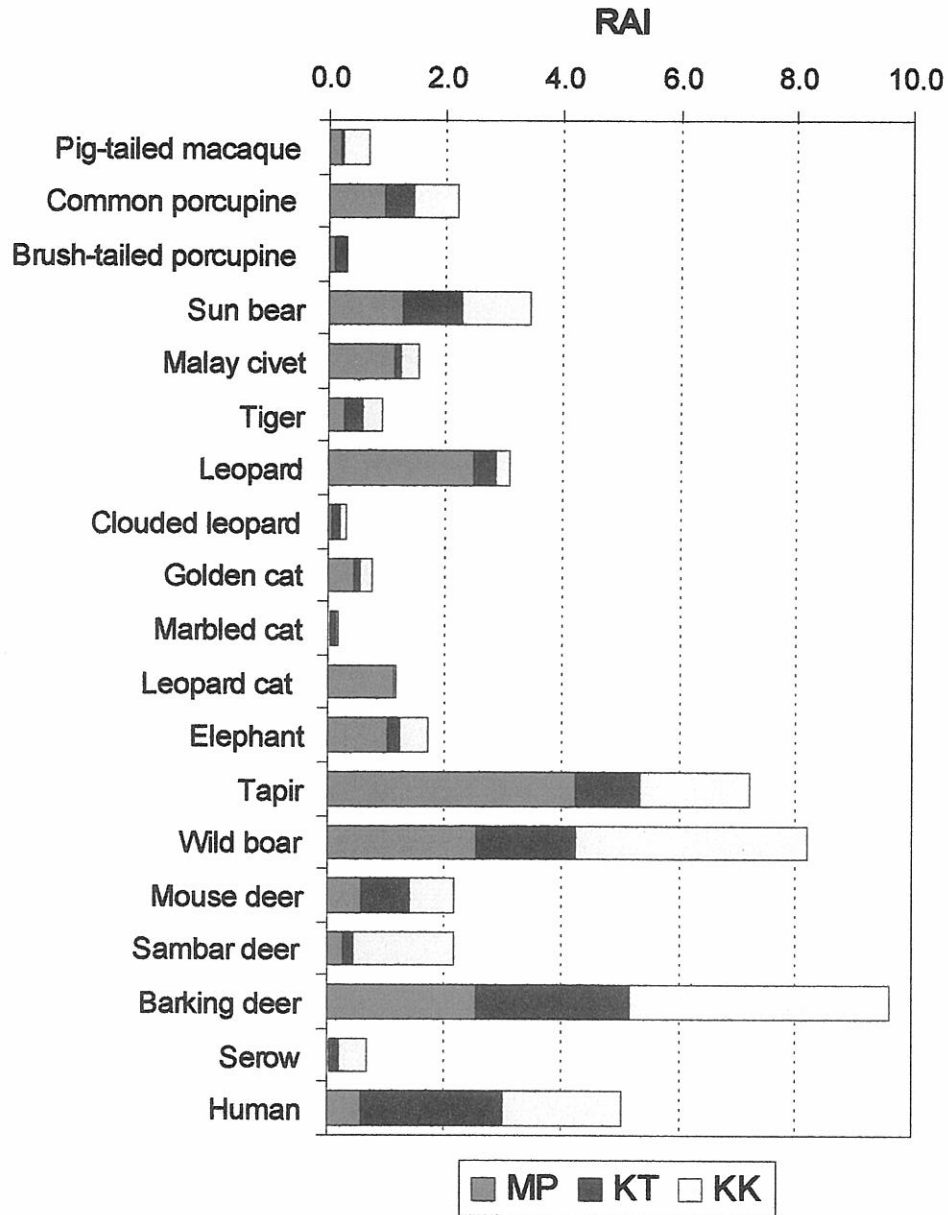


Figure 2. Combined Relative Abundance Indices (RAI) of medium to large terrestrial mammals photographically captured in the three study sites, Merapoh (MP), Kuala Terengan (KT), and Kuala Koh (KK) in Taman Negara National Park, Malaysia from April 1999 to August 2001. See text for computation of RAI.