

PRELIMINARY SURVEY OF MAMMALS AT CROCKER RANGE PARK (PARK HEADQUARTERS) SABAH, MALAYSIA

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ABSTRACT

A preliminary survey of mammal community was conducted in the secondary and primary forests along the Keningau-Kimanis Road (near Park Headquarters) from 16-22 October 1999. Traps and mist nets were used to capture small mammals while observational methods were used to record large mammal presence. From a total effort of 316 trap-days, 35 individuals representing 15 species of small mammals were captured. Half of the animals caught were bats. Five species were common to both secondary and primary forests, six species were caught in primary forest only and four in secondary forest only. Capture rates was 0.08 animal/trap-day for mousetraps in both secondary and primary forest habitats while the capture rate for bats was 0.39 and 0.13 bat/net-night in secondary and primary forests, respectively. In general, the primary forest seems to be more diverse compared to secondary forest in terms of the number of non-volant species. Bearded pig is the most common large animal in the secondary forest but no sign of this animal or any other large mammals were detected in the primary forest. None of the mammals are classified as threatened or endangered by IUCN.

INTRODUCTION

Crocker Range is a tropical highland that runs roughly parallel to the West Coast of Sabah and separates it from the interior of Sabah. This highland is divided into two management area, Kinabalu Park and Crocker Range Park. Crocker Range Park (CRP), enacted in 1984 and covering an area of 139,919ha, is located on the southwestern part of this range. It was established to protect the watershed of several rivers and to conserve the bill dipterocarp and montane forest which are habitats for a diverse community of flora and fauna. The park is surrounded by hundreds of villages of different ethnic communities who partially depend on the natural resources of Crocker Range for their livelihood.

Kinabalu Park has been the subject of numerous studies on small mammals (Junaini 1986, Lim and Heyneman 1968, Lim and Muul 1978, Lakim 1998 and Shukor 1997). These studies were chiefly concerned with the changes in diversity with increasing altitudes. However, very little published information is available on the small mammals of Crocker Range Park to the southwest of Mt. Kinabalu. For example, as part of a study on fleas and its host, 9 species of rodents were captured along the Kota Kinabalu-Tambunan Road (Injan 1987).

The objectives of this study are to compile an inventory of mammals at Crocker Range Park and to compare mammal species composition in secondary and primary forests. This information will be used to identify species that may require special attention for research and management

in future.

Several groups were involved in the mammal survey and covered different locations within the park; the group from USM sampled at Ulu Senagang (Tenom district) and Mahua (Tambunan district) while the UNIMAS group sampled along the Keningau-Kimanis Road (Keningau district). This paper reports the result of mammal survey conducted by the UNIMAS group.

MATERIALS AND METHODS

Study sites

The first site for the mammal survey was the secondary vegetation behind the Crocker Range Park Headquarters (GPS reading, 5°23.97'N and 116°06.19'E) located about 18km along the Keningau-Kimanis Road. The habitat consisted of thick secondary regrowth dominated by pioneer species, and in some patches by almost pure stand of wild ginger (family Zingiberaceae) and tall grasses (mainly *Pennisetum* spp.). The area was formerly managed and cultivated by a land development agency (Koperasi Pembangunan Desa) before it officially came under the jurisdiction of Sabah Park in 1998. A small stream flows down the mountain side near the Park Headquarters and supplies water to it. The vegetation near the stream consisted of old secondary forest which had been left untouched as part of stream reserve. The elevation at this study site ranged from 1000-1070m above sea level (a.s.l) and the hill slope was 5-20%.

The second site was in the primary forest located about 26km from Keningau along the Keningau-Kimanis Road. This tract of primary forest located on the left side of the road was chosen because it is closest to the road and therefore easily accessible for survey. The elevation at this site ranged from 800-900m a.s.l. and the hill slopes were steeper (20-60%). The habitat is classified as hill mixed dipterocarp forest (HMDF) and was dominated by emergent species including *Shorea* spp. and *Dipterocarpus* spp. The land on the right side of the road has been taken over by the local people who had declared their rights to own and cultivate the land.

METHODOLOGY

The survey was conducted on 16-18 October 1999 at the first site and 19-22 October 1999 at the second site. At both sites, the main method of survey for small mammals was by trapping. The presence of large mammals was indicated from observations of tracks and faeces as well as interviewing the local people. Mammal identifications were based on Payne et al. (1985). Weighing was done using Pesola Spring balance while all body measurements were made either with a digital caliper (Mitoyo Corporation) or with a stainless steel ruler. Tagging was done with a stainless steel clip containing numerical code and the word UNIMAS engraved on it. The tag was then attached to the animal via a necklace.

Forty local mousetraps baited with banana and sweet potato were placed about 25m apart on the ground along a winding jungle trail. The traps were checked between 7-9 am in the morning and 5-6 pm in the afternoon. Successful traps were rebaited and put back on the same spot after the

animal was removed. All animals were identified, weighed and their standard measurement recorded before being tagged and released.

Bats were captured using 10 mist nets and two harp traps. The mist nets (12m x 2.5m x 36mm; 4 shelves) and harp traps were placed at strategic positions across the probable flight paths of the bats. At the first site the nets were set up in the old secondary forest along the stream next to the Park headquarters. The mist nets were checked every hour from 7-10 pm and at 6.30 am the following day. All the bats captured were placed in cloth bags and brought back to the camp for identification. Their body weights and measurement were recorded before they were fitted with a UNIMAS identification tag and released. The same nets were used to capture birds during the daytime (Mustaffa et al. this volume). Some animals were euthanised and their tissue samples obtained for medical examination (Zunika and Siti Fairouz 2000 - this volume).

RESULTS AND DISCUSSION

A total of 35 individuals representing 15 species of small mammals were captured during this study. This small number of species however does not necessary mean that Crocker Range Park is depauperate, it may simply reflect the limitation in time and coverage of the study. Indeed the Crocker Range as a whole is quite rich in fauna as indicated by Lim and Muul (1978) who reported the occurrence of 101 species of small mammals including 13 which are arboreal and non-flying, 17 flyers, 11 gliders and 33 terrestrial groups. Based on the result of this expedition and examinations of specimens held in the Sabah Park mammal collection, Tuen et al. (2000) reported the presence of 41 species of bats including 11 megachiropterans and 30 microchiropterans from the Crocker Range area.

Seventeen of the animals caught using mist nets and harp traps were bats and the other 18 which were caught using mousetraps are squirrels, rats and treesbrews. Seventeen individuals were caught in secondary forest and 18 were caught in primary forest (Table 1)

Table 1. Trapping effort and number of captures in secondary and primary forest along Keningau-Kimanis Road, Crocker Range Park, Sabah.

	Secondary forest	Primary forest
Trapping effort (trap-days)	80	160
Trapping effort (net nights, include harp traps)	28	48
Total number of non-flying mammals	6	12
Total number of bats	11	6

Capture rate data is a useful indication of the relative abundance of animals. From Table 1 it can be calculated that the capture rate for rodents and shrews using mousetrap is 0.08 animal/trap-day in both secondary forest and primary forest. The capture rate for bats using both mist nets and harp trap is 0.39 and 0.13 animal/net-night in secondary and primary forest, respectively. Shahrul and Mohd Hifni (this volume) reported capture rate of 0.41 bats/net-nights at flu Senagang.

Previous studies on the small mammals at different elevation of Mt. Kinabalu Sabah recorded capture rates which varies with elevation. Lim and Heyneman (1968) reported capture rates of 2.8-7.9% with lowest capture rates at the mossy forest zone (2100-2600m a.s.l.) and highest at the lowland site near Tuaran Agricultural Research Station. Shukor (1997) reported capture rates of 5.4-16.3% with lowest capture rates at 700m a.s.l. and highest at 2200m a.s.l. Lakim (1998) reported capture rate of 3.3% and 1.6% for cage traps set on the ground and at the canopy level respectively, at Poring Hot Spring, Kinabalu Park. Our capture rate of 8% for Crocker Range Park is comparable to those in Kinabalu Park.

Table 2 shows the species of small mammals caught in secondary and primary forest. Five species were common to both secondary and primary forest, six species were caught in primary forest only and four in secondary forest only. None of these species were listed as threatened or endangered by IUCN.

Fruit and nectar bats were the most numerous of the small mammals caught (16 individuals) and were represented by five species, *Cynopterus brachyotis*, *C. horsfieldi*, *Megaerops eucadatus* and *Aethalops alecto*. The Short-nose fruit bat *Cynopterus brachyotis* and Tailless fruit bat *Megaerops eucadatus* were caught in both the old secondary and primary forest sites. The only horseshoe bat caught, *Rhinolopus trifoliatus*, was spotted roosting under a clump of palm and rattan leaves at the primary forest site and was later caught in a mist net placed close to this spot. All Myotis were caught in a harp trap placed near the Park Headquarters. With the exception of the Grey fruit bat *Aethalops alecto* which are mainly montane (Payne et al. 1985) the other bats have wide distribution from lowland to lower montane forest. Our data on the Trefoil horseshoe bat *Rhinolopus trifoliatus* is reinforced by the statement by Payne et al. (1985) that this species are found in the understorey of primary forest.

Our result seems to suggest that the primary forest have a greater diversity (7 vs 4 species) of non-volant small mammals compared to secondary forest. The Long-tailed giant rat *Leopoldamys sabanus*, the Dark-tailed tree rat *Niviventer cremoriventer* and the two squirrels (*S. brookei* and *S. lowii*) were found only in the primary forest. According to Payne et al. (1985) most of these animals prefer the tall trees of old secondary and primary forest; the House rat (*Rattus rattus*) and Lesser Treeshrew (*Tupaia minor*) however would be more at ease in heavily disturbed habitat near human settlements. Indeed, the two House rats we caught were from the hill just behind the Park Headquarters.

Studies by Lim and Heyneman (1968), Junaini (1986) and Shukor (1997) indicated that the Mountain Treeshrew, *Tupaia montana* is the most abundant species above 1200m a.s.l. This treeshrew has also been reported at Crocker Range 1200m a.s.l. (Payne et al. 1985). It has also been reported above 1350m a.s.l. along the Kota Kinabalu-Tambunan Road (Injan 1987). Our result seems to be one of the few records of this species occurring at lower elevation (800-1100m a.s.l.). This species however have been reported to occur at lower altitude in Sarawak (Payne et al. 1985).

Table 2. Small mammals of the secondary and primary forest along the Keningau-Kimanis Road, Crocker Range Park, Sabah.

Species	Secondary forest	Primary forest
BATS		
<i>Cynopterus brachyotis</i>	1M, 3F	3F
<i>Cynoptenis horsfieldi</i>	1M	-
<i>Megaerops eucudatus</i>	1M	1M
<i>Aethalops alecto</i>	1M	-
<i>Macroglossus minimus</i>	-	1F
<i>Rhinolopus trifoliatus</i>	-	1F
<i>Myotis muricola</i>	2M, 1F	-
SQUIRRELS		
<i>Sundasciurus brookei</i>	-	1M
<i>Sundasciurus lowii</i>	-	1F
TREE SHREWS		
<i>Tupaia minor</i>	2M	1M
<i>Tupaia montana</i>	1F	2M, 1F
RATS AND MICE		
<i>Rattus rattus</i>	2M	-
<i>Maxomys whiteheadi</i>	1M	1M, 1F
<i>Niviventer cremoriventer</i>	-	1M
<i>Leopoldamys sahanus</i>	-	2M, 1F
TOTAL	17	18

Sex: M = Male, F = Female

Based on their tracks, Bearded pig (*Sus barbatus*) is the most common large mammal in the secondary vegetation behind the Park Headquarters. These animals apparently fed on the patches of sweet potato and tapioca that were planted during the time when this part of the park was under the jurisdiction of Koperasi Pembangunan Desa, a land development agency. There were no signs of Bearded pigs on the steep slopes at the primary forest site but this does not rule out their presence in the valleys or during fruiting season.

The other large mammals that are present at Crocker Range Park, based on frequent sighting by the local people, are Sambar deer (*Cervus unicolor*) and the Masked Palm civet (*Paguma larvata*). The secondary vegetation is ideal for browsers such as deer and their presence is not surprising. In our visit to the local market in Keningau we saw several stalls selling wild pig and deer meat while other stalls sell live squirrels and civets in cages.

Bearded pigs and deer are often hunted and eaten by the local people resulting in the population of these animals declining at least in certain parts of Borneo where hunting surveys have been conducted (Bennett et al. 1995). Small mammals however are more affected by habitat loss and degradation and less by hunting pressure. With the establishment of Crocker Range Park the fate of these mammals seems secure but then again this depend on the effectiveness of law enforcement and cooperation of the local community.

Our study did not indicate the presence of threatened species in either the secondary or primary

forest habitats surveyed. However because of the limited nature of our survey, we could not rule out the presence of other species. Nevertheless, based on the comparatively greater diversity of small mammals and the presence of some montane specialist in the primary forest, it would seem prudent for the park management to preserve as much of this habitat as possible.

ACKNOWLEDGEMENT

We wish to thank the Organizers of the Crocker Range Park Expedition, and especially Sabah Park, for providing excellent field working environment. We are also indebted to the members of the wildlife team who braved the rain and rough terrain to help set the traps and erect mist nets; they are Besar Ketol, Isa Sait, Wahap Marni, Lizanah Wasly, Haidar Ali, Catherine Karim and Norashikin Mohd Fauzi. This study was supported by a research grant 187/99(41) from UNIMAS.

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