ISSN 0121 - 8126
VOL XV 1996/97

The Journal of

WILDLIFE AND PARKS

(Annotated Bibliographies of Completed Studies1941-1995)

ANNOTATED BIBLIOGRAPHIES OF COMPLETED STUDIES

1941 - 1995

CONTENTS PAGE

FOREWORD

The Department of Wildlife and National Parks-DWNP-(PERHILITAN), then known as the Game Department was mooted in 1896 and was formerly established in 1937. However, wildlife officers or wildlife rangers were appointed on a honorary or permanent basis by some state governments on an ad-hoc basic much earlier. The first salaried wildlife officer was appointed in the state of Perak in 1927 followed by appointments of other wildlife officers in the states of Negeri Sembilan and Pahang. The first law governing wildlife were formulated and known as the Wildlife Animals and Wildlife Birds Protection Bill in 1902. With the provision of this bill wildlife reserves were established, Chior, Perak (1903), Bukit Kutu, Selangor (1922), Bukit Sungai Puteh, Selangor (1923), Krau Pahang (1923) and Sungai Dusun, Selangor (1964). The wildlife reserves cover an estimated 146, 197 ha, and represents 5 percent of the total land area of Peninsular Malaysia.

In 1930, the Wildlife Commission was directed to investigate the status of the wildlife sanctuaries that had been established. The commission was headed by Mr. T.R. Hubback, an eminent naturalist. His devotion and dedication to wildlife resulted in the establishment of Taman Negara in Peninsular Malaysia in 1939, known as the King George V National Park. After independent in 1957, the Park is now known as Taman Negara or National Park. Taman Negara covers about 4343 km^2 encompassing three states, Pahang (2,472 km^2), Kelantan (1043 km^2) and Terengganu (828 km^2) and is even larger than the Gunung Tahan Wildlife Reserve which was established in 1925.

In the early days, the role of the Chief Game Warden was only to advise the Game Wardens in the various states (except the Superintendant of Taman Negara or King George V Parks) who were responsible to their respective state secretaries. In 1955, a legislation "Wild Animals and Wild Birds Protection Ordinance 1955" was passed. The ordinance provided more power to Game Wardens. It is to enable more wild animals and wild birds to be listed as protected animals. After the formation of the Federation of Malaya, the British Game Wardens were replaced by the locals. In 1960 a Malaysian, Mr. James Aw was appointed as the Chief Game Warden, later he was succeeded by Acting Chief Game Warden Mr. Bernard Thong who was in the capacity for 10 years, and subsequently Encik Mohd Khan Momin Khan was appointed the Director-General of the Department of Wildlife and National Parks. The latter held the position for 22 years, who perhaps held the position as the longest served Director-General in a department in the history of Malaysia. He retired in 1992.

The brief history of this Department would not be completed if mention is not made of the past British Game Wardens who were the pioneers of this department. They were Messers H.J. Kitchener, and other Game Wardens and Honorary Game Wardens,

like G.S. Olgilvie, G.T.C Metcalf, Robinson, A.M. Fetherenehough, A.H. Guel, and F.C. Foenander respectively. All these people were highly dedicated to the conservation and preservation of wildlife in the country. Their pioneering work on wildlife was the core keystone in the transformation of the natural history heritage.

The role of the Department gradually changed over the years. During the administration period of the Director-General, Encik Mohd Khan Momin Khan, the emphasis shifted from enforcement and licensing activities to rehabilitation and conservation of threatened and displaced wildlife species. Encik Mohd. Khan, realising the importance of wildlife research, brought in the first graduate officer, Encik Louis Ratnam to head the first Research Unit of the Department in 1972. Ex-situ centres to breed endangered species, such as rhinoceros, elephant, sambar deer and seladang were established in the Sungkai and Krau Game reserves. Hatcheries of river terrapins were established in Kedah, Perak and Terengganu to restock them to their natural habitats. To date over 30,000 young terrapins were released into the river systems.

In the late '70s and early '80s two groups of forester, biologist and zoologist with diploma and first degrees were employed to strengthen the research component of DWNP. Since then numerous activities from protection to rehabilitation and conservation of wildlife, species researches on keystone endangered vertebrate species (mammals, birds) to habitat preservation of wildlife were under taken by staff of the Department. In addition specialists such as botanist, mammologist, ecologist and conservationist etc. from research institutions both abroad and at home working collaboratively with the Department were and are being carried out. A Research Division was formerly established in 1974 headed by Encik Louis Ratnam who was later transferred to head the zoology section of the Forest Research Institute Malaysia (FRIM). Encik Jasmi bin Abdul , who succeeded him in 1986 has expanded the activities by including on inventory of invertebrate group, especially insects of economic and conservation importance.

Although the Research Division of the Department are not staffed with the typical research officers like in any other research institutions, nevertheless the wildlife officers and assistant wildlife officers, through their interests and love for wildlife, willingly undertake the additional research task. As of now, the Department has completed more than 400 research activities on various aspects of wildlife disciplines, such as biodiversity inventory (mammals, birds, reptiles), population studies of large mammals, breeding of endangered species, behavioural studies of specific groups of mammals, animal husbandry (including parasites) and conservation and management of critical species. DWNP is also involved in wildlife projects and its management for Government and Non-government agencies, such as the Kuala Lumpur International Airport (KLIA), Tasik Bera and Bagan Dato and also other Environmental Impact Assessments (EIA) projects for State Governments from time to time. Currently large scale biodiversity surveys such as Belum in Perak, Endau Rompin in Johor,

Krau Game Reserve in Pahang, Ulu Muda Forest Catchment Area in Perak and Taman Negara in Pahang and Terengganu are on-going projects. Most of the research studies were published. Some research findings have not been published due to lack of opportunities and restrictions . However, it is felt that a comprehensive up-to-date compilation of all published research would be useful. Published research in this case, refers from observations to field research activities. The aim of this publication is to bring together and briefly describe all the published reports by DWNP staff and also other collaborating scientists from institutions abroad and local between 1941 to 1995.

These research projects have incurred tremendous amount of input in the form of man hours in the field with limited financial resources provided by the Federal Government, and to some extent by outside agencies. The output of these researches is cost efficient and at the same time the values of these researches have been useful as input to the conservation and sustainable management of wildlife.

A total of 228 research papers have been published which are divided into two main groups, the invertebrate and vertebrate, and further categorized in eight subject matters. Under the invertebrate group, 18 papers have been published on parasites of small and large mammals and on general insects, primarily butterflies.

Under the vertebrate group, a total of 210 papers have been published. On these 26 are birds, one on fish, 68 on large mammals, 39 on small mammals, one on aquatic mammal, 23 on herpetofauna, 24 on animal husbandry and 19 on general conservation and management. In addition to the above, 9 papers were published on the flora only. Large mammals are important keystone species and highly popular because of their aesthetic existence and commercial value. Therefore it is only natural that more concentrated effort was made to study this group of species with the aim to conserve them in a sustainable way.

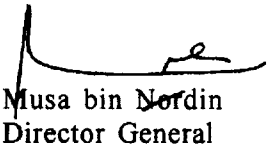
Almost all the published papers on small mammals are related to inventory and species diversity. Papers on animal husbandry were more confined to those threatened and rare large mammals species. The DWNP is also in the global play in bird-ringing programme, primarily on inventory of migratory birds in coastal and wetland areas of Peninsular Malaysia. Almost all the study leads to the call for the greater protection and conservation of the habitats which are also of great aesthetic and recreational significance to the country.

In taking stock of the applicability of all these published research activities, there were quite a number of papers deal with pure research. This is essential to understand the biology and ecology of flagship species and also the general biodiversity. It is acknowledged that future research programmes should be geared towards solving problems and issues pertaining to the sustainable management of the bio-diversity

and protected areas of the country. DWNP has also established a museum for scientific vertebrate specimens collection in 1987. To date more than 5000 vertebrate specimens (mammals, birds, amphibians and reptiles) and cover over 700 species of this vertebrate groups and they are properly curated. A small collection of about 700 species of invertebrates with emphasis on insects and ectoparasites was also deposited in the museum. The collection will increase over time with the aim of establishing this meseum as the Centre of Scientific Vertebrate Reference Collection in the country. The museum is open to all groups of people, such as school chidren, researchers from universities in Malaysia and visiting scientists from all over the world.

The staffs of this Department are to be congratulated for the progress made during all these years. The compilation of this work would not be possible without the assistance of the Heads and the scientific staff of each of the research section under the present leadership, Encik Jasmi bin Abdul. Therefore, my appreciation are due to them, particularly to Encik Sivananthan Ellagupillay, Encik Pan Khang Aun, Encik Saharudin bin Anan, Encik Burhanuddin bin Haji Mohd Nor and the staffs of the Division of Management Information System for their contribution to the completion of this work, and to Dr. Lim Boo Liat and Cik Norsham Suhaina Yaakob for their valuable and leading role in undertaking this work.

Finally a few words are needed on the presentation of this compilation. The publications are arranged according to subjects. The subject index and author index at the end of the compilation give the abstract number(s) where the particular publication(s) could be located.



Musa bin Nordin
Director General
Department of Wildlife and National Parks
Peninsular Malaysia

MAMMALS

existing 2 months to 1 month and only male deer be allowed to be harvested. Also the number of licenses issued for each year should be limited.

HABSAH MUDA 1984. Sambar Deer biological data collected from seven states of Peninsular Malaysia during hunting seasons October to November 1982 and 1983. J. Wildl. and Parks 3: 1-17

The survey of Sambar Deer in the seven states was carried out by distributing questionnaire forms to the states concerned. The feedback in 1982 out of 519 licences issued, 108 deer were shot as compared to 618 licences with 110 killed in 1983. The mean individual killed per licence was 0.21 in 1982 and 0.18 shot in 1983. The sex- ratio was 2:1 in 1982 as compared to 1:1 in 1983. The low number of animals shot during 1982 and 1983 (108 and 110 individuals) in the seven states in Peninsular Malaysia indicated a low density of deer despite the fact that the hunting season was closed for breeding past five years. Such low density was probably due to a rapid and prolonged loss of habitat.

MOHD KHAN BIN MOMIN KHAN 1968. Deer biological data. Malay. Nat. J. 21: 159- 164.

The paper gives description of size and other measurements of deer killed in Perak during 1968.

MOHD KHAN BIN MOMIN KHAN 1967. Population trends of deer in Perak as seen from Licence Reports. Malay. Nat. J. 20: 24-16

The paper provides number of deer reported killed by licensed hunters for a period of 7 years.

KITCHENER, H. J. 1961. The Sambar Deer- *Cervus unicolor equinus*. Malay. Nat. J. 15: 52-61

The paper gives physical description and notes on behaviour and feeding of both young and adult animals. There are also interesting anecdotes on interactions between deer and wild dogs and between tiger and seladang (gaur).

BURHANUDDIN MOHD NOR, MOHD SHARIFF DAIM, ZETI JANI AND KAMARIAH HASAN. 1995. Preliminary analysis on the use of satellite telemetry in monitoring elephant movements in Taman Negara Terengganu. J. Wildl. and Parks 14: 117-125

The use of satellite telemetry was introduced to monitor the movements of Asian elephants in Taman Negara Terengganu. The method was found to give more reliable result on the elephant movements compared to ground transmitter. Quality signals were obtained normally when the the animal was in the open areas like the forest fringes, plantations, rivers, and large water bodies. However, the quality of signals transmitted was found to deteriorate towards the end of the study period. Despite the above, this method would enable researchers to study the movements of translocated elephants in tropical forest.

HASSAN B. KASSIM 1994. Pemerhatian awalan gajah jinak yang dipindahkan ke Tasek Kenyir Terengganu Darul Iman. J. Wildl. and Parks 13: 8-16

Two tamed elephants, 'Gawi' and 'Pagi' were fitted with radio transmitters before being released to Tasek Kenyir, near Taman Negara Terengganu. The elephants were monitored for 166 days from October 1992 to December 1993. Gawi was observed 19 times using the telemetry receivers. However, Pagi could not be traced after the release. The physical condition of Gawi was better than before it was released and was able to adapt to the new surrounding. The elephant was found to cover an area of about 10.5 km^2.

HASSAN KASSIM 1991. Preliminary study of translocated elephants at Sungai Chenana, National Park, Terengganu. J. Widl. And Parks 11: 69- 75

The study was to investigate the status of elephants that have been translocated to Sungai Chenana within the National Park at the Trengganu border. Since 1989 till September 1992, 38 elephants comprising (3 juveniles, 12 sub-adults and 23 adults) comprised 18 females and 20 males were translocated in Sungai Chenana. Earlier in 1984, nine elephants consisting (a calf, 3 sub adults and 5 adults) of 5 females and 4 males were translocated from Buai Island. Altogether, a total of 47 elephants of various ages were translocated to Chenana. The earlier group of 9 elephants had established well in the translocated area and at least 3 calves were born since 1984. The latter group were scattered all over the area either into small group of 2 to 4 animals or moving solitary and no sign of reproduction by this group was observed.

SAHIR OTHMAN 1990. Biometric relationship of elephant measurements, J. Wildl. and Parks 9: 125-131

Data measurements of shoulder height and front foot diameter were gathered from 250 elephants captured since the beginning of elephant capture operation in 1974. An analysis was made to determine the relationship between male and female elephants. It was found that male elephant has greater measurements of shoulder height and foot diameter than the female. The regression line of male elephant ($y = 4.772 + 5.795x$) is steeper than the female ($y = 4.479 + 5.694x$).

SAHIR BIN OTHMAN 1986. Elephants population, distribution and population growth in the State of Johore. J. Wildl. and Parks 5: 93-102

The survey on the population and distribution of elephant in the State of Johore (Kota Tinggi, Kluang, Mersing, Segamat) was based on reports and data collected by rangers of the Elephant Control Unit during their routine works. The number of elephants for 1983 was 105 individuals as compared to 70 in 1981 showing 50 percent increase in population size in 1983. The 105 individuals comprised 30 males, 41 females and 34 young animals as compared to 24, 22 and 24 in 1981. Thus the population increase in 1983 was the result not only due to the discovery of more new herds but also a higher breeding activities in the wild.

HASSAN KASSIM 1986. The elephants in Pulau Besar, Kenyir Dam. J. Wildl. and Parks 5:103-109

In February 1985, 11 elephants from Jerantut District, Pahang and Sungai Gawi, Ulu Terengganu were translocated to Pulau Besar, the largest island in the reservoir which was created by the impoundment of Kenyir Dam. A follow-up study to monitor the movement using general survey and census to monitor the movement of these animals in its new habitat was carried out from April 1985 to February 1986. The study revealed that the range of these elephants had utilized almost the whole island and the home-range is restricted around the perimeter of the island which is about 96 km.

MOHD KHAN BIN MOMIN KHAN 1985. Population and distribution of the Malayan Elephant, *Elephas maximus* in Peninsular Malaysia. J. Wildl. and Parks 4: 1-16

An attempt was made to determine the population of elephant in Peninsular Malaysia based on data collected by the State Directors of the Wildlife and National Parks. The population was estimated to be 796 animals ranging from 6 animals to 166 animals in each of the states surveyed. States like Pahang and Perak have the highest number being 212 and 126 individuals were counted, and the lowest number of animals of 6 individuals each were in the states of Perlis and Selangor. Taman

Negara National Parks which embodies the boundaries of three states, Pahang, Johore and Kelantan, 166 animals were counted. There is no elephant in the states of Malacca and Penang.

HASSAN KASSIM AND UDADIN A/L KELING 1985. Dependence of *Elephas maximus* on rural agriculture. J. Wildl. and Parks. 4: 92-104

The paper describes a number of factors which have resulted in elephants (*Elephas maximus*) depending on rural agriculture with the reduction or destruction of their habitat. The readily available food in the villages encouraged the elephant to visit these areas. However, forested areas are still needed as refuges. Monitoring work was made difficult because the villages, secondary forest and agricultural areas developed on an *ad hoc* manner.

SAHARUDDIN BIN ANAN 1982. An experiment of utilisation of electric fence as a deterrent to crop damage by elephant. J. Wildl. and Parks 1: 23-27

The electric fence was one of the methods experimented to control elephants (*Elephas maximus*) from damaging crops. A group of six animals were involved in the damage of oil palms (*Elaeis quineensis*) on a FELDA scheme at Kemasul, south-west of Triang about 83 km from Temerloh, Pahang. Electrified wires carrying a pulse current of 5,000 volts, each pulse lasting for 0.03 millisecond were used. Damage crop figures were collected and compared before, during and after completion of fence construction. There was a reduction in both the number of damaged palm and frequency of elephant entry soon after the electric fence was put into operation.

MOHD KHAN MOMIN KHAN 1983. Age composition of the Malayan Elephant. J. Wildl. and Parks 2: 61-69

An analysis is made of the age composition of seven herds of elephants in Peninsular Malaysia. The Malayan Elephant has a long gestation period of 22 months. Young animals become sexually mature between 8 and 12 years. The sex ratio at birth is determined and found to be 100/100 with males leaving the herd on reaching maturity or decreasing through shooting. After birth the Malayan Elephant breeds again after 4 years and 4 months indicating a low rate of productivity.

MOHD KHAN BIN MOMIN KHAN 1977. The three senses of the Malayan elephant. Malay. Nat. J. 30: 31-34

Notes on elephants' sense of smell, sense of sight and sense of hearing; sense of smell seems to be the most important.

MOHD KHAN BIN MOMIN KHAN 1977. On the population and distribution of the Malayan elephant. Malay. Nat. J. 30: 1-13

The paper brings up-to-date on the present elephant population in Peninsular Malaysia and on the distribution of the herd.

MOHD KHAN BIN MOMIN KHAN 1977. Ageing of elephants: estimation by foot size in combination with tooth wear and body dimension. Malay. Nat. J. 30: 15-23

Attempts to relate approximate age to body dimensions, tooth wear and weights of 30 male elephants (*Elephas maximus*) collected in the State of Perak, Pahang, Johore and Terengganu.

MOHD KHAN BIN MOMIN KHAN 1977. Reproduction, productivity and mortality of the Malayan elephants. Malay. Nat. J. 30: 25-30

Study of reproduction, sex ratios of herds, mortality rates and birth rates among elephants in Peninsular Malaysia.

MOHD KHAN BIN MOMIN KHAN 1977. Utilization of plants and fruits by elephants. Malay. Nat. J. 30: 35-38

The study revealed 60 species of plants known to have been eaten by elephants, with details of their elevation, use and availability.

MOHD KHAN BIN MOMIN KHAN 1969. Population and distribution: studies of Perak elephants. Malay. Nat. J. 23: 7-14

Reports on the population and distribution of elephants in the State of Perak and also gives the cause of death in 15 youngs and 73 adults over two decades.

MOHD KHAN BIN MOMIN KHAN 1967. Movements of a herd of elephants in the upper Perak area. Malay. Nat. J. 20: 18-23

The paper records the movements of a herd of elephants, which has been studied for the purpose of managing the herd. Nine elephants were observed over a period of 5 years on approximately 50 occasions.

MOHD KHAN BIN MOMIN KHAN 1965. Problems with elephants, and where it is in danger in the State of Perak. Malay. Nat. J. 19: 138-140

A review of the problems and reasons for the decrease in elephants in Perak as well as an estimate of the number which may have been there at that time.

SHEBBEARE, E. O. 1940. An elephant trek. Malay. Nat. J. 1: 9-14

The author gives an interesting account of travels with elephants.

ZAINAL ZAHARI ZAINUDDIN. 1995. Review of Sumatran Rhinoceros (*Dicerorhinus sumatrensis*) population in Peninsular Malaysia. J. Wildl. and Parks 14: 1-15

The first comprehensive review of Sumatran Rhinoceros population in Peninsular Malaysi was made in 1984. Since then, population estimates were made on an *ad hoc* basis. In 1995, an effort was made to estimate the current population based on the more intensive and systematic surveys. In general, the population of Sumatran Rhinoceros in Peninsular Malaysia was observed to decline at an alarming rate. Factors that attributed to the decline included habitat loss, poaching and displacement of the rhinos into other forest reserves. Further surveys are necessary to provide an accurate population estimate for the country. However, it was strongly emphasized that the present known population should be provided with the maximum protection from habitat degradation and poaching. It was also recommended that the number of rhino protection units be increased and trained as permanent staff; increase protection of sensitive areas; increase surveys to include all forest reserves and the Main Range; capacity building; initiation of GEF Phase II with inclusion of fund raising programmes; accelerate village outreach projects; collaborative effort with the Department of Forestry on saving the species and establish captive breeding nucleus within a fenced up Game Reserves in Krau and Sungai Dusun. The situation with the Sumatran Rhinoceros in Malaysia demands a comprehensive multifaceted conservation strategy to ascertain a sustainable population growth. The key population requires immediate protection from poachers, habitat encroachment and degradation.

MOHD SAMSUDDIN MOHD SURI 1990. Sumatran Rhinoceros survey in the upper Sungai Selama, Perak. J. Wildl. and Parks 9:103-111

A survey on Sumatran Rhinoceros in the upper Sungai Selama, Perak was carried out from 11-21 July 1990. The survey area covers about 10,000 ha of the lower and upper part of Selama river basin and to the top ridges of the Gunung Titiwangsa, Gunung Inas, Gunung Ulu Jernih and Gunung Ulu Teras. The presence of rhinoceros in area was determined by fresh rhino tracks, wallows, faeces, etc. A total of 6 rhinoceros the were estimated in the 10100 ha area including one animal sighted. They were found at the lower and the upper reaches of Sungai Selama, Sungai Samar Gagak, Sungai Rambong, Sungai Sera Rimau and also on the mountain ridges at Gunung Titiwangsa, Gunung Inas, Gunung Ulu Jernih and Gunung Ulu Teras.

FLYNN, R. W. AND MOHD. TAJUDDIN ABDULLAH 1983. Distribution and number of Sumatran rhinoceros in the Endau-Rompin region of Peninsular Malaysia. Malay. Nat. J. 36: 219-247

A study of Sumatran Rhinoceros, *Dicerorhinus sumatrensis* in the Endau-Rompin region was carried out from 1975 to 1981. An estimation of 20-25 individual animals was found present in the region.

KHAIRIAH MOHD SHARIFF 1983. Status and distribution of Sumatran Rhinoceros (*Dicerorhinus sumatrensis*) in Peninsular Malaysia. J. Wildl. and Parks. 2: 93-102

The survey was carried out in Kuala Tahan, Sg. Tanum, Ulu Spia, Ulu Tahan and Sg. Sat in Taman Negara, Ulu Selama, Perak, Tenggaroh, Endau Rompin, Bt. Gebuk in Pahang and Johore and Sg. Dusun in Selangor from May 1982 to March 1983. Direct observation of the animals was encountered once and confirmation of the presence of the rest of the animals was based on footprints in all the areas surveyed. The survey revealed that at least 10 rhinoceros inhabit Taman Negara while between 29-38 animals were estimated to inhabit in other surveyed areas outside the Park. Apart from these, other areas such as Kuala Balah and Sg. Dipak in Kelantan, Ulu Lepar and Krau Reserve in Pahang, Ulu Belum in Perak, Gunung Blumut in Johore and the Kedah borded an estimate of 14-26 animals have been known to inhabit these areas. Taking all these figures into consideration the total estimated number of Sumatran Rhinoceros is between 52-74 individuals in the whole of Peninsular Malaysia.

MOHD ZUBER BIN MOHD ZAIN 1983. A review of the status and approximate range of Sumatran Rhino population in Sg. Dusun Game Reserve and surrounding areas. J. Wildl. and Parks 2:1-35

This paper is essentially a review of the earlier findings by D. L. Strickland with respect to the status and home-range of the Sumatran Rhinos in Sg. Dusun Game Reserve and the surrounding area. This study reveals that the ranged described earlier is essentially a part of movement within the core area; an area that span between the Northern and the North-western half of the reserve towards Sg. Bernam. During the course of study we found abundant rhino signs on both sides of Bernam river from the DID headworks to the point where Sg. Dusun joined Sg. Bernam. Signs were also found South of Felda Besaut 4 and therefore the core area defined earlier should also include this recent findings. Total excursion range of the Sumatran Rhinos should include a movement typical of this animal but irregular referred as 'wandering'. A factor yet to undetermined prompted the individual to abandon the usual pattern on movement within the core area and embarked on a far ranging journey.

A rhino survey was undertaken to determine the status of the population. From the results obtained it was deduced that the minimum population consists of five animals. A pair believed to be a mother and a semi-independant calf were found within the reserve and this reproduction indicated that the population is viable.

A project to increase food supply was initiated. It was observed that Bertam, which was extensive here, had a suppressive effect on the regeneration of plants, which form the major supply of rhino food. Cutting of Bertam increased regenerations and it was observed that rhino began visiting this area.

In those areas where food is scarce planting of rhino food plants is recommended. It is hoped that the increase in food supply will increase carrying capacity and will confine the rhinos in a smaller area in the reserve thus encouraging mating.

Conservation measure taken were mentioned and several conservation proposals were highlighted. Dangers threatening the population were discussed and possible solutions forwarded. The population has a good future.

MOHD TAJUDDIN BIN ABDULLAH 1982. Sumatran Rhinoceros in Endau-Rompin and future. J. Wildl. and Parks 1: 19-21

The effects of logging in an area inhabited by rhinoceros affects its population distribution. *Dicerorhinus sumatrensis* does not re-establish itself in disturbed forest of Endau-Rompin, Lower Sungai Endau, Sungai Selai and Sungai Juaseh-Sungai Kemidak are three main rhinoceros areas. These areas are greatly accessible on foot along logging roads and jungle tracks, and thus poses a great danger to rhinoceros conservation. Regular patrols and public relation works are among the vital tools to ensure perpetual survival of the endangered species.

METCALFE G. T. C. 1961. Rhinoceros in Malaya and their future. Malay. Nat. J. (special issue) 183-191

The paper discusses the historical and present status of *Rhinoceros sondaicus* and *Dicerorhinus sumatrensis* and discusses the ecology of the latter and the need for conservation measures.

FETHERSTONHAUGH, A. H. 1951. Rhinoceros. Malay. Nat. J. 5: 191-193

Refers to Burgess (5: 163) and comments on the importance of identifying the existence of this animal and lists five good characteristics to be used in its identification.

EBIL BIN YUSOF 1991. The study of forage utilization of seladang in Ulu Lepar, Pahang. J. Wild. and Parks. 11: 1-11

A forage utilization study of seladang (*Bos gaurus hubbacki*) was carried out in Block B, Pahang Oil Palm Estate in Ulu Lepar, Maran, Pahang. The study area covers approximately 3000 ha. It comprises three compartments of seladang habitat, namely primary forest, secondary forest and agriculture scheme. The altitude ranges from 50 m up to 300 m asl. Forty-five sample plots each of 0.004 ha circular size along transects (compass lines) passes at 20 m intervals were determined by random number tables. The study showed browsing rates of seladang under 5 categoris of vegetation, namely Rumput chengkenit (*Paspalum conjugatum*) (D1), Lalang (*Imperata cylindrica*) (D2), Selaput tunggul (*Centrocima pubscons*) (D3) shrubs (D4) and seedlings (D5) not equally preferred by seladang was highly significant ($P < 0.0076$). Seedlings (D5), amongst the 5 vegetation categories was found to be highly preferred with 80 % browsing rate. In addition, the pairs of D5-D4, D5-D3, D4-D3 and D3-D1 variables were found not significantly different. But the pairs D5-D1, D5-D2, D4-D1, D4-D2 and D3-D2 variables showed significantly different in terms of browsing rates.

EBIL YUSOF 1990. Drug dosage regression analysis for seladang. J. Wildl. and Parks 9: 112-127

A study of drug dosage in relation to age, weight, chest circumference, and horn length of seladang (*Bos gaurus hubbacki*) was made at Ulu Lepar, Pahang through the forested region and private oil palm estates during 1980-1984. Using Backwards Elimination Model Selection (BEM), the test was able to determine the relationship to the above parameters. Body weight of seladang was highly significant ($P < 0.020$) to the drug dosage which was the variable. The other 4 testing parameters, Horn ($P< 0.6788$) in step 1, Circumference ($P<0.07866$) in step 2, Age ($P< 0.4755$) in step 3 and Height ($P<0.4207$) in step 4 had been removed successfully. Thus it could be revealed that body weight was more highly significant to the drug dosage compared to horn, chest circumference, age and height. Since body weight functioned as a determinant for capturing seladang, it should be taken as accurate as possible. Therefore, determining for accurate dosage during drugging operation on seladang based on body weight may be an important technique.

SAHARUDIN ANAN 1984. Habitat suitability index model: Seladang (*Bos gaurus hubbacki*). J. Wildl. and Parks 3: 68-74

The habitat suitability index (HSI) model for seladang used in this paper is to consider specific variables and its relationship to life requisites. It attempts to document the logic and assumptions used to transform habitat information for the seladang to variable and equations used in the HSI model.

EBIL YUSOF 1984. The relation of body circumference to horn development of two seladang raised in captivity. J. Wildl. and Parks 3:55-62

The study attempts to study the growth of seladang particularly its horn and body girth. Measurements of both horn and body circumference were taken from two captive seladangs, a male named Ahad and a female, Baik in Zoo Melaka. A total of 18 measurements was made from the former and 17 from the latter which was taken from 21.4.81 to 8.11.83. Comparing the body circumferences of the two seladangs in the paddock, the female was much larger in size. However, significant correlation was found between the horn and body weight ($x = < 1.0$).

ZULKIFLI ZAINAL 1983. A preliminary observation on the effects of the development and logging on the numbers, distribution and movement of seladang in Ulu Lepar, Pahang. J. Wildl. and Parks 2: 151-160

The survey was carried out in Ulu Lepar which encompasses the entire upper reaches of the Lepar river and also that of the Lui river which also include part of the Tekam river and Tekal valley. The 1980 seladang census in Ulu Lepar, Pahang revelead at least 96 animals in 7 herds identified by locality. The present census in 1982/83 showed that at least 61 seladang in 9 herds are present in Ulu Lepar. The fate of at least 35 animals is yet to be studied. Thus preliminary report also mentions the possible new areas visited by seladang in that study area. Concern for the fate of gaur herds faced by development and logging at Ulu Lepar initiated the present study.

EBIL BIN HJ. YUSOF 1982. Habitat requirement for the Malayan Gaur. J. Wildl. and Parks 1: 7-16

The rapid and extensive development of the lowland dipterocarp rainforest is seriously affecting the Seladang (*Bos gaurus hubbacki*). Its natural habitat of lowland riverine forest is being greatly depleted by development schemes such as agricultural plantations, extensive logging, hydro electric dams and human settlements. Field surveys of six seladang area in the States of Pahang, Johore, Terengganu and Kelantan have revealed that they were affected or threatened in the near future by such development. In a more intensive study of seladang food requirement in the Lepar River Valley, Pahang, radio telemetry techniques were used. Telemetry locations of 3 animals over a 14 months period indicated a heavy use of disturbed areas by the animals. The percentage usage of secondary forest was about 73%, fringe area 45% and palm oil plantation area 20%, respectively.

MOHD KHAN BIN MOMIN KHAN 1973. Studies of the Seladang (*Bos gaurus*) in the State of Perak. Malay. Nat. J. 26: 163-169

Population of seladang (*Bos gaurus*) in Perak is estimated at 86 individuals; details of population and age structure are given, together with habitat requirements including a list of plants eaten by seladang.

WEIGUM, L. 1971. The last refuge. Malay. Nat. J. 24: 132-137

Describes aspects of seladang (*Bos gaurus*) ecology and suggests that Taman Negara may be the last refuge of the species.

OGILVE, C. S. 1954. The behaviour of seladang (*Bos gaurus*). Malay. Nat. J. 9: 1-10

Observations made over a period of over seven years on a herd in Taman Negara. Particularly interesting are the descriptions of their interaction with a series of other animals.

HISLOPS, J. A. 1950. The story of a Tapir. Malay. Nat. J. 17: 266-267

Two anecdotes about tapir in captivity, one having a very interesting note that the tapir remained under water for at least several minutes without any disturbance in the animal.

ABDUL KADIR ABU HASHIM AND MAAROF HASSAN. 1994. Preliminary survey of serow in Perlis. J. Wildl. and Parks 13: 52- 57

A study on the distribution and population of serows was conducted at Bukit Bintang Forest Reserve (Bukit Batu Pahat and Alor Kangar) and Mata Ayer Forest Reserve (Wang Mu and Wang Kelian) in the State of Perlis during June, July and December 1993. The survey estimated the presence of between 3-5 serows in Bukit Batu Pahat, 4-5 serows in Alor Kangar 6-9 serows in Bukit Wang Mu and 1-2 serows in Bukit Gua Burma (Wang Kelian).

MUSTAFA ABDUL RAHMAN, RICHARD, X. M., ROZYATI, T.H. AND ZAINAL ZAHARI Z. 1991. Notes of the skeleton of the serow (*Capricornis sumatrensis*) J. Wildl. and Parks 11: 24-27

An adult serow was captured in Negeri Sembilan which later died due to capture myopathy, and a preliminary observation of the oesteology was made. The complete skeleton of this serow was examined and compared with the skeletons of the ox and sheep. The total number of bones counted of the serow was 188-190 (excluding the hyoid bones and the auditory ossicles). The results showed there were no differences in the number of bones in the cervical, thoracic cage, forelimbs and hindlimbs among the three species of animals. However, differences were noted in the number of bones in the lumbar, sacrum and coccygeal. The number of bones in the lumbar and sacral vertebrae of the serow is similar to that of the ox, but differs from that of the sheep.

MUSTAFA ABDUL RAHMAN, MAAROF HASSAN AND SABRI ABD. RAHMAN 1990. Reconnaissance survey of serow in Pelangai Forest Reserve, Negeri Sembilan. J. Wildl. and Parks 9: 59-64

A reconnaissance survey of serow (*Capricornis sumatrensis*) in Pelangai forest reserve, Negeri Sembilan was conducted in January 1990. This was to find out location and number of serows in the area before capture operation started. The survey was done by tracking along the abandoned road. Tracks of 13 animals were recorded. A shelter cave was found where conspicuous and climbing marks were observed. Pelangai Forest Reserve was found to be a suitable area for serow capture work.

RAHIM AHMAD 1986. Behavioural studies of serows (*Capricornis sumatrensis*) at the Air Keroh Zoo in Malacca. J. Wildl. and Parks 5:85-92

Observation on the behaviour pattern of a pair of captive serows (*Capricornis sumatrensis*) at the Air Keroh Zoo, Malacca was carried out 3 days on August and September, 1986. Observation time from 0700 to 1800 hrs was made for each day. The scan sampling method (Lehner 1979) was used to collect data on the behaviour of the serows.

The behaviour pattern studied includes feeding, resting, moving, agonistic, autogrooming and interactions. Both the male and female animals spent most of their time resting while the male rest more frequently than the female. The degree of activity in terms of feeding, moving and agnostic behaviour are high in female, while the grooming frequency appeared to be high in the male. Feeding activities were high between 1200 hr and 1300 hr than any other period of the day, which was associated with the food supply by the keepers in the late morning. In the wild, the feeding activities occur in the early morning and late evening.

RAHIM AHMAD 1985. Preliminary observation on serow (*Capricornis sumatrensis*) at Klang Gates, Selangor and Kenyir Dam, Terengganu. J. Wildl. and Parks 4: 17-19

The survey of serow in both Klang Gates, Selangor and Kenyir Dam, Terengganu was based on indirect observation (track marks), direct observation (animal seen) and artificial salt licks (salt was inserted in a bamboo tube and hung in a chosen spot). During the survey the animal was only sighted twice and both occasions at Kenyir Dam, Terengganu. In Klang Gate, 5 track marks of different sizes of the animal was found while 6 track marks were seen at the Kenyir Dam. The result of the survey revealed that the population of serow (*Capricornis sumatrensis*) is relatively small, and this could be due to logging in the hill dipterocarp forest together with poaching probably the main factor that cause the decline of the species.

MD. YUSOF SAID AND IBAK 1984. Notes on serow (*Capricornis sumatrensis*) in captivity in West Malaysia. J. Wildl. and Parks. 3; 89-94

On 25 May 1978, Zoo Negara acquired a female adult serow named "Subang" was caught in the neighbourhood of Subang International Airport, Kuala Lumpur. On 5 January 1980, a male serow was captured at a dusun in Ulu Langat name "Rujang", the latter was paired with Subang. From 1980 to 1984, a record of seven births was produced by this pair. From the breeding results it revealed that captive breeding of this endangered species is viable. The breeding success of this species in captivity has a far reaching effort for future restocking of this animal back to nature.

KHADIJAH BTE OTHMAN 1990. Notes on wild pigs of Taman Negara. J. Wildl. and Parks 10: 164-165

Two species of wild pig (*Sus scrofa*) and the bearded pig (*S. barbatus*) were found in Taman Negara. Among the behaviour described were feeding, social, nesting and farrowing.

SAHIR OTHMAN, LAWUNG BALUN, SOFYAN ZAINAL, RIGWAN 1989. Disturbance of the forest floor by bearded pig in different habitats. J. Wildl. and Parks 8:53-61

A preliminary study was carried out to investigate the extent of pig disturbance within different habitat types. It was found that more disturbances occurred on alluvial bench habitat than on lowland sandstone, while no disturbance was observed on peat swamp habitat. Generally, the trend of pig disturbance showed a gradual decline in number with increase in slope. It was also noticed that there were substantial amounts of repeated disturbances especially on alluvial bench habitat.

HISLOPS, J. A. 1952. More about the Bearded Pig. Malay. Nat. J. 7: 22-23

The note contains photographs and measurements of a young boar and comparison of skulls.

HISLOPS, J. A. 1951. Pig snares. Malay. Nat. J. 5L 107-108

Discusses the catholicity of the catch in pig snares, and comments on the dangers of snaring elephant and tiger.

HISLOPS, J. A. 1949. Some field notes on the Bearded pig. Malay. Nat. J. 4(2): 62-65

A discussion of physical characteristics of the common wild pig (*Sus scrofa*) in comparison with those of the bearded pig (*Sus barbatus*). Also locations at which the bearded pig has been seen and some anecdotes on comparative behaviour.

RAHMAT TOPANI. 1990. Status and distribution of tiger in Peninsular Malaysia. J. Wildl. and Parks 9:71-102

Research on the status and distribution of tiger (*Panthera tigris corbetti*) in Peninsular Malaysia was carried out from 1988 to 1989. Information was gathered from surveys, interviews with villagers affected by livestock predation by tiger and reports gathered from district offices of the Department of Wildlife and National Parks (DWNP). Areas with frequent reports of tiger were surveyed to determine its presence, number and habitat. The status and distribution of tiger in 8 states and Taman Negara was determined. The tiger population was estimated to be between 491-510 animals with Terengganu having the largest population (109), Pahang (84-99), Perak (81), Kelantan (65-69), Johore (38-40), Kedah (14), Selangor (10-13), Negeri Sembilan (9-13) and Taman Negara (72). No tiger is reported in Pulau Pinang, Perlis, Malacca and the Federal Territory.

MOHD KHAN BIN MOMIN KHAN 1986. Tigers in Malaysia: Prospects for the future. J. Wildl. and Parks 5: 1-23

The paper reports on the status of the tiger population up to 1976 which was estimated at about 300 heads throughout Peninsular Malaysia. This was based on surveyed figure based on sighting and tracks made by the different State Wildlife Departments throughout the country. Tigers which are mainmed by firearms and steel wire snares which latter were shot by personnel of the State Wildlife including those shot and killed by the orang asli since 1947 to 1985 accounted for 378 heads. Since 1972, active conservation efforts were taken by the Wildlife Department coupled with increase of wildlife reserves and sanctuaries, tiger population appeared to increase in numbers.

JASMI BIN ABDUL 1986. Case study of man-eating tiger in Pahang. J. Wildl. and Parks 5: 143-147

The paper described four cases of tiger and leopard attacks in Pahang. On 12 March 1985, a 34 year man was attacked and killed by a female tiger at Kg. Kumbang Ulu, Merapoh, Kuala Lipis while on 26 April 1985 a young male orang asli was also attacked and killed by a male tiger at a logging kongsi at upper Sg. Kerom in Tekai Forest Reserve, Ulu Tembeling, Jerantut. The female man-eating tiger was later shot dead by a game ranger while the male tiger was not found after being pursued for several days. The third male tiger had killed 4 cattles before being shot dead by a game ranger on 10 May 1985 at Kg. Jerai, Ulu Cheka, Jerantut. On 17 April 1985, a Black Panther (*Panthera pardus*) attacked a 3 year old Malay boy playing near his house in the evening at Kg. Ganchong, Pekan. The boy escaped death as he was saved by his father who managed to scare the animal away.

SIVANANTHAN ELAGUPILLAY 1984. Territorial range of an adult tigress at the Behrang Ulu Cattle Farm. J. Wildl. and Parks 3:63-67

The survey is to look into the territorial range of an adult tigress (B1) and its relation to the adjacent farm. Tracking of B1 was done by locating it and identifying its pug marks. Observation shows that B1 movement ranges five miles to the north and two miles to the east of the Behrang Ulu Cattle Farm. It has become less dependant on cattle and is able to establish itself a far ranging territory as a normal tiger. Its territory overlaps with part of the farm which result in occasional attacks of some cattle introduce into these paddocks.

SIVANANTHAN T. ELAGUPILLAY 1983. Livestock depredation problem by tigers in cattle farms. J. Wildl. and Parks 2 : 114-150

A survey on the livestock depredation problem by tigers in two cattle farms namely Darabit, Pahang Tenggara and Behrang Ulu, Perak was carried out. Tiger identification was based on pug marks in the area. The survey revealed the 4 tigers and 1 panther was responsible in the killing of 415 cattle from 1979 to 1982 (29, 99, 150, 137) and in Behrang Ulu 296 (52, 57, 32, 55) cattle were predated by 4 tigers during the same periods. It was found that there was a correlation between kills and wet season in both the farms. Observations in the two farms revealed that the causes of tigers preying on cattle vary according to the local circumstances in each farm. The large scale land development in Darabit, Pahang Tenggara has forced the tigers develop dependence on cattle for food. In Behrang Ulu situated at the foothill of main to range in South Perak where less development of the vast virgin forest surrounding north and east of the farm there is no shortage of prey species of food for tigers inhabiting in the area. However, due to the close proximity of the forested areas and the farm, individual tigers found cattle in this farm are easy prey and have become habituated to cattle.

KITCHENER, H. J. 1961. The importance of protecting the Malayan Tiger. MNS (special issue) 202-206.

The paper describes the major features of tiger biology, particularly diet, and points out its importance in controlling wild pig. It also discusses the hazards to which it is exposed and the need for protection.

FETHERSTONHAUGH, A.H. 1948. Two Malayan Bears. Malay. Nat. J. 3: 90-92

A discussion of whether there are two species of bear in Malaya or not. He believes there is only a colour phase difference or a difference in level of maturity.

BURHANUDDIN HJ. MOHD NOR, HASSAN KASSIM, SAMSUDDIN SURI, SHAHRUDDIN OTHMAN AND MOHD. TAJUDDIN ABDULLAH. 1995. A survey on the distribution of large mammals in Endau Rompin State Park, Johor. J. Wildl. and Parks 14: 16-25

A survey to determine the distribution of wildlife especially the Sumatran Rhinoceros was conducted in Endau Rompin State Park, Johor in February 1992. The survey recorded a total of 251 individuals of large mammals comprising of 17 species. Some of the common wildlife were Tapir, Elephant, Sambar Deer, Wild Pig and Barking Deer. In terms of elevation, most wildlife were observed between 30 to 859 m. Only 18 signs of rhinoceros were recorded during the survey mostly in mountainous area above between 400-500 m and this is much lower than the numbers observed during previous surveys. Human intrusions and habitat degradation were considered to be the most important factors contributing to the decline of this species and serious efforts should be undertaken by the management authority and state government to protect and manage the remaining populations.

HASSAN B. KASSIM. 1992/1993. Distribution of large mammal in Tasek Kenyir Taman Negara Terengganu. J. Wildl. and Parks 12 : 22-35

A fourteen-day study conducted in Tasek Kenyir Taman Negara Terengganu revealed that the area is rich in wildlife especially in the valley of Sungai Chirchir to Gunung Gagau. Among the large mammals most frequently detected were the elephants followed by the Sumatran rhinoceros and tapir. The distribution of large mammals was the highest between altitude 200m and 600m.

MOHD KHAN BIN MOMIN KHAN 1990. Large mammals of Taman Negara. J. Wildl. and Parks 10: 166-171

This paper gives a fairly detail status and distribution of the large mammals, such as the Seladang, Tigers and Leopards, Bears, Deer and Tapir inhabiting Taman Negara.

MOHD KHAN BIN MOMIN KHAN 1971. The distribution of large animals in Taman Negara. Malay. Nat. J. 24: 125-131

The distribution of large animals in this report was based on opportunistic sighting of the animals and identification of tracks and droppings as well as informations from various sources. The number of Elephant, Seladang, Rhinoceros, Tapir, Sambar Deer, Serow and Tiger reported was just an estimate of these animals up to 1970.

HISLOPS, J. A. 1961. A distribution of Elephant, Rhinoceros, Seladang and Tapir in Malaya's National Park. Malay. Nat. J. (special issue) 95-99

Based on opportunistic sightings, identification of animal tracks, droppings and information from various sources, the occurrence of these four species of large games were described. Up to 1960, among them, the least common was the rhinoceros (*Dicerorhinus sumatrensis*), while the other three species, the elephant (*Elephas maximus*), the seladang (*Bos gaurus*) and the tapir (*Tapirus indicus)* were fairly abundant.

A.H. FETHERSTONHAUGH 1951. Nature Notes. Game Department, F of M. 19 pp

The paper describes faunal observations in the King George V National Park (Taman Negara) made for 10 months period in 1951. Fourteen species of mammals were observed. These comprised Gaur, Elephant, Rhinoceros, Tiger, Wild Pig, Sambar Deer, Barking Deer, Mouse Deer (2 species), Otter, 4 species of primates (Gibbons and 3 spp of monkeys) and Flying Lemur. In addition 74 species of birds, 20 of fish and 5 of snakes and lizard was also observed. Highlights of the observation was the breeding habit and behaviour pattern of the Gaur *(Bos gaurus hubbacki)* and an interesting account of the Sumatran rhinoceros *(Dicerorhinus sumatrensis)*. Other mammal species, Panther, Clouded Leopard, Felid cats (3 spp), Giant Flying Squirrel *(Petaurista spp)*, Binturong and Porcupines known to inhabit the Natural Park area, were not observed in 1951.

DAVID J. CHIVERS 1990. The Primates of Taman Negara. J. Wildl. and Parks 10: 153-163

Taman Negara contains most of the primates occurring in Peninsular Malaysia, but most of the information about them has been derived from other forest. The various species of loris, macaque, langur and gibbon are described with comparisons of their ecology and behaviour and discussion of their conservation; in relation to protected areas, such as Taman Negara, and selectively-logged forests, managed on a sustainable-yield basis (for timber and other forest products).

AZMI JOHOR AND MOHD FUAD MOHD. SHARIF 1985. Translocation of *Macaca fascicularis* to the Sungkai and Sg. Dusun Wildlife Reserve. J. Wildl. and Parks 4: 62-66

Two groups of *M. fascicularis* (n1 = n2 = 20) of captive animals were marked and released in two wildlife reserves to evaluate the success of the two groups in the wild. Follow-up observations of these macaques in the 3rd week after released showed that the death toll was high for both the groups. By the end of the 4th week the survival rate was between 35-50% while 25% for the young. The results showed that translocation of this species are not the best solution. The animals were found not able to adjust themselves to the new environments. The high death toll was probably due to factors, such as suitability of the habitats, food source, predator-prey and inter and intra-competition.

MOHD KHAN BIN MOMIN KHAN 1970. Distribution and Population of Siamang and Gibbons in the State of Perak. Malay. Nat. J. 24: 3-8

Observation was made of 13 families (60 individuals) of Lar Gibbon (*Hylobates lar*) living in an area of 2.5 acres.

SHEBBEARE, E. O. 1961. The Slow Loris - an enquiry. Malay. Nat. J. 15: 176-177

Owner of a very tame slow loris states that in total darkness a faint luminous spot always glows in the palm of each front hand near the ball of the thumb. The question is posed to reader whether they had ever seen this occur.

SHEBBEARE, E, O, 1940. Malayan Mammals. Part 1: Malay. Nat. J. 54-59

The paper gives a brief description of the gibbons and monkeys of the Malayan Peninsula.

BURHANUDDIN HJ. MOHD NOR AND NORIZAN AHMAD 1991. A study on habitat use by otters in Taman Negara, Pahang. J. Wildl. and Parks 10: 61-68

A study of habitat use was carried out along the Tembeling river in Taman Negara, Pahang. Direct and indirect observations, the latter based on the presence of footprints and scats of otters. Data collections were made every two weeks beginning from March 1991 to April 1992. A total of 21 sites visited by otters was identified. Of these three sites along the river, Sungai Tabong, Pasir Tempan and Sungai Kerlis were found most frequently used by otters because of the presence of deep pools, sandy banks and small rivers flowing into the Tembeling river. The otters in the river are able to adapt to the presence of human activities such as boating and fishing.

BURHANUDDIN HJ. MOHD NOR AND NORIZAN AHMAD 1991. A study on habitat use by otters in Taman Negara, Pahang. J. Wildl. And Parks. 11: 61-68.

A study on habitat use by the Smooth otter (*Lutra perspicillata*) and the Small-clawed otter (*Anoyx cinerea*) was conducted along the Tembeling river in Taman Negara. Direct observation of the animals through the aid of binoculars. Indirect observations were based on signs, such as footprints and scats. These were carried out in 21 sites along the river from March 1991 to April 1992. However 3 sites, Sg. Tabing, Pasir Tempan and Sg. Kerlis were areas where frequency of visits by otters were highest. The high frequency of visits was reflected by the presence of deep pools, sandy banks, and small rivers flowing into the Tembeling river. The study also revealed that the otters in the river were not affected by frequent human activities such as boating and fishing along the river.

BURHANUDDIN HJ. MOHD NOR 1990. Observation on the parental investment by Small-clawed otter in captivity. J. Wildl. and Parks 9: 47-52

A study on the parental investment in Small-clawed otter (*Aonyx cinerea*) was carried out at the Malacca Zoo. A total of 14 days observation was made on a family comprising an adult male, two adult females and a newborn pup. Each member of the group was identified by natural markings before observation took place. Observations were made during 10 minutes sampling periods with 5 minutes interval between each sampling period. Behaviour of each adult in the group in relation to the newborn pup and the time spent with it were recorded. Observations were only made during the day, starting when the other otters were beginning to get active and terminating in the evening when they retired.

The observation showed that the parental care was evident in the group besides other behavioural activities, such as self grooming, licking, nest maintenance, cooling, resting, grooming pup, playing and training newborn. On parental care the male spent 43 % (7340 minutes of total time observation) of his time with the newborn as compared

to 21.6% (8745 mins) by the bitch and 35.4% (8272 mins) by the non-breeding female. The male was shown to be protective and became aggressive when the pup was handled by either of the females. The training of the pup was under taken by both females. This was done by sub-merging the baby into the water forcing it to swim. On several occasions the male stepped in and took the pup ashore. The study revealed that there is a division of duty between the male and female otters in raising the young.

BURHANUDDIN HJ. MOHD NOR AND NORIZAN AHMAD 1990. A survey on the distribution of otters in Pulau Pinang and Perlis. J. Wildl. and Parks 9: 53-58

Survey on the status and distributions of otters were carried out in Pulau Pinang and Perlis of northern parts of Peninsular Malaysia. The presence of otters in an area was determined from scats, tracks or sightings during field surveys.

The results revealed that both the Smooth otter and the Small-clawed otter were distributed throughout the 2 states. The Smooth otter was found more abundant in areas with large water bodies such as reservoir and lakes while the Small-clawed otter was more confined to small rivers and stream. In ricefields and along the coastal areas both the species were found inhabitating such habitats. The present survey on the distribution of both the otter species, though it lacks the quantification to assess the status, however it does provide information of the presence of both species in 20 and 44 localities in Perlis and Penang.

BURHANUDDIN HJ. MOHD NOR 1989. Preliminary study on food preference of *Lutra perspicillata* and *Aonyx cinerea* in Tanjung Piandang, Perak. J. Wildl. and Parks 8: 47-52

A preliminary study on food preference of the *Aonyx cinerea* and *Lutra perspicillata* was carried out in Tanjung Piandang, Perak. Fifty scats sample from each species were collected and analysed. Swamp ponds from the study areas were drained to determine prey species density in the study area and to relate between fish species diversity and food preference of both these otters in the study area. From the study, it was found that sepat siam formed the largest proportion of the prey population in the study area and this affected to some extent, the food preference of both otter species in the study area. Feeding behaviour of captive *A. cinerea* revealed this otter preferred prey items which have more meat like *Nabas testudineus*. Other food items like molluses, crustacean and mammal species were also consumed, but these differ between both the otter species.

SHABRINA M. SHARIFF 1985. The occurrence of otters in the rice fields and coastal islands and the comparison of these habitats. J. Wildl. and Parks 4:20-24

A survey of otters was carried out in the rice fields of Kg. Pandek Putih in Perak and the coastal islands of Langkawi/Anak Gua Cerita/Bura, Kedah. Direct observations

of 16 and 20 occasions were made of the Smooth otter(*Lutrogale perspicillata)* and the Small clawed-otter, *(Amblonyx cinerea*) at Kg. Pandek Putih, Perak and 22 observations of the former species at the coastal islands of Langkawi and Anak Gua Ceria. In addition, based on pug marks and informations from the residents in both the areas, among the two species at Kg. Pandek Putih, the Smooth otter appeared to be more common than the Small-clawed otter, while at Pulau Langkawi areas, only the Smooth otter was found and with high population density. Examination of scats from both the species of otters, fish was the predominant food of the otters at Kg. Pandek Putih while at the Langkawi areas remnants of crab and crayfish were the main food.

SHABRINA M. SHARIFF 1984. Some observations on otters at Kuala Gula, Perak and National Park, Pahang. J. Wildl. and Parks. 3: 75-88

The study was conducted in two areas, the Kuala Tahan National Parks, Pahang, representing a freshwater system and Kuala Gula in Perak representing a coastal and mangrove system. Observations were made by spotting the animals with binoculars and also looking for signs, such as footprints, scats, dens, etc. A total of 83 days comprised 125 observations were carried out from 0700 to 1900 hr in the Park and 0800 to 1900 at Kuala Gula.

Only the Smooth otter (*Lutrogale perspicillata*) was observed. The population densities during the period observed revealed 23 otters in 8 groups along the waterway of 18 km from Kuala Tahan to Kuala Atok and about 18 in 8 groups along the waterways of 26 km from Kuala Tahan to Cegar Terom (Kenyam river). At Kuala Gula, 22 otters from 3 groups over a distance of about 23 km of water waterways were estimated.

LIM BOO LIAT 1992/1993. Behaviour and food habits of the Giant tree squirrels (*Ratufa bicolor* and *R. affinis*) in Peninsular Malaysia. J. Wildl. and Parks 12: 13-21

Field and laboratory observations were carried out on the behaviour and food habits of the two species of Giant Squirrels. Of the 14 encounters on *Ratufa bicolor* and 9 of *R. affinis*, 85.7% and 88.9% were solitary encounters as compared to 14.3% and 11.1 % which were social encounters involving two participants, thus confirming that both these two species were generally solitary in nature. *R. bicolor* was found to be more confined to the upper canopy levels of 25 m and above while *R. affinis* frequented the middle storey below 5 m with greater frequencies than *R. bicolor*.

Both the *Ratufa spp*, were observed to feed on ripen and unripen fruits with no specific preference from one to the other. *R. affinis* was observed eating the shoots and leaves of fruit trees with a higher frequency than *R. bicolor*, while the latter's preference was more confined to fruits. At least 15 genus of fruit trees were identified which were frequented by both these animals. Stomach contents of both the *Ratufa spp.* revealed *R. bicolor* showed a greater preference for fruits than *R. affinis*, but for leaves and shoots, it was never the reverse situation. Insects particles were found in stomach contents of relative percentage of both the Ratufa spp. Animal particles were found only in the stomach contents of *R. bicolor* only. Feeding experiments on greens, insects and fruits between both the *Ratufa spp.* further confirmed the feeding behaviours of both these species in nature.

Parasites pattern were identical in both the *Ratufa spp.* The findings of the trombiculid mite, *Ascoxchoengastia audyi* and a blood protozoan, *Hepatocystus*, both of which are associated with arboreal rodents, further confirmed that both the *Ratufa spp.* are restricted to the canopy levels in the forest.

Most of the seeds of fruits eaten by both the *Ratufa spp.* were still intact suggesting that they may be potential as seed dispersers.

LIM BOO LIAT 1992/1993. Predators of Sciurids. J. Wildl. and Parks 12 : 36-42

The study of predators on sciurids were based on stomach contents examined from 13 species of snakes, 7 species of small carnivores and 5 species of birds of prey. For snakes, 26 out of 81 stomachs examined were positive with animal remains; that of small carnivores and birds of preys, 12 out of 31 and 8 out of 24 stomach examined were positive respectively. Predation on sciurids by snakes is shown to be associated with the different types of predator-prey species living at different levels of the forest. Arboreal snakes tend to feed on sciurids, which are mostly arboreal in habit and ground dwelling snakes prey on sciurids which are more terrestrial in their habits. Small carnivore predators of sciurids exhibited similar patterns of predation like the

snake predators. Predation by bird of preys is associated with the behaviour pattern of predator-prey activities, nocturnal against nocturnal and diurnal against diurnal. Owls were found to be the main predators of small and medium-sized flying squirrels, the latter appeared to be the first case reported in Peninsular Malaysia.

OGILVIE, C. S. 1958. The Arrow-tailed Fying Squirrel- *Hylopetes sagitta* (Linne). Malay. Nat. J. 12: 149-152

Observations were made on feeding and behaviour of captive animals and description of two wild *H. sagitta* eating small snakes.

OGILVIE, C. S. 1949. Some notes on a Malayan Bamboo Rat Malay. Nat. J. 1: 24-28

The paper gives a brief resume of species of bamboo rats and description of behaviour of a captive female which have given birth 21 days after capture to five young. Description of activity of young and development over several months was discussed.

LIM BOO LIAT 1995. A study of the Lesser Tree-shrew, (*Tupaia minor*) in Peninsular Malaysia with special reference to reproductive patterns. J. Wildl. and Parks 14: 83-96

The present report on the Lesser Tree-shrew (*Tupaia minor*) was based on data collected during the period 1973-1975 from three forest reserves in Selangor. Body weights were used as a basis for classifcation of the age structure for the groups. Among the 228 *T.minor* examined, 12.7% were estimated as young animals, 14% subadults and the remaining 73.3% were adults. There was a distinct difference in the body measurements within the three different age groups. The most significant characteristic was the tail which grew much faster relative to the head and body length in the young, and attained maximum length by subadulthood. Females were matured at an estimated age of 5-6 months after birth and they bred all year round, with peak breeding activities occurring during April to July. Two fetuses were the normal litter size of pregnant females. Mature males were associated with their body and testicular weights with a body weight between 50-75 g and testicular weight from 1.4-2.2 g constituting a stable and active population

Of the stomach of 120 *T. minor* examined, 42.5% were found with food contents. Insect fragments were found in 62.7% out of 51 positive stomach representing 5 orders of arthropods with Coleoptera and Hymnoptera being the major insects taken. Ectoparasites were found in 10.9% of 120 animals and helminths in 19.5% of 87 animals examined. Both the ectoparasites and helminths parasitizing these animals have been found to be of good ecological labelling of the host species.

LIM BOO LIAT 1995. Food habits of *Tupaia glis* with remarks on the evaluation of its economic importance. J. Wildl. and Parks 14: 97-116

The study of the natural diet of *Tupaia glis* was based on examining 85 stomach contents of this species collected from the various lowland forests in Selangor from 1966 to 1975. Amongst the 85 stomachs examined, 69.4% had insect fargments in them. Analysis of the insect fragments produced 7 orders of insects, an order of Arachnida and 4 other animal types belonging to the Class Crustacea and Mollusca and the Orders of Rodentia and Squamata. Of the 59 positive stomach contents, fragments of Coleoptera comprised 89.9%, Isoptera 50.8%, Lepidoptera 40.7%, Hymenoptera and Orthopetra less than 25% each and Hemiptera 17%. Other than Arthropods, Arachnida was found 12%, crustacean and molluscan animals were present in 6.8% and 8.5% respectively. Feeding experiments of captive animals with mixed fruits, insects and mollusc revealed the percentages of insect weight volume (crickets, cockroaches, mealworms) averaged higher than mixed fruits, and snails were the least preferred. This further supports the finding that insects comprised the main diet of this animal in nature besides fruits for captive *T.glis*.

Field observations supported by experimental results confirmed that *T.glis* has the habit of stripping barks of young seedlings of the rubber and pine plants. This animal was known to visit cocoa and banana plantations where fruits were destroyed. On the other hand, stomach contents also revealed that they preyed on suckling and young rats which are pests of plantations and forests. Such omnivorous habits, based on natural and experimental findings, suggest that *T.glis* in a forest community plays an economic role as both pest and predator as discussed.

LIM BOO LIAT 1995. Field observation on the social behaviour of the Common tree-shrew (*Tupaia glis*). J. Wildl. and Parks 14:26-32

Field observations on the social behaviour of *Tupaia glis* were carried out at Bukit Lanjan Forest Reserve, Selangor from January to December 1975. Observations were carried out by walking along forest trials. A total of 93 field trips with 49 encounters of these animals which comprised of 73.5% solitary and 26.5 % social encounters involving either 2 or more animals.Among the solitary encounters, 77. 8% were seen at ground levels and 22.2 % above 1.5 m. The social behaviour of three social encounters revealed the male partners of each of these groups as the dominant hierarchy. Both the males and females in these social encounters displayed different signs and vocalisation in the form of threats, excitement, warnings, pleasurable emotion and territorial aggresion. The observation on the copulation of a pair tree-shrews constituted the second record ever reported in its natural environment.

BURHANUDDIN HJ. MOHD. NOR, NORIZAN AHMAD AND SHOKO SUKIGARA. 1994. Estimation on the density of Common Palm Civet (*Paradoxurus hermaphroditus*) in oil palm plantation at Kuala Gula, Perak. J. Wildl. and Parks 13: 1-7

An attempt to estimate the density of the Common Palm Civet was carried out in an oil palm estate at Kuala Gula, Perak. The mean estimated density of civets in the area was calculated to be 29.74 civets/km^2. The civets seemed to prefer old and tall oil palm stands as these provide them with cover, protection from predators, and food especially oil palm fruits. The removal of old stands in the area has resulted in the temporary loss of habitat for the civets. The importance of this habitat types for civets should not be overlooked.

SAHARUDIN ANAN AND RAFAEE ADBUL HAMID 1990. Noted on the Crab-eating Mongoose from Peninsular Malaysia. J. Wildl. and Parks 9: 45-46

The capture of a female Crab-eating mongoose (*Herpestes urva*) in the secondary forest at Sungai Dusun Wildlife Reserve in May 1990 constitutes the fifth record of this species found in Peninsular Malaysia.

JASMI BIN ABDUL 1987/88. A short note on the Otter Civet (*Cynogale bennettii*). J. Wildl. and Parks 6 & 7 : 87

A male Otter Civet (*Cynogale bennettii*) was caught in a nylon snare which was set to capture pheasants in a logged-over swampy forest in the Besout Forest Reserve, Perak on 20 March 1987. The animal was very weak and died a few days later in captivity.

LOUIS CLEMENT RATNAM 1982. Preliminary observation on the Tragulidae at Kuala Lompat. J. Wildl. and Parks 1: 29-33

The study was carried out at Kuala Lompat which is sited between the Sungai Krau to the east and the Sungai Lompat to the south extending about 500 m in both direction. Four methods were used, the plastic-funnel bait trail, diurnal, nocturnal and platform observations. The plastic-funnel bait method was found to be an unreliable indicator after a two months' trial period. A total of 250 man-days observations within a period of six months 111 sightings were made. Of these 92.8 % of these animals were sighted between 0700 to 1200 hr as compared to 7.2% during 1300 to 1800 hr. Night observations by spot lights 44 spotings were made during a two weeks period. All except 1 individual were spotted between 2000 to 2200 hr, the exception was at 1945 hr. Of 10 sightings made on the platform 8 animals were sighted between 1900 to 1945 hr and the remaining two sightings (1 pair each) at 0530 to 0550 hr. The study revealed that the animal is not entirely crespuscular in activity. No attempt was made to distinguished between *Tragulus napoh* and *T. javanicus*, however for practical purposes this study is of *T. javanicus*.

HABSAH MUDA AND RAFAEE ABD HAMID. 1994. Diet of Diadem roundleaf horseshoe bat (*Hipposideros diadema*) inhabiting "Gua Dato Kob" in Gua Musang, Kelantan. J. Wildl. and Parks 13: 17-26

The diet of *Hipposideros diadema* was studied in a population of about 300-400 individuals, which inhabited the cave "Gua Dato Kob" of Gua Musang, Kelantan. Throughout the study period of about six months (May to October 1993), eight orders of insects comprising of at least 29 species from 13 families were identified in the diet of *Hipposideros diadema*. Insects from the order Isoptera, Coleoptera and Orthoptera formed the three major components of its diet with percentage proportions of 35.0%, 26.0% and 22.0% respectively. There seemed to be likely seasonal changes in its diet. Isoptera was mainly consumed in June and September, Coleoptera in May and July while Orthoptera in September.

HABSAH BT MUDA 1991. Diet of small mammals in the secondary tropical forests in Malaysia. J. Wildl. and Parks 11: 44-52

The diet of squirrels, tree-shrews, insectivorous and frugivorous bats were studied from the stomach contents of these animals captured from the various secondary forest reserves in Negeri Sembilan, Johore, Perak and Selangor. *Tupaia glis* seemed to take more variety of insects besides fruits and vegetative matter as compared to the other species of tree and ground squirrels examined. Among the various insects examined, Hymenoptera was the most frequent prey followed by Coleoptera. *Callosciurus notatus*, *C. prevostii*, *Sundasciurus tenuis*, *Rhinosciurus laticaudatus* and *Lariscus insignis* were found with insects, which formed part of the diet. Among the insectivorous bats, *Rhinolophus affinis* had the greater variety of insects followed by *Hipposideros armiger*. Coleoptera seemed to be the most preferred insects among the insectivorous bats. All insects fragments from frugivorous bats were too far digested making identification to taxonomic level not possible.

HABSAH MUDA 1990. Food habits of some small mammals. J. Wildl. and Parks 9: 18-20

A total of 86 individuals of small mammals comprising of 62 bats of 3 species of bats (*Megaderma spasma*, *Cynopterus brachyotis*, *C. horsefieldii*), 17 tree-shrews (*Tupaia glis*), and 7 tree-squirrels of 4 species (*Callosciurus caniceps*, *C, nigrovittatus*, *C. notatus*, *C. prevostii*) was collected from various forest areas in Malacca, Pahang, Perak and Selangor. The contents of each of the stomachs from all these mammals were immersed in saline solution and examined under a stereo-microscope.

Among the bats, 39 out of 62 had food contents in their stomachs with mostly unidentified insect and fruit remains. Food contents were found in 11 of the 17 *T. glis* examined. All stomach content except one contained vegetable matter and insect particles, the exception one was found with only insect particles.

SAHARUDIN ANAN 1992/1993. Breeding pattern of some Malayan small mammals. J. Wildl. and Parks 12 : 43-48.

Reproductive status of 15 species of small mammals from 16 localities in Melaka, Selangor, Perak, Pahang, Kelantan, Johor, Terengganu and Negeri Sembilan from 1991 and 1992 was reported. Some breeding information was new to the ecological information of the species. Reproductive information from this study was discussed in relation to other studies in other localities.

SAHARUDIN ANAN AND RAFAEE ABD. HAMID 1991. The small mammals if Ulu Gombak, Sungai Lalang and Bukit Kemandul Forest Reserves, Selangor. J. Wildl. and Parks 11: 28-32

Small mammals were trapped in highly disturbed secondary forest at Ulu Gombak (A), in disturbed secondary forest fringes by rubber estate and orchard plantations at Sungai Lalang (B) and in forest edge fringed by oil palm and rubber plantations at Bukit Kemandul (C) in Selangor. A total of 363 individuals comprising of 27 species of small mammals from the three trapping sites were captured and identified. Site A being confined around an orang asli settlement produced the lowest number of individuals (23) and speciation (10) trapped; site B with the orang asli settlement situated quite a distance from the forest area yielded 109 individuals with 17 species and site C being a mixed forest/plantation type of habitat caught 254 individuals with 21 species. Trapping in site C which covered a variety of habitats resulting in large numbers of commensal murid species (*Rattus rattus diardii, R. tiomanicus, R. argentiventer*) and forest fringe species (*R. annandalei*) which represented 58.2% of the total catch of 254 individuals. However, among the 19 species of small mammals of forested areas trapped in the three trapping sites, 4 forest species (*Tupaia glis, Callosciurus caniceps, Sundamys muelleri, Leopoldamys sabanus*) were the most abundant.

LIM BOO LIAT AND SAHARUDDIN ANAN 1990. Small Mammals of Taman Negara. J. Wildl. and Parks 10: 148-152

Based on previous studies of small mammals, a total of 71 small mammal species were collected and identified from the lowland forest (150-300 mm) in Taman Negara. This represents 36.6 % of the 197 recorded members of small mammals of Peninsular Malaysia. However, the authors emphasized that further studies in the Park should be carried out at the zoonation level on Taman Negara to get a better prospective of species diversity of the overall small mammal fauna in the Park.

LOUIS RATNAM, SAHARUDIN ANAN AND HABSAH MUDA 1989. Studies of a collection of bats. J. Wildl. and Parks 8: 9-16

During 1988/89 a collection of bats were made in 7 localities in Selangor and Pahang, Peninsular Malaysia. A total of 101 specimens were collected comprising 16 species representing families. Four species are fruit bats (Megachiroptera) and 12 are insectivorous bats (Microchiroptera). All except 1 of the bat species are common. The exception is a male *Hesperoptenus doriae*, a very rare bat, and this represents the second authenticated record of this species in Peninsular Malaysia and the third specimen of this bat in museum collections in the world. Some of these species recorded in this report also represent new locality records for Peninsular Malaysia.

SAHARUDIN ANAN, LOUIS RATNAM AND SHABRINA M. SHARIFF 1989. Study of small mammals in Bukit Lanjan Forest Reserve, Selangor, during 1988-1989. J. Wildl. and Parks 8: 1-8

A study of small mammal fauna was carried out at Bukit Lanjan Forest Reserve for a period of 10 months from September 1988 to May 1989. A total of 252 specimens were collected which comprised 23 species of small mammals. Five of these species were bats belong to 3 families, Pteropodidae, Emballonuridae and Vespertilionidae, and 18 species of other taxa representing 4 families, Tupaiidae, Muridae, Hystrisidae and Sciuridae. Among the bats, a species of the fruit bat (*Cynopterus brachyotis*) and a species of the insectivorous bat (*Tylonycteris robustula*) were the most commonly netted. The Tupaiidae was represented by 2 species (*Tupaia glis*, *T. minor*) and together they consist of 21.9% of the total collection of 219 mammal specimens collected. The Muridae comprised 11 species of both the forest and field rats. Among the forest rats, *Rattus rajah* and *R. surifer* represented 54.5% of 55 specimens of forest rats while that of the field rats, *R. tiomanicus* represented 95.1% of 81 specimens of the field rats examined. The study revealed that the species diversity of small mammals is associated with the monthly trend of catches and also to factor such as the rapid environmental changes in the recent years in the study area resulting in the increase of human activities.

LIM BOO LIAT, LOUIS RATNAM AND SAHARUDIN ANAN 1989. Study of the small mammals in Taman Negara with special reference to the rat lungworm. J. Wildl and Parks 8: 17-30

The study was carried out in 3 collecting sites basically represent 3 different but not mutually exclusive habitat types. Site A, Kuala Tahan headquarters, represent developed area of human habitation surrounded by narrow band of belukar, grasses and riparian shrubs between the rest house complex and the river. Site B, Kuala Tahan represents a more natural habitat and includes all the undisturbed forests within about 1 mile of the headquarters on the park side of the Tembeling river. Site C is

centred around the small village opposite the park headquarters on the other side of the Tembeling includes the habitat represented by the village itself and the surrounding slightly undisturbed forests.

Collections of small mammals were made in 1956, 1962 and 1973 for 10 trapping nights in each of the 3 sites. Visual observations were made during the day as well as at night. Mist nets were set to catch bats. A total of 537 small mammals comprised of 53 species were trapped at the 3 sites. Seventeen species were identified visually, 14 of which were not collected, resulting in total of 67 species being identified as occurring within the 3 sites in Taman Negara. The collection comprised of 9 orders of mammals. They are in descending order of numbers, 33 murids, squirrels, bamboo rat and porcupines (Rodentia), 17 frugivorous and insectivorous bats (Chiroptera), 5 weasel, civet and felid cats (Carnivora), 4 gymnures and shrews (Insectivora), 4 primates, 2 tree-shrews (Scandentia), and 1 of each flying lemur (Dermoptera), mouse deer (Artiodacytla) and pangolin (Pholidata). These constitutes 34.8% of the total 192 small mammals species recorded in Peninsular Malaysia.

Of the 67 species of small mammals identified, 26 species were from site A, 50 species from site B and 44 species from site C, respectively. Site A, yielded species which are known commensals to man's habitation such as *Rattus tiomanicus*, *R. exulans*, *R. rattus diardii* and *R. argentiventer* and an insectivore, *Suncus murinus* found exclusively in this site. Sites B and C yielded mainly species of the forest. In the case of bats, because of their ability to fly and cover relatively great distances, it was found that there was no appreciable difference between the 3 sites. One of the species collected in site B, the Smokey Flying Squirrel (*Pteromyscus pulverulentus*) is a rare find and constitutes a significant locality record for this species. It was apparent from the result that the major proportion of the small mammal fauna of the Taman Negara is to be found in the lowland dipterocarp forest below 1,300 m.asl. The fact that 34.8% of the total small mammal species was collected from a small area.

Ectoparasites, such as fleas, lice, gamasoid, ticks and trombiculid mites (chigger) were also collected from infested hosts. Arboreal mammals were found to be less infected with these parasites than the terrestrial forms. Endoparasite studies were confined to the rat lung-worm, *Angiostrongylus malaysiensis*, and only the commensal rat species were found to be affected by this helminth. The presence of this parasite in these commensal rats (*R. timonaincus*, *R. exulans*, *R. argentiventer* and *R. rattus diardii*) around Kuala Tahan headquarters constitutes a new locality record.

SAHARUDIN ANAN, SHABRINA M. SHARIFF AND LOUIS RATNAM 1987/88. Catalogue of small mammals collected and curated by PERHILITAN between June to December 1988. J. Wildl. and Parks 6 & 7 : 106 -111

A total of 452 specimens were collected and curated from two major and two minor localities in addition to a few specimens collected randomly. These specimens are listed and catalogued. They represent 40 species of 12 families from five mammalian orders.

AZMIN BIN MOHD. RASHDI, RAFAEE BIN ABD. HAMID, AZMAN BIN MOHD ARIF, ABDULLAH LATIF BIN ABD. RAHMAN AND SAARI BIN IDRIS 1987/88. Evaluation of trap-success of small mammals with special reference to bait preference. J. Wildl. and Parks 6 & 7 : 99-102

The result of this study revealed that in the collecting of small mammals, the trap-success in forest habitat is much lower than that in forest fringe habitats. It was also found that in the forest although the diversity of animal species was high there was apparently a lower diversity of individual species. This may be compared to the fringe habitats where there was a lower diversity of species with apparently high density of few individuals. The bait reference study revealed that banana, oil palm fruits and sweet potato are suitable baits, and banana is shown to be the most favoured among the five different baits tested.

LOUIS RATNAM, SAHARUDIN ANAN AND SHABRINA M. SHARIFF. 1987/88. Ecological studies on the small mammals of the Air Hitam Forest Reserve, Puchong, Selangor. J. Wildl. and Parks 6 & 7 : 88-89

A collection of small mammals was made in four different eco-type habitat at the Air Hitam Forest Reserve, Puchong, Selangor from June to December 1988. Wire cage traps baited with banana were used for trapping small mammals while mist nests were employed to net bats. A total of 188 individuals covering 25 species from 12 genera, seven families and four orders were identified. These comprised four bat species, two tree-shrews species, nine species each of sciurids and murids and a single species of small carnivore.

Among the four eco-types habitats, Habitat A, a combination of good standing secondary forest yielded 48 individuals with 17 species; Habitat B with highly disturbed secondary forest adjacent to starfruit and oil palm plantations 54 individuals with 9 species were trapped, Habitat C being recently logged secondary forest mixed with belukar 13 individuals with 14 species and 72 individuals with 14 species from Habitat D which was a mixture plantations, belukar and fringe forest vegetations were trapped. Four species of bats comprising of 3 insectivorous and 1 frugivorous bats were netted.

The abundant species among the small mammals identified from the four trapping sites were *Tupaia glis*, *Callosciurus notatus*, *Sundasciurus tenuis*, *Sundamys muelleri*,and*Maxomys rajah*. Of significant species samples were 3 species of flying squirrels, *Hylopetes lepidus*, *H. platyurus* and *Iomys horsefieldii*. Among the 4 species of bat, *Miniopterus medius*, which occurs more frequently at higher elevations was netted in the lowland study site.

SHABRINA BT. M. SHARIFF 1987/88. The small mammals in the lowland habitats of Pahang and Selangor. J. Wildl. and Parks. 6 & 7 : 9-25

A study of the small mammals was carried out in the Sungai Dusun Forest, Sabak Bernam, Selangor, Bukit Batu at Ulu Lepar, Kuantan, Pahang and Bukit Sungai Putih Forest Reserve, Cheras, Selangor from February till October 1987. A total of 105 individuals comprising of 17 species belonging to 7 families were captured at the three areas in Selangor and Pahang. Rodents comprised 70.6 % of the 17 species identified with three families (Hystricidae, Muridae, Sciuridae), 5.9 % each of the species in the families (Erinaceidae, Tupaiidae, Tragulidae) and 11.7 % of two species in the family Viverridae. The majority of the small mammals were captured at Bukit Sungei Putih Forest reserve with a total of 37 individuals of 7 species from 4 families followed by 36 of 8 species from 6 families and 32 of 7 species from 3 families. Sciuridae was the most commonly trapped family at the Sungai Dusun forest (30%). But in Bukit Batu and Bukit Sungei Putih Forest Reserve, Muridae was the most common, comprising 71.4% and 66.7%, respectively. The other remaining families trapped at the three areas occurred in relatively low numbers.

KITCHENER, H. J. 1954. Hair. Malay. Nat. J. 2:57-61

Discusses the importance of hair of animals as a covering for the body to assist in the retention of body heat, and describes the different hair structures of human as compared to some species of mammals.

HISLOPS, J. A. 1954. The limestone hills of Ulu Kenyam. Malay. Nat. J. 9: 87-89

Describes his journey to the limestone hills of Ulu Kenyam, and gives an interesting account of the type of terrain and some animal lives encountered.

LOUIS CLEMENT RATNAM 1982. The Irrawaddy River Dolphin in the Bernam River. J. Wildl. and Parks 1: 17

A River Dolphin (*Orcaella brevirostris*) was sighted in the Bernam river on 20th March 1980, at the site where canal connects the Bernam river to the Sungai Tengi, Selangor. The specimen was estimated at 1.8 m in length. The known range of this species encompasses the Bay of Bengal at one end and Borneo at the other including Java, the Straits of Malacca and the East Coast of Peninsular Malaysia. The animal was observed surfacing at intervals of between 5 second and 2 minutes along a 200 metre length of the river. The sighting of this species in the Bernam river, Selangor, indicates that the range of this animal is more widely distributed than speculated.