KFRI Research Report S8

PERIYAR TIGER RESERVE:

A RECONNAISSANCE REPORT

KERALA FOREST RESEARCH INSTITUTE
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INTRODUCTION

Many of our Wildlife Sanctuaries, National Parks and Tiger Reserves do not have adequate scientific background information for proper management. No effort has been made to study the ecological conditions, the ecological requirements of wildlife and the availability of resources. As a result erroneous decisions are often taken based on casual observations. Undue alarm is sometimes voiced about the increase of population of a particular species and advice is given to Cull them. In 1976 such a situation arose in Periyar Tiger Reserve, with respect to the wild dog.

It was in this context that the present project "An Ecological Study in Periyar Tiger Heserve with special reference to wildlife" was initiated, The major objective is to help evolve a management plan for the reserve based on population dynamics, basic ecological requirements of the major species, resource availability and the general ecological conditions prevailing in the Reserve,

Before undertaking intensive studies an individual species, it was necessary to make a reconnaissance in the Reserve, to bring out the general status, distribution and habitat preference of each species, to evaluate the overall ecological

conditions in the Reserve and, to assess the more important problems in respect of management. These goals have been attained by the survey and the present report covers this part of the study.

The survey commenced in November 1977 and completed in December, 1978. We could not cover the entire sanctuary area of 777km sq. Some of the places are quite inaccessible. Even if we locate a particular animal in such areas, it will not be possible to make regular observations there. However, we intend to cover such areas also in the next phase of the study,

As most of the animals in the Reserve are nocturnal or shy, we had to depend heavily on indirect evidences like droppings and tracks, to judge their occurrence, abundance and distribution. We have not deduced the population of each species based on these evidences as a thorough population study will be conducted in the next phase.

The study brings out a checklist of mammals (excluding smaller ones) and birds in the Periyar Tiger Reserve. It also indicates the distribution pattern of the major species of wildlife in the Reserve and its preferred habitat. The disturbance to wildlife in the Reserve and the various problems related to management are briefly dealt with. We have made some interim recommendations and also suggested the areas where intensive

research is required,

We would welcome comments on this report so that they can be evaluated and changes in approach made if necessary, before the completion of the study.

STUDY AREA

The origin of the Periyar Reserve is linked with the construction of a masonry dam across the river Periyar in 1895 for irrigation purpose, resulting in the creation of an artificial lake of about 26 km^2. This is perhaps the first major human interference in the area. However, adequate care is reported to have been taken to avoid excessive damage to the flora and fauna at the time of construction. In 1899 the forest around the lake was declared a Reserve forest. The Maharaja of the erstwhile Travancore State appointed C.H. Robinson in 1933 as the first game warden to constitute and maintain a sanctuary here. In 1934 the Periyar Game Sanctuary was formed. More area was added to this in 1950 and the Periyar Wildlife Sanctuary was constituted which included Periyar Lake Reserve, Rattenden Valley and Mount Plateau. Considering the importance of the sanctuary in respect of its Tiger population and the urgent need to protect this population, the area was chosen for Project Tiger in 1978 and the sanctuary is now called Periyar Tiger Reserve, the tenth Tiger Reserve in the country.

Location and Extent:

The Reserve is situated on the Western Ghats ($9^{o}15'$ and $9^{o}40'N$; $76^{o}55'$ and $77^{o}25'E$) in the Peermade Taluk of Idukki District, Kerala, about 113 km east of Kottayam (the nearest Railway

Station) and about 135 km west of Madurai (the nearest Air Port).

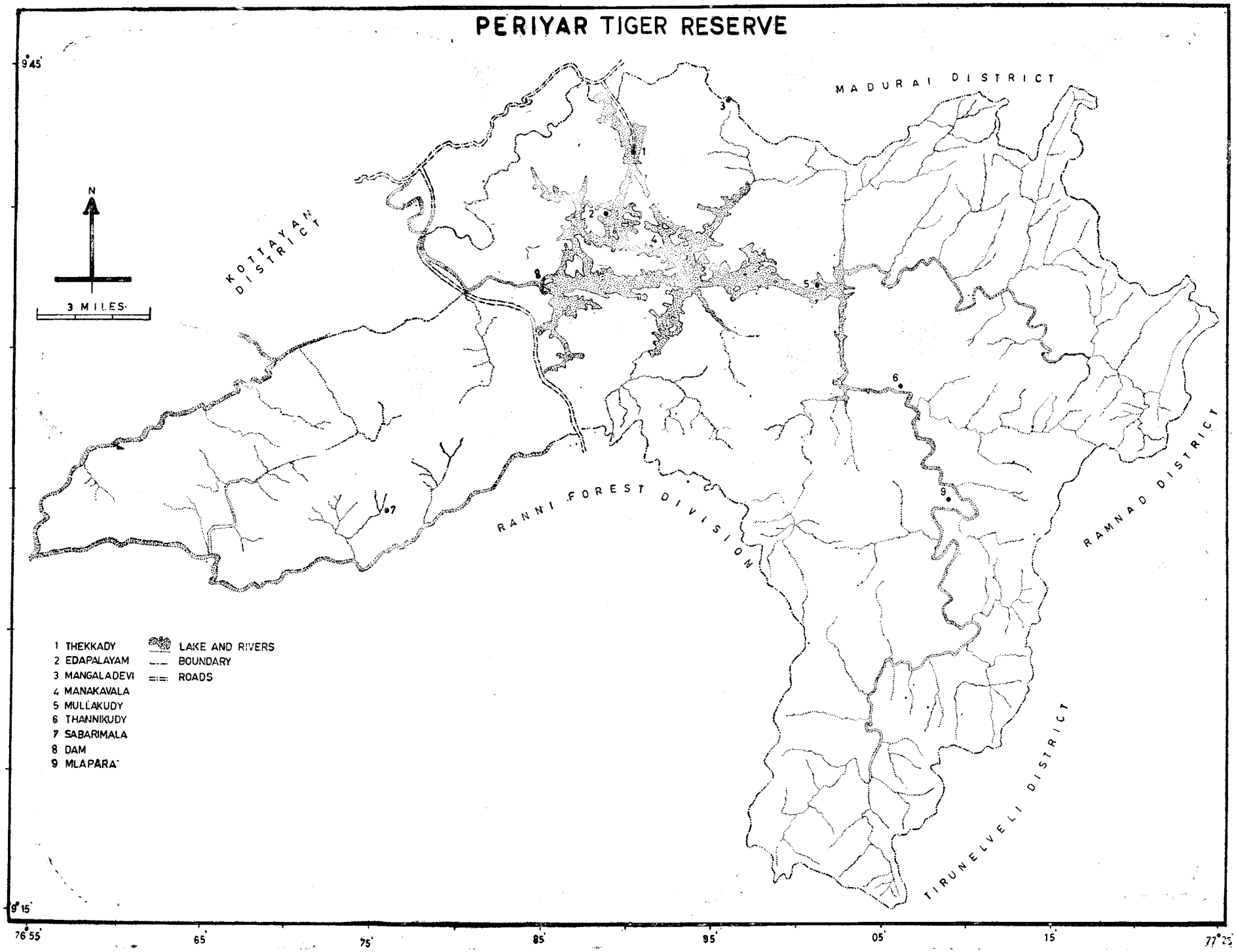
The Reserve is 777 km^2 and includes Periyar Lake Reserve (600 km^2), Rattenden Valley (12.95 km^2) and Mount Plateau (163.17 km^2). Out of this, the actual forest area excluding Periyar Lake, residential colonies, Sabarimala Temple premise etc. is estimated at 741 km^2 (Chandrasekharan, 1973).

Boundaries:

The boundary on the north, north east and east, approximately 90 km is the State boundary between Tamil Nadu and Kerala. On the north the boundary is formed by the Madurai District and on the east by Ramnadu and south east by Tirunelveli District of Tamil Nadu. On the south the Reserve is bordered by Ranni Forest Division and the west by Kottayam Division (Fig.1).

Topography:

The terrain is rugged with a large number of hills and hillocks, often rolling and occasionally with precipitous slopes. The elevation ranges from 900 to 2019 m. The prominent peaks in the Reserve are Komalai (1641 m), Koyilmalai (1569 m), Chavarakuzhi medu (1549 m) and Karimalai (1844 m). There are some more peaks of the same range but they are unnamed. The major higher peaks along the border are Vellimalai (2014 m), Pachimalai (1800 m), Nagamalai (1733 m), Sundaramalai (1808 m), Udamalai (1589 m), Chokkampattimalai (1801 m), Kallimalai (1637 m),


PERIYAR TIGER RESERVE
9°45'
9°15'
76°55'
65'
75'
85'
95'
05'
15'
77°25'
N
3 MILES
KOTTAYAN DISTRICT
MADURAI DISTRICT
RANNI FOREST DIVISION
RAMNAD DISTRICT
TIRUNELVELI DISTRICT
1 THEKKADY
2 EDAPALAYAM
3 MANGALADEVI
4 MANAKAVALA
5 MULLAKUDY
6 THANNIKUDY
7 SABARIMALA
8 DAM
9 MLAPARA
LAKE AND RIVERS
BOUNDARY
ROADS

Sivagirimalai (1740 m), Pulamalai (1498 m), Thottimalai (1640 m), Changumalai (1552 m), Pachiyarmalai (1750 m), Surulipara (1626 m) and Mangaladevi (1337 m).

River Periyar which originates from Chokkampatti - Kallimalai side, about 50 km from Thekkady with its various tributaries is the main drainage of the area. The lake which was formed as a result of the construction of dam has an area of 26 km^2. Maximum depth of water at maximum water level is 46 m and at minimum is 32 m. Most of the tributaries are not named and among the named the important ones are Inchiparathodu, Vazhukuparathodu, Cherakattai River and Mullathodu (Fig.1).

Roads:

There are two metalled roads in the Reserve, Kumily - Thekkady road, about 4 km and Vandiperiyar - Muzhikal road, about 10 km of which passes through the Vallakadavu range of the Reserve. The two other major roads which are jeepable in the reserve are 4th mile (Near Vallakadavu)-Uppupara, about 15 km and Thekkady - Mangaladevi, about 18 km. There are two bridle paths, one connects Mullakudy to Thekkady - Mangaladevi road, about 15 km and the other connects Thannikudy to the eastern border of the Reserve on Sivagiri mettu, about 20 km.

Climate:

Thekkady has a rather cool climate, the temperature ranging from 15.5° to 31°C throughout the year (Thekkady Development

Authority, 1975). March and April are comparatively warmer months. Average annual rainfall is 2030 mm. Although the area receives both the monsoons, south west is responsible for more than half of the total annual rainfall (Fig.2). The highest precipitation is in the month of July and the lowest in the month of January.

Vegetation:

Vegetation type of each area visited was noted down, based mainly on the appearance and the presence of a few characteristic species. No attempt was made to study the composition of different forest types. The terminology of forest types followed in the report is after Champion and Seth (1968). The vegetation types and the extent (Table 1) were reported earlier (Chandrasekharan, 1973).

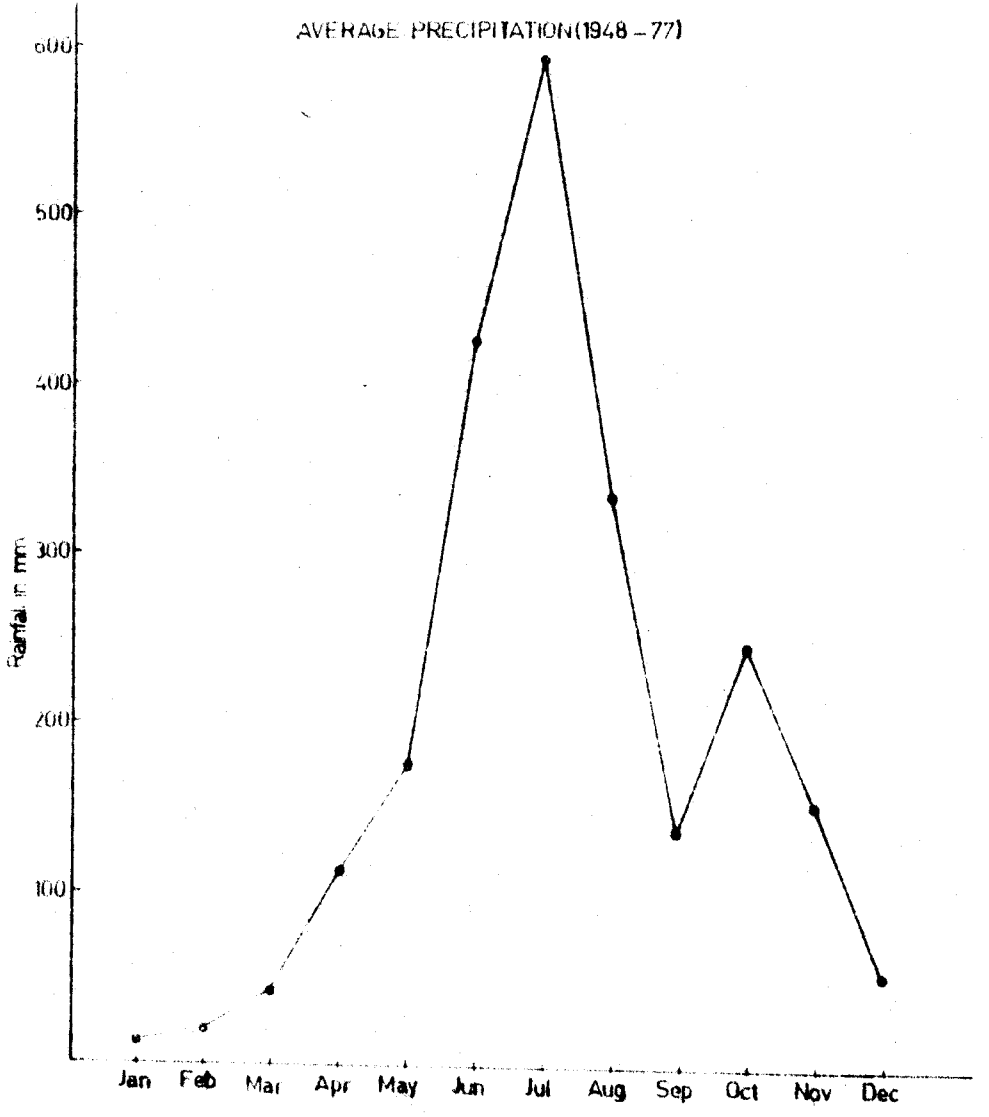
TABLE 1

Forest Types in the Reserve

Type of forest	Area in km^2
West Coast tropical evergreen forest ..	305
West Coast semi-evergreen forest ..	275
Southern secondary moist mixed deciduous forest ..	98
South Indian subtropical hill savannah (woodland) and Southern montane wet grassland. ..	12
Reed brakes ..	10
Eucalyptus plantation ..	41
Total ..	741

Adopted from Chandrasekharan, 1973.

FIG. 2


AVERAGE PRECIPITATION(1948 – 77)
600
500
400
300
200
100
Rainfal in mm
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

The above breakdown into forest types is tentative and need confirmation after careful survey.

West Coast Tropical Evergreen Forest (Plate I):

This type of forest is mostly confined to areas beyond Thannikudy, Ummikuppan and Mlappara. Some of the important places having this type of forest are Vakilelan, Koyilmalai, Kadamamalai, Aladi, Inchipara, Nedumpara, Valimeenkayam, Tholukkampara, Sivagiri and Madhalamthookki. Evergreen forest occurs also in Sabarimalai area. All these areas are quite far from the lake. In the eastern border it forms almost a belt.

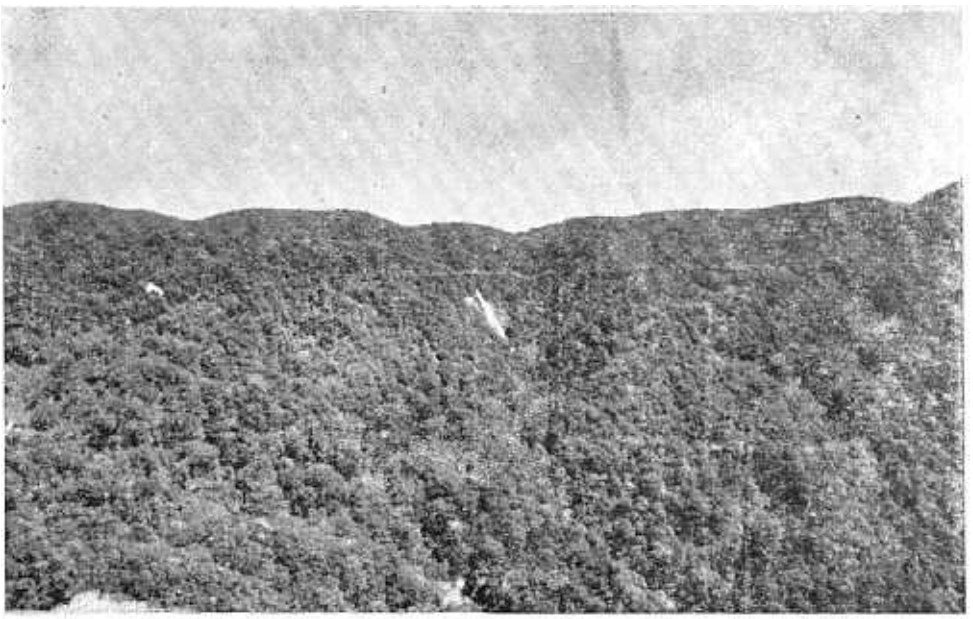
West Coast Tropical Semi-evergreen forest (Plate II-1):

Unlike the former, this type occurs in patches in the Reserve. The larger patches are found in Sabarimalai area and between Pakadi mettu and Mlappara. The latter is a narrow strip, contiguous with evergreen forest on the east. This type of forest was seen in small patches in Cheriyakanam, Valiyakanam, several places along the lake margins, between Ummikuppan and Ummikuppan mettu, some parts of Koyilmalai, Chinkaraman mettu, Inchipara, Kumarikulam, Murikkadikayam, Pothamperi, Mulankal, Kunnar and, in Kozhikanam and Pachakanam.

Southern Secondary Moist Mixed Deciduous forest (Plate II-2):

This type of forest has again a very patchy distribution inside the Reserve. This is found mainly in Mullakudy, Ayyappanthuruthu, Chevalotthuruthu, Navikkayam, Kallar, Kunnar

Plate -

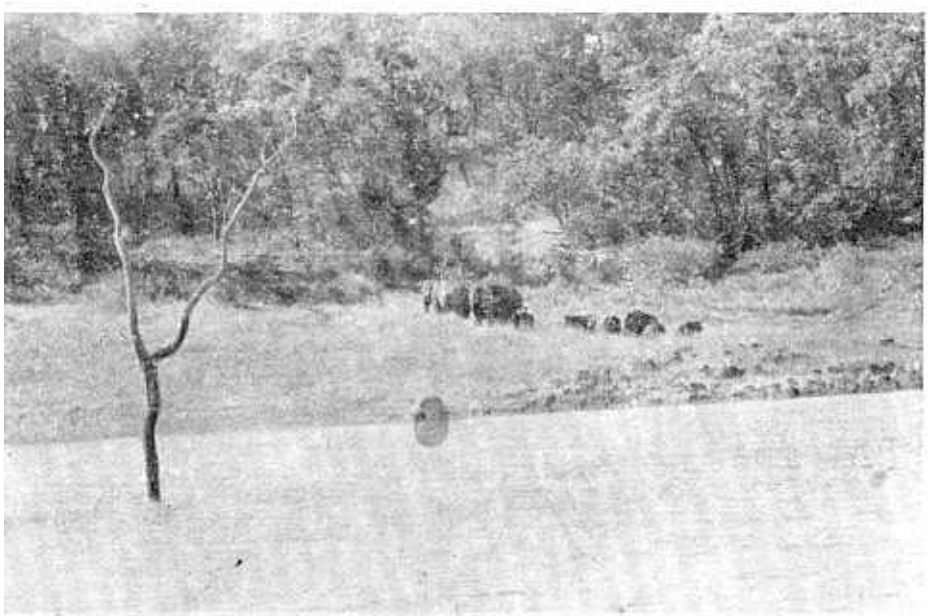


1. West Coast tropical evergreen forest near Vellimalai

2. West Coast tropical evergreen forest with grass-clad rolling hills in the background - near Kottamalai.

Plate - II

1 West Cost semi - evergreen forest along the margin of Periyar Lake.



2. Southern secondary moist mixed deciduous forest near the lake: A herd of elephants grazing.

and near Valiyakanam and Cheriyakanam.

Grassland:

Though the total extent of grassland is estimated at 12 km^2 (Chandrasekharan, 1973), we feel that it is an under-estimate. There are two types of grasslands in the Reserve: South Indian subtropical hill savannah and southern montane wet grassland. The former is characterised by tall grass interspersed with trees like Terminalia paniculata and Emblica officinalis (Plate III-1, 2 & Plate IV-1). Sometimes even these trees are also absent (Plate XIII-2). Phoenix humilis occurs among tall grass especially on slopes as in Swamikayam, Palkachimalai and Mangaladevi area. Profuse regeneration of Dalbergia latifolia was noted in this type of grassland, on the tope of Kannimar-medu, during March. Southern montane wet grassland is confined mainly to the top of hills and is characterised by a carpet of grass without any trees (Plate IV-2).

Plantations:

About 41 km^2 of grassland in Vallakadavu range of the Reserve has been planted with Eucalyptus grandis as a part of the major grassland afforestation scheme initiated in early 1960's. The growth is good in some areas.

Plate - III

1. South Indian subtropical hill savannah (woodland).

2. A close view of the above showing an elephant qrazing.

Plate - IV

1 A herd of elephants amongst thick tall grass.

2. Southern mountane wet grassland

Common evergreen species in the area are:

Actinodaphne hookeri

Aglaia sp.

Agrostistachys meeboldii

Albizia chinensis

Alstonia scholaris

Aporosa lindleyana

Artocarpus heterophyllus

Artocarpus hirsuta

Atlantia sp.

Baccaurea courtallensis

Bischofia javanica

Calophyllum apetalum

Canarium strictum

Cinnamomum sp.

Cullenia exarillata

Dillenia pentagyna

Diospyros candolleana

Diospyros microphylla

Drypetes venusta

Dysoxylum malabaricum

Elaecocarpus tuberculatus

Euphoria longana

Evodia lunu-ankenda

Filicium decipiens

Holigarna arnottiana

Hydnocarpus alpina

Leea indica

Linociera malabarica

Macaranga peltata

Maesea indica

Mesua ferrea

Mangifera indica

Myristica dactyloides

Olea dioica

Palaquium ellipticum

Persea macrantha

Pithecellobium bigeminum

Pygeum wightianum

Syzygium arnottiana

Syzygium cumini

Viburnum sp.

Common deciduous species in the Reserve are:

Acrocarpus fraxinifolius

Albizia amara

Albizia odoratissima

Albizia procera

Anogeissus latifolia

Bombax ceiba

Dalbergia latifolia

Donella roxburghii

Emblica officinalis

Gmelina arborea

Grewia tiliaefolia

Lagerstroemia lanceolata

Lasiosiphon eriocephalus

Pterocarpus marsupium

Scolopia crenata

Stereospermum personatum

Terminalia alata

Terminalia bellerica

Terminalia chebula

Terminalia paniculata

Toona ciliata

Vitex altissima

Woodfordia fruticosa

ommon climbers are:

Entada pursaetha

Gnetum scandens

Luvunga sp.

Toddalia sp.

Ventilago bombaiensis

METHODOLOGY

The major objectives at this stage of the study were to obtain information on:. (1) the general status of each species (2) the possible areas where each could be located (3) the areas where they are concentrated and *(4)* their habitat preference, The study was concentrated mainly on larger mammals.

The team camped in various places inside the Reserve and the area around each camp was surveyed intensively. The team was split into two or three as the case nay be, and each investigator accompanied by a local helper went in different directions and on an average 15 km was covered on foot by each party everyday, Forest paths and animal tracks wherever available were followed; it was especially so in the case of evergreen and semi-evergreen forests, As the observer walker! through, the following details were recorded: (1) species of animal sighted both on ground and above (2) time of observation (3) activity of the animal at the time of observation *(4)* size of troop, herd or pack, whenever possible (5) droppings (6) spoors (pug marks were measured and tracer! wherever possible) and (7) habitat where observation was made,

Owing to the nocturnal habit of most of the animals, rugged nature of the terrain and the characteristic luxurience of evergreen forests, most of the animals, especially carnivores could not be sighted and their occurrence could be deduced only

by indirect evidences like droppings, tracks, calls and diggings, Indirect evidences were recorded for all the mammal species except elephant and wild boar, which could be sighted very frequently, If the investi ator had to return through the same path - which happened very rarely, records were made very cautiously avoiding repetitions. In such cases indirect evidences were not recorded again, unless there was a fresh one.

For identifying the elephant herd, herd size and composition individual marks like truncated tail, broken tusk, holes and folding of the ear etc, were considered,

Frequency of direct and indirect evidences were taken as indication of abundance of the species concerned, In the case of elephant and wild boar only direct evidences were considered,

Habitat preference of each species is indicated by the frequency of direct and indirect evidences in dif rent habitat types. Equal weights have been given for individuals as well as troops or herds,

The survey was spread over a period of eight months between November 1977 and December 1978,

MAMMALIAN FAUNA

No systematic study has so far been undertaken to assess the status and distribution of mammals in the Reserve. An attempt was made by Kurup (1971) who conducted a short term survey. This was followed by the observations of Waller (1972). Some information on the status of a few species like the liontailed macaque (Daniel and Kannan, 1967; Green and Minkowski, 1977), the Nilgiri langur (Daniel and Kannan, 1967; Kurup, 1975) and the tiger (Department of Mathematics, U.C. College, Alwaye,1975) are available.

The Reserve has a good representation of all the groups of larger mammals recorded in Kerala. On the whole, 32 species were recorded in the Reserve (Table 2; Appendix 1). In a booklet brought out by the Thekkady Development Authority (1975) thirty one species of mammals have been listed as present in the Reserve. The source of information on which the above list was compiled is not known. Their list did not include the following species recorded during the present study: Presbytis johni, Macaca silenus, Herpestes smithi, Petinomys fuscocapillus, Platacanthomys lasiurus, Rattus rattus, Bandicota indica and Mus musculus. However, certain species not recorded during this study were reported: Presbytis entellus, Felis bengalensis, Vulpus bengalensis, Ratufa macroura, Golunda ellioti, Tatera indica and Rattus blanfordi. Among this the report of the occurrence of Ratufa macroura needs confirmation, as its normal

habitat is quite different. We have noted Presbytis entellus in the adjacent drier areas in Tamil Nadu but not inside the Reserve.

While fairly authentic information has been gathered on the diurnal forms, it is not so in respect of nocturnal ones especially felids. Hence, the possibility of occurrence of more species, particularly nocturnal ones in the Reserve cannot be ruled out. In the next phase of the study, when smaller mammals will be trapped, a more clear picture will be available.

Family Cercopithecidae (Macaques and Langurs)

Four species are reported so far from Kerala; two macaques, Macaca radiata and M. silenus and, two langurs, Presbytis johni and P. entellus. Except, P. entellus all are found in the Reserve. Among the three species found in the Reserve P. johni is the most common and it is followed by M. silenus. P. entellus prefers comparatively drier areas and was noted in Tamil Nadu adjacent to the Reserve. P. johni and M. silenus prefer almost identical habitat - tropical evergreen forest, but the former has more adaptability and extends to moist deciduous forest also. M. radiata is generally scarce in thick evergreen forest, and they are common in scrub jungles and around human habitations.

Macaca radiata (Geoffroy). The Bonnet Macaque
(Table 3, 4; Appendix III-1)

Seven troops of this commonest South Indian monkey were seen inside the Reserve. Call of three troops were also recorded. Of the total ten troops, three were in the evergreen forest around the estates on the eastern border - Mlappara, Inchippara and Elatheri, and the rest were in moist deciduous forest.

Macaca silenus (Linnaeus). The Liontailed Macaque
(Table 3, 4; Appendix III-2; Fig.3)

This endemic, endangered, arboreal macaque has a very restricted distribution in its range. In the Reserve nine troops were seen and two were heard from different localities (Table 3). All of them were from the evergreen forests where human disturbance was the least (Table 4). However, they were recorded in the cardamom estates at Mlappara, Elatheri, Ummikuppan, Ponvarai and Pachakanam also (Fig.3).

Though we could not see them in other areas, we were told that they were present in those areas near the eastern and north eastern border, where the habitat was typical for them, like Vellimalai and Kottamalai. The characteristics of forest in these areas with abundance of Cullenia exarillata and the half-eaten fruits of this species scattered on the floor lend credence to this.

TABLE 2

Mammalian fauna of Periyar Tiger Reserve

Species	Remarks
Cercopithecidae	
Macaca radiata	Rare
Macaca silenus	Thinly represented in some localities.
Presbytis johni	Common in some localities
Felidae	
Panthera tigris	Estimated at 25 to 30
Panthera pardus	Rare
Felis chaus	Rare
Viverridae	
Viverricula indica	Rare
Paradoxurus hermaphroditus	Common in some localities
Herpestidae	
Herpestes edwardsi	Extremely rare
Herpestes smithi	Extremely rare
Herpestes vitticollis	Extremely rare
Canidae	
Canis aureus	Extremely rare
Cuon alpinus	Thinly distributed

TABLE 2 (Contd.)

Species	Remarks
Ursidae	
Melursus ursinus	Common in some localities
Mustelidae	
Lutra sp.	Common in some localities (species could not be identified)
Pteropidae	
Pteropus giganteus	One large colony
Sciuridae	
Petinomys fuscocapillus	Rare
Ratufa indica	Common in some localities
Funambulus palmarum	Common in some localities
Muscardinidae	
Platacanthomys lasiurus	
Muridae	
Rattus rattus	
Bandicota indica	
Mus musculus	
Hystricidae	
Hystrix indica	Abundant in some localities

TABLE 2 (Contd.)

Species	Remarks
Leporidae	
Lepus nigricollis	Rare
Proboscidae	
Elephas maximus	Estimated at 700 - 750
Bovidae	
Bos gaurus	Thinly distributed
Cervidae	
Cervus unicolor	Common in some localities
Muntiacus muntjak	Thinly distributed
Tragulidae	
Tragulus meminna	Thinly distributed
Suidae	
Sus scrofa	Common in some localities
Manidae	
Manis crassicaudata	Rare

TABLE 3

Frequency of sightings of direct and indirect evidences of mammals in the Reserve

Species	Direct evidence				Indirect evidences			
	Solitary	No. of Herd/ troop/ pack etc.	Total No. in the herd/ troop/ pack etc.	Grant total seen	Heard	No. of Foot prints	No. of droppings	Other evidences
1	2	3	4	5	6	7	8	9
Macaca radiata	-	7	26+	26+	3	-	-	-
Macaca silenus	-	9	85+	85+	2	-	-	-
Presbytis johni	6	89	368+	374+	79+	-	-	-
Panthera tigris	1	-	-	-	-	17	19	1 Scratching.
Panthera pardus	-	-	-	-	-	3	10	-
Felis chaus	-	-	-	-	-	-	18	-
Viverricula indica	-	-	-	-	-	-	12	-
Paradoxurus hermaphroditus	-	-	-	-	-	-	167	-
Herpestes edwardsi	3	-	-	3	-	-	-	-
Herpestes smithi	-	1(pair)	-	2	-	-	-	-
Herpestes vitticollis	-	2(pairs)	-	4	-	-	-	-

TABLE 3 (Contd.)

1	2	3	4	5	6	7	8	9
Canis aureus	1	-	-	-	-	-	-	-
Cuon alpinus	-	6	40	40	-	-	4	
Melursus ursinus	2	-	-	2	-	5	35	4 diggings
Lutra sp.	-	2	10	10	-	4	2	-
Ratufa indica	76	-	-	76	75	-	-	-
Hystrix indica	-	-	-	-	-	-	418	19
Lepus nigricollis	4	-	-	-	-	-	13	-
Elephas maximus	8	65	580	588	-	-	-	-
Bos gaurus	2	4	49+	51+	-	7	13	1
Cervus unicolor	11	12	46	57	3	58	333	1
Muntiacus muntjak	8	-	-	-	3	5	2	-
Tragulus meminna	-	-	-	-	-	12	5	-
Sus scrofa	22	16	278	300	-	-	-	-

TABLE 4

Primates: Percentage of evidences in different habitats

	No. of troops & solitary seen and heard	Ever-green/ semi-ever-green	Moist deciduous	Savannah	Planta-tions
Macaca radiata	10	30	70	-	-
Macaca silenus	11	100	-	-	-
Presbytis johni	174	58	39	2	1

Though these macaques are truly arboreal, we were told that at times they descend to the ground to pull out fresh leaves of cardamom and devour them. The Cullenia exarillata dominant forest is the favourite habitat of this species (Green & Minkowski, 1977). The macaques feed on the flowers and fruits of this species.

Presbytis johni (Fischer). The Nilgiri Langur
(Table 3, 4; Appendix III-3; Plate V-1)

This endemic species is the commonest primate in the Reserve. Eighty nine troops and 6 solitary individuals were seen, and seventy nine calls were heard from different localities. Troop size varied from 6 to 27, however, often it was not possible to count the number of individuals in a troop, due to the inaccessibility of the terrain and the quick disappearance of the members into thick foliage.

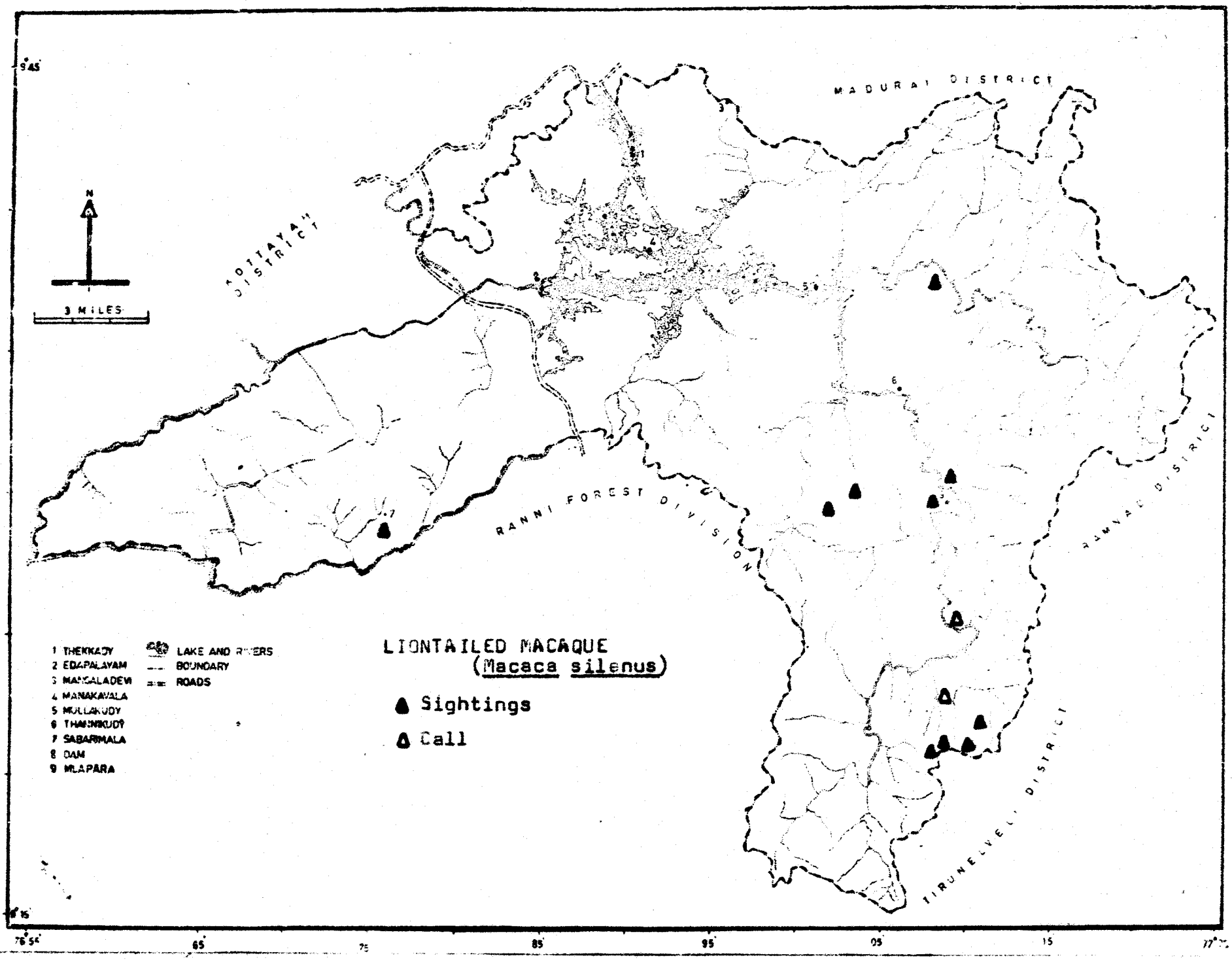


Fig. 3 MAP OF PERIYAR TIGER RESERVE SHOWING LOCALITIES WHERE EVIDENCES OF LIONTAILED MACAQUE WERE RECORDED

The habitat of this langur ranges from evergreen to moist deciduous forest. However, it prefers the evergreen/semi-evergreen type of forest (Table 4). Three troops are found in Thekkady proper, a tongue like projection, where the offices and hotels are situated. Kurup (1975) estimated the population of this species in the Reserve at 100 troops. In this study 174 troops have been recorded and indications are that there are at least 200 troops.

Family Felidae Cats

Of the six species of cats recorded in Kerala, three were noted in the Reserve - Panthera tigris, P. pardus and Felis chaus. Though evidences of occurrence of other three - F. bengalensis, F. rubiginosa and F. viverrina could not be gathered, the possibility of occurrence of the first two cannot be ruled out.

Panthera tigris (Linneaus). The Tiger
(Table 3, 5; Appendix III-4; Fig.4)

This endangered species is the largest predator in the Reserve. During the course of the survey 17 pug marks and 19 droppings were noted. One animal was seen near Ponnambalamedu, but only a fleeting glimpse was obtained.

A tourist saw one between Chevalot and Manakavala and a wildlife guide saw one at Manakavala in August 1978. Further, a kill was noted near Cheriyakanam in October 1978. In the same month one was sighted near Edapalayam. Pug marks of a tigress and cub

were noted near Anchuruli.

From the indirect evidence like pug mark, its different size and location of sightings, and the distribution of droppings, we feel that the population of this species inside the Reserve is between 25 and 30. According to the survey conducted by the Forest Department in 1972, the tiger population in the Reserve was 14, while this was 36 in 1975 (Department of Mathematics, U.C. College, Alwaye, 1975).

Our tentative conclusion, as mentioned above, is based on the location of sightings of pug marks and droppings, and also on the size difference of the pug marks. There are certain drawbacks in this method. Slight size difference may be caused by the different ground condition. If the ground is slushy, the toes will splay out, so that the pug mark may appear to be larger than it would have appeared on hard ground. In such cases when the size difference is only slight, the location of sighting is taken into consideration. However, in some cases, the pug marks could not be measured or traced as it was not clear enough due to the hard substratum. Hence, from the present data the population of this species cannot be accurately estimated. It may be between 25 and 30.

The distribution of pug marks and droppings showed their preference to grassland than to any other habitat (Table 5). An analysis of the droppings indicates that the predominant prey

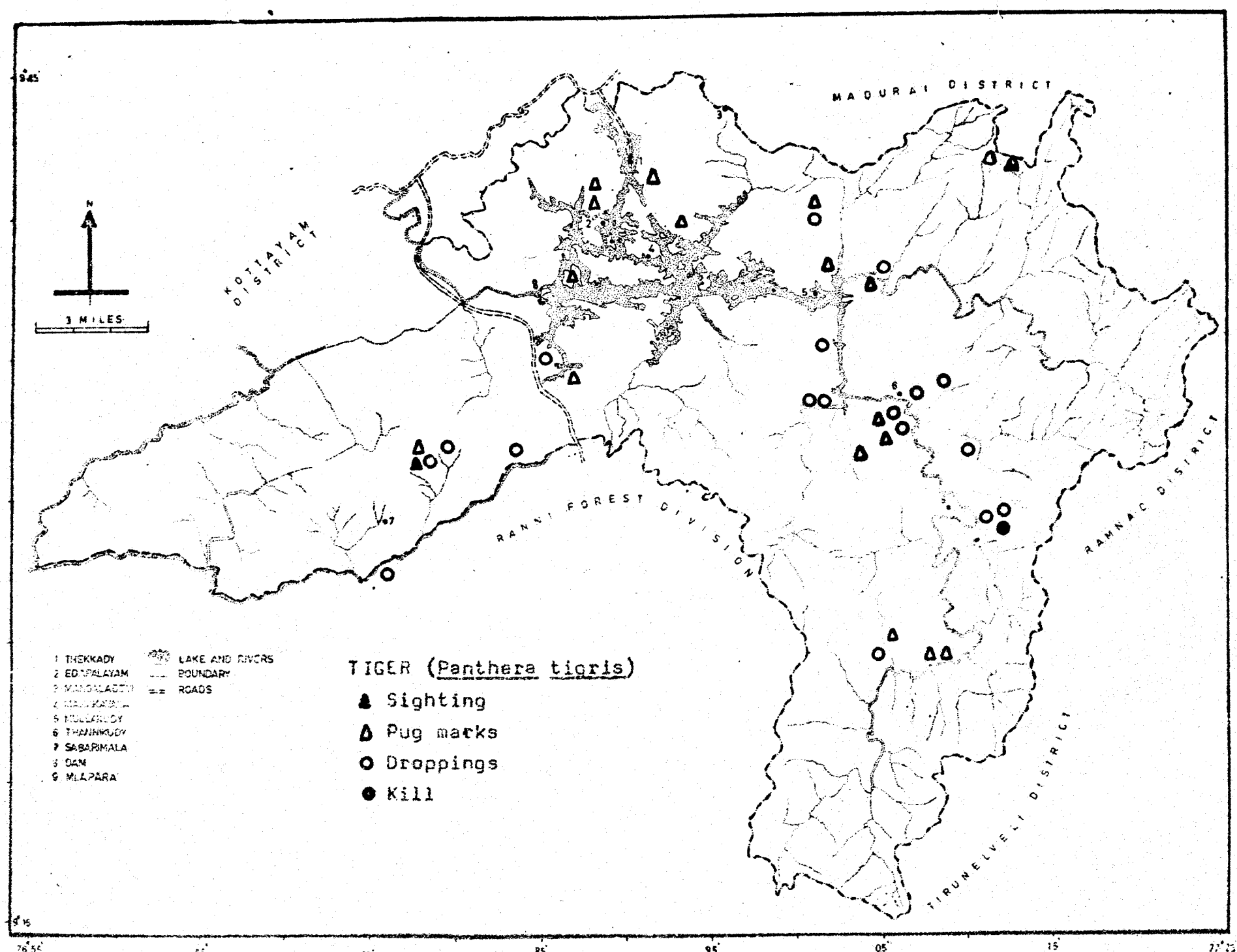


FIG. 4 MAP OF PERIYAR TIGER RESERVE SHOWING LOCALITIES WHERE EVIDENCES OF TIGER WERE RECORDED

inside the Reserve is sambar. The other prey species, as evidenced by faecal analysis, are porcupine and wild boar. Cattle lifting was reported from Cheriyakanam area.

Panthera pardus (Linnaeus). The Panther
(Table 3, 5; Appendix III-5; Fig.5)

The panther was not seen. Ten droppings and three pug marks were recorded. They were more common in the forested areas than in the grassland (Table 5). Black panther, a melanic form of Panthera pardus, though not seen by the team, is reported to be present in the Reserve.

Black hairs, probably of Nilgiri langur or liontailed macaque were also seen in the droppings. Once, bones of Nilgiri langur including parts of its skull were noted.

Felis chaus Guldenstaedt. The Jungle Cat
(Table 3, 5; Appendix III-6)

It was not possible to see this small cat in the Reserve. Indirect evidences of their occurrence were obtained. One decayed carcass of this cat was seen near Valiyakayam, on the river bank. Their population appears very small and they appear to frequent grassland more (Table 5). The droppings showed that they feed mainly on small rodents like rats. Remains of crabs were also obtained from one dropping.

FIG. 5

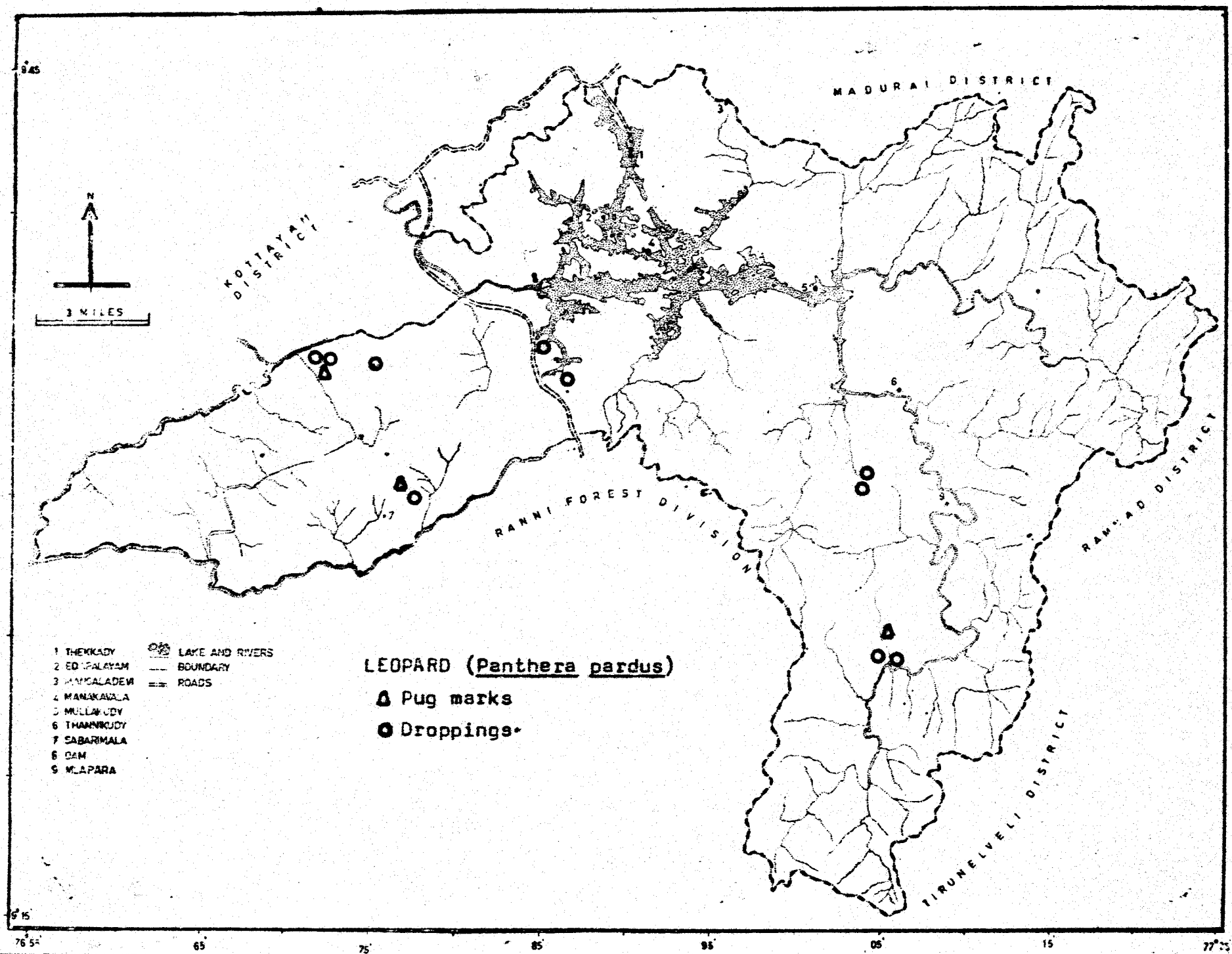


FIG. 5 MAP OF PERIYAR TIGER RESERVE SHOWING LOCALITIES WHERE EVIDENCES OF LEOPARD WERE RECORDED

Carnivores: Percentage of evidences in different habitats

Species	*Total No. of evidences	Evergreen/ Semi-evergreen	Moist deciduous	Savannah	Grassland	Plantations
Panthera tigris	38	26	21	-	50	3
Panthera pardus	13	54	38	8	-	-
Felis chaus	18	27	22	6	39	6
Viverricula indica	12	82	9	-	9	-
Paradoxurus hermaphroditus	147	54	29	-	6	11
Cuon alpinus	47	23	15	-	60	2
Melursus ursinus	32	19	28	6	44	3

*This total varies from the figure given in Table 3 and in the appendices, as equal weights have been given for individuals as well as packs or 'groups'.

Family Viverridae Civets

Of the four species of civets so far recorded from Kerala - Viverricula indica, Viverra megaspilla, Paradoxurus hermaphroditus, P. jerdoni, only two were noted in the Reserve - V. indica and P. hermaphroditus. V. megaspilla, the Malabar civet was reported to be common in the coastal districts of north and south Kerala. But there was no report of this for a long time and it is possibly extinct.

Viverricula indica (Desmarest). The Small Indian Civet.
(Tables 3, 5; Appendix III-7)

This nocturnal creature could not be seen inside the Reserve, but their occurrence was evident from the droppings. Droppings contained mainly insect material. They were found mostly on the forest floor, unlike the toddy cat which defecate on logs, exposed roots etc.

Their number appeared very small inside the Reserve and confined mainly to evergreen/semi-evergreen forests (Table 5); although it has been reported that they show less preference to thick forests (Prater, 1971).

Paradoxurus hermaphroditus (Pallas). The Common Palm Civet or Toddy Cat
(Tables 3, 5; Appendix III-8)

Like the small Indian civet this is also inactive during day, lying in tree holes or curled on branches and becomes active at night. This nocturnal habit made it almost impossible to

observe them. Their occurrence was however evident from the droppings. Frequency of droppings at various locations show that this species is more common than the small Indian civet. They too appeared to prefer thick forest (Table 5).

The toddy cat invariably defecates on roots which are well exposed on the ground, on rocks, on tree trunks or on branches of fallen trees. They seldom defecate on the ground. Their population appeared much higher than that of the small Indian civet.

Family Herpestidae Mongoose

This family closely allied to the former is represented by six species in India and there is a likelihood of four species occurring in Kerala; out of which three were recorded in the Reserve (Table 3).

Herpestes edwardsi (Geoffroy). The Common Mongoose
Herpestes smithi Gray. The Ruddy Mongoose
Herpestes vitticollis Bennett. The Stripednecked Mongoose

The only missing species is H. fuscus Waterhouse, the Brown Mongoose.

All the three species were extremely rare in the Reserve. H. edwardsi was seen in Ummikuppan, Pachakanam and Thekkady area. One pair of H. vitticollis was seen near Periyar House and another pair near Wood's House. H. smithi was seen near Vallakadavu.

Family Canidae Dogs

Of the three species that are reported from Kerala, two were sighted in the Reserve - Cuon alpinus and Canis aureus. We have not yet seen Vulpes bengalensis - the Indian fox, inside the Reserve. Cuon alpinus is the commonest representative of this family in the area. Canis aureus - the jackal was seen only once.

Cuon alpinus (Pallas). The Indian Wild Dog or The Dhole.
(Tables 3, 5; Appendix III-9; Fig.6)

Six packs numbering 40 individuals of this predator were observed in the Reserve. Droppings were noted in 41 places (Table 3). Some of the droppings noted were of solitary individuals. The approximate pack size appeared 8 to 9, and the largest pack observed had 13 individuals.

They seemed to frequent mainly grassland (Table 5). The main prey was sambar. Near Thannikudy Observation Tower, a pack consisting of ten adults and two pups was noticed actively feeding on a sambar fawn. Near the boat landing also, a pack was noticed killing sambar during the course of the survey. The Veterinary doctor and an official of the Forest Department have reported a pack of wild dogs on the carcass of an elephant calf.

It was believed that population of wild dog in the Reserve was increasing rapidly and that steps should be taken to check it.

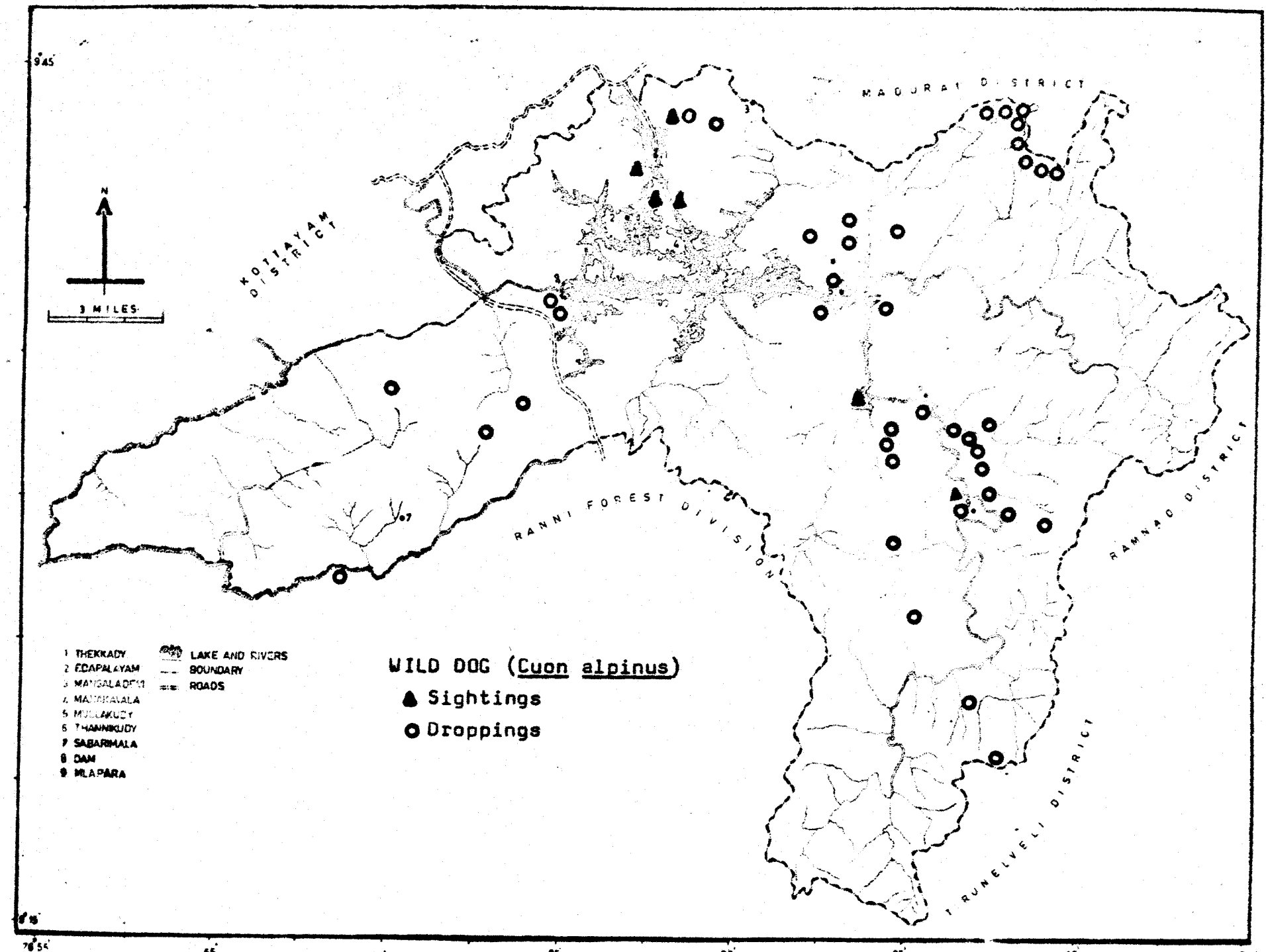


FIG-6 MAP OF PERIYAR TIGER RESERVE SHOWING LOCALITIES WHERE EVIDENCES OF WILD DOG WERE RECORDED

Kurup (1971) also mentioned that the wild dog population was very high and recorded concern over the decline of sambar population due to over predation. It was perhaps so in 1971. Our survey did not yield sufficient evidence to support this view; and, we are of the opinion that the population of wild dog inside the Reserve has not reached a stage which requirs culling.

Family Ursidae Bears

The only representative of this in Peninsular India is Melursus ursinus.

Melursus ursinus (Shaw). The Sloth Bear
(Tables 3, 5; Appendix III-10)

Two bears resting at Pulikayam, 35 droppings, five pug marks and four diggings were noted during the survey. A burnt skeleton of bear was seen at Chamikayam mettu in March 1978. The entire grass in the area around was charred. The condition of the flesh on the skeleton suggested that the animal had died probably a week earlier. We are not sure of the reason. As the bones were scattered around, it can be presumed that it must have been killed by some predators before the fire, or it must have been a sick or wounded animal unable to escape the fire and later scavengers must have pulled the bones apart.

The droppings collected varied in size, suggesting perhaps different age groups. A few were very small in diameter whereas, some were bigger though they contained the same matter. A number of undigested insect remains constituted the

main content of the dropping. Mango seeds were one among the various seeds noted in the faeces. They prefer grassland to other types of habitats in the Reserve.

Mustelidae (Otters etc.)

Though five species are likely to be present in Kerala (3 species of otters, one species of marten and one species of ratel), only otters were recorded from the Reserve (Table 3; Appendix III-11). We were not quite sure of the identity, whether it was Lutra lutra, Lutra perspicillata or Aonyx cinerea. From the habitat and range we presumed that it was Lutra lutra. Two parties of otters, containing ten members were recorded. Four paw marks and two droppings were also seen on the margins of the lake. Though we have not seen many, we feel there is a good population.

Family Sciuridae Squirrels

All the three groups of squirrels that occur in Kerala - flying squirrels, giant squirrels and striped squirrels, are present in the Reserve.

Flying Squirrels

Of the two species, Petaurista petaurista and Petimomys fuscocapillus, only the latter was seen once in Thekkady - near the office of the Wildlife Preservation Officer. It appears that the species is rather rare in the Reserve.

Giant Squirrels

The commonest species in Kerala is Ratufa indica. R. macroura is quite unlikely to be present in Kerala.

Ratufa indica (Erxleben). The Indian Giant Squirrel
(Tables 3, 6; Appendix III-12)

This arboreal rodent has a wide distribution inside the Reserve. A total of 76 were seen and another 75 were heard from different parts. They were found mainly in evergreen/semi-evergreen and moist deciduous type of forests (Table 6).

The striking pelage and loud rattling calls aid to locate them easily. They feed mainly on fruits, flowers, flower buds, bark and young leaves.

Striped Squirrels

Of the three species so far recorded from Kerala, only the Threestriped Palm Squirrel - Funambulus palmarum was seen here, which was common in the moist deciduous forest and in the disturbed areas.

Family Hystricidae Porcupines.

The family is represented only by one species in Kerala - Hystrix indica.

Hystrix indica Kerr. The Indian Porcupine.
(Tables 3, 6; Appendix III-13)

Due to its nocturnal habit none could be seen during the survey. However, indirect evidences showed that they are

TABLE 6

Rodents: Percentage of evidences in different habitats

Species	Total No. of evidences	Ever-green/ Semi-ever-green	Moist deci-duous	Savannah	Grassland	Plantation
Ratufa indica	121	56	43	-	-	1
Hystrix indica	157	9	21	10	60	-

abundant in some parts of the Reserve (Table 3).

They normally avoid thick forest and prefer grassland (Table 6). In some places like Kannimarmettu, evidences of concentration of a large number of them were obtained. Their droppings contained largely undigested plant material. Their natural enemy in the Reserve appeared mainly tiger.

Family Leporidae Hares

This family is represented only by one species in Kerala - Lepus nigricollis nigricollis.

Lepus nigricollis nigricollis F. Cuvier. The Blacknaped Hare. (Table 3, Appendix III-14)

The team could see only four individuals and thirteen droppings. The poor number of sightings may be attributed to the nocturnal habit of the species; but the infrequent occurrence of droppings suggests the rarity of the species inside the Reserve.

The blacknaped hare normally does not prefer thick forest. In the present case, out of the four seen and thirteen droppings noted twelve were in grassland and five in moist deciduous forest. The proportion of grassland to other types of habitat is too small and therefore perhaps, the lack of suitable habitat may be the reason for the rarity of the species.

Family Proboscidae Elephants

The only representative in the country is the Indian Elephant.

Plate - V

1 The Nilgiri Langur: the commonest monkey in the Reserve.

2. A herd of elephants moving steadily along the lake margin.

Elephas maximus Linnaeus. The Indian Elephant.
(Tables 3, 7, 8; Appendix III-15;
Plates V-2; VI, VII & VIII)

Sixty five herds and 8 solitary individuals to make a total of five hundred and eighty eight were seen inside the Reserve (Table 3).

Composition of herds, especially age groups could not be assessed in all cases due to inability to observe them from close range. However, they were classified mainly into: adult bulls, sub-adult bulls, calves and others (cows and makhnas). Makhnas, said to be common in the area, could not often be recognised from distance, especially when they were among thick tall grass.

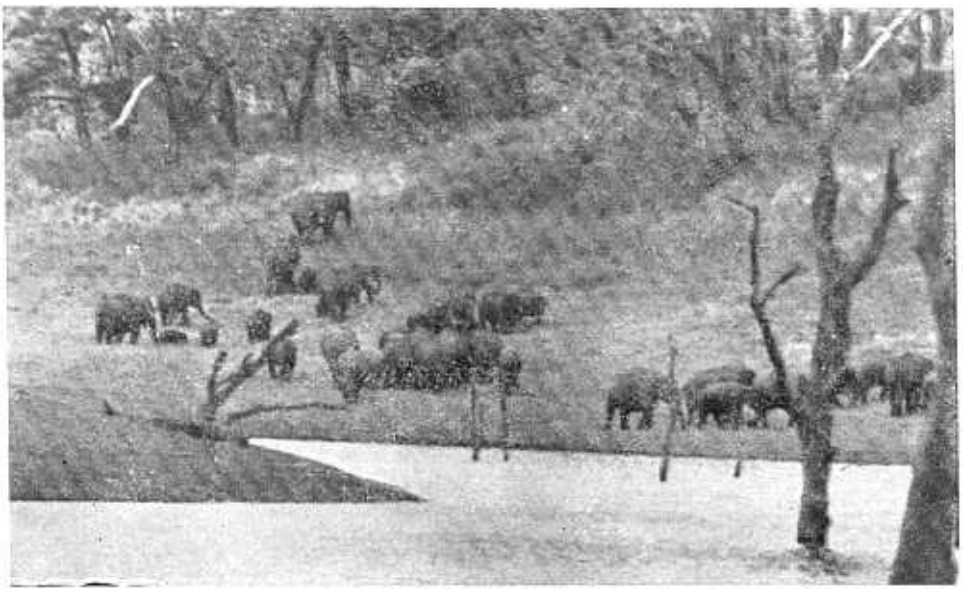
Altogether 29 bulls were seen, among which 13 were adult and 16 sub-adult (Table 7). The largest herd which could be classified as composite herd (Krishnan, 1975) had 60 elephants.

TABLE 7

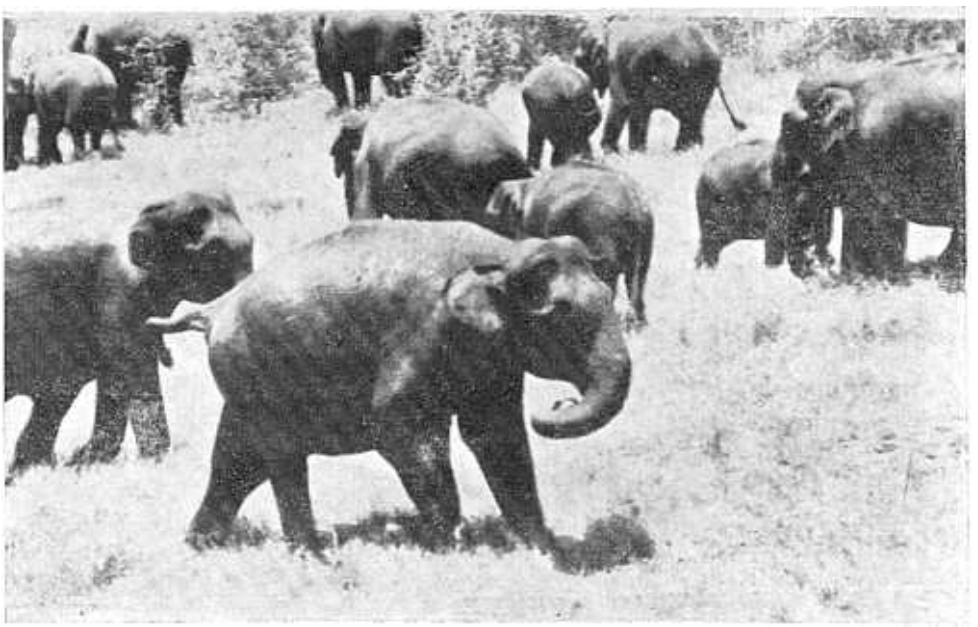
Elephas maximus: Composition of population (Approximate)

Sex & Age class	Total No. of individuals seen	Percentage
Adult Bulls ..	13	2
Sub-adult Bulls ..	16	3
Calves ..	42	7
Others (Cows & Makhnas)..	517	88
Total seen..	588	

Plate - VI



1. A 'composite herd' of elephants near Mullakudy.



2. A herd of elephants disturbed at the sight of photographer.

The nature of the terrain does not appear a barrier to the movement of the elephant except perhaps the very steep cliffs. The lake too is often negotiated with ease. They were seen in all kinds of terrain, from the lake margin through the numerous valleys and hills and, even grass-clad hill tops like Sivagirimettu, Madhalamthookki and Chamikayam.

Their most preferred habitat is grassland and then, the moist deciduous forest (Table 8). Though we could not see them in the evergreen forests, the presence of dung in these forests suggests that such forests also form part of their habitat though less preferred.

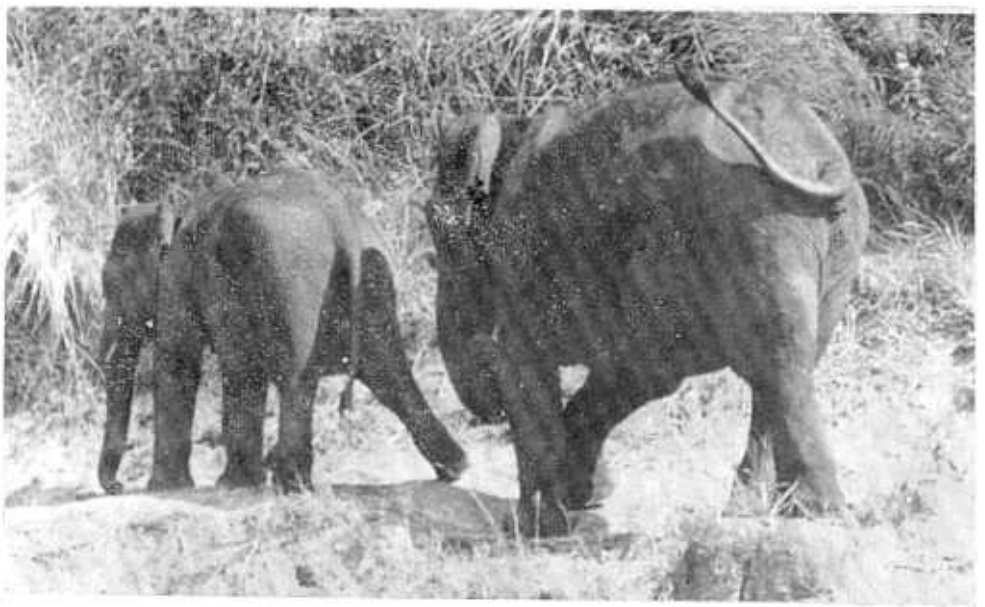
The elephant deaths noted during the investigation period were two sub-adult bulls, two cows and one 3 to 5 month old calf; all between March and December 1978.

TABLE 8

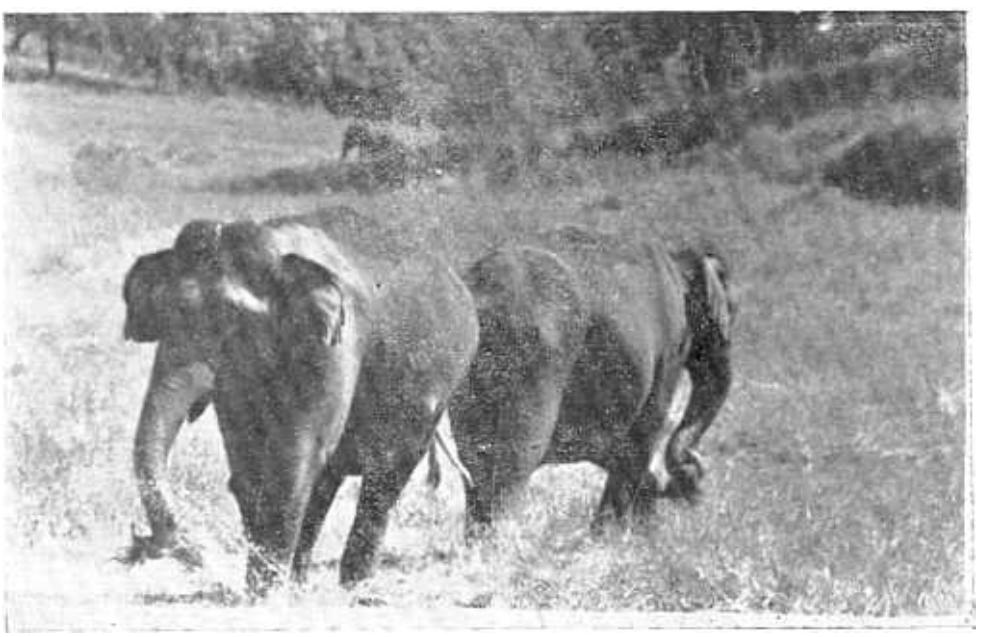
Elephas maximus: Percentage of sightings in different habitats

Type of Habitat	Total No. of herds and, solitary individuals seen	Percentage
Evergreen/Semi-evergreen ..	-	-
Moist deciduous ..	29	40
Savannah ..	7	9
Grassland ..	37	51
Total ..	73	

Plate - VII

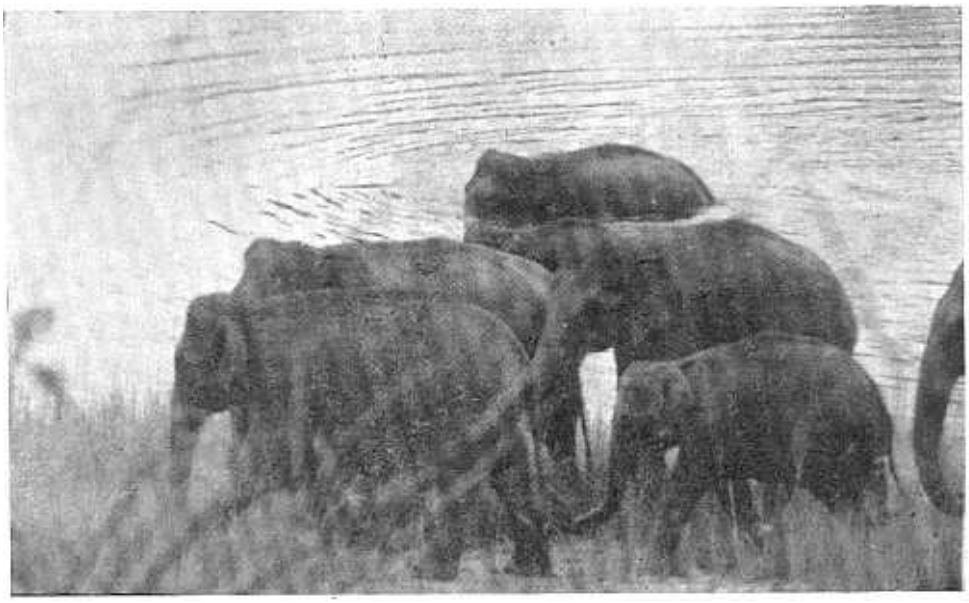


1. A sub - adult bull with an adult cow elephant.

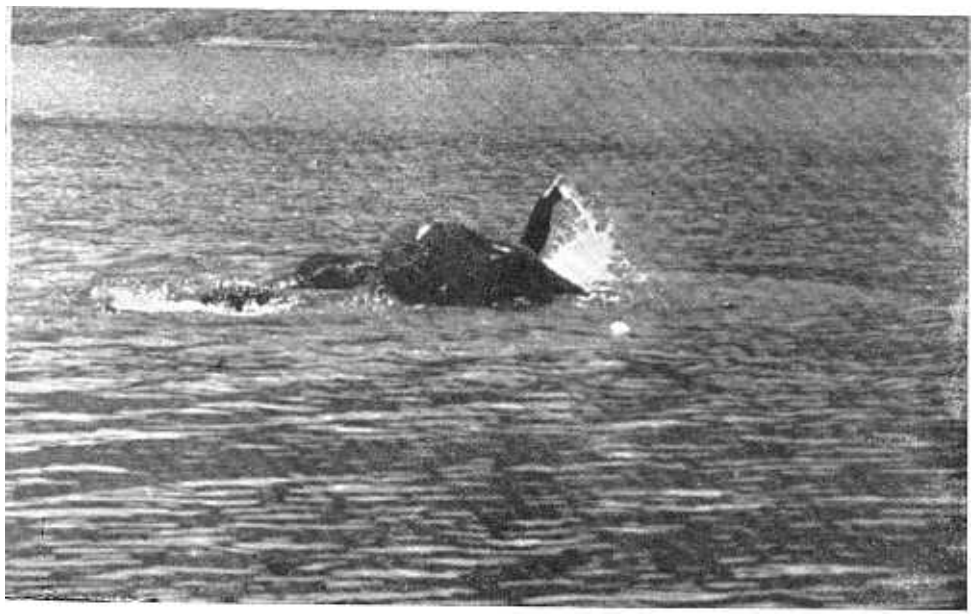


2. Two adult cow elephants feeding on grass near the lake.

Plate VIII



A herd lake margin



2. Elephant swimming lake

We could not study the movements of elephants of the Reserve during the survey period. From enquiries made, mainly from estate officials on the border areas and the Forest Officials, it is learnt that most of the elephants in the Reserve avoid the heavy monsoon by migrating to adjoining Tamil Nadu forests. However, this aspect has to be studied in detail.

Family Bovidae oxen, sheep, goats etc.

This largest family of even-toed ungulates is represented in Kerala by two species: Bos gaurus and Hemitragus hylocrius.

Bos gaurus H. Smith. The Gaur or Indian Bison
(Tables 3, 9, 10; Appendix III-16; Plate IX; Fig.7)

Only four herds with a total of 49 individuals and two solitary bulls were observed (Table 3). Indirect evidences were also noted.

Out of the four herds seen, the composition of herds could not be studied properly in two herds, as they were too far off. Calves in these two herds could not be counted. On the whole, from the available data it is surmised that there were 26% of calves in the population (Table 9) and the bull/cow ratio was 1:3.

Plate - IX

1. A herd of gaur near Manakavala.

2. A herd of gaur near Edapalayam.

FIG. 7

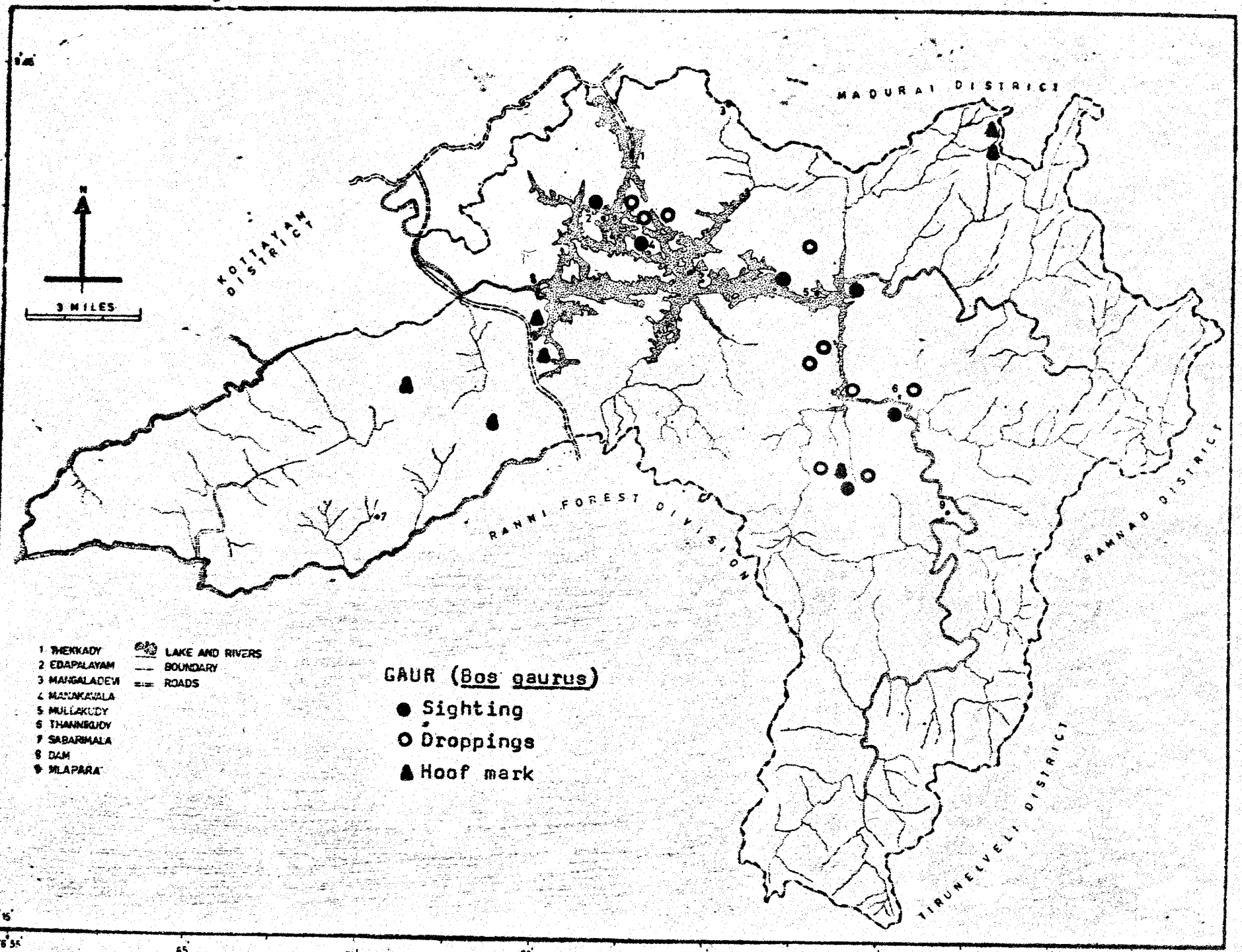


FIG.7 MAP OF PERIYAR TIGER RESERVE SHOWING LOCALITIES WHERE EVIDENCES OF GAUR WERE RECORDED

TABLE 9

Bos gaurus: Herd Composition

Herd No.	No. of Bulls	No. of Cows	No. of Calves	Total
1	3	7	6	16
2	1	6	-	7
3	-	-	5	18
4	-	-	2	8
			Total:	49 (2 solitary bulls were also noted)

Most of them were located on grassland and moist deciduous forest (Table 10). However, they seem to avoid grasslands in the higher hill topes like Madhalamthookki, Chamikayam and Kannimarmettu.

There was a catastrophic fall in the population of the gaur, in 1974, due to the outbreak of rinderpest. The calves seen in the population during the survey is, however, a welcome sign.

Hemitragus hylocrius (Ogilby). The Nilgiri Tahr.

None could be located during the present study, although local enquiries revealed that the grassy hills in the Reserve supported a good population of this endangered species of goat. Some of the hills inside the Reserve are known as "Tahr hills", "Attumudi" or "Varayattumudi", indicating that these animals were once abundant in these areas. It is claimed that Mangaladevi area has a relict population of tahr. Our careful

TABLE 10

Artiodactyles: Percentage of evidences in different habitats

Species	Total	Ever-green/ Semi-ever-green	Moist deciduous	Savannah	Grassland	Plantation
Bos gaurus	25	12	52	-	28	8
Cervus unicolor	244	12	28	9	49	2
Muntiacus muntjak	17	41	29	-	29	-
Tragulus meminna	17	41	35	-	24	-
Sus scrofa	36	6	44	-	50	-

searches on several occasions, however, produced negative results. It is quite possible that sambar from a distance is mistaken for tahr. They have been reported in the High-wavy Estates, lying on the north-eastern border of the Reserve.

Family Cervidae Deers

The family is represented by three species in Kerala, out of which two are present in the Reserve - Cervus unicolor and Muntiacus muntjak. Axis axis was reported to be present earlier.

Cervus unicolor Kerr. The Sambar
(Tables 3, 10; Appendix III-17; Plate X)

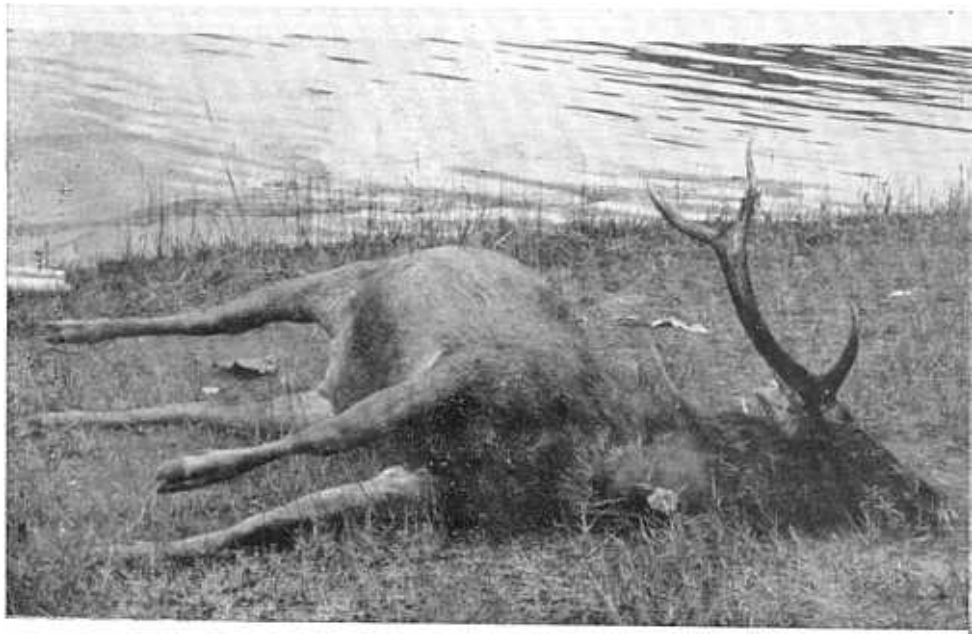
Fifty seven sambar were seen in the Reserve. The frequency of occurrence of droppings indicates that a good population of this deer exists in the area (Table 3).

They were usually seen in small herds upto 5 individuals and once a herd of 10 (7 adult does and 3 fawns) were seen grazing. The most preferred habitat of this species is grassland, though they do occur in evergreen/semi-evergreen forests (Table 10). They were occasionally seen in Eucalyptus plantation also.

The sambar is the main prey of the tiger and the wild dog. Packs of wild dog attacking sambar were observed twice, once near Thannikudy machan and another time near the boat landing. A fawn was almost completely eaten up by a pack near Thannikudy, when we noticed it. Often the sambar escapes, running to the lake and swimming across it.

Plate - X

1. A heard of sambar in the savannah (woodland).



2. A dead sambar stag with a prominent 'sore - patch'.

An old adult stag was found dead and floating in the reservoir near Mullakudy. This was brought to the boat landing. It had a prominent "sore patch" (Plate X-2). The 'sore' had a white tipped mouth resembling a skin gland. The skin around it was naked and fleshy in appearance.

Axis axis (Erxleben). The Chital or Spotted Deer.

There was no sign of this species in the Reserve. From the records we found that they were once present in this area. In 1936, an attempt was made by the Forest Department to build up a population of this species in the Reserve and 18 spotted deer were released into an island. This attempt was a total failure. However, the island is now known as Deer Island.

Muntiacus muntjak (Zimmermann). The Muntjac or Barking Deer.
(Tables 3, 10; Appendix III-18)

Only 8 individuals of this species could be seen in the Reserve. Calls of 3, hoof prints of 5 and fresh droppings of 2 individuals were also noted from different localities (Table 3).

The majority of evidences were of solitary animals. One doe with fawn seen around the Wood's House, is apparently a resident of the area. The fawn was noticed in November.

They were noted more in evergreen/semi-evergreen type of forests (Table 10).

The predators of this species are the same as those of the sambar. When alarmed they give out a series of cackling barks, which earned the common name - barking deer.

Family Tragulidae Mouse Deer

Tragulids, unlike cervids are tiny shy creatures without antlers. There is only one species in India.

Tragulus meminna (Erxleben). The Indian Chevrotain or Mouse Deer.

(Tables 3, 10; Appendix III-19; Plate XI-1)

Its diminutive size and shy nature makes it a difficult animal to be seen. One was sighted at Koruthivaduthi - one of the estates on the eastern border of the Reserve. Twelve hoof prints and five droppings were located in the Reserve (Table 3). They were more common in the evergreen/semi-evergreen and moist deciduous forest (Table 10).

We have evidence of wild dog preying on the mouse deer. In April 1978, between Thannikudy and Ummikuppan, a mouse deer doe, which had a full grown embryo, was killed by wild dogs.

Family Suidae Wild Boar

This non-ruminant ungulate is represented only by one species in India - Sus scrofa.

Sus scrofa Linnaeus. The Indian Wild Boar
(Tables 3, 10; Appendix III-20; Plate XI-2)

Sixteen sounders consisting of 278 boars and 22 solitary individuals were recorded from different parts of the Reserve (Table 3). Of the 16 parties, 2 were very small (less than 10 individuals) and 13 had 10 to 25 individuals and the largest one had more than twenty five individuals. Before this study, a sounder having eighty individuals had been seen by the senior author.

They were seen mostly in grassland and moist deciduous forest (Table 10). They are active in the morning and evening and sometimes at night. They dig the ground for tubers, rhizomes, etc. In some places, especially in wet grassy areas, the ground looked as though it was ploughed.

This species is preyed on by tigers in the Reserve.

There has been concern over the declining population of this species in the Reserve. It is claimed that larger sounders were frequently seen previously. This claim however, is based upon observations in the lake area only. We did not see many wild boar carcasses or bones inside the Reserve to substantiate this concern about the decimation of population. We do not think, that there was either over predation or epidemic. There is apparently no evidence to suggest that they might have moved away to adjacent areas. The only reason that seems probable is that they are given to local movements, and, at the time of

Plate - XI

1. An exhausted mouse deer near Tannikudy - unable to bolt off.

2. A solitary wild boar bull.

such casual observations the sounders may have moved inside, away from the lake area.

Family Manidae Pangolins

There is only one species of this primitive mammal in Kerala.

Manis crassicaudata Gray. The Indian Pangolin

This primitive protected mammal could not be located in the Reserve due to its nocturnal habit. Two burrows of this species were located. We were told by tribals and others that they are not uncommon in the Reserve.

Other Mammals

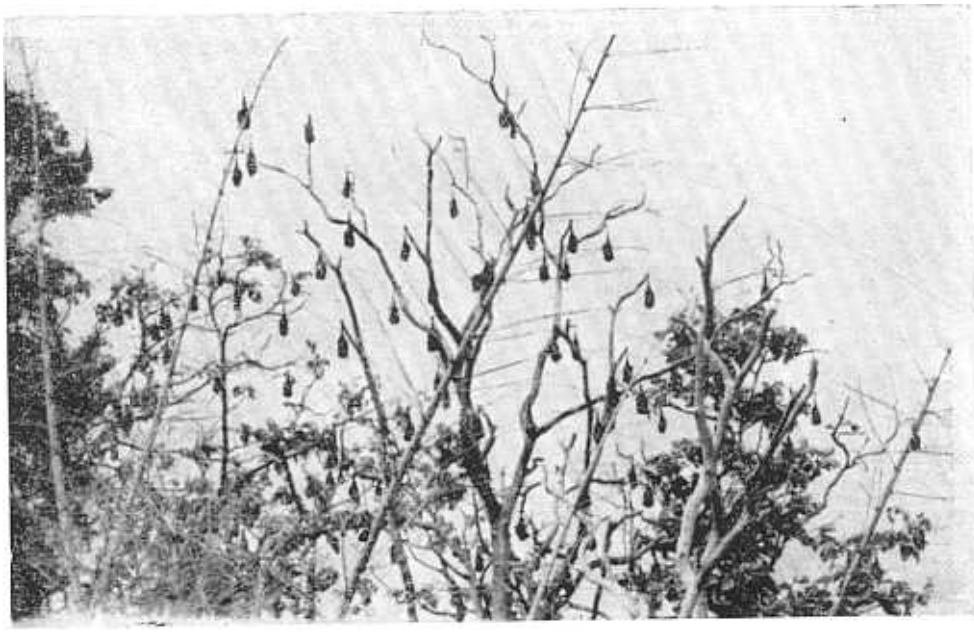
Pteropus giganteus (Brunnich). The Flying Fox
(Plate XII-1)

This, largest among Indian bats, is very common in the Reserve. There is a colony of over 1,000 bats at the entrance to the Reserve, roosting on the dry bamboo clumps and on neighbouring trees. Seasonal variation in the number was observed. In November 1978, there was a substantial decline in the population. When the population was dense even the branches were not visible as they cling to them, giving the appearance of a tree full of fruits. At dusk they move towards Peermade side and so far we have not seen them moving into the Reserve.

Platacanthomys lasiurus Blyth. Malabar Spiny Mouse

A pair of this mouse was collected from Ummikuppan area of the Reserve. Tribals use this for medicinal purpose. Among the

Plate - XII



A roost of flying - fox at the entrance to the Reserve

2. Indian darter on a stump in the lake.

smaller rodents, apart from Malabar spiny mouse, Bandicota indica (Bechstein), the bandicoot rat, Rattus rattus (Linnaeus), the common house rat and Mus musculus Linnaeus, the house mouse were also noted in the Reserve.

THE AVIFAUNA

Avifauna of the area was first studied, though not entirely, several years ago (Ali, 1935, 1936 & 1937). Of the total of about 400 species recorded from Kerala, a little less than half-181 has so far been noted in the Periyar Tiger Reserve. We have still not undertaken a detailed ornithological survey in the Reserve.

General status:

Except procellariiformes and anseriformes, all the orders of birds that were reported from Kerala, were represented at least by a few species inside the Reserve (Table 11). The status of the former is not yet very clearly known. Lack of suitable habitat must be the reason for the absence of anseriformes and the fewer representation of charadriiformes. Psittaciformes, cuculiformes, coraciiformes, piciformes and passeriformes are well represented.

Of the 181 species recorded in the Reserve (Appendix II), the majority are residents, some are local migrants and a few are winter migrants (Table 12). Status of a few species, whether migratory or resident is not yet known. The common winter migrants are greenish warblers - *Phylloscopus magnirostris* and *P. trochiloides*, wagtails - *Motacilla indica*, *M. caspica* and *M. flava*, and, Rosefinch - *Carpodacus erythrinus*. The nearest breeding ground of all these species is Himalayas (Ali, 1969).

TABLE 11

Occurrence of Avian groups in the Reserve

Orders	Recorded in Periyar Tiger Reserve	*Recorded from Kerala
Podicipediformes	1	1
Procellariiformes	-	2 (?)
Pelecaniformes	2	5
Ciconiiformes	9	18
Anseriformes	-	6
Falconiformes	12	38
Galliformes	4	10
Gruiformes	1	12
Charadriiformes	4	49
Columbiformes	6	12
Psittaciformes	4	5
Cuculiformes	6	14
Strigiformes	8	13
Caprimulgiformes	2	6
Apodiformes	4	7
Trogoniformes	1	1
Coraciiformes	12	19
Piciformes	12	16
Passeriformes	93	156
	181	390

*Source Ali (1969)

TABLE 12

Status of birds inside the Reserve

Status	No. of species	Percentage
Resident	153	84
Local migrant	3	2
Winter migrant	16	9
Uncertain	9	5
	181	

Some of them go beyond Himalayas. They begin to arrive by the second half of September or by the first week of October and leave by the middle of March.

Among the residents the more common species are bulbuls, mynas, babblers, drongos and King fishers (Table 12). Darters are common and can be seen on the stumps in the lake (Plate XII-2).

An analysis on the basis of food habit shows that all except scavengers are common inside the Reserve. This might perhaps, indicate the fewer death of animals due to natural causes other than predation.

Protected species:

The only protected species that occurs in the Reserve is the Great Indian Hornbill - Buceros bicornis. We have noted about eighty seven pairs of this inside the Reserve. A night roost of about 20 birds was noted near Mullakudy. They are quite common in Sabarimalai area.

A list of birds with their comparative abundance and status is given in Table 13.

TABLE 13

Status and Comparative abundance of birds observed in Periyar Tiger Reserve

Species	Status	Very common	Common	Not common	Rare
1	2	3	4	5	6
Podiceps ruficollis	R	-	-	-	+
Phalacrocorax niger	R	-	-	+	-
Anhinga rufa	R	-	+	-	-
Ardea cinerea	R	-	-	-	+
Butorides striatus	R	-	-	-	+
Ardeola grayii	R	+	-	-	-
Bubulcus ibis	R	-	+	-	-
Egretta alba	(?)	-	-	+	-
Ixobrychus cinnamomeus	R	-	-	-	+
Ixobrychus sinensis	R	-	-	-	+
Dupetor flavicollis	R	-	-	-	+
Ciconia episcopus	R	-	-	-	+
Elanus caeruleus	(?)	-	-	+	-
Aviceda leuphotes	R	-	-	+	-
Haliastur indus	R	-	-	+	-
Accipiter badius	R	-	-	+	-
Ictinaetus malayensis	R	-	-	-	+
Haliaeetus leucogaster	R	-	-	-	+

TABLE 13 (Contd.)

1	2	3	4	5	6
Icthyophaga ichthyaetus	R	-	-	+	-
Torgos calvus	R	-	-	-	+
Circaetus gallicus	R	-	-	-	+
Spilornis cheela	R	-	+	-	-
Pandion haliaetus	(?)	-	-	+	-
Falco tinnunculus	M	-	-	-	+
Coturnix chinensis	R	-	-	-	+
Perdicula sp.	R	-	-	-	+
Galloperdix spadicea	R	-	-	+	-
Gallus sonneratii	R	+	-	-	-
Amaurornis phoenicurus	R	-	-	+	-
Vanellus indicus	R	+	-	-	-
Charadrius dubius	M	-	-	+	-
Tringa stagnatilis	M	-	-	-	+
Capella gallinago(?)	M	-	-	-	+
Treron phoenicoptera	LM	+	-	-	-
Treron pompadora	R	+	-	-	-
Ducula badia	R	+	-	-	-
Columba elphinstonii	R	+	-	-	-
Streptopelia chinensis	R	-	+	-	-
Chalcophaps indica	R	-	+	-	-
Psittacula krameri	R	+	-	-	-
Psittacula cyanocephala	R	+	-	-	-

TABLE 13 (Contd.)

1	2	3	4	5	6
Psittacula columboides	R	+	-	-	-
Loriculus vernalis	R	-	+	-	-
Cuculus varius	R	-	+	-	-
Surniculus lugubris	R	-	-	+	-
Eudynamys scolopacea	R	-	+	-	-
Rhopodytes viridirostris	R	-	-	+	-
Centropus sinensis	R	-	+	-	-
Centropus toulou	R	-	-	-	+
Otus bakkamoena	R	-	-	+	-
Bubo bubo	R	-	-	+	-
Bubo nipalensis	R	-	-	-	+
Bubo zeylonensis	R	-	-	-	+
Glaucidium radiatum	R	-	+	-	-
Ninox scutulata	R	-	-	+	-
Athene brama	R	-	+	-	-
Strix leptogrammica	R	-	-	+	-
Caprimulgus indicus	R	-	+	-	-
Caprimulgus asiaticus	LM	-	+	-	-
Chaetura gigantea	R	-	-	+	-
Chaetura sylvatica	R	-	-	+	-
Apus affinis	R	-	-	-	+
Cypsiurus parvus	R	-	-	+	-
Harpactes fasciatus	R	-	-	+	-

TABLE 13 (Contd.)

1	2	3	4	5	6
Ceryle rudis	R	-	+	-	-
Alcedo atthis	R	-	+	-	-
Alcedo meninting	R	-	-	-	+
Pelargopsis capensis	R	-	-	+	-
Halcyon smyrnensis	R	+	-	-	-
Merops leschenaulti	R	-	+	-	-
Merops orientalis	R	-	-	+	-
Coracias benghalensis	R	-	-	+	-
Eurystomus orientalis	(?)	-	-	+	-
Upupa epops	R	-	-	+	-
Tockus griseus	R	+	-	-	-
Buceros bicornis	R	-	+	-	-
Megalaima viridis	R	+	-	-	-
Megalaima rubricapilla	R	+	-	-	-
Picumnus innominatus	R	-	+	-	-
Micropternus brachyurus	R	-	+	-	-
Picus chlorolophus	R	-	+	-	-
Dinopium benghalense	R	+	-	-	-
Dinopium javanense	R	-	-	+	-
Dryocopus javensis	R	-	-	+	-
Dendrocopos mahrattensis	R	-	+	-	-
Dendrocopos nanus	R	-	-	+	-
Hemicircus canente	R	-	-	+	-

TABLE 13 (Contd.)

1	2	3	4	5	6
Chrysocolaptes festivus	R	-	-	-	+
Pitta brachyura	M	-	-	-	+
Alauda gulgula	R	-	+	-	-
Hirundo concolor	R	-	+	-	-
Hirundo daurica	R	-	+	-	-
Lanius schach	R	-	-	+	-
Lanius cristatus	M	-	-	+	-
Oriolus oriolus	R	-	+	-	-
Oriolus xanthornus	R	-	-	+	-
Dicrurus adsimilis	R	-	-	+	-
Dicrurus leucophaeus	(?)	+	-	-	-
Dicrurus aeneus	R	-	+	-	-
Dicrurus paradiseus	R	-	+	-	-
Artamus fuscus	R	-	+	-	-
Sturnus malabaricus malabaricus	LM	-	+	-	-
Sturnus malabaricus blythii	R	-	+	-	-
Sturnus pagodarum	R	-	-	+	-
Sturnus roseus	M	-	-	-	+
Acridotheres tristis	R	+	-	-	-
Acridotheres fuscus	R	+	-	-	-
Gracula religiosa	R	+	-	-	-
Dendrocitta vagabunda	R	-	+	-	-

TABLE 13 (Contd.)

1	2	3	4	5	6
Dendrocitta leucogastra	R	-	+	-	-
Corvus splendens	R	-	-	+	-
Corvus macrorhynchos	R	-	-	+	-
Hemipus picatus	R	-	-	+	-
Tephrodornis virgatus	R	-	+	-	-
Tephrodornis pondicerianus	R	-	+	-	-
Coracina novaehollandiae	R	-	+	-	-
Coracina melanoptera	(?)	-	+	-	-
Pericrocotus flammeus	R	+	-	-	-
Pericrocotus cinnamomeus	R	+	-	-	-
Aegithina tiphia	R	-	-	+	-
Chloropsis aurifrons	R	+	-	-	-
Chloropsis cochinchinensis	R	-	+	-	-
Irena puella	R	-	+	-	-
Pycnonotus melanicterus	R	-	+	-	-
Pycnonotus jocosus	R	+	-	-	-
Pycnonotus cafer	R	-	+	-	-
Hypsipetes indicus	R	+	-	-	-
Hypsipetes madagascariensis	R	+	-	-	-
Pellorneum ruficeps	R	-	-	+	-
Pomatorhinus schisticeps	R	-	+	-	-
Rhopocichla atriceps	R	-	+	-	-
Turdoides subrufus	R	-	+	-	-

TABLE 13 (Contd.)

1	2	3	4	5	6
Turdoides striatus	R	+	-	-	-
Garrulax delesserti	R	-	-	+	-
Garrulax jerdoni meridionale	R	-	-	+	-
Alcippe poioicephala	R	+	-	-	-
Muscicapa latirostris	(?)	-	-	+	-
Muscicapa parva	M	-	-	-	+
Muscicapa pallipes	R	-	-	+	-
Muscicapa rubeculoides	M	-	-	+	-
Muscicapa tickelliae	R	-	-	+	-
Culicicapa ceylonensis	(?)	-	-	+	-
Rhipidura aureola	R	-	-	+	-
Terpsiphone paradisi	R	-	+	-	-
Monarcha azurea	R	-	-	+	-
Cisticola juncidis	R	-	-	+	-
Prinia hodgsonii	R	-	-	+	-
Prinia subflava	R	-	-	+	-
Orthotomus sutorius	R	-	-	+	-
Acrocephalus stentoreus	R	-	-	-	+
Acrocephalus dumetorum	M	-	-	+	-
Phylloscopus magnirostris	M	-	+	-	-
Phylloscopus trochiloides	M	-	+	-	-
Copsychus saularis	R	-	-	+	-
Saxicola caprata	R	-	-	+	-
Saxicoloides fulicata	R	-	-	-	+
Myiophoneus horsfieldii	R	-	+	-	-

TABLE 13 (Contd.)

1	2	3	4	5	6
Zoothera citrina cyanotus	R	-	-	+	-
Turdus merula	R	-	-	+	-
Parus major	R	-	+	-	-
Parus xanthogenys	R	-	-	+	-
Sitta frontalis	R	-	+	-	-
Anthus novaeseelandiae	M	-	+	-	-
Motacilla indica	M	-	-	-	+
Motacilla flava	M	-	-	+	-
Motacilla caspica	M	-	+	-	-
Motacilla maderaspatensis	R	-	-	+	-
Dicaeum agile	R	-	+	-	-
Dicaeum erythrorhynchos	R	-	+	-	-
Dicaeum concolor	R	-	-	+	-
Nectarinia zeylonica	R	-	-	+	-
Nectarinia minima	R	-	+	-	-
Nectarinia lotenia	R	-	+	-	-
Nectarinia asiatica	R	-	+	-	-
Arachnothera longirostris	R	-	-	+	-
Zosterops palpebrosa	R	-	+	-	-
Passer domesticus	R	-	-	-	+
Lonchura malabarica	R	-	-	+	-
Lonchura kelaarti	R	-	-	+	-
Lonchura malacca	R	-	-	+	-
Carpodacus erythrinus	M	-	+	-	-

R = Resident, M = Migrant, (?) = Status uncertain
LM = Local migrant

OTHER FAUNAL RECORDS

I. Varanus

Four individuals and three droppings of this reptile were recorded in different locations of the Reserve, in evergreen/semi-evergreen forest, Quite possibly there must be many more. Because of its secretive mode of life it was difficult to locate them, It is a vulnerable species, Flesh is said to have high medicinal value and hence much sought after by the tribals.

Uropeltis

This digging reptile was once noticed between Sabarimalai and Uppupara.

Rana curtipes

(Plate XIII-1)

The abundance of tad poles and adults just after metamorphosis was noteworthy. During February-March, the shallow reaches of the lake, especially around Mullakudy was teeming with these tad poles and the lake margins with young frogs. Their number could be several hundreds. During that period it was not possible to walk along the lake margin without trampling a few. Many of them were found dead in the depressions caused by elephant foot,

Their number decreased by the end of April. We could not obtain any information on the natural predators or the factors

Plate - XIII

1. *RANA CURTIPES:* Found in hundreds on the lake margins, especially near Mullakudy.

2. Thick tall grass after fire

which control their population, Predatory birds were not found attracted by them,

Fish fauna of the lake

We have not undertaken any study on the fish fauna of the lake in the Reserve. This is proposed in the next phase of the study,

A survey of the fish fauna of the lake was conducted several years ago (Chacko, 1948) to develop the fishery. According to him there were about 35 species of fishes.

DISTURBANCES TO WILDLIFE

As in most of the other Project Tiger areas, Sanctuaries and National Parks, Periyar Tiger Reserve also is exposed to certain amount of disturbance. The more important among them are discussed below. Some of them have already been mentioned by Thekkady Development Authority (1975).

1. Livestock:

More than 800 cattle depend upon the Reserve for fodder. They enter mainly from Kumily. There are 4 types of cattle population in the Kumily-Thekkady area.

i) Transient population: This consists of cattle passing from Tamil Nadu to Kerala through Kumily.

ii) Permanent population: This consists of cattle living in Kumily. They are mostly stall fed and do not enter the Reserve. Their number is considerably small.

iii) Floating population: This consists of cattle spending the day grazing in the Reserve and returning to Kumily at night. Their number is about 700.

iv) Feral population: This consists of cattle abandoned in the Reserve by the villagers. They have become ferel and are often quite aggressive.

The transient population is the most dangerous as it brings epidemic diseases like, foot and mouth disease and rinderpest. Though precautionary measures are being taken to prevent the possible spread, by vaccinating the cattle, disease infected

ones do appear in the population as noted by the veterinary surgeon at Kumily. These unhealthy, infected cattle do spend time in Kumily and may spread the disease to the permanent population as well as to the floating population. The latter carry the disease to the Reserve.

The feral population of cattle was noted near Manakavala padam, which is a favourite haunt of sambar, gaur and elephant. Wild boar was also seen here. This population may not carry the disease directly from the villages, but is a potential source of spreading it.

There was a severe attack of rinderpest in the Reserve in 1974, which took a heavy toll of gaur. The gaur population is fortunately building up again; but another out-break may be a threat to the remaining population.

The effect of cattle grazing in the Reserve on terrestrial herbivores cannot be ascertained now, as we have not completed an extensive study. However, it is to be noted that when cattle were totally prevented from entering the Reserve for a few days, more herbivores were found grazing around the lake area, which cattle usually monopolized. Cattle grazing promotes growth of unpalatable weeds. The abundance of Lantana camera and Eupatorium in some areas is testimony to the adverse effect of grazing.

The Forest Department has already allotted an area of about 200 hectares at Thekkady for grazing and a trench has been dug along the border separating the allotted area from the Reserve. However, this is incomplete and rather ineffective as cattle enter the Reserve freely.

2. Fire:

(Plate XIII-2)

This is an important source of disturbance in the Reserve. During summer, a large portion of the grassland in the Reserve is burnt.

Activities of tribals and other villagers inside the Reserve are the cause of fire. Sometimes, they do it inadvertantly by carelessly throwing cigerette stumps or lit match-sticks, and at times, deliberately to clear foot-path for their movement and to collect fallen seeds of commercial value. The dry grass and gentle wind favour spreading of the fire rapidly. Other minor forest produce collectors also contribute towards forest fire. To escape from wild animals, the tribals at times resort to setting fire to the grass.

It may not be necessary to explain the adverse effect of fire on wildlife and ecosystem. Suffice it to say that it affects the ground dwelling forms, the grazers, the insect fauna, the insectivorous birds and also the forest around.

3. Fishing:

Although fishing is banned in the Reservoir, illicit fishing is a regular feature. Tribals and villagers fish for commercial purposes. Anchuruli, Nellikkampatti and Mullakudi are some of the fishing centres.

Apart from the possible adverse effect on the fish population, fishermen are mainly responsible for starting fires.

4. Poaching:

Bull elephant, gaur, sambar, Nilgiri langur, liontailed macaque and giant squirrel are the major species which attract the poacher. Though there is a control over this activity in Thekkady, it has been going on unchecked in the bordering areas of the Reserve, especially the border between Tamil Nadu and the Reserve.

The tribals and villagers are perhaps not involved in poaching. It is understood that there are poachers who enter the Reserve through the unprotected north, north-eastern and eastern boundaries and camp inside the Reserve for poaching. Bull elephants are their main targets. The number of bulls in the Reserve was less even two decades ago and it was suggested that it was the result of poaching (Bassett, 1959). Though we do not entirely subscribe to this view, we feel that poaching is one of the factors which reduces the number of bulls in the population. A gaur was reportedly killed recently from Vellimalai side.

Birds are also persecuted. We understand that the eggs of darter are stolen by the tribals. These birds nesting on the dead trees in the lake are even otherwise very vulnerable to predation. Their population in the Reserve is very small and human predation on their eggs is deplorable. Eggs and squabs of great Indian hornbill are also not spared.

5. Estates and other private holdings in and around the Reserve:

There are private and departmental estates of cardamom inside the Reserve, and 27 privately owned cardamom estates, scattered along the north-eastern boundary.

Presence of these estates appeared detrimental to the Reserve. The estates lying inside the proposed core area of the Reserve - Mlappara, Lakshmipara, Naduthottom and Ummikuppan, have numerous labourers with their dependents. These labourers make several trips from Kumily to these estates right through the Reserve. Thus the sanctum sanctorum of the Reserve is exposed to human activity. They put fire to grassland and also deprive wild dog of its kill. Their firewood requirement has to be met by the forest around. The most disastrous effect of having private estates in the Reserve is that it provides abundant opportunities for poachers and other miscreants to move around in the Reserve at their will, pretending as estate workers.

The approach to the estates on the border is from Tamil Nadu, and hence they do not go through the Reserve. Their movements are unchecked as it is in their 'territory'. There is a possibility of poachers finding asylum in these estates.

Apart from these, in cardamom estates, the growth of shrubs and other undergrowth is discouraged, so that the diversity of habitat is reduced to that of a single species. This affects those species which depend on the natural undergrowth. Those living on the canopy are also disturbed by the human activity below. Langurs, bonnet macaques, liontailed macaques and giant squirrels are the common arboreal mammals here. Bonnet macaques constantly and other monkeys occasionally descend to the cardamom and cause considerable damage. Therefore, in most of the cardamom estates "monkey watchmen" are appointed.

Occasionally, elephants get into the estates and uproot a few stands. They are not fond of feeding on the cardamom, but the destruction caused by trampling is heavy. Private estates may not sacrifice their crop for elephants, and will invariably take measures to protect the crop.

The settlement of people in Pamba Valley area in Vallakadavu range is detrimental to wildlife preservation activities. They have damaged the forest around and planted several commercially important species. The settlement in Koruthodu area is also a threat to the future of wildlife. Gradually these settlers may

encroach on the forest lands. The human habitation inside the Reserve in Thekkady itself is a liability to the Reserve.

The settlers, acquire gun license on the pretext of 'crop protection' and the gun shots when heard were often reported by the officials as "settlers driving away the wild beasts from their crops".

There are two families of tribals - 'Pandarans', living near the Kunnar Dam and five families near Mayiladumchingampara. Smaller animals like porcupine, mouse deer, jungle fowl etc., are reportedly killed by these tribals for subsistance.

6. Eucalyptus plantation:

During 1960's, 41 hectares of grassland in the Vallakadavu range of the Reserve were planted with Eucalyptus. This replacement of grassland with Eucalyptus has resulted in considerable damage to the grassland ecosystem. Those species which require open grassland for grazing are affected; grassland dwellers are disturbed and those nesting in the grassland are forced to move away. When a major change takes place in a few spcies, a chain reaction takes place and thus the entire system is upset.

Though these are some of the adverse consequences, we have noted certain advantages to some other forms of wildlife as a result of Eucalyptus plantation. As the plantation is protected from fire, the undergrowth is encouraged, which provides

a comparatively better habitat for birds. Thus, bulbuls, mynas, babblers, chloropsis, sunbirds etc., colonize the plantation areas, in place of larks and pipits, which are the main avian occupants of grassland. Mammals are not averse to this habitat. However, the complete impact of Eucalyptus plantation in grassland on wildlife is not yet known.

7. Collection of Minor Forest Produce:

Cardamom, cinnamon bark, honey and cane are the minor forest produce in the Reserve. The forest department collects cardamom from the area owned by them. It is illegally collected by people from Tamil Nadu and also the nearby villages in Kerala. The bark of cinnamon is collected and transported on donkeys to the plains. They abandon the sick, wounded or handicapped donkeys inside the Reserve.

Collection of cardamom and cinnamon bark may not affect the wildlife directly, except the giant squirrel which feeds on the bark of cinnamon; but the activities of the labourers working there are detrimental to wildlife.

Cane is extracted from deep inside the Reserve. Apart from destruction of habitat caused by removal of canes in large quantities, their camp inside the reserve causes intentional or unintentional damage to forest as well as wildlife. From Chokkampatti area cane is extracted by people from Tamil Nadu as well as Kerala.

Honey extractors, mainly tribals, are also responsible for the forest fire.

'Elephant grass', used for thatching, is collected by villagers and tribals in large quantities from different parts of the Reserve and sold in the market. The total area of grassland in the Reserve according to the available information is only 12km^2 (Chandrasekharan, 1973), which is perhaps quite inadequate to support the terrestrial herbivore population. Therefore, collection of grass may adversely affect the herbivores.

8. Collection of firewood:

Firewood is collected in large quantities from the Reserve. We have seen people collecting it from Edapalayam, Thampuran thuruthu, Chevalot, Manakavala and Karadipara. It is more regular in Cheriyakanam and Valiyakanam area of the Reserve.

The entire firewood requirement of Kumily and Thekkady are being met from the Reserve. This excessive removal of firewood from the Reserve results in direct and indirect damage to the habitat and wildlife.

9. Wild dog kill:

When a pack of wild dog kills its prey, it is chased away and the kill removed by people. This is an unfortunate practice. We have seen this once near the boat landing area and twice in the forest. In Thekkady, once we saw the remains of a sambar,

which was freshly killed. The nature of the left over did not indicate that the wild dog had its prey. On the contrary, it was clear that the wild dog was denied of it and the sambar flesh was removed by some one.

Tribals, villagers and others who move through the forest never miss the opportunity of gathering meat, mostly of sambar from the wild dog's kill. Once we collected an almost full grown foetus of a mouse deer from tribals when they snatched the kill from the wild dog. It is an indirect way of poaching. It deprives wild dog of its prey and forces it to kill another animal, thus causing stress on the population of prey species.

10. Pilgrimage:

A temple is situated in the Sabarimalai beat of the Reserve. Lakhs of pilgrims visit this temple annually from December to March.

Among other considerations, this temple achieved its importance because of its location in the midst of forest and the hazardous approaches to it. There are three approaches to the temple, Chalakayam-Pamba-Sabarimalai, Azhutha-Karimalai-Sabarimalai and, Vandiperiyar-Uppupara-Sabarimalai. All the paths are through forest and should be negotiated on foot for a long distance. Walking through the wilderness was a fearful experience in olden days. The condition has now changed as the paths are well cleared and there are big crowds everywhere.

This annual inflow of lakhs of people has its own effect on the flora and fauna. Mainly a change in undergrowth is caused along the path and around the temple due to regular clearance of natural growth. Trees are also felled around the temple area to acquire more area to provide facilities for the growing number of pilgrims. These changes in the habitat brought out a change in the fauna; for example, the presence of red-vented bulbul - Pycnonotus cafer in the area. The typical habitat of this bulbul is scrub jungle and it is not found in evergreen/ semi-evergreen forest. Therefore its presence around the temple area is an indication of the degradation of forest in that area.

Firewood requirements of the pilgrims who halt there and the numerous tea-shops, which come up as mushrooms in the season to cater to them, have to be met from the forest around.

11. Tourism:

The importance of wildlife in tourism development is well-known. Even the conservationists are not averse from encouraging tourism.

Periyar Tiger Reserve is unique in its facilities for viewing wildlife. Statistics show that for the last seven years a yearly average of 52,000 tourists have been visiting the Reserve. Sometimes their activities are detrimental to wild-life.

The only means to get about to see wildlife is the boats. At present there are about a dozen boats of varying capacities, run by four agencies, Forest Department, Kerala Tourism Development Corporation, Peermade Wildlife Preservation Society and a private party. There is no proper arrangement to control the tourists at the boat landing. Sometimes boats are overcrowded. They play radios while cruising and indulge in shouting when an animal is sighted. Boat crews are often persuaded to take the boat very close to the shore when animals are sighted. Boats, at times go very near to swimming herd of elephant, causing disturbance to them.

At present control over the entry of people into the Reserve is inadequate. Miscreants also easily find their way in. Some of them get into the forest, wander around and at times halt there for a few days, without the knowledge of the authorities.

INTERIM RECOMMENDATIONS FOR MANAGEMENT

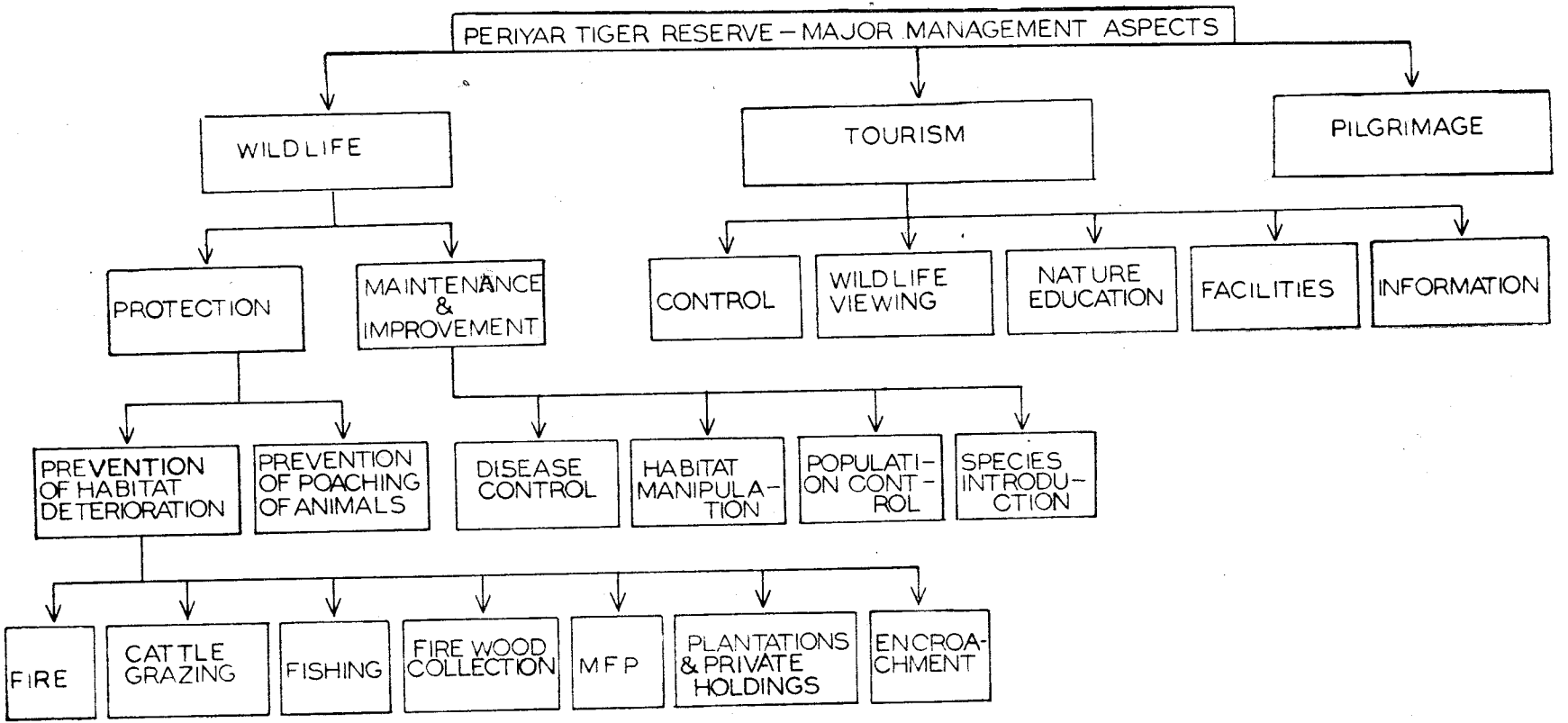
Based on our present findings the major aspects to be covered in the management programme for the Reserve are identified (Fig.8) and the approach to be followed is discussed separately.

General administration of the Reserve:

A year's experience in the Periyar Tiger Reserve has convinced us of the inherent limitations and weakness of the present system and, the inadequacy of the set up and facilities, at the disposal of local administration.

The major problem is that there are too many agencies interested in the Reserve - Forest Department, Kerala Tourism Development Corporation, Travancore Devaswam Board, Peermade Wildlife Preservation Society and Tamil Nadu Electricity Board. We, therefore, recommend that the entire activities in the Reserve should be brought under one authority - the Forest Department. The same view was expressed by the 10th IUCN Congress in New Delhi in 1969, which urged the responsible authorities, to integrate various interests involved and to place them under the control of one authority. This authority, if it is the Forest Department, should have the benefit of advice and guidance of a duly constituted advisory committee, in which local people and concerned departments should be represented. If local people are given opportunities to involve themselves in the management, they will be more aware of the importance of the Reserve. Also,

FIG. 8


PERIYAR TIGER RESERVE – MAJOR MANAGEMENT ASPECTS
WILDLIFE
TOURISM
PILGRIMAGE
PROTECTION
MAINTENANCE & IMPROVEMENT
CONTROL
WILD LIFE VIEWING
NATURE EDUCATION
FACILITIES
INFORMATION
PREVENTION OF HABITAT DETERIORATION
PREVENTION OF POACHING OF ANIMALS
DISEASE CONTROL
HABITAT MANIPULA-TION
POPULATI-ON CONT-ROL
SPECIES INTRODU-CTION
FIRE
CATTLE GRAZING
FISHING
FIRE WOOD COLLECTION
M F P
PLANTATIONS & PRIVATE HOLDINGS
ENCROA-CHMENT

a provision should be made to allocate a part of the revenue earned from the Reserve, for developmental activities in the villages around the Reserve, so that the villagers will feel that they are directly benefited by the Reserve.

The Advisory Committee may have the following members:-

Chairman : Chief Conservator of Forests (Development)

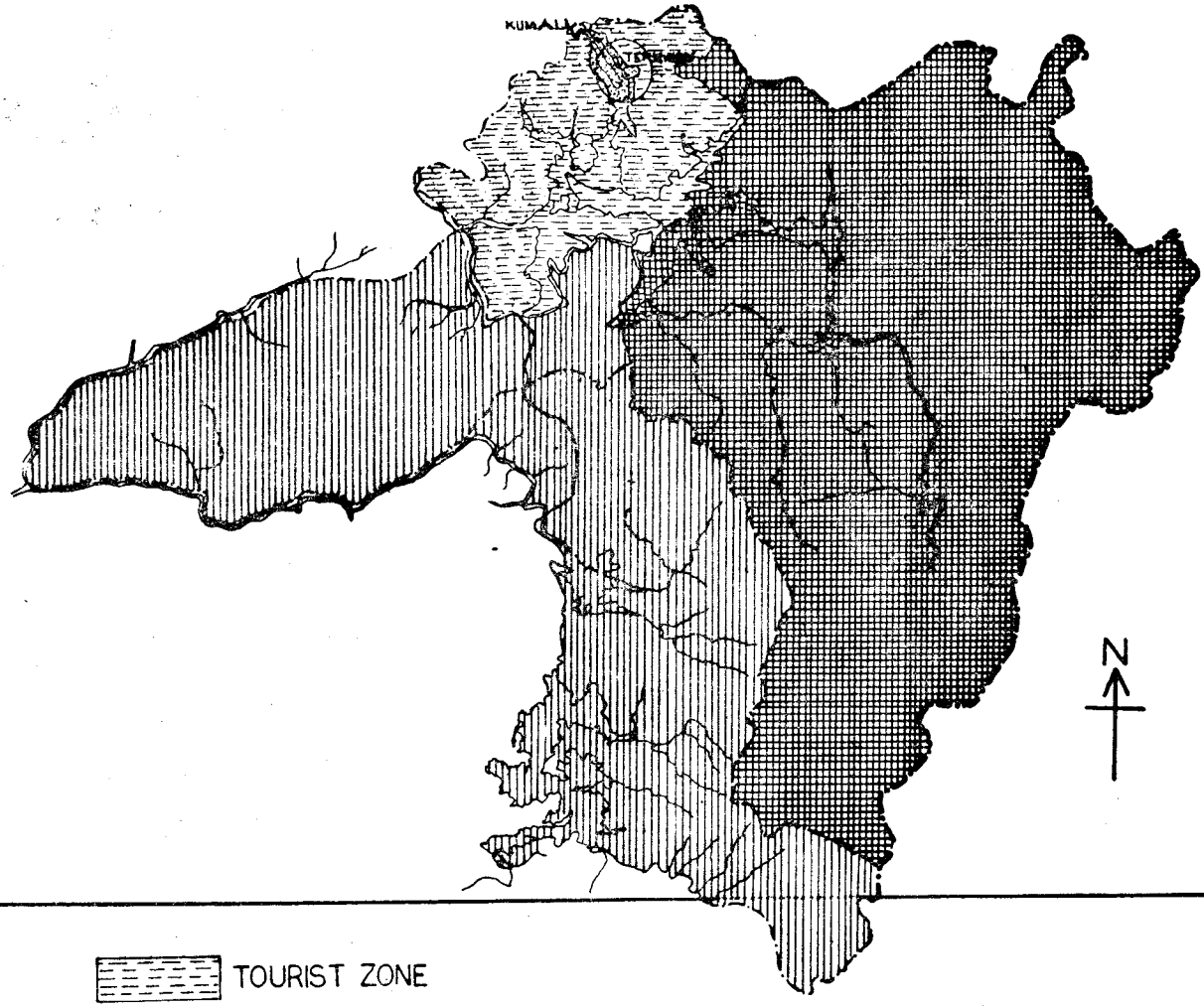
Members:

1. Representative of Kerala Tourism Development Corporation.
2. Representative of Devaswam Board.
3. Representative of Tamil Nadu Electricity Board.
4. M.L.A. of the locality.
5. Panchayat President, Kumily.
6. Representatives of District Revenue & Police Departments.
7. Representative of planters of the adjacent areas.
8. Chief Wildlife Warden of Tamil Nadu or his nominee.
9. Representative of D.I.G. of Police, Madurai.
10. Veterinary Doctor.
11. Wildlife Expert.
12. Field Director, Periyar Tiger Reserve (Convener)

For effective control and management, the Reserve should be divided into three zones as tentatively indicated (Fig.9), which is only a modification of the suggestion made by Thekkady Development Authority in 1975. The catchment areas of Pamba and Kakki Dam in the Gundrickal range contiguous to the southern border of the Reserve should also be declared as buffer zone to the Reserve. This area has a high potentiality for wildlife.

FIG. 9

PERIYAR TIGER RESERVE — ZONES PROPOSED



Wildlife Preservation

Protection:

A. Prevention of habitat deterioration:

1. Fire protection:

Control of human activity in the Reserve is the only way of preventing fire. Fishing, minor forest produce collection, firewood collection and the movement of people from Kumily through the Reserve to various estates - Ummikuppan, Mlappara, Naduthottom and Lakshmipara - should be regulated. Fire line alone will not be of any use if the root cause is not contained.

2. Cattle grazing:

This must be completely stopped. Trenches are ineffective in preventing cattle from entering the Reserve. The graziers often, fill the trench and allow cattle to cross over. The only permanent solution for this is to construct a wall on the border common to Kumily village and the Reserve which is about 5 km in length. Such a wall will also prevent wildlife from getting into the village and damaging the crops.

3. Fishing:

As we have not undertaken a study of fish population in the lake, we do not make any recommendation either for or against fishing. Judging from the quantum of fish being caught and removed out of the lake every day, we feel that fish population in the lake is quite high. However, we question the

advisability of commercial fishing in the lake as scientific data are lacking. If fishing is to be permitted it should be carried out under the supervision and control of the Forest Department.

4. Collection of firewood:

Collection of firewood should not be permitted from the interior of the Reserve and should be discouraged from the periphery. Effective measures to provide alternative sources of fuel to the hotels, rest houses and the population of Thekkady and Kumily, are extremely important and urgently required.

5. Collection of Minor Forest Produce:

Although collection of minor forest produce are not permitted in the Reserve there are unauthorised attempts. Effective steps are essential to stop collection of all kinds of minor forest produce discussed earlier.

6. Eucalyptus plantations:

The impact of planting Eucalyptus in the grassland is not thoroughly investigated. Its effect on wildlife is worth studying. Apart from academic interest such a study may help to provide guide lines for future plantations. As indicated earlier significant changes in vegetation and fauna have been observed even now. Therefore, we recommend retaining the plantation inside the Reserve as an experimental plot for a continuous monitoring study.

7. Private estates in the Reserve:

Three estates, Mlappara, Naduthottom and Lakshmipara are situated in the Reserve. These should be taken over by the Forest Department and the activities in these estates gradually reduced.

8. Pamba Valley settlement:

This settlement is in the south-western border of the Reserve. The Reserve border of this area should be surveyed and marked properly.

B. Prevention of poaching:

The present staff strength and the facilities at the disposal of the staff are quite inadequate to contain poaching. There are four Range Officers, one each for the Ranges - Vallakadavu and Thekkady and one each for flying squad and tourism. There are two Deputy Rangers, one Wildlife Assistant, four Foresters, forty eight guards and a few trackers. The Field Director is stationed at Kottayam and there is a post of Assistant Field Director and Wildlife Preservation Officer, both at the time of writing this report are vacant.

If all the 48 guards are pressed into action, each guard will have to look after about 16 km^2. In an inhospitable terrain like that in the Periyar Tiger Reserve, it is impossible for one to accomplish the task of surveillance of 16 km^2 regularly and hence, we suggest that the present staff strength should

be increased in such a way that a guard should not be made responsible for more than 10 km^2.

At present there are only two ranges - Thekkady and Vallakadavu. Thekkady range encompasses 75% of the Reserve area. This must be divided into two - Thekkady and Thannikudy.

Protection staff should be posted at the most vulnerable areas: along the northern, north-eastern and eastern borders of the Reserve - especially at Vellimalai, Manalar, Sivagirimettu, Chokkampatti, etc. - and inside the Reserve at Methakanam, Mullakudy, Ummikuppan etc. A check post is very essential at Pachakanam border, at the point where the sanctuary begins while coming from Pamba side by road.

Staff on duty in the interior and on the borders should be sufficiently armed to combat the poachers who come in organized gangs. Apart from this, facility should be given for the officials at the border areas to communicate with the central office in Thekkady. A well organized communication system is indispensable to this.

Lack of facility for easy and quick movement of protection staff inside the Reserve, gives confidence and safety feeling to poachers. It takes about five hours to reach Mlappara from Thekkady, which involves $2\frac{1}{2}$ hours' boat journey and $2\frac{1}{2}$ hours' walk. It is about two days walk to Chokkampetti malai

through the Reserve from Thannikudi on foot. Therefore, a motorable road is a must, connecting Thekkady to Chokkampetty Via. Mullakudy, Thannikudy and Mlappara and then, Chokkampetti to Thekkady Via. Kozhikanam along the southern border of the Reserve. This may look formidable, but once implemented will give excellent opportunity for protection staff to move around and to function more efficiently. This might be expensive but will be highly rewarding and is a right step towards uprooting the curse of poaching from the Reserve.

We realize that the road will pass through the proposed core area of the Reserve and also will cause disturbance to wildlife especially while laying the road; but we are sure that this will be several times lesser than the disturbance caused to the wildlife by poaching.

Maintenance & Improvement:

Basic data regarding the ecological requirements of major species in the Reserve and the resource availability are required to suggest management practices. We are now working on it and recommendations can be made only after completing the study.

Tourism

Recommendations are made on the four major aspects of tourism in the area - general control, wildlife viewing, nature education and, boarding and lodging.

I. General Control:

1. The entire responsibility of tourism including catering, lodging, wildlife viewing and nature education should be brought under the armpit of one authority - the Forest Department, as is followed in the Bandipur Tiger Reserve. There is sufficient justification for this:

a) General administrative hurdles will be reduced as the number of authorities and agencies is reduced.

b) Tourism can be developed to the maximum extent as the authority is one.

c) Running of boats etc. can be controlled effectively without much disturbance to wildlife. Also, the tourists will find it easy to ascertain the availability of boat etc., if only one authority is to be approached. At present there are four agencies involved in conducting cruises - Forest Department, Kerala Tourism Development Corporation, Peermade Wildlife Preservation Society and a private party.

d) Accommodation can be easily arranged if all the lodging facilities are brought under one authority.

e) If catering to tourists are brought under Forest Department, collection of firewood can be effectively controlled.

2. Check post at the entrance to the Reserve in Thekkady must be made to function more promptly and strictly. All the

vehicles passing in should be entered in the register and their departure time noted.

3. Entrance fee for vehicles of all kinds should be charged.

4. A small amount must be collected as entrance fee to the Reserve from all tourists. At present the entrance fee is collected when one gets into the boat. This can be shifted to the entrance to the Reserve at Thekkady check post. This will be an effective check over miscreants.

5. The 2 km length Thekkady proper is subject to heavy disturbance. A dead body was found near the office of the Wildlife Preservation Officer in 1977 December. Proper watch must be made to ward off such activities.

6. Foreign tourists at times, go into the forests and stay there for a few days without the knowledge of the Forest Department. This should be prevented.

II. Wildlife Viewing:

1. Arrangements should be made to control the tourists more efficiently. Boat crews should not be permitted to take the boat close to the bank where animals are sighted. Also, boats should not be permitted to go close to the swimming herds of elephants.

2. Each boat should be provided with a wildlife guide who should be able to enlighten the tourists of the wildlife

heritage in the Reserve, the type of forest, and the important and conspicous flowering trees around the lake.

3. Boats should strictly follow their route and should not go beyond the dam site.

4. The present timings of boat services should be altered. At present the first trip of the Forest Department boat is at 8 A.M. and the last at 4 P.M. The Kerala Tourism Development Corporation's boat takes off the bank at 7.30 A.M. The best part of the day for wildlife viewing is either early morning or in the evening. Therefore, we suggest the morning trips from 6.30 to 10.30 A.M. and afternoon trips from 3 to 5 P.M. This arrangement will be appreciated also by those who are interested in wildlife photography.

5. Two or three riding elephants should be made available for tourists. Though animals can be seen much easily from boat, interested tourists can see and experience the tropical rain forest by riding on an elephant. Riding route should include Valiyakanam forest also.

III. Nature Education:

It is advisable to have a nature education scheme here to inculate interest in wildlife among the younger and to make them and the public aware of the necessity of conservation.

1. A small auditorium with a capacity of 200 people may be constructed for this.

2. Slide and movie projector should be procured and films on nature and wildlife shown there. A nominal entrance fee may be collected for this too. Films on wildlife of the State may be preferred. Recorded talks of naturalists which may be of use to students must also be played.

3. It is highly desirable to organise nature walk for tourists who are genuinely interested. A walk from Thekkady check post to Valiyakanam through the forest and grasslands would be very enjoyable. Proper guides should be provided for this, who could identify the common trees, birds, butterflies and animals and also to give a brief note of whatever they see.

Boarding & Lodging:

In Periyar Tiger Reserve, as in most of the sanctuaries and national parks, the interest of the low-income group is not taken care of. As a result wildlife tourism has become a privilege of high-income group. This should be changed.

The cost of boarding and lodging facilities in the Reserve is beyond the means of low-income groups and students. This has to be brought down. Dormitory type boarding facilities may be provided especially for students.

Information System:

The functioning of the Information Centre at Thekkady boat landing must be made more efficient.

Pilgrimage

This is a peculiar feature of this Reserve, perhaps existing in no other tiger reserves and sanctuaries. The following recommendations are made to minimise disturbance to wildlife, without causing hurdles or hardship to pilgrims.

1. No trees should be allowed to be cut from the vicinity of the temple and approaches to the temple, to preserve the sylvan beauty and to save habitat from destruction.

2. To meet the firewood requirement of the pilgrims, charcoal should be provided by the authorities. The coconut shells that the pilgrims bring in, and the lakhs of coconut they break at various points in the temple and its vicinity, should be collected and used as fuel along with coal. A mechanism should be worked out for timely removal of shells.

SUMMARY

A list of mammals and birds found in the Reserve has been prepared and the distribution of certain important species of mammals indicated. The Reserve has a good representation of Peninsular Indian mammals and of endemic species of the Western Ghats. Altogether 32 species of mammals have been reported out of which two are endangered, the liontailed macaque and the tiger.

The Avifauna of the area is rich. Though not exhaustively studied 181 species have been noted, among which 16 are winter migrants, 3 local migrants and 153 residents.

Among the arboreal mammals, Nilgiri langur is the commonest. The Reserve has a good population of giant squirrel.

Among the herbivores, elephant is the most numerous. Next to it is the wild boar which is followed by the sambar. The wild dog is the commonest predator followed by the tiger. The population of the latter may be between 25 and 30. The panther is much less in number.

All the three arboreal species, prefer evergreen/semi-evergreen type of forest. While liontailed macaque is restricted to this type of forest, Nilgiri langur and the giant squirrel are seen in moist deciduous forest also. Of the 14 major mammals, 9 prefer grassland which include the two common predators, tiger

and wild dog and the two major prey species, sambar and wild boar. The evergreen/semi-evergreen forest is preferred mainly by two carnivores - panther and toddy cat, and the two herbivores - muntjac and mouse deer.

As regards the resource availability to arboreal forms, we feel there is no deficiency, considering the extent of forest, which is their principal habitat in the Reserve. Out of the 777 km^2, six hundred and seventy eight km^2 is forest. In the case of grazers, especially elephant, gaur and sambar, we doubt whether the food available is sufficient, considering the area available for grazing. All these species are seen mostly in grassland and in moist deciduous forests. The total area of these habitats, including grasslands, moist deciduous forests and reed brakes, is only 161 km^2. Evergreen/semi-evergreen forests are very rarely frequented by these grazers.

It will be premature to make an assessment on the predator-prey relationship at this stage of the study. Sambar, porcupine and wild boar are the chief prey for tiger. The number of prey species is much less here for tiger when compared to the report of Schaller (1967) for Kanha Tiger Reserve.

Habitats of arboreal as well as terrestrial mammals are being destroyed by various factors. This is severe in the case of the habitats of terrestrial mammals. Based on our study we have made the following interim recommendations.

1. The Forest Department should take over all the private estates in the Reserve and activities in such estates should be discouraged.

2. Movement of unauthorised people through the Reserve should be prevented.

3. Fishing should be either completely stopped or legalized and done under the supervision of the Forest Department.

4. Collection of firewood should be discouraged.

5. Collection of minor forest produce should be prevented.

6. Fire protection measures should be strengthened and implemented more seriously.

7. Eucalyptus plantation in the Reserve should be retained for research purpose.

8. Stringent measures should be taken to prevent depriving wild dog of its kill.

9. A check-post must be established at the entrance to the Reserve from Pachakanam side.

10. A wall should be constructed between the border of Kumily and the Reserve to prevent cattle from entering the Reserve.

11. An entrance fee for visitors and vehicles should be fixed and collected at the entrance to the Reserve from Kumily.

12. Guard posts should be made at vulnerable points and constant vigilance and surveillance against poaching should be made in areas, especially in Methakanam, Vellimalai, forest near Manalar Estate, Mullakudy surroundings, Thannikudy surroundings, Sivagirimettu, Chokkampetti, Kozhikanam, Koruthodu and Pamba valley.

13. A communication system should be established.

14. A motorable road should be constructed connecting Thekkady to Chokkampetti Via. Mullakudy, Thannikudy and Mlappara and then, Chokkampetti to Thekkady Via. Kozhikanam along the southern border of the Reserve.

15. All the activities in the Reserve should be brought under one administrative control - Forest Department.

16. An Advisory Committee should be set up to guide the administration and management of the Reserve.

From our overall findings, we are convinced that a management programme based on ecological studies is most urgently required, especially for terrestrial herbivores and their predators.

APPENDIX I

LIST OF MAMMALS RECORDED IN THE RESERVE

Macaca radiata (Geoffroy) The Bonnet Macaque

Macaca silenus (Linnaeus) The Liontailed Macaque

Presbytis johni (Fischer) The Nilgiri Langur

Panthera tigris (Linnaeus) The Tiger

Panthera pardus (Linnaeus) The Panther

Felis chaus Guldenstaedt The Jungle cat

Viverricula indica (Desmarest) The Small Indian Civet

Paradoxurus hermaphroditus (Pallas) The Common Palm Civet or Toddy cat.

Herpestes edwardsi (Geoffroy) The Common Mongoose

Herpestes smithi Gray. The Ruddy Mongoose

Herpestes vitticollis Bennett. The Stripednecked Mongoose

Canis aureus Linnaeus. The Jackal

Cuon alpinus (Pallas) The Indian Wild Dog

Melursus ursinus (Shaw) The Sloth Bear

Lutra sp. (*lutra*?) Otter

Pteropus giganteus (Brunnich) The Flying Fox

Petinomys fuscocapillus Jerdon. The Small Travancore Flying Squirrel.

Ratufa indica (Erxleben) The Indian Giant Squirrel

Funambulus palmarum (Linnaeus) The Threestriped Palm Squirrel

Platacanthomys lasiurus Blyth. The Malabar Spiny Mouse

Bandicota indica (Bechstein) The Bandicoot Rat

Rattus rattus (Linnaeus) The Common House Rat

Mus musculus Linnaeus The House Mouse

Hystrix indica Kerr. The Indian Porcupine

Lepus nigricollis nigricollis F. Cuvier. The Blacknaped Hare

Elephas maximum Linnaeus The Indian Elephant

Bos gaurus H. Smith. The Gaur or Indian Bison

Cervus unicolor Kerr. The Sambar

Muntiacus muntjak (Zimmermann) The Muntjac or Barking Deer

Tragulus meminna (Erxleben) The Indian Chevrotain or Mouse Deer

Sus scrofa Linnaeus. The Indian Wild Boar

Manis crassicaudata Gray. The Indian Pangolin

APPENDIX II

LIST OF BIRDS OBSERVED IN PERIYAR TIGER RESERVE

Podiceps ruficollis, Indian Little Grebe or Dabchick

Phalacrocorax niger, Little Cormorant

Anhinga rufa, Indian Darter or Snake-bird

Ardea cinerea, Eastern Grey Heron

Butorides striatus, Indian Little Green Bittern

Ardeola grayii, Indian Pond Heron or Paddy Bird

Bubulcus ibis, Cattle Egret

Egretta alba, Eastern Large Egret

Ixobrychus cinnamomeus, Chestnut bittern

Ixobrychus sinensis, Yellow Bittern

Dupetor flavicollis, Black Bittern

Ciconia episcopus, Whitenecked Stork

Elanus caeruleus, Blackwinged Kite

Aviceda leuphotes, Indian Blackcrested Baza

Haliastur indus, Brahminy Kite

Accipiter badius, Ceylon Shikra

Ictinaetus malayensis, Black Eagle

Haliaeetus leucogaster, Whitebellied Sea Eagle

Icthyophaga ichthyaetus, Greyheaded Fishing Eagle

Torgos calvus, Black, or King, Vulture

Circaetus gallicus, Short-toed Eagle

Spilornis cheela, Crested Serpent Eagle

Pandion haliaetus, Osphrey, or Fish Hawk

Falco tinnunculus, Indian Kestrel

Perdicula sp., Bush Quail

Galloperdix spadicea, Travancore Red Spurfowl

Gallus sonneratii, Grey Junglefowl

Amaurornis phoenicurus, Whitebreasted Waterhen

Vanellus indicus, Redwattled Lapwing

Charadrius dubius, Little Ring Plover

Capella gallinago(?) Common or Fantail Snipe

Treron phoenicoptera, Southern Green Pigeon

Treron pompadora, Greyfronted Green Pigeon

Ducula badia, Jerdon's Imperial Pigeon

Columba elphinstonii, Nilgiri Wood Pigeon

Streptopelia chinensis, Indian Spotted Dove

Chalcophaps indica, Indian Emerald Dove

Psittacula krameri, Roseringed Parakeet

Psittacula cyanocephala, Western Blossomheaded Parakeet

Psittacula columboides, Bluewinged Parakeet

Loriculus vernalis, Malabar Lorikeet

Cuculus varius, Common Hawk-Cuckoo, or Brainfever Bird

Surniculus lugubris, Indian Drongo-Cuckoo

Eudynamys scolopacea, Indian Koel

Rhopodytes viridirostris, Small Greenbilled Malkoha

Centropus sinensis, Southern Crow-Pheasant, or Coucal

Centropus toulou, Lesser Coucal, or Crow-Pheasant

Otus bakkamoena, Collared Scops Owl

Bubo bubo, Indian Great Horned Owl

Bubo nipalensis, Forest Eagle Owl

Bubo zeylonensis, Brown Fish Owl

Glaucidium rádiatum, Malabar Jungle Owlet

Ninox scutulata, South Indian Hawk Owl

Athene brama, Southern Spotted Owlet

Strix leptogrammica, Brown Wood Owl

Caprimulgus indicus, Indian Jungle Nightjar

Caprimulgus asiaticus, Common Indian Nightjar

Chaetura gigantea, Brownthroated Spintail Swift

Chaetura sylvatica, Whiterumped Spintail Swift

Apus affinis, House Swift

Cypsiurus parvus, Palm Swift

Harpactes fasciatus, Malabar Trogon

Ceryle rudis, Travancore Pied Kingfisher

Alcedo atthis, Common Ceylon Kingfisher

Alcedo meninting, Blue-eared Kingfisher

Pelargopsis capensis, Brownheaded Storkbilled Kingfisher

Halcyon smyrnensis, Indian Whitebreasted Kingfisher

Merops leschenaulti, Chestnut-headed Bee-eater

Merops orientalis, Common, or Small Green, Bea-eater

Coracias benghalensis, Southern Indian Roller

Eurystomus orientalis, Broadbilled Roller, or Dollar Bird

Upupa epops, Ceylon Hoopoe

Tockus griseus, Malabar Grey Hornbill

Buceros bicornis, Great Indian Hornbill

Megalaima viridis, Small Green Barbet

Megalaima rubricapilla, Malabar Crimsonthroated Barbet

Picumnus innominatus, Nilgiri Speckled Piculet

Micropternus brachyurus, Southern Rufous Woodpecker

Picus chlorolophus, South Indian Small Yellownaped Woodpecker

Dinopium benghalense, Malabar Goldenbacked Woodpecker

Dinopium javanense, Malabar Goldenbacked Threetoed Woodpecker

Dryocopus javensis, Malabar Great Black Woodpecker

Dendrocopos mahrattensis, Southern Yellowfronted Pied Woodpecker

Dendrocopos nanus, Malabar Pigmy Woodpecker

Hemicircus canente, Heartspotted Woodpecker

Chrysocolaptes festivus, Blackbacked Woodpecker

Pitta brachyura, Indian Pitta

Alauda gulgula, Small Nilgiri Skylark

Hirundo concolor, Dusky Crag Martin

Hirundo daurica, Sykes's Striated, or Redrumped, Swallow

Lanius schach, Southern Greybacked Shrike

Lanius cristatus, Brown Shrike

Oriolus oriolus, Indian Oriole

Oriolus xanthornus, South Indian Blackheaded Oriole

Dicrurus adsimilis, Black Drongo

Dicrurus leucophaeus, Indian Grey Drongo

Dicrurus aeneus, Bronzed Drongo

Dicrurus paradiseus, Large Racket-tailed Drongo

Artamus fuscus, Ashy Swallow-Shrike

Sturnus malabaricus malabaricus, Greyheaded Myna

Sturnus malabaricus blythii, Blyth's Myna

Sturnus pagodarum, Blackheaded, or Brahminy, Myna

Sturnus roseus, Rosy Pastor

Acridotheres tristis, Common Myna

Acridotheres fuscus, Southern Jungle Myna

Gracula religiosa, Southern Grackle

Dendrocitta vagabunda, Tree Pie

Dendrocitta leucogastra, Southern Tree Pie

Corvus splendens, Ceylon House Crow

Corvus macrorhynchos, Indian Jungle Crow

Hemipus picatus, Blackbacked Pied Flycatcher-Shrike

Tephrodornis virgatus, Malabar Wood Shrike

Tephrodornis pondicerianus, Indian Common Wood Shrike

Coracina novaehollandiae, Large Indian Cuckoo-Shrike

Coracina melanoptera, Blackheaded Cuckoo-Shrike

Pericrocotus flammeus, Orange Minivet

Pericrocotus cinnamomeus, Malabar Small Minivet

Aegithina tiphia, Ceylon Iora

Chloropsis aurifrons, Goldenfronted Chloropsis, or Leaf-Bird

Chloropsis cochinchinensis, Jerdon's Chloropsis, or Leaf-Bird

Irena puella, Fairy Bluebird

Pycnonotus melanicterus, Rubythroated Bulbul

Pycnonotus jocosus, Southern Redwhiskered Bulbul

Pycnonotus cafer, South Indian Redvented Bulbul

Hypsipetes indicus, Yellowbrowed Bulbul

Hypsipetes madagascariensis, South Indian Black Bulbul

Pellorneum ruficeps, Travancore Spotted Babbler

Pomatorhinus schisticeps, Travancore Scimitar Babbler

Rhopocichla atriceps, Bourdillon's Blackheaded Babbler

Turdoides subrufus, Rufous Babbler

Turdoides striatus, Malabar Jungle Babbler

Garrulax delesserti, Wynaad Laughing Thrush

Garrulax jerdoni meridionale, Blanford's, or South Travancore, Laughing Thrush.

Alcippe poioicephala, Nilgiri Quaker Babbler

Muscicapa latirostris, Brown Flycatcher

Muscicapa parva, Eastern Redbreasted Flycatcher

Muscicapa pallipes, Whitebellied Blue Flycatcher

Muscicapa rubeculoides, Bluethroated Flycatcher

Muscicapa tickelliae, Tickell's Blue Flycatcher

Culicicapa ceylonensis, Greyheaded Flycatcher

Rhipidura aureola, Southern Whitebrowed Fantail Flycatcher

Terpsiphone paradisi, Paradise Flycatcher

Monarcha azurea, Indian Blacknaped Blue Flycatcher

Cisticola juncidis, Travancore Streaked Fantail Warbler

Prinia hodgsonii, Coorg Longtailed-, or Wren-Warbler

Prinia subflava, Nilgiri Longtailed-, or Wren-Warbler

Orthotomus sutorius, Tailor Bird

Acrocephalus stentoreus, Indian Great Reed Warbler

Acrocephalus dumetorum, Blyth's Reed Warbler

Phylloscopus magnirostris, Largebilled Leaf Warbler

Phylloscopus trochiloides, Greenish Leaf Warbler

Copsychus saularis, Southern Magpie-Robin

Saxicola caprata, Nilgiri Pied Bushchat

Saxicoloides fulicata, South Indian Blackbacked Robin

Myiophoneus horsfieldii, Malabar Whistling Thrush

Zoothera citrina cyanotus, Whitethroated Ground Thrush

Turdus merula, Blackbird

Parus major, Indian Grey Tit

Parus xanthogenys, Travancore Yellowcheeked Tit

Sitta frontalis, Velvetfronted Nuthatch

Anthus novaeseelandiae, Richard's Pipit

Motacilla indica, Forest Wagtail

Motacilla flava, Yellow Wagtail

Motacilla caspica, Grey Wagtail

Motacilla maderaspatensis, Large Pied Wagtail

Dicaeum agile, Thickbilled Flowerpecker

Dicaeum erythrorhynchos, Tickell's Flowerpecker

Dicaeum concolor, Nilgiri Flowerpecker

Nectarinia zeylonica, Indian Purplerumped Sunbird

Nectarinia minima, Small Sunbird

Nectarinia lotenia, Loten's, or Maroonbreasted, Sunbird

Nectarinia asiatica, Indian Purple Sunbird

Arachnothera longirostris, Little Spider-hunter

Zosterops palpebrosa, Nilgiri White-eye

Passer domesticus, Indian House Sparrow

Lonchura malabarica, Whitethroated Munia

Lonchura kelaarti, Rufousbellied Munia

Lonchura malacca, Blackheaded Munia

Carpodacus erythrinus, Common Indian, or Hodgson's, Rosefinch.

APPENDIX III-1

Records on the Bonnet macaque

Locality & Date	Seen		Heard		Remarks
	No. of Troops	No. of individuals	No. of Troops	No. of individuals	
Chevalot thuruthu 29-10-'77	1	4+	-	-	1 female with one infant.
Opposite to Edapalayam 28-3-'78	1	5+	-	-	
Kadukkapparamukku 29-3-'78	1	2+	-	-	
Mlappara Estate 21-5-'78	1	10+	-	-	
Between Inchipara and Mlappara 22-5-'78	1	1+	-	-	
Near Ponvarai Estate 30-5-'78	1	3+	-	-	More troops reported.
Kozhikanam 5-6-'78	1	1+	-	-	
Vallithodu thavalam 9-6-'78	-	-	1	1+	
Near Vellaramchetta thavalam 9-6-'78	-	-	1	1+	
Between Kunnar Dam and Sabarimalai 12-6-'78	-	-	1	1+	
Total:	7	26+	3	3+	

APPENDIX III-2

Records on the Lionthailed Macague

Locality & Date	Seen		Heard		Remarks
	Troop	No. of individuals	Troops	No. of individuals	
Mullathodu 26-4-'78	1	16	-	-	
Koyilmala thazhvaram 15-5-'78	1	5+	-	-	Two young ones.
Ummikuppan 16-5-'78	1	15+	-	-	
Sivagirimettu 20-5-'78	1	5+	-	-	
Mlappara Estate 22-5-'78	1	15+	-	-	
Near Manadi 24-5-'78	1	1+	-	-	
Choriparaoda thalappu 27-5-'78	-	-	1	1+	
Madhalamthookki oda 27-5-'78	-	-	1	1+	
Elatheri Estate 28-5-'78	1	6+	-	-	
Near Ponvarai Estate 5-6-'78	1	10+	-	-	
Sabarimalai (Poonkavanam) June 1978	1	10+	-	-	
Total:	9	85+	2	2+	

APPENDIX III-3

Records on the Nilgiri Langur

Locality & Date	Seen			Heard		Remarks
	Solitary	No. of troops	No. of individuals	No. of troops	No. of individuals	
1	2	3	4	5	6	7
Nellikkampetti 28-10-'77	-	1	5+	-	-	
Chevalot thodu 28-10-'77	1	-	1	-	-	
Chevalot thuruthu 29-10-'77.	-	2	12+	1	1+	
Edapalayam 30-10-'77 & 5-11-'77	-	3	14+	-	-	
Chennayapara 3-11-'77	1	1	3+	-	-	
Chettichivayal 3-11-'77	1	-	1	-	-	
Karumankayam 3-11-'77	1	-	1	-	-	
Cheriyakanam 4-11-'77	-	2	3+	-	-	
Near Manakavala padam 7-11-'77	-	1	6+	-	-	
Manakavala machan 8-11-'77	-	1	10+	-	-	
Manakavala 9-11-'77	1	1	2+	-	-	

1	2	3	4	5	6	7
Thekkady 11-11-'77	-	3	60+	-	-	
West of Udapalayam 12-12-'78	-	-	-	1	1+	
Methakanam area 7-3-'78, 8-3-'78 & 15-3-78	1	-	40+	3	3+	
Mullakkudy R.H. 8-3-'78	-	1	8+	-	-	
Near Mullathodu 8-3-'78	-	1	2+	-	-	
Opposite Mullakkudy R.H. 10-3-'78 & 19-3-'78	-	-	-	2	2+	
Kannimarmedu side 12-3-'78	-	-	-	1	1+	
Near Palkachimalai 14-3-'78	-	-	-	1	1+	
Karadivalavu 15-3-'78	-	1	1+	-	-	
Ottamaram 18-3-'78	-	2	5+	-	-	
Near Navikayam 20-3-'78	-	-	-	1	1+	
Mulakupara 21-3-'78	-	3	14+	-	-	2 babies
Near Thannikkudy R.H. 1-4-'78 & 2-4-'78	-	2	6+	-	-	
Near Ummikuppan oda 1-4-'78	-	1	1+	1	1+	
Near Ummikkuppan 1-4-'78 & 13-4-'78	-	4	4+	1	1+	

1	2	3	4	5	6	7
Vakkappadappu kanam 2-4-'78	-	1	1+	-	-	
Vazhukkipara kanam 2-4-'78	-	1	1+	-	-	
Karikavu kanam 1-4-'78 & 3-4-'78	-	1	1+	1	1+	
Ummikuppan path 3-4-'78	-	1	1+	-	-	
Vakkappadappu oda 5-4-'78	-	1	1+	1	1+	
Thoshampara kanam 5-4-'78	-	2	2+	-	-	
Kumarikavumalai 5-4-'78	-	1	1+	-	-	
Murikkadikayam kanam 6-4-'78	-	2	2+	-	-	
Chorakotta oda 7-4-'78	-	2	2+	-	-	
Thekkudakkumpara kanam 8-4-'78	-	1	1+	-	-	
Pulikkayam kanam 8-4-'78	-	1	1+	-	-	
Opposite Thannikkudy R.H. 9-4-'78	-	1	2+	-	-	One feeding on the ground
Near Pandaramalai 13-4-'78	-	-	-	1	1+	
Pothamperi 13-4-'78	-	6	32+	2	2+	

1	2	3	4	5	6	7
Vakilelan 13-4-'78	-	2	2+	2	2+	
Chinnamala Periyamamala 13-4-'78	-	-	-	1	1+	
Near Koyilmalai 14-5-'78 & 15-5-'78	-	2	6+	4	4+	
Koyilmala adivaram 14-5-'78 & 15-5-'78	-	2	4+	1	1+	
Koyilmala thazhuvaram 15-5-'78	-	3	8+	1	1+	
Kathiramudi base 15-5-'78	-	2	11+	-	-	
Kadamamalai East 18-5-'78	-	1	1+	-	-	
Naduthottam area 18-5-'78	-	1	1+	-	-	
Kuthukalkanam 18-5-'78	-	-	-	1	1+	
Nedumpara 18-5-'78	-	-	-	1	1+	
Lakshmipara Estate 18-5-'78	-	1	10+	-	-	
Near Lakshmipara 19-5-'78	-	-	-	1	1+	
Tholukkanpara kavala 19-5-'78	-	1	1+	-	-	
Tholukkanpara thodu 19-5-'78	-	1	5+	1	1+	
Tholukkanpara 19-5-'78	-	2	2+	-	-	

1	2	3	4	5	6	7
Kanthiranthammettu 20-5-'78	-	-	-	1	1+	
Verukudungi 20-5-'78	-	-	-	1	1+	
Near Inchipara thodu 22-5-'78	-	-	-	2	2+	
Near Valimeenkayam 23-5-'78	-	-	-	3	3+	
Pullakayam 24-5-'78	-	-	-	1	1+	
Near Manadi 24-5-'78	-	1	1+	-	-	
Chakkumuthi oda 25-5-'78	-	-	-	2	2+	
Near Aladi 25-5-'78	-	-	-	1	1+	
Choriparaoda thalappu 27-5-'78	-	-	-	1	1+	
Periyathukooti oda 27-5-'78	-	-	-	1	1+	
Madhalamthookki thodu 27-5-'78 & 29-5-'78	-	-	-	2	2+	
Near Kozhikanam landing 5-6-'78	-	-	-	1	1+	
Near Arali oda 5-6-'78	-	1	2+	-	-	
Kozhikanam 5-6-'78	-	5	19+	3	3+	A troop feeding on mangoes.

1	2	3	4	5	6	7
Chamikanam 5-6-'78	-	-	-	5	5+	
Pachakanam 5-6-'78	-	2	4+	3	3+	
Near Uppupara 6-6-'78	-	1	1+	1	1+	
Vamanakulam junction 6-6-'78	-	-	-	2	2+	
Vamanakulam Quarters 6-6-'78	-	-	-	2	2+	
Near Fourth mile 6-6-'78	-	-	-	1	1+	
Attapudungi 7-6-'78	-	-	-	1	1+	
Near Poonkavanam 7-6-'78	-	-	-	1	1+	
Near Sabarimalai 7-6-'78	-	-	-	1	1+	
Ponnambalamedu 8-6-'78 & 13-6-'78	-	-	-	3	3+	
Near Ambalakadavu 12-6-'78	-	-	-	1	1+	
Saramkuthi (West) 12-6-'78	-	2	11+	-	-	
Near Sabaripeetam 12-6-'78	-	1	11+	-	-	
Kunnar Dam 12-6-'78	-	2	10+	4	4+	
Near Nedumtheri 12-6-'78	-	-	-	2	2+	

1	2	3	4	5	6	7
Near Inchimalai 13-6-'78	-	-	-	1	1+	
Appachikuzhi 13-6-'78	-	1	12+	-	-	
Near Chalakayam 14-6-'78	-	-	-	1	1+	
Near Manalar 10-11-'78	-	-	-	1	1+	
Upper Manalar 10-11-'78	-	1	5+	-	-	
Total:	6	89	374+	79	79+	

APPENDIX III-4

Records on the Tiger

Locality & Date	No. of pug-marks	No. of scats	Seen	Remarks
1	2	3	4	5
Nellikkampetti 28-10-'77 & 11-2-'78	2	-	-	
Anchuruli 8-2-'78	2	-	-	One cub
Deer Island 10-2-'78	1	-	-	
Near Mullakudy machan 7-3-'78	1	-	-	
Mullathodu 11-3-'78	-	1	-	Fed on sambar
Near Mullayar 12-3-'78	1	-	-	
Methakanam 15-3-'78	1	1	-	
Ponparamedu 23-3-'78	-	1	-	
Near Murikkadikayam 1-4-'78	-	2	-	Fed on porcupine
Lakshmipara road 2-4-'78	-	1	-	
Thoshampara 2-4-'78	-	1	-	Fed on sambar
Pulikayam kanam 8-4-'78	-	2	-	Fed on sambar
Mlappara kavala 16-5-'78	-	-	-	One scratching

1	2	3	4	5
Pulikayam 16-5-'78	2	-	-	
Kadamamalai West 18-5-'78	-	1	-	Porcupine parts in the scat.
Near Naduthottam 18-5-'78	-	2	-	"
Polkooralakayam 22-5-'78	1	1	-	
Aladi 25-5-'78	2	-	-	
Near Kozhikanam landing 5-6-'78	1	-	-	
64 Plantation (Eucalyptus) 6-6-'78	-	1	-	Wildboar hair and grasses in the scat.
Near Poonkavanam 7-6-'78	-	1	-	Fed on sambar
Ponnambalamedu 8-6-'78	1	2	1	Fed on sambar
Near Pamba 14-6-'78	-	1	-	"
Near Manalar 10-11-'78	2	-	-	
Near Upper Manalar 10-11-'78	-	1	-	
Total:	17	19	1	1 scratching

APPENDIX III-5

Records on the Panther

Locality & Date	No. of pug-marks	No. of scats	Remarks
Near Kathiramudi 1-4-'78	-	2	Fed on Nilgiri Langur or Liontailed Macaque
Near Inchipara 22-5-'78	-	1	"
Near Inchipara odakooty 22-5-'78	-	1	"
Polkooralakayam 22-5-'78	1	-	
Chamikanam 5-6-'78	-	1	Bones of Nilgiri Langur including parts of skull.
Kozhikanam road 5-6-'78	-	1	
Vallithodu thavalam 9-6-'78	1	1	
Vellaramchetta thavalam 9-6-'78	-	1	
Ambalakadavu 12-6-'78	1	-	
Kunnar Dam 12-6-'78	-	1	Fed on barking deer
Ennakapally 15-6-'78	-	1	Fed on Nilgiri Langur or Liontailed macaque.
Total:	3	10	

APPENDIX III-6

Records on the Jungle Cat

Locality and date	Number of droppings	Remarks
Methakanam 7-3-'78	3	
Methakanam road 15-3-'78	1	
Chennayapara 20-3-'78	2	
Near Chennayapara 20-3-'78	1	
Near Navikayam 20-3-'78	1	
Vakkappadappukanam 2-4-'78	1	
Lakshmipara road 2-4-'78	1	
Karikavukanam 3-4-'78	1	
Opposite Thannikkudi machan 7-4-'78	1	
Chorakkotta odakanam 7-4-'78	1	
Chakkumuthi 22-5-'78	1	
Near Aladi 22-5-'78	1	
Near Vamanakulam 6-6-'78	1	Fed on Crab
Near Sabarimalai 7-6-'78	2	
Total:	18	

APPENDIX III-7

Records on the Small Indian Civet

Locality & Date	No. of droppings	Remarks
Near Palkachimalai 14-3-'78	1	
Inchipara thodu 22-5-'78	1	
Polkooralakayam 22-5-'78	2	
Chakkumuthi 22-5-'78	5	
Valliyakayam medu 24-5-'78	1	
Chakkumuthi oda 25-5-'78	2	
Total:	12	

APPENDIX III-8

Records on the Indian Palm Civet or The Toddy Cat

Locality & Date	No. of droppings	Remarks
1	2	3
Methakanam road 8-3-'78	2	
Near Mullathodu 11-3-'78	1	
Near Kannimarmedu 11-3-'78	1	
Ottamaram area 18-3-'78	10	One fed on *Solanum* sp.
Mulakupara area 21-3-'78	10	
Near Kathiramudi adivaram 1-4-'78	1	
Thekkudakkumpara 2-4-'78	1	
Vazhukkipara 2-4-'78	1	
Chaverkuzhy area 2-4-'78	12	4 fed on Albizia; 1 on Jack fruit; 3 on Lantana fruit
Karikavukanam 3-4-'78	1	
Thurakkotta oda 3-4-'78	1	
Ummikkuppan path 3-4-'78	1	
Thoshampara kanam 5-4-'78	1	

1	2	3
Near Kumarikavu malai 5-4-'78	1	
Chorakkotta odakanam 7-4-'78	2	
Pulikkayam kanam 8-4-'78	1	
Near Vakilelan 13-5-'78	1	
Chinnamamalai Periyamamalai Valley 13-5-'78	1	
Chingaramanmalai 14-5-'78	1	
Koyilmalai side 14-5-'78	2	
Ummikuppan medu 14-5-'78	3	
Koyilmalai adivaram 14-5-'78	1	
Kuthukalkanam 18-5-'78	2	
Nedumpara 18-5-'78	1	
Naduthottam 18-5-'78	1	
Kadamamalai East 18-5-'78	1	
Lakshmipara Estate 18 & 19-5-'78	5	
Tholukkanpara kavala 19-5-'78	4	

1	2	3
Tholukkanpara oda 19-5-'78	2	
Kanthuranthanmettu 20-5-'78	1	
Sivagirimettu 20-5-'78	1	
Near Mlappara Estate 22-5-'78	8	Fed on Holigarna arnottiana
Inchiparavettu 22-5-'78	14	
Near Inchipara thodu 22-5-'78	3	
Chakkumuthi 22-5-'78	1	
Chakkumuthi kavala 22-5-'78	2	
Near Valimeenkayam 23-5-'78	2	
Sivagiri foot path 24-5-'78	2	
Chembukeni oda 24-5-'78	2	
Near Pullakayam 24-5-'78	1	
Valikayam 24-5-'78	1	
Near Aladi 25-5-'78	3	
Aladi 25-5-'78	2	

1	2	3
Choripara oda 27-5-'78	1	
Near Kozhikanam landing 5-6-'78	2	One fed on *Solanum* sp. and one on Jack fruit.
Near Uppupara 6-6-'78	1	
Vamanakulam 6-6-'78	6	One fed on *Solanum* sp. and one on Jack fruit
Vamanakulam Kavala 6-6-'78	1	Fed on *Solanum* sp.
Near Poonkavanam 7-6-'78	3	One fed on Jack fruit
Near Sabarimalai 7-6-'78	2	
Ponnambalamedu area 8-6-'78	15	
Ambalakadavu 12-6-'78	1	
Kunnar dam area 12-6-'78	9	One fed on *Baccuaria courtallensis* and one on *Spondias* sp.
Near Pambayar 14-6-'78	1	
Valiyamedu 15-6-'78	2	
Near Ettumadakku 15-6-'78	1	
Near Nellikkapara 15-6-'78	1	
Near Manalar Estate 10-11-'78	4	
Near Upper Manalar 10-11-'78	2	
Total:	167	

APPENDIX III-9

Records on the Indian Wild dog

Locality & Date	Seen		No. of dropp-ings	Remarks
	No. of packs	Total No. of indi-viduals		
1	2	3	4	5
Cheriyakanam road 28-10-'77	-	-	3+	
Opposite boat landing 5-11-'77	1	2	-	Feeding on sambar.
Near Thampuranthuruthu 11-2-'78	1	6	-	
Near Mullakkudi R.H. 8-3-'78	-	-	1+	
Methakanam road 8-3-'78	-	-	2+	
Near Swamikayam malai 10-3-'78	-	-	1+	
Kannimarmedu 12-3-'78	-	-	1	
Near Palkachimalai 14-3-'78	-	-	1	Sambar hair in the dropping
Near Karadivalavu 15-3-'78	-	-	1	"
Near Uttamaram 18-3-'78	-	-	1+	
Nellikkampetti 24-3-'78	1	6	-	
Cheriyakanam 30-3-'78	1	4+	-	

1	2	3	4	5
Near Murikkadikayam 1-4-'78	-	-	2+	Sambar hair in the dropping
Murikkadikayam 1-4-'78	-	-	1	"
Near Karikavukanam 1-4-'78	-	-	1+	"
Thekkudakkumpara 2-4-'78	-	-	1+	"
Murikadikayam kanam 6-4-'78	-	-	1	
Near Murikadikayam kanam 6-4-'78	-	-	2+	
Near Thannikudy machan 7-4-'78	1	13	-	All feeding on sambar. 4 pups
Near Pulikayam kanam 8-4-'78	-	-	11+	Sambar hair in the dropping.
Naduthottam 18-5-'78	-	-	4+	
Lakshmipara Estate 19-5-'78	-	-	1+	
Mlappara Estate 21-5-'78 & 22-5-'78	1	9	1+	
Polkooralakayam 22-5-'78	-	-	1+	
Thannikkudy-Mlappara road 24-5-'78	-	-	2+	
Manadi 24-5-'78	-	-	3+	

1	2	3	4	5
Near Aladi 25-5-'78	-	-	1+	
Madhalamthookki oda 27-5-'78	-	-	1+	
Elatheri Estate 29-5-'78	-	-	1+	
Dam area 6-6-'78	-	-	2+	Fed on sambar
Near Uppupara 6-6-'78	-	-	1	"
Vamanakulam Kavala 6-6-'78	-	-	1+	"
Near Chalakayam 14-6-'78	-	-	1+	"
Valiyamedu 15-6-'78	-	-	3+	"
Near Manalar Estate 10-11-'78	-	-	4+	
Upper Manalar 10-11-'78	-	-	1	
Near Eravangalar 10-11-'78	-	-	3+	
Total:	6	40	61	

APPENDIX III-10

Records on the Sloth Bear

Locality & Date	No. of droppings	No. of foot prints	No. of animals seen	Remarks
1	2	3	4	5
Manakkavala 9-11-'79	1	-	-	
Chellayanoli 12-2-'78	-	1	-	Small one
Methakanam road 8-3-'78 & 15-3-'78	8	-	-	
Mullathodu 11-3-'78	1	-	-	
Kannimarmedu 12-3-'78	5	-	-	
Near Ottamaram. 18-3-'78	3	-	-	
Near Mullakudy R.H. 20-3-'78	-	-	-	One digging on termite mounts
Near Navikayam 20-3-'78	-	-	-	Two diggings
Near Mulakupara oli 21-3-'78	1	-	-	
Near Chaverkuzhi 2-4-'78	2	-	-	
Kumarikavumalai 5-4-'78	1	-	-	
Thoshampara kanam 5-4-'78	-	1	-	

1	2	3	4	5
Near Karian oda 6-4-'78	1	-	-	
Pulikayam kanam 8-4-'78	1	1	-	
Koyilmalai adivaram 14-5-'78	1	-	-	
Near Koyilmalai 16-5-'78	3	-	-	
Pulikayam 16 & 17-5-'78	6	-	2	
Kozhikanam landing 5-6-'78	1	1	-	
Arali oda 5-6-'78	-	1	-	
64 Plantations(Eucalyptus) 6-6-'78	-	-	-	1 digging
Total:	35	5	2	Total digs seen = 4

APPENDIX III-11

Records on Otter

Locality & Date	No. of groups seen	No. of individuals	No. of foot prints	Remarks
Near Edapalayam 7-11-'77	1	4+	-	
Mullakkudy area 19-3-'78	-	-	2+	
Ottamaram area 21-3-'78	-	-	1+	
Near Ayyappanthuruthu 29-3-'78	1	6	-	
Tholukkampara thodu 19-5-'78	-	-	-	2 droppings
Near Chakkumuthi 22-5-'78	-	-	1+	
Total:	2	10	4+	

APPENDIX III-12

Records on the Indian Giant Squirrel

Locality & Date	No. of animals seen	No. of animals heard	Remarks
1	2	3	4
Nellikkampetti 28-10-'77	-	1	
Chevalot thuruthu 29-10-'77	3	3	
Edapalayam 30-10-'77 & 5-11-'77	2	1	
Manakavala 9-11-'77	1	-	
Paravalavu 11-11-'77	1	-	
Ayyappan thuruthu 11-11-'77	2	-	
Thekkady 26-1-'78	4	-	
Methakanam 7-3-'78, 8-3-'78 & 15-3-'78	3	2	
Palkachi malai 14-3-'78	2	2	
Near Mullakkudy R.H. 20-3-'78	1	-	
Navikayam 20-3-'78	2	-	
Mulakupara 21-3-'78	5	-	
Karikavukanam 3-4-'78	1	2	

1	2	3	4
Vakkappadappu oda 5-4-'78	6	2	
Near Murikkadikayam 6-4-'78	2	2	
Near Kariyan oda 6-4-'78	1	-	
Cheriyamamalai Periyamamalai Valley 13-5-'78	1	1	
Pothamperi 13-5-'78	3	2	
Ummikkuppan medu 14-5-'78	1	-	
Near Kathiramudi 14-5-'78	2	-	
Koyilmalai adivaram 14-5-'78	-	4	
Koyilmalai Valley (Right side) 15-5-'78	3	-	
Koyilmalai Valley (Left side) 15-5-'78	2	1	
Ummikkuppan 15-5-'78	4	-	
Manadi 18-5-'78	2	-	
Nedumpara oda 18-5-'78	1	1	
Lakshmipara Estate 18-5-'78 & 19-5-'78	-	3	
Kadama malai East 18-5-'78	-	1	

1	2	3	4
Mlappara kavala 19-5-'78	-	2	
Tholukkanpara area 19-5-'78	-	3	
Naduthottam 20-5-'78	1	-	
Sivagirimettu 20-5-'78	-	1	
Near Mlappara Estate 22-5-'78	2	-	
Inchipara area 22-5-'78	1	2	
Chembukeni 24-5-'78	1	-	
Near Valiyakayam 24-5-'78	1	-	
Near Manadi 24-5-'78	1	-	
Mlappara 25-5-'78	-	1	
Near Aladi 25-5-'78	-	1	
Madhalamthookki thodu 27-5-'78	2	1	
Madhalamthookki 29-5-'78	-	1	
Near Ponvarai Estate 30-5-'78	2	-	
Near Arali oda 5-6-'78	-	2	

1	2	3	4
Kozhikanam area 5-6-'78	1	7	
Kozhikanam oda 5-6-'78	1	1	
Near Old Cardamom depot 5-6-'78	-	1	
Chamikanam 5-6-'78	1	1	
Pachakanam 5-6-'78	-	2	
Vamanakulam junction 6-6-'78	-	1	
Plantation border 6-6-'78	-	2	
Attapudungi 7-6-'78	-	1	
Poonkavanam 7-6-'78	-	1	
Ponnambalamedu 8-6-'78 & 13-6-'78	-	2	
Vellaramchetta thavalam 9-6-'78	-	2	
Saramkutti (West) 12-6-'78	1	1	
Sabaripeetam 12-6-'78	2	-	
Kunnar Dam area 12-6-'78	-	10	
Mulankal 12-6-'78	1	-	

1	2	3	4
Near Inchimalai 13-6-'78	-	1	
Appachimedu 13-6-'78	1	-	
Valiyanavattom (Top) 13-6-'78	1	-	
Near Valiyamedu 15-6-'78	1	-	
Total:	76	75	

APPENDIX III-13

Records on the Indian Porcupine

Locality & Date	No. of droppings	No. of diggings	Remarks
1	2	3	4
Karadiallu 7-11-'77	-	1	
Manakavala machan 8-11-'77	-	-	Spines seen
Edapalayam thuruthu 10-11-'77	1	-	
Ayyappanthuruthu 11-11-'77	1	-	
Near Mullakkudy machan 7-3-'78	1	-	
Near Mullakkudy R.H. 7-3-'78	1	-	
Methakanam road 8-3-'78 & 15-3-'78	53	-	
Swamikayam malai 10-3-'78	2	-	
Mullathodu 11-3-'78	24	-	
Kannimarmedu area 12-3-'78	169	-	
Palkachimalai area 14-3-'78	32	-	
Ottamaram area 18-3-'78 & 19-3-'78	38	1	
Near Chennayapara 20-3-'78	1	-	

1	2	3	4
Mulakupara area 21-3-'78	9	-	
Kottakoorakal area 23-3-'78	10	-	
Near Murikadikayam 1-4-'78	1	-	
Near Chorakkotta oda 1-4-'78	10	-	
Ummikkuppan oda 1-4-'78	1	-	
Kathiramudi adivaram 1-4-'78	2	-	
Ummikkuppan para 1-4-'78	2	-	
Karikavukanam 1-4-'78 & 3-4-'78	2	-	
Vazhukkipara 2-4-'78	5	-	
Vazhukkipara kanam 2-4-'78	2	-	
Ummikkuppan 3-4-'78	2	-	
Kumarikavu malai 5-4-'78	2	1	
Near Ummikuppan kanam 6-4-'78	8	-	
Ummikuppan kanam 6-4-'78	2	-	
Chorakotta odakanam 7-4-'78	30	-	3 Burrows also seen
Pulikayam 8-4-'78	4	-	

1	2	3	4
Pothamperi 13-4-'78	-	1	
Koyilmalai adivaram 14-5-'78	-	-	1 burrow
Sivagirimettu 20-5-'78	-	2	
Arali oda 5-6-'78	-	1	
Dam area 6-6-'78	-	2	
Poonkavanam 7-6-'78	-	-	Spines seen
Kozhuppamalai 9-6-'78	1	-	
Seethakallu malai 9-6-'78	1	-	
Vellaramchetta thavalam 9-6-'78	1	-	
Near Myladum chingampara 15-6-'78	-	3	
Upper Manalar 10-11-'78	-	-	Spines seen
Total:	418	12	4 burrows; 3 spines

APPENDIX III-14

Records on the Blacknaped Hare

Locality & Date	No. of droppings	No. of animals seen	Remarks
Kannimarmedu 12-3-'78	1	-	
Palkachimalai area 14-3-'78	5	-	
Navikayam 20-3-'78	-	1	
Near Chaverkuzhy 2-4-'78	-	1	
Near Kumarikavu mala 5-4-'78	1	-	
64 Plantations (*Eucalyptus*)	6	-	
Near Mulakkudy machan 7-3-'78	-	1	
Near Aranya Nivas 28-11-'78	-	1	
Total:	13	4	

APPENDIX III-15

Records on the Indian Elephant

Locality & Date	Solitary	No. of Herds	Total No. of individuals	Remarks
1	2	3	4	5
Chevalot thuruth 29-10-'77	-	3	19	
Top of dam site 31-10-'77	-	2	10+	
Deer Island 1-11-'77	-	1	5+	Seen on the hill near dam site.
Opposite deer island 2-11-'77 & 3-11-'77	-	5	24+	One herd observed from Paravalavu and one herd seen swimming.
Thannikkudy machan 3-11-'77 & 3-4-'78	1	1	6+	One solitary (cow or Makhna?)
Thannikudy R.H. area 3-11-'77	-	2	27+	
Near Karadiallu 7-11-'77	1	1	1+	On the top of the hill.
Anchuruli malai 10-11-'77	-	1	1+	
Edapalayam 10-11-'77	-	1	6	Two calves
Opposite boat landing 25-1-'78	-	1	5	1 adult bull, 2 adults and 2 sub-adults

1	2	3	4	5
Padikkayam 28-1-'78	-	1	18	1 adult bull, 2 sub-adult, 3 calves & the rest adult cows.
Kadukaipara 30-1-'78	-	1	7	
Near Padikkayam 30-1-'78, 17-3-'78 & 29-3-'78	1	2	15	4 adults, 2 sub-adults, 3 babies (one very small)
Opposite Edapalayam 30-1-'78	-	1	11+	
Panamkal 6-2-'78	-	1	60+	1 Adult bull, 4 sub-adult bulls and 1 calf
Thampuranthuruth oli 8-2-'78 & 9-2-'78	-	3	36+	Two bulls. Mating also observed. One sub-adult bull.
Near Thampuranthuruthu 10-2-'78	-	1	17+	1 sub-adult bull 4 calves
Near Mullakudi R.H. 7-3-'78	-	1	10	1 bull
Mullathodu 11-3-'78	-	2	17+	Composition of both the herds could not be studied, as they were seen quite far off.
Mullakudi R.H. 13-3-'78	1	-	1	Solitary, grazing at midnight.
Near Palkachimalai 14-3-'78	-	1	10	2 calves

1	2	3	4	5
Near Deer Island 17-3-'78 & 29-3-'78	1	4	49	1st herd - 2 calves, 6 adults & 2 sub-adults. 2nd herd - 1 small calf, 2 sub-adults. 3rd herd - 3 small calves, 5 sub-adults (2 bulls).
Opposite Mullakudi R.H. 19-3-'78	-	2	29	4 adults, 2 sub-adults, 1 small bull and 5 calves.
Navikayam 20-3-'78	-	2	10+	
Near Ottamaram 21-3-'78	-	1	9	1 Makhana & 2 calves
Mullakkudy R.H. 21-3-'78	-	1	9	Crossing the river
Near Navikayam 24-3-'78 & 29-3-'78	3	-	3	2 solitary bulls and 1 solitary (cow or muckhna?)
Near Swamikayam 24-3-'78	-	3	24+	One herd - 6 adults & 3 calves
Mangaladevi Valley 30-3-'78 & 31-3-'78	-	3	28+	One herd - 1 bull & 1 sub-adult bull.
Ummikuppan oda 1-4-'78	-	2	17+	
Vakkappadappu oda 2-4-'78	1	1	6+	Solitary cow or makhna?

1	2	3	4	5
Near Murikadikayam kanam 6-4-'78	4	1	4	
Near Karian oda 6-4-'78	-	1	8	1 bull, 2 small calves
Near Ummikuppan kanam 6-4-'78	-	2	26	1 adult bull with large tusk.
Opposite Thannikudy machan 7-4-'78	-	1	12	4 calves
Chorakotta odakanam 7-4-'78	-	2	8+	One bull & 2 calves
Vakilelan 13-5-'78	4	1	3	
Lakshmipara 19-5-'78	-	1	10+	8 adults & 2 calves
Arali oda 5-6-'78	-	1	8	4 adults & 4 young ones (one bull)
Near Kozhikanam oda 5-6-'78	-	1	6	3 adults, 2 sub-adults and 1 calf.
Chamikanam 5-6-'78	-	1	3	All cows
Near Valiyamedu 15-6-'78	-	2	10	5 adults, 1 calf and a small bull
Total:	8	65	588	

APPENDIX III-16

Records on the Gaur

Locality & Date	No. Seen	No. of dungs	No. of hooves	Remarks
1	2	3	4	5
Nellikkampetti 28-10-'77	-	1	-	
Chevalot thuruthu 29-10-'77	-	4+	-	
Manakkavala padam 29-10-'77	16	-	-	
Ayyappanthuruthu 11-11-'77	-	1+	-	Fresh
Near Edapalayam R.H. 11-2-'78	8+	-	-	
Near Palkachimalai 14-3-'78	-	1	-	Old one
Opposite Mullakkudy R.H. 21-3-'78	1	-	-	Adult bull
Kottakurakal area 23-3-'78	-	2	-	
Kakka oli 24-3-'78	7	-	-	1 adult bull
Ummikuppan para 1-4-'78	-	1	-	
Near Thannikudy R.H. 5-4-'78	-	1	-	
Near Karian oda 6-4-'78	-	1	-	
Ummikuppan kanam 6-4-'78	1	-	-	Bull
Thannikudy machan 7-4-'78	-	1	-	

1	2	3	4	5
Opposite Thannikudy R.H. 9-4-'78	18	-	-	5 calves
Near Pandaramalai 13-5-'78	-	-	1	
Nedumpara oda 18-5-'78	-	-	-	Fresh grazing sign.
Near Kozhikanam oda 5-6-'78	-	-	1	
64 Plantations(Eucalyptus) 6-6-'78	-	-	1	
Vamanakulam Quarters 6-6-'78	-	-	1	
Thevarpadimalai 9-6-'78	-	-	1	
Near Eravangalar Estate 10-11-'78	-	-	2	
Total:	51	13	7	1 grazing sign

APPENDIX III-17

Records on the Sambar

Locality & Date	No. seen	No. of droppings	No. of tracks	Remarks
1	2	3	4	
Chevalot 28-10-'77	-	1	-	
Nellikkampetti 28-10-'77	3	4	-	Two does
Chevalot thodu 28-10-'77	1	1	1	
Chevalot thuruthu 29-10-'77	5	1	4	
Edapalayam 30-10-'77	-	-	1	
Dam site (Top) 31-10-'77	2	-	-	
Deer Island 1-11-'77	-	2	1	
Paravalavu 2-11-'77	6	1	1	5 stags
Thannikudy R.H. 3-11-'77 & 1-4-'78	1	1	2	Doe
Chennayapara 3-11-'77	4	-	-	One stag
Opposite boat landing 5-11-'77	-	-	3	
Karadiallu 7-11-'77	-	1	2	1 Call
Manakkavala machan 8-11-'77	2	-	1	
Manakavala 9-11-'77	2	1	4	1 Stag

1	2	3	4	5
Edapalayam thuruthu 10-11-'77	-	-	1	
Ayyappanthuruthu 11-11-'77	-	-	2	
Chakkappara 30-1-'78	2	-	-	Stags
Swamikayam 10-3-'78	1	2	3	Doe
Mullathodu 11-3-'78	-	4	-	
Kannimarmedu area 12-3-'78	-	8	-	
Palkachimalai area 14-3-'78	-	5	-	
Near Padikayam 17-3-'78	1	-	-	Stag
Ottamaram area 18-3-'78	-	7	1	
Mulakupara area 21-3-'78	-	15	1	
Kottakkurakal area 23-3-'78	5	25	-	
Methakanam oda 26-3-'78	1	-	-	
Near Deer Island 29-3-'78	3	-	-	2 Stags
Near Chorakkotta oda 1-4-'78	-	1	-	
Kathiramudi adivaram 1-4-'78	-	8	-	
Near Ummikuppan para 1-4-'78	-	1	-	

1	2	3	4	5
Near Karikavukanam 1-4-'78	-	1	-	
Thekkudakkumpara 2-4-'78	-	1	-	
Vazhukkapara 2-4-'78	-	1	-	
Vazhukkipara kanam 2-4-'78	-	1	-	
Vazhukkipara 2-4-'78	-	1	-	
Karikavukanam 3-4-'78	-	1	1	
Opposite Thannikudy machan 3-4-'78	1	1	-	Doe
Kumarikavu malai 5-4-'78	1	19	-	
Near Murikadikayam kanam 6-4-'78	1	2	-	Stag
Near Ummikkuppan kanam 6-4-'78	-	8	-	
Ummikuppan kanam 6-4-'78	-	3	-	1 Call
Thannikkudy machan area 7-4-'78	1	7	-	1 Doe looking at 13 wild dogs feeding on a fawn.
Chorakkotta odakanam 7-4-'78	-	76	-	
Pulikayamkanam area 8-4-'78	-	32	-	

1	2	3	4	5
Near Pandaramalai 13-5-'78	-	-	1	
Pothamperi 13-5-'78	-	1	1	
Kathiramudi 13-5-'78	-	82	-	
Nedumpara 18-5-'78	-	1	-	
Nedumpara oda 18-5-'78	-	-	1	
Lakshmipara 18-5-'78	-	-	1	
Pudukad 19-5-'78	2	-	-	One stag
Tholukkanpara 19-5-'78	-	-	1	
Mlappara kavala 20-5-'78	-	-	-	1 Call
Chembukeni 24-5-'78	-	-	1	
Near Arali oda 5-6-'78	-	-	1	
Pachakanam 5-6-'78	-	2	2	
Pachakanam thodu 5-6-'78	-	-	1	
62 Plantations (Eucalyptus) 6-6-'78	10	-	-	7 doe & 3 fawns
64 Plantations (Eucalyptus) 6-6-'78	-	2	-	

1	2	3	4	5
Near Vamanakulam Quarters 6-6-'78	-	1	-	
Ponnambalamedu 8-6-'78	-	-	1	
Thevarpadimalai 9-6-'78	-	-	1	
Ambalakadavu 12-6-'78	-	-	1	
Saramkutti 12-6-'78	-	-	1	
Near Inchimalai 13-6-'78	1	-	2	
Appachimedu 13-6-'78	-	-	1	
Near Pambayar 13-6-'78	-	-	1	
Ulakuzhitheertham manda 15-6-'78	1	-	-	Doe
Near Manalar 10-11-'78	-	1	9	
Near Upper Manalar 10-11-'78	-	-	2	
Total:	57	333	58	3 Call

APPENDIX III-18

Records on the Barking Deer

Locality & Date	Number seen	No. of droppings	No. of hooves	Remarks
Mullathodu 11-3-'78	-	-	1	
Near Ottamaram 18-3-'78	1	-	-	1 heard
Near Methakanam oda 26-3-'78 & 31-3-'78	2	-	-	
Near Kumarikavu malai 5-4-'78	-	1	-	
Ummikuppan 6-4-'78	-	1	-	
Pothamperi 13-5-'78	-	-	1	
Pachakanam 5-6-'78	2	-	1	
Near Uppupara 7-6-'78	-	-	-	1 heard
Mukkuzhi 9-6-'78	-	-	-	1 heard
Near Manalar 10-11-'78	1	-	-	
Near Upper Manalar 10-11-'78	-	-	2	
Wood's house November '78	2	-	-	1 female & 1 calf
Total:	8	2	5	3 heard

APPENDIX III-19

Records on the Mouse Deer

Locality & Date	No. of droppings	No. of hooves	Remarks
Manakavala 7-11-'77	-	1	
Near Manakavala R.H. 9-11-'77	1	1	
Mullathodu 11-3-'78	1	-	
Ottamaram 18-3-'78	1	-	
Vakkappadappu oda 5-4-'78	-	1	
Karian oda 6-4-'78	1	-	
Chorakkotta odakanam 7-4-'78	1	-	
Near Tholukkanpara 19-5-'78	-	1	
Inchipara odakutti 22-5-'78	-	1	
Vallithodu thavalam area 9-6-'78	-	2	
Near Ambalakadavu 12-6-'78	-	1	
Near Manalar Estate 10-11-'78	-	3	
Near Upper Manalar Estate 10-11-'78	-	1	
Total:	5	12	

APPENDIX III-20

Records on the Wild Boar

Locality & Date	No. of solitary individuals seen	No. of sounders seen	Total No. of individuals seen	Remarks
1	2	3	4	5
Chevalot area 28-10-'77 & 29-10-'77	1	1	14	
Edapalayam 30-10-'77	2	-	2	
Manakavala padam 7-11-'77	1	-	11	
Manakkavala machan 8-11-'77	2	1	23+	
Manakavala 9-11-'77	1	1	21+	Sounder contained 3 piglets
Thekkady 25-1-'78	-	1	20+	
Padikayam 28-1-'78 & 30-1-'78	-	2	45+	One sounder in association with elephants.
Chakkappara area 30-1-'78	-	2	28+	
Nellikampetti 6-2-'78	-	2	40+	
Methakanam road 8-3-'78	3	1	22	
Swamikayam 10-3-'78	1	-	1	

1	2	3	4	5
Mullathodu 11-3-'78	-	2	31	
Chennayapara oli 20-3-'78	1	-	1	
Near Cruzo Island 20-3-'78	-	1	8	
Near Deer Island 29-3-'78	4	2	37	
Near Padikayam 29-3-'78	1	-	1	
Near Kadukapara 29-3-'78	2	-	2	
Near Mlappara Estate 22-5-'78	1	-	1	
Kozhikanam road 5-6-'78	1	-	1	
Uppupara 5-6-'78	1	-	1	
Total:	22	16	300	

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