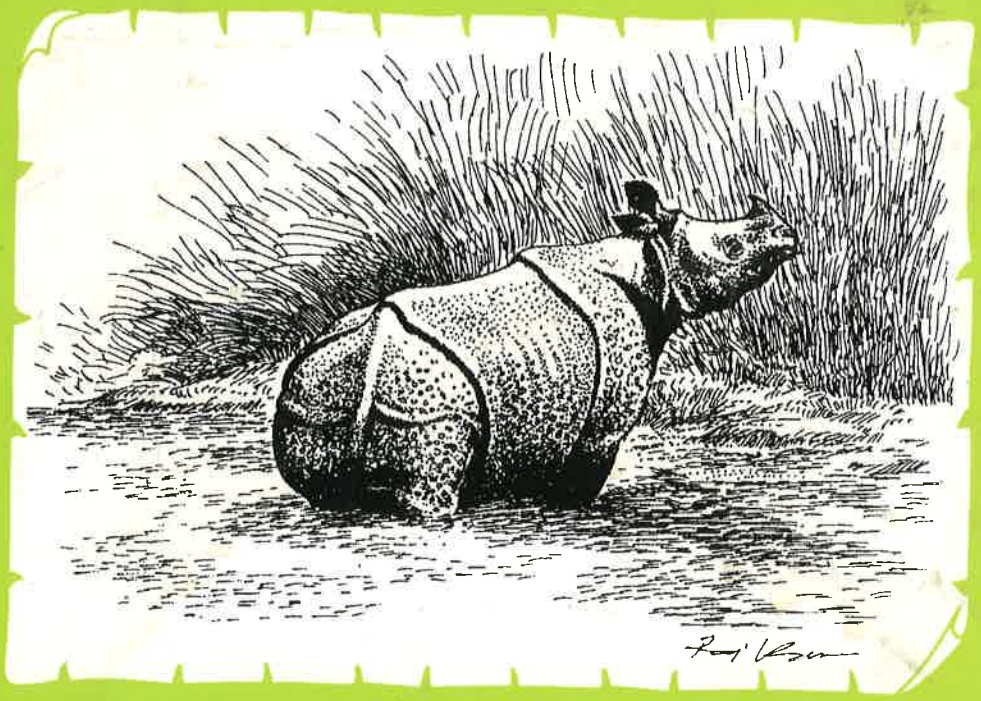
Indian Zoo Year Book

VOLUME - II, 1997



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VOLUME - II, 1997

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PREFACE

The management of wild animals and birds in captivity is a challenging task. The Zoo movement in India and its contribution in this regard enriching our existing knowledge of captive wildlife has been greatly appreciated by zoo and animal lovers throughout the country. In our first endeavour a humble attempt was made to compile scientific and practical informations relating to Indian zoos which could be useful besides serving as a handy reference book. It is heartening that our effort has been well received and this alone has given us an impetus to bring out the second issue of the Indian Zoo Year Book with some improvement over the past issue. We shall consider ourselves most fortunate to find the present issue quite useful and informative to readers and scientists engaged in conservation of wild fauna.

We are grateful to all the contributors to this issue and to those who helped us for this publication.

We express our gratitude to Central Zoo Authority for financial support for this second volume of Indian Zoo Year book.

We record our sincere appreciation of the assistance rendered by Dr. A.T. Rao and Dr. D.N. Mohanty for editing some of the papers.

There is enough scope for its further qualitative improvement. Suggestions for further improvement of the subsequent issues shall be greatly valued.

Editors

Indian Zoo Year Book, Volume - II (1997)

BREEDING SMOOTH-COATED OTTER (LUTROGALE PERSPICILLATA) AND COMMON OTTER (LUTRA LUTRA) IN CAPTIVITY - SOME IMPORTANT REGULATORY FACTORS

J. H Desai

Abstract

The paper provides guidelines and basic requirements for breeding the Smooth-coated Otter or the Indian Smooth Otter and the Common Otter in captivity on the basis of experience gained during 1968-88 at the National Zoological Park, New Delhi.

Three key factors, housing (enclosure), diet and behaviour are discussed and minimal requirements for enclosure design and diet are suggested.

Introduction

There are twelve species of otters in the world distributed over Africa, Asia, Europe, North and South America. Three species viz., Common Otter *(Lutra lutra)*, Smooth-coated Otter or Indian Smooth Otter, *(Lutrogale perspicillata)* and Short-clawed or Clawless Otter (*Aonyx cinerea*) are found in India.

While the Common Otter is found in Jammu and Kashmir, Himalayas, Assam and south India, the Smooth-coated Otter is essentially a plains otter whose range extends from the dry zone of western and central India to south India. The Short-clawed or Clawless Otter is found in the Himalayan foothills from Kulu to the hill ranges and plains of Assam and lower hill ranges and plains of Assam and lower West Bengal and the higher elevations of hill ranges of Coorg and Nilgiris in the south (Prater, 1993).

At present, twenty three specimens of Smooth-coated Otter are available at eleven zoos. While four zoos have twelve Common Otters, none of the zoos in the country has Short-clawed or Clawless Otter in its collection.

The Smooth-coated Otter has been successfully bred at the National Zoological Park, New Delhi (NZP) and the zoo at Jaipur in the past. The Common Otter has been bred at Kamla Nehru Zoological Garden, Ahmedabad where five young in two litters were born during 1994 and 1996. The NZP has been most successful in breeding the Smooth-coated Otter regularly from 1968 to 1989 during which thirty nine young ones were born in 14 litters.

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1. Central Zoo Authority, Annexe-IV, Bikaner House, Shahjahan Road, New Delhi - 110 011

On the basis of observations made and experience gained during twenty years in breeding the otters at the NZP it is surmised that the success in breeding the species is linked to three factors: (i) enclosure, (ii) diet and (iii) behaviour of individual otters. In case of less successful zoos it has been time and again observed that one of these factors was responsible for failure in breeding the species.

Sharing the concern of zoo personnel regarding difficulties in breeding the species in captivity, an attempt has been made to identify and suggest ways to conform with some important regulatory factors to facilitate the breeding of the Common Otter and Smooth-coated Otter in zoos.

Physical Features, Habits and Reproductive Biology

Both the species are highly adapted to a semi-aquatic life. They have extensive webbing between the fingers and toes and thick tapering tails which give the body a shape of a torpedo. The Smooth Indian Otter or Smooth-coated Otter closely resembles the Common Otter in shape, size and colour as well as habits.

The most distinguishing physical feature that differentiates the two species is the shape of the upper margin of the nose pad. In case of the Common Otter *(Lutra lutra)*, the upper margin of the nose pad is doubly concave, forming a flattened 'W' while in case of the Smooth-coated Otter *(Lutrogale perspicillata)* the upper border of the nose pad is convex or peaked (Fig.1). By observing the shape of the upper margin or border of the nose pad, the species can be easily identified even from a distance.

Being social species, the otters prefer to live in groups. They are very active, playful and extroverted. Although otters are aquatic mammals, they spend considerable time on land. They are fossorial in habits and excavate holts/burrows for shelter and to litter. Otters are most active during early morning and late afternoon. Their main activities include basking, rolling on ground, grooming, foraging for fish and chasing each other on the land and in water. They defecate at the same spot some distance away from their holts.

The litter size of the Common Otter is one to five (usually two to three) and the young nurse for about four months (Walker, 1964). The gestation period is 61 days (Burton, 1962).

The gestation period of the Smooth-coated or Indian Smooth Otter at the NZP varied from 60-62 days and litter size from 1-5 with an average of 2-3 young (Desai, 1974; Yadav, 1967). The females attained sexual maturity at the age of 20-22 months and gave birth at the age of two years. The young ones were weaned completely in 18-20 weeks (Desai, 1974)

Some Important Regulatory Factors

Essentially zoo animals which are healthy, in the prime of life and kept in congenial living conditions are expected to reproduce in due course. Contrary to this traditional maxim, some species show no inclination to breed even if the above essential conditions are fulfilled. In such a situation it is often observed that there are certain other factors which contribute to trigger the reproductive process. These factors are known as regulatory or contributory factors.

On the basis of experience gained in maintaining and breeding the otters at the NZP during a span of twenty years, it is surmised that the success in breeding the species is strongly linked to three factors :

(i) Enclosure design - space, land to water ratio, quality of soil;

(ii) Diet-quality and quantity of fish and supplements;

(iii) Intra specific behaviour - Group composition, individual behaviour, group behaviour, compatibility.

(i) Enclosure (Housing)

At the NZP the enclosure for otters cover an area of 200 sq.m. fronted on two sides by dry moat of two meter width and 1.1 meter depth (1.5 to 2.0 meter deep on visitors' side). In the middle of the enclosure is an oval pool 1.5 meter deep and 70 sq. meter in area. There is a small island measuring 1.5 x 5.0 meter in the centre of the pool. The ground between the pool and the dry moat is composed of sandy soil. The ground is punctuated with a few medium sized trees and shrubs. At the back side of the enclosure are small cells where the otters can be taken in case of any exigency. The water from the pool is drained out once a week. The land to water ratio is approximately 2:1, soil is soft but strong enough to support a labyrinth of underground holts without caving in. One side of the enclosure is fenced off with a two meter high chainlink mesh with 30 cm. overhang on top (Fig.2).

Otters are nimble climbers and can easily cross over the chainlink fence if overhang on top is not provided. It can also dig beneath the fence, therefore, the chainlink must extend a meter or more into the ground.

The otter enclosure at the NZP was constructed in 1965 and a trio (1:2) was released in it. Not only did the three animals adapted to the 200 sq. meter enclosure space but reproduced year after year. Their subsequent generations also continued the process. Encouraged by the breeding success, the zoo authorities constructed another enclosure of the same dimensions in 1973 and transferred a young pair to this new enclosure where the pair reproduced in 1975 for the first time and continued to do so thereafter.

Enclosure for otter should resemble its natural environ and meet the biological requirements of the species. Enclosure space, land to water ratio and type of ground/soil are useful components to replicate habitat conditions.

There is no mathematical formula to determine the optimum space requirement for a pair or group of otters. The general rule is to be as liberal as possible depending upon the area available. Considering the breeding rocord of the species at the NZP it can be surmised that the enclosure space for a pair of otters should be about 200 sq. meter with land to water ratio of 2:1 or 3:1. The ground should be soft upto a depth of 0.75 meter to facilitate burrowing.

Otters spend considerable time on ground for basking, rolling on sand, grooming and rubbing against rocks or trees. It is essential to provide a 5 cm. thick layer of sand over the ground to facilitate fur drying activity as dry fur provides insulation and buoyancy. Rocks, hollow logs and trees provide rubbing areas while shrubs provide cover and withdrawal areas where the otters rest in quiet and privacy. These areas also help the young ones to remain hidden from crows and kites.

Stagnant water exposed to sunlight promotes algal and bacterial growth, therefore, water from the pool should be drained out, pool should be scrubbed, cleaned and filled with fresh water atleast once a week.

Moderately running water is preferable but not essential. If, however, underwater viewing facility is provided for the visitors, installation of water circulating and filtration system is a must because in sub-tropical climate water becomes turbid in no time at all.

(ii) **Diet**

The food of river otters includes fish, frogs, crayfish, insects and any small mammals or birds they may be able to capture (Crandall, 1964). In captivity, otters do well on a diet of fish. At the NZP an adult otter is given 500 gm fresh water fish twice daily. The first feed is given at about 9-10 a.m. and the second feed in the late afternoon.

Freshly grated carrots in small quantity mixed with one raw egg help to maintain proper coat condition and general health.

Daily diet of live fish is preferable because it sustains natural instinct and lessens the chances of infection, however, if it becomes a logistical constraint, fresh dead fish can be given. Live fish and one day old chicks may be given once or twice a week to provide a change and maintain healthy apetite.

(iii) **Inter Specific Behaviour**

Otters which have been brought up together or are familiar with each other make a cohesive group, however, when females come in estrus quarrelling among males may take place. Male/female rivalry in a group is uncommon but fights do occur among group members resulting in isolation of an individual due to fear from aggressive member of the group. This can be corrected by removal of the aggressor.

There is a major risk in the introduction of strange otters to an enclosure already occupied by one or more older animals. Territorial intrusions are likely

to result in fierce fighting. Differences in age, temperament and physical condition can lead to aggression among the members of a group. A small harmonious group is better for reproductive success than a large one.

Playful activities among males and females become more frequent prior to mating which occur mostly in water. After the initial copulation, the frequency of mating increases. As the time of parturition approaches, females begin to excavate holts. Males are chased away initially, however, later they share the parental duties.The young are usually allowed to come out of the holt when about a month old, however, they are not allowed to enter water unitl they are about 10-12 weeks old. At this age, the young ones begin to nibble at fish, then wean completely at the age of 18-20 weeks.

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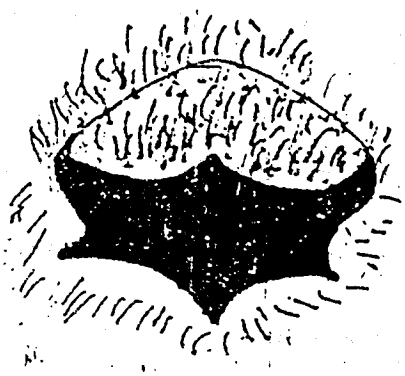

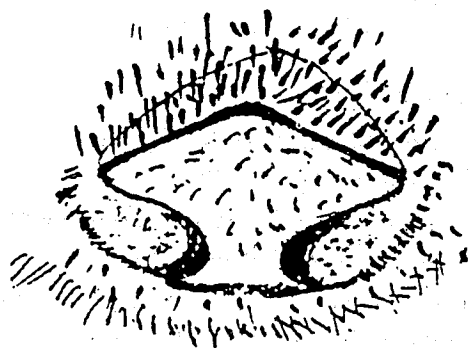

Fig.1

Nose Pad of Common Otter (*Lutra lutra*)

Nose Padof Smooth Coated or Indian Smooth Otter (*Lutrogale perspicillata*)

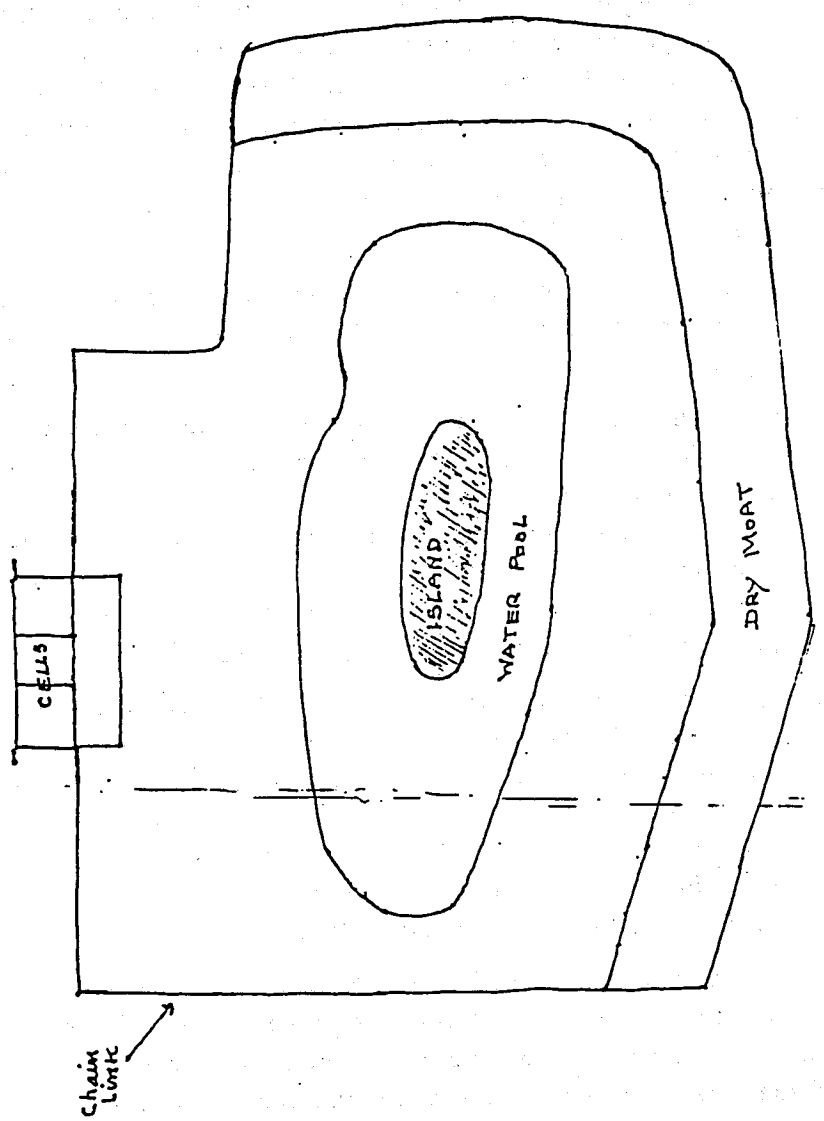

Fig.2 : Plan of otter enclosure at the National Zoological Park, New Delhi
(Scale : 1 cm = 1 metre)

RED PANDA IN DARJEELING ZOO

N.C. Bahuguna and T. Chakraborty

The red panda *(Ailurus fulgens fulgens)* is a highly endangered animal of the eastern Himalayas. This monotypic member of the family Ailuridae has been in the collection of Darjeeling Zoo since its establishment in the year 1958. In spite of this long period in captivity, the condition of this cat bear was far from satisfactory. Only from the year 1994, the animal has started breeding on a regular manner as a result of improved management. This was the beginning of a comprehensive Indian captive breeding programme in the Himalayan region.

With the aim to promote captive breeding, an effort has been made to discuss the past and present management of this animal in this zoo with special reference to its biology and nutrition.

From the very beginning, the Zoo has remained dependent on the supply of the red panda from the wild. In sixties when there was no restriction on the capture, the Zoo became a centre of trade for all local wild animals. The tendency reduced after seventies. Still as per available records more than 50 red pandas were procured from the wild for the Zoo since the year 1972. Actual number must be much higher. Such inflow from the natural forests had direct bearing on the condition of animals in captivity. More the capture from the wild, lesser their chances of survival. (Graph 1).

Although, other Indian zoos have also kept and even bred red pandas, they could not maintain their collection (Walker, 1990). Hostile climatic conditions, unnatural and uncomfortable enclosures devoid of behavioural requirement, did have adverse effects. All these causes mortality and short life span in captivity (Sanyal, 1892). However, the enclosure had always been naturalistic in Darjeeling. There is a lot of vegetation and a number of trees to fulfil the biological requirements of this arboreal animal. Yet climbing was prohibited in the past. This was done to check the escape of the animals.

In the wild, red pandas are reported to be most active at dawn and dusk and at night (Hodgson, 1847; Anon., 1978). But during this period, the animals were confined in small cubicles of about 4ft x 4ft x 6ft (1.20m x 1.20m x 1.80m) space. This space not only restricted the movement of the animals, but also created unhygienic conditions for them. This was evident from the fact that none of the red pandas had good fur on the tail for most of its life. This was because the tail was always soaked in urine. It sometimes, gave an impression that the animals were suffering from metabolic problem. With time, a brightly coloured thick fur would cover the body (Pradhan et al. 1994).

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1. Padmaja Naidu Himalayan Zoological Park, Darjeeling - 734 101, West Bengal.

To improve the enclosure, thorough investigation was made. It was found that red pandas used to find the escape routes through the damaged joints and not through the branches of the trees. Therefore, all plain galvanised sheets wrapped around the trees were removed. This, however, did not have much effect, because they refused to climb up the big trees and spent most of their time on the ground.

Later on, the entire fence was replaced by a moat. The minimum height of the moat was kept 5ft (1.50m) from inside with 1.5ft (45cm) overhanging. Simultaneously, arrangement was made so that the animals could always have the access to the outdoor enclosure. This not only gave them an opportunity to develop their natural routine, but also allowed them privacy. If teased, they could always find some shelter away from the visitors.

In the new enclosures, old system of indoor cages were discarded because with improvements, the animals began to spend most of their time on the tree. They come down only for food and excretion. So hardly there is a need for night shelter. Even in the day of snowfall this year, they were found on the trees throughout the day without any difficulty. Instead nest boxes were provided for shelter and breeding purpose.

Like a cat, the red panda has the habit of shifting the cubs. Therefore, 2 to 3 nest boxes were placed in each enclosure. The nest boxes were so designed that a red panda could easily move in and out. The door has a hole 15cm in diameter and 15cm high above the floor, so that it would prohibit the movement of the new born cubs. The nest box had two chambers. The inside chamber was kept dark. It helps in breeding. This arrangement also restricts the intrusion of birds (Bleijenberg, 1988). In a few nest boxes, the inner chamber had two stories. One is used for feeding and the other for breeding. The new nest boxes were further modified and prepared in cylindrical shape. The outside surface was covered with sal bark, to give the nest boxes look of broken sal trees. Some nest boxes were prepared in the shape of forks of trees.

Diet of wild animals in captivity, is one of the important factors. Very little is known about the food habit of the red panda in the wild. Its diet constitutes almost exclusively of bamboo which accounts 90 per cent of the total food intake. In addition to bamboo, the animal takes fruits, berries, insects and small mammals (Hodgson, 1847; Yonzon & Hunter, 1989).

The anatomical features of digestive system of any species indicate the dietary preference of the species but red panda seems to be the exception. In pandas, the digestion of the food is not like ruminants due to lack of modified stomachs (Catton, 1990). Even they do not possess caecum where bacteria help breaking the long cellulose fibres. The intestine of the red panda is between four and five times the length of its body, similar to that of a carnivorous racoon or civet. There are no microorganisms in the gut of pandas to digest bamboo. However, the gut of the giant panda has certain

modifications. The wall of the oesophagus is tough and horny, and the stomach has thick and muscular wall.

The dentition of this animal is typical of carnivore except the fourth upper premolar is missing. But the teeth are more like those of a ruminant herbivore than a carnivore. The cheek teeth are all unusually large, flat and broad with a complex pattern of ridges.

They have heavily boned skull for their size. The deep skull and prominent cheek bones provide anchor points for powerful muscles that close the jaws. This is why the animal in the absence of sufficient bamboo, tries to feed on other local grasses or tree leaves.

The zoos in the West depend heavily on artificial diet due to non availability of bamboo. For the red panda they mostly use the commercial feed available for cats and dogs. There, the disease problem are related mainly to nutrition because the cat and dog pellets are not prepared keeping wild species in mind. The diet given to the pandas in these zoos include wheat germ, barley malt, oats, corn flakes, milk, maize, egg and fruits (Bleijenberg, 1984). In addition, protein and vitamin mineral supplements are given.

To develop a systematic breeding programme, the conventional diet of this zoo was reviewed. Since the beginning, the red panda was given the following feed twice a day:

Semolina (Suji)	75gm
Sugar	50gm
Egg	1 piece
Condensed (Skimmed) milk	300gm (to make it 1.5 litres of milk)

In addition, 3kg of bamboo (mainly leaves) was supplied every day. There was no supplementation of vitamins.

To improve the diet, initially the condensed milk, for which constituents were unknown, was replaced by baby milk powder. The new diet was

Semolina (Suji)	75gm
Sugar	50gm
Egg	2pieces
Milk (powder)	300gm
Bread	15gm
Corn flakes	10gm

Vitamin Mineral supplement

Vit A	60000IU	Cal Phos	129. 00mg
Vit D	1000IU	Mag Oxide	60.00mg
Vit B1	10mg	Ferous Sulph	32. 00mg
Vit B2	10mg	Mang Sulph	2.03Mg
Vit B6	3mg	Copper Sulph	3.39mg
Vit B12	15mg	Zinc Sulph	2.20mg

Calcium pantothanate	16.30mg
Vit C	150mg
Vit E	225mg
Protein supplement	10gm

The diet is also given twice a day. Later on quantity of sugar was reduced to avoid dental problem (Glatston, 1988). It was replaced by honey. No doubt, dental problem was never recorded in Darjeeling. Later on the milk was also discontinued. The protein supplement is stopped now.

The changes gradually began to yield result. For the first time, mating was recorded on 09.02.93. This mating, however, proved to be ineffective. Next year, the lone male mated with two females on January 18 and February 15.

Although, there is a record that a female gave birth to two cubs in Darjeeling in 1908 (Wall, 1908), followed by other reports of breeding this species in captivity, yet first systematic, scientific and successful breeding was achieved in India when on 20 June, 1994 a female gave birth to a pair of cubs. In earlier cases, there are neither mating records nor any mention of action taken to initiate such breeding. Secondly, a breeding success is considered only when the offspring becomes the breeder itself (Wharton *et al.* 1992). In 1996, the female born in 1994 became mother. With this, breeding was recorded for last three successive years.

First indication of breeding comes when during cold weather, the male and female share the same spot for urinating. It seems that the urine becomes scented during this period. After that the male gives breeding call in response to female. It is like a chirping of a sparrow. In the past, such calls remained unnoticed in view of the presence of the birds in the vicinity. While making the sound, the male climbs down the tree and starts walking. During this period, frequency of urination increases. The male starts scent marking. It sniffs and rubs the anal region on the ground. If female also climbs down,

the male runs after the female. Then copulation starts. In Darjeeling, mounting was observed from 5 seconds to 15 seconds in different cases. Feeding is reduced during this period. Mating mostly takes place during evening and morning. The maximum frequency of mating was 7 times a day. Since observations were never made during night-time, it is not clear whether the frequency is more or not. Atter mating the animals climb up the tree and take rest or sometimes opt for feed. The duration of estrus is 24 hours.

Mating of the lesser panda is seasaonal, usually between early January and mid-March (Dittoe, 1944; Zuckerman, 1953; Mottershead, 1958, 1963; Erken and Jacobi 1972; Roberts and Kessler, 1979; Keller, 1980; Roberts, 1980, 1981). The earliest mating in Darjeeling was recorded on January 28 and latest on March 11. While on March 13, call was heard from the male, but no mating was recorded.

Bulging is observed after two months and becomes prominent after three months.

After the female starts taking rest inside the nest box, the indoor chamber is cushioned with dry leaves. As soon as birth takes place, it looks as if the female has disappeared. To know, in which nest box she has given birth, a feeble sound with a plastic bag is made. The mother comes out to check the intruder. A loud noise may distract the mother and she may disown or even kill the cubs.

In the wild, birth takes place from spring to summer mainly in June (Hodgson, 1847; Pocock, 1946; Wall, 1908). In captivity in the northern hemisphere, 3.5% of 199 litters were born in May, 79% in June, 16% in July, and 1.5% in August (Roberts, 1996). In Darjeeling 4% of 25 litters were born in April, 12% in May, 60% in June, 20% in July and 4% in September (Graph 2). However, the records of births shown in April and September are not authentic.

The gestation period of red pandas varies between 112 and 158 days (Dittoe, 1944; Mottershead, 1958; Erken and Jacobi 1972; Roberts and Kessler, 1979; Roberts, 1981; Roberts and Gittleman, 1984). The mean of 17 reported gestations in captivity was 134.2 days (Roberts 1996). In Darjeelig, the minimum gestation period was 111 and the maximum 129 days.

From the second month the mother starts coming out of the nest box at day time also. After 3 months the frequency increases to 4 times a day and after 5 months 5-8 times a day.

In the beginning, the sound of the cubs is like rats. After two months the sound changes to a long drawn squeak *chw....e...e...n...chw....e...e...n*. Whenever the cubs are hungry, they make the sound. The mother comes in front of the door of the nest box and makes an aggressive sound *khyek–khyek* to check if the cubs are in trouble. Then

after entering the nest box, pulls the cubs towards her teats and encloses them by the tail. The mother sleeps with them for 3 hours and when they are asleep, she comes out. After coming out, the mother is found to take milk first, then fruit and then bamboo leaves.

In the third month, the mother takes the cubs in mouth and shifts them to another cage. If she does not find any distrubance, she will not shift them further. If she feels disturbed, she will try to shift them earlier also. One female is so sensitive that in the first year, she shifted the cub on the fourth day itself. Repeated it on the fifth and seventh day. On the eighth day, the dead cub was lying on the ground. In the second year, she was moving with the cub in her mouth for half an hour on the fifteenth day. Again on seventeenth day, she was moving for 25 minutes. The cub got injured in the process. The injury was conspicuous. On the twenty third and twenty fourth day, the cubs died.

During the first breeding in Darjeeling, there was not much space for shifting. As a consequence, when once there was disturbance, the mother did not go to cubs in spite of their crying. Immediately, the area was cordoned and the indoor cage was covered with Hessian cloth. Soon, the mother moved to the cubs.

After 3 months the mother takes a tender twig of bamboo in her mouth, goes in front of nest box and calls the cubs. She brushes the twig on their mouth. First the male cub eats the grass and then the female. Now the cubs start playing and coming out of the nest box. The mother, however, does not give full freedom to them lest they should get injured.

After 5 months, the cubs start running. They follow the mother. In all activities, the mother is followed by the male and the female cubs respectively.

After 6 months the mother takes the cubs to the milk pot. First she moves in a circle around the bowl, and then licks the milk. They follow. After taking milk they go to the nest box in which birth took place. They sleep for three hours. They call the mother soon after they are awake. She comes and takes them to fruit tray. She eats the fruits. The cubs do the same thing. Each consumes nearly half the quantity of what the mother takes.

After 6 months the cubs follow the mother up the trees. After 7 months, she does not allow the cubs to remain too near and often drives them away. But communication is not broken. If sometimes, the cubs cry and the mother is sleeping, the father comes to take them up a tree.

The weaning is done after 6 months. In Darjeeling, weaning, in all cases, was done in February, between 7 and 8 months. Delayed weaning disturbs the breeding in all other animals. But in red pandas, the effect was not observed.

It is reported that females tend to give birth within 10 days of the date of parturition of the previous year (Roberts, 1981). This could not be substantiated in Darjeeling. One female gave birth on June 20, June 19 and July 14 and another on June 6 and June 24 in successive years.

Darjeeling Zoo is in the initial stages of captive breeding, therefore efforts were always made to breed all potential animals. Of course, even a very good breeding performance cannot maintain sustainable population if health of the animals is not monitored. Infectious deseases have been found dreadful to red pandas. To take prophylactic measure, a thorough study on the diseases, was made. The available past records, for the period 1972 to 1996, show that *Pasteurella* infection was the main problem. In 1975 eight red pandas died in an outbreak of Pasteurellosis. Other deaths occurred due to gastroenteritis, impaction, accidental trauma and senility (Graph 3). Maximum mortality was noticed in the month of June and July. This also includes neonatal mortality, as the red panda gives birth in these months. Secondly high moisture content in the atmosphere during this season favours bacterial infection. There is no report of liver disease nor is there prevalence of viral infection. During the last three years, there have been 12 (5:7) births in all. Out of these 4 (2:2) died at infant stage, while the 1 (0:1) died in juvenile stage. The cause of neonatal mortality was also *Pasteurella* infection. The cub mortality is highest in the youngest (0 to 1 year) and higher in male (Roberts, 1981, 1982). More death of females in Darjeeling may be assigned to insufficient data. Even in the adults, more deaths have been recorded in females, because of more females arrived in the zoo stock.

Presently, in the Zoo, there are 12 (6:6) pandas, housed in six different enclosures. To accommodate more animals, and to maintain their natural behaviour, efforts are on to make a semi-natural enclosure. Presently, the management of the zoo is being done on the basis of past experience. Western ideas are also being modified to suit Indian conditions. There is, however, no feed back from other zoos in the country because of the absence of the red panda in other zoos. Therefore, research work has been taken up to study the animal, so that its condition can be further improved.

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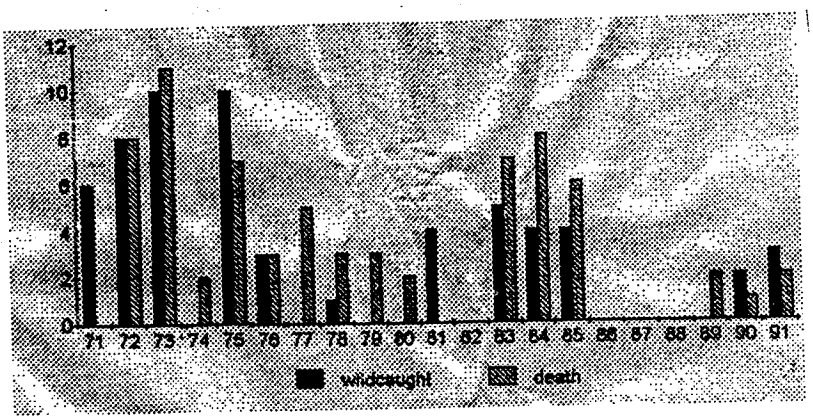

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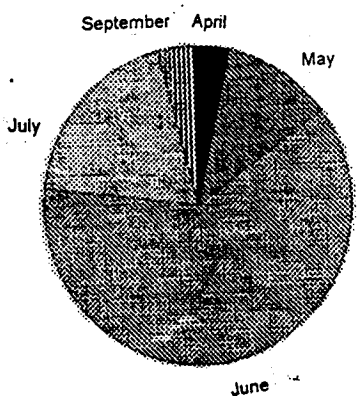

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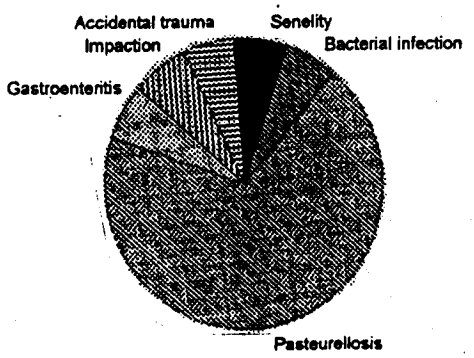

Indian Zoo Year Book, Volume - II (1997)

OTTER EXHIBIT IN NANDANKANAN ZOOLOGICAL PARK, ORISSA

S.K. Patnaik

Otters are very playful animals and usually exhibit their natural behaviour in a waterbody, when they swim, dive, hunt for food and also quite often use the banks of rivers, (sandy or rocky) for basking, running and playing. The fishing cats also love a similar topography though they mostly use estuarine habitat. In fact an exhibit was designed at Nandankanan Zoological Park to house the fishing cats with a glass fronted pool for visitors to see the underwater behaviour of the animals, through the glass from a sunken gallery. But after the construction, it was felt that the enclosure shall be much more useful for having the otters than the fishing cats. Now the otters are being housed there and they enjoy this.

The display area is a semi circular sloping ground 13.2m in width and 15.8m in length with perimeter wall of 2.5m height with slanting overhang of 0.5m. There are trees, bushes and boulders to provide a near natural topography in the exhibit. There is a 1.2m deep and 6.4m wide pool on the lowest point of the display area, which is separated from the visitor's gallery by a 0.85m high glass, which is 7.5m long. There are two night shelters of 2.6m x 1.4m each with a keepers' gallery of 3.6m x 1.5m. Both night shelters have windows of 1.25m width. These shelters are approached through small steel doors. There is an independent access to the display area through a 1.10m x 1.80m size door.

The visitors gallery which is at a much lower level than the natural ground is approached through a stair-case. This 2.8m wide visitors' gallery is covered with reinforced cement concrete roofing and has a 7.5m long x 0.85m high glass fronted viewing window and is at the normal eye level of visitors. For a better view of the animals when they are on the ground, two glass windows (1.25m wide each) have been provided close to the staircase. There are openings to the visitors' gallery for better lighting and ventilation.

Draining of water to keep the pond clean is a very important aspect, which was kept in mind while designing the exhibit. A small duct is provided at the lowest point of the sloping pool, so that the entire water from the exhibit can be removed by gravity, through an under ground sewarage system. This is absolutely necessary, as the pool which becomes dirty with the left over food need frequent cleaning to maintain hygiene and also to facilitate viewing while the otters dive for food or otherwise.

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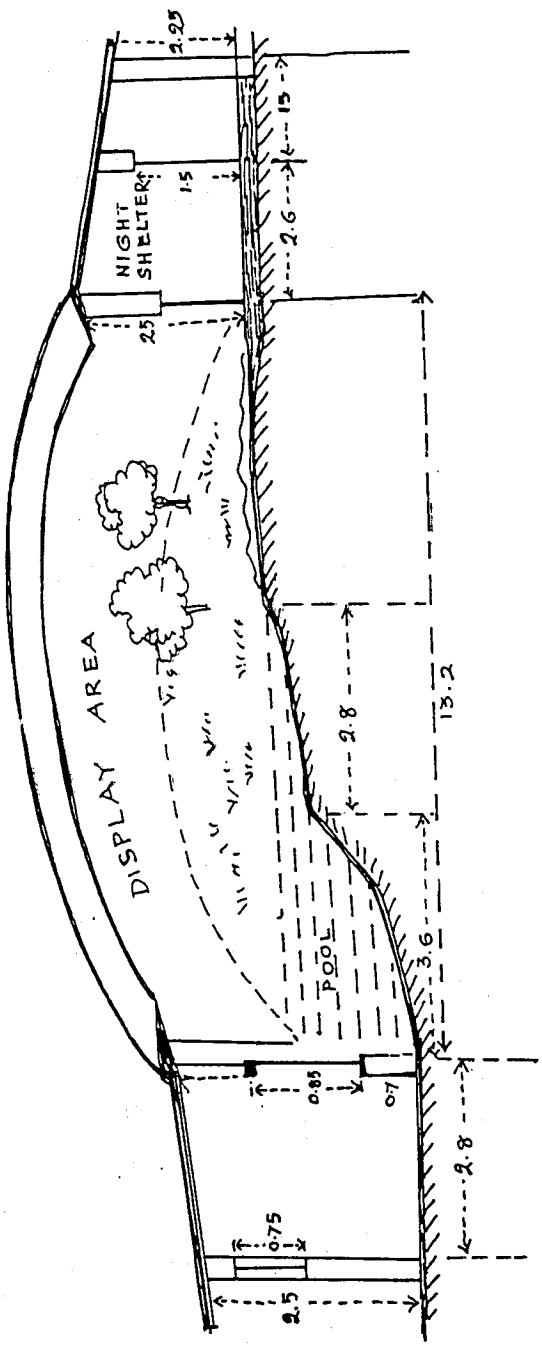
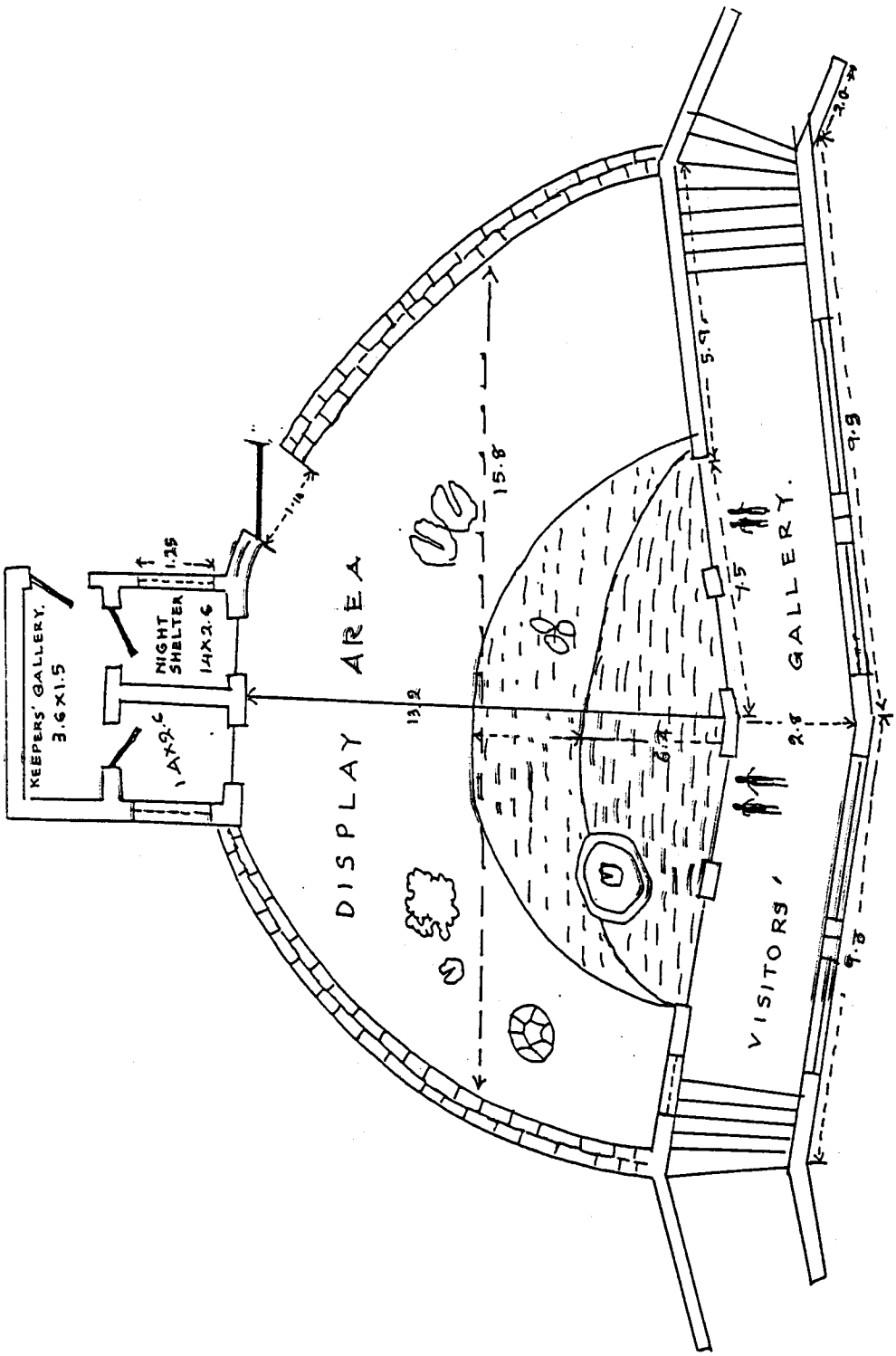
1. Chief Wildlife Warden, Orissa, 7, Saheed Nagar, Bhubaneswar - 751 007



Otter Exhibit, Nandankanan Zoological Park (Not to scale) - Side View



Layout plan of Otter Exhibit, Nandankanan Zoological Park (not to the scale)

SPECIFIC DISEASES AND CAUSES OF MORTALITY IN NON-AQUATIC BIRDS AT NANDANKANAN ZOO - AN OVERVIEW

A. T. Rao[1] & L. N. Acharjyo[2]

Avians form an important and attractive group of exhibits in any Zoological Park. Information on diagnosis particularly based on gross and histopathology of common diseases has been lacking. Sporadic reports of causes of mortality in budgerigars at Lucknow zoo (Gupta, 1967), diseases of captive birds in Alipore zoo and other markets at Calcutta (Chakraborty, 1988), parasitic diseases of wild birds from Calcutta (Sen and Chatterjee, 1965; Sengupta, 1974a, b) Punjab (Bali and Kalra, 1975), Delhi (Chauhan *et al.*, 1973; Bhatia *et al.*, 1972), Lucknow (Chauhan *et al.*, 1973) and Bombay (Deodhar and Narsapur, 1968) zoos, mycoplasmosis in doves and sparrows (Jain *et al.*, 1971), parrots, pigeons and turkeys (Mall *et al.*, 1975), serological incidence of Toga viral infection in varieties of birds at Ranchi and Champaran areas of Bihar (Loach *et al.*, 1983), Marek's disease (Mohanty *et al.*, 1971; Raghavan and Murty, 1977 and Sah *et al.*, 1982 a, b) Japanese encephalitis in egrets, paddy birds, crows and ducks of Dhanbad and Asansol (Khan and Banerjee, 1980), colibacillosis in captive birds of Nehru Zoological Park (Char and Rao, 1983), neoplasms in pheasants and parrots of Alipore zoo (Basak *et al.*, 1975, 1976; Sarkar *et al.*, 1977), gout in cage and aviary birds of Madras zoo (Damoderan *et al.*, 1978), tuberculosis in an emu of Hyderabad zoo (Rao and Choudhury, 1980) and captive birds (Sah *et al.*, 1985) have been reported. This paper gives a comprehensive information on common diseases and pathological conditions occurring in non-aquatic birds at the Nandan Kanan Zoological Park, Orissa.

Materials and Methods

The materials formed for the study were based on detailed necropsy and histopathological examination of 200 non-aquatic birds of 56 species (Table-1).

These birds had died naturally between 1968-1993 at Nandankanan Zoological Park. After detailed necropsy examination appropriate tissues were collected for routine histopathological examination. Apart from routine haematoxyline and eosin staining, special staining techniques such as periodic acid schiff's reaction (PAS) for *Aspergillus* sp, modified Gram's stain for *Nocardia* sp., Z. N. carbol fuchsin staining for *Mycobacterium tuberculosis*, De Galantha's stain for urates were employed wherever necessary.

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Results and Discussion

List of specific diseases and causes of mortality has been shown (Table-2).

1. **Aspergillosis** - Aspergillosis with or without involvement of thoracoabdominal air sacs was encountered in 16% of the total cases examined which included 5 gallinaceous birds (comprising 2 peafowls and one each of crested wood partridge, turkey, black-tailed bantem), 2 pigeons, 4 mynas, 7 emu chicks, 3 goldfronted chloropsis and one each of white-eyed buzzard, striated laughing thrush, budgerigar, roseringed parakeet, short-toed eagle, racket-tailed drongo, black-headed gull, common weaver bird, koel, spur winged plover and orange headed ground thrush. Except emu chicks which experienced 100% mortality in an outbreak, all the other birds affected were adults and the disease only occurred sporadically. In the former both the lungs were markedly congested, oedematous and pneumonic while in the latter solitary/multiple yellowish white/black/greenish nodules in one or both invariably congested and oedematous lungs were seen. Diagnosis was based on demonstration of typical branched and septate hyphae in the caseonecrotic epitheliod granulomas in PAS stained sections. In black-tailed bantem tumour-like growths noticed on the skin were due to caseonecrotic and giant cell granulomas associated with branched and septate hyphae.

Aspergillosis has been considered as one of the most common diseases in captive birds all over the world and all the avian species are susceptible to the disease (Ainsworth, 1957). This was confirmed in several zoos throughout the world (Saez, 1971, Keymer, 1972; Geringer, 1973; Kronberger and Schuppel, 1977; Saez et al., 1979; Chakroborty, 1988, Rao and Acharjyo, 1989). The incidence of this disease was found to be considerably low in aquatic birds (8.4%) at the zoo (Rao and Acharjyo, 1996a) and virtually non-existent in mammalian species.

2. **Neoplasms** - Bronchogenic carcinoma in 4 peafowls, ovarian papillary/ cystadenocarcinoma in 3 turkey fowls, lymphoid leucosis in 3 peafowls and one each in black-tailed bantem, hill myna, pied myna, grey jungle fowl and white-throated laughing thrush and lachrymal adenoma in a peafowl were encountered (Rao, 1991). Bronchogenic carcinoma was characterised by greyish white nodular cauliflower like growths replacing large areas of one or both the lungs. Microscopically, neoplastic cuboidal/columnar cells in acinar/solid/papillary patterns were oriented around the bronchioles. The pathomorphology of lymphoid leucosis resembling those of domestic and zoo birds (Choudhury and Rao, 1981) was characterised by diffuse or nodular

enlargement of affected organs associated with massive infiltrating blast type of lymphoid cells obliterating the histological features. Liver was invariably involved in all species. A number of other visceral organs like lungs, kidneys, spleen alone or concurrently were involved. Ovarian adenocarcinomatous growths affecting 3 turkey hens aged 6-9 years occupied major part or the abdominal cavity. Cauliflower-like growths with of without cysts weighed between 250-350 g. Metastatic growths in spleen of one and transplantation growths on the serosa of gizzard, proventriculus, mesentry and pancreas of another turkey hen associated with cirrhosis and ascites were recorded.

From India, except Alipore zoo from where 3 cases of carcinoma from kidneys, pancreas and skin in 2 pheasants and a parakeet (Basak *et al.*, 1975, 1976; Sarkar *et al.*, 1977) and adenocarcinoma of liver, fibroma of foot pad, leiomyoma of intestines and lymphoid leucosis (Chakroborty, 1988). Information on tumour occurrence from other zoos has been lacking despite the fact that neoplasia is one of the common causes of death in captive birds throughout the world (Fox, 1923; Ratacliffe, 1933; Beach, 1965; Blackmore, 1965; Kronberger and Schuppel, 1977; Effron *et al.*, 1977; Hubbard *et al.*, 1983). It was noticed that occurrence of neoplasia in this group of birds was considerably lower (8%) than those seen in aquatic ones (21.3%) (Rao and Acharjyo; 1096a).

3. Parasitic diseases

a. Parasitic serositis - The disease was encountered in 15 birds (7.5%) of 7 varieties (owls-5; hill myna-3; red billed-blue magpie and pied myna-2 each; whitebreasted waterhen, hoopoe and crested wood partridge - one each). The gross lesions were characterised by the presence of numerous discrete, pin head sized greyish white nodules on the serosa of gastrointestinal tract starting from proventriculus to caeca. Microscopically, these nodules consisted of sections of parasites surrounded by monocytes, foreign body giant cells and fibrous connective tissue capsule. The parasites remained unidentified. Such lesions were found to be rare (one out of 131) in aquatic birds of this zoo (Rao and Acharjyo, 1996a).

b. Tetrameriasis - Parasitic proventriculitis caused by *Tetrameres* sp. was encountered in 5% of the birds examined histologically (peafowls-3, pigeons and goldfronted chloropsis-2 each, pigmy falcon, tree pie and blackheaded oriole -one each). At necropsy numerous dark coloured uniform nodular elevations were detected in the luminal side of proventriculus. On incision of the nodules blood red coloured fusiform/spherical spiruroid nematodes (identified as *Tetrameres* sp.)

parrots and love birds of Nehru Zoological Park, Hyderabad. Kronberger and Schuppel (1977) accounted 7.8% of total deaths in captive birds in Germany to respiratory disorders.

8. **Enteritis** - Like domestic birds enteritis occurred in various species of captive birds with distressing regularity constituting 8.5% of the birds examined (guinea fowls and parakeets-3 each); goldfronted chloropsis and weaver birds-2 each; peafowl, partridge, pigeon, neclaced-laughing thrush and common grey, Malabar pied and great Indian hornbill-one each). In these birds the entire intestine showed catarrhal enteritis. No bacterial/viral studies were attempted. However, in 3 parakeets the mucosa of intestine particularly duodenum and jejunum revealed crater like ulcers having raised irregular borders with or without haemorrhages invariably in association with multiple necrotic foci in liver. Clumps of Gram positive sporulating rods resembling *Clostridium* sp. were detected in necrotic areas of intestines and liver. This disease resembled ulcerative enteritis in quails. According to Char and Rao (1983) *Escherichia coli* was frequently associated with enteritis in captive birds at Nehru Zoological Park.

9. **Necrotic/granulomatous hepatitis** - Such lesions due to unknown etiology mostly in association with enteritis was seen in 6.5% of the birds examined (guinea fowls, horn-bill, buzzard and goldfronted chloropsis-2 each; peafowl, owl, harrier, hair-crested drongo and crimsonbrested barbet-one each). Martin *et al.* (1981) reported common occurrence of hepatic diseases in mynas and Kronberger and Schuppel (1977) in 10.3% of the cases.

10. **Miscellaneous diseases :**

a. Intussusception of proventriculus - A two year old peacock had drooping of wings, anorexia and was dull and disinclined to move a week prior to death. At necropsy the gizzard was markedly distended and the entire proventriculus was missing and found inside the gizzard. The proventriculus was distorted and fibrosed with obliteration of lumen. A weakened proventricular wall due to inflammation was responsible for intussusception. This is the only case reported in zoo birds (Rao and Acharjyo, 1979).

b. Ulcerative and proliferative proventriculitis - Thickness of proventricular wall with or without ulceration of luminal surface was seen in 4 peafowls. Histologically, there was hyperplasia of lining epithelial cells of mucosa with or without ulceration associated with fibrosis of submucosa. The cause of such lesions remained obscure.

c. Traumatic ventriculitis - A stick of plant origin (4.3 x 0.3 cm) was firmly embedded in the empty gizzard of a 12-year old peacock which died of inanition and senility.

d. Traumatic ventriculoperitonitis - A two-year old female common pigeon died due to penetration of an L-shaped stapple wire into the gizzard and peritoneum.

e. **Traumatic pericarditis** - A common peahen aged 4 years was found to be dull and unable to perch. It was found walking slowly and while catching it was giving a peculiar cracking sound. At necropsy a rusted iron wire of about 5 cm length had perforated through the duodenal wall and entered into pericardium resulting in was adhesion of peritoneum with pericardium. The pericardial sac contained about 3 ml of purulent exudate. The wall of the duodenum at the site of perforation was thickened and ulcerated. Traumatic pericarditis is a rare pathological condition in avian species unlike ruminants.

f. **Egg peritonitis and egg bound condition** - Escape of yolk material into peritoneal cavity in a pigeon, presence of 3 fully formed eggs in oviduct of another pigeon and overdistention of oviduct due to accumulation of hard ball of egg material (500g) in an adult female Reaves' pheasant was recorded. The latter was dull and depressed with pendulous abdomen and pus flakes were present in oviduct. Liver and spleen were atrophied while crop and intestines were empty. This bird in question died of oviduct impaction.

g. **Senility** - A red and blue macaw had died of senility because there were no lesions of pathological significance in any organ. It remained in captivity for 30 years.

Summary and conculsions

The objective of this paper is to give comprehensive information on common diseases and pathological conditions occurring in non-aquatic birds at Nandankanan Zoological Park, Orissa. For this purpose detailed necropsy and histopathological examination was conducted on 200 non-aquatic birds which succumbed naturally between 1968-1993. The specimens for this study included 64 gallinanceous birds of 8 varieties, 18 pigeons of 3 varieties, 19 mynas of 2 varieties, 5 laughing thrushes of 4 varieties, 8 hornbills of 4 varieties, 12 budgerigars, macaw, cockatoo and parakeets of 7 varieties 18 bird of prey of 9 varieties and 56 other birds of 19 varieties.

It has been concluded that about 27% of the birds presently studied had lesions associated with helminthic parasitic infestation primarily affecting the digestive tract of gallinaceous, prey and myna birds. Though some of the parasitic lesions were common to domestic birds such as tetrameriasis, cestodiasis, coccidiosis, ascariasis, capillariasis, in other parasitic diseases like parasitic hepatitis, nephritis and serositis the agent could not be identified from tissue sections. Among infectious diseases (19%), pulmonary aspergillosis affected sporadically in adult birds of varieties of species except emu chicks which died of acute form of an outbreak. Tuberculosis and nocardiosis occurred occasionally. Neoplasms were most common in adult gallinaceous birds and occasionally in mynas and thrushes. In general non infectious causes (15.5%) including neoplasms, nonspecific pneumonia (7%), enteritis (8.5%) and hepatitis (6.5%) were responsible for major losses in nonaquatic captive birds.

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TABLE-1: LIST OF NON-AQUATIC BIRDS OF NANDANKANAN ZOOLOGICAL PARK INCLUDED IN THE STUDY

Sl. No.	Common Name (Zoological Name)	Number	Remarks
1.	2.	3.	4.
1.	Common Peafowl *(Pavo cristatus)*	39	
2.	Guinea Fowl *(Numida meleagris)*	11	
3.	Turkey fowl *(Meleagris gallopavo)*	06	
4.	Ringnecked Pheasant *(Phasianus colchicus)*	02	
5.	Crested wood Partridge *(Rollulus roul roul)*	02	
6.	Black-Tailed Bantem Hen	02	
7.	Reaves' Pheasant *(Syrmaticus reevesi)*	01	
8.	Grey Junglefowl *(Gallus sonneratii)*	01	
9.	Common Pigeon *(Columba livia)*	16	
10.	Nilgiri Wood Pigeon *(Columba elphinstonii)*	01	
11.	Jerdon's Imperial Pigeon *(Ducula badia cuprea)*	01	
12.	Hill Myna *(Gracula religiosa)*	15	
13.	Pied Myna *(Sturnus contra)*	04	
14.	Whitecrested Laughingthrush *(Garrulax leucolophus)*	02	

1.	2.	3.	4.
15.	Striated Laughing-thrush *(Grammatoptila striata)*	01	
16.	White-Throated Laughing-thrush *(Garrulax albogularis)*	01	
17.	Necklaced Laughing-thrush *(Garrulax moniliger)*	01	
18.	Malabar Pied Hornbill *(Anthracoceros coronatus)*	03	
19.	Wreathed Hornbill *(Aceros undulatus)*	02	
20.	Great Indian Hornbill *(Buceros bicornis)*	01	
21.	Common Grey Hornbill *(Tockus birostris)*	02	
22.	Budgerigar *(Melopsittacus undulatus)*	04	
23.	Red and Blue Macaw *(Ara chloroptera)*	01	
24.	Roseringed Parakeet *(Psittacula krameri)*	02	
25.	Large Indian Parakeet *(Psittacula eupatria)*	02	
26.	Blossomheaded Parakeet *(Psittacula cyanocephala)*	01	
27.	Red-breasted Parakeet *(Psittacula alexandri)*	01	
28.	White Cockatoo *(Kakatoe* Sp.)	01	
29.	Redheaded Marlin *(Falco chicquera)*	03	
30.	White-eyed Buzzard *(Butastur teesa)*	03	

1.	2.	3.	4.
31.	Barred Jungle Owlet *(Glaucidium radiatum)*	03	
32.	Barn Owl *(Tyto alba)*	02	
33.	Indian Great Horned owl *(Bubo bubo)*	02	
34.	Brown Fish Owl *(Bubo zeylonensis)*	02	
35.	Short-toed Eagle *(Circaetus gallicus)*	01	
36.	Pigmy Falcon *(Falco* Sp.)	01	
37.	Pale Harrier *(Circus macrourus)*	01	
38.	Common Weaver Bird *(Ploceus philippinus)*	10	
39.	Emu *(Dromiceus novaebollandiae)*	10	
40.	Goldfornted Chloropsis *(Chloropsis aurifrons)*	13	
41.	Whitebreasted Waterhen *(Amaurornis phoenicurus)*	03	
42.	Koel *(Eudynamys scolopacea)*	03	
43.	Red-billed Blue Magpie *(Urocissa erythrorhyncha)*	03	
44.	Crimsonbreasted Barbet *(Megalaima haemacephala)*	02	
45.	Spurwinged Plover *(Vanellus spinosus)*	01	
46.	Java Sparrow *(Padda oryzivora)*	01	

1.	2.	3.	4.
47.	Racket-tailed Drongo *(Dicrurus paradiseus)*	01	
48.	Hair-crested Drongo *(Dicrurus hottentottus)*	01	
49.	Blackheaded Gull *(Larus ridibundus)*	01	
50.	Orangeheaded Ground Thrush *(Zoothera citrina)*	01	
51.	Tree Pie *(Dendrocitta vagabunda)*	01	
52.	Blackheaded Oriole *(Oriolus xanthornus)*	01	
53.	Hoopoe *(Upupa epops)*	01	
54.	Cut-throat Finch *(Amadina fasciata)*	01	
55.	White Throated Munia *(Lonchura malabarica)*	01	
56.	Goldenbacked Wood Pecker *(Dinopium bengalense)*	01	
		200	

TABLE 2 SPECIFIC DISEASES/CAUSES OF MORTALITY IN 8 MAJOR GROUPS OF NON-AQUATIC BIRDS DIED AT NANDANKANAN ZOOLOGICAL PARK, ORISSA (1968-1993)

Sl. No.	Disease/cause of death	Gallina-ceous bird	Pigeon	Myna	Thrush	Horn Bill	Budgerigar Cockatoo, Parakeets & Macaw	Birds of prey	Others	Total
1	2	3	4	5	6	7	8	9	10	11
1.	**Aspergillosis**	5	2	4	2	-	2	2	15	32
2.	**Neoplasms**	13	-	2	1	-	-	-	-	16
3.	**Parsitic diseases**									
	a) Parasitic serositis	1	-	5	-	-	-	5	4	15
	b) Tetrameriasis	3	2	-	-	-	-	1	4	10
	c) Caecal coccidiosis	7	-	-	1	-	-	-	-	8
	d) Cestodiasis	4	1	1	-	-	-	-	-	6
	e) Ascariasis	2	-	-	-	-	-	-	-	2
	f) Capillariasis-crop	1	-	-	-	-	-	-	-	1
	g) Parasitic hepatitis	1	-	2	-	-	3	3	-	9
	h) Parasitic nephritis	-	-	-	-	-	-	-	3	3
4.	**Tuberculosis**	1	2	-	-	-	1	-	1	5
5.	**Nocardiosis**	-	-	1	-	-	-	-	-	1
6.	**Visceral Gout**	4	-	-	-	-	-	-	-	4
7.	**Non-Specific pneumonia**	3	-	3	1	1	1	-	5	14
8.	**Enteritis**	5	1	-	1	3	3	-	4	17
9.	**Hepatitis**	3	-	-	-	2	-	4	4	13
10.	**Miscellaneous diseases**									
	a) Intussussception of proventriculus	1	-	-	-	-	-	-	-	1
	b) Ulcerative and proliferative proventriculitis	4	-	-	-	-	-	-	-	4
	c) Traumatic ventriculitis	1	-	-	-	-	-	-	-	1
	d) Traumatic ventriculo peritonitis	-	1	-	-	-	-	-	-	1
	e) Traumatic pericarditis	1	-	-	-	-	-	-	-	1
	f) Egg peritonitis and Egg bound condition	1	2	-	-	-	-	-	-	3
	g) Senility	-	-	-	-	-	1	-	-	1

Table-3 PARASITES IN DIFFERENT BIRDS

Sl. No.	Kind of bird	Parasites
1.	Vulture	1. *Porrocaecum depressum* 2. *Porrocaecum anguistieolle* 3. *Necator sp.*
2.	Tree pie	1. *Diplotriania sp.*
3.	Painted spurfowl	1. *Contugnia dignophora*
4.	Red spurfowl	1. *Ascaridia compar*
5.	Peafowl	1. *Ascaridia galli* 2. *Ascaridia perspicillum* 3. *Ascaridia lineata* 4. *Dyspharunx pavonis* 5. *Raillietina tetragona* 6. *Contugnia longicirrosa* 7. *Tetrameres sp.* 8. *Heterakis beramporia*
6.	Grey junglefowl	1. *Contugnia intermedia* 2. *Heterakis gallinae*
7.	Pigeon	1. *Raillietina columba* 2. *Contugnia cuneata* 3. *Ascaridia columbae* 4. *Echinostoma revolutum*
8.	Jungle myna	1. *Choanotaenia sonoti* 2. *Diplotrianea tricuspis*
9.	Brahminy myna	1. *Choanotaenia sonoti*
10.	Pied myna	1. *Raillietina penetrans*
11.	Red-billed blue magpie	1. *Passerilepis stylosa*
12.	White-eyed buzzard	1. *Contracecum milvi* 2. *Idiogenes butasteri*
13.	Barred jungle owlet	1. *Centrorhuchus globocaudatum*
14.	Guinea fowl	1. *Opisthorchis sp.* 2. *Capillaria sp.*

CAUSES OF MORTALITY IN DIFFERENT SPECIES OF NONHUMAN PRIMATES OF ASSAM STATE ZOO (1985 TO 1991)

P.K Goswami[1], A. Chakraborty[2] and A. Mukit[2]

Abstract

Causes of mortality in 10 different species of nonhuman primates of Assam State Zoo for a period of 7 years have been studied. The following conditions were recorded in decreasing order of frequency : pneumonia (24.7%), enteritis (16.47%), tuberculosis (12.94%), traumatic injury (11.76%), stress (9.41%), neonatal mortality (8.23%), mycotic infection (4.70%), gastric ulcer (3.52%), malignant neoplasm and senility (2.35% each), while 1.17 per cent each of gastric dilatation, poisoning and dystocia cases was recorded.

Introduction

A systematic study on the mortality of nonhuman primates is yet to be under taken in our country although some preliminary reports are available (Chakraborty and Datta, 1981, Rahman at al., 1981, Rathore and Khera, 1981, Arora *et al.*, 1985, Rao and Acharjyo 1987). The present study was planned to detect the causes of death in different species of nonhuman primates at Assam State Zoo, for a period of seven years (1985 to 1991).

Materials and Methods

Eighty five carcasses belonging to 10 different species of nonhuman primates at Assam State Zoo from 1985-to 1991, formed the material for the present study. At postmortem examination the gross lesions were recorded and representative tissue samples were fixed in 10% formol-saline solution and processed for histopathological examination. Besides routine haematoxylin and eosin method, special staining methods such as Brown and Brenn, Ziehl-Neelsen's, Periodic Acid Schiff (PAS) and Grocott Gomori Methananine Silver (GMS) stains were employed. Attempt for isolation of bacteria from the suspected cases were made as per the method of Cruickshank *et al.* (1975). The parasites collected at postmortem examination were also studied as per the conventional methods with the help of Department of Parasitology, College of Veterinary Science, Khanapara, Guwahati.

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Results and Discussion

Altogether 85 carcasses of nonhuman primates from 1985 to 1991 were necropsied and diagnosis was made on the basis of history of the case, gross and histopathological examination, microbiological, parasitological and chemical analysis of the tissue when warranted. The causes of death of the animals are presented (Table).

The following conditions were recorded in different animals in decreasing order of frequency - pneumonia (24.70%), enteritis (16.47%), tuberculosis (12.94%), traumatic injury (11.76%), Stress (9.41%), neonatal mortality (8.23%), mycotic infection (4.70%), gastric ulcer (3.52%), malignant neoplasm (2.35%), gastric dilatation (1.17%), poisoning (1.17%), dystocia (1.17%) and senility (2.35%).

Respiratory and alimentary disease complex claimed the highest number of deaths of captive nonhuman primates. Though pneumonia was recorded in 21 animals (24.70%), it was associated with other ailments. Pneumonia as the major cause of death was also recorded earlier (Arora *et al.* 1985; Rathore and Khera, 1981; Rao and Acharjyo, 1987). A case of giant cell pneumonia was recorded in the present study. Although the virus isolation was not attempted, the clinical manifestations along with demonstration of giant cells on histopathology suggested it to be a case of measles as reported earlier by Manning *et al.* (1968). Enteritis was recorded in 14 cases (16.47%) which support the findings of Yamashiroya *et al.* (1971), Harold *et al.* (1972) and Martin (1986). Out of these, 4 cases were due to *Oesophagostomum aculeatum* infection, 3 cases of gastric ulcer and one case was of gastric dilatation. Bacterial isolation was attempted only in few cases and *E. coli* and *Citrobacter* could be isolated.

Tuberculosis is well recognized as a serious and potentially devastating problem in primates in captivity. In the study, 11 animals were found dead where both *Mycobacterium tuberculosis* human type and bovine type were involved and most of the cases were pulmonary type. However, disseminated lesions were also recorded on few occasions. Earlier workers recorded tuberoculosis in nonhuman primates in captivity (Basak *et al.*, 1976; Rahman et al., 1981; Rao and Acharjyo, 1987) and the present study endorses their views.

Traumatic injury resulting from inter- and intra-species fighting, infighting during mating season and from capture operations, casused mortality upto the extent of 11.76 of the total deaths. Trauma as the cause of death was also recorded by Migaki *et al.* (1971), Cooper and Holt (1975) and Rathore and Khera (1981). However, in the study death due to trauma was comparatively lower than reported by Rathore and Khera (1981) from different zoos of the country and Rao and Acharjyo (1987) from Nandan Kanan Zoo.

Occurrence of mycotic infection in nonhuman primates is considered to be rare and hence the record of 4 cases of pulmonary mycotic infection (3 cases of

coccidioidomycosis and one case of blastomycosis) is worth mentioning. Occurrence of two malignant neoplasms (adenocarcinoma and bronchogenic carcinoma) during the study is also another important finding. Incidence of adenocarcinoma has been recorded by the earlier workers (Parihar *et al.*, 1976; Depaoli and McClure, 1982).

Three cases of gastric ulcers and one case of gastric dilatation were recorded in the study. Although literature on gastric ulcer was not traceable, the incidence may be of common occurrence as it is seen in human beings. In the present study, the specific cause of gastric ulcer could not be ascertained. However, it can be assumed that stress in captivity, hypersecretion or influences of hormone etc. might have played a role in genesis of ulcer.

Neonatal mortality in seven cases (8.25%) have been noticed in the study which was in accordance with the findings of Acharjyo and Rao (1987). Stress associated death have been recorded in 8 (9.40%) animals. Chakraborty (1991) was of the opinion that during capture of wild animals, physical, environmental, psychological and physiological factors affect the animals simultaneously and the effects were cumulative and the present finding endorse his views.

Death due to senility is probably rare in captivity as captive animals are under constant stress and so they die before attaining their maximum life span. The gross changes seen at postmortem and microscopic pathology were suggestive of senile condition.

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TABLE : CAUSES OF MORTALITY IN DIFFERENT SPECIES OF NON-HUMAN PRIMATES IN ASSAM STATE ZOO

Sl. No.	Cause of death	Gibbon (Hylobates hoolock)	Golden Langur (Presbytis geei)	Capped Langur (Presbytis pileatus)	Common Langur (Presbytis entellus)	Nilgiri Langur (Presbytis johni)	Phayres Leaf Monkey (Presbytis phayrei)	Bonnet Monkey (Macaca radiata)	Lion Tailed Monkey (Macaca silenus)	Assamese Monkey (Macaca assamensis)	Slow Loris (Nycticebus coucang)	Total
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Tuberculosis	2	5	1	.	1	.	.	1	1	.	11
2.	Pneumonia	5	4	1	1	.	.	.	.	1	9	21
3.	Enteritis	9	2	1	.	.	.	.	.	.	2	14
4.	Mycotic Infection	.	3	.	.	1	.	.	.	.	.	4
5.	Malignant Neoplasm	.	.	1	1	.	.	.	.	.	.	2
6.	Gastric Dilation	.	1	.	.	.	.	.	.	.	.	1
7.	Gastric Ulcer	.	.	.	1	.	1	.	.	.	1	3
8.	Dystocia	.	.	1	.	.	.	.	.	.	.	1
9.	Poisoning	.	.	.	.	.	1	.	.	.	.	1
10.	Traumatic Injury	.	1	4	.	.	.	.	.	3	2	10
11.	Senility	.	.	.	.	.	.	1	1	.	.	2
12.	Stress	1	1	.	.	.	.	.	.	.	6	8
13.	Neonatal Mortality	1	3	1	.	.	.	.	.	2	.	7
14.	Total	18	20	10	3	2	2	1	2	7	20	85

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INCIDENCE OF MALARIA IN AFRICAN CROWNED CRANES (BALEARICA PAVONINA)

Mir Gowher Ali Khan

Malarial parasites affect several species of animals, birds and man. These parasites are world wide in distribution and over 25 per cent of all avian host species are parasitized (Kreier, 1994). Avian malaria is considered as a fatal disease in many species of birds. *Plasmodium relictum, P. elongatum* and *P. cathemerium* have been recorded in pigeon, mourning dove, a number of Anatidae, various passerine birds like English sparrow, red-winged blackbird etc., canaries and ducks. Experimentally *P. gallinaceum* infects pheasants, goose, partridge and peacock (Soulsby, 1968). An outbreak of avian malaria due to *P. cathemerium* in a canary breeding flock caused approximately 25 per cent loss without showing any apparent signs of illness except swollen eyes (William and Mathey, 1955). Similarly *P. relictum* infection in an outbreak form was first recognised in penguins at the San Diego Zoo during summer and fall of 1965 and later recorded in albatross, Galapogos dove and a blue winged mountain tanager. It was characterised clinically by acute onset and sudden death and pathologically by hyperplasia of reticulo-endothelial cells (Griner and Sheridan, 1967). Seasonal epizootics due *to P. relictum* and *P. elongatum* have also been encountered in European Zoos (Fowler, 1978). Presently incidence of malaria in captive African crowned cranes of Nehru Zoological Park, Hyderabad is reported hereunder.

Case Reports

Four African crowned cranes *(Balearica pavonina)* were procured for the park on 03.09.1964 from an animal dealer of New Delhi and kept in quarantine. Paddy, maize and Jowar seeds along with chopped alfalfa were offered to them. Antibiotics with vitamins were administered in the drinking water as a routine. However, they were seen huddled up in a corner during the day time and showed no inclination to eat but they consumed the feed partially during night hours. On the fourth day one of the cranes was found dead. The blood smears collected during necropsy at the Veterinary Biological and Research Institute, Hyderabad (V.B.R.I.) were found positive for *Plasmodium* infection.

The remaining three cranes showed no clinical signs of illness but the appearance of their feathers were found ruffled occasionally. They remained off feed during the day but consumed some feed at night time. But as a precautionary measure their body temperature was recorded, which remained normal (106°F to 107°F) for the most of the days but occasionally there was slight rise of temperature upto 108°F. The blood smears were screened at V.B.R.I. for the presence of *Plasmodium* sp. at the height of temperature. *Plasmodium* sp. were found in most of the blood smears screened.

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Treatment

Nivaquine (Chloroquine as base) was administered both intramuscularly and orally from time to time at the rate of 2.50mg per kg body weight i.e. 20mg per bird (Body weight of each crane was varying from 7 to 8 kg).

Discussion

The typical symptoms as mentioned for canaries (William and Mathey, 1955) and in penguins (Griner and Sheridan, 1967) were presently not observed in the crowned cranes because of milder form of malaria as recorded by Arnal and Keymer (1975). Quinine preparations being potentially anti-malarial, Nivaquine acted remarkably well in the current infection in the cranes and brought about complete clinical recovery. The drug was found safe and highly effective.

Summary

A report of avian malaria (*Plasmodium* sp.) in crowned cranes at the Nehru Zoological Park, Hyderabad is described in this communication. The disease was characterised clinically by anorexia, depression, ruffled feathers and weakness and was successfully treated with Nivaquine.

Acknowledgement

The author is thankful to Dr. Ch. Govind Rao, Disease Investigation Officer (Retd.), V.B.R.I., Hyderabad for identification of *Plasmodium* sp. and for going through the manuscript.

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SKIN DISEASES OF WILD ANIMALS

R.K. Dwivedi

Skin is easily invaded by external parasites such as lice, ticks and mites causing various skin infections and mange. Different allergic reactions cause eczema, dermatitis etc. Fungal infection causes ringworm. The invasion by bacteria, viruses, dust and other particles may cause various complications. Skin being a protective layer easily gets external injuries from insect bites, bites by other bugs, thorn pricks etc. causing damage to skin.

Important skin diseases, their causes, pathological conditions and the treatment required are given (Table)

TABLE : IMPORTANT SKIN DISEASES OF WILD ANIMALS.

Sl. No.	Factors and causes	Pathological conditions clinical signs	Treatment
1	2	3	4
1.	External Injuries	Abrasion, open wound ulcer contusion, maggots, scratching, restlessness and rubbing.	1. Find the cause. 2. Wash wound with an antiseptic.
2.	Allergic Reaction	Urticaria, eczema	Antiallergic oral and local application.
3.	External parasites like lice, ticks, fleas, mites etc.	Anaemia, rough coat, itching, babesiosis, haematoma of ears, mange, alopecia some times in patches	Keep skin free from ticks, mites, lice and fleas by using anti parasitic preparations. Send scrapping for laboratory examination.
4.	Fungal infection	Ring worm, favus and scabies	Anti fungal drugs and external applications.
5.	Bacterial and viral infections	Acne impetigo, wounds nodules, pustules, pyoderma and other infections, dermatophilus (Wet paint-brush like hairs)	Use antibiotic injections and local applications.

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1	2	3	4
6.	Papillomas & Tumors	Papillomas, tumors dermoid cyst, granuloma, warts.	Consult Vet. for surgical removal or if possible Antimosan and Anthiomalin injections.
7.	Nutritional deficiencies like minerals and vitamins	General weakness debility, rough coat with lack of lustre, alopecia	Give balanced feed with sufficient vitamins and minerals as per requirement.
8.	Metabolic diseases like diabetes mellitus	Skin susceptible to minor injuries with less or no tendency to heal, loss of hair in patches.	Treat for the cause in consultation with qualified Vet.
9.	Psychological factors	Reluctant to take feed, erection of hair, itching etc., does not obey commands.	Give love and affection to restore confidence.
10.	Toxins, poisoning, burns, necrosis gangrene, frost bite etc.	Acid and alkaline burns, bran like scales e.g. chronic iodine poisioning.	Check food ingredients. Take expert advice.
11.	Hormonal, atrophy of testicles, disturbances in estrus cycle.	Alopacia, pigmentation and sterility	Consult veterinarian.
12.	Miscellaneous cutaneous asthenia	Fragile and elastic skin due to defective formation of collagen firbres, skin may appear too big for its body.	Consult veterinarian.
13.	Oedema	Chest and abdomen oedema suggests cardiac failure in animal.	Obtain veterinarian's advice.

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TRAINING IN ZOO MANAGEMENT IN INDIA

J.H. Desai

Introduction

Until very recently formal training in management of wild animals in captivity was not available in India although the zoo movement in the country is one hundred forty years old. There are more than three hundred captive wildlife facilities, including one hundred and seven zoos in India at present which are managed by sixteen different agencies (Desai, 1990). In the absence of any formal training in the specific area of zoo management, the zoo personnel gained working knowledge through practical experience by trial and error over a period of time. The quality of management of zoos and their objectives differed widely from institution to institution. Lack of desired level of communication between zoos, coupled with frequent transfers of key zoo personnel accentuated the problem leading to stagnancy and haphazard development of zoos.

The concept of zoo management has changed radically during the last thirty years. There has been a phenomenal qualitative and quantitative devlopment of management techniques. It is this gap in technology and zoo philosophy that needs to be bridged if the zoos in India are to complement the field conservation effort.

The Government of India and the Indian Board for wildlife have for long been concerned about the status of management and performance of zoos in the country. One of the major constraints is the shortage of qualified and trained personnel who can plan and implement scientific development of zoos. Lack of perspective planning, inability to keep abreast of new techniques and dearth of skills for innovative management of zoos have kept our zoos from moving forward.

Waugh (1988) mentions different types of training programmes in zoo biology, captive breeding and conservation available in developed countries. He states that the training courses with more international scope, that will provide relevant experience for personnel from less-developed countries, are very few. Due to lack of awareness and resource constraints, very few zoo personnel from India have been able to avail the training opportunities in developed countries. There was, thus, a long felt need for an indigenous training programme for personnel engaged in the management of wildlife in captivity.

Training Programmes

Sharing this concern, the Wildlife Institute of India, Dehra Dun planned and developed two training programmes on zoo management to fill this need. A short term training programme was designed for zoo professionals (i.e. institutional heads, senior

1. Central Zoo Authority, Annexe-IV, Bikaner House, Shahjahan Road, New Delhi - 110 011

veterinarians and curators) while another programme was developed for middle level zoo officials and technicians, (viz., deputy directors, veterinarians, curators and those in charge of educational/interpretative programmes).

Objectives

These training programmes have been planned to provide a large number of zoo personnel within a short duration the ability

(i) to understand the redefined objectives and modern approaches to zoo management specially in the contest of Indain situation,

(ii) to understand the essential components of zoo management so as to attain a desired level of standard for upkeep of wild animals in captivity, and

(iii) to make them aware of modern techniques and measures to improve the standard of zoo management.

Schedule

The two training programmes are conducted alternately in successive years. Announcement about the scheduled programme is made four to five months in advance through correspondence with zoos, state forest departments, municipal corporations and other agencies managing zoos. It is also announced in Zoos' Print (A Zoo Outreach Organisation publication) and the 'Newsletter' of the Wildlife Institute of India. The training is conducted in association with a major zoo having requisite infrastructure facilities for conducting classes, practical demonstrations and A.V. equipment. Arrangements for accommodation, local transport and food for trainees are made by the Wildlife Institute in local hotels, guest houses or university hostels. The institutions/ organisations who sponsor the trainees have to bear expenses only for their to and fro travel to the place of training; the trainees do not have to pay for their tuition, food and accommodation.

The number of trainees is limited to 20-25 for each programme. The instructing faculty is drawn mainly from the Wildlife Institute, however, experienced zoo directors, senior veterinarians, and other subject experts are invited as guest speakers/resource persons for treatment of special topics. With the support and cooperation of various organisations/institutes and individuals, it has been possible to achieve a high teacher : student ratio of 1 : 3 in the five training programmes conducted so far.

Course Curricula

The curricula for the two training programmes have been developed separately keeping in view the two different levels of zoo officials to whom these are addressed. The training programme for zoo professional is designed to develop the faculty for perspective planning which will enable the participants to implement scientific development of zoos. For the middle level zoo personnel and technicians, it is planned

to provide basic grounding and develop innovative skills for day to day management on scientific lines.

The training programmes cover all the major components of zoo management, viz., history of zoo movement, objectives and functions, zoo organisation, procurement and transportation of animals, handling and restraint techniques including chemical immobilisation, design and construction of enclosures, sanitation, exhibit presentation, diet and nutrition, diseases, captive breeding, artificial rearing, care and maintenance of special collections, education and interpretative techniques, animal marking techniques, maintenance of records, safety and security, research, preparation of master/ management plan and zoo administration.

For supplementary reading, the Institute has specially developed study material consisting of (i) Guidelines for management of zoos and (ii) A compilation of key references which is provided to the trainees free of cost.

The daily schedule of training consist of three to four lectures, class exercises, video programmes, demonstrations and presentation by participatns about their own zoos. The entire training is conducted in English as trainees are fully conversant with the language.

Class room exercises comprise of preparation of different signages, guide maps, visitor survey and analysis and preparation of material for different types of media.

Practical demonstrations include techniques of marking animals, methods of pinioning birds, chemical immobilisation, use of microcomputers in maintaining animal and veterinary records, ISIS record systems ARKS and MEDARKS, preparation of studbooks, animal diet schedule and treatment of animals.

Selected video programmes are also screened to keep the trainees aware of new developments and techniques of management of captive animals in developed countries. These include programmes on artificial insemination, safety measures, feeds and feeding, environmental enrichment of exhibits, research programmes, captive breeding and rehabilitation programmes.

During the training, short study tours are also organised to acquaint the trainees with management aspects and problems of different types of captive facilities.

Trainees

The first short term (two weeks) training programme for zoo professionals was organised at the Nandanakanan Biological Park, Bhubaneswar, Orissa from 26th November to 8th December, 1990. It was attended by 28 trainees from 13 Indian states and union territories (UTs). The following year a four week training programme for zoo technicians was conducted at the Wildlife Institute of India, Chandrabani campus, Dehra Dun from 11th November to 6th December, 1991. Sixteen trainees from ten states and UTs attended this programme. In 1992., a two week training programme for zoo

professionals was organised at the Nehru Zoological Park, Hyderabad from 16th to 29th November which was attended by twenty two candidates from fourteen states and UTs. Twenty two participants from 15 states and UTs attended the two week training programme at the Arignar Anna Zoological Park, Vandalur (Chennai) from 27th December, 1993 to 9th January, 1994. A two week training programme for zoo professionals was organised at the National Zoological Park, New Delhi from 28th December, 1994 to 10th January, 1995 which was attended by 24 participants from 16 states and UTs. One hundred twelve officials from twenty four states and UTs representing forty six zoos, fifteen National Parks/Sanctuaries and other wildlife facilities have availed the five training programmes conducted so far (Table 1).

TABLE 1: NUMBER OF PARTICIPANTS FROM DIFFERENT STATES/UTs IN FIVE ZOO MANAGEMENT TRAINING PROGRAMMES

SL. NO.	STATE / UNION TERRITORIES	1990	1991	1992	1993	1994	TOTAL
1.	ANDAMANS	1	1	-	1	-	3
2.	ANDHRA PRADESH	1	2	4	1	1	9
3.	ARUNACHAL PRADESH	1	-	-	1	-	2
4.	ASSAM	-	-	-	1	1	2
5.	BIHAR	2	2	1	2	3	10
6.	DELHI	-	-	-	-	1	1
7.	GUJARAT	3	2	2	2	1	10
8.	GOA	-	-	1	-	-	1
9.	HARYANA	-	-	-	-	1	1
10.	HIMACHAL PRADESH	-	2	-	1	1	4
11.	JAMMU & KASHIMIR	-	-	1	-	-	1
12.	KARNATAKA	-	-	1	1	1	3
13.	KERALA	2	-	1	1	1	5
14.	MADHYA PRADESH	2	-	3	-	2	7
15.	MAHARASHTRA	6	2	3	1	3	15
16.	NAGALAND	-	-	1	1	-	2
17.	ORISSA	6	-	-	-	2	8
18.	PUNJAB	-	-	-	1	-	1
19.	RAJASTHAN	-	-	-	-	1	1
20.	SIKKIM	1	1	1	1	1	5
21.	TAMIL NADU	1	1	1	6	2	11
22.	TRIPURA	-	2	-	-	-	2
23.	UTTAR PRADESH	1	1	1	1	2	6
24.	WEST BENGAL	1	-	1	-	-	2
	TOTAL	28	16	22	22	24	112

The educational background of the one hundred twelve trainees who attended the five training programmes ranged from post high school diploma to post graduate degree/diploma in various disciplines such as forestry, veterinary science, animal husbandry, horticulture, biology and pharmacy (Table 2).

TABLE 2 : EDUCATIONAL BACKGROUND OF TRAINEES

Education	Forestry	Veterinary Science	Animal Husbandry	Horticulture	Biology	Pharmacy
Post Graduate Degree/Diploma	51	22	1	3	7	-
Undergraduate Diploma	26	-	-	-	1	1

The trainees held various positions in zoos, national paks/sanctuaries, state wildlife or forest divisions (Table 3). Although the trainees had different educational background and diverse work disciplines, they evinced keen interest and involvement in all training activities. Their active partcipation in group discussions revealed a high degree of motivation and a desire to learn as much as possible.

TABLE 3 : UTILIZATION OF TRAINING BY VARIOUS LEVEL OF OFFICERS

Designation	Zoo	National Parks/ Sanctuary	State Wildlife Division	State Forest Division	N.G.O.
Director/ Superintendent	24	3	-	-	-
Asst. Director/ Dy. Superintendent	5	-	1	-	-
Veterinary Officer	15	-	6	-	-
Asst. Conservator of Forests	7	4	6	4	-
Curator	2	-	-	-	-
Asst. Curator/Range Officer	14	2	7	-	-
Zoo Supervisor/ Technician	3	-	-	-	-
Research Officer	-	-	1	-	3
Wildlife Warden	-	-	5	-	-
Total (112)	70	9	26	4	3
%	62.5	8.0	23.2	3.6	2.7

VOLUNTEERS AT MYSORE ZOO

D.H. Tanuja

The concept of "Zoo Volunteers" is yet to be tapped in Indian Zoos. When we tell someone that we work as Zoo Volunteers at Mysore Zoo we are always given a weird look and it is not difficult to dicipher it, the first and foremost question we aniticipate is "What do you do as volunteers ?" We explain to them the concept of "Volunteers" and then go on to explain what we do.

We help the zoo visitors find their way, even though there are guidemaps and directions. Secondly, we stop the visitors from teasing and feeding the animals, in general we stop zoo vandalism and give them the right information. Thirdly, and the most important "Zoo Education" or as we put it "Zoo In Reach" wherein we bring school children free of cost, (we Concentrate on Government Schools as they are the deprived lot) take them around the zoo, tell them about animals, birds, environment, how we are a part of the damaging system of environment and pollution. We always give emphasis that "We cannot stop using plastics, wood, paper, petrol, etc. but we could always minimise the use and difinitely find alternatives". The Zoo runs "Youth Club" whose members are students of different schools and colleges aged between 12 to 18 years, we handle the field work and other activities.

The Zoo also has "Zoo Outreach Programme" where the well informed zoo staff take T.V. Set, a video player, a few wildlife films, multimedia to different schools. It can be said that zoo is taken to the schools' door step and we also go along with them in this novel venture. The zoo also holds various competitions on different occasions. We give our full help and support.

Yet all these does not seem to suffice the palate of the listner, once they find out that we are not paid anything, they always seem to think it is a waste of time. We feel sorry for them as they do not realise that we are more than handsomely paid. The satisfaction we get and the encouragement from the teachers suffices our palate. On the road or in the market when we are recongised by the students we feel delighted. Spending 3 to 5 hours at the zoo with children is something extra-ordinary and uncomparable to spending 3 hours at a cinema hall with a hole burnt in our pockets.

The sheer joy and excitement on their faces once they realise that they are at the zoo and that they are going to get special attention is something not to be missed. The lighted up faces, the laughter, the excitement oozing out of each and everyone is extra-

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ordinary, we do not aim at educating each and every student, atleast 5 in each batch is more than enough for us.

We like to thank our former zoo Directors, the present Zoo Director, the Zoo Administrators for giving us this opportunity to render our little service for the society.

Lastly, we feel that Zoo Management must and should encourage the public participation because the Zoo belongs to one and everyone of that particular City/ Town. With more public participation one can expect maximum help at the time of crisis and also maximum encouragement for development and once the Zoo has public support less becomes the negative impact of the mass media. In this way Zoos can also get maximum Volunteers.

ROLE OF IUCN RED LIST CRITERIA AND CBSG CAMP PROCESS AS A METHOD FOR PRIORITISING INDIAN TAXA FOR CONSERVATION BREEDING AND ZOO COLLECTION PLANS

Sally Walker and Sanjay Molur

Abstract

Population expansion and the land use and concomittant industrial growth it have led to destruction of habitat, resulting in the reduction and fragmentation of wildlife populations on an unprecedented scale. The new conservation sciences make it possible to assess species status and population viability with greater accuracy and also provide tools for recovery of species and populations in trouble. Captive breeding, carried out primarily by zoos, is one of the important tools of recovery. Zoos have limited area and resources where as the list of animals which require ex situ security is growing day by day. Zoos, therefore, must develop priorities so that there is sufficient space and resources for correctly maintaining and systematically breeding the species in danger of extinction. This paper aims to familiarise Indian zoo and wildlife personnel with the revised IUCN Red List criteria and the Conservation Assessment and Management Plan (CAMP) Workshop process as a tool for species prioritisation for conservation and collection planning as well as the workshops held recently under the Biodiversity Conservation Prioritisation Project (BCPP) and their results. Indian Mammals, normally the most popular group of animals, are used as a case study.

Key words : CBSG, CAMP, CZA, taxon, taxa, Red Data Book, BCPP

Introduction

The IUCN Red Data Books and Categories have been used by the conservation community to rank individual species conservation status, usually globally, for some three decades, since the 1970's. In some instances, individual countries have brought out Red Data Books on various taxon groups. In India there are Indian Red Data Books for Plants (1987, 1989 and 1991), Vertebrates (1994) and Invertebrates (in preparation) based on versions of the IUCN criteria which preceeded the final approved version (December, 1994). Indian Red Data books have been brought out by the nodal governmental agencies responsible for identification and monitoring of plants and animals, the Botanical Survey of India and the Zoological Survey of India, respectively.

In 1979, Sir Peter Scott, then Chairman of the Species Survival Commission of IUCN requested Dr. U. S. Seal, Chairman of then Captive Breeding Specialist Group to develop a methodology to prioritise species for captive breeding which would be relevant to

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Taxa for which information is insufficient to derive a category are classified as Data Deficient. Taxa which could not be assessed for whatever reason are designated as Not Evaluated.

Early CAMP Workshops

The early CAMP workshops held by CBSG were global in scope and, for that reason, often lacked field biologists from a number of countries. The early workshops, however, were considered as a virtual starting point or "first cut" at the task since there was nothing in place of this kind at the time. With the passage of time over the last decade CAMP Workshops have become more and more specialised and are now held as rapid assessments for a great variety of groups. These assessments can be done Globally, as mentioned before, Regionally (as within continents, in political groups of countries, within regions in countries, biogeographic regions, and Nationally (as within countries).

CAMP Workshops have been initiated, sponsored and hosted for the most part by zoos, and conducted or facilitated by the Conservation Breeding Specialist Group. Participants are from a variety of conservation backgrounds, including wildlife agencies and members of the taxon based specialist groups of SSC. CAMP Reports have been and are used not only by zoos to prioritise species for conservation programmes and collection plans but by government ministries and their wildlife agencies in preparation of action plans, for legislation, for export policy and the like.

CBSG followed up early CAMP workshops with plans or recommendations for captive breeding called G-CAPs or R-CAPs (Global or Regional Captive Action Plans / Recommendations). The purpose of the early CAMPs and their recommendations was to help zoos all over the world make informed or "conservation relevant" decisions regarding their collection plans. This device was much welcomed by the zoo communities who had become concerned over the most pragmatic utilisation of zoo space. This followed definitive articles on the subject by William Conway in 1980 and 1984 as well as conservation scientists around that time and later.

The American, Australian and European Zoo communities have formed coordinated captive breeding programmes with the participating zoos entering a contract with one another to maintain and breed a particular species according to scientific principles of genetics and demography which detemine as to which animals are bred, not bred, exchanged and when. These programmes rely heavily on results of CAMP workshops.

India was not lagging behind in the subject of breeding programmes. A meeting was organised at the National Zoological Park to create a national breeding programme in 1983.[4] Working groups assigned species to different zoos for purpose of captive breeding with the idea that these zoos would provide the nucelus stock and the impetus for continuing a coordinated scientific programme. However, due to problems of transfer of officials, expensive communication and transportation, inadequate decision-making powers on the part of Directors, inadequate restraining tools and techniques, lack of

understanding of zoo conservation by higher officials, and an administrative system that punishes initiative and rewards maintaining the status (a total combination which is uniquely Indian), this plan and several other attempts after it (1988, 1989, 1994)[5,6,7] have not been implemented.

Indian CAMP Workshops

CBSG is an empowering organisation and their goal is to train and develop individuals and institutions which can do regionally and locally what CBSG does globally. Training courses in facilitation skills are held regularly and CBSG, India staff have availed of these opportunities. In 1993, CBSG, India organised two "mini-CAMPs" as a demonstration of the process in Chennai for southern Indian mammals, and in Vadodara for western Indian mammals. These were held at the time of PHVA workshops for Lion-tailed macaque and Asiatic lion organised by Arignar Anna Zoo and Sayyaji Baug Zoo respectively and were facilitated by Dr. Seal.

In India the first full CAMP Workshops were organised for Medicinal Plants by the Foundation for Revitalisation for Local Health Traditions (FRLHT), CBSG, and CBSG, India. CBSG, India is a regional network of the Conservation Breeding Specialist Group operating from Zoo Outreach Organisation. As a result of the training and help of CBSG, CBSG, India developed expertise in conducting the workshops and now CAMPs are completely Indian exercises.

In 1996 a project to help India fulfill its commitments as a signatory to the Biodiversity Convention was activated by World Wide Fund for Nature with impetus and financial assistance from the Biodiversity Support Programme, a consortium of funding agencies (USAID, The Nature Conservancy, and the World Resources Institute). The project, the Biodiversity Conservation Prioritisation Project for India or "BCPP" convened an all India workshop to decide precisely how this enormous task would be carried out. In an Endangered Species Working Group it was decided to use the IUCN Red List Criteria to prioritise species in CAMP workshops organised by CBSG, India.

CBSG, India suggested seven workshops in an attempt to cover as much of Indian biodiversity as possible within a given time frame. The proposal covered all vertebrates excluding birds (mammals, amphibians, reptiles and fish) and selected invertebrates and plants. These groups consisted of numbers less than 1000. Groups of organisms which are larger than 1000 such as plants and invertebrates, were sampled only, using selected species in a regional and subject area group which could be used as a catalyst, model and training device for further workshops. These workshops consisted of medicinal plants of northern India (Lucknow), mangroves of India (Goa), soil invertebrates of southern India (Chennai) and selected invertebrates found in mangroves (Goa). Birds are being assessed by the Salim Ali Centre for Ornithology and Natural History (SACON) and Bird Life, International. SACON is also the Coordinator of the Endangered Species Project of BCPP.

The kind of knowledge required for the IUCN assessment process is specialised field biology which is contributed by field researchers. In a CAMP workshop, qualified

generalists are useful for some aspects of the assessment if they have knowlege of habitat, and current issues. They also make useful Facilitators, Recorders and Researchers for the Working Groups, to contribute to the special issue working groups usually formed at the end of the workshops and to provide objectivity to data input and assessment. Given the number of species to be covered and the national scope, however, it was necessary for these workshops to limit participation as much as possible to specialists in population and distribution of target species. The exercise was to be participatory, to include as many individuals and institutions relevant to conservation as possible. For this a comprehensive list of 2000 field biologists and other Indian specialists was assembled. Chief Wildlife Wardens from all States received an invitation to depute appropriate persons. The Central Zoo Authority and selected zoo personnel (both active and retired) were invited to the reptile, mammal, amphibian and invertebrate workshops.

The Workshops were conducted over a 9 month period and involved representation of upto 35 reputed Indian scientific institutions at each workshop. The Mammal CAMP, on which this paper will focus, was conducted at the Indian Institute of Science (IISc.), Centre for Ecological Sciences (CES), Bangalore in August 1997. This workshop covered all Indian mammals (386), of which 332 could be evaluated and given a conservation status. The following institutions were represented : Asian Elephant Conservation Centre, CES, IISc., A.V.C. College, Mannampandal, Zoology / Wildlife Biology Department, Bombay Natural History Society, Mumbai; Central Zoo Authority of India, Centre for Ecological Sciences, Indian Institute of Science, Bangalore, Chiroptera Specialist Group, SSC, IUCN, Coimbatore Zoological Park and Conservation Centre, Coimbatore, , Conservation of Nature Trust, Calicut, Conservation Breeding Specialist Group, SSC, IUCN, Wildlife Department of Jammu and Kashmir, Forest Department of Karnataka, Wildlife Wing, Forest Department of Tamil Nadu, Wildlife Wing, GKVK, Zoology Department, Uni. of Agricultural Sciences, Bangalore, Gujarat Inst. of Desert Ecology, Patwaid Naka, Bhuj, J.C.B.M. College, Zoology Department, Sringeri, Kerala Ag. Univ., Dept. of Wildlife Sciences, College of Forestry, Thrissur, Kerala Forest Research Institute, Peechi, Thrissur, Madurai Kamaraj Univ., Dept of Animal Behaviour, Sc of Biol Sci, Madurai, M.S.Swaminathan Research Foundation, Chennai, Salim Ali Centre for Ornithology and Natural History, Coimbatore, Traffic, India,University of Agricultural Sciences, Department of Zoology, Bangalore, Veterinary Specialist Group, SSC, IUCN, Wildlife Institute of India, Dehra Dun, Zoo Outreach Organisation / CBSG, India; Zoological Survey of India (ZSI), Calcutta, ZSI - Western Regional Station, Pune and ZSI, Gangetic Plains Regional Station, Patna

Technical modalities of CAMP workshop

The CAMP Workshop process uses a form called a Taxon Data Sheet to record information about species. Each species or subspecies has a seperate Taxon Data Sheet. The Taxon Data Sheet consists of several major information and recommendation modules:

1. ***In situ* status**
   - information on population trends, numbers, distribution, fluctuation, habitat, threats, etc. for deriving the IUCN status
   - recommendations for survey, monitoring, habitat management, etc.
2. **Trade**
   - information on trade in the species, whether local, domestic, commercial or international
   - recommendations for research and legislation
3. ***Ex situ* status**
   - information on existence of captive programmes, including names of facilities, level of difficulty in breeding, etc.
   - recommendations for level of captive programme, e.g. intensive management, long-term conservation, research, and breeding
4. **Documentation**
   - information on data quality, sources and compilers of the Taxon Data Sheet

A Taxon Data Sheet sample is included in Appendices of this article. The modalities of deriving a conservation status is complex and beyond the spatial constraints of this paper. However, a CAMP Manual which contains the complete guidelines from IUCN Red List Criteria, Final Version can be obtained from the Zoo Outreach Organisation/ CBSG, India office on request.

Captive Breeding Component

It should be emphasized that the sections on Trade, on Captive Breeding and on Documentation are devices of the CAMP workshop as developed by the Conservation Breeding Specialist Group and do not part of the guidelines for the IUCN Red List Criteria. Although trade forms a threat to a species which may be used in the assessment and part of documentation in data quality which may be used in the assessment, these components as such do not form part of the conservation status assessment. Captive breeding as such is not used to derive conservation status, unless the species is Conservation dependent and relies solely on a captive programme for survival. These devices have been added by CBSG for CAMP workshops to aid in recording more information in the case of trade and documentation and for making recommendations on the basis on status in the case of captive breeding.

The captive breeding component of the Taxon Data Sheet as extracted from the Taxon Data Sheet and with modifications which have been incorporated for Indian condition and easier understanding is given below.

Captive Breeding

A. **Recommendations** (for Captive Breeding)

Level 1 - a,b,c
Level 2 -
Level 3
Level 4
Level 5
Not recommended
Pending

B. **Level of difficulty** (in breeding the taxon in captivity)

Least difficult
Moderately difficult
Very difficult

C. **Existing Captive Programmes :** yes, no or unknown

If yes, Names of facilities:

The explanation (given below) for how this part of the information sheet is filled is extracted from the CAMP Manual, which is provided to each participant but has minor revisions and explanations to enhance relevance and comprehension for the purpose of this article. In a Workshop, short code letters are used to fill the Taxon Data Sheet to save valuable participant time of writing out textual explanations. These codes are expanded in the Report when it is produced by the Editors.

A. Recommendations

Captive breeding of animals Programme Recommendations are to be made on different levels, depending on the conservation needs of the species as reflected in the IUCN category and other information gathered at the workshop :

1. Level one recommendation

A captive population is recommended as a component of a conservation programme. This programme has a tentative goal of developing and managing a population sufficient to preserve 90% of the genetic diversity of a population for 100 years (90%/100). The program should be further defined with a species management plan encompassing the wild and captive populations and implemented immediately with . . .

a. available stock in captivity.

If the current stock is insufficient to meet program goals, a species management plan should be developed to specify the need for . . .

b. additional founder stock either from the wild or from unrelated individuals held in facilities outside India.

If no stock is present in captivity then the program should be developed collaboratively with appropriate wildlife agencies and specialist institutions to provide . . .

c. initial founder stock either from the wild or from unrelated individuals held in facilities outside India.

2. Level two recommendations

Similar to the above except a species management plan would include periodic reinforcement of captive population with new genetic material from the wild. The levels and amount of genetic exchange needed should be defined in terms of the program goals, a population model, and species management plan. It is anticipated that periodic supplementation with new genetic material will allow management of a smaller captive/ cultivated population. The time period for implementation of a Level 2 program will depend on recommendations made at the CAMP.

3. Level three recommendations

A captive breeding programme is not currently recommended as a demographic or genetic contribution to the conservation of the species / subspecies but is recommended for education, research, or husbandry.

4. Level four recommendations

A captive breeding programme is required for either Levels 1, 2, 3 and for sustainable utilisation to promote only captive or cultivated taxa in any form of legal trade.

5. Level five recommendations

A programme to downsize existing stock far in excess of requirement in the zoos is recommended as spatial and economic contribution to the wider zoo community. This downsizing can be done by approved methods of sterilisation or of culling if allowed and appropriate to the culture of the country in which the taxon exists.

Level 5.1 -- Depending on the species and circumstances, a nucleus stock of individuals carefully selected for genetic diversity may be maintained to insure that it is not necessary to take animals from the wild.

Level 5.2 -- If the species is of Lower risk- least concern in the wild, and individually are periodically added to the zoo population by confiscation, injury, etc. then the existing stock can be bred to extinction and only newly added animals kept for systematic breeding.

Not recommended

A captive or cultivation programme is not currently recommended as a demographic or genetic contribution to the conservation of the species / subspecies.

Pending

A decision on a captive breeding programme will depend upon further data either from a PHVA, a survey, or existing identified sources to be queried.

B. Level of difficulty

What is the level of difficulty in maintaining and breeding the taxon in captivity

1. **Least difficult** - Techniques are in place for capture or collection maintenance, and propagation of similar taxa in captivity which ostensibly could be applied to the taxon.
2. **Moderate difficulty** - Techniques are only partially in place for capture or collection maintenance and propagation of similar taxa in captivity, and many techniques still need refinement.
3. **Very difficult** - Techniques are not in place for capture or collection, maintenance, and propagation of similar taxa in captivity and techniques still need to be developed.

C. Existing Captive population

Number of individuals in captivity or cultivation according to the International Species Information System, Central Zoo Authority of India, or similar listing.

The above format differs somewhat from that in the Taxon Data Sheet developed by CBSG which was drawn up for a zoo community with well established collection plans and coordinated programmes and scientific species management already in place. We have added recommendations (such as Level 5a, b Recommendation) based on the need of the Indian zoo community to be able to defend management practices which may be difficult for administrators and animal welfare activists to understand or accept.

CAMP Workshops and Conservation Action Planning for Zoos

It is interesting to note that the CAMP Workshop originally was developed by the Conservation Breeding Specialist Group to prioritise species for captive action plans for zoos, yet have become so useful to *in situ* conservation for animals as well as to the plant conservation community. This is particularly true in India where results of CAMP workshops have been used to strengthen government policies on export of medicinal plants and in recommending species for inclusion in revised Schedules of the Wildlife Protection Act.

Although in other parts of the world, zoos have played a leading role in initiating, sponsoring and participating in CAMP Workshops, in India this has not been the case except in one instance when the Nandankanan Zoo was a collaborator for the Amphibian CAMP. This is consistent with the fact that over time, Indian zoos have not developed at the same rate and in the same manner as zoos elsewhere on the planet in regard to collection

planning, planned breeding programmes and rationalisation of zoo space and resources for conservation. This lacunae can be attributed to the problems enumerated earlier. *It is unfortunate because one of the greatest problems of zoos is their difficulty in proving their conservation relevance, both to their own governments and to their public.*

Enthusiastic participation in these national level scientific processes could be used to demonstrate the seriousness of purpose of zoos and their practical linkage with *in situ* conservation. On the other hand, state Forest Departments were hosts for 3 workshops, collaborators for 6 workshops, and sent representatives for 7 workshops.

To our knowledge, information from either IUCN or Indian Red Data Books has not so far been utilised specifically for prioritising species for captive breeding in Indian zoos. Selection has been made both in consensual decisions taken in zoo directors meetings and by individual zoo personnel for their own zoo. In both cases selection has been based first on what was already held by zoos and on subjective and commonly held impressions of what seemed to be endangered. This method of selecting animals for breeding and display was in keeping with the global model of about 20 years ago, but it is now outdated.

It is possible that the Wildlife (Protection) Act has been utilised as a guide in some zoos and decisions making exercises, but the Wildlife Protection Act is not based on degree of endangerment alone but on trade or poaching threats to the species. For example, blackbuck is kept in Schedule One of theWL(P) Act despite the fact of its relatively large numbers and wide distribution, because it is a likely target for poaching. Zoo collection plans and breeding priorities are most appropriately based on conservation status.

The Central Zoo Authority provided detailed scientific input from its data base to the two workshops which concerned animal groups already held by zoos, reptiles and mammals. Scientific Officer of CZA, Vipul Chakraborthy, attended the Reptile Workshop and provided print-outs of CZA records for the Mammal workshop. The first author, a Central Zoo Authority member, represented CZA in the mammal workshop. Zoo managers or wildlife technical staff were represented in some of the other workshops but were unable to attend the Mammal CAMP.

Discussion

The recommended strategy for different levels of captive programmes given in the CAMP Manual used in CAMP workshops has been developed by the Conservation Breeding Specialist Group in consultation with demographers, geneticists, and biologists from both *in situ* and *ex situ* conservation communities. These recommendations are in line with accepted guidelines and practices being carried out all over the world today. As several workshops were conducted for some groups of organisms for the first time in India, a few modifications have been added and are being reviewed by CBSG. For example, the first CAMP for plants were held in India and resulted in "cultivation" recommendations being added to the captive breeding section, and also a category for sustainable use (Level 4 Captive Breeding Recommendation). In addition, as explained before, we have added Level 5a,b recommendation which suggests a specific

programme for downsizing a zoo population which has grown beyond all possible utility, such as the 6364 Axis deer held in Indian zoos today !

In respect of India, one potentially controversial assumption in the CAMP captive breeding recommendations is that, when fresh genetic material is required for establishing and maintaining a captive population with potential for 90% genetic diversity over the long term, the concerned wildlife agency will have no objection to insuring that this is supplied.

In India, the nodal wildlife agency represented by the Ministry of Environment & Forests, Government of India has been understandably cautious in allowing or supporting captive breeding programmes which involve capture from the wild. Indian zoos are numerous and their quality varies widely, from "dangerous to life" up to "international standard" with all levels inbetween. This fact is likely to be a contributing factor to the conservative attitude adopted by many official and non-official individuals and institutions with regard to captive breeding and conservation in India.

Now, however, there are several legal mechanisms to evaluate, identify, monitor and improve zoos. Some of these facilities could participate in cooperative conservation programmes with wildlife agencies for strengthening wild populations of endangered species, providing back-up in case it is required, and reintroducing or introducing captive animals for conservation purpose. These mechanisms include the Indian Zoo Rules within the Amendments to the Wildlife (Protection) Act, 1972, the Recognition of Zoo Rules (Norms and Standards), the Central Zoo Authority itself with various subcommittees, training programmes organised by Wildlife Institute of India and other specialist organisations, the upcoming Conservation Centre in Hyderabad, and the National Zoo Policy which was recently approved by Parliament. With the formation of the Central Zoo Authority itself and with the approval of the National Zoo Policy, the Government of India has given a legal mandate and methodology for using captive facilities or zoos for carrying out conservation programmes. The Central Zoo Authority is generously funded by the Ministry and is in a position to provide training, research, facilities and any other item required by a conservation programme. That being the case, there should be no cause for reticence with regard to utilising zoos identified as appropriate by CZA for conservation programmes.

There is still cause for intensive care and planning, however, the kind which is taken by zoos and agencies all over the world when running such programmes and is not being taken by any Indian zoo to date.

The step which needs to be taken is for zoos themselves to organise their priorities, to communicate, collaborate and cooperate with one another to create rational programmes for endangered species. Zoos will also have to take responsibility for educating the administrators who frequently come in the way of decisions and timely action required to implement programmes.

CAMP workshop information, which relies on current information from field biologists from reputed institutions and focuses on species population and distribution, as well as trade, can provide a sort of "first information report". This F.I.R. would provide a starting point to enable zoos to create a National Conservation Breeding Priorities Programme for all Indian taxa.

In the past, the degree of risk to small populations has not been appropriately taken into consideration. Species with restricted population and distribution run a far greater risk of extinction than those with wide range or very large numbers. Past experience shows that waiting until a population or even several fragmented populations has declined to a few dozens is not productive; often waiting until a crisis stage equals waiting too late. Therefore, with information provided by field biologists in the CAMP Workshop, it is possible to formulate plans based on information just a few months old. The IUCN Policy Statement on Captive Breeding recommends the establishment of captive populations as a support to wild populations at an early stage, "preferably when the wild population is still in the thousands" [8] The Policy goes on to recommend that "Vertebrate taxa with a current census below one thousand individuals in the wild require close and swift cooperation between field conservationists and captive breeding specialists, to make their efforts complementary and minimize the likelihood of the extinction of these taxa"

Table 1 which follows is complete list of Indian mammals compiled by expert mammologists using the most up to date scientific nomenclature ordered according to conservation status as given by the workshop and by zoological Order. Those held in captivity in Indian zoos are marked by a double asterisk, eg **. Some of the species which are categorised as NE, (Not Evaluated), will be given a status by the time of the CAMP Report by a field researcher working on that species. The Data Deficient species are those which, according to the specialists attending the workshop, have not been surveyed in the last several decades, and cannot be given a conservation status at this time for lack of information. Therefore, some of these 100 + animals could also be threatened with extinction.

Table II is an alphabetised list of Indian mammals currently held by Indian zoos according to Central Zoo Authority records and including common name. Number of zoos holding, number of zoos holding pairs, sex ratio and total numbers is also given. Analysis of this information and its implications for zoos and conservation of species is beyond the scope of this paper. Also, captive breeding recommendations from the CAMP Workshop cannot be used for reference until circulated to CAMP participants and CZA scientists and policy makers and returned, that is, until the final Report is published.

Readers may like to draw some of their own conclusions, however, simply by referring to Table III. Table III is a Summary which lists the number of species in conservation status categories, the number of zoos holding that species, the number of zoos holding pairs, the sex ratio and the total number of individuals. It is immediately obvious that zoo holdings are inversely proportional to that which is required for relevance to conservation !

Table IV shows the taxonomic orders and number of species in each according to its conservation status, revealing the number of species which are threatened yet do not have representation in captivity. For some of these species, such as Cetaceans, captive breeding may not be a solution, but for other, small bodied taxa threatened with extinction, ex situ conservation may be their only hope.

A detailed analysis of Indian zoo holdings as compared with the list of assessed mammals, and an attempt to rationalise them according to space, zoo economics, conservation value and conservation priority is urgently required.

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Table I
Indian Mammals listed according to IUCN Status and Taxonomic Order as assessed in CAMP Workshop, Bangalore, 1997.
Mammal currently kept in Indian Zoos are starred with a double asterisk **

EX – Extinct
IUCN Red List Definition : A taxon is Extinct when there is no reasonable doubt that the last individual has died.

ORDER CARNIVORA
Acinonyx jubatus venaticus (Schreber, 1775)

ORDER PERISSODACTYLA
Dicerorhinus sumatrensis (G. Fischer, 1814)
Rhinoceros sondaicus Desmarest, 1822

ORDER RODENTIA
Ratufa indica dealbata

CR - Critically Endangered
Red List Definition : A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the imediate future as defined by IUCN Red List criteria of population decline, hbitat deterioration and other factors.

ORDER CHIROPTERA
Otomops wroughtoni (Thomas, 1913)
Rhinolophus subbadius Blyth, 1844

ORDER PRIMATES
** *Macaca fascicularis umbrosa* (Raffles, 1821)
** *Trachypithecus geei Khajuria, 1956*

ORDER CARNIVORA
** *Panthera leo* persica (Linnaeus, 1758)
Viverra civettina Blyth, 1862

ORDER CETACEA
Balaenoptera musculus (Linnaeus, 1758)
Dugong dugon (Muller, 1776)
Platanista gangetica (Roxburgh, 1801)

ORDER ARTERODACTYLA
** *Bos grunniens* Linnaeus, 1766 (possibly misidentified in Indian zoos)
Capra falconeri falconeri (Wagner, 1839)
Capra falconeri kashmeriensis Cervus duvauceli branderi
** *Cervus eldi eldi* M'Clelland, 1842
** *Cervus elaphus hangul* Linnaeus, 1758
Pantholops hodgsoni
Sus salvanius (Hodgson, 1847)

ORDER RODENTIA
Biswamoyopterus biswasi Saha, 1981

EN - Endangered
IUCN Red List Definition : A taxon is Endangered when it is not Critical but is facing a very high risk of extinction in the wild in the nearfuture as defined by the IUCN Red List criteria of population decline, habitat deterio-ration, and other factors.

ORDER CHIROPTERA
Ia io Thomas, 1902
Latidens salimalii Thonglongya,1972

ORDER PRIMATES
** *Hylobates hoolock (Harlan, 1834)*
** *Macaca silenus* (Linnaeus, 1758)
Trachypithecus phayrei (Blyth, 1847)

ORDER CARNIVORA
Herpestes palustris (Ghose, 1965)
** *Lynx lynx isabelina* (Linnaeus, 1758) (Probably misidentified in Indian zoo)
** *Melogale moschata (Gray, 1831)*
** *Panthera tigris* (Linnaeus, 1758)
** *Uncia uncia* (Schreber, 1775)

ORDER CETACEA
Eubalaena glacialis (Muller, 1776)
Megaptera novaeangliae (Borowski, 1781) *Orcaella brevirostris* (Gray, 1866)
Sousa chinensis (Osbeck, 1765)

ORDER PERISSODACTYLA
** *Rhinoceros unicornis* Linnaeus, 1758

ORDER ARTIODACTYLA
Bubalus bubalis (Linnaeus, 1758)
** *Budorcas taxicolor* Hodgson, 1850
Capra ibex Linnaeus, 1758
** *Cervus duvauceli duvauceli* G. Cuvier, 1823
** *Hemitragus hylocrius* (Ogilby, 1838)
Ovis ammon (Linnaeus, 1758)

ORDER RODENTIA
** *Atherurus macrourus* (Linnaeus, 1758) *Berylmys bowersi* (Anderson, 1879)
Cricetulus migratorius (Pallas, 1773). *Diomys crumpi* Thomas, 1917.
Marmota bobak
Mus famulus Bonhote, 1898
Niviventer brahma (Thomas, 1914).
** *Ratufa macroura dandolena* (Pennant, 1769)

ORDER LAGOMORPHA
Ocotona curzoniae

VU - Vulnerable
IUCN Red List Definition : A taxon is Vulnerable when it is not Critical or Endangered but is facing a high risk of extinction in the wild in the medium-term future as defined by the IUCN Red List criteria of population decline, habitat deterioration, and other factors.

ORDER INSECTIVORA
Suncus montanus (Kelaart,1850)
Suncus dayi (Dobson, 1888)
Feroculus feroculus (Kelaart, 1850)

ORDER CHIROPTERA
Eonycteris spelaea (Dobson,1871)
Hipposideros lankadiva Kelaart, 1850
Murina tubinaris (Scully, 1881)
Murina grisea Peters, 1872
Otonycteris hemprichii Peters, 1859
Pipistrellus paterculus Thomas, 1915
Pipistrellus pipistrellus (Schreber, 1774)
Pteropus faunulus Miller, 1902
Rhinolophus ferrumequinum (Schreber, 1774
Rhinolophus mitratus Blyth, 1844
Rhinolophus pusillus Temminck, 1834

ORDER PRIMATES
** *Trachypithecus johnii (Fischer, 1829)*

ORDER CARNIVORA
** *Ailurus fulgens fulgens Cuvier, 1825*
Arctogalidia trivirgata (Gray, 1832)
Herpestes fuscus fuscus Waterhouse, 1838
** *Herpestes urva* (Hodgson, 1836)
** *Melursus ursinus (Shaw, 1791)*
Prionodon pardicolor Hodgson, 1842
Paradoxurus jerdoni Blanford, 1885
** *Prionailurus viverrinus* (Bennett, 1833)
** *Viverra zibetha* Linnaeus, 1758

ORDER PROBOSCIDEA
** *Elephas maximus* Linnaeus, 1758

ORDER ARTIODACTYLA
** *Moschus chrysogaster* (Hodgson, 1839)

ORDER RODENTIA
Chiropodomys gliroides (Blyth, 1856)
Cremnomys elvira (Ellerman, 1946)
Cricetulus alticola (Thomas)
Dacnomys millardi Thomas, 1916.
Hylopetes alboniger (Hodgson, 1836)
Hylopetes fimbriatus (Gray, 1837)
Hystrix brachyura Linnaeus, 1758
Marmota caudata
Micromys minutus (Pallas, 1771).
Millardia kondana Mishra and Dhanda, 1975
Niviventer eha (Wroughton, 1916).
Petinomys fuscocapillus fuscocapillus (Jerdon, 1847)
??? podemus draco (Berrett-Hamilton, 1900)
Rattus tiomanicus (Miller, 1900)
Rattus ranjiniae Agarwal and Ghosal, 1969
Ratufa indica centralis
** *Ratufa indica indica*
** *Ratufa bicolor gigantea* (Sparrman, 1778)

LR-nt - Lower risk-near threatened
A taxon is Lower Risk when it has been evaluated and does not quality for any of the other categories. It can be further classified as Low risk - near threatened or Low risk - least concern. A taxon may be categorised as LR-nt when it is relatively abundant but is the object of one or more threats which may diminish its numbers sufficiently to pose a danger to its survival as a species.

ORDER CHIROPTERA
Hipposideros armiger (Hodgeson, 1835)
Hipposideros ater Temppleton, 1848
Hipposideros fulvus Gray,1838
Hipposideros speoris (Schneider, 1800)
Kerivoula picta (Pallas, 1767)
Myotis formosus (Hodgson, 1835)
Myotis horsfieldii (Temminck, 1840)
Pipistrellus coromandra (Gray, 1838)
Pipistrellus dormeri (Dobson, 1875)
** *Pteropus giganteus giganteus* (Brunnich,1782)
Rhinolophus affinis Horsfield, 1823
Rhinolophus cepidae Blyth 1844
Rhinolophus lepidus Blyth, 1844
Rhinolophus pearsonii Horsfield, 1851
Rhinolophus rouxii Temminck, 1835
Rhinopoma hardwickei Gray,1831
Rhinopoma microphyllum (Brunnich, 1782)
Scotophilus kuhlii Leach, 1821
Scotophilus pallidus (Dobson, 1876)
Tadarida aegyptiaca (Geoffroy, 1818)
Taphozous perforatus Geoffroy, 1818
Taphozous melanopogon Temminck, 1841
Taphozous nudiventris Cretzschmar, 1830
Tylonycteris pachypus (Temminck, 1840)
ORDER PRIMATES
** *Loris tardigradus* (Linnaeus, 1758)
** *Nycticebus coucang* (Boddaert, 1785).
** *Trachypithecus pileatus (Blyth, 1843)*

ORDER CARNIVORA
** *Cuon Alpinis* (Pallas, 1811)
** *Felis chaus* Schreber, 1777
Felis silvestris ornata Schreber, 1775
Herpestes vitticollis Bennett, 1835
** *Hyaena hyaena* (Linnaeus, 1758)
Mustela sibirica Pallas, 1773
** *Mellivora capensis* (Schreber, 1776)
** *Neofelis nebulosa (Griffith, 1820)*
Pardofelis marmorata (Martin, 1837)
** *Panthera pardus* (Linnaeus, 1758)
** *Prionailurus bengalensis* (Kerr, 1792)
Prionailurus rubiginosus (Geoffroy Saint-Hilaire, 1831)

** *Ursus arctos* Linnaeus, 1758
** *Ursus thibetanus* [Baron] (Cuvier, 1823)
** *Viverricula indica* (Desmarest, 1804)
Vulpes vulpes pusilla (Linnaeus, 1758)
Vulpes vulpes montana
** *Vulpes bengalensis* (Shaw, 1800)

CETACEANS
Kogia breviceps (Blainville, 1838)
Neophocaena phocaenoides (G. Cuvier, 1829)

ORDER ARTIODACTYLA
** *Axis porcinus* (Zimmermann, 1780)
** *Bos gaurus* Smith, 1827
Manis crassicaudata Gray, 1827
** *Moschiola meminna* (Erhleben, 1777)
** *Pseudois nayaur* (Hodgson, 1833)
Naemorhedus sumatraensis (Bechstein, 1799)
** *Tetraceros quadricornis* (Blainville, 1816)
** *Hemithagus jemlahicus*

ORDER PHILIDOTA
** ***Manis crassicaudata* Gray, 1827**

ORDER RODENTIA
Belomys pearsonii (Gray, 1842)
Callosciurus erythraeus (Pallas, 1779)
Cremnomys blanfordi (Thomas, 1881).
Dremomys lokriah (Hodgson, 1863)
Eupetaurus cinereus
Funambulus tristriatus (Waterhouse, 1837)
Gerbillus nanus Blanford, 1875.
Millardia gleadowi (Murray, 1886)
Mus cookii Ryley, 1914
Petaurista philippensis (Elliot, 1839)
Ratufa indica maxima
Rhizomys pruinosus Blyth, 1851
Tamiops macclellandi (Horsefield, 1840)

ORDER LAGOMORPHA
Ochotona forresti
Ochotona roylei (Ogilby, 1839)
Ochotona thibetana (Milne-Edwards, 1871)
LR-lc – Lower risk- least concern
A taxon may be categorised as Lower risk-least concern when is it abundant and is the object of few or no threats to its survival as a species.

ORDER INSECTIVORA
** *Hemiechinus auritus (Gmelin, 1770)*
Suncus etruscus (Savi,1822)
Suncus murinus (Linnaeus,1766)
Suncus stoliczkanus (Anderson,1877)

ORDER CHIROPTERA
Cynopterus brachyotis (Muller,1838)
Cynopterus sphinx (Vahl,1797)
Megaderma lyra Geoffroy, 1810
Miniopterus schreibersi (Kuhl, 1817)
Pipistrellus ceylonicus (Kelaart,1852)
Pipistrellus tenuis (Temminck, 1840)
Rousettus leschenaulti (Desmarest,1820)
Taphozous longimanus Hardwicke, 1825
Scotophilus heathi (Horsfield, 1831)
ORDER PRIMATES
** *Macaca mulatta* (Zimmermann, 1780)
** *Macaca radiata* (Geoffroy, 1812)
** *Semnopithecus entellus (Dufresne, 1797)*

ORDER CARNIVORA
** *Canis aureus* Linnaeus, 1758
** *Herpestes edwardsii* (Geoffroy Saint-Hilaire, 1818)
Herpestes javanicus (Geoffroy Saint-Hilaire, 1818)
Herpestes smithii smithii Gray, 1837
** *Martes flavigula* (Boddaert, 1785)
** *Paradoxurus hermaphroditus* (Pallas, 1777)
** *Paguma larvata* (Hamilton-Smith, 1827)

ORDER ARTIODACTYLA
** *Antilope cervicapra* (Linnaeus, 1758)
** *Axis axis* (Erhleben, 1777)
** *Boselaphus tragocamelus* (Pallas, 1766)
** *Cervus unicolor* Kerr, 1792
** *Gazella bennettii* (Sykes, 1831)
** *Muntiacus muntjak* (Zimmermann, 1780)
** *Sus scrofa* Linnaeus, 1758

ORDER RODENTIA
Alticola roylei (Gray, 1842)
Apodemus sylvaticus (Linnaeus, 1758)
Berylmys mackenziei (Thomas, 1916)
Bandicota indica (Bechstein, 1800)
Bandicota bengalensis (Gray and Hardwicke, 1833)
Callosciurus pygerythus (Geoffroy St Hilaire,1831)
Cannomys badius (Hodgson, 1841)
Cremnomys cutchicus Wroughton, 1912
Funambulus palmarum (Linnaeus, 1766)
** *Funambulus pennantii* Wroughton, 1905
Gerbillus gleadowi Murray, 1886.
** *Hystrix indica* Kerr, 1792
Meriones hurrianae Jerdon, 1867
Microtus sikimensis (Hodgson, 1849)
Millardia meltada (Gray, 1837)
Mus booduga (Gray, 1837)
Mus cervicolor Hodgson, 1845.
Mus musculus Linnaeus, 1758
Mus phillipsi Wroughton, 1912
Mus platythrix Bennett, 1832.
Mus saxicola Elliot, 1839
Nesokia indica (Gray and Hardwicke, 1830)
Niviventer fulvescens (Gray, 1847)
Niviventer niviventer (Hodgson, 1836)
Platacanthomys lasiurus Blyth, 1859
Rattus norvegicus (Berkenhout, 1769)
Rattus rattus (Linnaeus, 1758)
Rattus turkestanicus (Satunin, 1903)
Tatera indica (Hardwicke, 1807).
Vandeleuria oleracea (Bennett, 1832)
xxxxxxxx olunda ellioti Gray, 1837.

ORDER LAGOMORPHA
** *Lepus nigricollis* Cuvier, 1823
DD – Data Deficient

Data Deficient (DD) -- A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.

ORDER CHIROPTERA
Barbastella leucomelas (Cretzschmar,1830)
Chaerephon plicata (Buchanan, 1800)
Coelops frithi Blyth, 1848
Eptesicus nilssoni (Keyserling and Blasius, 1839)
Eptesicus pachyotis (Dobson, 1871)
Eptesicus serotinus (Schreber, 1774)
Eptesicus tatei Ellerman and Morrison-Scott, 1951
Harpiocephalus harpia Hodgson
Hesperoptenus tickelli (Blyth, 1851)
Hipposideros cineraceus Blyth, 1853
Hipposideros galeritus Cantor, 1846
Hipposideros larvatus (Horsfield, 1823)
Hipposideros pomona K. Anderson, 1918
Hipposideros schistaceus K. Anderson, 1918
Kerivoula papillosa (Temminck, 1840)
Kerivoula hardwickii (Horsfield, 1824)
Macroglossus sobrinus Anderson,1911
Megaderma spasma (Linnaeus, 1758)
Megarops niphanae Yenbutra and Felton, 1983
Miniopterus pusillus Dobson, 1876
Murina aurata Milne-Edwards, 1872
Murina cyclotis Dobson, 1872
Murina huttoni (Peters, 1872)
Murina leucogaster Milne-Edwards, 1872
Myotis annectans (Dobson, 1871)
Myotis blythii (Tomes, 1857)
Myotis daubentoni (Kuhl, 1817)
Myotis hasseltii (Temminck, 1840)
Myotis sicarius Thomas, 1915
Myotis siligorensis (Horsfield, 1855)
Myotis montivagus (Dobson, 1874)
Myotis muricola (Gray, 1846)
Myotis mystacinus (Kuhl,1817)
Nyctalus leisleri (Kuhl, 1817)
Nyctalus montanus (Barrett-Hamilton, 1906)
Nyctalus noctula (Schreber, 1774)
Pipistrellus affinis (Dobson, 1871)
Pipistrellus cadornae Thomas 1916
Pipistrellus kuhlii (Kuhl, 1817)
Pipistrellus savii (Bonaparte, 1837)
Plecotus auritus (Linnaeus, 1758)
Plecotus austriacus (J. Fischer, 1829)
Pteropus melanotus Blyth,1863
Pteropus vampyrus (Linnaeus,1758)
Rhinolophus cognatus Anderson, 1906
Rhinolophus hipposideros (Bechstein, 1800)
Rhinolophus luctus Temminck, 1835
Rhinolophus trifoliatus Temminck, 1834
Rhinolophus yunanensis Dobson, 1872
Saccolaimus saccolaimus (Temminck, 1838)
Scotomanes ornatus (Blyth, 1851)
Sphaerias blanfordi (Thomas,1891)
Tadarida teniotis (Refinesque, 1814)
Taphozous theobaldi Dobson, 1872

ORDER CARNIVORA
Arctictis binturong (Raffles, 1821)
Arctonyx collaris F. G. Cuvier, 1825
Catopuma temmincki (Vigors and Horsfield, 1827)
** *Helarctos malayanus* (Raffles, 1821)
Martes foina (Erxleben, 1777)
Mustela altaica Pallas, 1811
Mustela erminea ferghanae Linnaeus, 1758
Mustela kathiah Hodgson, 1835
Mustela putorius larvatus Linnaeus, 1758
Mustela strigidorsa Gray, 1855

ORDER CETACEA
Balaenoptera acutorostrata Lace'pe'de, 1804.
Balaenoptera borealis Lesson, 1828
Balaenoptera edeni Anderson, 1879
Balaenoptera physalus (Linnaeus, 1758)
Delphinus delphis Linnaeus, 1758
Globicephala macrorhynchus Gray, 1846
Grampus griseus (G.Cuvier, 1812)
Kogia simus (Owen, 1866)
Orcinus orca (Linnaeus, 1758)
Peponocephala electra (Gray, 1846)
Physeter catodon Linnaeus, 1758
Pseudorca crassidens (Owen, 1846)
Stenella longirostris (Gray, 1828)
Tursiops truncatus (Montagu, 1821)
Ziphius cavirostris G. Cuvier, 1823

ORDER ARTIODACTYLA
Manis pentadactyla Linnaeus, 1758.
Ovis orientalis Linnaeus, 1758

ORDER RODENTIA
Alticola albicauda (True, 1894)
Alticola montosa (True, 1894)
Alticola stoliczkanus (Blanford, 1875)
Berylmys manipulus (Thomas, 1916)
Eothenomys melanogaster (Milne-Edwards, 1871)
Hadromys humei (Thomas, 1886)
Hyperacrius wynnei (Blanford, 1881)
Hyperacrius fertilis (True, 1894)
Leopoldamys edwardsi (Thomas, 1882)
Microtus leusurus (Blyth, 1863)
Mus pahari Thomas, 1916
Niviventer tenaster (Thomas, 1916)
Niviventer langbianis (Robinson and Kloss, 1922)
Rattus palmarum (Zelebor, 1869)
Rattus nitidus (Hodgson, 1845)
Rattus sikkimensis Hinton, 1919
Rattus stoicus (Miller, 1902)
Sicista concolor (Buchner, 1892).

ORDER LAGOMORPHA
Lepus capensis Linnaeus, 1758
Lepus oiostolus
Ochotona ladacencis
Ochotona macrotis
Ochotona numbrica
NE -- Not Evaluated

Not Evaluated (NE) – A taxon is Not Evaluated when it has not yet been assessed against the criteria. In the case of the BCPP Indian CAMP Workshops, all species which were not categorised as Data Deficient and Not Evaluated in the workshop are being referred to an appropriate specialist for supplying information necessary for categorisation. These will be incorporated into the Draft Report and if participants agree, go into the Report.

ORDER CHIROPTERA
Pipistrellus javanicus (Gray, 1838)
Vespertilio murinus Linnaeus, 1758
ORDER PRIMATES
** *Macaca nemestrina* (Linnaeus, 1766)
** *Macaca assamensis* (M'Clelland, 1840)
** *Macaca arctoides* (Geoffroy, 1831)

ORDER CARNIVORA
** *Canis lupus chanco* Linnaeus, 1758
** *Canis lupus pallipes* Sykes
Vulpes cana Blanford, 1877
** *Lutra lutra (Linnaeus, 1758)*
** *Lutrogale perspicillata* (Geoffroy Saint-Hilaire, 1826)
Amblonyx cinerea Illiger, 1815
Caracal caracal (Schreber, 1776)
ORDER PERISSODACTYLA
** *Equus hemionus khur*, Boddaert, 1785
Equus kiang

ORDER ARTIODACTYLA
Procapra picticaudata
** *Budorcas taxicolor* Hodgson, 1850
** *Naemorhedus goral* (Hardwicke, 1825)
Naemorhedus bailey Pocock, 1914
** *Hemitragus jemlahicus* (H. Smith, 1826)
ORDER RODENTIA
Alticola argentatus (Severtzov, 1879)
Dremomys pernyi (Milne-Edwards, 1867)
Dremomys rufigenis (Blanford, 1878)
Funambulus layardi (Blyth, 1849)
Funambulus sublineatus (Waterhouse, 1838).
Hylopetes barberi (Blyth, 1847)
Petaurista petaurista (Pallas, 1766)
Petaurista elegans (Muller, 1840)
Petaurista magnificus (Hodgson, 1836)

ORDER LAGOMORPHA
Caprolagus hispidus (Pearson, 1839)

TABLE II
INDIAN MAMMALS HELD IN INDIAN ZOOS LISTED ACCORDING TO CONSERVATION STATUS AS PER CENTRAL ZOO AUTHORITY RECORDS, AUGUST 1997 AND MAMMALS CAMP, AUGUST 1997

		STATUS	No. of Zoos holding Spp	No. of Zoos holding pairs	Male	Female	Unknown	Total
CRITICALLY ENDANGERED								
ORDER PRIMATES								
Macaca fascicularis umbrosa (Raffles, 1821)	Crab - eating macaque	CR	1	1	10	7	0	17
Trachypithecus geei Khajuria, 1956	Golden langur	CR	10	4	9	8	0	17
ORDER CARNIVORA								
Panthera leo persica Linnaeus, 1758) ??	Asiatic lion	CR	14	9	33	68	0	101
ORDER ARTIODACTYLA								
Cervus eldi eldi M'Clelland, 1842	Sangai	CR	14	9	41	76	7	124
Cervus elaphus hangul Linnaeus, 1758	Kashmir stag or Hangul	CR	1	0	1	0	0	1
Bos grunniens Linnaeus, 1766	Wild yak	CR	5	1	4	2	0	6
Total CR mammals in Indian zoos		**6 spp**	**45**	**24**	**98**	**161**	**7**	**266ind.**
ENDANGERED								
ORDER PRIMATES								
Macaca silenus (Linnaeus, 1758)	Lion tailed macaque	EN	22	13	34	34	6	74
Hylobates hoolock (Harlan, 1834)	Hoolock gibbon	EN	9	1	5	5	0	10
ORDER CARNIVORA								
Melogale moschata (Gray, 1831)	Chinese ferret- badger	EN	1	1	1	1	0	2
Lynx lynx isabelina (Linnaeus, 1758)	Lynx	EN	1	0	2	0	0	

Panthera tigris (Linnaeus, 1758) ??	Bengal tiger	EN	31	26	94	105	10	209
Uncia uncia (Schreber, 1775)	Snow leopard	EN	1	1	4	4	0	8
ORDER PERISSODACTYLA								
Rhinoceros unicornis Linnaeus, 1758	Indian rhino	EN	12	6	23	12	0	35
ORDER ARTIODACTYLA								
Cervus duvauceli duvauceli G. Cuvier, 1823	Swamp deer	EN	8	6	33	45	2	80
Budorcas taxicolor Hodgson, 1850	Takin	EN	1	0	1	0	0	1
Hemitragus hylocrius (Ogilby, 1838)	Nilgiri Tahr	EN	1	0	2	0	0	2
ORDER RODENTIA								
Ratufa macroura dandolena (Pennant, 1769)	Grizzled giant squirrel	EN	6	1	3	5	2	10
Atherurus macrourus (Linnaeus, 1758)	Brush tailed porcupine	EN	2	1	2	1	0	3
Total EN mammals in Indian zoos		**11 spp**	**94**	**56**	**203**	**212**	**20**	**435ind.**

VULNERABLE

ORDER PRIMATES								
Trachypithecus johnii (Fischer, 1829)	Nilgiri langur	VU	9	4	13	9	4	26
ORDER CARNIVORA								
Melursus ursinus (Shaw, 1791)	Sloth bear	VU	48	29	68	55	16	139
Ailurus fulgens fulgens Cuvier, 1825	Red panda	VU	2	1	5	6	0	11
Viverra zibetha Linnaeus, 1758	Large Indian civet	VU	2	0	1	0	1	2
Herpestes urva (Hodgson, 1836)	Crab eating mongoose	VU	1	0	1	0	0	1
Prionailurus viverrinus (Bennett, 1833)	Fishing cat	VU	5	2	6	5	0	11
ORDER PROBOSCIDEA								
Elephas maximus Linnaeus, 1758	Asian elephant	VU	26	14	28	56	0	84
ORDER ARTIODACTYLA								
Moschus chrysogaster (Hodgson, 1839)	Musk deer	VU	3	2	12	9	0	21
Naemoredus sumatrensis	Serow	VU	1	1	1	2	0	3
ORDER RODENTIA								
Ratufa indica indica	Indian giant squirrel	VU	7	3	8	4	1	13
Ratufa bicolor gigantea (Sparrman, 1778)	Malayan giant squirrel	VU	3	2	3	3	1	7
Total VU mammals in Indian zoos		**11spp.**	**107**	**58**	**146**	**149**	**23**	**318ind.**

NON- THREATENED ACCORDING TO IUCN CRITERIA

LOW RISK NEAR THREATENED

ORDER CHIROPTERA -- BATS								
Pteropus giganteus giganteus (Brunnich,1782)	Indian Flying fox	LR-nt	2	0	0	0	22	22
ORDER PRIMATES								
Loris tardigradus (Linnaeus, 1758)	Slender loris	LR-nt	3	1	1	5	3	9
Nycticebus coucang (Boddaert, 1785).	Slow loris	LR-nt	11	6	16	13	3	32
Trachypithecus pileatus (Blyth, 1843)	Capped langur	LR-nt	15	4	12	14	0	26
ORDER CARNIVORA								
Vulpes bengalensis (Shaw, 1800)	Common fox	LR-nt	19	7	14	16	11	41
Cuon alpinus (Pallas, 1811)	Wild dog	LR-nt	4	3	2	8	9	19
Ursus thibetanus [Baron] (Cuvier, 1823)	Himalalyan black bear	LR-nt	39	30	73	67	10	150
Ursus arctos Linnaeus, 1758	Himalayan brown bear	LR-nt	5	2	6	2	0	8
Mellivora capensis (Schreber, 1776)	Ratel	LR-nt	11	4	15	5	3	23
Viverricula indica (Desmarest, 1804)	Small Indian civet	LR-nt	19	2	12	9	16	37
Hyaena hyaena (Linnaeus, 1758)	Stripped Hyaena	LR-nt	45	32	61	59	21	141
Felis chaus Schreber, 1777	Jungle cat	LR-nt	24	5	20	10	10	40
Prionailurus bengalensis (Kerr, 1792)	Leopard cat	LR-nt	20	11	36	45	9	90
Neofelis nebulosa (Griffith, 1820)	Clouded leopard	LR-nt	7	3	9	4	0	13

Panthera pardus (Linnaeus, 1758)	Panther	LR-nt	58	43	152	130	28	310
ORDER ARTERODACTYLA								
Moschiola meminna (Erhleben, 1777)	Mouse deer	LR-nt	4	1	4	1	1	6
Axis porcinus (Zimmermann, 1780)	Hog deer	LR-nt	36	25	106	123	36	265
Bos gaurus Smith, 1827	Gaur	LR-nt	5	2	8	7	0	15
Tetracerus quadricornis (Blainville, 1816)	Four horned antelope	LR-nt	20	7	30	34	21	85
Hemithagus jemlaticus	Himalayan tahr	LR-nt	1	0	1	1	0	2
Pseudois nayaur (Hodgson, 1833)	Blue sheep	LR-nt	1	0	1	0	0	1
ORDER PHOLIDOTA								
Manis crassicaudata Gray, 1827.	Pangoline	LR-nt	6	0	3	3	16	22
Total LR-nt mammals in Indian zoos			22	355	198	573	552	219	1344ind.

LOW RISK LEAST CONCERN

ORDER INSECTIVORA								
Hemiechinus auritus (Gmelin, 1770)	Longeared Hedgehog	LR-lc	2	1	1	1	2	4
ORDER PRIMATES								
Macaca radiata (Geoffroy, 1812)	Bonnet macaque	LR-lc	44	32	152	94	186	432
Macaca mulatta (Zimmermann, 1780)	Rhesus macaque	LR-lc	76	48	204	176	83	463
Semnopithecus entellus	Hanuman langur	LR-lc	36	25	78	56	19	153
ORDER CARNIVORA								
Canis aureus Linnaeus, 1758	Jackal	LR-lc	44	22	64	56	33	1153
Martes flavigula (Boddaert, 1785)	Yellow throated marten	LR-lc	1	1	1	1	0	2
Paradoxurus hermaphroditus (Pallas, 1777)	Common palm civet	LR-lc	34	18	48	33	15	96
Paguma larvata (Hamilton-Smith, 1827)	Himalayan palm civet	LR-lc	4	2	2	3	1	6
Herpestes edwardsii (Geoffroy Saint-Hilaire,1818)	Common mongoose	LR-lc	9	6	30	37	7	74
ORDER ARTIODACTYLA								
Sus scrofa Linnaeus, 1758	Wild boar	LR-lc	23	18	73	139	118	330
Cervus unicolor Kerr, 1792	Sambar	LR-lc	88	55	438	554	228	1220
Axis axis (Erhleben,- 1777)	Spotted deer	LR-lc	161	95	1793	2277	2294	6364
Muntiacus muntjak (Zimmermann, 1780)	Barking deer	LR-lc	54	33	115	154	155	424
Boselaphus tragocamelus (Pallas, 1766)	Nilgai	LR-lc	57	39	199	240	92	531
Antilope cervicapra (Linnaeus, 1758)	Black buck	LR-lc	78	49	262	302	290	854
Gazella bennettii (Sykes, 1831)	Indian gazelle or Chinkara	LR-lc	24	13	48	69	40	154
ORDER RODENTIA								
Funambulus pennantii Wroughton, 1905	Five striped palm squirrel	LR-lc	2	1	2	1	0	3
Hystrix indica Kerr, 1792	Porcupine	LR-lc	53	30	73	73	105	251
ORDER LAGOMORPHA								
Lepus nigricollis Cuvier, 1823	Hare	LR-lc	7	5	29	28	47	104
Total LR-nt mammals in Indian zoos			19 spp	797	493	3612	4294	3715	11,621ind.

STATUS NOT KNOWN

(according to IUCN Criteria as applied by workshop participants)

DATA DEFICIENT

Data deficient means that no field specialists have surveyed this species sufficiently to derive a status. Field survey have to be done for these species. In the meantime, some of these also are possibly Critically endangered, Endangered or Vulnerable !

ORDER PRIMATES								
Macaca nemestrina (Linnaeus, 1766)	Pig tailed macaque	DD	9	5	9	1	0	10
ORDER CARNIVORA								
Canis lupus chanco Linnaeus, 1758	Tibetan wolf	DD	1	1	10	5	0	15
Helarctos malayanus (Raffles, 1821)	Sun bear	DD	3	0	0	2	3	5
Arctictis binturong (Raffles, 1821)	Binturong	DD	8	1	5	6	0	11
Catopuma temmincki (Vigors and Horsfield, 1827)	Golden cat	DD	2	0	2	0	0	2
Total DD mammals in Indian zoos								

NOT EVALUATED

Not evaluated means that the field specialists known to have studied this species were not at the workshop; these may be given a status in the near future if these specialists will provide data. In the meantime, some of these also are possibly Critically endangered, Endangered or Vulnerable !

ORDER PRIMATES								
Macaca assamensis (M'Clelland, 1840)	Assamese macaque	NE	17	7	44	24	6	74
Macaca arctoides (Geoffroy, 1831)	Stump tailed macaque	NE	14	8	23	18	0	41
ORDER CARNIVORA								
Canis lupus pallipes Sykes	Indian wolf	NE	16	7	21	20	11	52
Lutra lutra (Linnaeus, 1758)	The Common Otter	NE	13	5	17	10	4	31
Lutrogale perspicillata (Geoffroy Saint-Hilaire, 1826)	Smooth Indian Otter	NE	3	1	4	2	0	6
ORDER PERISSODACTYLA								
Equus hemionus khur Boddaert, 1785	Indian Wild ass	NE	5	1	4	7	0	11
ORDER ARTIODACTYLA								
Budorcas taxicolor	Takin	NE	1	0	1	0	0	1
Naemorhedus goral (Hardwicke, 1825)	Goral	NE	7	4	13	11	7	31
Hemitragus jemlahicus (H. Smith, 1826)	Himalayan Tahr	NE	1	0	1	1	0	2
Naemorhedus goral (Hardwicke, 1825)	Goral	NE	7	4	13	11	7	31
Hemitragus jemlahicus (H. Smith, 1826)	Himalayan Tahr	NE	1	0	1	1	0	2
Total LR-nt mammals in Indian zoos		**11 spp**	**91**	**40**	**150**	**109**	**35**	**294 ind.**

Table III

Summary of Number of Indian Mammals currently held in Indian zoos, their sex ratio and their conservation status according to IUCN Criteria

Conservation Status	No. speciesheld in zoos in India	No. of Indian zoos holding spp of this status	No. of Indian zoos holding spp. in PAIRS	m	f	unk	Individuals held in Indian zoos
Critically endangered	6	45	24	98	161	7	266
Endangered	11	94	56	203	212	20	435
Vulnerable	11	107	58	146	149	23	318
Low risk - near threatened	22	355	190	573	552	219	1344
Low risk - least concern	19	797	493	3612	4294	3715	11621
Data deficient	5	22	7	26	14	3	43
Not evaluated	11	91	40	150	109	35	294
Total	xx	xx	xx	xx	xx	xx	xx

Table IV : Orders and Species of Indian Mammals according to Conservation Status and Representation in Indian Zoos according to Central Zoo Authority Records, August 1997 and Draft Summary Output of Conservation Assessment and Management Plan Workshop, August 1997.

Conservation status =>	EX	CR	EN	VU	LR	LR	DD nt	NE lc	Total spp. in Taxo-nomic Order	Total spp in Indian Zool. Gardens
Insectivora	-	-	-	3	-	3	-	19	25	1
Scandentia	-	-	-	-	-	-	-	4	4	0
Chiroptera	-	2	3	11	24	9	55	2	106	1
Primates	-	2	3	1	3	3	-	3	15	14
Carnivora	1	2	5	11	17	7	10	8	61	33
Cetacea	-	2	4	-	2	-	15	-	23	0
Sirenai	-	1	-	-	-	-	-	-	1	0
Proboscidea	-	-	-	1	-	-	-	-	1	1
Perissodactyla	2	-	1	-	-	-	-	2	5	1
Artiodactyla	-	7	4	3	6	7	-	6	33	21
Pholidota	-	-	-	-	1	-	1	-	2	1
Rodentia	1	1	8	18	13	31	18	9	99	6
Lagomorpha	-	-	1	-	3	1	5	1	11	1
Total number	4	18	30	46	69	61	104	54	386	80

MAMMALS IN INDIAN ZOOS ACCORDING TO CENTRAL ZOO AUTHORITY, INVENTORY, AUGUST 1997

Scientific name	Common name	Status	#Zoos holding	#Zoo w/pair	M	F	U	Total
INSECTIVORES (hedgehogs, moonrats, gymnures, shrews, etc.)								
Hemiechinus auritus (Gmelin, 1770)	Longeared Hedgehog	LR-lc	2	1	1	1	2	4
BATS								
Pteropus giganteus giganteus (Brunnich,1782)	Indian Flying fox	LR-nt	2	0	0	0	22	22
PRIMATES								
Loris tardigradus (Linnaeus, 1758)	Slender loris	LR-nt	3	1	1	5	3	9
Nycticebus coucang (Boddaert, 1785).	Slow loris	LR-nt	11	6	16	13	3	32
Macaca silenus (Linnaeus, 1758)	Lion tailed macaque	EN	22	13	34	34	6	74
Macaca nemestrina (Linnaeus, 1766)	Pig tailed macaque	DD	9	5	9	1	0	10
Macaca radiata (Geoffroy, 1812)	Bonnet macaque	LR-lc	44	32	152	94	186	432
Macaca assamensis (M'Clelland, 1840)	Assamese macaque	NE	17	7	44	24	6	74
Macaca mulatta (Zimmermann, 1780)	Rhesus macaque	LR-lc	76	48	204	176	83	463
Macaca fascicularis umbrosa (Raffles, 1821)	Crab - eating macaque	CR	1	1	10	7	0	17
Macaca arctoides (Geoffroy, 1831)	Stump tailed macaque	NE	14	8	23	18	0	41
Semnopithecus entellus (Dufresne, 1797)	Common Hanumanlangur	LR-lc	36	25	78	56	19	153

Trachypithecus johnii (Fischer, 1829)	Nilgiri langur	VU	9	4	13	9	4	26
Trachypithecus pileatus (Blyth, 1843)	Capped langur	LR-nt	15	4	12	14	0	26
Trachypithecus geei Khajuria, 1956	Golden langur	CR	10	4	9	8	0	17
Hylobates hoolock (Harlan, 1834)	Hoolock gibbon	EN	9	1	5	5	0	10
CARNIVORES (Cats, wolves, bears, civets, badgers, otters, etc.)								
Canis lupus chanco Linnaeus, 1758	Tibetan wolf	DD	1	1	10	5	0	15
Canis lupus pallipes Sykes	Indian wolf	NE	16	7	21	20	11	52
Canis aureus Linnaeus, 1758	Jackal	LR-lc	44	22	64	56	33	153
Vulpes bengalensis (Shaw, 1800)	Common fox	LR-nt	19	7	14	16	11	41
Cuon alpinus (Pallas, 1811)	Wild dog	LR-nt	4	3	2	8	9	19
Ursus thibetanus [Baron] (Cuvier, 1823)	Himalalyan black bear	LR-nt	39	30	73	67	10	150
Ursus arctos Linnaeus, 1758	Himalayan brown bear	LR-nt	5	2	6	2	0	8
Helarctos malayanus (Raffles, 1821)	Sun bear	DD	3	0	0	2	3	5
Melursus ursinus (Shaw, 1791)	Sloth bear	VU	48	29	68	55	16	139
Ailurus fulgens fulgens Cuvier, 1825	Red panda	VU	2	1	5	6	0	11
Martes flavigula (Boddaert, 1785)	Yellow throated marten	LR-lc	1	1	1	1	0	2
Mellivora capensis (Schreber, 1776)	Ratel	LR-nt	11	4	15	5	3	23
Melogale moschata (Gray, 1831)	Chinese ferret- badger	EN	1	1	1	1	0	2
Lutra lutra (Linnaeus, 1758)	The Common Otter	NE	13	5	17	10	4	31
Lutrogale perspicillata (Geoffroy Saint-Hilaire, 1826)	Smooth Indian Otter	NE	3	1	4	2	0	6
Viverra zibetha Linnaeus, 1758	Large Indian civet	VU	2	0	1	0	1	2
Viverricula indica (Desmarest, 1804)	Small Indian civet	LR-nt	19	2	12	9	16	37
Paradoxurus hermaphroditus (Pallas, 1777)	Common palm civet	LR-lc	34	18	48	33	15	96
Paguma larvata (Hamilton-Smith, 1827)	Himalayan palm civet	LR-lc	4	2	2	3	1	6
Arctictis binturong (Raffles, 1821)	Binturong	DD	8	1	5	6	0	11
Herpestes edwardsii (Geoffroy Saint-Hilaire, 1818)	Common mongoose	LR-lc	9	6	30	37	7	74
Herpestes urva (Hodgson, 1836)	Crab eating mongoose	VU	1	0	1	0	0	1
Hyaena hyaena (Linnaeus, 1758)	Stripped Hyaena	LR-nt	45	32	61	59	21	141
Felis chaus Schreber, 1777	Jungle cat	LR-nt	24	5	20	10	10	40
Prionailurus bengalensis (Kerr, 1792)	Leopard cat	LR-nt	20	11	36	45	9	90
Prionailurus viverrinus (Bennett, 1833)	Fishing cat	VU	5	2	6	5	0	11
Catopuma temmincki (Vigors and Horsfield, 1827)	Golden cat	DD	2	0	2	0	02	
Lynx lynx isabelina (Linnaeus, 1758)	Lynx	EN	1	0	2	0	0	2
Neofelis nebulosa (Griffith, 1821)	Clouded leopard	LR-nt	7	3	9	4	0	13
Panthera pardus (Linnaeus, 1758)	Panther	LR-nt	58	43	152	130	28	310
Panthera tigris tigris (Linnaeus, 1758) ??	Bengal tiger	EN	31	26	94	105	10	209
Panthera leo persica (Linnaeus, 1758) ??	Asiatic lion	CR	14	9	33	68	0	101
Uncia uncia (Schreber, 1775)	Snow leopard	EN	1	1	4	4	0	8
UNGULATES - Elephants, rhinos, horses, deer, antelopes, etc.								
Elephas maximus Linnaeus, 1758	Asian elephant	VU	26	14	28	56	0	84
Rhinoceros unicornis Linnaeus, 1758	Indian rhino	EN	12	6	23	12	0	35
Equus hemionus khur Boddaert, 1785	Indian Wild ass	NE	5	1	4	7	0	11
Sus scrofa Linnaeus, 1758	Wild boar	LR-lc	23	18	73	139	118	330
Moschiola meminna (Erhleben, 1777)	Mouse deer	LR-nt	4	1	4	1	1	6
Moschus chrysogaster (Hodgson, 1839)	Musk deer	VU	3	2	12	9	0	21
Cervus duvauceli duvauceli G. Cuvier, 1823	Swamp deer	EN	8	6	33	45	2	80

Cervus eldi eldi M'Clelland, 1842
Cervus unicolor Kerr, 1792
Cervus elaphus hanglu Linnaeus, 1758
Axis axis (Erhleben, 1777)
Axis porcinus (Zimmermann, 1780)
Muntiacus muntjak (Zimmermann, 1780)
Bos gaurus Smith, 1827
Bos grunniens Linnaeus, 1766
Boselaphus tragocamelus (Pallas, 1766)
Tetracerus quadricornis (Blainville, 1816)
Antilope cervicapra (Linnaeus, 1758)
Gazella bennettii (Sykes, 1831)
Budorcas taxicolor Hodgson, 1850
Naemorhedus goral (Hardwicke, 1825)
Naemoredus sumatrensis
Hemitragus jemlahicus (H. Smith, 1826)
Hemitragus hylocrius (Ogilby, 1838)
Pseudois nayaur (Hodgson, 1833)
Manis crassicaudata Gray, 1827.
Ratufa macroura dandolena (Pennant, 1769)
Ratufa indica indica
Ratufa bicolor gigantea (Sparrman, 1778)
Funambulus pennantii Wroughton, 1905
Hystrix indica Kerr, 1792
Atherurus macrourus (Linnaeus, 1758)
Lepus nigricollis Cuvier, 1823

Sangai	CR	14	9	41	76	7	124
Sambar	LR-lc	88	55	438	554	228	1220
Kashmir stag or Hangul	CR	1	0	1	0	0	1
Spotted deer	LR-lc	161	95	1793	2277	2294	6364
Hog deer	LR-nt	36	25	106	123	36	265
Barking deer	LR-lc	54	33	115	154	155	424
Gaur	LR-nt	5	2	8	7	0	15
Wild yak	CR	5	1	4	2	0	6
Nilgai	LR-lc	57	39	199	240	92	531
Four horned antelope	LR-nt	20	7	30	34	21	85
Black buck	LR-lc	78	49	262	302	290	854
Indian gazelle or Chinkara	LR-lc	24	13	48	69	40	154
Takin	NE	1	0	1	0	0	1
Goral	NE	7	4	13	11	7	31
Serow	VU	1	1	1	2	0	3
Himalayan Tahr	LR-nt	1	0	1	1	0	2
Nilgiri Tahr	EN	1	0	2	0	0	2
The Bharal Blue sheep	LR-nt	1	0	1	0	0	1
Pangoline	LR-nt	6	0	3	3	16	22
Grizzled giant squirrel	EN	6	1	3	5	2	10
Indian giant squirrel	VU	7	3	8	4	1	13
Malayan giant squirrel	VU	3	2	3	3	1	7
Five-striped palm squirrel	LR-lc	2	1	2	1	0	3
Porcupine	LR-lc	53	30	73	73	105	251
Brush tailed porcupine	EN	2	1	2	1	0	3
Hare	LR-lc	7	5	29	28	47	104

SMALL POPULATION BIOLOGY AND THE TOOLS OF RECOVERY EX SITU REPORT*

Introduction

The 1993 PHVA workshop Recommendations maintained that a healthy captive stock of Lion-tailed macaque (LTM) was crucial for intensive metapopulation management by providing genetic material for wild population by reintroduction of live animals or of germ plasm. Intensive management of metapopulations of both wild and captive animals itself may be crucial for saving some small, isolated groups of LTM.

The Workshop identified ways that the captive population can strengthen the wild population, among them the most feasible being the introduction of 1.2 adults into a population of 20 - 30 animals every 3 years. This would improve the chance of survival of the group significantly by maintaining the level of heterozygosity, reducing the amount of inbreeding and increasing the percentage of breeding females.

The Training Workshop for *ex situ* managers was set up at the suggestion of Sri S. C. Dey and organised with the captive recommendations of 1993 in mind. The Training Workshop was both an instruction in some of the tools and techniques required to carry out the recommendation as well as a "reality check" to see how the zoos were following up the recommendations.

Major recommendations can be summarised as :

Conservation breeding of LTM to be conducted under recommendations of a Regional Species Co-ordinator responsible coordinating the zoos identified as LTM Conservation Breeding Centres for the Indian programme. The Centres would manage their LTMs according to a coordinated breeding programme, observing genetic and demographic principles.

Husbandry measures for LTM should include :

- enclosures designed for behavioural and biological characteristics of the animals;
- training in modern methodology for staff and keepers with regular updates;
- exchange of information between the facilities holding the species;
- diet to ensure that all animals receive optimal nutritional requirements, especially animal protein as vertebrates and invertebrates make up 37.3% of the diet in the wild;

Source : Central Zoo Authority, New Delhi

- regular veterinary screening of both LTMs and their keepers; and
- permanent individual identification of animals.

The areas in which the zoos holding LTM were lacking or uncertain were primarily in the area of species coordination and a systematic breeding programme, identification of animals, diet, some behavioural and enrichment features of enclosures and veterinary screening of animals. Efforts were made to call Resource Persons who could instruct in these areas and assist in formulating a breeding plan. Also because all the zoo personnel may not be familiar with the principles of small population dynamics which explains the rationale behind maintaining healthy captive populations, experts in small population dynamics and related subject areas were also kept on the Agenda.

At the Workshop the available data was examined and entered into the International and National Studbooks. From this and information taken from participants about the different zoos, a management and movement programme was formulated. This programme as well as rationalisation for the moves are detailed elsewhere.

Also small groups examined the existing and required diet of LTM, behavioural needs, enrichment devices and health measures. Some of these aspects can be carried out by the participants at their own level. Participants made individual commitments to investigate or implement the recommendations.

As the participants were, for the most part, staff members who supervise keepers and take care of ground realities of the zoo animals, direct and quick implementation can be expected. The species management recommendations will be examined at the Zoo Directors Meeting in New Delhi, 19-21 November 1996.

GENERAL DISCUSSION AND RECOMMENDATIONS

Species Management

After becoming familiarised with the principles of population biology during several days of lectures and computer demonstrations and practice, the Training Workshop participants concluded that genetic and demographic management is crucial to the survival and fitness of small captive populations. Animals must be moved from zoo to zoo on a regular basis according to a set of guidelines and principles involving their genetic profile, compatibility, fitness, age, sex ratio, group size and enclosure facilities at the various zoos.

The Training Workshop participants undertook an exercise, led by experienced geneticists, demographers and studbook keepers, in making recommendations for movement, breeding and holding of animals based on the available studbook data brought to the workshop by participating zoos and their observations.

The recommendations made by the participants with justification and rationalisation for these decisions are given institution-wise at appropriate places.

Enclosure design

The Workshop participants, after visiting the habitat of LTM felt that any enclosure design should mimic the natural habitat as much as possible, particularly having lofty perches to preserve the arboreal habits of the animals and convey their natural behaviour to visitors.

Group composition

The optimum group size according to the International Studbook Keeper is one male to four females. This was taken as a goal and a guideline for time being.

Husbandry Guidelines

The Workshop participants felt that Husbandry Guidelines specifically for LTM in Indian zoos should be established in India. The international husbandry guidelines may be consulted when published to insure that no useful information has been missed. The Directors of LTM bearing zoos may like to select someone to draft such Guidelines.

Marking and identification of LTMs

Workshop participants reaffirmed that marking and identification of animals is crucial too maintenance of Studbook data from which decisions regarding the rational pairing of animals for genetic and demographic variability can be made.

It was felt that although transponder numbers were unique, permanent and desirable, in view of the lack of equipment and devices, at present tattooing was considered next most desirable for permanent marking. Tags were rejected as impermanent and dangerous. The possibility of the permanent marking devices could be explored.

The Workshop participants agreed that it was possible for a conscientious biologist, supervisor or keeper who sees the animals on a daily basis to identify LTMs by their facial characteristics and movements alone if the group was no larger than about ten animals. For behavioural observations, including the recording of important reproductive information, this is the only practical method as distance from the animals in a naturalistic enclosure precludes using either tattoo marks or transponders for identification.

In this regard it is desirable to have a minimum of one animal keeper or observer for every ten animals or for every group so that important behavioural events may not be missed. The potential and problems of using volunteers for behavioural observation

was discussed and some measures suggested for spotting and selection of suitable volunteers in pre-arranged educational programmes.

Records

Following the participants' review of the LTM data brought to the Training Workshop, it was felt that the data being maintained for the species may not be optimal for making decisions to adequately implement a programme of scientific management of LTM in captivity. In some of the zoos, only administrative records are being maintained which do not contain sufficient information for correct management. The Central Zoo Authority (CZA) Norms and Standards require that individual animal records be maintained by all zoos and the participants underscored the importance of these rules. It was also suggested that in the livestock register two or more columns could be added for sire and dam (if known) and for giving some indication of the new animal's background (e.g., if confiscated from private owner or substandard zoo; rescued from life threatening situation; and how long kept alone, etc.)

Training and Research

The Workshop participants emphasized the importance of captive studies which would add to the body of knowledge of this endangered species. The importance of the zookeeper in behavioural observation was reaffirmed. It was suggested by participants that zoos might select their most literate zookeepers for looking after endangered species, particularly LTM.

The efforts of the CZA to encourage regional-based keeper training were applauded by the participants and it was felt that the teaching of behavioural observation should be highlighted in the keeper training course, as well as in any in-house keeper training being given in the individual zoos.

The Workshop participants recommended that every zoo keeping LTM should send the keeper looking after them to the official CZA Training.

It was also thought desirable that as an incentive, the LTM keeper be allowed to visit some other zoos having more ideal facilities and management of LTM to promote a deeper understanding of their care.

Workshop participants recommended that one keeper be earmarked for LTM only so that he will be available at least eight hours a day for observation and specialised care for this highly endangered species.

The participants, being supervisory and biological staff, recognised the importance of their own role in creating interest, involvement and a sense of responsibility among keepers of LTM. Methods for doing this included:

- frequent checking of behavioural recording sheets;
- inquiring often what the keepers have observed and reinforcing new observations;
- sharing some interesting information every day about the species in the wild or in other zoos; and
- encouraging LTM keepers to interact with visitors and assist in zoo's efforts to educate the public using the information given.

Education

The importance of public education was reaffirmed and methods discussed to enhance the zoo's educational reach. Volunteers, including college students, could be utilised to educate visitors but it was recognised that these had to be carefully selected and monitored. One idea was that Wrokshop participants visit one school or college or other group every three months and give a programme on LTM using information collected in the workshop. A byproduct of these visits may be the ability to spot interested and sincere persons as potential volunteers.

Nutrition Working Session

Working Group : *T. Kalaichelvan (Facilitator); B. Rathinasabathy; S. Manimozhi (Recorder); L.N. Acharjyo; B.K Jha and S.S Rawat*

Participants reviewed the daily feed chart for adult LTMs from four different zoos, compiled by Dr. Acharjyo. This chart is appended at the end of this Report.

Taking into consideration the different items consumed by LTM in the wild as reported by field researchers it appears that the LTM requires more than 37% animal protein and some amount of nectors. On that basis the following recommendations for the zoo diet of this species are put forth :

1. The daily feed schedule of four Indian zoos were studied and appropriate modifications made accordingly. The following daily feed formula is suggested.

i)	fruits	250 gm
ii)	vegetables	200 gm
iii)	milk	50 ml
iv)	boiled egg (1)	60 gm
v)	insects, other invertebrate, minced meat	150 gm
vi)	honey	10 ml
vii)	nuts without shell and grams	50 gm
viii)	bread and / or rice	50 gm
ix)	greens	100 gm

This feeding schedule may be subject to change after observing the results and effect on the animals.

2. The nutritional requirement of LTM is captivity which has already been studied elsewhere may be collected and other items added to feeding schedule if appropriate.
3. The animal should have free access to insects which forms a large part of the natural diet. Insect culture such as crickets, etc. can be taken up in the zoos for this purpose.
4. The availability of artificial monkey chow in India and its preparation should be explored.
5. The quality of all the feed items should be examined before feeding.
6. Supply of vitamins and minerals in feeds in appropriate quantity and frequency can be practiced.
7. The feed should be given twice daily, in the forenoon and in the afternoon.
8. The food should be given in such a way that all the animals in the enclosure will get an equal opportunity to take it.
9. Supply of clean and unpolluted water all the time of the day must be insured as well as other conventions as per CZA Rules.

Working Session on Health

Working Group : *T. Kalaichelvan (Facilitator); B. Rathinasabathy; S. Manimozhi (Recorder); L.N. Acharjyo; B.K. Jha and S.S. Rawat*

Summary of Health issues

Disease : Infection of Tuberculosis (T.B.) and bacterial enteritis have been observed in LTM in Indian zoos. Other diseases like parasitic diseases, conjunctivitis, urogentital disorders, cystic liver, hepatitis, pneumonia, etc. have also been observed.

Besides, accidental death like injuries of various kinds, drowning, etc. have been recorded in many Indian zoos. However, information available on mortality, health and disease problems of LTM from Indian zoos is scanty.

Recommendations

1. The available information on mortality, health and disease problem in LTM may be collected from different Indian zoos using the proforma of the CZA. It will be documented and circulated to all the Indian zoos holding LTM.

Health Proforma Summary:
I.D. or name / Date of death / Sex / Age at death / Disease history / Cause of death / Remarks

2. Detailed post mortem of all the dead LTMs supported with laboratory findings have to be carried out and recorded properly for future reference.
3. One individual may take responsibility for all LTM exhibiting Indian zoos to collect information on health, disease and mortality and documentation.
4. The individual history sheet depicting the causes of mortality, health and disease problems of the LTM should be maintained regularly and the information should be circulated periodically to all the Indian zoos having LTM
5. All the health and disease problems to be encountered in LTM should be properly investigated with the help of nearest veterinary laboratory to find out the exact cause of illness, and recorded.
6. Tuberculosis being one of the important diseases in LTM, testing of LTM for T.B. once in a year must be carried out.
7. Herpes-B virus infection in macaques is another infectious disease which may be prevalent in LTM. Attempts should be made to carry out tests to detect the existence of infection if any, among the LTMs of Indian zoos.
8. The LTM keeper must be screened for any probable infectious disease of zoonotic significance as per CZA norms. A list of potential zoonoses from LTM, compiled by Dr. L. N. Acharjyo was noted by participants. This list is appended at the end of this Report.
9. Periodical faecal sample examination of all LTMs should be carried out for discovery of parasites and positive cases to be treated.
10. Since traumatic injuries seem to be a major cause of death in LTM population special attention should be given for the behavioural management of LTM population and carrying capacity of the enclosure.

Working Session on Behaviour

Working Group members : S. V. Raajalinga Raja (Facilitator); K.L. Purohit (Recorder); C. R. Raje Gowda; P.R. Gopalkrishna Nair; B. Gupta; I. Mallick and L. Gledhill

Behaviour

1. The Behaviour Group, realising the importance of zookeepers in making observations and reporting on LTMs constructed a simple behavioural observation form of seven attributes which could be used by (literate) keepers to record the important behavioural activities of LTMs during the day. The form should be filled every day by keepers and reviewed (also daily) by supervisory staff or biologist.

Behavioural Chart Name of Animal : _____ Date & time : _____
Studbook number : _____ Keeper name : _____

		Remarks
1.	Appearance	_____
2.	Taking food provided by zoo	_____
3.	Foraging natural food in enclosure	_____
4.	Aggression/fighting	_____
5.	Swelling*	_____
6.	Mating	_____
7.	Interaction with visitors	_____

In Remarks column - one can observe if the following took place : Grooming; interaction with other animals; defecation; climbing; playing; suckling and other infant care; other behaviour etc. If facilities for taking weight exist, an additional column may be added.

*If swelling of female is observed by the keeper, then a biologist, supervisor or volunteer may take over observation of the estrus animal using the above mentioned Chart.

2. Ideally a chart for monitoring reproductive behaviour during estrus for all females should be maintained to assist in scientific management. An example of such a chart is given at the end of this Report. Maintenance of these records are crucial for maximising the reproductive potential of LTM in the zoos. If suitable staff cannot be spared for many hours for this job, the services of local college students or volunteers could be obtained.

3. The participants noted that injuries due to fighting were one of the primary causes of death of LTM and pointed out the following focus areas for observation with an eye to prevention of fighting :
   a) behaviour in holding area
   b) behaviour in enclosure
   c) breeding-harassment by other female
   d) mothering-females fighting over young
   e) adult females not in estrus disturbing other females

4. Dr. Iqubal Malik has studied LTM behaviour at Delhi Zoo and has formulated some guidelines to help understand the behaviour of LTMs in captivity. This is appended at the end of this Report.

Working Session on Environmental Enrichment

Working Group members : *S. V. Raajalinga Raja (Facilitator); K.L. Purohit (Recorder); C.R. Raje Gowda; P.R. Gopalakrishna; B. Gupta; I. Mallick and L. Gledhill*

The following suggestions were made for enriching the environment with an eye to enhancing opportunities for activity of the animal

1. Improvised bamboo pole pieces with insects and larvae inside
2. Dispersing bits of food such as nuts, seeds, grains, etc. over the floor and enclosure substrate
3. Provision of inexpensive straw basket or similar item with seeds and grains dispersed in weave and cracks for LTMs to pick out.
4. Round caly pots with sticky substance such as honey or molasses inside
5. Wooden logs and large branches judiciously placed in the enclosure to ensure natural look as well as multiple perches for animals
6. Rotten logs can be provided with seeds scattered inside; these also to encourage insects which can be eaten by the macaques
7. Small play things of wood
8. Introduction of snails for LTMs to catch and eat
9. Wholenut fruits such as *Terminalia kadappa*
10. Lofty perches to compliment the species arboreal habits
11. Wood shavings and hay
12. Hidden food materials to encourage searching and extended foraging.

COMMITMENTS - EX SITU GROUP

Participants and Resource Persons

Manimozhi - will correct record entries by biologists and send correct figures to International Studbook keeper

Raajalinga Raja - will prepare format for Zookeepers to keep observational records; will explain to zookeepers the importance of collecting behavioural information of LTM ex situ.

Kalaichelvan - will collect breeding data on LTM; regularise LTM records at his zoo; teach zookeepers about LTM

Rawat - will collect records of LTM at National Zoological Park (NZP).

Gopalakrishnan - will update all records at Thiruvananthapuram Zoo and make them correct by 30 November 1997.

Saba	- will assist Zoo Outreach Organisation in preparing educational material for LTM for zoos
Acharjyo	- will compile health data for LTMs in all Indian zoos
Jha	- will start captive breeding programme at Central Zoo, Nepal and enhance management procedures.
Purohit	- will motivate keepers for better care of LTMs; will collect information from keepers or directly; will provide more captive data to CZA; will devote one hour a week to LTM
Brij	- will develop signage on LTM for ZOO
Rajegowda	- will keep a daily observation book to record the behavioural aspects and other health monitoring aspects.
	- will teach zoo keepers about the feeding, social behaviour, environmental enrichment to keep track of breeding symptoms and avoid vandalism
	- will introduce boiled egg to LTM
	- will take up breeding programme
Bob	- will answer questions about computer programmes
Ajith	- will monitor LTMs in the wild and aspire that no LTM has to come into captivity by necessity
Iqubal	- will help with enrichment ideas and devices; will help if reintroduction programme is implemented
Laurie	- will add all participants to Old World TAG Newsletter; will answer questions about husbandry
Desai	- will find old history sheets of LTM in NZP and regularise NZP record
Sharma (CZA)	- will support any programme for improving housing or health care of LTM
Sally	- will attempt to find an industrial sponsor in India for LTM "advocate", a researcher and naturalist to do nothing else except promote conservation for LTM in India; and develop and distribute educational materials to zoos to encourage keepers and volunteers to educate the public about conservation of LTM.
Sanjay	- will become more expert in the relevant computer programmes relative to zoos (e.g. SPARKS, DEMOG, etc.) and provide training to persons who want to learn these programmes.

DAILY FEED CHART OF LTM PER ADULT PER DAY

		Nandankanan Zoological Park Bhubaneswar	National Zoological park New Delhi	Veermata Jijabai Zoo Bombay	Arignar Anna Zoological Park Chennai
1.	Milk	50 ml	100 ml	-	-
2.	Boiled Egg	-	-	1 No	-
3.	Banana	250 gm	2 Nos	2 Nos	3 Nos
4.	Pumpkin	50 gm	-	-	-
5.	Cucumber	-	50 gm	-	-
6.	Orange or mango	-	-	-	Half
7.	Guava		-	-	-
8.	Mixed Vegetables and Fruits	-	-	500 gm	-
9.	Pears	-	100 gm	-	-
10.	Sweet Potato	100 gm	-	-	-
11.	Carrot	50 gm	-	50 gm	-
12.	Ladies Finger	50 gm	-	-	-
13.	Cabbage	100 gm	-	-	30 gm
14.	Brinjal	100 gm.	-	-	-
15.	Boiled Potato	-	100 gm	-	-
16.	Onion	-	25 gm	-	-
17.	Tomato	-	25 gm	-	-
18.	Groungnut (Without Shell)	50 gm	50 gm	100 gm	25 gm
19.	Green Peanut	50 gm	-	-	-
20.	Soaked Gram	50 gm	50 gm	50 gm	25 gm
21.	Bread	30 gm	100 gm	-	-
22.	Green 'Bhutta'	-	100 gm	-	-
23.	Cooked Rice	50 gm	-	-	50 gm
24.	Green leaves	Sufficient Quantity	100 gm	-	-

Compiled by Dr. L.N. Acharjyo, Retd. Vety. Officer, Nandankanan Zoological Park

POTENTIAL ZOONOSES FROM LION-TAILED MACAQUE (LTM)

Disease	Cause	Transmission	Preventive Procedures	Detection in LTM	Diagnosis in Man
BACTERIAL					
Tuberculosis	*Mycobacterium tuberculosis*	Direct	Sanitation, hygiene	Intradermal skin test radiograph	Intradermal skin test radiograph
Shigellosis	*Shigella* spp.	Direct contact, fomites	Sanitation hygiene	Presumptive with dysentery culture	Culture
Salmonellosis	*Salmonella* spp.	Direct contact, fomites	Sanitation, hygiene	Culture	Culture
VIRAL					
Herpes B	Herpes virus Simiae	Bite, saliva, scratches	Protective apparel	Lip and tongue ulcers,	History, signs, antigen antibody level titer
Measles	*Rubella* virus	Direct	Vaccine, not known to be zoonotic in man	Paired antibody titers, signs	Paired sera with rise in antibody titer, signs
Rabies	Rabies virus	Bite, saliva	Care in handling tissues, protective apparel.	Mouse inoculation, FA, suspicion with neurological signs	Antibody titers
PARASITIC					
Strongyloidiasis	*Strongyloides* spp.	Direct	Sanitation, hygiene	Faecal exam.	Faecal exam.
Entamoebiasis	*Entamoeba histolytica*	Direct	Sanitation, hygiene	Faecal exam.	Faecal exam.
Enterobiasis	*Enterobius vermicularia*	Direct	Sanitation, hygiene	Faecal exam.	Faecal exam.
Balantidiasis	*B. coli*	Direct	Sanitation hygiene	Faecal exam.	Faecal exam.
MYCOTIC					
Dermatomycosis	*Microsporum spp.* *Trichophton spp.*	Direct	Sanitation, hygiene	Culture, signs	Culture, signs FA=Fluroscent Antibody

Compiled by Dr. L.N. Acharjyo
Retd. Vety. Officer, Nandankanan Zoological Park.

NOTES AND RECOMMENDATIONS FROM BEHAVIOURAL STUDIES ON LION-TAILED MACAQUE AT NATIONAL ZOOLOGICAL PARK

1. Ascertaining Compatibility in LTM in Zoos

Spending one hour every morning observing LTM's can reveal important informations.

1. Identify the animals based on their natural features like
   a) thickness of coat and mane
   b) ear lobes
   c) marks on the face
   d) gait
   e) tail etc.
2. Collect data on who grooms whom atleast one hour every morning.
3. Record when the sexual swellings appear on each of the females in the group.
4. Record which female gives the long calls on which day.
5. Note down in which direction the call is given.
   a) is it directed towards any male in the group or
   b) is it directed towards the outside of the enclosure or
   c) are the calls not given at all.
6. If the calls are directed towards a male in the group note down the behaviour of that male after the call. Does he approach the female. Does he lift her tail and sniff her. Does he mate with her. Does he gives long hooting call while mating. Frequency and longevity of mating.
7. If the male does not react to all this for a particular female, does he respond to another female in estrus. This would reveal male's preferance.
8. If the female does not give call to any male in the group then another male would have to be brought in.
9. Never introduce a new male directly in the group. Keep it in a nearby enclosure from where he can see all the females and the females can see him. By making all the above observations again we would know if they are compatible or not.

Formulated by Dr. Iqubal Malik, Director, Vatavaran, 540, Asian Games Village, New Delhi

2. **Recommended food for LTMs for enhanced captive breeding**

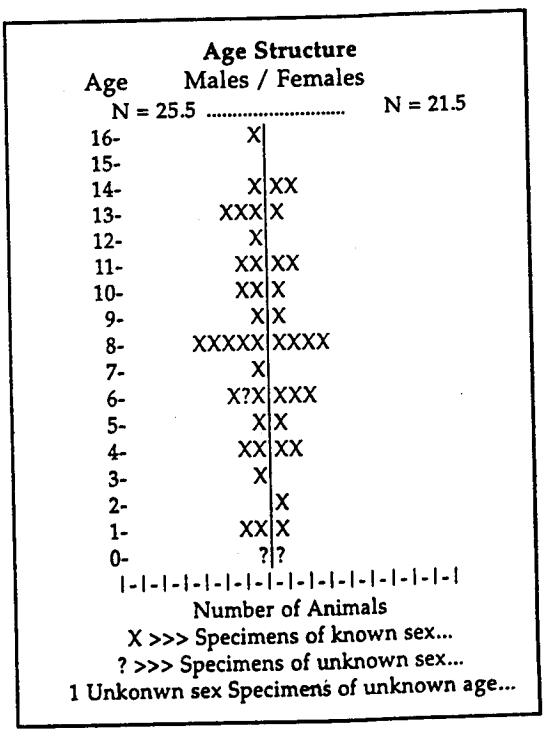
1. Provide whole fruits instead of fruits being cut into pieces.
2. Encourage the growth of undergrowth in the enclosure so that insect life increases. Encourage foraging behaviour in the animals of both insect life and plants. Even if insects have to be added in the feed they must not be given in the feeding cell but must be spread in the open muddy green part of the enclosure.
3. Provide lots and lots of greens.

3. **Recommended to stop the females rejecting their new born**

1. If all LTMs in all zoos can always have a mixed age ratio preferably with one year or less old ones also it would help the adults to learn to look after the young ones.
2. If a young mother rejects her infant she must be removed from the group and special work by a behavioural scientist would need to be done with her to make her learn to be good mother and suckle the new born.

MASTERPLAN FOR THE INDIAN EX-SITU POPULATION OF LION-TAILED MACAQUES, MACACA SILENUS

A Captive Management Masterplan was generated by the participants and very experienced zoo biologists with data from their zoos using tools and techniques learned in the workshop. This plan will be helpful in beginning the rational movements of animals to maintain their genetic variability, improve the rate of reproduction and strengthen the national population of captive LTMs.



Population Assumptions

The current Indian captive population has fourteen ancestors of unknown parentage. It is unlikely that these animals had any living relatives in the population other than their directly known descendents but due to the percentage (27%) of the total population and the presence of an

additional nine unrepresented animals of unknown parentage, the following population assumptions were made. All assumptions were made on a "worst-case" basis so that decisions made using them would have a minimum deleterious effect upon the population.

(1) If multiple wild-caught animals arrived at a single location at the same time, it was assumed that they were captured from the same troop and had a common sire and individual dams. They were listed in the Indian LTM studbook as WILD 01, WILD 02 etc..

(2) The Delhi collection descended from six (3.3) individuals obtained in 1959 and two additional individuals obtained in 1966 and 1970. Thirty-nine offsprings have descended from these founders. Unfortunately, the only records available are of birth and death dates. No parentage information was recorded. Due to the impact that these animals can have on population planning, pedigree assumptions were made using established LTM life history information (age of first reproduction, inter-birth interval, etc).

(3) For demographic purposes the age of capture of wild-caught individuals is that established in the International LTM Studbook (ie. two years). For animals acquired from an unknown source (not wild caught) where age has not been estimated, an age of four years is assumed.

(4) When a date is estimated to the year, a mid-year date of 15 June is used for demographic purposes.

Current Captive Population

As of 17 October 1996 the Indian population of LTM numbered 25.21.1 individuals in twelve institutions. The age structure is shown in the adjacent graphic. A healthy, growing population would be pyramid shaped with the majority of the animals in the lower age classes. The existing structure is indicative of an unstable population which could easily become extinct.

Due to insufficient life history details, additional demographic analysis of the captive population was not performed as it would not provide relevant information.

Genetic analysis indicates that there are 15 founders currently represented in the living population with the potential to increase this representation to 29 founders. The range of founder representation is from 1.200 to a high of 14.76^{0}_{0}.

Computer gene drop simulation indicates that there are only 4.30 founder genome equivalents (FGE) in the current population. By controlling future reproduction there is a potential to increase this representation to 20.45 FGE's. (The Founder genome

equivalent is the number of newly caught wild animals which would be required to obtain the genetic diversity as found in the current population. This figure reflects the loss due to disparities in founder reproduction). The disparity between potential and current FGE's demonstrates that extensive genetic control must be employed to increase this representation. The mean inbreeding coefficient of the population is 0.116 which also indicates the need for genetic control.

Masterplan Objectives

The primary objective of this masterplan is the establishment of a secure and genetically diverse population, capable of supporting a future re-introduction program if one should be deemed advisable. The generally established recommendation for genetic management of a captive population is used in this masterplan. This goal is to maintain 90% of the current population heterozygosity for a 100 year span. The immediate goal of the program is to expand the captive population as rapidly as possible while correcting the genetic and demographic unbalance. These considerations were the basis for the following recommendations.

Specific Institutional Recommendations

Individual recommendations, and their justifications, were made on an institution by institution basis.

Nehru Zoological Park, Hyderabad

Obtain female 2404 from Patna

Neither of the animals currently at Hyderabad have reproduced. Female 2404 at Patna is related to the male 2403 with which she is housed and genetically should not be allowed to breed with him. The transfer of 2404 to this location could induce reproduction.

Sanjay Gandhi Biological Park, Patna, Bihar

Remove male 2403

This male has two full siblings and two half siblings living within the Indian captive population and further reproduction at this time is not warranted.

Send female 2404 to Hyderabad

There has been no reproduction at Hyderabad and it is felt that the introduction of a new female will induce reproduction.

Obtain male 2163 from Thiruvananthapuram

This is a wild caught male that has not reproduced. His estimated age places him in prime reproductive age. Offspring from this male will be very valuable to the population.

Obtain female 1960 from Vadodara

This is a female of unknown age and parentage that has not produced any known offspring. It is felt that she is not related to any other animals within the Indian captive population. As she has been with a male for seven years without reproduction, it is important that she be exposed to a new male in an attempt to obtain offspring.

National Zoological Park, New Delhi

Remove males 1551, 1563, 2075 and 2096

This collection is descended primarily from four animals obtained in 1959. The majority of these descendants currently living throughout the captive population are inbred. In order to correct this situation these animals need to be removed from current reproduction.

Obtain male 1761 from Vadodara

This is a male of unknown origin but believed to be unrelated to any of the Delhi animals. This male has no recorded offspring and is an ideal selection to breed with the Delhi females to offset the deleterious effects of their inbreeding.

Shri Sayaji Baug Zoo, Vadodara

After transferring the two animals currently at this location this location will no longer maintain LTM.

Note : Subsequent information indicates that both the animals at Shri Sayaji Baug Zoo, Vadodara have died. Therefore these two animals will not be available for the Delhi and Patna collection. Other animals will have to be substituted.

Send male 1761 to Delhi

This is a male of unknown origin but believed to be unrelated to any of the Delhi animals. This male has no recorded offspring and is an ideal selection to breed with the Delhi females to offset the deleterious effects of their inbreeding.

Send female 1960 to Patna

This is a female of unknown age and parentage that has not produced any known offspring. It is felt that she is not related to any other animals within the Indian captive population. As she has been with a male for seven years with out reproduction, it is important that she be exposed to a new male in an attempt to obtain offspring. Transferring her to Patna will accomplish this.

Thiruvananthapuram Zoo, Thiruvananthapuram

This collection contains two adult males which could be inhibiting reproduction. One of them is apparently the sire of female 2027 and should not be allowed to breed with her. The staff should attempt to determine the identity of the sire and remove him from the group, or if the facilities allow, this group could be divided into two separate

groups with females 1965 and 2027 with the male determined not to be the sire of 2027. The other two females 2053 and 2067 should be housed with the male determined to be the father of 2027.

Send male 2163 to Patna

This wild caught male is the third male at this location and theoretically unneeded for breeding. He is approximately the same age as the female recommended for Patna and as an animal unrelated to any others in the Indian population is an ideal choice for breeding.

Peshwe Park Zoological Garden, Pune

Exchange male 1736 for male 1253 at Nandankanan

Male 1736 is apparently unrelated to any animal within the the Indian captive population and male 1253 at Nandankanan is the sire of all the animals currently at that site. To prevent inbreeding at Nandankanan, male 1736 should be exchanged for male 1253. Male 1253 has eight descendants in the captive population and should be restricted from reproduction at the current time.

Mysore Zoo, Mysore

Remove male 1596

This male has been at this location since 1982 without reproduction. As a new male (2242) has been obtained this year (1996) this animal should be removed from the group to prevent him from being a distraction and reproductively inhibiting factor.

Nandankanan Zoological Park, Bhubaneswar

Exchange male 1253 for male 1736 at Pune

Male 1736 is apparently un-related to any animal within the Indian captive population while male 1253 is the sire of all the animals currently at this site. To prevent inbreeding male 1736 should be exchanged for male 1253.

Send male 2127 to Chennai

One male (1468) has been the sire of all the infants born at Chennai and as the oldest female has reached reproducilve age it has been necessary to establish a second group to prevent inbreeding. This male is just reaching prime reproductive age and both genetically and demographically is ideal for this second group.

Maitri Baugh Zoo, Bhilai

Parentage of the animals at the site is unknown and will be difficult to determine. From available records it is highly probable that they are all related and inbred. None of the animals at this site have studbook numbers assigned. They will be assigned after additional analysis of the records.

Remove all males

These males have been housed with the one female at this site for several years without reproduction. There is aggression between them which is probably contributing towards the lack of interest in the female. Regardless of the cause of the lack of reproduction, they should not be bred with the female due to the possible relatedness.

Obtain male 1505 from Chennai

This male was confiscated from a travelling circus and is unrelated to any animal currently in any zoological institution and can add a new founder to the population.

Mahendra Chaudhury Zoological Park, Chhat Bir

This institution was not represented at the workshop and current information was not supplied, therefore, it was impossible to make any recommendations for this site.

Jaipur Zoological Garden, Jaipur

These animals have been together for many years without reported reproduction. A thorough physical and behavioural evaluation of this collection should be conducted to determine the cause for the lack of reproduction.

Arignar Anna Zoological Park, Chennai

Obtain male 2127 from Nandankanan

One male (1468) has been the sire of all the infants born at this site and as the oldest female has reached reproductive age it has been necessary to establish a second group to prevent inbreeding. This male is just reaching reproductive age and is genetically and demographically ideal for this group.

Send 1505 to Bhilai

This male, confiscated from a traveling circus, is unrelated to any animal currently in any zoological institution and can add a new founder to the population. Parentage of the animals at Bhilai is unknown and will be difficult to determine. From available records it is highly probable that they are all related and inbred. This male will provide an unrelated mate for Bilai's female.

Kanpur Zoological Park, Kanpur

The pair at this location successfully reproduced in 1995 and no changes are recommended at this time.

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DRAFT MASTERPLAN COLLECTION REPORT
LION-TAILED MACAQUE, MACACA SILENUS
INDIAN POPULATION

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Name	% Inbred	Recommendation
Nehru Zoological Park, Hyderabad 500 264, Andhra Pradesh											
1600	F	~ 1980	Wild	Wild	Tamilnadu	~ Feb 1984	---------	Capture			
					Hyderabad	8 Mar 1984	007	Transfer			
2294	M	5 Dec 1990	1468	1467	Chennai	5 Dec 1990	Unk	Birth	Shashi	0.1250	
					Hyderbad	27 Aug 1992	008	Transfer			
2404	F	29 Jan 1992	1253	1689	Nandankan	29 Jan 1992	LTM18	Birth		0.4395	Obtain from Patna
					Patna	26 Mar 1995	Unk	Transfer			
Sanjay Gandhi Biological Park, Patna, Bihar											
2403	M	12 Jan 1992	1253	1311	Nandankan	12 Jan 1992	LTM17	Birth		0.3008	Remove
					Patna	26 Mar 1995	Unk	Transfer			
2404	F	29 Jan 1992	1253	1689	Nandankan	29 Jan 1992	LTM18	Birth		0.1250	Send to Hyderabad
					Patna	26 Mar 1995	Unk	Transfer			
1960	F	- 1987	Unk	Unk	Unknown	~ 1987	Unk	Birth			obtain from Vadodara
					Vadodara	???	32	Transfer			
2163	F	- 1986	Wild	Wild	India	~ 1989	---------	Capture	Ganish		obtain from Thiruvan
					Thiruvan	18 May 1989	Unk	Transfer			
National Zoological Park, New Delhi 110003											
1481	F	4 Apr 1980	994	1099	Delhi	4 Apr 1980	---------	Birth			
1546	F	8 Apr 1981	994	859	Delhi	8 Apr 1981	---------	Birth			
1551	M	1 May 1981	994	1025	Delhi	1 May 1981	---------	Birth			Remove
1563	M	10 Jul 1981	994	1158	Delhi	10 Jul 1981	---------	Birth			Remove
1761	M	~ 1985	Unk	Unk	Unknown	~ 1985	Unk	Birth			Obtain from Vadodara
					Chennai	????	Unk	Transfer			
					Vadodara	6 Mar 1989	31	Transfer			
2075	M	19 Jul 1988	1456	1025	Delhi	19 Jul 1988	-----	Birth		0.1484	Remove
2096	M	18 Sep 1988	1456	1099	Delhi	18 Sep 1988	-----	Birth		0.1484	Remove

Compiled by : Laurence Giedhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct.1996

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DRAFT MASTERPLAN COLLECTION REPORT
LION-TAILED MACAQUE, MACACA SILENUS
INDIAN POPULATION

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Name	% Inbred	Recommendation
Shri Sayaji Baug Zoo, Vadodara, Gujarat											
1761	M	~ 1985	Unk	Unk	Unknown	~ 1985	Unk	Birth			Send to Delhi
					Chennai	????	Unk	Transfer			
					Vadodara	6 Mar 1989	31	Transfer			
1960	F	~ 1987	Unk	Unk	Unknown	~ 1987	Unk	Birth			Send to Patna
					Vadodara	???	32	Transfer			
No Lion-Tailed macaques left at this location											
Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala											
1652	M	24 Jan 1983	Unk	Unk	Thiruvan	24 Jan 1983	Unk	Birth	Raju		
1943	M	~ 1982	Wild	Wild	India	~ 1987	------	Caputre	Mohan		
					Thiruvan	24 Apr 1987	Unk	Transfer			
1965	F	1 Jan 1987	Wild	Wild	India	~ 1987	-------	Capture	Mani		
					Thiruvan	13 Jul 1987	Unk	Transfer			
2027	F	13 Mar 1988	Unk	Unk	Thiruvan	13 Mar 1988	Unk	Birth	Thara		
2053	F	~ 1986	Wild	Wild	India	~ 1988	-----	Capture	Bindu		
					Thiruvan	25 May 1988	---				
2067	F	~ 1988	Wild	Wild	India	~ 1990	-----	Capture	Babu		
					Trichur	~ 1990	Unk	Transfer			
					Thiruvan	16 Nov 1994	-----	Transfer			
2163	F	~ 1986	Wild	Wild	India	~ 1989	----	Capure	Ganish		Send to Patna
					Thiruvan	18 May 1989	Unk	Transfer			
Peshwe Park Zoological Gardens, Pune, Maharashtra											
1253	M	26 May 1976	513	925	Delhi	26 May 1976	----	Birth			Obtain from Nandankanan
					Nandankan	20 Jan 1982	LTM6	Transfer			

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Data current thru : 17 Oct.1996

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DRAFT MASTERPLAN COLLECTION REPORT
LION-TAILED MACAQUE, MACACA SILENUS
INDIAN POPULATION

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Name	% Inbred	Recommendation
1736	M	~ 1982 +/-1yr	Wild	Wild	India	????	--------	Capture			Send to Nandankanan
					Mohotta	~1982 +/-1yr	Unk	Transfer			
					Pune	~ Aug 1984	Unk	Transfer			
Sri Chamarajendra Zoological Gardens, Mysore 570 010, Karnataka											
1528	F	~1979	Wild	Wild	Bannergh	~1981	---------	Capture	Sharavathi		
					Mysore	~1981	Czak-1	Transfer			
1596	M	~1981	Wild	Wild	India	~1982	---------	Capture	Manja		Remove
					Mysore	~1982	820004	Transfer			
2237	F	~1990	Wild	Wild	Bannergh	~Jan 1992	---------	Capture	Nethra		
					Mysore	20 Jan 1992	Czak-3	Transfer			
2242	M	~1988	Wild	Wild	India	~1990	---------	Capture	Rama		
					Shimoga	~1990	Unk	Transfer			
					Mysore	13 Mar 1996	Czak-5	Transfer			
2263	F	~1990	Wild	Wild	India	~1992	---------	Capture	Shanti		
					Mangalore	~1992	Unk	Transfer			
					Mysore	13 Mar 1996	Czak-6	Transfer			
2274	F	15 Jun 1990	Wild	Wild	Bannergh	~Oct 1992	---------	Capture	Priya		
					Mysore	10 Oct 1992	Czak-4	Transfer			
Nandankanan Zoological Park, Bhubaneswar 751 007, Orissa											
1253	M	26 May 1976	513	925	Delhi	26 May 1976	---------	Birth			Send to Pune
					Nandankan	20 Jan 1982	LTM6	Transfer			
1689	F	4 Oct 1983	1253	1311	Nandankan	4 Oct 1983	LTM8	Birth		0.3008	
1736	M	~1982 +/-1yr	Wild	Wild	India	????	---------	Capture			Obtain from Pune
					Mohotta	~1982 +/-1yr	Unk	Transfer			
					Pune	~Aug 1984	Unk	Transfer			
2127	M	25 Jan 1989	1253	1773	Nandankan	25 Jan 1989	LTM14	Birth		0.4395	Send to Chennai
2249	F	16 Mar 1990	1253	1311	Nandankan	16 Mar 1990	LTM16	Birth		0.3008	

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Data current thru : 17 Oct.1996

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DRAFT MASTERPLAN COLLECTION REPORT
LION-TAILED MACAQUE, MACACA SILENUS
INDIAN POPULATION

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Name	% Inbred	Recommendation
Maitri Bagh Zoo, Bhilai 490 010, Madhya Pradesh											
????	M	Unknown	Unk	Unk	Bhilai	????	---------	Birth		Remove	
????	M	Unknown	Unk	Unk	Bhilai	????	---------	Birth		Remove	
????	F	Unknown	Unk	Unk	Bhilai	????	---------	Birth			
T505	M	~1988	Wild	Wild	India	~ 1990	---------	Capture	Ramu		Obtain from Chennai
					Private	~ 1990	---------	Transfer			
					Chennai	20 May 1994	Unk	Transfer			
Mahendra Chaudhary Zoological Park, Chhat Bir, Punjab											Current information not supplied to workshop - no recommendations made
1332	M	27 Oct 1979	Unk	Unk	Chhat Bir	27 Oct 1979	---------	Birth			
1345	?	~ 1976	Wild	Wild	India	~ 1978	---------	Capture			
					Thiruvan	~1978	---------	Transfer			
					Chhat Bir	6 Mar 1979	Unk	Transfer			
1575	M	~1979	Wild	Wild	India	~1981	---------	Capture			
					Chhat Bir	26 Oct 1981	---------	Transfer			
1615	?	2 Jul 1982	994	1151	Delhi	2 Jul 1982	---------	Birth			
					Chhat Bir	21 Oct 1989	Unk	Transfer			
1869	M	1 Jun 1986	Unk	Unk	Chhat Bir	1 Jun 1986	---------	Birth			
1998	M	16 Nov 1987	Unk	Unk	Chhat Bir	16 Nov 1987	---------	Birth			
2214	?	????	Wild	Wild	India	~1989	---------	Capture			
					Chhat Bir	21 Oct 1989	---------	Transfer			
2223	M	13 Dec 1989	Unk	Unk	Chhat Bir	13 Dec 1989	---------	Birth			
2256	?	1 Apr 1990	Unk	Unk	Chhat Bir	1 Apr 1990	---------	Birth			

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Data current thru : 17 Oct.1996

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DRAFT MASTERPLAN COLLECTION REPORT
LION-TAILED MACAQUE, MACACA SILENUS
INDIAN POPULATION

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Name	% Inbred	Recommendation
Jaipur Zoo, Jaipur, Rajasthan									No Changes		
1220	M	1 Jan 1975	Wild	Wild	India	~ 1975	----------	Capture			
					Thiruvan	9 Dec 1975	Unk	Transfer			
					Jaipur	12 May 1981	Unk	Transfer			
1221	F	1 Jan 1975	Wild	Wild	India	~ 1975	----------	Capture			
					Thiruvan	16 Dec 1975	Unk	Transfer			
					Jaipur	12 May 1981	Unk	Transfer			
1242	?	23 Mar 1976	513	859	Delhi	23 Mar 1976	----------	Birth			
					Jaipur	27 May 1981	Unk	Transfer			
1370	?	26 Apr 1978	994	925	Delhi	26 Apr 1978	----------	Birth			
					Jaipur	11 Feb 1981	Unk	Transfer			
Arignar Anna Zoological Garden, Chennai - 600 048, Tamil Nadu											
1468	M	~1980	Wild	Wild	Tamilnadu	????	Unk	Capture	Mohan		Group I
					Guindy	????	Unk	Transfer			
					Chennai	7 Apr 1990	Unk	Transfer			
1829	F	~1988	Wild	Wild	Valparai	26 May 1990	----------	Capture	Bhama		Group II
					Chennai	26 May 1990	Unk	Transfer			
2127	M	25 Jan 1989	1253	1773	Nandankan	25 Jan 1989	LTM14	Birth	Obtain from Nandankanan		Group II
2258	F	~1988	Wild	Wild	Valparai	~May 1990	----------	Capture	Rukkumani		Group I
					Chennai	26 May 1990	----------	Transfer			
2321	F	16 July 1991	1468	1829	Chennai	16 Jul 1991	----------	Birth	Malar		Group II
2468	M	1 Oct 1993	1468	2258	Chennai	1 Oct 1993	----------	Birth	Vijayan		Group I
2498	F	21 Dec 1993	1468	1829	Chennai	21 Dec 1993	----------	Birth	Uma		Group I
T505	M	~1988	Wild	Wild	India	~ 1990	----------	Capture	Ramu		Group II
					Private	~1990	----------	Transfer			Send to Bhilai
					Chennai	20 May 1994	Unk	Transfer			

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Data current thru : 17 Oct.1996

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DRAFT MASTERPLAN COLLECTION REPORT
LION-TAILED MACAQUE, MACACA SILENUS
INDIAN POPULATION

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Name	% Inbred	Recommendation
x104	M	4 Jan 1995	1468	2258	Chennai	4 Jan 1995	----------	Birth	Seenu		Group II
x601	M	14 Jun 1995	1468	1829	Chennai	14 Jun 1995	----------	Birth	Venu		Group I
Y500	?	~ 1996	1468	1829	Chennai	~ 1996	----------	Birth			Group II
Y600	?	~ 1996	1468	2258	Chennai	~ 1996	----------	Birth			Group I
Kanpur Zoological Park, Kanpur, Uttar Pradesh										No Changes	
1453	F	5 Aug 1979	Unk	1170	Kanpur	5 Aug 1979	2305	Birth	Neeta		
1608	M	28 Apr 1982	994	1099	Delhi	28 Apr 1982	----------	Birth			
					Lucknow	24 Mar 1988	Unk	Transfer			
					Kanpur	~1995	Unk	Transfer			
x 602	F	~1995	1102	1453	Kanpur	~ 1995	Unk	Birth			

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct.1996

LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Rearing Name	%Inbred
266	?	????	Unk	Unk	Veermata	????	Unk	Birth		
					Melbourne	1 Dec 1949	490000	Transfer		
						1 Aug 1958		Death		
267	M	????	Unk	Unk	Veermata	????	Unk	Birth		
					Melboure	1 Dec 1949	490001	Transfer		
						10 Oct 1959		Death		
287	F	????	Unk	Unk	Veermata	????	Unk	Birth		
					Melbourne	10 Dec 1949	490002	Transfer		
						1 Jul 1964		Death		
288	F	????	Unk	Unk	Veermata	????	Unk	Birth		
					Melbourne	10 Dec 1949	490003	Transfer		
						1 Jul 1964		Death		
318	M	????	Wild	Wild	Inida	~1953	Unk	Capture	Parent	
					Calcutta	~1953	Unk	Transfer		
					Adelaide	17 Dec 1953	530001	Transfer		
						12 Mar 1981		Death		
319	F	~ 1951	Wild	Wild	India	! 1953	Unk	Capture	Parent	
					Calcutta	~ Jun 1953	Unk	Transfer		
					Adelaide	17 Dec 1953	530002	Transfer		
						~ Jun 1961		Death		
386	F	~ 1954	Wild	Wild	India	~ Juj 1956	Unk	Capture	Parent	
					Ahmedabad	~ 1958	Unk	Transfer		
					Perth	28 Feb 1961	Unk	Transfer		
						11 May 1974		Death		
429	M	~1957	Wild01	Wild02	India	~ Jun 1959	Unk	Capture	Parent	
					Delhi	11 Sep 1959	Unk	Transfer		
						20 Sep 1970		Death		
437	F	~ 1957	Wild01	Wild03	India	~ Jun 1959	Unk	Capture	Parent	
					Delhi	11 Sep 1959	Unk	Transfer		
						4 Oct 1970		Death		
444	F	~1957	Wild04	Wild05	India	1 Jan 1959	Unk	Capture	Parent	
					Delhi	23 Oct 1959	Unk	Transfer		
						31 Dec 1976		Death		
445	M	~1957	Wild01	Wild19	India	~ Jun 1959	Unk	Capture	Parent	
					Delhi	23 Oct 1959	Unk	Transfer		
						23 Nov 1967		Death		
449	M	~1957	Wild	Wild	Inida	~1959	Unk	Capture	Parent	
					Delhi	23 Oct 1959	Unk	Transfer		
					Rangoon	6 Nov 1969	Unk 1tf	Transfer		
450	F	~1957	Wild01	Wild15	Inida	~1959	Unk	Capture	Parent	
					Delhi	23 Oct 1959	Unk	Transfer		
					Rangoon	6 Nov 1969	Unk 1tf	Transfer		
465	M	~Jun 1955	Unk	Unk	Calcutta	~Jun 1955	Unk	Birth		
					Perth	20 Nov 1960	Unk	Transfer		
					Adelaide	18 Apr 1985	850054	Transfer		
						18 Nov1985		Death		

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

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LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID		Event	Rearing Name	%Inbred
513	M	18 Mar 1962	429	437	Delhi	18 Mar 1962 10 Oct 1977	Unk		Birth Death	Parent	
526	F	~ 1964	Wild	Wild	India Delhi	~ Feb 1966 29 Mar 1966 20 Nov 1977	Unk Unk		Capture Transfer Death	Parent	
717	F	~ 1963	Wild	Wild	India Nandankan	15 Dec 1955 29 Jan 1966 18 May 1984	Unk LTM1		Capture Transfer Death	Parent	
718	F	~ 1963	Wild	Wild	India Nandankan	15 Dec 1965 29 Jan 1966 16 Jun 1984	Unk LTM2		Capture Transfer Death	Parent	
776	M	~ 1965	Wild	Wild	India Nandankan	~ Jan 1967 29 Mar 1967 15 Nov 1975	Unk LTM3		Capture Transfer Death	Parent	
777	F	~ 1972	Wild	Wild	India Nandankan	~ Jan 1974 13 Feb 1974 29 Aug 1975	Unk Ltm4		Capture Transfer Death	Parent	
859	F	7 Jan 1969	429	437	Delhi	7 Jan 1969 13 Aug 1982	Unk		Birth Death	Parent	
906	M	~ 1974	Wild	Wild	India Mysore	~ 1976 10 Feb 1976	Unk Unk	1tf	Capture Transfer	parent	
918	M	~ 1968	Wild	Wild	India Delhi	~ Jan 1970 26 Mar 1970 8 Nov 1985	Unk Unk		Capture Transfer Death	Parent	
925	F	19 May 1970	429	444	Delhi	19 May 1970 16 Mar 1979	Unk		Birth Death	Parent	
969	M	1 Mar 1967	429	444	Delhi Sandiegoz	1 Mar 1967 12 Mar 1971 2 Mar 1993	Unk 171041		Birth Transfer Death	Parent	
970	F	13 May 1967	429	437	Delhi Sandiegoz	13 May 1967 12 Mar 1971 6 Jan 1993	Unk 171042		Birth Transfer Death	Parent	
982	?	7 May 1971	513	444	Delhi	7 May 1971 1 Dec 1981	Unk		Birth Death	Parent	
994	M	9 Sep 1971	513	526	Delhi	9 Sep 1971 6 Nov 1984	Unk		Birth Death	Parent	
999	F	15 Jun 1969	Wild	Wild	India Calcutta Adelaide	~ Jun 1971 ~ Jun 1971 18 Oct 1971 18 Jul 1985	Unk Unk 710002		Capture Transfer Transfer Death	Parent	
1000	F	~ 1969	Wild	Wild	India Calcutta Adelaide	~ Jun 1971 ~ Jun 1971 18 Oct 1971 9 Feb 1996	Unk Unk 710003		Capture Transfer Transfer Death	Parent	

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

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LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID		Event	Rearing Name	%Inbred
1005	F	~ 1969	Wild	Wild	India	~ Jun 1971	Unk		Capture	Parent	
					Veermata	29 Nov 1971	Unk		Transfer		
						17 Jul 1989			Death		
1007	F	~1969	Wild	Wild	India	~ Jun 1971	Unk		Capture	Parent	
					Veeramata	29 Nov 1971	Unk	1tf	Transfer		
1025	F	1 Mar 1972	513	444	Delhi	1 Mar 1972	Unk	1tf	Birth	Parent	
1074	?	14 Mar 1973	513	526	Delhi	14 Mar 1973	Unk		Birth	Parent	
						11 Jun 1979			Death		
1099	F	28 Sep 1973	513	444	Delhi	28 Sep 1973	Unk		Birth	Parent	
						17 Jun 1989			Death		
1102	M	~ 1971	Wild12	Wild13	India	~ Jun 1973	Unk		Capture	Parent	
					Kanpur	6 Oct 1973	2301		Transfer		
						~ Jun 1995			Death		
1119	M	~ 1972	Wild	Wild	India	~ 1974	Unk		Capture	Parent	
					Nandankan	13 Feb 1974	LTM5		Transfer		
						17 Feb 1982			Death		
1151	F	24 Sep 1974	513	859	Delhi	24 Sep 1974	Unk		Birth	Parent	
						1 Dec 1987			Death		
1155	M	15 Jun 1972	Wild	Wild	India	~ Jun 1974	Unk		Capture	Parent	
					Kanpur	6 Nov 1974	2302		Transfer		
						3 Mar 1987			Death		
1156	M	~ 1972	Wild	Wild	India	15 Jun 1974	Unk		Capture	Parent	
					Kanpur	6 Nov 1974	2303		Transfer		
						21 Jun 1993			Death		
1158	F	10 Nov 1974	513	444	Delhi	10 Nov 1974	Unk		Birth	Parent	
						12 Oct 1985			Death		
1166	F	~ 1973	Wild	Wild	Indian	~ Jun 1975	Unk		Capture	Parent	
					Mysore	29 Aug 1975	Unk	1tf	Transfer		
1170	F	~ 1973	Wild	Wild	India	~ Jan 1975	Unk		Capture	Parent	
					Kanpur	20 Jan 1975	2304		Transfer		
						11 Dec 1990			Death		
1185	F	24 May 1975	513	526	Delhi	24 May 1975	Unk		Birth	Parent	
						21 May 1987			Death		
1220	M	15 Jun 1973	Wild	Wild	India	~ Jun 1975	Unk		Capture	Parent	
					Thiruvan	9 Dec 1975	Unk		Transfer		
					Jaipur	12 May 1981	Unk	1tf	Transfer		
1221	F	15 Jun 1973	Wild	Wild	India	~ Jun 1975	Unk		Capture	Parent	
					Thiruvan	16 Dec 1975	Unk		Transfer		
					Jaipur	12 May 1981	Unk	1tf	Transfer		
1242	?	23 Mar 1976	513	859	Delhi	23 Mar 1976	Unk		Birth	Parent	
					Jaipur	27 May 1981	Unk	1tf	Transfer		

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

Contd.....

LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID		Event	Rearing Name	%Inbred
1249	F	~ 1974	Wild	Wild	India	~ Mar 1976	Unk		Capture	Parent	
					Ahmedabad	19 May 1976	Unk		Transfer		
						26 Jun 1987			Death		
1250	F	~ 1974	Wild	Wild	Inida	~ Mar 1976	Unk		Capture	Parent	
					Ahmedabad	19 May 1976	Unk		Transfer		
						28 Nov 1989			Death		
1253	M	26 May 1976	513	925	Delhi	26 May 1976	Unk		Birth	Parent	
					Nandankan	20 Jan 1982	LTM6	1tf	Transfer		
1278	?	13 Nov 1976	513	526	Delhi	13 Nov 1976	Unk		Birth	Parent	
						27 Aug 1989			Death		
1283	F	~ 1974	Wild	Wild	India	~ Jun 1976	Unk		Capture	parent	
					Veermata	22 Nov 1976	Unk	1tf	Transfer		
1284	M	~ 1974	Wild	Wild	India	~ Jun 1976	Unk		Capture	Parent	
					Veermata	22 Nov 1976	Unk	1tf	Transfer		
1285	F	~ 1974	Wild	Wild	India	~ Jun 1976	Unk		Capture	Parent	
					Veeramata	22 Nov 1976	Unk		Transfer		
						11 Sep 1985			Death		
1292	F	~ 1975	Wild	Wild	India	~ Jan 1977	Unk		Capture	Parent	
					Chhat Bir	9 Mar 1977	Unk		Transfer		
						16 Sep 1989			Death		
1303	M	~ 1973	Wild	Wild	India	~ 1977	--------		Capture	Parent	
					Chhat Bir	9 Mar 1977	Unk		Transfer		
						25 Sep 1990			Death		
1304	F	15 Jun 1975	Wild	Wild	India	~ Jan 1977	Unk		Capture	Parent	
					Chhat Bir	9 Mar 1977	Unk		Transfer		
						30 Aug 1985			Death		
1311	F	18 Jul 1977	513	1025	Delhi	18 Jul 1977	Unk		Birth	Parent	
					Nandankan	20 Jan 1982	LTM7		Transfer		
						24 Aug 1996			Death		
1332	M	27 Oct 1979	Unk	Unk	Chhat Bir	27 Oct 1979	Unk	1tf	Birth	Parent	
1345	?	~ 1976	Wild	Wild	India	~ Jan 1978	Unk		Capture	Parent	
					Thiruvan	1 Jan 1978	Unk		Transfer		
					Chhat Bir	6 Mar 1979	Unk	1tf	Transfer		
1357	F	~ 1978	Wild	Wild	India	~ Mar 1980	Unk		Capture	Parent	
					Thiruvan	14 May 1980	Unk		Transfer		
						5 Aug 1985			Death		
1365	F	15 Jun 1978	Wild	Wild	Inida	~ 1980	Unk		Capture	Parent	
					V.O.C.	~ Jun 1980	Unk		Transfer		
						5 Aug 1990			Death		
1370	?	26 Mar 1978	994	925	Delhi	26 Mar 1978	Unk		Birth	Parent	
					Jaipur	11 Feb 1981	Unk	1tf	Transfer		
1371	F	27 Mar 1978	994	859	Delhi	27 Mar 1978	Unk	1tf	Birth	Parent	

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

Contd.....

LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID		Event	Rearing Name	%Inbred
1387	?	11 Aug 1978	994	925	Delhi	11 Aug 1978 3 Sep 1990	Unk		Birth Death	Parent	
1392	?	2 oct 1978	994	1025	Delhi	2 Oct 1978 21 Oct 1978	Unk		Birth Death	Parent	
1393	?	17 Oct 1978	994	1151	Delhi	17 Oct 1978 17 Oct 1978	Unk		Birth Death	Parent	
1418	F	~ Jun 1979	Unk	Unk	Unknown Chennai Hyderabad	~ Jun 1979 ~ Jun 1980 12 Sep 1983 10 Sep 1985	Unk Unk 005		Birth Transfer Transfer Death	Parent	
1451	F	29 Jul 1979	994	1151	Delhi	29 Jul 1979 16 Mar 1991	Unk		Birth Death	Parent	
1453	F	5 Aug 1979	Unk	1170	Kanpur	5 Aug 1979	2305	1tf	Birth	Parent	
1456	M	11 Sep 1979	994	859	Delhi	11 Sep 1979	Unk	1tf	Birth	Parent	
1460	?	1 Oct 1979	994	1025	Delhi	1 Oct 1979 3 Jan 1980	Unk		Birth Death	Parent	
1466	M	~ 1978	Wild	Wild	India Mysore	~ Jan 1980 1 Oct 1980	Unk 800001	1tf	Capture Transfer	Parent	
1467	F	~ 1988	Wild06	Wild07	Tamilnadu Guindy Chennai	~ 1990 ~ 1990 7 Apr 1990 16 Nov 1995	Unk Unk Unk		Capture Transfer Transfer Death	Parent	
1468	M	~ 1988	Wild06	Wild08	India Tamilnadu Guindy Chennai	~ 1990 ~ 1990 ~ 1990 7 Apr 1990	Unk Unk Unk Unk	1tf	Capture Transfer Transfer Transfer	Parent	
1481	F	4 Apr 1980	994	1099	Delhi	4 Apr 1980	Unk	1tf	Birth	Parent	
1490	F	~ 1978	Wild	Wild	India Thiruvan Chennai	~ Jun 1980 3 Jun 1980 13 Aug 1985	Unk Unk Unk	1tf	Capture Transfer Transfer	Parent	
1517	?	10 Nov 1980	994	1158	Delhi	10 Nov 1980 13 Nov 1980	Unk		Birth Death	Parent	
1526	M	~ 1979	Wild	Wild	India Mysore	~ Mar 1981 26 Mar 1981	Unk Unk	1tf	Capture Transfer	Parent	
1528	F	~ 1979	Wild	Wild	India Mysore	~ Jun 1981 ~Jun 1981	Unk Unk	1tf	Capture Transfer	Parent	
1540	F	31 Mar 1981	Unk	Unk	Thiruvan	31 Mar 1981	Unk	1tf	Birth	Parent	
1546	F	8 Mar 1981	994	859	Delhi	8 Mar 1981	Unk	1tf	Birth	Parent	
1551	M	1 May 1981	994	1025	Delhi	1 May 1981	Unk	1tf	Birth	Parent	
1563	M	10 Jul 1981	994	1158	Delhi	10 Jul 1981	Unk	1tf	Birth	parent	

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

Contd.....

LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID		Event	Rearing Name	%Inbred
1564	M	13 Jul 1981	1284	1283	Veermata	13 Jul 1981	M13		Birth	Parent	
						9 Nov 1993			Death		
1575	M	~ 1979	Wild	Wild	India	~ Jun 1981	Unk		Capture	Parent	
					Chhat Bir	26 oct 1981	Unk	1tf	Transfer		
1596	M	~ 1980	Wild	Wild	India	~ Jun 1982	Unk		Capture	Parent	
					Mysore	~ Jun 1982	820004	1tf	Transfer		
1600	F	~ 1982	Wild	Wild	India	~ Feb 1984	Unk		Capture	Parent	
					Tamilnadu	~ Feb 1984	Unk		Transfer		
					Hyderabad	8 Mar 1984	007	1tf	Transfer		
1608	M	28 Mar 1982	994	1099	Delhi	28 Mar 1982	Unk		Birth	Parent	
					Lucknow	24 Mar 1988	Unk		Transfer		
					Kanpur	~ Jun 1995	Unk	1tf	Transfer		
1615	?	2 Jul 1982	994	1151	Delhi	2 Jul 1982	Unk		Birth	Parent	
					Chhat Bir	21 Oct 1989	Unk	1tf	Transfer		
1625	F	16 Aug 1982	994	1025	Delhi	16 Aug 1982	--------		Birth	Parent	
					Lucknow	24 Mar 1988	Unk	1tf	Transfer		
1633	M	~ 1982	Unk	Unk	Chennai	~ 1982	--------		Birth	Parent Ramu	
					Shimla	16 Oct 1986	Unk		Transfer		
1634	F	~ 1982	Unk	Unk	Chennai	~ 1982	--------		Birth	Parent Leela	
					Shimla	16 Oct 1986	Unk		Transfer		
1651	M	2 Dec 1982	994	1185	Delhi	2 Dec 1982	--------	1tf	Birth	Parent	
1652	M	24 Jan 1983	Unk	Unk	Thiruvan	24 Jan 1983	Unk		Birth	Parent Raju	
1668	F	~ 1982	Wild	Wild	India	~ 1984	---------		Capture	Parent Sita	
					Thiruvan	14 Feb 1984	Unk		Transfer		
					Mysore	4 Aug 1984	Unk		Transfer		
					Toronto	9 Mar 1986	20488		Transfer		
1676	?	17 Jul 1983	Unk	1453	Kanpur	17 Jul 1983	Unk		Birth	Parent	
						19 Jul 1983			Death		
1689	F	4 Oct 1983	1253	1311	Nandankan	4 Oct 1983	LTM8		Birth	Parent	0.3008
1708	M	~ 1983	Wild	Wild	India	~ 1985	---------		Capture	Parent Rajan	
					Thiruvan	~ 1985	Unk		Transfer		
1713	M	19 Feb 1984	Unk	Unk	Thiruvan	19 Feb 1984	Unk		Birth	Parent Rama	
					Mysore	4 Aug 1984	Unk		Transfer		
					Toronto	9 Mar 1986	20487		Transfer		
1723	?	21 Nov 1984	994	1025	Delhi	21 Nov 1984	---------		Birth	Parent	
						21 Nov 1984			Death		
1731	?	22 Jun 1984	Unk	1453	Kanpur	22 Jun 1984	Unk		Birth	Parent	
						23 Jun 1984			Death		
1736	M	~ 1980	Wild	Wild	India	~ 1982	--------		Capture	Parent	
					Mohotta	~ 1982	Unk		Transfer		
					Pune	~ Aug 1984	Unk		Transfer		

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

Contd.....

LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Rearing Name	%Inbred
1761	M	~ 1985	Unk	Unk	Unknown	~ 1985	Unk	Birth	Parent	
					Chennai	????	Unk	Transfer		
					Vadodara	6 Mar 1989	31	Transfer		
1773	F	28 Mar 1985	1253	1311	Nandankan	28 Mar 1985	LTM9	Birth	Parent	
						9 Apr 1991		Death		
1829	F	~ 1988	Wild09	Wild10	Valparai	~ 1990	---------	Capture	Parent Bahama	
					Chennai	26 May 1990	---------	Transfer		
1844	M	14 May 1983	994	1099	Delhi	14 May 1983	---------	Birth	Parent Sinba	0.1406
					Ny Bronx	31 May 1989	981092	Transfer		
					Baltimore	15 May 1991	91049	Transfer		
1851	M	31 Mar 1986	Unk	Unk	Thiruvan	31 Mar 1986	---------	Birth	Parent Ravi	
1854	F	20 Feb 1985	1456	1185	Delhi	20 Feb 1985	---------	Birth	Parent Salsa	0.2110
					Ny Bronx	31 mar 1989	981093	Transfer		
					Colo Sprg	13 Aug 1991	91M059	Transfer		
1860	?	6 May 1986	Unk	1453	Kanpur	6 May 1986	Unk	Birth	Parent	
						7 May 1986		Death		
1869	M	1 Jun 1986	Unk	Unk	Chhat Bir	1 Jun 1986	---------	Birth	Parent	
1921	M	21 Jan 1987	1253	1311	Nandankan	21 Jan 1987	LTM10	Birth	Parent	
						26 May 1991		Death		
1922	M	????	Wild	Wild	Tamilnadu	????	---------	Capture	Parent	
					Guindy	????	Unk 1tf	Transfer		
1923	M	????	Wild	Wild	Tamilnadu	????	---------	Capture	Parent	
					Guindy	15 Jun 1989	Unk 1tf	Transfer		
1943	M	~ 1985	Wild	Wild	India	~ 1987	---------	Capture	Parent Mohan	
					Thiruvan	22 Apr 1987	Unk	Transfer		
1944	M	~ 1985	Wild	Wild	India	?????	---------	Capture	Parent Sankar	
					Thiruvan	22 Apr 1987	---------	Transfer		
						29 Jun 1993		Death		
1960	F	~ 1987	Unk	Unk	Unknown	~ 1987	Unk	Birth		
					Vadodara	????	32	Transfer		
1965	F	~ 1985	Wild	Wild	India	~ 1987	---------	Capture	Parent Mani	
					Thiruvan	13 Jul 1987	---------	Transfer		
1998	M	16 Nov 1987	Unk	Unk	Chhat Bir	16 Nov 1987	---------	Birth	Parent	
2013	M	19 Jan 1988	1253	1689	Nandankan	19 Jan 1988	LTM11	Birth	Parent	
						19 Jan 1988		Death		
2027	F	15 Mar 1988	Unk	Unk	Thiruvan	15 Mar 1988	Unk	Birth	Thara	
2053	F	~ 1986	Wild	Wild	India	~ 1988	---------	Capture	Parent Bindu	
					Thiruvan	25 May 1988	---------	Transfer		

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

Contd.....

LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Rearing Name	%Inbred
2063	?	1 Jun 1988	1456	1099	Delhi	1 Jun 1988 11 Jun 1988	----------	Birth Death	Parent	
2067	F	~ 1988	Wild	Wild	India Trichur Thiruvan	~ 1990 ~ 1990 16 Nov 1994	---------- Unk ----------	Capture Transfer Transfer	Parent Babu	
2075	M	19 Jul 1988	1456	1925	Delhi	19 Jul 1988	----------	Birth	Parent	0.1484
2096	M	18 Sep 1988	1456	1099	Delhi	18 Sep 1988	----------	Birth	Parent	0.1484
2110	M	3 Nov 1988	1253	1311	Nandankan	3 Nov 1988 20 Aug 1989	LTM12	Birth Death	Parent	
2116	M	14 Nov 1988	1253	1689	Nandankan	14 Nov 1988 14 Nov 1988	LTM13	Birth Death	parent	
2127	M	25 Jan 1989	1253	1773	Nandankan	25 jan 1989	LTM14	Birth	Parent	0.4395
2163	M	~ 1987	Wild	Wild	India Thiruvan	~ 1989 18 May 1989	---------- ----------	Capture Transfer	Parent Ganish	0.4395
2214	?	????	Wild	Wild	India Chhat Bir	~ 1989 21 Oct 1989	---------- ----------	Capture Transfer	Parent	
2223	M	13 Dec 1989	Unk	Unk	Chhat Bir	13 Dec1989	----------	Birth	Parent	
2235	M	9 Jan 1990	1253	1689	Nandankan	9 Jan 1990 29 Sep 1994	LTM15	Birth Death	Parent	
2237	F	~ 1990	Wild	Wild	Bannergh Mysore	~ Jan 1992 20 Jan 1992	---------- Czak-3	Capture Transfer	Parent Nethra	
2242	M	~ 1988	Wild	Wild	India Shimoga Mysore	~ 1990 ~ 1990 13 Mar 1996	---------- Unk Czak-5	Capture Transfer Transfer	Parent Rama	
2249	F	16 Mar 1990	1253	1311	Nandankan	16 Mar 1990	LTM16	Birth	Parent	0.3008
2256	?	1 Apr 1990	Unk	Unk	Chhat Bir	1 Apr 1990	Unk	Birth	Parent	
2258	F	15 Jun 1988	Wild09	Wild11	Valparai Chennai	~ May 1990 16 May 1990	---------- ----------	Capture Transfer	Parent Rukkumani	
2263	F	~ 1990	Wild	Wild	Inida Mangalore Mysore	~ 1992 ~ 1992 13 Mar 1996	---------- Unk Czak-6	Capture Transfer Transfer	Parent Shanti	
2271	M	11 Aug 1990	1102	1170	Kanpur	11 Aug 1990 11 Aug 1990	Unk	 Death	Birth	Parent
2274	F	15 Jun 1990	Wild	Wild	Bannergh Mysore	~ Oct 1992 10 Oct 1992	---------- Czak-4	Capture Transfer	Parent Priya	
2294	M	5 Dec 1990	1468	1467	Chennai Hyderabad	5 Dec 1990 27 Aug 1992	---------- 008	Birth Transfer	Parent Shashi	0.1250
2321	F	16 Jul 1991	1468	1829	Chennai	16 Jul 1991	----------	Birth	Parent Malar	
2340	?	15 Oct 1991	1456	1025	Delhi	15 Oct 1991 19 Oct 1991	----------	Birth Death	Parent	

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

Contd.....

LION-TAILED MACAQUE INDIAN STUDBOOK
(Macaca silenus)

Stud	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Event	Rearing Name	%Inbred
2360	F	13 jan 1992	1468	2258	Chennai	13 Jan 1992	---------	Birth	Parent Geetha	
2384	M	18 Aug 1992	1468	1467	Chennai	18 Aug 1992	---------	Birth	Parent Pandian	0.1250
2403	M	12 Jan 1992	1253	1311	Nandankan Patna	12 Jan 1992 26 Mar 1995	LTM7 Unk	Birth Transfer	Parent	0.3008
2404	F	29 Jan 1992	1253	1689	Nandankan Patna	29 Jan 1992 26 Mar 1995	LTM18 Unk	Birth Transfer	Parent	0.4395
2468	M	1 Oct 1993	1468	2258	Chennai	1 Oct 1993	---------	Birth	Parent Vijayan	
2498	F	21 Dec 1993	1468	1829	Chennai	21 Dec 1993	---------	Birth	Parent Uma	
T505	M	~ 1988	Wild	Wild	India Private Chennai	~ 1990 ~ 1990 20 May 1994	--------- --------- ---------	Capture Transfer Transfer	Parent Ramu	
X104	M	4 Jan 1995	1468	2258	Chennai	4 Jan 1995	---------	Birth	Parent Seenu	
X601	M	14 Jun 1995	1468	1829	Chennai	14 Jun 1995	---------	Birth	Parent Venu	
X602	F	~ 1995	1102	1453	Kanpur	~ 1995	Unk	Birth	Parent	
Y500	?	15 Jun 1996	1468	1829	Chennai	15 Jun 1996	---------	Birth	Parent	
Y600	?	~ 1996	Unk	Unk	Chennai	~ 1996	---------	Birth	Parent	

Compiled by : Laurence Gledhill thru Woodland Park Zoological Gardens
Data current thru : 17 Oct. 1996

TOTALS : 65.68.23 (156)

Contd.....

INDIAN LION-TAILED MACAQUE POPULATION
Analysis date : 31/10/96

INBREEDING COEFFICIENTS AND MEAN KINSHIPS

ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	Males	Mk	Age	Known		Females	Mk	Age	Known		Unknowns	Mk	Age	Known	
1	1736	.0000	16	1.00	Pune	1634	.0000	14	0.00	Shiml	2214	.0000	0	1.00	Chhat
2	1633	0.000	14	0.00	Shiml	1965	.0000	11	1.00	Thiru	2256	.0000	7	0.00	Chhat
3	1652	.0000	14	0.00	Thiruv	2053	.0000	10	1.00	Thiru	Y600	.0000	0	0.00	Chenn
4	1708	.0000	13	1.00	Thiruv	1960	.0000	9	0.00	Vodod	Y500	.1116	0	1.00	Chenn
5	1761	.0000	11	0.00	Vadod	2027	.0000	9	0.00	Thiru					
6	1943	.0000	11	1.00	Thiruv	2067	.0000	8	1.00	Thiru					
7	1851	.0000	11	0.00	Thiruv	2237	.000	6	1.00	Mysor					
8	1869	.0000	10	0.00	Chhat	2263	.0000	6	1.00	Mysor					
9	2163	.0000	9	1.00	Thiruv	2274	.0000	6	1.00	Mysor					
10	1988	.0000	9	0.00	Chhat	x602	.0238	1	0.75	Kanpu					
11	2242	.0000	8	1.00	Mysore	2258	.0773	8	1.00	Chenn					
12	T505	.0000	8	1.00	Chennai	1829	.0863	8	1.00	Chenn					
13	2223	.0000	7	0.00	Chhat	2360	.1071	5	1.00	Chenn					
14	2294	.0937	6	1.00	Hyder	2321	.1116	5	1.00	Chenn					
15	2384	.0937	4	1.00	Chennai	2498	.1116	3	1.00	Chenn					
16	2468	.1071	3	1.00	Chennai	2249	.1613	7	1.00	Nanda					
17	X104	.1071	2	1.00	Chennai	1689	.1660	13	1.00	Nanda					
18	X601	.1116	1	1.00	Chennai	2404	.1681	5	1.00	Patna					
19	2096	.1227	8	1.00	Delhi										
20	2075	.1255	8	1.00	Delhi										
21	2403	.1613	5	1.00	Patna										
22	2127	.1635	8	1.00	Nanda										

GENETIC SUMMARY OF POPULATION

Descendant population Mean Kinship : 0.1162
Gene Diversity : 0.8838
Founder Genome Equivalents : 4.3038

FOUNDER ANALYSIS

Founder studbook numbers in parentheses indicate Unknowns.
Studbook numbers beginning with P indicate wild or unknow founders that mated with studbook # without the P to produce captive-born offspring.

Founders	526	1170	(1633)	(1634)	(1652)	1668	1708
Founders	(1713)	1736	(1761)	(1851)	(1869)	1943)	(1960)
Founders	1965	(1998	(2027)	2053	2067	2163	2214
Founders	(2223)	2237	2242	(2256)	2263	2274	T505
Founders	(Y600)	(P1170)	Wildo1	Wildo2	Wildo3	Wildo4	Wildo5
Founders	Wildo6	Wildo7	Wildo8	Wildo9	Wild10	Wild11	Wild12
Founders	Wild13						

Founder contributions

0.8750	0.2500	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.2500	3.0625	1.7191	1.3442	1.0000	1.0000
2.7500	0.5000	2.2500	2.7500	1.5000	1.2500	0.2500
0.2500						

SUMMARY OF THE RECOMMENDATIONS OF THE ZOO DIRECTORS' MEETING HELD FROM 19-21 NOVEMBER, 1996 IN NEW DELHI*

I. General

1. Last few decades have witnessed a revolution in zoo management. Zoos have become centres of conservation instead of recreational places. To cope up with these changes, there is need for greater technical expertise and increased financial inputs in zoo management. The State Governments, Central Government and Central Zoo Authority should endeavour to provide increased financial inputs for management of zoos in this country. In view of the limited resources with State Governments, the Central Zoo Authority should provide 100% funding for selected items of works in zoos owned by the government/civic bodies.

2. The Central Government should help in evolving a process in which the funds given by the Central Zoo Authority are utilized effectively for improvement of zoos. At present the fund have to be routed through State exchequer which not only causes delay in execution of works but at times also leads to diversion of funds for non-zoo purposes.

3. There are many Corporate Industries and Business Houses which want to give donations for purpose of improving management of zoos. Central Zoo Authority should facilitate the process of channelising these donations for improvement of zoos, selected by the donors.

II Planning and Management

1. While planning for a new zoo, it should be ensured that the selected site has adequate land with suitable topography and vegetative cover. The extent of land should be such that it can also meet the requirements of the future development of the zoo.

2. Since the maintenance of a zoo require substantial quantities of water and power supply, detailed consultation should be carried out with the LSDG Department and State Board of Electricity before deciding to set up a new zoo on a particular site.

3. The layout plan of zoo should be decided on the basis of the declared objectives of the zoo in consultation with a multidisciplinary team comprising of zoo experts, veterinary specialists, architects, landscape designers and other zoo enthusiasts including animal welfare activists.

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*Source : Central Zoo Authority, New Delhi

4. The preference of species to be put on display in a zoo should be in descending order - local, regional, national and global. The sequence of the display of the species should be decided as per the theme of the zoo.

5. The enclosure designs should be such that the biological, physiological and behavioral requirement of the species are fully met and the animals are not subjected to unnecessary stress.

6. Highest standards of upkeep and health care for animals should be ensured. The curatorial staff and health care staff should be provided appropriate training on these aspects both in India and abroad.

7. All records regarding animals e.g. animal history cards, stud boards, medical records, natality and mortality should be kept meticulously. The large and medium zoos should be provided computer facilities for this purpose.

8. The Directors should be delegated adequate administrative and financial powers for managing the zoos effectively.

9. In order to keep abreast with latest concept in the field of zoo management at least one Director should be sponsored by the Central Zoo Authority for participation in the International Union of Directors of Zoological Gardens (IUDZG).

III Management of Endangered Species

1. Zoos should only indulge in captive breeding of such species where there is urgent need of human intervention. Such species should be identified at National level in consultation with the State Governments. The State Governments should remove price tags on animals to be included in such breeding programmes.

2. The breeding stock for such programme should be carefully identified and detailed animal by animal management plan for each species should be developed.

3. Only such zoos which have proper infrastructure, technical expertise and good track record should be involved in such breeding programmes.

4. Central Zoo Authority should collect and collate the technical information for carrying out such programmes effectively and transfer it to zoos involved in the programmes.

5. Species management plans should have well defined strategy and mechanism for continued supervision and monitoring of programme till the zoo bred populations establish themselves finally in the wild.

6. Since no programme of reintroduction can be successful without public support, each programme for reintroduction should have well defined public education and extension component.

7. Each reintroduction programme should be preceded by socioeconomic surveys and impact assessment of proposed reintroduction programmes. Strategies to mitigate the difficulties of the local people, if any, should also be evolved.

8. Frequent changes of zoo Directors, Curators and Veterinary Officers during the currency of species management plans are bound to affect success of the programme. Therefore, the State Governments and Municipal Corporations should allow these officers to continue in the same zoo till the programme reaches its logical end.

9. The Central Zoo Authority so far have been persuasive in its approach. It should be more pro-active in movement of single animals from one to another zoo.

IV Education

1. The main role of the zoos in a country like India where 50 million people visit zoos every year is to create an empathy amongst visitors towards all forms of life and to convince them for living in harmony with nature. This needs significant zoo education input in every zoo.

2. To bring home the message of conservation amongst the visitors, every zoo should have library, class room, videofilm, screening facilities and zoo souvenir shops. Those who can afford could have computer simulations facilities and auditorium facilities.

3. Every zoo should attempt to establish a Youth Club involving local students and impart them education in the field of zoo management.

4. Periodical events like painting, elocution, essay writing and visit to nature areas should be organised.

5. Zoo staff particularly executive level and supervisory level, should be trained in communication skills. These skill could be passed by them to keepers level also.

V Improving Public Perception of the zoos

1. Every zoo should endeavour to bring transparency in the management system and apprise the media and the zoo enthusiast about their significant achievement.

2. The zoo should develop properly designed lawns, gardens and civic facilities for the visitors to the zoo.

3. Battery operated cars/trollies with proper interpretation facilities should be organised by the zoos.

4. Advisory Committee with representation from various walks of public life should be constituted for each zoo. Scheme for adoption of animals and public facilities by Private Sectors should be encouraged.

RECENT LIST OF INDIAN ZOOS WITH THEIR ADDRESSES

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
ANDAMAN & NICOBAR ISLANDS		
1. Mini Zoo, Haddo Port Blair Off : 20816 Res : 20309	Small Zoo	Deputy Conservator of forests, Wildlife Division, Haddo, Portblair, Andaman & Nicobar Islands - 744 102
ANDHRA PRADESH		
1. Alisagar Deer Park Alisagar Off : 08462-20802, Res. : 31550	Mini Zoo	Divisional Forest Officer, Nizamabad, Andhra Pradesh - 503 001
2. Deer Park, Kandaleru Off : 28546, Res. : 25950	Mini Zoo	Deputy Conservator of Forests, Compensatory Afforestation Project, Telugu Ganga Project, Nellore, Andhra Pradesh
3. Deer Park Chittoor Reserve Forest, Chittoor East Division	Mini Zoo	Forest Range Officer, Deer Park, Chittoor Reserve Forest, Chittoor East Range, Chittoor East Division, Chittoor, Andhra Pradesh
4. Deer Park, Kesoram Cement Basant Nagar	Mini Zoo	Sr. Manager (Design & Constn.), Kesoram Cement, Kesoram Industries Ltd, P.O. : Basant Nagar Tq. Peddapalli, Dist. : Karim Nagar, Andhra Pradesh - 505 187
5. Deer Park, Municipal Park Rajahmundry	Mini Zoo	Commissioner, Rajahmundry Municipality, Rajahmundry, Andhra Pradesh - 533 003
6. Deer Park, NFCL Green Belt Kakinada Off : 62311, 73071, 78949 Res : 64175 Fax : 0884-62084	Mini Zoo	Deputy General Manager (Pers & Admn), Nagarjuna Fertilizer & Chemicals Ltd., Nagarjuna Road, Kakinada, Andhra Pradesh - 533 003

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
7. **Deer Park, Tirumala Hills Chittoor**	Mini Zoo	Executive Officer, Tirumala Hills Deer Park, Devasthanam, Tirupati, Dist.: Chittoor, Andhra Pradesh
8. **Himabindu Deer Park (Pullaiah Deer Park), Kurnool**	Mini Zoo	Divisional Forest Officer, Govt. Of Andhra Pradesh, Forest Department, Kurnool Division, Kurnool, Andhra Pradesh
9. **Indira Gandhi Zoological Park Visakhapatnam** Off : 552081 Res : 550765	Large Zoo	Curator, Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh - 530 001
10. **Jawahar Lake Tourist Complex Shamirpet** Off : 230561/206 & 312 (extn)	Mini Zoo	Conservator of Forests, Govt. of Andhra Pradesh, Wildlife Management, Hyderabad, Andhra Pradesh
11. **Kinnerasari Deer Park Kinnerasari**	Mini Zoo	Divisional Forest Officer, Wildlife Management, Paloncha, Andhra Pradesh - 507 115
12. **Mahavir Harina Vanasthali Deer Park, Vanasthalipuram** Off : 230561 / 206 & 312	Small Zoo	Deputy Conservator of Forests, Wildlife Investigation, Hyderabad, Andhra Pradesh
13. **Mrugaya-Ni Chilkur Deer Park, Chilkur** Off : 230561/206 & 312 (extn)	Mini Zoo	Conservator of Forests, Wildlife Management, Hyderabad, Andhra Pradesh
14. **Nehru Zoological Park Hyderabad** Off : 523355 Res : 520389 Fax : 4413252	Large Zoo	Curator, Nehru Zoological Park, Hyderabad, Andhra Pradesh - 500 264
15. **Pillalamarri Deer Park Mahabub Nagar**	Mini Zoo	Divisional Forest Officer, Govt. of Andhra Pradesh, Forest Department, Mahabub Nagar, Andhra Pradesh

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
16. **Sri Venkateswara Zoological Park, Tirupati** Off : 08574 - 20220	Small Zoo	Curator, Sri Venkateswara Zoological Park, Pudipatla Post, Tirupati, Andhra Pradesh - 517 505
17. **Vanavigyan Kendra, Hunter Road, Hanamkonda, Warangal**	Mini Zoo	Divisional Forest Officer, A.P. Forest Department, Wildlife Management, Warangal, Andhra Pradesh
ARUNACHAL PRADESH		
1. **Miao Mini Zoo** **Miao** Off : 03807 - 222 Res : 03807 - 221	Mini Zoo	Divisional Forest Officer, Govt. of Arunachal Pradesh, Wildlife Sanctuary Division, Miao, Arunachal Pradesh
2. **Mini Zoo, Roing**	Mini Zoo	Divisional Forest Officer, Mehao Mini Z00, Wildlife Sanctuary Division, Roing, Arunachal Pradesh
3. **Zoological Park, Itanagar** Off : 44416, 33533, Res : 44364 Fax : 0360-22361	Medium Zoo	Deputy Chief Wildlife Warden, Ex-Officio Director, Zoological Park, Itanagar, Itanagar Wildlife Sanctuary Division, Naharlagun Arunachal Pradesh - 791 110
ASSAM		
1. **Assam State Zoo-cum-Botanical Garden, Guwahati** Off : 561363, Res : 563331	Large Zoo	Divisional Forest Officer & Director, Assam State Zoo Division, Guwahati, Assam - 781 005
BIHAR		
1. **Bhagwan Birsa Biological Park Ranchi** Off : 76531, Res : 501550 Fax : 501550	Small Zoo	Director, Bhagwan Birsa Biological Park, P.O. : Hinoo P.B.No. 41, Ranchi, Bihar - 834 002

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
2. **Birsa Mrig Vihar Kalamati** Off : 0651 - 501754	Mini Zoo	Divisional Forest Officer, Wildlife Division, Nepal House, Combined Building, P.O. : Hinoo, Ranchi, Bihar - 834 002
3. **Chacha Nehru Island Tailaiya** Off : 3385	Mini Zoo	Deputy Director of soil Conservation (Forestry), West, Soil Conservation Deptt., Damodar Valley Corporation, Hazaribag, Bihar - 825 301
4. **Chandrapur Deer Park Chandrapur** Off : 2445 Res : 2445	Mini Zoo	Deputy Director, Soil Conservation (DVC), Forestry East Division, Hazaribagh, Bihar
5. **Deer Park Maithon Dam, DVC**	Mini Zoo	Deputy Director of Soil Conservation, Soil Conservation Deptt., For East Damodar Valley Corporation, Hazaribagh, Bihar
6. **Jaiprakash Park Bodh Gaya** Off : 21199, Res : 420167	Mini Zoo	Divisional Forest Officer, Gaya Afforestation Division, Sewanagar, Gaya, Bihar - 823 001
7. **Jawaharlal Nehru Biological Park, Bokaro** Off : 87239, Res : 87014, 46821	Medium Zoo	Deputy Chief Surgeon (Vety.) Incharge, Jawaharlal Nehru Biological Park, Sector-IV, Bokaro Steel City, Bihar - 827 004
8. **Mugger Breeding Centre Muta** Off : 0651-501754	Mini Zoo	Divisional Forest Officer, Wildlife Division, Nepal House, Combined Building, P.O. : Hinoo, Ranchi, Bihar - 834 002
9. **Sanjay Gandhi Biological Park, Patna** Off : 223455 Res : 222664	Large Zoo	Director, Sanjay Gandhi Biological Park, Patna, Bihar - 800 001
10. **Satsang Zoo for Children Education, Satsang** Off : 06432 - 22491 Res : 06432 - 22981	Mini Zoo	Director, Satsang Zoo for children Education, Satsang, Deoghar, Bihar - 814 116

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
11. **Tata Steel Zoological Park** **Jamshedpur** Off : 0657-424086 Res : 0657-430787	Small Zoo	Director, Tata Steel Zoological Park, Jubillee Park, Jamshedpur, Bihar - 831 001
DAMAN & DIU		
1. **Deer Park, Daman**	Mini Zoo	Deputy Conservator of Forests & Chief Wildlife Warden, Administration of Daman And Diu, Daman, Daman & Diu - 396 220
2. **Deer Park, Diu**	Mini Zoo	Dy. Conservator of Forests & Chief Wildlife Warden, Administration of Daman And Diu, Daman, Daman & Diu - 396 220
DELHI		
1. **Deer Park, Hauz Khas** Off : 6447094	Mini Zoo	Deputy Director (H), Division IV, Deer Park, Hauz Khas, DDA, Seikh Sarai - 1, C/O Range Officer, Near Green Park, Delhi - 110 017
2. **National Zoological Park** **Mathura Road** Off : 4618500, 4619825 Res : 4618629, Fax : 4602408	Large Zoo	Director, National Zoological Park, Mathura Raod, New Delhi - 110 003
DADRA & NAGAR HAVELI		
1. **Deer Park, Satmaliya**	Mini Zoo	Chief Wildlife Warden, Deer Park (Satmaliya), Forest Department, Silvassa, Dadra & Nagar Haveli
2. **Khanvel Deer Park** **Silvassa**	Mini Zoo	Chief Wildlife Warden, Khanvel Deer Park, Forest Department, Silvassa, Dadra & Nagar Naveli

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
3. Mini Zoo, Silvassa Khanvel	Mini Zoo	Chief Wildlife Warden, Mini Zoo Silvassa, Khanvel, Forest Department, Silvasa, Dadra & Nagar Haveli
GUJARAT		
1. Fertilizer Nagar Deer Park Vadodara Off : 363415 Res : 460737	Mini Zoo	The Vice President, Fertilizer Nagar Deer Park, (Mini Zoo), Vadodara, Gujarat - 391 750
2. Indroda Nature Park Gandhi Nagar Off : 21385 Res : 20560	Small Zoo	Director, Geer Foundation, G-1, 194/3, Sector 30, Gandhi Nagar, Gujarat - 382 030
3. Kamla Nehru Zoological Garden, Ahmedabad Off : 079-2163415 Res : 079-2169971 Fax : 079-5350226	Large Zoo	Zoo Superintendent, Kamla Nehru Zoological Garden, Kankaria, Ahmedabad, Gujarat - 380 008
4. Nature Education Centre Jamnagar Off : 74454, 72321 Res : 72372	Mini Zoo	Commissioner, Jamnagar Municipal Corporation, Jubilee Gardens, Jamnagar, Gujarat - 361 001
5. Nature Park, Surat Off : 42375-59, 422245 Fax : 0261-422110	Small Zoo	Commissioner, Surat Municipal Corporation, Muglisara, Surat, Gujarat - 395 003
6. Rajkot Municipal Corporation Zoo, Rajkot Off : 28122, 35122 Fax : 0281-24258	Small Zoo	Zoo Superintendent, Rajkot Municipal Corporation, Dr. Ambedkar Bhuvan, Dhebarbhai Road, Rajkot, Gujarat - 360 001
7. S.I. Works Quarry Pvt Limited Vadodara Off : 23791	Mini Zoo	Administrative Officer, S.I. Works Quarry Pvt. Limited, Quarry Timba Road, Village Udalpur, Taluka Savli, Dist. : Vadodara, Gujarat - 390 002

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
8. **Sakkarbaug Zoo, Junagarh** Off : 0285-20235 Res : 0285-31067 Fax : 0285-32900	Large Zoo	Zoo Officer, Sakkarbaug Zoo, Outside Majevadi Gate, Junagadh, Gujarat - 362 001
9. **Sayaji Baug Zoo Vadodara** Off : 328074 Res : 328074	Medium Zoo	Curator, Sayaji Baug Zoo, Municipal Corporation, Vadodara, Gujarat - 390 018
10. **Sundervan Nature Discovery Centre, Jodhpur Tekra** Off : 409838, 404148	Mini Zoo	Director, Sundervan Nature Discovery Centre, Jodhpur Tekra, S.M. Raod, Ahmedabad, Gujarat - 380 015
GOA		
1. **Bondla Zoo, Usgao**	Small Zoo	Deputy Conservator of Forests (WL), Government of Goa, Forest Department, Wildlife and Parks Division, Panaji, Goa
HIMACHAL PRADESH		
1. **Dhauladhar Nature Park Gopalpur** Off : 2639	Mini Zoo	Divisional Forest Officer, Wildlife Division, Chamba, Dist. : Chamba, Himachal Pradesh - 176 310
2. **Himalayan Nature Park Kufri**	Small Zoo	Deputy Conservator of Forests, Wildlife Division, Shimla, Himachal Pradesh - 171 002
3. **Pheasantry & Aviary & Musk Deer Farm, Sarahan**	Mini Zoo	Divisional Forest Officer, Wildlife Division, Saharan Bushahr, Dist. : Shimla, Himachal Pradesh - 171 002
4. **Pheasantry at Chail Solan**	Mini Zoo	Deputy Conservator of Forests, Wildlife Division, Deptt. of Forest Farming & Conservation, Shimla, Himachal Pradesh - 171 002

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
5. **Renuke Zoo / Lion Safari Sirmur**	Mini Zoo	Deputy Conservator of Forests, Wildlife Division, Deptt. of Forest Farming & Conservation, Shimla, Himachal Pradesh - 171 002
6. **Rewalsar Wildlife Zoo Mandi**	Mini Zoo	Divisional Forest Officer, Wildlife Division, Hamirpur, Manali Road, Visa Jahoo, Kullu, Himachal Pradesh
HARYANA		
1. **Chinkara Breeding Centre Kairu, Bhiwani**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
2. **Deer Park, Chandi Mandir**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
3. **Deer Park, Hissar**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
4. **Deer Park, NFL, Panipat** Off : 20676 Res : 23874 Fax : 01742-45515	Mini Zoo	Manager (P & A), NFL Ltd., Gohana Road, Panipat, Haryana
5. **Mini Zoo Abubshahar, Dist. Sirsa**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
6. **Mini Zoo, Bhiwani**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
7. **Mini Zoo, Jind**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
8. **Mini Zoo, Pipli**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
9. **Mini Zoo H.A.P, Madhuban** Off : 0184-253032 Res : 0184-253752	Mini Zoo	The Commandent, Haryana Armed Police Training Centre, 4th BN. H.A.P., Madhuban, Karnal, Haryana
10. **Mini Zoo, Yadavanda Garden Tourist Complex, Pinzore**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
11. **Pheasant Breeding Centre Morni, Dist. Ambala**	Mini Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
12. **Rohtak Zoo, Rohtak** Off : 561213 (Panchkula)	Small Zoo	Deputy Chief Wildlife Warden, Government of Haryana, Panchkula, Haryana
JAMMU & KASHMIR		
1. **Manda Mini Zoo, Ramnagar** Off : 530567 Res : 532007	Mini Zoo	The Veterinary Officer, Wildlife Veterinary Wing, Wildlife Protection Deptt., Srinagar, Jammu & Kashmir
2. **Mansar Mini Zoo, Mansar**	Mini Zoo	The Veterinary Officer, Wildlife Veterinary Wing, Wildlife Protection Deptt., Srinagar, Jammu & Kashmir
3. **Srinagar Deer Park Cum Zoo Srinagar**	Mini Zoo	The Veterinary Officer, Wildlife Veterinary Wing, Wildlife Protection Deptt., Srinagar, Jammu & Kashmir
KERALA		
1. **Crocodile Farm, Kozhikode**	Mini Zoo	Divisional Forest Officer, Kozhikode Division, Kozhikode, Kerala
2. **Deer Park, Ponmudi Thiruvananthapuram**	Mini Zoo	Divisional Forest Officer, Deer Park, Ponmudi, Thiruvananthapuram, Kerala

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
3. **Hill Palace Zoo, Ernakulam Thiruvananthapuram** Off : 777113	Mini Zoo	Executive Officer, Society for the Prevention of Hill Palace Premises, Hill Palace, P.O. : Tripunithura Kerala - 682 301
4. **Lion Safari Park at Nayyar Dam Thiruvananthapuram**	Mini Zoo	Wildlife Warden (Sanctuary), Lion Safari at Nayyar Dam, Thiruvananthapuram, Kerala
5. **Mini Zoo, Kodanadu**	Mini Zoo	Deputy Conservator of Forest, Malayattor, Kodanadu, P.O.: Kodanadu, Kerala
6. **Parassinikkadavu Snake Park Kannur** Off : 76238	Mini Zoo	President, Parassinikadavu Snake Park, Parassinikadavu, Kannur District, Kerala - 670 563
7. **Snake park, Malampuzha Palakkad**	Mini Zoo	Divisional Forest Officer, Palakkad Division, Palakkad, Kerala
8. **State Museum & Zoo Thrissur** Off : 0487-333056	Small Zoo	Director, Museums & Zoos & Artgall., Department, Government of Kerala, Thrissur, Kerala - 680 020
9. **Thiruvananthapuram Zoo Thiruvananthapuram** Off : 436275 Res : 436328	Medium Zoo	Director, Zoological Gardens, Department of Museums and Zoos, Thiruvananthapuram City, Kerala

KARNATAKA

1. **Antharagange Children Park Kolar**	Mini Zoo	Deputy Conservator of Forests, Kolar Forest Division, Kolar, Karnataka
2. **Bellary Childrens Park-Cum-Zoo, Bellary** Off : 5797	Small Zoo	Deputy Conservator of Forests, Bellary Children Park-Cum-Zoo, Radio Park, Contonment, Bellary, Karnataka - 583 103

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
3. **Bhutanal Deer Park Bijapur** Off : 22165	Mini Zoo	Range Forest Officer (Territorial), Shikarkhana, Bijapur, Dist. : Bijapur, Karnataka
4. **Children park & Zoo Gadag** Off : 8502	Mini Zoo	Deputy Conservator of Forest, Gadag Division, Gadag, Karnataka
5. **Children's Park Mini Zoo Shimoga** Off : 08182-223983 Res : 08182-44983	Mini Zoo	Deputy Conservator of Forests, Wildlife Division, Shimoga, Karnataka - 577 201
6. **Children's Park, Sirsi Division Sirsi** Off : 76445 Res : 76584	Mini Zoo	Deputy Conservator of Forests, Sirsi Division, Sirsi, Uttara Kannada District, Karnataka - 581 401
7. **Childrens Mini Zoo Dharwad**	Mini Zoo	Deputy Conservator of Forests, Dharwad Division, Dharwad, Karnataka
8. **Children's Deer & Snake Park at Kadri Hill, Mangalore**	Mini Zoo	Deputy Conservator of forests, Mangalore Division, Mangalore, Karnataka
9. **Deer Park at Haliyal Town Uttar Kannada Disirict**	Mini Zoo	Deputy Conservator of Forests, Haliyal Division, Haliyal, Dist. : Uttar Kannada, Karnataka - 581 329
10. **Deer Park at Shri Kshetra Sogal, Soundatti**	Mini Zoo	Range Forest Officer, Deer Park at Shri Kshetra Sogal, Sogal Shri Kshetra at Shri Someshwar Temple, Soundatti, Karnataka
11. **Deer Park, N.N.D.C. Ltd. Bellary** Off : 62624, 62654, 62621 Fax : 08395-62687	Mini Zoo	The General Manager, National Mineral Development Corporation Limited, Donimalai Iron Ore Project, Donimalai Township, Dist. : Bellary, Karnataka - 583 118

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
12. **Indira Priyadarshini Sangrahalaya, Aragodu, Davangere Taluk**	Mini Zoo	Range Forest Officer, Davangere Division, Aragodu, Davangere Taluk, Karnataka
13. **Kaiwara Tapowana Chintamani Talluk, Kolar**	Mini Zoo	Deputy Conservator of Forests, Kolar Forest Division, Kolar, Karnataka
14. **Karadigudda Deer Park Karjagi**	Mini Zoo	Range Forest Officer, Haveri, Karnataka - 581 110
15. **Kempambudi Deer Park Bangalore**	Mini Zoo	Deputy Conservator of Forests, Bangalore Urban Division, Bangalore, Karnataka
16. **Kempegowda Vanadhana Savanadurga, Magadi Taluk**	Mini Zoo	Deputy Conservator of Forests, Bangalore, Karnataka
17. **Kittur Rani Cannamma Nisarg Dhama Bhutramanhatti Belgaum** Off : 0831-20071, Res : 0631-420354	Mini Zoo	Deputy Conservator of Forests, Belgaum Division, Belgaum, Karnataka - 590 001
18. **Kudremukh Mini Zoo Chickmagalur** Off : 54143 / 54153 Res : 54104	Mini Zoo	Deputy General Nanager (Town Admn.), Kudremukh Iron Ore Company Ltd., P.O. : Kudremukh, Dist. : Chickmagalur, Karnataka - 577 142
19. **Lalbagh Deer Park Bangalore**	Mini Zoo	Deputy Director of Horticulture, Lalbagh Botanical Garden, Lalbagh, Bangalore, Karnataka - 560 027
20. **Mini Deer Park Chickmagalur**	Mini Zoo	Deputy Conservator of Forests, Chickmagalur Division, Chickmagalur, Karnataka
21. **Mini Zoo, Hassan**	Mini Zoo	Deputy Conservator of Forests, Hassan Division, Hassan, Karnataka
22. **Mini Zoo A. M. Gudi Balvana, Chitradurga**	Mini Zoo	Deputy Conservator of Forest, Chitradurga Division, Audumalleswara Gudi, Chitradurga, Karnataka

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
23. **Mini Zoo at Induval Nature Park (Prakruti Vana), Mandya** Off : 20630, Res : 74035	Mini Zoo	Deputy Conservator of Forests, Mandya Division, Mandya, Karnataka - 571 401
24. **Mini Zoo at Kondajji Deer Park, Chiradurga**	Mini Zoo	Range Forest Officer, Deer Park, Kondajji, Harihar Taluk, Karnataka
25. **Mini Zoo at Minakanagurkai Kolar**	Mini Zoo	Deputy Conservator of Forests, Kolar Forest Division, Kolar, Karnataka
26. **Mini Zoo Cum Children park Gulbarga**	Mini Zoo	Deputy Convervator of Forests, Gulbarga Territorial Division, Public Garden, Gulbarga, Karnataka
27. **Namadachilume Deer park Tumkur** Off : 76512	Mini Zoo	Range Forest Officer, Tumkur Range, Near Banashankari Temple, Tumkur, Karnataka - 572 101
28. **National Park, Bannerghatta Zoological Garden Bangalore** Off : 8428540, Res : 8428572	Medium Zoo	Deputy Conservator of Forests (WL), Bannerghatta National Park, Bangalore, Karnataka - 560 083
29. **Nature park, Raichur** Off : 20029, Res : 41248	Mini Zoo	Deputy Conservator of Forests, Raichur Division, Raichur, Karnataka - 584 101
30. **Sorakayalahalli Children & Deer Park, Kolar**	Mini Zoo	Deputy Conservator of Forests, Kolar Forest Division, Kolar, Karnataka
31. **Sri Chamarajendra Zoological Gardens, Mysore** Off : 0821-520302, 30752 Res : 0821-485293 Fax : 0821-563494	Large Zoo	Director, Sri Chamarajendra Zoological Garden, Indira Nagar, Mysore, Karnataka - 570 010

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
32. **Tiger & Lion Safari Thyyarekoppa, Shimoga** Off : 08182-22983, Res : 08182-44983	Mini Zoo	Deputy Conservator of Forests, Wildlife Division, Shimoga, Karnataka - 577 201
33. **Tungabhadra Dam Mini Zoo Bellary**	Mini Zoo	Superintendent of Gardens, Tungabhadara Board, Tungabhadara Dam, Via. : Hospet, Dist. : Bellary, Karnataka - 583 225

MAHARASHTRA

1. **Aurangabad Municipal Zoo Aurangabad** Off : 331956 Res : 334052 Fax : 331213	Small Zoo	Zoo Superintendent, Aurangabad Zoo, Sidharth Garden, Municipal Corporation, Aurangabad, Maharashtra - 431 001
2. **Deer Park, Gangapur**	Mini Zoo	Deputy Conservator of Forests, Tal. & Dist. : West Nashik, Maharashtra
3. **Esselworld Snake Park Esselworld** Off : 493-3280, 3281, 9686, 9689 Fax : 4935188	Mini Zoo	Deputy General Manager (Marketing), Pan India Paryatan Ltd., Continental Building, 135, Dr. Annie Besant Road, Worli, P.O.B.No. 6591, Mumbai, Maharashtra - 400 018
4. **Maharaja Shahaji Chhatrapati Zoo, Kolhapur** Off : 26144	Mini Zoo	Maharaja Shahaji Chhatrapati Zoo Trust, New Palace, Kolhapur, Maharashtra - 416 003
5. **Maharajbag Zoo, Nagpur** Off : 522621, 523138 Res : 526394	Small Zoo	Associate Dean, College of agriculture, Maharajbag Zoo, Nagpur, Maharashtra - 440 001
6. **Mahatma Gandhi Rastriya Udyan Zoo, Solapur** Off : 24231	Mini Zoo	Veterinary Officer, Rastriya Udyan Zoo, Bijapur Road, Solapur Municipal Corporation, Solapur, Maharashtra

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
7. **Pal Wild Animal Orphanage Jalgaon**	Mini Zoo	Deputy Conservator of Forests, Yawal Forest Division, Yawal Wildlife Sanctuary, Jalgaon, Maharashtra
8. **Peshwe Park Zoological Gardens, Pune** Off : 322541, 324365, Res : 437333	Small Zoo	Additional Municipal Commissioner, Pune Municipal Corporation, Shivajinagar, Pune, Maharashtra - 411 005
9. **Pratap Singh Udyan & Zoo Sangli**	Mini Zoo	Chief Officer, Sangli Municipal Council, Sangli, Maharashtra
10. **Rambagh Cheetal Park Chandrapur**	Mini Zoo	Deputy Conservator of Forests, Chandrapur Division, Chandrapur, Maharashtra
11. **Rani Bag Zoo, Buldana**	Mini Zoo	Deputy Conservator of Forests, Rani Bag Zoo, Buldhana, Maharashtra
12. **Sanjay Gandhi National Park Borivli (East)** Off : 8860362, 8860389	Small Zoo	Deputy Conservator of Forests, Sanjay Gandhi National Park, Borivli (East), Mumbai, Maharashtra - 400 066
13. **Seminery Hills Deer Park Nagpur** Off : 523874	Mini Zoo	Deputy Conservator of Forests, Nagpur Forest Division, Seminery Hills Deer Park, Nagpur, Maharashtra
14. **Shri Ganjanan Vatika Buldana** Off : 52018, 52251 Fax : 07265-52346	Mini Zoo	Vyasthapak, Shri Gajanan Maharaj Sansthan, Shegaon, Buldana Public Trust, Buldana, Maharashtra - 444 203
15. **Snake Park & Aviary Pune** Off : 776036, Res : 776036 Fax : 779999	Mini Zoo	Director, Snake Park & Aviary, Pimpri, Chinchwad Municipal Corporation, Sambhaji Nagar, G - Block, Chinchwad, Pune, Maharashra - 411 019

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
16. **Somnath Prakalpa Zoo Chandrapur** Off : 07176-32034, 82425	Mini Zoo	Secretary, N.S.S. Earora Anand Wan, (Somnath Praklpa Zoo), TQ, Mula, Dist, Chandrapur, Maharashtra
17. **Vasani Smruti Mrig Vihar, Umarsara, Yeotmal**	Mini Zoo	Deputy Conservator of Forests, Yavatmal Division, Yavatmal, Maharashtra
18. **Veermata Jijabi Bhosle Udyan & Zoo, Byculla (East)** Off : 022-3725799, 3723578 Res : 022-3724057 Fax : 022-2620101	Large Zoo	Superintendent of Gardens I/C, Veermata Jijabai Bhosle Udyan, Byculla, Mumbai, Maharashtra - 400 027
19. **Vivekanand Vidya Mandir Zoo, Buldana** Off : 3225, 3230,3231	Mini Zoo	Secretary, Vivekanand Ashram, Vivekanand Nagar, TQ. Mehkar, Dist. : Buldana, Maharashtra - 443 301
MADHYA PRADESH		
1. **Deer Park Tata Export Ltd Dewas** Off : 2591-2594 Fax : 7272-3150, 0731-491457	Mini Zoo	Deputy General Manager, Personnel & Admn., Tata Export Ltd., Leather Complex, Industrial Area, Dewas, Madhya Pradesh - 455 001
2. **Gandhi Zoological Park Gwalior** Off : 326550 Res : 342801	Medium Zoo	Commissioner, Municipal Corporation, Gwalior, Madhya Pradesh
3. **Indira Udyan, Bilaspur**	Mini Zoo	Divisional Forest Officer, North Bilaspur, HQ. : Bilaspur, Madhya Pradesh
4. **Kamla Nehru Prani Sanghrahalay, Indore** Off : 400972, Res : 5355701 Fax : 531166	Small Zoo	Incharge, Indore Zoo, Kamla Nehru Park, Navlakha, Indore, Madhya Pradesh - 452 001
5. **Kanan Pandari, Bilaspur** Off : 5470, Res : 7660	Mini Zoo	Divisional Forest Officer, Bilaspur Division, Bilaspur, Madhya Pradesh - 495 001

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
6. **Maitri Baagh Zoo, Bhilai** Off : 0788-357180, 357910 Fax : 07742-5317	Medium Zoo	Sr. Manager (Horticulture), Bhilai Steel Plant, Bhilai, Madhya Pradesh - 490 001
7. **Mrignayani Deer Park Panchmarhi**	Mini Zoo	The Superintendent, Pachmarhi Sanctuary, Pachmarhi, Madhya Pradesh - 461 881
8. **Nandan Van, Raipur**	Mini Zoo	Divisional Forest Officer, North Raipur, Forest Department, Nandanvan, NH-6, Raipur to Durg Road, Raipur, Madhya Pradesh
9. **S.F.R.I. Zoo, Jabalpur** Off : 25540 Res : 25739 Fax : 0761-411304	Mini Zoo	Director, S.F.R.I. Zoo, Polipathar, Jabalpur, Madhya Pradesh - 482 008
10. **Van Vihar National Park Bhopal** Off : 550774, Res : 552627 Fax : 0755-551561	Medium Zoo	Director, Van Vihar National Park, PB No.348, Bhopal, Madhya Pradesh - 462 003
MEGHALAYA		
1. **Lady Hydari Park, Animal Land, Shillong** Off : 0364-226181	Small Zoo	Divisional Forest Officer, Khasi Hills Wildlife Division, Shillong, Meghalaya
2. **Tura Zoo, Akhongini, Tura** Off : 03651-22225	Mini Zoo	Divisional Forest Officer, East And West Garo Hills Wildlife Division, Tura, Meghalaya
MANIPUR		
1. **Manipur Zoological Garden Imphal** Off : 220854 Res : 285358	Medium Zoo	Chief Conservator of Forests (Wildlife), Govt. of Manipur, Imphal, Manipur

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
MIZORAM		
1. **Aizawl Zoo, Aizawl** Off : 25371, Res : 23439	Small Zoo	Chief Wildlife Warden, Govt. of Mizoram, Wildlife Division, Aizawl, Mizoram - 796 001
2. **Deer Park, Thenzawl**	Mini Zoo	Chief Wildlife Warden, Govt. of Mizoram, Wildlife Division, Aizawl, Mizoram - 796 001
NAGALAND		
1. **Zoological Park, Kohima**	Mini Zoo	Addl. Chief Conservator of Forests, (Wildlife), Govt. of Nagaland, Dimapur, Nagaland - 797 112
ORISSA		
1. **Deer Park, Berhampur Unit Berhampur**	Mini Zoo	Head, P.G. Dept. of Zoology, Berhampur University, Berhampur, Orissa - 760 007
2. **Deer Park, Papadahandi Nawarangpur** Off : 22014, Res : 22041	Mini Zoo	Divisional Forest Officer, Nawarangpur Division, Nawarangpur, Orissa - 764 059
3. **Gandhamardan Deer Park Bolangir**	Mini Zoo	Divisional Forest Officer, Bolangir Division, Bolangir, Orissa - 767 001
4. **Gharial Research & Conservation Unit, Tikarapara**	Mini Zoo	Divisional Forest Officer, Satkosia Wildlife Division, Angul, Orissa
5. **H.A.L. Deer Park, Sunabeda** Off : 06853-20264 Res : 06853-20369 Fax : 06853-20004, 0891-55546	Mini Zoo	Manager (Works), Township, Hindustan Aeronautics Ltd., Koraput Division, P.O. : Sunabeda, Orissa - 763 002
6. **Indira Gandhi Park Zoo & Dear Park, Rourkela** Off : 0661-890641-46 Fax : 0661-890085	Mini Zoo	Manager (Horticulture), Town Service Department, Rourkela Steel Plant, Sector IV, Rourkela, Orissa

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
7. **Kapilash Zoo, Dhenkanal** Off : 515880	Mini Zoo	Divisional Forest Officer, Dhenkanal Division, At / P.O. / Dist. : Dhenkanal, Orissa - 759 001
8. **Kuanria Deer park, Nayagarh Forest Division, Nayagarh** Off : 52226, Res : 52227	Mini Zoo	Divisional Forest Officer, Nayagarh Division, Nayagarh, Orissa - 752 069
9. **Motijharan Deer Park Sambalpur**	Mini Zoo	Divisional Forest Officer, Badrama Wildlife Division, P.O. : Budharja, Sambalpur, Orissa
10. **Municipality Deer Park Cuttack** Off : 24375	Mini Zoo	The Executive Officer, Cuttack Municipal Corporation, Cuttack, Orissa - 753 009
11. **Nandankanan Zoological Park Bhubaneswar** Off : 515840, Park 440580 Res : 411146 Fax : 0674-501152	Large Zoo	Director, Nandankanan Zoological Park, Mayur Bhawan, Janapath, Saheed Nagar, Bhubaneswar, Orissa - 751 007
12. **Palm Beach Zoo, Gopalpur Ganjam** Off : 0680-82021, 82023 Fax : 0680-82300	Mini Zoo	The General Manager, The Oberoi Palm Beach, Gopalpur-on-Sea, Ganjam, Orissa - 761 002
13. **Regional Science Centre Bhubaneswar**	Mini Zoo	Project Coordinator, Regional Science Centre, (N.C.S.M.) Pandit Jawaharlal Nehru Marg, Bhubaneswar, Orissa - 751 013
14. **Taptapani Deer Park Taptapani**	Mini Zoo	Divisional Forest Officer, Parlakhemudi Division, Parlakhemudi, Dist. : Gajapati, Orissa
15. **Tribal Museum Koraput** Off : 3608	Mini Zoo	Director, Tribal Museum, Plot No. 486 (P), Khata No. 435, Koraput Nagar, Koraput, Orissa - 764 020

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
PUNJAB		
1. **Deer park, Bir Moti Bagh Patiala**	Mini Zoo	Farm Manager, Deer Park, Bir Moti Bagh, Dakala Road, Patiala, Punjab
2. **Deer Park, Bir Talab Bhatinda**	Mini Zoo	Wildlife Inspector, Deer Park, Bir Talab, Bhatinda, Punjab
3. **Deer park, Neelon Ludhiana**	Mini Zoo	Incharge, Deer Park, Neelon, P.O. : Katani Kalan, Th. : Sarmala, Dist. : Ludhiana, Punjab
4. **Mahendra Chaudhury Zoological Park, Chatt Bir** Off : 41080, Res : 23291	Large Zoo	Director, Mahendra Chaudhury Zoological Park, Chatt Bir, SCO No. 839-40, SEC, 22-A, Chandigarh, Punjab
5. **Mini Zoo, Bansar Bagh Sangrur**	Mini Zoo	Incharge, Mini Zoo, Bansar Bagh, Sangrur, Punjab
6. **Nature Park, Bhatinda Military Station, Bhatinda** Off : 0164-08-2627	Mini Zoo	Chief Engineer, Bhatinda Nature park, C/O Engineers Branch, HQ, 10 Corps, C/O 56 APO, Punjab
7. **Tiger Safari, Ludhiana**	Mini Zoo	Forest Department, Punjab Government, Tiger Safari, Right Side of G.T. Road, Near' 'Amaltas' Tourist Complex, Bhatinda, Ludhiana, Punjab
RAJASTHAN		
1. **Deer Park, Shri Goverdhan Trust, Udaipur** Off. : 0294-528016-19 Res : 0294-528016-19 Fax : 0294-528006	Mini Zoo	Secretary, Shri Goverdhan Trust, Goverdhan Vilas Po, Udaipur, Rajasthan - 313 001

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
2. **Jaipur Zoo, Jaipur** Off : 47319	Medium Zoo	Deputy Chief Wildlife Warden, Jaipur Zoo, Ramnivas Bagh, Jaipur, Rajasthan - 302 004
3. **Jodhpur Zoo, Jodhpur** Off : 44371	Medium Zoo	Deputy Conservator of Forests (Wildlife), Jodhpur Zoo, Umned park, High Court Road, Jodhpur, Rajasthan - 342 001
4. **Mrig Van, Chitorgarh**	Mini Zoo	Deputy Chief Wildlife Warden, Udaipur, Rajasthan
5. **Panchwati Deer Park** **Pilani**	Mini Zoo	Secretary, Pilani Charity Trust, Pilani, Rajasthan
6. **Safari Park, Haridasji-** **Ki-Magri, Udaipur** Off : 0294-528011/528016-19 Res : 0294-528011/528016-19 Fax : 0294-528006	Mini Zoo	Company Secretary, The Lake Palace Hotels & Motels Pvt. Ltd., City Palace, Udaipur, Rajasthan - 313 001
7. **Udaipur Zoo, Udaipur** Off : 28413, Res : 28413	Small Zoo	Deputy Chief Wildlife Warden, Udaipur, Rajasthan - 313 001
8. **Zoological Garden** **Bikaner** Off : 527901	Small Zoo	Wildlife Warden, Zoological Garden, Public Park, Bikaner, Rajasthan - 334 001
SIKKIM		
1. **Baguwa Pheasant Farm** **Gangtok**	Mini Zoo	Divisional Forest Officer, Wildlife Circle, C/O DFO, South & West Wildlife Division, Jorethary, Sikkim
2. **Himalayan Zoological Park** **Bulbuley, Gangtok**	Mini Zoo	Divisional Forest Officer, Govt. of Sikkim, Fisheries & Wildlife Circle, Forest Department, Gangtok, Sikkim
3. **Rustomji Deer Park** **Gangtok**	Mini Zoo	Chief Wildlife Warden, Govt. of Sikkim, Gangtok, Sikkim

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
TAMIL NADU		
1. **Amirdhi Zoo, Vellore**	Mini Zoo	District Forest Officer, Vellore Division, Vellore, Tamil Nadu
2. **Arignar Anna Zoolocical Park Vandalur** Off. : 044-2376089, Res : 044-2376052 Fax : 044-436850	Large Zoo	Director, Arignar Anna Zoological Park, Vandalur, Chennai, Tamil Nadu - 600 048
3. **Children's Corner, Guindy** Off : 2354469	Medium Zoo	Wildlife Warden, Guindy Children's Park, Chennai, Tamil Nadu - 600 022
4. **Crocodile Rearing Centre Amaravathi Nagar**	Mini Zoo	Wildlife Warden Indira Gandhi Wildlife Sanctuary, Poilachi, Tamil Nadu
5. **Deer Park, Udhagai, Nilgiris Nilgiris District** Off : 44083, Res : 43932	Mini Zoo	District Forest Officer Nilgiris South Division, Udhagai, Tamil Nadu - 643 001
6. **Gangaikondan Deer Park, Neliai, Kattabomman** Off : 299, 275	Mini Zoo	Secretary, Thirunelveli Wildlife Association, P.O. : Sankarnagar Dist. : Tirunelveli, Tamil Nadu - 627 357
7. **Hogainakkal Mini Zoo Dharmapuri** Off : 60003	Mini Zoo	District Forest Officer, Dharmapuri Division, Dharmapuri, Tamil Nadu
8. **Kurumbapatti Zoological Park Salem**	Mini Zoo	District Forest Officer, Kurumbapatti Reserve Forest, Salem Division, Salem, Tamil Nadu
9. **Madras Crocodile Bank Trust/Centre For Herpetology Mamallapuram** Off : 04124-332 Fax : 044-4910910, 4918747	Medium Zoo	Director, Centre for Herpetology, Post Bag No. 4, Mamallapuram, Tamil Nadu - 603 104

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
10. **Chennai Snake Park Trust Guindy** Off : 2350821	Medium Zoo	Chairman, Chennai Snake Park Trust, Guindy, Chennai, Tamil Nadu - 600 022
11. **Mini Zoo, Courtallam**	Mini Zoo	Executive Officer, Courtallam Municipal Township, Courtallam, Tamil Nadu - 627 802
12. **Montfort School Mini Zoo Yercaud, Salem** Off : 22228, 22428, 22328 Fax : 04281 - 22398	Mini Zoo	Principal, Montfort Higher Secondary School, Yercaud, Dist. : Salem, Tamil Nadu - 636 601
13. **Shivganga Garden Mini Zoo Thanjavur**	Mini Zoo	Commissioner, Thanjavur Municipality, Thanjavur, Tamil Nadu - 613 001
14. **V.O.C Park Mini Zoo Coimbatore** Off : 212379, Res : 46868	Medium Zoo	Corporation Veterinary Officer and Zoo Director, V.O.C. Park Mini Zoo, Nehru Stadium, Coimbatore, Tamil Nadu - 641 001
15. **V.O.C. Park Mini Zoo, Erode**	Mini Zoo	Commissioner, Erode Municipality, Municipal Administration & Water Supply Dept. Parriyar, Dist. : Erode, Tamil Nadu
TRIPURA		
1. **Deer Park, Patichari**	Mini Zoo	Deputy Conservator of Forest (ML), Govt. of Tripura, O/O the Principal Chief Conservator of Forests, Agartala, Tripura
2. **Sepahijala Zoological Park Sepahijala** Off : 225253 Res : 225408	Medium Zoo	Wildlife Warden, Sepahijala Wildlife Sanctuary, Sepahijala, Tripura

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
UTTAR PRADESH		
1. **Aranaya Bhawan Buland Shahar**	Mini Zoo	Divisional Forest Officer, Social Forestry Division, Aranya Bhawan, Buland Shahar, Uttar Pradesh
2. **Ban Devi Recreation Park Mau** Off : 246140	Mini Zoo	Divisional Director, Social Forestry Division, Mau, Uttar Pradesh
3. **Cheetal Park, Khatoli Muzaffarnagar**	Mini Zoo	Divisional Director, Social Forestry Division, Muzaffarnagar, Uttar Pradesh
4. **Deer park, Moradabad**	Mini Zoo	Divisional Director, Social Forestry Division, Moradabad, Uttar Pradesh
5. **Deer park, Air Force Memaura** Off : 256333	Mini Zoo	Squadron Leader, Senior Admin. Officer, Station Commander, 505, Signals Unit, Air Force, C/O 56/AP, Uttar Pradesh
6. **Deer Park, Hindalco Industries Ltd., Sunbhadra** Off : 2078, Res : 371	Mini Zoo	Town Administrator, Hindalco Industries Ltd., Po : Renukoot, Dist. Sonbhadra, Uttar Pradesh - 231 217
7. **Deer Park, Narain Tewari Dewal, Almora** Off : 23753 Res : 22276 Fax : 05962-22065	Mini Zoo	Divisional Forest Officer, East Almora Forest Division, Almora, Uttar Pradesh - 263 601
8. **Deer Park, UCL Chattnag Jhusi, Allahabad** Off : 622232, 6233646 Fax : 624390	Mini Zoo	Liason Officer, Universal Cables Ltd., Anand Kanan, Chattnag, Jhusi, Allahabad, Uttar Pradesh - 211 001
9. **Gharial Rehabilitation Centre Kukrail** Off : 249405	Mini Zoo	Divisional Forest Officer, Endangered Species Project, 13, Lajpat Rai Marg, (Nanpara House), Lucknow, Uttar Pradesh - 226 001

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
10. **Indira Manoranjan Van (Deer park), Mehewa Lakhimpur Kheri** Off : 52868, Res : 52086	Mini Zoo	Divisional Forest Officer, South Kheri Forest Division, Lakhimpur Kheri, Uttar Pradesh - 262 701
11. **Kanpur Zoological Park Kanpur** Off : 543676 Res : 541782	Large Zoo	Director, Kanpur Zoological Park, Allen Forest, Kanpur, Uttar Pradesh - 208 002
12. **Kukrail Deer Park & Gharial Rehabilitation Centre Kukrail**	Mini Zoo	Divisional Forest Officer, Endangered Species Project, Gharial Rehabilitation Centre, Lucknow, Uttar Pradesh
13. **Malsi Deer Park, Dehra Dun** Off : 23749	Mini Zoo	Divisional Forest Officer, Dehra Dun Forest Division, 5, Tilak Road, Dehra Dun, Uttar Pradesh - 240 001
14. **Musk Deer Breeding Centre Kanchula Khark, Chamoli** Off : 2179	Mini Zoo	Deputy Conservator of Forests, Nanda Devi National Park, Joshi Math, Dist. : Chamoli, Uttar Paradesh
15. **Nawabganj Deer Park Unnao** Off : 820274	Mini Zoo	Divisional Forest Officer, Social Forestry Division, Unnao, Uttar Pradesh - 209 801
16. **Prince of Wales Zoological Gardens, Lucknow** Off : 222750 Res : 215039	Large Zoo	Director, Prince of Wales Zoological Gardens Trust, P.B. No. 448, Hazratganj, Lucknow, Uttar Pradesh - 226 001
17. **Pt. Govind Ballabh Pant High Altitude Zoo, Nainital**	Mini Zoo	Divisional Forest Officer, Nainital Forest Division, Nainital, Uttar Pradesh
18. **Rampur Mandi Deer Park & Aviary, Kalsi**	Mini Zoo	Divisional Forest Officer, Chakrata Forest Division, Kalsi, Uttar Pradesh

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
19. **Sarnath Deer Park Varanasi**	Small Zoo	Divisional Forest Officer, Social Forestry Division, Paharia, Varanasi, Uttar Pradesh - 221 007
20. **Van Prani Udyan, I.V.R.I., Bareilly** Off : 471659	Mini Zoo	Director/Incharge, Centre for Wildlife Conservation and Disease Management Surveillance, I.V.R.I. Izzatnagar, Bereilly, Uttar Pradesh - 243 122
21. **Vinod Van Mini Zoo, Ramgarh, Gorakhpur**	Mini Zoo	Divisional Forest Officer, South Gorakhpur Forest Division, Gorakhpur, Uttar Pradesh
WEST BENGAL		
1. **Bellilius Park, Howrah** Off : 660-3211	Mini Zoo	The Commissioner, Howrah Municipal Corporation, Howrah, West Bengal
2. **Calcutta Snake Park Zoological Garden, Badu**	Small Zoo	Proprietor, Calcutta Snake Park, Zoological Garden Conservation & Laboratory, 31, Hindustan Park, Calcutta, West Bengal - 700 029
3. **Corporation Park, Jogmaya Howrah** Off : 6603211 Res : 5484	Mini Zoo	Commissioner, Howrah Municipal Corporation, Belilious Road, Howrah, West Bengal
4. **Deepak Mitra's Snake House Hindustan Park, Calcutta**	Mini Zoo	Proprietor, Deepak Mitra's Snake House, A Touring Reptile Zoo, 31, Hindustan Park, Calcutta, West Bengal - 700 029
5. **Deer Park (Mini Zoo) Jhargram**	Mini Zoo	Divisional Forest Officer, Govt. of West Bengal, Directorate of Forests, West Midnapore Division, P.O. : Jhargram, West Bengal

ZOO NAME & LOCATION	CATEGORY	ADDRESS OF THE CONTROLLING AUTHORITY
6. **Deer Park, Dow Hill Kurseong**	Mini Zoo	Divisional Forest Officer, Govt. of West Bengal, Directorate of Forests, Kurseong Division, Kurseong, West Bengal
7. **Deer Research Centre Salt Lake, Calcutta**	Mini Zoo	Forest Directorate, Govt. of West Bengal, AE Block, Salt Lake, Near C.A.P. Camp, Calcutta, West Bengal
8. **Kumari Kangsabuti Deer Park Bonpakuria, Bankura** Off : 03242-50307 Res :03242-50308 Fax : 03242-50307	Mini Zoo	Divisional Forest Officer, Govt. of West Bengal, Directorate of Forests, Bankura South Division, Bankura, West Bengal - 722 101
9. **Padmaja Naidu Himalayan Zoological Park, Darjeeling** Off : 0354-54250	Small Zoo	Director, Padmaja Naidu Himalayan Zoological Park, Jawahar Parbat, Darjeeling, West Bengal - 734 001
10. **West Bengal Snake Park & Laboratory Badu, 24-Parganas North**	Mini Zoo	West Bengal Snake Park & Laboratory, Vill.: Katore, P.O. : Badu, Barasat, 24- Parganas North, West Bengal
11. **Zoological Garden, Alipore** Off : 033-4791150 Res : 033-4791275	Large Zoo	Director, Zoological Garden, Alipore, Calcutta, West Bengal - 700 027

INFORMATIONS ABOUT SOME OF THE INDIAN ZOOS

(AS ON 01-04-1997)

A : NATURE PARK, SURAT (GUJARAT)

01. Name of the Zoo/Zoological Garden/Zoological Park/ Deer Park/Snake Park/with address for correspondence : "Nature park"

02. Managed by : Surat Municipal Corporation,Surat (Gujarat)

03. Name of the Director/Officer in charge with address for correspondence :
    i. Divisional Head
    Shri R.D. Desai,
    Director of planning.
    ii. Departmental Head,
    Shri H.K. De,
    Superintedent of Zoo Park Garden,
    Surat Municipal Corporation,
    Muglis, Surat - 395 003.

04. Phone no. Office/Res./Park : (0261) 423750 to 423756

05. Fax/E.Mail, if any : 0261 - 422110

06. Name of the Deputy Director Asst. Director/Curator : Nil

07. Name of the veterinary officers : Market Superintedent & Hon. Vet
Dr. R.M. Talati

08. Date/year of establishment of zoo : 23rd March 1984

09. Area : 81 acres

10. Animals exhibited :

	Species	Number
Mammals	10	53
Birds	26	99
Reptiles	03	13
Fishes	23	101
Total	62	266

11. Speciality : Nil

12. Entry fee & fee for other facilities	:	i. Above 10 years Re. 1/- Below 10 years Re. 0.50 paise ii. Free entry for children during the wildlife week and 14th November
13. Facilities like children park/boating/invalid transport or any other facility available	:	Nil
14. Staff strength	:	a) Permanent : 13Posts b) Temporary : 3Posts
15. Educational facilities	:	Arranging the various types of programme by corporation for creating awareness about wildlife and prevention of cruelty to animals.

B : AURANGABAD MUNICIPAL ZOO, AURANGABAD (MAHARASHTRA)

01. Name of the Zoo/Zoological Garden/Zoological Park/ Deer Park/Snake Park/with address for correspondence	:	Aurangabad Municipal Zoo, Aurangabad Siddharth Garden, Near Central Bus Stand, Aurangabad (Maharashtra - 431 001)
02. Managed by	:	Municipal Corporation, Aurangabad (Maharashtra)
03. Name of the Director/Officer in charge with address for correspondence	:	Dr. S.V. Razvi, Zoo Superintendent
04. Phone no. Office/Res./Park	:	0240 - 331956 (Park), 0240 - 334052 (Res.)
05. Fax/E.Mail, if any	:	0240 - 331213
06. Name of the Deputy Director Asst. Director/Curator	:	Sri S.S. Kulkarni, Livestock Supervisor
07. Name of the veterinary officers	:	Dr. S.V. Razvi, B.V.Sc. & A.H.
08. Date/year of establishment of zoo	:	January, 1985
09. Area	:	About 14 acres (5.50 Hectares)

10. Animals exhibited :

	Species	Number
Mammals	19	168
Birds	05	28
Reptiles	03	90
Fishes	-	-
Total	27	286

Aquarium started in January, 1997 and collection of fish is in progress.

11. Speciality : Wild life Education through closed Video theatre by showing Video Casettes.

12. Entry fee & fee for other facilities :

Zoo Entry fees Adult : Rs.2/-
Child : Re.1/-

Aquarium Adult : Rs.3/-
Child : Re.1/-

13. Facilities like children park/boating/invalid transport or any other facility available : Nil

14. Staff strength :

a) Permanent : 14Posts
b) Temporary : 18Posts

15. Educational facilities : Through Video Theatre only.

C : CHENNAI SNAKE PARK, CHENNAI (TAMIL NADU)

1. Name of the Zoo/Zoological Garden/Zoological Park/ Deer Park/Snake Park/ with address for correspondence : Chennai Snake Park,
Rajbhavan Post,
Chennai - 600 022
(Tamil Nadu)

2. Manged by : Board of Trustees

3. Name of the Chairman with address for correspondence : Sri. B. Vijayaraghavan,
Chennai Snake Park,
Rajbhavan Post, Chennai - 600 022.
Tamil Nadu

4. Phone No. Off./Res./Park : 2350821

5. Fax/E.Mail, if any : Nil

6. Name of the Director : Sri. V. Kalaiarasan,
Chennai Snake Park,
Rajbhavan Post,
Chennai - 600 022.

7. Name of the Veterinary Officers : Dr. V Krishnamurthy
Dr. A.V. Gopalakrishnan

8. Date/Year of establishment of Zoo : 1972

9. Area : One Hectare

10. Animals Exhibited :

	Species	Number
Mammals	-	-
Birds	-	-
Reptiles	46	487
Fishes	-	-
Total	46	487

11. Speciality : Reptiles

12. Entry fee & fee for other facilities. : Adult : Rs.2/-
Child : Re.1/-

13. Facilities like children Park/ boating/invalid transport or any others available : Nil

14. Staff strength : a) Permanent : 22Posts
b) Temporary : Nil

15. Educational facilities : Research and Extension Education of reptiles.

D : AIZAWL MINI, ZOO, AIZAWL (MIZORAM)

01. Name of the Zoo/Zoological Garden/Zoological Park/ Deer Park/Snake Park/with address for correspondence : Aizawl Mini Zoo,
Aizawl (Mizoram)

02. Managed by : Divisional Forest Officer
Wildlife Division, Aizawl

03. Name of the Director/Officer in charge with address for correspondence : Divisional Forest Officer, Wildlife, E & F Department, Aizawl

04. Phone no. Office/Resi/Park : (0389) 26231

05. Fax/E.Mail, if any : (0389) 22733 / 302733

06. Name of the Deputy Director Asst. Director/Curator : Mr. Lalnuntluanga, Range Officer, Zoo Range

07. Name of the veterinary officers : Dr. Lalrinawma, Veterinary Asst. Surgeon, Mini Zoo, Aizawl

08. Date/year of establishment of zoo : 1977

09. Area : 198 Hectares

10. Animals Exhibited :

	Species	Number
Mammals	14	72
Birds	8	25
Reptiles	1	7
Fishes	-	-
Total	23	104

11. Speciality : Nil

12. Entry fee & fee for other facilities : Re.1/-

13. Facilities like children park/boating/invalid transport or any other avilable : Nil

14. Staff strength :
a) Permanent : 14Posts
b) Temporary : 3Posts

15. Educational facilities : Nil

E : INDRODA NATURE PARK, INDRODA (GUJARAT)

01. Name of the Zoo/Zoological Garden/Zoological Park/ Deer Park/Snake Park/with address for correspondence : Indroda Nature Park,
At / P.O.: Indroda
Taluk / Dist. Gandhinagar (Gujarat)

02. Managed by : Gujarat Ecological Education and Research (GEER) Foundation, G.1, 194/3, Sector-30, Gandhinagar - 382 030

03. Name of the Director/Officer in charge with address for correspondence : Shri H.S. Singh, IFS
Director, GEER Foundation, G.1, 194/3, Sector-30, Gandhinagar - 382 030 (Gujarat)

04. Phone no. Office/Res./Park : 21385 (O), 23891 (R)
Indroda Park - 20560

05. Fax/E.Mail, if any : Not available

06. Name of the Deputy Director Asst. Director/Curator : Shri P.H. Yadav
Park Warden, Indroda Nature Park, Gandhinagar

07. Name of the veterinary officers : –

08. Date/year of establishment of zoo : 1978

09. Area : 168 Hectares

10. Animals Exhibited :

	Species	Number
Mammals	7	110
Birds	5	66
Reptiles	9	87
Fishes	-	-
Total	21	263

11. Speciality : This is the only Nature Education Centre in Gujarat State and 70,000 students and teachers have been given nature education so far.

12. Entry fee & fee for other facilities :

Adult : Rs 2.00
Child : Re 1.00

13.	Facilities like children park/boating/invalid transport or any other avilable	:	Nil
14.	Staff strength	:	a) Permanent : 29Posts b) Temporary : 6Posts
15.	Educational facilities	:	Nature trail, Botanical Garden, Snake Park, Walk-in-aviary and Deer enclosures with interpretation material

F : NANDANKANAN ZOOLOGICAL PARK, BHUBANESWAR (ORISSA)

01.	Name of the Zoo/Zoological Garden/Zoological Park/ Deer Park/Snake Park/with address for correspondence	:	Nandankanan Zoological Park, P.O. Barang, Dist. : Cuttack, Orissa - 754 005
02.	Managed by	:	Government of Orissa, Forest & Environment Department
03.	Name of the Director/Officer in charge with address for correspondence	:	Shri S.K. Patnaik, IFS, Director, Nandankanan Zoological Park, Saheed Nagar, Bhubaneswar, Orissa - 751 007
04.	Phone no. Office/Res./Park	:	515840 (O), 411146 (R) 440580 (Park)
05.	Fax / E.Mail, if any	:	0674 - 512502
06.	Name of the Deputy Director Asst. Director/Curator	:	Shri A. Behera, OFS (I), Wildlife Conservation Officer, Shri P. Sethy, OFS (II), Asst. Conservator of Forests
07.	Name of the veterinary officers	:	Dr. B.N. Mohanty, Senior Veterinary Officer Dr. S.K. Das, Veterinary Asst. Surgeon
08.	Date/year of establishment of zoo	:	December 29, 1960
09.	Area	:	452 Hectares

10. Animals Exhibited :

	Species	Number
Mammals	65	653
Birds	73	467
Reptiles	17	212
Fishes	-	-
Total	155	1332

11. Speciality : Captive breeding of all three species of Indian Crocodilians and largest White Tiger population

12. Entry fee & fee for other facilities :

(Rs.)

Adult	: 2.00
Child	: 1.50
Foreigners	: 10.00
Parking fee (Light vehicle)	: 5.00
Parking fee (Scooter & Motor cycle)	: 1.00
Lion safari & White Tiger safari	: 5.00
Tow Master	: 4.00
Aquarium : Adult	: 1.00
Children	: 0.50
Wildlife film (Each)	: 1.00
Accommodation in Tourist cottage (2 beds)	: 15.00
Accommodation in Tourist cottage (4 beds)	: 20.00
Boating (3 seater pedaling)	: 5.00 for 30 min.
Boating (4 seater pedaling)	: 10.00 for 30 min.
Rowing boat for family	: 20.00 for 30 min.
Elephant ride	: 0.50 each

13. Facilities like Children Park / boating / invalid transport or any others available	:	1. Children Park 2. Boating inside lake 3. Perambulator 4. Aerial Rope way 5. Lion / White Tiger Safari
14. Staff strength	:	a) Permanent : 159 (casual labourers) b) Temporary : 134
15. Educational facility	:	Two Capsule courses on Zoo Management was organised

G : NEHRU ZOOLOGICAL PARK, HYDERABAD (ANDHRA PRADESH)

01. Name of the Zoo/Zoological Garden/Zoological Park/ Deer Park/Snake Park/with address for correspondence	:	Nehru Zoological Park, Bahadurpura, Hyderabad - 500 264
02. Managed by	:	Forest Department
03. Name of the Director/Officer in charge with address for correspondence	:	Shri K.N. Benarji, IFS Nehru Zoological Park, Bhadurpura, Hyderabad - 500 264 (Andhra Pradesh)
04. Phone no. Office/Res./Park	:	4577355 (O), 520389 (R)
05. Fax/E.Mail, if any	:	4413253
06. Name of the Deputy Director Asst. Director/Curator	:	Mr. S. Noor Ahmed, SFS,
07. Name of the veterinary officers	:	Dr. M. Navin Kumar
08. Date/year of establishment of zoo	:	1959
09. Area	:	160 Hectares
10. Animals Exhibited	:	

	Species	Number
Mammals	66	235
Birds	124	1613
Reptiles	22	238
Fishes	5	185
Total	217	2271

11. Speciality : 1. Modern Reptile House
2. Nocturnal Animal House
3. Safaries (Lion, Tiger, Bison & Bear)

12. Entry fee & fee for other facilities :

(Rs.)

Main Entry	Adult	:	5.00
	Child	:	2.00
Car (With 5 Occupants)		:	200.00
Camera		:	10.00
Video Camera		:	75.00
Train	Adult	:	3.00
	Child	:	1.00
Elephant ride	Adult	:	3.00
	Child	:	1.00
Safaries (Lion & Tiger)	Adult	:	8.00
	Child	:	4.00
Battery Powerred Vehicle	Adult	:	10.00
	Child	:	5.00
Film Shooting		:	5,000 per day
Guest Houses	No. I	:	100.00
	No.II	:	100.00
	No.III	:	100.00
	No.IV	:	15.00

13. Facilities like children park/boating/invalid transport or any other avilable : Wheel Chairs provided for handicapped

14. Staff strength : a) Permanent : 265 Posts
b) Temporary : 15 Posts

15. Educational facilities : Informal

SCHEDULED ANIMALS* HOUSED IN LARGE, MEDIUM & SMALL ZOOS
(AS ON 31ST MARCH, 1997)

BIRDS

Sl.No.	Zoological Park	M	F	U	T
Bustard Houbara *(Chlamydotis undulata)*					
01.	Zoological Garden, Bikaner, Rajasthan	0	1	0	1
	Total	**0**	**1**	**0**	**1**
Duck White-Winged Wood *(Cairina scutalata)*					
01.	Assam State Zoo-cum-Botanical garden, Guwahati, Assam	1	0	0	1
	Total	**1**	**0**	**0**	**1**
Falcon Large / Peregrine *(Falco peregrinus japonesis)*					
01.	Bondla Zoo, Usgao, Goa	0	0	1	1
02.	Nature Park, Surat, Gujarat	1	0	0	1
	Total	**1**	**0**	**1**	**2**
Hawks *(Accipitridae)*					
01.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	0	0	2	2
02.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	0	0	1	1
03.	Sepahijala Zoological Park, Sepahijala, Tripura	1	1	0	2
	Total	**1**	**1**	**3**	**5**
Hornbill Wreathed *(Rhyticeros undulatus ticehursti)*					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	2	0	0	2
02.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	0	0	1	1
	Total	**2**	**0**	**1**	**1**
Owlet Forest Spotted *(Athene blewitti)*					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	0	0	7	7
02.	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	0	0	2	2
	Total	**0**	**0**	**9**	**9**
Peafowl *(Pavo cristatus)*					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	4	6	0	10
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	1	0	2
03.	Sri Venkateswara Zoological Park, Tirupati, Andhra Pradesh	4	4	0	8

M - Male, F - Female, U - Unsexed, T - Total
"Scheduled animal" means an animal specified for the time being in Sch.I or Part-II of Sch.II.

Sl.No.	Zoological Park	M	F	U	T
04.	Zoological Park, Itanagar, Arunachal Pradesh	3	0	0	3
05.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	2	3	0	5
06.	Bhagwan Birsa Biological Park, Ranchi, Bihar	1	1	0	2
07.	Jawaharlal Nehru Biological Park, Bokaro, Bihar	11	8	0	19
08.	Sanjay Gandhi Biological Park, Patna, Bihar	8	6	0	14
09.	Tata Steel Zoological Park, Jamshedpur, Bihar	3	2	0	5
10.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	0	0	11	11
11.	Nature Park, Surat, Gujarat	1	1	0	2
12.	Sakkarbaug Zoo, Junagarh, Gujarat	2	1	0	3
13.	Sayaji Baug Zoo, Vadodara, Gujarat	4	3	0	7
14.	Bellary Children's Park-cum-Zoo, Bellary, Karnataka	2	1	0	3
15.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	2	2	0	4
16.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	6	6	0	12
17.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	4	4	0	8
18.	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	2	0	0	2
19.	Van Vihar National Park, Bhopal, Madhya Pradesh	19	20	8	47
20.	Aurangabad Municipal Zoo, Aurangabad, Maharashtra	2	7	0	9
21.	Maharajbag Zoo, Nagpur, Maharashtra	3	3	0	6
22.	Peshwe Park Zoological Gardens, Pune, Maharashtra	4	1	0	5
23.	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	6	3	0	9
24.	Lady Hydari Park, Animal Land, Shillong, Meghalaya	2	0	0	2
25.	Aizawl Zoo, Aizawl, Mizoram	1	0	0	1
26.	Nandankanan Zoological Park, Bhubaneswar, Orissa	2	6	0	8
27.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	1	2	0	3
28.	Jaipur Zoo, Jaipur, Rajasthan	0	0	10	10
29.	Jodhpur Zoo, Jodhpur, Rajasthan	2	3	0	5
30.	Kota Zoo, Kota, Rajasthan	0	0	1	1
31.	Udaipur Zoo, Udaipur, Rajasthan	1	1	0	2
32.	Zoological Garden, Bikaner, Rajasthan	4	6	0	10
33.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	1	2	0	3
34.	Children's Corner, Guindy, Tamil Nadu	0	0	6	6
35.	V.O.C. Park Mini Zoo, Coimbatore, Tamil Nadu	3	5	0	8

Sl.No.	Zoological Park	M	F	U	T
36.	Sepahijala Zoological Park, Sepahijala, Tripura	1	0	0	1
37.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	1	2	0	3
38.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	3	1	0	4
39.	Zoological Garden, Alipore, West Bengal	2	3	4	9
	Total	**118**	**114**	**40**	**272**
Pheasant Cheer *(Catreus wallichi)*					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	0	0	1
02.	Himalayan Nature Park, Kufri, Himachal Pradesh	1	1	0	2
03.	Padmaja Naidu Himalayan Zoological Park, Darjeeling, West Bengal	1	0	0	1
	Total	**3**	**1**	**0**	**4**
Pheasant Hume's Bar-Backed *(Syrmaticus humiae)*					
01.	Manipur Zoological Garden, Imphal, Manipur	1	0	0	1
	Total	**1**	**0**	**0**	**1**
Pheasant Monal / Impeyan *(Lophophorus impejanus)*					
01.	Himalayan Nature Park, Kufri, Himachal Pradesh	4	0	0	4
02.	Padmaja Naidu Himalayan Zoological Park, Darjeeling, West Bengal	1	0	0	1
	Total	**5**	**0**	**0**	**5**
Pheasant Peacock *(Polyplectron bicalcaratum)*					
01.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	1	0	0	1
02.	Sanjay Gandhi Biological Park, Patna, Bihar	1	2	0	3
03.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	0	0	1	1
04.	Sayaji Baug Zoo, Vadodara, Gujarat	0	3	0	3
05.	Manipur Zoological Garden, Imphal, Manipur	0	1	0	1
06.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	2	3	6
	Total	**3**	**8**	**4**	**15**
Pigeon Nicobar *(Caloenas nicobarica pelewensis)*					
01.	Mini Zoo, Haddo, Port Blair, Andaman & Nicobar Islands	0	0	1	1
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	1	0	2
03.	Indroda Nature Park, Gandhi Nagar, Gujarat	0	0	2	2

Sl.No.	Zoological Park	M	F	U	T
04.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	0	0	14	14
05.	Sakkarbaug Zoo, Junagarh, Gujarat	2	1	0	3
06.	Nandankanan Zoological Park, Bhubaneswar, Orissa	3	2	0	5
07.	Zoological Garden, Alipore, West Bengal	0	0	3	3
	Total	**6**	**4**	**20**	**30**

Teal Large Whistling *(Dendrocygna bicolor)*

01.	Manipur Zoological Garden, Imphal, Manipur	0	0	3	3
02.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	1	1	0	2
	Total	**1**	**1**	**3**	**5**

MAMMALS

Antelope Four Horned - Chowsingha (*Tetracerus quadricornis*)

01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	0	1	0	1
02.	Sri Venkateswara Zoological Park, Tirupati, Andhra Pradesh	0	1	0	1
03.	Nature Park, Surat, Gujarat	0	1	0	1
04.	Sakkarbaug Zoo, Junagarh, Gujarat	10	9	0	19
05.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	0	1	0	1
06.	Van Vihar National Park, Bhopal, Madhya Pradesh	4	6	2	12
07.	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	7	6	3	16
08.	Nandankanan Zoological Park, Bhubaneswar, Orissa	1	1	0	2
09.	Jaipur Zoo, Jaipur, Rajasthan	0	2	0	2
10.	Kota Zoo, Kota, Rajasthan	1	0	0	1
11.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	0	3	0	3
12.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	1	2	0	3
	Total	**24**	**33**	**5**	**62**

Ass Wild Indian - Ghorkhar (*Equus heminous khur*)

01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	0	1	0	1
02.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	0	1	0	1
03.	Sakkarbaug Zoo, Junagarh, Gujarat	4	3	0	7
04.	Nandankanan Zoological Park, Bhubaneswar, Orissa	0	1	0	1
05.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	0	1	0	1
	Total	**4**	**7**	**0**	**11**

Bear Sloth (*Melursus ursinus*)

01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	4	3	0	7
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	5	2	0	7

Sl.No.	Zoological Park	M	F	U	T
11.	Lady Hydari Park, Animal Land, Shillong, Meghalaya	0	1	0	1
12.	Nandankanan Zoological Park, Bhubaneswar, Orissa	1	4	0	5
13.	Sepahijala Zoological Park, Sepahijala, Tripura	5	4	0	9
14.	Zoological Garden, Alipore, West Bengal	1	1	0	2
	Total	**29**	**42**	**8**	**79**
Chinkara - Indian Gazelle (*Gazella gazella bennetti*)					
01.	Sri Venkateswara Zoological Park, Tirupati, Andhra Pradesh	2	1	0	3
02.	National Zoological Park, New Delhi, Delhi	1	4	0	5
03.	Indroda Nature Park, Gandhi Nagar, Gujarat	0	0	1	1
04.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	2	1	0	3
05.	Sakkarbaug Zoo, Junagarh, Gujarat	2	6	0	8
06.	Sayaji Baug Zoo, Vadodara, Gujarat	1	1	0	2
07.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	1	1	0	2
08.	Gandhi Zoological Park, Gwalior, Madhya Pradesh	1	11	0	12
09.	Kamla Nehru Prani Sanghrahalay, Indore, Madhya Pradesh	2	4	0	6
10.	Aurangabad Municipal Zoo, Aurangabad, Maharashtra	1	0	0	1
11.	Nandankanan Zoological Park, Bhubaneswar, Orissa	0	2	0	2
12.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	0	4	0	4
13.	Jaipur Zoo, Jaipur, Rajasthan	7	13	8	28
14.	Jodhpur Zoo, Jodhpur, Rajasthan	3	0	0	3
15.	Udaipur Zoo, Udaipur, Rajasthan	0	0	1	1
16.	Zoological Garden, Bikaner, Rajasthan	6	3	0	9
17.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	1	0	0	1
18.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	0	0	1
19.	Zoological Garden, Alipore, West Bengal	2	3	0	5
	Total	**33**	**54**	**10**	**97**
Deer Brow-Antlered - Sangai - Manipur (*Cervus eldi*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	4	8	0	12
02.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	2	8	0	10
03.	National Zoological Park, New Delhi, Delhi	10	31	9	50
04.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	1	1	0	2
05.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	2	1	0	3
06.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	1	0	0	1
07.	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	1	3	0	4
08.	Manipur Zoological Garden, Imphal, Manipur	1	0	7	8
09.	Nandankanan Zoological Park, Bhubaneswar, Orissa	0	1	0	1

Sl.No.	Zoological Park	M	F	U	T
10.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	0	1	0	1
11.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	5	4	0	9
12.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	3	7	0	10
13.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	0	0	1
14.	Zoological Garden, Alipore, West Bengal	8	7	0	15
	Total	**39**	**72**	**16**	**127**
Deer Mouse (*Tragulus meminna*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	0	1	2
02.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	1	1	0	2
03.	Nandankanan Zoological Park, Bhubaneswar, Orissa	1	0	0	1
04.	Sepahijala Zoological Park, Sepahijala, Tripura	1	0	0	1
	Total	**4**	**1**	**1**	**6**
Deer Musk – Kasturi Mrig (*Moschus moschiferus*)					
01.	Himalayan Nature Park, Kufri, Himachal Pradesh	3	2	0	5
	Total	**3**	**2**	**0**	**5**
Deer Swamp (Barasingha) (*Cervus duvauceli*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	2	2	0	4
02.	National Zoological Park, New Delhi, Delhi	5	8	1	14
03.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	4	7	0	11
04.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	3	2	0	5
05.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	5	3	0	8
06.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	10	21	6	37
	Total	**29**	**43**	**7**	**79**
Elephant Indian (*Elephas maximus*)					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	1	1	0	2
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	3	5	0	8
03.	Sri Venkateswara Zoological Park, Tirupati, Andhra Pradesh	3	0	0	3
04.	Zoological Park, Itanagar, Arunachal Pradesh	1	1	0	2
05.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	3	9	0	12
06.	Sanjay Gandhi Biological Park, Patna, Bihar	0	3	0	3
07.	National Zoological Park, New Delhi, Delhi	1	3	0	4
08.	Bondla Zoo, Usgao, Goa	1	1	0	2
09.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	1	1	0	2
10.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	2	2	0	4

Sl.No.	Zoological Park	M	F	U	T
11.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	5	4	0	9
12.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	0	1	0	1
13.	Gandhi Zoological Park, Gwalior, Madhya Pradesh	0	1	0	1
14.	Kamla Nehru Prani Sanghrahalay, Indore, Madhya Pradesh	1	1	0	2
15.	Peshwe Park Zoological Gardens, Pune, Maharashtra	0	1	0	1
16.	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	0	3	0	3
17.	Nandankanan Zoological Park, Bhubaneswar, Orissa	1	5	0	6
18.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	0	4	0	4
19.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	2	1	0	3
20.	Children's Corner, Guindy, Tamil Nadu	1	1	0	2
21.	Sepahijala Zoological Park, Sepahijala, Tripura	0	1	0	1
22.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	1	0	2
23.	Zoological Garden, Alipore, West Bengal	0	3	0	3
	Total	**27**	**53**	**0**	**80**
Gaur - Indian Bison (*Bos gaurus*)					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	1	0	0	1
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	2	1	0	3
03.	Bondla Zoo, Usgao, Goa	1	0	0	1
04.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	4	5	0	9
05.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	0	1	0	1
	Total	**8**	**7**	**0**	**15**
Gibbon Hoolock (*Hylobates hoolock*)					
01.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	1	0	0	1
02.	Sanjay Gandhi Biological Park, Patna, Bihar	0	1	0	1
03.	National Zoological Park, New Delhi, Delhi	0	1	0	1
04.	Sanjay Gandhi National Park, Borivali (E), Maharashtra	1	0	0	1
05.	Manipur Zoological Garden, Imphal, Manipur	1	1	0	2
06.	Aizawl Zoo, Aizawl, Mizoram	1	0	0	1
07.	Sepahijala Zoological Park, Sepahijala, Tripura	0	1	0	1
08.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	0	0	1
	Total	**5**	**4**	**0**	**9**
Langur Capped (*Presbytis pileatus*)					
01.	Nehru Zoological park, Hyderabad, Andhra Pradesh	2	2	0	4
02.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	1	0	0	1
03.	Jawaharlal Nehru Biological Park, Bokaro, Bihar	0	2	0	2
04.	Sanjay Gandhi Biological Park, Patna, Bihar	1	0	0	1

Sl.No.	Zoological Park	M	F	U	T
05.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	0	2	0	2
06.	Sayaji Baug Zoo, Vododara, Gujarat	1	0	0	1
07.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	0	1	0	1
08.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	0	1	0	1
09.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	2	1	0	3
10.	Jaipur Zoo, Jaipur, Rajasthan	0	1	0	1
11.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	2	0	0	2
12.	Sepahijala Zoological Park, Sepahijala, Tripura	0	1	0	1
13.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	1	0	0	1
14.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	2	0	3
	Total	**11**	**13**	**0**	**24**
Langur Golden (*Presbytis geei*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	2	0	3
02.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	1	2	0	3
03.	Jawaharlal Nehru Biological Park, Bokaro, Bihar	1	0	0	1
04.	Sanjay Gandhi Biological Park, Patna, Bihar	1	0	0	1
05.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	0	1	0	1
06.	Sanjay Gandhi National Park, Borivali (E), Maharashtra	2	1	0	3
07.	Sepahijala Zoological Park, Sepahijala, Tripura	1	0	0	1
08.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	1	1	0	2
	Total	**8**	**7**	**0**	**15**
Langur Nilgiri (*Presbytis johni*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	1	0	2
02.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	3	2	0	5
03.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	1	1	0	2
04.	Nandankanan Zoological Park, Bhubaneswar, Orissa	1	0	0	1
05.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	4	4	3	11
06.	V.O.C. Park Mini Zoo, Coimbatore, Tamil Nadu	1	0	0	1
07.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	0	1	0	1
	Total	**11**	**9**	**3**	**23**
Leopard / Panther (*Panthera pardus*)					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	5	1	0	6
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	4	1	0	5
03.	Sri Venkateswara Zoological Park, Tirupati, Andhra Pradesh	0	0	2	2

Sl.No.	Zoological Park	M	F	U	T
04.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	4	6	0	10
05.	Bhagwan Birsa Biological Park, Ranchi, Bihar	1	1	1	3
06.	Jawaharlal Nehru Biological Park, Bokaro, Bihar	0	2	0	2
07.	Sanjay Gandhi Biological Park, Patna, Bihar	6	7	0	13
08.	Tata Steel Zoological Park, Jamshedpur, Bihar	1	1	0	2
09.	National Zoological Park, New Delhi, Delhi	1	0	0	1
10.	Bondla Zoo, Usgao, Goa	2	1	0	3
11.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	3	3	0	6
12.	Rajkot Municipal Corporation Zoo, Rajkot, Gujarat	1	2	0	3
13.	Sakkarbaug Zoo, Junagarh, Gujarat	13	6	0	19
14.	Sayaji Baug Zoo, Vadodara, Gujarat	1	2	0	3
15.	Rohtak Zoo, Rohtak, Haryana	1	0	0	1
16.	Himalayan Nature Park, Kufri, Himachal Pradesh	3	0	0	3
17.	Bellary Children's Park-cum-Zoo, Bellary, Karnataka	1	1	0	2
18.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	5	3	2	10
19.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	6	5	0	11
20.	State Museum & Zoo, Thrissur, Kerala	3	0	0	3
21.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	1	1	0	2
22.	Gandhi Zoological Park, Gwalior, Madhya Pradesh	1	2	3	6
23.	Kamla Nehru Prani Sanghrahalay, Indore, Madhya Pradesh	2	1	0	3
24.	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	2	5	0	7
25.	Van Vihar National Park, Bhopal, Madhya Pradesh	4	5	2	11
26.	Aurangabad Municipal Zoo, Aurangabad, Maharashtra	5	8	0	13
27.	Maharajbag Zoo, Nagpur, Maharashtra	2	1	0	3
28.	Peshwe Park Zoological Gardens, Pune, Maharashtra	3	3	0	6
29.	Sanjay Gandhi National Park, Borivali (E), Maharashtra	3	4	4	11
30.	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	5	5	0	10
31.	Manipur Zoological Garden, Imphal, Manipur	0	0	3	3
32.	Nandankanan Zoological Park, Bhubaneswar, Orissa	3	6	0	9
33.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	7	5	1	13
34.	Jaipur Zoo, Jaipur, Rajasthan	4	2	0	6
35.	Jodhpur Zoo, Jodhpur, Rajasthan	2	3	0	5
36.	Kota Zoo, Kota, Rajasthan	3	4	0	7

Sl.No.	Zoological Park	M	F	U	T
37.	Udaipur Zoo, Udaipur, Rajasthan	2	2	0	4
38.	Zoological Garden, Bikaner, Rajasthan	0	1	0	1
39.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	4	2	0	6
40.	Children's Corner, Guindy, Tamil Nadu	0	0	2	2
41.	Sepahijala Zoological Park, Sepahijala, Tripura	4	6	0	10
42.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	1	2	0	3
43.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	4	3	0	7
44.	Padmaja Naidu Himalayan Zoological Park, Darjeeling, West Bengal	4	4	0	8
45.	Zoological Garden, Alipore, West Bengal	7	2	0	9
	Total	**134**	**119**	**20**	**273**
Leopard Clouded (*Neofelis nebulosa*)					
01.	Zoological Park, Itanagar, Arunachal Pradesh	2	0	0	2
02.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	3	1	0	4
03.	Sanjay Gandhi Biological Park, Patna, Bihar	1	1	0	2
04.	Manipur Zoological Garden, Imphal, Manipur	1	0	0	1
05.	Lady Hydari Park, Animal Land, Shillong, Meghalaya	1	1	0	2
06.	Jaipur Zoo, Jaipur, Rajasthan	0	1	0	1
07.	Sepahijala Zoological Park, Sepahijala, Tripura	1	0	0	1
	Total	**9**	**4**	**0**	**13**
Leopard Snow (*Panthera uncia*)					
01.	Padmaja Naidu Himalayan Zoological Park, Darjeeling, West Bengal	4	4	0	8
	Total	**4**	**4**	**0**	**8**
Lion Indian (*Panthera leo persica*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	3	3	0	6
02.	National Zoological Park, New Delhi, Delhi	1	2	0	3
03.	Kamla Nehru Zoological Garden, Ahmedabad, Gujurat	0	1	0	1
04.	Rajkot Municipal Corporation Zoo, Rajkot, Gujarat	1	3	0	4
05.	Sakkarbaug Zoo, Junagarh, Gujarat	12	31	0	43
06.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	2	4	0	6
07.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	1	1	0	2
08.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	2	1	0	3
09.	Van Vihar National Park, Bhopal, Madhya Pradesh	0	1	0	1

Sl.No.	Zoological Park	M	F	U	T
10.	Peshwe Park Zoological Gardens, Pune, Maharashtra	1	0	0	1
11.	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	0	2	0	2
12.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	2	6	0	8
13.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	2	0	3
14.	Zoological Garden, Alipore, West Bengal	1	1	0	2
	Total	**27**	**58**	**0**	**85**
Loris Slender (*Loris lardigradus*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	5	0	6
02.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	0	0	1	1
	Total	**1**	**5**	**1**	**7**
oris Slow (*Nycticebus coucang*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	1	0	2
02.	Zoological Park, Itanagar, Arunachal Pradesh	2	2	0	4
03.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	4	3	0	7
04.	Sanjay Gandhi Biological Park, Patna, Bihar	4	2	0	6
05.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	0	1	0	1
06.	Manipur Zoological Garden, Imphal, Manipur	0	0	2	2
07.	Lady Hydari Park, Animal Land, Shillong, Meghalaya	1	2	0	3
08.	Aizawl Zoo, Aizawl, Mizoram	2	1	0	3
09.	Nandankanan Zoological Park, Bhubaneswar, Orissa	0	1	0	1
10.	Zoological Garden, Alipore, West Bengal	0	0	1	1
	Total	**14**	**13**	**3**	**30**
Macaque Crab-Eating / Long Tailed (*Macaca irus umbrosa*)					
01.	Mini Zoo, Haddo, Port Blair, Andaman & Nicobar Islands	10	7	0	17
	Total	**10**	**7**	**0**	**17**
Macaque Lion-Tailed (*Macaca silenus*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	0	0	1
02.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	0	1	0	1
03.	Sanjay Gandhi Biological Park, Patna, Bihar	1	1	0	2
04.	National Zoological Park, New Delhi, Delhi	3	2	0	5
05.	Bellary Children's Park-cum-Zoo, Bellary, Karnataka	0	1	0	1
06.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	1	3	0	4
07.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	2	4	0	6
08.	State Museum & Zoo, Thrissur, Kerala	3	2	0	5

Sl.No.	Zoological Park	M	F	U	T
09.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	4	3	0	7
10.	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	2	1	0	3
11.	Peshwe Park Zoological Gardens, Pune, Maharashtra	1	0	0	1
12.	Nandankanan Zoological Park, Bhubaneswar, Orissa	2	2	0	4
13.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	2	1	0	3
14.	Jaipur Zoo, Jaipur, Rajasthan	3	2	0	5
15.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	4	4	2	10
16.	Sepahijala Zoological Park, Sepahijala, Tripura	0	1	0	1
17.	Kanpur Zoologial Park, Kanpur, Uttar Pradesh	1	2	0	3
18.	Zoological Garden, Alipore, West Bengal	1	1	0	2
	Total	**31**	**31**	**2**	**64**
Monkey Leaf (*Presbytis phayrei*)					
01.	Sepahijala Zoological Park, Sepahijala, Tripura	2	2	0	4
	Total	**2**	**2**	**0**	**4**
Panda Red / Lesser (*Ailurus fulgens*)					
01.	Padmaja Naidu Himalayan Zoological Park, Darjeeling, West Bengal	5	5	0	10
	Total	**5**	**5**	**0**	**10**
Pangolin (*Manis crassicaudata*)					
01.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	1	0	0	1
02.	Bellary Children's Park-cum-Zoo, Bellary, Karnataka	0	0	1	1
03.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	0	0	11	11
04.	Nandandanan Zoological Park, Bhubaneswar, Orissa	1	0	4	5
05.	Sepahijala Zoological Park, Sepahijala, Tripura	0	2	0	2
06.	Zoological Garden, Alipore, West Bengal	1	1	0	2
	Total	**3**	**3**	**16**	**22**
Ratel (*Mellivora capensis*)					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	1	0	0	1
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	2	2	0	4
03.	Zoological Park, Itanagar, Arunachal Pradesh	1	0	0	1
04.	Sanjay Gandhi Biological Park, Patna, Bihar	1	0	0	1
05.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	1	1	0	2

Sl.No.	Zoological Park	M	F	U	T
06.	Sakkarbaug Zoo, Junagarh, Gujarat	1	0	0	1
07.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	1	1	0	2
08.	Nandankanan Zoological Park, Bhubaneswar, Orissa	4	1	0	5
09.	Udaipur Zoo, Udaipur, Rajasthan	0	0	3	3
	Total	**12**	**5**	**3**	**20**
Rhinoceros Indian One Horned (*Rhinoceros unicornis*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	0	0	1
02.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	5	4	0	9
03.	Sanjay Gandhi Biological Park, Patna, Bihar	2	4	0	6
04.	National Zoological Park, New Delhi, Delhi	3	1	0	4
05.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	1	0	0	1
06.	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	1	0	0	1
07.	Nandankanan Zoological Park, Bhubaneswar, Orissa	1	1	0	2
08.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	1	0	0	1
09.	Sepahijala Zoological Park, Sepahijala, Tripura	1	0	0	1
10.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	4	1	0	5
11.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	0	0	1
12.	Zoological Garden, Alipore, West Bengal	2	1	0	3
	Total	**23**	**12**	**0**	**35**
Serow (*Capricornis sumatraensis*)					
01.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	1	2	0	3
	Total	**1**	**2**	**0**	**3**
Squirrel Giant Grizzled (*Ratufa macroura*)					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	1	0	0	1
02.	National Zoological Park, New Delhi, Delhi	1	0	0	1
03.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	0	2	0	2
	Total	**2**	**2**	**0**	**4**
Stag Kashmiri - Hangul (*Cervus elaphus hanglu*)					
01.	Himalayan Nature Park, Kufri, Himachal Pradesh	1	0	0	1
	Total	**1**	**0**	**0**	**1**
Tahr Himalayan (*Hemitragus jemlahicus*)					
01.	Himalayan Nature Park, Kufri, Himachal Pradesh	0	1	0	1
	Total	**0**	**1**	**0**	**1**

Sl.No.	Zoological Park	M	F	U	T
Tahr Nilgiri (*Hemitragus hylocrius*)					
01.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	2	0	0	2
	Total	**2**	**0**	**0**	**2**
Tiger Bengal (*Panthera tigris tigris*)					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	4	5	0	9
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	8	11	0	19
03.	Zoological Park, Itanagar, Arunachal Pradesh	3	1	0	4
04.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	3	3	0	6
05.	Bhagwan Birsa Biological Park, Ranchi, Bihar	1	2	0	3
06.	Jawaharlal Nehru Biological Park, Bokaro, Bihar	4	2	0	6
07.	Sanjay Gandhi Biological Park, Patna, Bihar	4	8	0	12
08.	Tata Steel Zoological Park, Jamshedpur, Bihar	2	1	0	3
09.	National Zoological Park, New Delhi, Delhi	1	1	0	2
10.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	1	1	0	2
11.	Rajkot Municipal Corporation Zoo, Rajkot, Gujarat	1	1	0	2
12.	Sakkarbaug Zoo, Junagarh, Gujarat	2	3	0	5
13.	Sayaji Baug Zoo, Vadodara, Gujarat	3	1	0	4
14.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	3	8	4	15
15.	State Museum & Zoo, Thrissur, Kerala	2	1	0	3
16.	Gandhi Zoological Park, Gwalior, Madhya Pradesh	2	0	0	2
17.	Kamla Nehru Prani Sanghrahalay, Indore, Madhya Pradesh	6	1	0	7
18.	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	2	4	0	6
19.	Maharajbag Zoo, Nagpur, Maharashtra	1	2	0	3
20.	Peshwe Park Zoological Gardens, Pune, Maharashtra	3	7	0	10
21.	Nandankanan Zoological Park, Bhubaneswar, Orissa	12	12	0	24
22.	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	8	3	6	17
23.	Kota Zoo, Kota, Rajasthan	3	6	0	9
24.	Udaipur Zoo, Udaipur, Rajasthan	1	0	0	1
25.	Zoological Garden, Bikaner, Rajasthan	0	1	0	1
26.	Arignar Anna Zoologial Park, Vandalur, Tamil Nadu	4	5	0	9
27.	Sepahijala Zoological Park, Sepahijala, Tripura	1	1	0	2
28.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	4	5	0	9
29.	Zoological Garden, Alipore, West Bengal	0	1	0	1
	Total	**89**	**97**	**10**	**196**

Sl.No.	Zoological Park	M	F	U	T
Tiger Bengal White (*Panthera tigris tigris*)					
01.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	1	0	2
02.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	1	0	0	1
03.	National Zoological Park, New Delhi, Delhi	1	2	0	3
04.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	1	0	0	1
05.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	1	3	0	4
06.	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	1	4	0	5
07.	Van Vihar National Park, Bhopal, Madhya Pradesh	1	1	0	2
08.	Peshwe Park Zoological Gardens, Pune, Maharashtra	1	1	0	2
09.	Nandankanan Zoological Park, Bhubaneswar, Orissa	18	10	0	28
10.	Jaipur Zoo, Jaipur, Rajasthan	1	2	0	3
11.	Zoological Garden, Alipore, West Bengal	0	2	0	2
	Total	**27**	**26**	**0**	**53**
Wolf Indian (*Canis lupus pallipes*)					
01.	Indira Gandhi Zoologial Park, Visakhapatnam, Andhra Pradesh	1	3	0	4
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	4	2	0	6
03.	Sri Venkateswara Zoological Park, Tirupati, Andhra Pradesh	0	0	3	3
04.	Jawaharlal Nehru Biological Park, Bokaro, Bihar	1	2	0	3
05.	National Zoological Park, New Delhi, Delhi	1	1	0	2
06.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	1	0	0	1
07.	Sakkarbaug Zoo, Junagarh, Gujarat	7	7	0	14
08.	Sayaji Baug Zoo, Vadodara, Gujarat	0	1	0	1
09.	Himalayan Nature Park, Kufri, Himachal Pradesh	0	2	0	2
10.	Jaipur Zoo, Jaipur, Rajasthan	3	2	0	5
11.	Jodhpur Zoo, Jodhpur, Rajasthan	1	1	0	2
12.	Udaipur Zoo, Udaipur, Rajasthan	1	0	0	1
13.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	1	0	0	1
14.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	1	0	0	1
15.	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	2	2	0	4
	Total	**24**	**23**	**3**	**50**
Wolf Tibetan (*Canis lupus chanco*)					
01.	Padmaja Naidu Himalayan Zoological Park, Darjeeling, West Bengal	10	5	0	15
	Total	**10**	**5**	**0**	**15**

REPTILES

Sl.No.	Zoological Park	M	F	U	T
Crocodile Long-Snouted - Gharial (*Gavialis gangeticus*)					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	0	0	3	3
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	0	0	2	2
03.	Zoological Park, Itanagar, Arunachal Pradesh	0	0	2	2
04.	Assam State Zoo-cum-Botanical Garden, Guwahati, Assam	1	0	0	1
05.	Jawaharlal Nehru Biological Park, Bokaro, Bihar	3	3	0	6
06.	Sanjay Gandhi Biological Park, Patna, Bihar	0	0	12	12
07.	National Zoological Park, New Delhi, Delhi	1	1	0	2
08.	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat	0	0	4	4
09.	Sakkarbaug Zoo, Junagarh, Gujarat	1	2	0	3
10.	Sayaji Baug Zoo, Vadodara, Gujarat	1	3	0	4
11.	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	1	2	0	3
12.	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	0	0	7	7
13.	State Museum & Zoo, Thrissur, Kerala	2	2	0	4
14.	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	3	3	0	6
15.	Gandhi Zoological Park, Gwalior, Madhya Pradesh	3	4	0	7
16.	Kamla Nehru Prani Sanghrahalay, Indore, Madhya Pradesh	1	4	0	5
17.	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	0	0	4	4
18.	Van Vihar National Park, Bhopal, Madhya Pradesh	0	10	0	10
19.	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	3	3	0	6
20.	Nandankanan Zoological Park, Bhubaneswar, Orissa	1	6	67	74
21	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	2	4	0	6
22.	Jaipur Zoo, Jaipur, Rajasthan	1	3	0	4
23.	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	1	1	0	2
24.	Chennai Snake Park Trust, Guindy, Tamil Nadu	3	3	0	6
25.	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	0	0	36	36
26.	Kanpur Zoological Park, Kanpur, Uttar Pradesh	0	0	3	3
27.	Zoological Garden, Alipore, West Bengal	0	0	3	3
	Total	**28**	**54**	**143**	**225**
Crocodile Marsh (Mugger) (*Crocodylus palustris*)					
01.	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	0	0	39	39
02.	Nehru Zoological Park, Hyderabad, Andhra Pradesh	12	14	0	26

Sl.No.	Zoological Park	M	F	U	T
03	Sri Venkateswara Zoological Park, Tirupati, Andhra Pradesh	0	0	2	2
04	Jawaharlal Nehru Biological Park, Bokaro, Bihar	3	2	8	13
05	Sanjay Gandhi Biological Park, Patna, Bihar	1	0	0	1
06	National Zoological Park, New Delhi, Delhi	0	0	9	9
07	Bondla Zoo, Usgao, Goa	8	8	0	16
08	Indroda Nature Park, Gandhi Nagar, Gujarat	0	0	167	167
09	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat 0	0	27	27	
10	Nature Park, Surat, Gujarat	3	0	0	3
11	Rajkot Municipal Corporation Zoo, Rajkot, Gujarat	1	1	15	17
12	Sakkarbaug Zoo, Junagarh, Gujarat	2	3	4	9
13	Sayaji Baug Zoo, Vadodara, Gujarat	1	1	0	2
14	Rohtak Zoo, Rohtak, Haryana	1	1	0	2
15	Bellary Children's Park-Cum-Zoo, Bellary, Karnataka	0	0	7	7
16	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	3	1	0	4
17	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	0	0	8	8
18	State Museum & Zoo, Thrissur, Kerala	1	1	0	2
19	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	3	3	0	6
20	Gandhi Zoological Park, Gwalior, Madhya Pradesh	3	3	0	6
21	Kamla Nehru Prani Sanghrahalay, Indore, Madhya Pradesh	1	3	0	4
22	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	0	0	2	2
23	Van Vihar National Park, Bhopal, Madhya Pradesh	1	1	12	14
24	Aurangabad Municipal Zoo, Aurangabad, Maharashtra	2	2	0	4
25	Sanjay Gandhi National Park, Borivali (E), Maharashtra	3	2	2	7
26	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	2	7	2	11
27	Nandankanan Zoological Park, Bhubaneswar, Orissa	0	1	6	7
28	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	1	2	0	3
29	Jaipur Zoo, Jaipur, Rajasthan	44	7	6	57
30	Jodhpur Zoo, Jodhpur, Rajasthan	1	1	0	2
31	Udaipur Zoo, Udaipur, Rajasthan	0	0	15	15
32	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	0	0	186	186
33	Chennai Snake Park Trust, Guindy, Tamil Nadu	6	8	20	34
34	Children's Corner, Guindy, Tamil Nadu	0	0	2	2
35	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	0	0	4198	4198
36	V.O.C. Park Mini Zoo, Coimbatore, Tamil Nadu	0	0	10	10
37	Sepahijala Zoological Park, Sepahijala, Tripura	2	0	0	2
38	Kanpur Zoological Park, Kanpur, Uttar Pradesh	0	0	9	9
39	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	1	1	0	2
40	Calcutta Snake Park, Zoological Garden, Badu, West Bengal	3	4	0	7
41	Zoological Garden, Alipore, West Bengal	0	0	3	3
	Total	**109**	**77**	**4759**	**4945**

Sl.No.	Zoological Park	M	F	U	T
Crocodile Salt Water (*Crocodylus porosus*)					
01	Mini Zoo, Haddo, Port Blair, Andaman & Nicobar Islands	14	14	9	37
02	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	0	0	18	18
03	Nehru Zoological Park, Hyderabad, Andhra Pradesh	4	1	0	5
04	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat 2	1	0	3	
05	Sayaji Baug Zoo, Vadodara, Gujarat	1	0	0	1
06	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	1	1	0	2
07	Nandankanan Zoological Park, Bhubaneswar, Orissa	0	0	3	3
08	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	1	1	0	2
09	Chennai Snake Park Trust, Guindy, Tamil Nadu	1	2	0	3
10	Children's Corner, Guindy, Tamil Nadu	0	0	8	8
11	Zoological Garden, Alipore, West Bengal	0	0	1	1
	Total	**24**	**20**	**39**	**83**
Gecko Golden (*Calodactylodes aureus*)					
01	Calcutta Snake Park, Zoological Garden, Badu, West Bengal	0	0	5	5
	Total	**0**	**0**	**5**	**5**
Monitor Lizard Yellow - Barred - Oval (*Varanus flavescens*)					
01	Chennai Snake Park Trust, Guindy, Tamil Nadu	1	2	0	3
02	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	0	0	1	1
03	Calcutta Snake Park, Zoological Garden, Badu, West Bengal	3	7	0	10
04	Zoological Garden, Alipore, West Bengal	0	0	2	2
	Total	**4**	**9**	**3**	**16**
Python Bivittatus (*Python molurus bivittatus*)					
01	Calcutta Snake Park, Zoological Garden, Badu, West Bengal	1	2	0	3
	Total	**1**	**2**	**0**	**3**
Python Indian - Rock (*Python molurus molurus*)					
01	Indira Gandhi Zoological Park, Visakhapatnam, Andhra Pradesh	0	0	6	6
02	Nehru Zoological Park, Hyderabad, Andhra Pradesh	1	1	2	4
03	Zoological Park, Itanagar, Arunachal Pradesh	0	0	1	1
04	Assam State Zoo Cum Botanical Garden, Guwahati, Assam	0	0	8	8
05	Bhagwan Birsa Biological Park, Ranchi, Bihar	0	0	3	3
06	Jawaharlal Nehru Biological Park, Bokaro, Bihar	3	4	0	7
07	Sanjay Gandhi Biological Park, Patna, Bihar	1	2	0	3
08	National Zoological Park, New Delhi, Delhi	0	0	5	5
09	Bondla Zoo, Usgao, Goa	2	2	0	4
10	Indroda Nature Park, Gandhi Nagar, Gujarat	0	0	1	1
11	Kamla Nehru Zoological Garden, Ahmedabad, Gujarat 0	0	1	1	
12	Nature Park, Surat, Gujarat	0	1	0	1
13	Rajkot Municipal Corporation Zoo, Rajkot, Gujarat	1	0	0	1

Sl.No.	Zoological Park	M	F	U	T
14	Sakkarbaug Zoo, Junagarh, Gujarat	2	2	1	5
15	Sayaji Baug Zoo, Vadodara, Gujarat	2	3	4	9
16	National Park, Bannerghatta Zoological Garden, Bangalore, Karnataka	2	1	0	3
17	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	0	0	4	4
18	State Museum & Zoo, Thrissur, Kerala	4	4	0	8
19	Thiruvananthapuram Zoo, Thiruvananthapuram, Kerala	3	4	0	7
20	Gandhi Zoological Park, Gwalior, Madhya Pradesh	0	0	1	1
21	Kamla Nehru Prani Sanghrahalay, Indore, Madhya Pradesh	1	1	0	2
22	Maitri Baagh Zoo, Bhilai, Madhya Pradesh	0	0	2	2
23	Sanjay Gandhi National Park, Borivali, (E), Maharashtra	0	0	1	1
24	Veermata Jijabai Bhosle Udyan & Zoo, Mumbai, Maharashtra	1	1	5	7
25	Manipur Zoological Garden, Imphal, Manipur	0	0	1	1
26	Nandankanan Zoological Park, Bhubaneswar, Orissa	0	0	5	5
27	Mahendra Chaudhury Zoological Park, Chhat Bir, Punjab	0	2	0	2
28	Jaipur Zoo, Jaipur, Rajasthan	0	0	1	1
29	Jodhpur Zoo, Jodhpur, Rajasthan	0	1	0	1
30	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	0	0	10	10
31	Chennai Snake Park Trust, Guindy, Tamil Nadu	9	2	16	27
32	Children's Corner, Guindy, Tamil Nadu	0	0	3	3
33	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	2	2	3	7
34	V.O.C. Park Mini Zoo, Coimbatore, Tamil Nadu	0	0	1	1
35	Sepahijala Zoological Park, Sepahijala, Tripura	1	2	0	3
36	Kanpur Zoological Park, Kanpur, Uttar Pradesh	0	0	2	2
37	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	3	1	0	4
38	Calcutta Snake Park, Zoological Garden, Badu, West Bengal	1	1	0	2
39	Zoological Garden, Alipore, West Bengal	0	0	9	9
	Total	**39**	**37**	**96**	**172**
Python Reticulated (*Python reticulatus*)					
01	Mini Zoo, Haddo, Port Blair, Andaman & Nicobar Islands	2	0	0	2
02	National Zoological Park, New Delhi, Delhi	0	0	5	5
03	Sri Chamarajendra Zoological Gardens, Mysore, Karnataka	1	1	0	2
04	Nandankanan Zoological Park, Bhubaneswar, Orissa	1	1	0	2
05	Arignar Anna Zoological Park, Vandalur, Tamil Nadu	1	1	6	8
06	Chennai Sanke Park Trust, Guindy, Tamil Nadu	1	1	24	26
07	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	0	0	5	5
	Total	**6**	**4**	**40**	**50**

Sl.No.	Zoological Park	M	F	U	T
Terrapin Batagur (*Batagur baska*)					
01	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	1	1	0	2
02	Zoological Garden, Alipore, West Bengal	0	0	7	7
	Total	**1**	**1**	**7**	**9**
Terrapin Eastern Hill (*Melanochelys tricarinata*)					
01	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	0	0	1	1
	Total	**0**	**0**	**1**	**1**
Terrapin Sail (*Kachuga kachuga*)					
01	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	0	0	2	2
	Total	**0**	**0**	**2**	**2**
Terrapin Spotted Black (*Geoclemys hamiltoni*)					
01	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	0	1	0	1
	Total	**0**	**1**	**0**	**1**
Turtle Fresh Water / Indian Soft-Shelled (*Lissemys punctata punctata*)					
01	Nehru Zoological Park, Hyderabad, Andhra Pradesh	0	0	70	70
02	Nature Park, Surat, Gujarat	0	9	0	9
03	Nandankanan Zoological Park, Bhubaneswar, Orissa	0	0	45	45
04	Jaipur Zoo, Jaipur, Rajasthan	0	0	1	1
05	Chennai Snake Park Trust, Guindy, Tamil Nadu	0	0	14	14
06	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	10	12	24	46
07	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	0	0	2	2
	Total	**10**	**21**	**156**	**187**
Turtle Ganges Soft-Shelled (*Trionyx gangeticus*)					
01	Sayaji Baug Zoo, Vadodara, Gujarat	2	2	0	4
02	State Museum & Zoo, Thrissur, Kerala	0	1	0	1
03	Madras Crocodile Bank Trust/Centre for Herpetology, Mamallapuram, Tamil Nadu	0	0	2	2
04	Prince of Wales Zoological Gardens, Lucknow, Uttar Pradesh	0	0	2	2
	Total	**2**	**3**	**4**	**9**

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