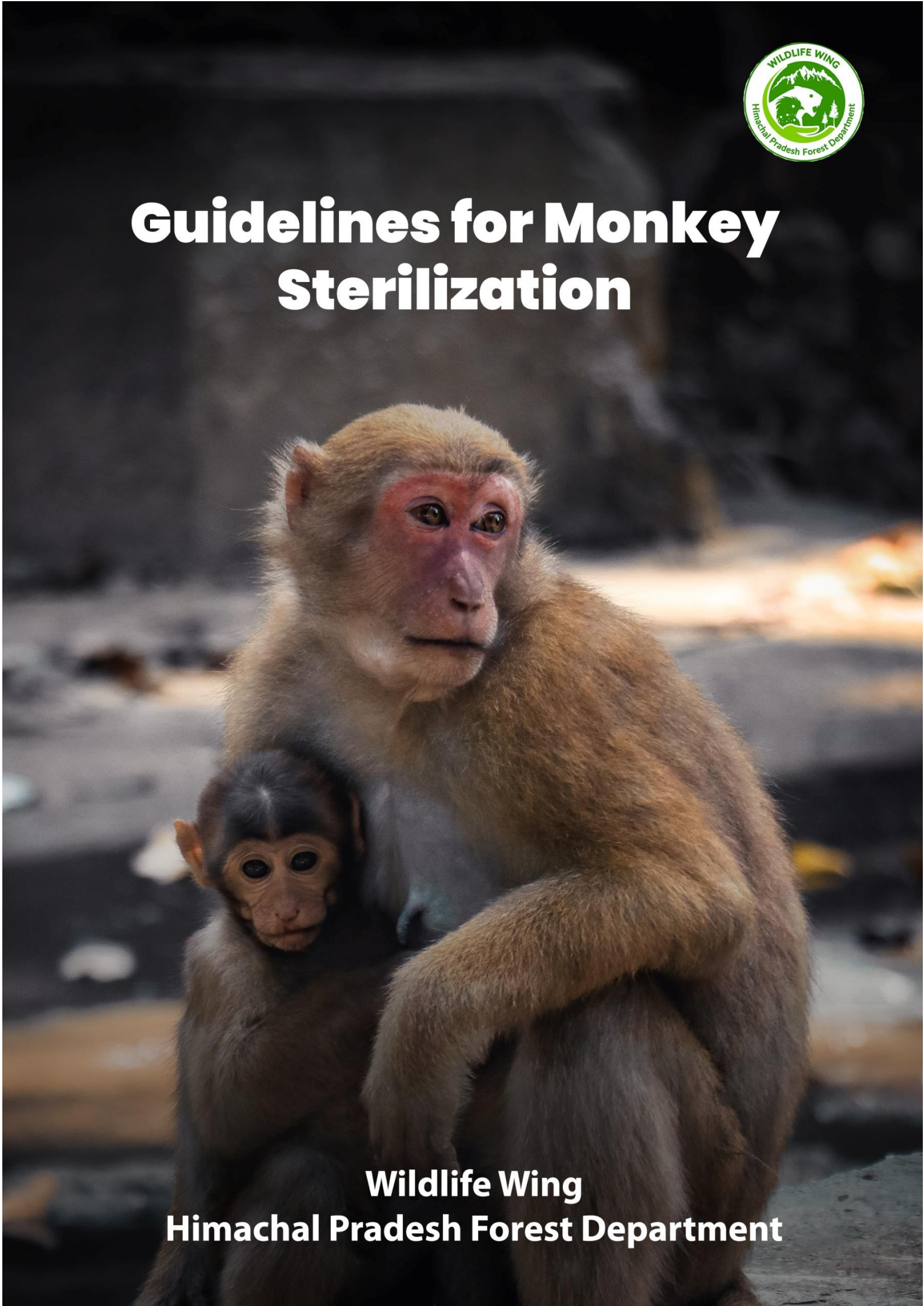
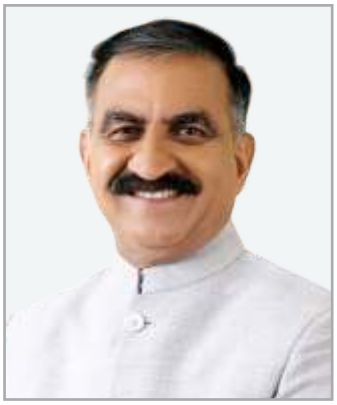
Guidelines for Monkey Sterilization



Wildlife Wing
Himachal Pradesh Forest Department



Sukhvinder Singh Sukhu
Hon'ble Chief Minister
Himachal Pradesh

MESSAGE

"Monkey sterilization is a vital tool in the realm of wildlife management and conservation. It plays a crucial role in addressing the challenges posed by rapidly growing monkey populations in various regions. By controlling their numbers through humane and scientifically sound sterilization techniques, we not only mitigate potential conflicts between humans and monkeys but also protect the delicate balance of our ecosystems.

This approach is particularly essential in areas where human-monkey interactions are common. Uncontrolled monkey populations can lead to crop damage, disease transmission, and disruption of local ecosystems. Sterilization provides a sustainable and ethical solution to these issues.

The importance of proper research and understanding of sterilization techniques cannot be overstated. 'Guidelines for Monkey Sterilization delves into this critical subject. It explores the science, ethics, and real-world applications of sterilization methods, providing a comprehensive resource for wildlife experts, conservationists, and anyone interested in the well-being of our natural world.
In a world where preserving biodiversity and coexisting with wildlife is of paramount importance, the significance of monkey sterilization cannot be ignored. It represents a responsible and compassionate approach to maintaining the harmony between humans and nature.

(Sukhvinder Singh Sukhu)

Dr. Amandeep Garg, IAS
Secretary (Forests)
Govt. of Himachal Pradesh

MESSAGE

The "Guidelines for Monkey Sterilization" addresses a topic of immense importance and urgencies the issue of controlling monkey population. Monkeys are remarkable creatures that share our planet, exhibiting intelligence, adaptability, and complex social structures. However, the increasing population of monkeys in certain regions has led to a multitude of challenges, including habitat destruction, human-wildlife conflicts, and the spread of diseases. One approach that has been explored to address these issues is monkey sterilization.

Sterilization, when conducted responsibly and ethically, can be an effective tool for population control, preserving the delicate balance between human and wildlife coexistence. It offers a humane and non-lethal solution that aims to reduce the number of monkeys without causing unnecessary harm or disruption to their social structures.

I strongly believe that by implementing responsible and well-regulated sterilization programs, we can mitigate the challenges posed by increasing monkey populations while respecting the intrinsic value and rights of these incredible creatures.

(Dr. Amandeep Garg)

Rajiv Kumar, IFS
Principal Chief Conservator
of Forests (HoFF)
Himachal Pradesh, Shimla

MESSAGE

As PCCF (HoFF) cum PCCF (WL) HP and a passionate advocate for wildlife conservation, I would like to address all of you who have embarked on the enlightening journey on "Guidelines for Monkey Sterilization". Your interest in this critical topic demonstrates your commitment to understanding and addressing the complex challenges we face in managing human-wildlife interactions.

Monkeys, with their innate intelligence and intriguing social dynamics, have captured our collective fascination for centuries. However, as human population expanded and encroached upon natural habitats, it was crucial that we find sustainable and compassionate solutions to mitigate the negative impacts on both humans and monkeys.

The book you are reading delves into the intricate details of monkey sterilization program, offering valuable insights and thought-provoking perspectives. It is a testament to our collective dedication to unraveling the complexities of population control and finding humane methods to ensure the well-being of both humans and our primate counterparts.

I extend my deepest gratitude to the vetrinarians, and contributors who have dedicated their time and expertise to bring this book to fruition. Their collective efforts have helped shape a resource that will serve as a catalyst for positive change in our approach to monkey population control.

As you continue your journey through these pages, I encourage you to reflect on the intricate interplay between humans and monkeys and the urgent need for responsible and compassionate solutions. Let us unite in our efforts to preserve the rich biodiversity of our planet and foster harmonious coexistence with our fellow beings.

Thank you may this book be a catalyst for enlightened conversations and transformative action.

(Rajiv Kumar)

Anil Thakur, IFS
Addl. Principal Chief Conservator
of Forests (Wildlife)
Himachal Pradesh, Shimla

MESSAGE

As APCCF Wildlife cum CEO HPZCBS, I express my gratitude for your interest in the "Guidelines for Monkey Sterilization". It is my privilege to address you and shed light on the significance of this valuable resource in our ongoing efforts to tackle the complex challenges surrounding human-monkey interactions. The guideline represents a comprehensive and thought-provoking exploration of the topic, bringing together the expertise of veterinarians, and practitioners in the field of wildlife conservation. Its pages are filled with insights, analysis, and practical recommendations that can guide our collective actions towards sustainable and responsible population control measures.

I would like to express my sincere appreciation to the Veterinarians for their tireless efforts in producing a comprehensive and well-documented publication. Their commitment to advancing our understanding of this complex issue is commendable, and their contributions will undoubtedly shape future discussions and initiatives in the field of wildlife conservation.

It is my fervent hope that this book serves as a catalyst for meaningful dialogue and action within your respective communities. Let us seize this opportunity to collaborate, share knowledge, and work together to ensure a harmonious balance between humans and monkeys for the benefit of all.

Thank you.

(Anil Thakur)

ACKNOWLEDGEMENT

I would like to take this opportunity to thank Sh Rajiv Kumar, IFS, PCCF (HoFF) cum PCCF (WL) Shimla, Himachal Pradesh for his kind supervision and for inspiring me to document the guidelines for Monkey Sterilization Programme. It's an amazing honor to serve under his direction.

I was inspired and guided to write this by Sh Anil Thakur, APCCF(WL), IFS, Shimla, Himachal Pradesh. He is acknowledged and thanked reverently.

My ability to write this in an appropriate manner was greatly aided by the ongoing surgical work done by Wildlife Veterinarians across various Monkey Sterilization Centers (MSC's) in Himachal Pradesh and their willingness to share their expertise and experiences. I owe a tremendous debt of appreciation to all the Veterinarians who were involved in starting and standardizing this flagship programme for Wildlife Wing of Forest Department which is the first in the world programme to control population of any wild animal in such a large scale and performed by minimum invasive technique, and helped to create the guidelines, and inspired me to document the same with their unflinching support.

Dr. Karan Sehgal
Veterinary Officer (Headquarters)
Wildlife Wing HP Forest Department

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Chapter 1

Monkey Sterilization Himachal Pradesh

Himachal Pradesh has been reeling under the stress of monkey menace for many decades now. Over the years wholehearted steps have been taken to check the menace by the forest department by all possible means. So far all efforts to control the menace have been carried out by Forest Department and needless to say only this department is being looked upon as a responsible to control problem. With continuing habitat loss these species have increasingly come into contact with humans predisposing them to become pests, stealing food from crops and gardens, and pestering people for food. Himachal is facing acute problem of the Rhesus macaque as a result of crop depredation, destruction to horticulture produce, aggressive behaviour by way of bites and destruction of property. As a result of this H.P. is facing a huge monetary loss resulting in unemployment problem and seriously affecting the tourist potential of the state. To mitigate this Rhesus macaque–human conflict the veterinarians of the Wildlife Wing of HP Forest department standardized the technique and adopted method to mass-sterilize the monkey in first Monkey Sterilization Centre (MSC) of the state at Tutikandi, Shimla in February 2007. This was first such attempt by anyone in entire world to surgically manage the population of any wild population on such a large scale.

1.1 Introduction

The Rhesus macaque (*M. mulatta*) is among the most common monkeys in North India. It is highly intelligent and has learnt to adapt to almost all habitats, from near-desert habitats to thick jungles, even to mountains above the snowline at 2,500 m. In India, where they are considered sacred and thus protected, they live successfully in agricultural and even urbanized areas.

They often become so fearless of humans that they can be a pest or even danger to humans. A comprehensive management Monkey Action Plan was formulated by Wildlife Wing of Himachal Pradesh in coordination with the Government of India to maintain a healthy viable population of primates in the state of Himachal Pradesh on directions of the Hon'ble High Court Himachal Pradesh consequent to the writ petition filed by Sh. Kanwar Rattanjit Singh vide Writ Petition (Civil) No. 653/2003. Under the Action Plan first Monkey Sterilization Centre (MSC) of the state was set up at Tutikandi, Shimla in February 2007, soon more MSCs were set up .Now seven more MSC`s including one at Tutikandi are functional viz Sastar (Hamirpur), Gopalpur (Kangra), Boul (Una), Slapper (Mandi), Bhagani (Chamba) and Paonta Sahib (Sirmaur) with average annual target of sterilization of 10000 monkeys. Since this is the most effective technique to control population of the monkeys, it is presumed that the effective control of monkey population can be achieved through this. Sterilization is carried out in both the males and females using electro-thermo cautery technique and laparoscopic technique respectively. In the year 2019 the population abundance estimation was carried out in collaboration with Wildlife Institute of India, Dehradun & SAICON, as per that estimation 1,36,443 monkeys have been reported to be there in the state of HP. Till March 2023 a total of 1,81,204 monkeys (Male 93,903 & female 87,301) have been sterilized across the state in MSC`s which has prevented about 8.5 Lakh new births. In addition to the sterilization the monkeys were declared vermin in year 2016 initially in Shimla town and later in 38 tehsil of HP for six months and subsequently extended it by another three years for 53 additional tehsils which expired on 20/12/2019.

Now monkeys has been brought of the preview of WPA 1972 in 2022 amendment hence is not required to be declared as vermin in the act .

CHRONOLOGICAL ORDER OF EVENTS W.R.T. MONKEY STERILIZATION PROGRAMME

A CWP No. 653/2003 was filed by Sh Kanwar Rattanjit Singh in Hon'ble High Court

18.08.2003	The Hon'ble High Court directed respondents (Secretary Forests) to file reply by 09.09.2003 on proposed course of action to initiate in curbing the monkey menace
15.09.2003	Hon'ble High Court directed State Govt. to consider the matter for making law against feeding monkeys
24.11.2003	Hon'ble High Court directed GOI and State Govt. to coordinate with each other in evolving an agreed action plan w.r.t. dealing with monkey
29.12.2003	GOI MOEF set up expert committee to prepare an action plan
28.08.2004	Affidavit along with short term and long term action plan filed
18.11.2004	Affidavit by DIG (WL) MOEF, earmarking a sum of Rs. 80.00 lakh to meet the support activities like cost for capturing, sterilization and release of monkey
22.07.2005	Submission of pilot project through Pr. Secretary (Forests) to seek 100% funding from GOI.
10.2005	P. CCF (WL) discussed problem of monkey menace in the 39th Annual General meeting of Animal Welfare Board of India. It was decided to comprise a team to assess the gravity of monkey menace in H.P.
12.12.2005	Hon'ble High Court H.P. issued direction to union of India to sanction & release a sum of Rs. 1.20 crore
6.01.2006	All relevant information sought from time to time by Secy AWBI were submitted timely
05.2006	Renovation of old museum and construction of various units under monkey sterilization project started at RRC Tutikandi
09.2006	Renovation/construction completed at RRC Tutikandi.
10.06.2007	Various equipment's/ furniture. Medicines required under monkey project were procured and minor improvements as per requirement of Deptt., Veterinary Doctors were done in various units at RRC Tutikandi
16.12.2007	Capturing/ sterilization and release on monkey at same locality started and is continuing till date.

The process of monkey sterilization is briefly explained below: -

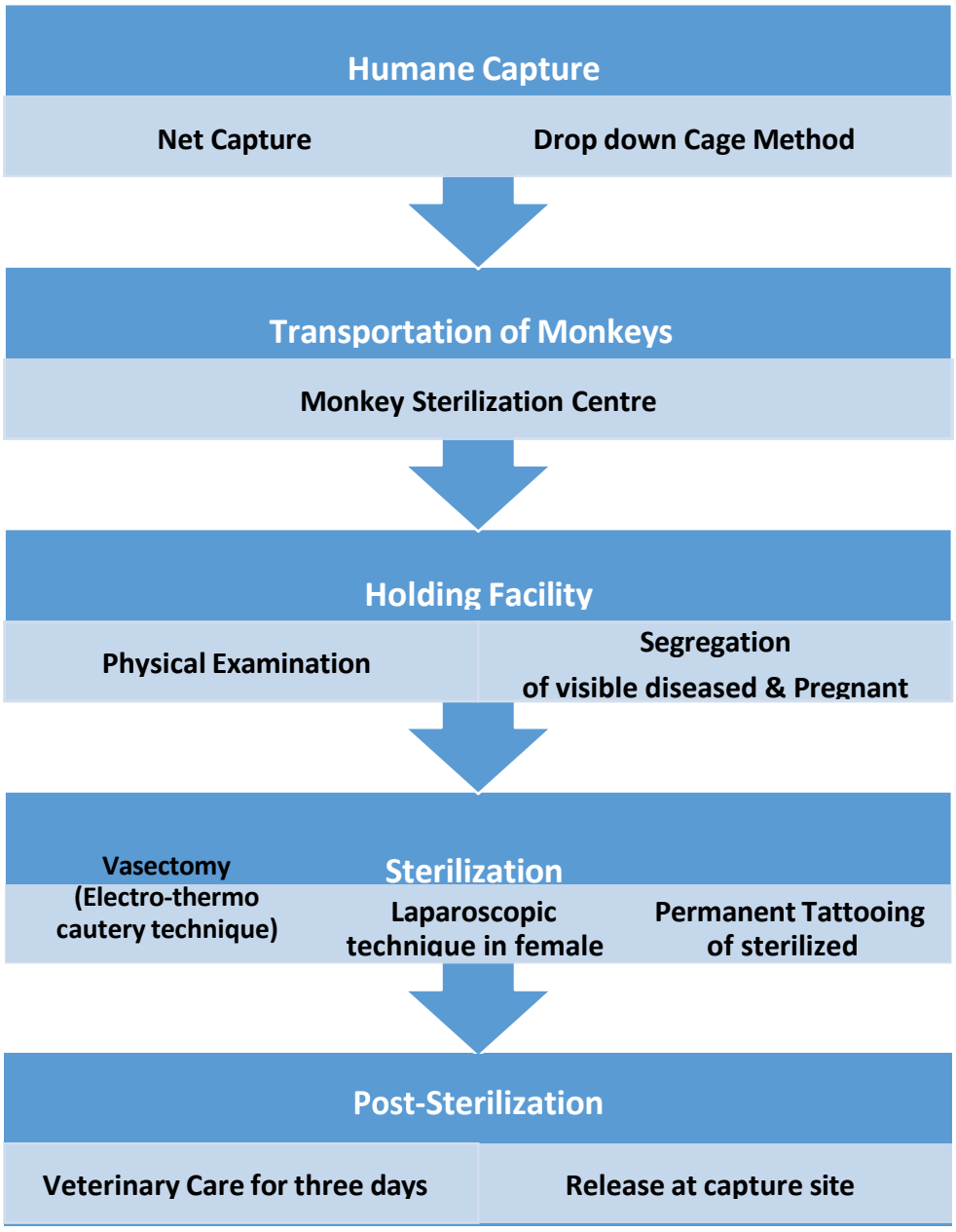


Fig 1: The Flow diagram of monkey sterilization

1.2 Biology of Rhesus Macaque

1.2.1 Infancy

Birth is preceded by behavioral signs, such as touching the vagina, squatting, body shakes, tail wagging and frequent position changing. Labour lasts 1 to 3 hours. The infant begins to suckle at 1 hour. By 2 weeks of age the mother will have begun to introduce solid foods into the diet. At 4 weeks infant weight is around 0.65 kg (rhesus), and by 6 weeks the infant is able to move independently and starts to explore away from the mother. Nutritional weaning begins gradually at 4 months.

1.2.2 Yearlings and juveniles

Nutritional weaning is complete around 12 to 14 months (earlier in captivity). Yearlings weigh around 1 to 1.3 kg. Juveniles usually remain close to their mother until the birth of a sibling (1 to <2 years). Juveniles develop social skills, through sex-specific patterns of play. Their diet now resembles that of adults; rhesus macaques are omnivorous frugivorus.

1.2.3 Adolescence and sexual maturity

Rhesus macaque females reach sexual maturity at 3 years, and males at 4 years. Maturity may be reached sooner in captivity. Oestrus is accompanied by reddening of the sexual skin on the rump and face. Peak fertility (ovulation) occurs 11 to 14 days after onset of menstruation regardless of cycle length (26 to 29 days in rhesus). On reaching sexual maturity, males may become more aggressive and begin exploring away from the natal group.

1.2.4 Adulthood

The breeding season in macaques varies in timing and length between species, locations and over time; breeding seasonality is evident in rhesus macaques. Macaques mate promiscuously. Females give birth approximately every 1 to 2 years, from 3 to 20 years of age. Higher-ranked females reproduce more often, from an earlier age, and have higher infant survival rates.

1.2.5 Senescence

The median lifespan of macaques in the wild is less than 15 years (<5% reach 25 years). In captivity, macaques can live for over 25 years (maximum recorded is 40 years). Females over 25 years of age experience menopause. Geriatric illnesses are rarely seen in wild populations, but geriatric captive macaques exhibit illnesses such as arthritis, atherosclerosis, cataracts, gum

disease, cancer, diabetes and obesity. Low ranking macaques are at higher risk of chronic psychosocial stress, leading to more health problems in old age.

Fig 2: Biology of Rhesus Macaque

1.3 Types of conflict by Rhesus Macaques.

1.3.1 Urban Areas

- Rioting in unguarded areas
- Pilferage from homes/shops/people
- Destruction of vegetation/home gardens /offices/communication lines
- Bites/Attacks on tourists/women/children
- *en masse* attack on pets

1.3.2 Rural areas

- Crop raiding
- Destruction of seedlings/seeds
- Destruction of cash-crops
- Occasional bites
- Attack on pets/guard dogs

Both urban & rural conflicts are interchangeable owing to seasonal variations and the migratory nature of the animals in conflict.

Chapter 2

Standard Operating Procedures for Monkey Sterilization

Standard Operating Procedures for Monkey Sterilization adopted are:-

2.1 Humane handling of Monkeys

General Principles

a. The capturing method used by the monkey catchers should be minimally invasive, most humane that can be safely applied for that particular animal and situation. The monkeys must be treated with kindness to minimize stress or any physical injury to the animals.

b. Monkey catchers employed by Forest Department although professionally trained in capturing should also be trained along with accompanying Forest guards for addressing issues of emergency first aid treatment and humane handling of monkeys at the time of capture and their transport to and from any MSC.

c. All the staff assisting in monkey sterilization including the wildlife guards and the monkey capturers should be well aware of the method of visual identification of the pregnant monkeys.

d. Adequate training in the treatment of monkey bite wounds, along with emergency first aid kit should be provided to the monkey catching team.

Capturing Techniques

Proper capture techniques are essential to minimize pain, fear, distress and anxiety experienced by the animal and also for the safety of the operator. Hence capture of monkeys is to be done through a drop-down door type of large cage as this method offers following advantages:

Fig 3: Drop Down door cage method

- This is a scientific method of capture of monkeys.
- It doesn't involve any kind of injury or direct animal handling.
- It allows the staff to identify the basic signs of ill health, injuries, advanced pregnancies, etc.
- It facilitates animal handling after capture in a humane manner.

It is to be strictly noted that any other method for capturing monkeys is distressing and poses serious risk of injury at the time of capture and hence should not be used for catching monkeys. The capturing work is done by person well trained in the process/skilled persons only

2.2 Do's and Don'ts with regard to catching of monkeys

General Considerations

a. Monkeys capturing and handling personnel need to be wary of the potential for serious injury when handling wild animals as monkeys can be aggressive and may attack.

b. When working in the field, personnel should work in teams of at least two people.

c. Protective clothing, footwear and gloves may reduce the chances of injury when handling monkeys. However, the use of heavy gloves decreases sensitivity and dexterity and may increase the risk of handling injuries to small species.

Specific considerations

a. All monkey handlers must be given prophylactic vaccinations against rabies.
b. Monkeys should be caught and released preferably in the early morning hours to avoid heat stress and better blending into the habitat.
c. The monkeys should be released at the same spot where they were captured from.
d. Since capture of the monkeys by drop-down door type cage and further shifting to transport cages doesn't involve handling by the humans, it should so be practiced that no animal is handled with rods, tongs or wires etc.
e. Ensure picking of infants only if accompanied by a lactating female otherwise such infants should be released at the site of capture itself to prevent their starvation.
f. Visually pregnant females and monkeys less than ~2 kg of weight should also be released at the site of capture itself.
g. The monkeys which are ill should be transported separately. The MSC can provide treatment to sick animals for only three days it is advised that any monkey after this period be transported to the nearest veterinary hospital for proper treatment and care of such animals. If required extremely sick animals can be retained in the isolation facilities of MSCs for further treatment.

It is advisable that the monkey catchers work systematically and catch monkeys from one area as per troupe the constitution of the troupe at a time. This would help in systematic combing of the area and results would be visible soon. If monkeys from different areas/pockets are picked up, then they should be brought in separate cages with proper identification of the time and area of capture.

2.3 Transportation of Monkeys

Fig 4: Transportation of Monkeys

Key Concerns during Transportation of Monkeys

Once caught, the monkeys must be safely transported to the MSC premises. The type of vehicles should be such that it is easily able to navigate small lanes and byways in cities and towns. The areas from which the monkeys are to be caught also influence the type of vehicle to be used.

a) Vehicular design considerations

- The holding section of the vehicle should be free from sharp edges, protruding screws etc. so that the chances for injury during transport are prevented.
- The vehicle design needs to be such, that monkeys should be transported in a manner that they do not fight with one another.
- The vehicle must be adequately ventilated, even when a full load of monkeys is contained within.
- The vehicle should be easy to clean and the transportation cages sufficiently strong and secure so that the monkeys once caught, cannot escape.

b) Basic specifications for monkey catching vans.

- The monkey transportation vehicle should have an open body with provision for covering the cages with tarpaulin during transport to avoid adverse weather conditions.
- The vehicle should have two separate compartments, the driver's compartment and the monkey holding compartment.
- The driver's compartment should be able to accommodate a minimum of two members of the monkey capture and handling team, in addition to the driver.
- There should be a provision for viewing the monkey holding compartment from the driver's seat.

c) Monkey transportation: Dos and Don'ts

- Adequate care should be taken to avoid overcrowding in transportation cages. As a rule do not transport more than 6 monkeys in any of the transportation cages.
- Size and Type of Crate for transport of Monkeys from trapping area to the nearest MSC and from the MSC to the release area should have dimensions so as to provide an average space of ~ 0.035 m^3/animal (if each animal has an average weight between 3.1 to 5.0 kg). For example, a transportation cage with dimensions of 910 x 760 x 510 mm will provide the stipulate space (as per Transportation of Animals Act 1978) for 10 monkeys having average weight between 3.1 to 5.0 kg. The type of cages used in our case for transporting monkeys to and from MSC have dimensions of 900 mm x 600 mm x 600 mm that provide an average space of 0.054 m^3/adult animal. Hence a maximum of 6 adult animals can be easily transported in such cages.
- Animals are to be captured, fed and watered and thereafter transported immediately to the nearest MSC.
- If the travel distance is more than three hours, stop on the way and provide water for the monkeys.
- An attendant should periodically check the monkeys in the vehicle, when in transit.
- Adequate care should be taken to maintain hygiene of the transportation cages and they should be thoroughly cleaned before transporting monkeys to and from MSCs.
- Catchers should not ignore obviously sick or injured monkeys when catching. Therefore, at least one separate cage for an injured, ill monkey should always be carried in the vehicle.
- Additional vehicles or catching times could also be used to specifically pick up monkeys that the public has reported as sick or injured.
- Great care should be taken during loading, transportation and unloading.
- Withhold the evening meal to allow overnight fasting which is essential otherwise the excessive feed in the intestines obstructs with the surgical procedure in females.
- Withhold water on the day of surgery as distended bladder interferes with surgery in female animals.

d) Choice of vehicles Dos and Don'ts with regard to catching of monkeys

The small utility pick up vehicles have been found suitable for the purpose of catching and transporting the monkeys as these vehicles can be easily adapted and modified to serve as animal capture vans.

2.4 Infrastructure and holding Facility of Monkey Sterilization Centre / programmes.

Before an MSC can start functioning it should be ensured that minimum standards of housing, feeding, hygiene and veterinary care are provided for the captured monkeys. The preparation room and operation theatre must be well equipped with necessary instruments, equipment and medicines to adequately handle the volume of work as well as to ensure that surgery carried out on the monkeys is free of any untoward complications. The MSC must also take care to ensure that adequate number of personnel are available on duty to run the Monkey Sterilization Program efficiently.

a) Housing

It is essential that in addition to the general housing arrangement (pre and post-operative wards) made for the captured monkeys selected to undergo the Sterilization, arrangements are also in place to provide a separate isolation room house individual monkeys that show symptoms of illness. If possible, arrangements should be made to ensure that the drainage system is kept separate in the areas where the ill monkeys are housed. Care should be taken to ensure ad lib provision of water and specified quantity of feed to each monkey. There should be adequate provision of shelter from climatic extremes. All aggressive/dominant monkeys within the same troop should be kept separately to avoid injury to sub dominant individuals of the same troop.

Fig 5: Holding facility at MSC.

Important: The monkeys should be kept in the MSC not just until they recover from the effects of the anesthesia, but for at least a minimum period of another 72 hours more, to allow complete wound healing and avoid any post-operative complications, if any.

b) Unloading Areas. Secure areas for unloading monkeys from and to vehicles allow secure examination of monkeys at the time of unloading or loading monkeys.

c) Flooring and walls. The floor and walls should be covered with tiles to facilitate easy cleaning. Proper arrangements should be made to ensure the cages, floors, walls are efficiently cleaned. Cleaning and sanitizing product like Safeguard etc. is recommended.

d) Cages management. The cages have should be designed such that they provide more than the recommended space for each animal, the floors are built with welded mesh of 1”x1” so that the paws don’t get stuck in them and they don’t pick-up any of the left over feed from the bottom. Such cages allow their cleaning and disinfection very easily and are not discomforting to monkeys during their temporary stay at the MSC.

e) Ventilation. There should be adequate provision for circulation of air, natural sunlight and increase the ventilation inside the pre and post-operative wards. This can easily be

achieved through open-to-air roofing in the Centre of the facility which helps in proper air circulation and optimizing sunlight too. During inclement weather care should be taken to keep the pre and post-operative wards well insulated and within the comfort zone of animals. Provision of fans, temporary drop-down covers or heating options can be provided for this.

f) Minimal requirements of a operation theatre room

The Operation Theatre must have the following basic equipment:

1. Two strong, sturdy, surgical operating tables with tilt and height adjustment facility (one each for operating the males and females)

2. One OT light with adequate lux intensity to perform the required surgery.

3. Instrument Trolley 1 each for the male and the female operating table.

4. Trays 8"x4" 2 each for the male and the female operating table.

5. A cupboard to stock essential medicines

7. An I/V stand

8. UV lamp

9. Air conditioning/Heating system (optional, depending on the weather)

10. Exhaust fans with protected exhaust vents -2

11. Emergency medicine kit

12. Surgical waste bins.

The standard surgical instruments for laparoscopy provided in each MSC include:-

a) Endoscope (Diameter 5mm, length 300mm, autoclavable).

b) Maxi type grasper with non-ratcheted handle (diameter 5mm, length 330mm).

c) Trocar provided with a flap valve (size 5.5mm).

d) Obturator (size 5.5mm).

e) Veress insufflations needle (Diameter 2mm, length 120 mm).

f) Fiber optic light cable (diameter 4.8mm, length 2300mm).

g) Insufflators with flow rate 0-10 liters /min.

h) LED TV 26".

i) Electrosurgical unit 400w with foot paddle. Both unipolar and bipolar output and metal conduction plates. Bipolar pencil and other standard accessories.

j) CO2 cylinder 5Kg.

Other Instruments like autoclave, sterilizers, O.T. lights, surgical tables, oxygen concentrator, surgical sets, clinical dressing drums, stretchers, monkey handling equipment's (capture nets, jab stick, leather gloves etc) fumigation/ disinfection pumps. Pulse oximeter etc.

g) Personnel. The number of people to be employed by the MSC must be calculated based on the volume of work that is to be done. For an MSC that undertakes 300 sterilizations and 300 Anti Tetanus vaccinations per month, the following personnel should be employed:

1. One Full time Veterinary Surgeon.
2. One Full time Veterinary Pharmacist.
3. Ten animal attendants who will attend to the unloading and loading of the animals in the pre-operative and post-operative wards, sterilization related assistance such as restraint, carrying, scrubbing and shaving of the animals to be sterilized. These attendants will also carry out feeding and cleaning in the pre-operative and post-operative wards.

2.5 Surgery for Monkey Sterilization programmes: Anesthetic & Surgical Protocols.

The particular combination of anesthetic to be used is a choice that should be made by the Veterinary Surgeon in charge of the MSC Programmes.

Good anesthetics protocol should achieve the following:

1. Loss of consciousness that permits surgical procedures to be carried out
2. Sufficient degree of sedation, analgesia and muscle relaxation
3. Maintenance of adequate cardiac function at optimal levels

a) Anesthetic protocols Recommended

Anesthetic Protocol

- Inj. Xylazine @ 1mg/ kg body weight.
- Inj. Ketamine @ 5 mg/ kg body weight. (To make the surgeries economical 50mg/ml Ketamine is to be used)

Both mixed in a single syringe and cocktail given I/M in the squeeze cage.
Maintenance with increment of 1/3rd calculated induction dose of ketamine.

Sterilization Procedure

Before operating upon female monkeys it is to be ensured using hand palpation that they are non-pregnant. If female found pregnant it is not to be operated upon.

b) Surgical Procedure for Female Monkeys (laparoscopic tubectomies)

Laparoscopic tubectomies are to be performed only on non-pregnant female monkeys.

Procedure:

a) Female monkey is kept in dorso ventral recumbency on inclined operation table.
b) Patent Veress needle is inserted on inferior crease of umbilicus.
c) Confirming the needle is in abdominal cavity (using Normal Saline flushing and suction) CO_2 is insufflated to recommended pressure to produce pneumoperitoneum.
d) Veress needle is removed, and 0.5 cm incision made at umbilicus.

Fig 6: Laparoscopic Tubectomy

e) Through this incision Trocar is inserted into abdomen piercing through Rectus and Peritoneum. Then through its cannula laparoscope is made to enter abdominal cavity.
f) Abdominal cavity is viewed on screen when second Trocar is inserted from secondary incision made lateral to umbilicus.
g) Through second cannula Maxi grip forceps is inserted, and fallopian tube of either side is grasped avoiding omentum.
h) Electro cautery is used to cut and seal the tube.
i) Both right and left tubes are cut using electro cautery.

j) Check for hemorrhages and if any, coagulate it using electro cautery coagulation.
k) Remove forceps and lightly press abdomen to let residual CO_2 escape. Remove laparoscope.
l) Incision site is dressed with povidone iodine ointment.

c) Surgical Procedure for Male Monkeys (Vasectomy)

Vasectomy is performed on male monkeys.

Procedure:

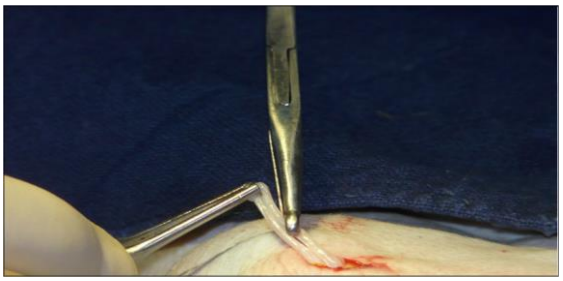


Fig 7: Vasectomy in males

a) Male monkey is positioned in dorso-ventral recumbency.
b) Small incision about 2 mm is made on skin at pre-pubic site using Electro cautery pencil.
c) Ring forceps is inserted subcutaneously from this incision.
d) Using left hand, left vas deferens is palpated and grasped with forceps.
e) Vas deferens exteriorized using scalpel blade (11 No.).
f) Vas deferens loops is cut and sealed (both ends) using electro cautery pencil.
g) Same procedure repeated on right side.
h) Check for hemorrhage and incision site dressed with povidone Iodine ointment.

d) Post-operative care

The choice of antibiotics and analgesics to be used after the surgery is a decision that is to be made on a case by case by the veterinary surgeon. The decision about the antibiotic /analgesic to be used would be influenced by the veterinary surgeon's clinical experience, conditions prevailing at the MSC and the health of the monkeys. Care should be taken to ensure that the antibiotics used are broad-spectrum.

Monkeys recovering from anesthesia and surgery need to be kept warm and dry. Once the monkeys have recovered sufficiently from anesthesia and surgery, the monkeys should be provided access to drinking water.

The monkeys should be checked at least once daily by a veterinary surgeon and based on the clinical condition of the monkeys; a decision should be made for additional medications to be given.

During daily checks, the monkeys which are ready to be released must be identified, and the necessary steps should be taken to release the monkeys.

2.6 Use of Analgesics:

Firstly, an injection of meloxicam is given to all the animals as per their body weight 15 minutes prior to surgery. Thereafter after 24 hours of surgery, acetaminophen pediatric analgesic

solution (reconstituted at double strength) is smeared on a bread slice and given to each animal as per the body size for the next two days. Such a combination of protocol for administering analgesics has removed the need for repeated subcutaneous or intramuscular injections in monkeys that requires firm physical restraint to enable an injection to be given safely and effectively. Such a procedure of physical restraint if repeated is highly distressing to the operated monkeys and compromises with wound healing.

2.7 Permanent Marking

Every animal which is sterilized at MSC is marked with a tattoo mark between eye brows by tattooing machine, so that if the animal gets captured again can be segregated at once on visualization of tattoo mark.

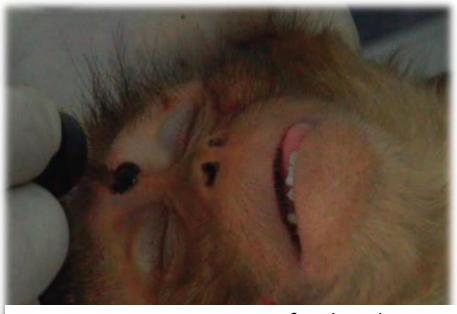


Fig 8: Tattoo on forehead

2.8 Guidelines for release of monkeys.

a) Only monkeys identified by a veterinary surgeon as fit for release should be released.
b) It is imperative that monkeys are released back to the same location from where they were captured. Care should be taken to ensure correct identification of monkeys and their location of capture.
c) Although monkeys should be released after ensuring that they have been fed, they should not be fed immediately prior to their transport to the release sites as this practice may cause travel sickness leading to vomiting.
d) The release of the monkeys is to be done by Monkey catcher in presence of Forest staff of that area to ensure the releases are in same location.
e) In many areas, the release of monkeys during the early morning hours is preferred.

Chapter 3

Challenges of Monkey Sterilization Programme

Himachal is pioneer place in entire world where large scale sterilization of macaques using minimal invasive technique has been adopted. At present, there are seven fully functional sterilization centers, which if supported by adequate capture of monkeys, can sterilize at least 40,000 monkeys per annum. Only hiccup these centers face is the adequate capture of monkeys, who have over the period outsmarted all the capture techniques and efforts of the monkey capturers. Various techniques have been tried like, spring-net, drop-door cage, individual capture, darting, but still the capture is going down due to basic reason that the monkeys from almost all areas have been captured a multiple time. That is to say, almost seven generations of monkeys now have a feel and cognizance to identify the capture efforts and take steps to evade it. The situation has also been badly affected by the target oriented approach, whereby the monkey capturers are just concerned with the catch, and they keep on capturing even one or two odd monkeys out of entire troupe, which might comprise just 2-5% of the troupe and causes multi-troupe formation. Further mixing of such splinter groups and later unmonitored release has further led to worsening of situation in a big way. The original concept of sterilizing at least 80% of the troupe has really been farfetched except for few places and the picture thus being presented is that of failure of sterilization programme, whereas, more than 8.40 lakh new births have been prevented due to sterilization of the female macaque population (Table 1). To get over this, it is suggested that the strategy should now be focused on mass sterilization based upon the hot-spots and one which involves sterilizing maximum number of monkeys in one area.

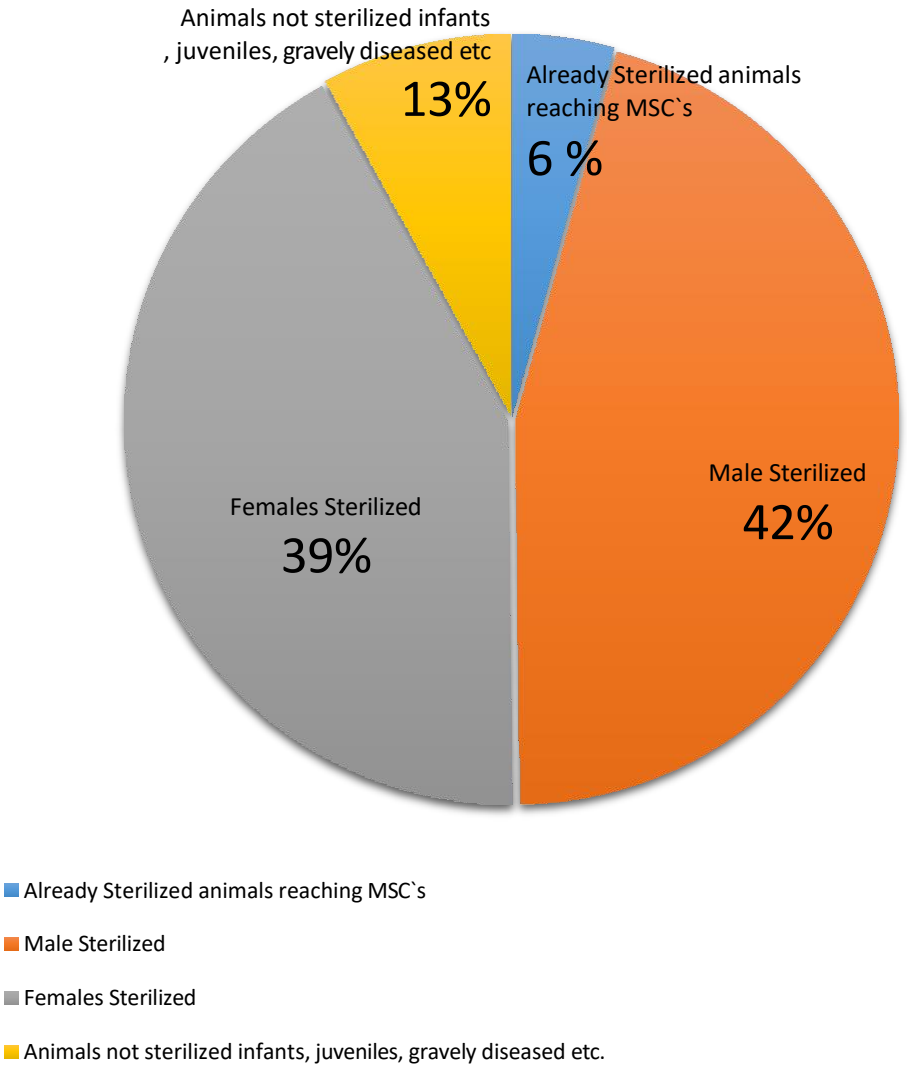
In the year 2019 the population abundance estimation was carried out in collaboration with Wildlife Institute of India, Dehradun & SAICON, as per that estimation 1,36,443 monkeys have been reported to be there in the state of HP while the earlier number reported in year 2004 was 3.17 Lakh monkeys (pre -sterilization) . Till March 2023 a total of 1, 81,204 monkeys (Male 93, 903 & female 87,301) have been sterilized across the state in MSC`s which has prevented about 8.40 Lakh new births. Had population control through sterilization not attempted, the population of monkeys would have crossed 13 lakhs by now. Also declaration of monkey as a vermin by Government of India MOEF&CC in 2016 and 2019 year helped to reduce the population of simians in rural areas although officially very less reporting of culling was done by local communities despite incentives. However the number of simians in urban

areas seems to be stable as culling was not practiced as was done in rural areas of the state owing to crop protection at village level.

The Forest Department tried that the habitation enrichment be done in forest areas with the aim that the simians return back to their natural habitat by plantations of wild fruit-bearing trees, grasses and berries etc. decision has been taken that at least 30% of total planted plants should be fruit-bearing trees in all the plantations raised under CAMPA funds.

It is worthwhile mentioning that the zoonotic impact of Rhesus macaque needs to be addressed as they are carriers of several viral, bacterial, protozoan, parasitic ,rickettsial diseases such as monkey pox, rabies ,herpes virus ,viral hemorrhagic fever ,strongylodiasis etc .These diseases

Fig 9: Monkey Conflict highest among wild animals.



can infect humans by way of scratch, bite, fomite born –touching railing ,infected water and food sources .

To worsen the scenario, exceptionally high level of human imprinting is being noticed in lot of monkey species. Because of this most of the monkeys who were earlier either afraid of humans or avoided humans at mere site of them, are now comfortable in the company of same. Our failure to properly dispose of solid-waste in both urban and rural areas has further deteriorated the condition to a very large extent. Presently, periphery of every human habitation is littered with household wastes and most of the monkeys frequent these areas to feed on these. Thus, many of the species have become scavengers from being dependent on prey only. Unless, we introduce stricter control on the garbage and solid-waste, the situation is going to get worse only. There has been definite evidence of decrease of conflict with wild animals, especially monkeys, once the solid waste has been removed from various locations.

3.1 Long Term Strategy to combat monkey menace.

3.1.1 INVOLVEMENT OF LINE DEPARTMENTS

- Municipal Corporations/other local bodies: By aggressive management of garbage, proper implementation of legislation.
- Department of Law and Order: to strictly enforce restrictions on feeding of monkeys
- Agriculture and Horticulture Departments: by proper assessment of damage done, seasonal raiding pattern, approximate troupe size, movement pattern, etc. Moreover, these departments should research and suggest for alternative crops which are not raided by macaques. In addition, they can have valuable inputs regarding the early maturing feed varieties for the macaques which can be used by various stakeholders as alternative control measure of habitat enrichment. These departments have already commenced upon a programme of funding solar-fences around the crop fields by subsidizing the cost up to 80% of total cost. The department is also promoting sowing of tubers, marigold etc. which are not eaten by the monkeys.
- Involvement of NHAI/PWD: Since, many macaques dwell by the sides of the roads, it should be important that these authorities carry out the work of control of feeding by means of strict vigil, management of garbage, evacuation of road-side vendors who are selling bread etc.
- Publicity Department: The department can provide necessary public awareness both for the tourists and residents to make them aware of legislations and approach required for dealing with wild animals.
- Department of Industries: To help procure better technology like electrical fencing etc. keeping in view the geography of HP.

- Department of Animal Husbandry: Providing services of vets and para-veterinary staff.
- NGOs: These bodies play a major role in educating people and creating a wave to better control the menace by participatory movement.

3.1.2 PUBLIC AWARENESS CAMPAIGN

- By putting of large billboards, pamphlets etc. and utilizing media like radio and television a constant effort would be to educate the people about methods to control conflict with wild animals.
- Intensive campaigning will be made in Panchayats and urban local bodies by educating people not to feed monkeys and to dispose of household waste at designated clearing sites only.
- Volunteers will be enrolled to utilize scaring methods like use of slingshots, air guns/pistols, firecrackers etc. The names of these volunteers will be shared with community to seek their assistance at the time of distress. These volunteers will be equipped with all the possible scaring tools and will be dressed in proper gear. It is proposed that 5000 such volunteers shall be enrolled in phased manner in the state in next five years.
- Based on the experience of Monkey Patrol in Shimla town, similar arrangement will be made in few other towns of Himachal where monkey menace is on a higher scale.

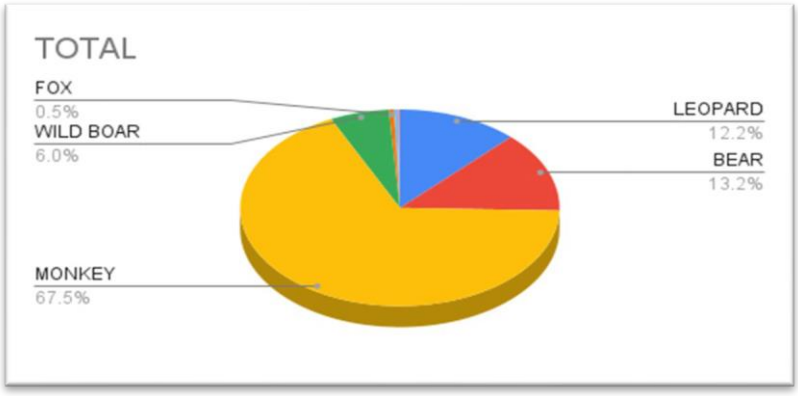


Fig 9: Monkey Conflict highest among wild animals.

BIRTH PREVENTED IMPACT

	Monkeys Sterilised			New births prevented in the year																
	Male	Female	Total	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	Total
2006-07	366	190	556	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	**3230**
2007-08	773	672	1445		672	672	672	672	672	672	672	672	672	672	672	672	672	672	672	672	**10752**
2008-09	863	1677	2540			1677	1677	1677	1677	1677	1677	1677	1677	1677	1677	1677	1677	1677	1677	1677	**25155**
2009-10	5179	6445	11624				6445	6445	6445	6445	6445	6445	6445	6445	6445	6445	6445	6445	6445	6445	**90230**
2010-11	7490	7588	15078					7588	7588	7588	7588	7588	7588	7588	7588	7588	7588	7588	7588	7588	**98644**
2011-12	11117	9658	20775						9658	9658	9658	9658	9658	9658	9658	9658	9658	9658	9658	9658	**115896**
2012-13	7733	7080	14813							7080	7080	7080	7080	7080	7080	7080	7080	7080	7080	7080	**77880**
2013-14	8188	7876	16064								7876	7876	7876	7876	7876	7876	7876	7876	7876	7876	**78760**
2014-15	6858	6073	12931									6073	6073	6073	6073	6073	6073	6073	6073	6073	**54657**
2015-16	7065	6478	13543										6478	6478	6478	6478	6478	6478	6478	6478	**51824**
2016-17	8591	7333	15795											7333	7333	7333	7333	7333	7333	7333	**51331**
2017-18	8484	7132	15616												7132	7132	7132	7132	7132	7132	**42792**
2018-19	7568	6807	14375													6807	6807	6807	6807	6807	**34035**
2019-20	4303	3815	8118														3815	3815	3815	3815	**15260**
2020-21	3609	3185	6794															3185	3185	3185	**9555**
2021-22	3304	2691	5995																2691	2691	**5382**
2022-23	2718	2322	5040																	2322	**2322**
Total	**94209**	**87022**	**181102**	**190**	**862**	**2536**	**8978**	**16566**	**26224**	**33310**	**41186**	**47259**	**53737**	**61070**	**68202**	**75009**	**78824**	**82009**	**84700**	**87022**	**767705**
Mortality @7%				**13**	**60**	**178**	**628**	**1160**	**1836**	**2331**	**2872**	**3297**	**3751**	**4264**	**4764**	**5770**	**5518**	**5741**	**5929**	**6092**	**53739**

Table 1: Birth prevented impact.

Total sequential deaths (F2 onwards)	**53739**
Total births prevented (cumulative)	**767705**

3.1.3 Monkey Sterilization Centres also serves as employment generators.

These MSC`s served as source of employment generation & human resource development as to run these centres Veterinarians were deputed from Animal Husbandry Department to perform these specialist surgeries ,also animal attendants and keepers (8 No in each) were posted from funds received from HP Zoo & Conservation Breeding Society to run these centres smoothly and efficiently .Also monkey catchers are paid remuneration of Rs 700 per monkey if catch is less than 80 % of troop and Rs1000 if exceeds 80% ,also they are paid @ Rs300, Rs400, Rs150 ,Rs1000 for already sterilized, pregnant, juveniles and monkeys suffering from untreatable life threatening diseases respectively from HPZ&CBS fund

Table 2: Capture rate of Monkeys in HP

No.	Category	Rate	Office order	Remarks
1.	Monkeys sterilized	• Rs. 700 per monkey, if total catch of monkeys is below 80% of the total population of the target troupe • Rs. 1000 per monkey, if total catch of monkeys exceeds 80% of total population of the target troupe	Office Order No. 194, Dated 27/10/16	
2.	Monkeys found already sterilized	Rs. 300 per monkey	Office order 59; 18/9/18	
3.	Monkeys found pregnant	Rs. 400 per pregnant female monkey		
4.	Juvenile monkeys, weaned, not sterilized	Rs. 150 per weaned monkey		
5.	Monkeys found suffering from diseases which are untreatable	Rs. 1000 per monkey	Office Order No. 137, Dated: 10/10/2017	
6.	Monkeys culled as per provisions of being declared as vermin under WPA, 1972	Rs. 500 per monkey	Office Order No. 194, Dated 27/10/16	Valid till Rhesus Macaque declared as vermin by GoI

Chapter 4

Monkey Sterilization Programme Adoption

Taking learning from the sterilization programme of Himachal Pradesh which was pioneer programme in the world many other states from India have followed the same. The veterinarians across India visit our sterilization centres and get trained in this specialized procedure. The state of Uttarakhand, Telangana & Andhra Pradesh have also adopted the model for control of population of *Rhesus macaques* .

Table 3: Data regarding total sterilization done till March 2023

Captured	Male	Female	Total
226439	93903	87301	181204

About 20% monkeys which are not sterilized about 15% are pregnant plus juveniles and other 5 %) are already sterilized.

Chapter 5

Studies & Research

Studies & Research conducted by Forest Department on Rhesus macaques in Himachal and their findings were found as follows -

5.1 Findings of study conducted by University of California, Davis, USA.

Study was conducted on two troupes at Jakhu and at BSNL Building, The Mall, Shimla.

a. People initiate aggressive interactions with monkeys
b. In Jakhu teasing by humans is more rampant then on The Mall area
c. For feed/provisioning interactions of monkeys and humans are more than that on the Mall.
d. Local people were of opinion that their life has been affected by macaques as they are damaging property and stealing food, mobiles, clothes etc .
e. Study revealed maximum number of people were not aware of Himachal Pradesh Forest Department Sterilization Programme.
f. People questioned in the survey were of opinion for translocation, sterilization, culling and some suggested use of monkeys for research /laboratory teaching to solve the menace.
g. The study has concluded more of inter and intra group relationship ,people remember more negative effects ,people being objective due to personal loss and mystique about sterilization .
h. Study also suggested to create more awareness in people about how to tackle monkey menace by making more fruitful awareness drive by placing large hoarding etc. in public places and educating about sterilization process to public.
i. Study suggested displaying of monkey menace helpline numbers at various places.
j. Study suggested that in future Jhaku area be selected as monitoring site for behavior studies, for demographic & post sterilization studies for human macaque conflicts and for disease transmission dynamics of multiple groups.

5.2 Population status and post- sterilization behavior of Rhesus macaque (Macaca mulatta) in Himachal Pradesh study conducted by Salim Ali Centre for Ornithology and Natural History, Coimbatore (SACON).

The total population of rhesus macaque was estimated to be 1,36,443 individuals, in 3336 groups done in 2019-20

Major observations

a) High number of smaller macaque groups.
b) Mean group size of macaques in Himachal Pradesh (16.40) is lower than many other locations, and also with the previous earlier records in Himachal Pradesh e.g., 33.10 in 1980 (Tiwari and Mukherjee 1982), 32 in Shimla of Himachal Pradesh (Pirta et al. 1997; Ciani 1984).
c) Skewed number of adult males to adult females in some groups.
d) Some groups show a very less number of infants to adult females, however, many groups show a good number of infants to number adult females in the group.
e) Observation of male bands indicates the possible unrelated individuals.
f) This may be a consequence of the randomization effect.
g) The record of an all-male band of the rhesus macaque. Our observation shows a formation of all-male bands with juvenile, sub-adult, and adult males that remained for nine months is unusual.
h) The high variation in the age-sex ratios and percent composition of age-sex individuals of the groups- possibility of loose social organization may be due to unrelated individuals.
i) The high number of individuals or immature in certain groups, and also less number of number of individuals or immature in certain groups.

5.3 Conclusion

1. Decline in the population size is evident
2. Although the number of infants to a number of adult females is recorded, but a large number of adult females having infants in certain groups require discussion.
3. Skewed adult ratio, male bands, and less group cohesion are due to the randomization effect which is evident from the genetic data.

Chapter 6

General perception about impact of monkey sterilization

General perception about impact of monkey sterilization programme in Himachal Pradesh by Forest Officials and public.

- The population of monkeys has declined considerably in rural areas , this has resulted due to the sterilization programme .One school of thought is that during vermin declaration period of macaques by GOI large scale killing of monkeys were done in the villages which was never reported to the authorities and no financial assistance was taken .
- In urban areas specially Shimla people and department have observed considerable decline in the number of macaques, however the killing during vermin declaration period was very less owing to urbanization and very less area under cultivation (crop and fruit).
- The size /bulkiness of monkeys have decreased considerably as per visual sighting as less number of giant monkeys are present nowadays .This could be due to gene depletion or deletion due to massive sterilization drive across state . Also the feeding behavior changing from frugivorus to bread /wheat eaters may have decreased puberty and generation interval.
- The installation of high LED mast light towers has resulted in monkey menace in night time, which needs to be studied in future.
- The troupe disintegration /splinter troupe formation is being observed, this might be result of rejection of dominant males /females being sterilized and as they are not able to produce progeny as before sterilization.
- As per physiology of sterilization process there should be no change in hormonal levels of sterilized animals compared with normal and thus no behavioral changes, yet their rejection due to be sterile needs to be studied.
- Large scale human imprinting during the sterilization process from capture to release might be leading to fearlessness from humans in some individuals and fresh protocol for this problem needs to be framed and discussed.

- As monkeys live up to 20-25 years the permanent identification methods such as PIT (Passive Integrated Transponder) be used instead of ancient tattooing techniques which are more reliable.
- The capture and release of monkeys be monitored with innovative methods so that no leak is done during release time , as people generally complain that after sterilization centres their areas is seen with new troupes of macaques which was probably monkey free long time ago .

Way Forward for Monkey Sterilization.

The Wildlife Wing of HP Forest Department is going to conduct population estimation of the Monkeys in the State, to find out present trend of the population of monkeys .The sterilization programme is going to continue in the state till a viable population is achieved which can co-exist with humans. The MSC`s are now designated as staging point of Rescue and Rehabilitation of wild animals and would render treatment to wild injured animals. The services of the staff posted in these centers would also be utilized for rescue of wild animals during conflict /injury /distress. These MSC`s are also serving as employment generators for workers employed under Himachal Pradesh Zoo and Conservation Breeding Society. The Laparoscopic equipment's in MSC`s are also upgraded in phased manner to provide best surgical intervention to the captured macaques for early recovery and more precision as per latest practices.

"The greatness of a nation can be judged by the way its animals are treated."

~Mahatma Gandhi

Principal Chief Conservator of Forests (Wildlife),
Himachal Pradesh Forest Department,
Talland, Shimla - 171001 (INDIA)
Phone: 91-177-2624186, 2623147
FAX: 91-177-2624192, 2624193