

National Studbook Swamp Deer (*Rucervus duvaucelii*)

Component of Central Zoo Authority sponsored project titled “Maintenance of Studbooks for Selected Endangered Species in Indian Zoos” awarded to the Wildlife Institute of India vide sanction order: no. 9-2/2012-CZA(NA)/418 dated 7th March 2012

Published: October 2017

Data till August 2017



भारतीय वन्यजीव संस्थान
Wildlife Institute of India



केन्द्रीय चिड़ियाघर प्राधिकरण
Central Zoo Authority

National Studbook of Swamp Deer (*Rucervus duvaucelii*)

Published as a part of the Central Zoo Authority sponsored project titled “Development and maintenance of studbooks for selected endangered species in Indian zoos”

PROJECT PERSONNEL

Research Assistant

Ms. Neema Sangmo Lama

Project Consultant

Anupam Srivastav, Ph.D.

Project Investigator

Dr. Parag Nigam

Copyright © WII, Dehradun, and CZA, New Delhi, 2017

Photo Credits: Dr. Parag Nigam and Dr. Animesh Talukdar

This report may be quoted freely but the source must be acknowledged and cited as:

Wildlife Institute of India (2017) National Studbook of Swamp Deer (*Rucervus duvaucelii*), Wildlife Institute of India, Dehradun and Central Zoo Authority, New Delhi. TR. No 2017/ 011 pages: 41.

For correspondence:

Project Investigator
WII-CZA Studbook Project
Wildlife Institute of India
PO Box 18, Dehradun, 248001
Uttarakhand, India

FOREWORD

Conversion of floodplain grassland habitats to agricultural landscapes and changes in the hydrological regimes have led to extensive loss of habitat for species associated with such habitats. Swamp deer (*Rucervus duvaucelii*) is one such habitat specialist that is facing imminent extinction threats. Intensive protection and habitat management efforts have led to marginal recoveries of the population; however, factors causing its decline remain operational.

The Central Zoo Authority in collaboration with zoos in India has identified the species for *ex-situ* conservation in Indian Zoos for ensuring its long-term survival. Scientific management based on pedigree records contained in studbooks forms the basis for ensuring the long-term genetic viability and demographic stability of captive populations of the species.

As a part of the endeavour of effectively managing *ex-situ* populations of species prone to extinction, a Memorandum of Understanding has been signed with the Wildlife Institute of India for compilation and update of studbooks of identified species in Indian zoos. As part of the project outcomes, the WII has compiled the National Studbook of Swamp Deer (*Rucervus duvaucelii*).

The report highlights the need for individual animal identification using appropriate marking techniques besides maintaining the integrity of the three sub-species that occur in three distinct geographical regions of India. Further, the recommendations contained in the studbook form the basis for the long-term management of the species in captivity. It is hoped that the holding institutions will adopt the recommendations and keep the WII informed of changes in their populations on a regular basis to enable the timely update of the studbook.

(Dr. D.N. Singh, I.F.S.)
Member Secretary,
Central Zoo Authority

ACKNOWLEDGEMENTS

The National studbook of Swamp Deer (*Rucervus duvaucelii*) is a part of the assignment to the Wildlife Institute of India, Dehradun by the Central Zoo Authority, New Delhi on the development and maintenance of studbooks of selected endangered species in Indian zoos.

The authors are thankful to the Central Zoo Authority for the financial support in carrying out the assignment. The guidance and support extended by Dr. D.N. Singh, IFS, Member Secretary, CZA is gratefully acknowledged. The authors also thank Dr. Brij Kishore Gupta, Evaluation and Monitoring Officer, Dr Devender Singh, Scientific Officer and the support staff of the Central Zoo Authority for facilitating this work.

The valuable advice and support provided by Dr. V.B. Mathur, Director, WII and Dr. G.S. Rawat, Dean Faculty of Wildlife Sciences, is duly acknowledged. Authors sincerely acknowledge the support from the Directors, Veterinarians and other personnel from holding zoos (provided below) for providing pedigree information that led to the successful development of the studbook.

Alipore Zoological Garden, Kolkata
Arignar Anna Zoological Park, Chennai
Indira Gandhi Zoological Park, Vishakhapatnam
Kanan Pandari Zoo, Raipur
Kanpur Zoological Park, Kanpur
Mahendra Chaudhury Zoological Park
Nandankanan Biological Park, Bhubaneswar
National Zoological Park, Delhi
Nawab Wazid Ali Shah Zoological Garden, Lucknow
Nehru Zoological Park, Hyderabad
Sakkarbaug Zoo, Junagadh
Sanjay Gandhi Biological Park, Patna
Sri Chamarajendra Zoological Gardens, Mysore
Sri Venkateswara Zoological Park, Tirupati
Thiruvananthapuram Zoo, Thiruvananthapuram
Van Vihar National Park Zoo, Bhopal

We also thank Mr. Mukesh Arora for layout and design of this document.

Authors

CONTENTS

Swamp Deer Species Biology	1
Threats and conservation measures	5
Status in Captivity	5
Methods	6
Scope of the Studbook	6
Analysis	7
Constraints	8
Conclusions and Recommendations	10
References	11
Annexure I: Status of Captive Population of Swamp Deer across Indian Zoos	13
Annexure II: Location Glossary	41

Swamp Deer Species Biology

Taxonomy

Phylum:	Chordata
Sub-phylum	Vertebrata
Class:	Mammalia
Order:	Artiodactyla
Family:	Cervidae
Genus:	Rucervus (Hodgson 1838)
Species:	<i>Rucervus duvaucelii</i> (G. Cuvier 1823)

Swamp deer (*Rucervus duvaucelii*) are members of the sub-family Cervinae in the family Cervidae. Members of the sub-family are characterized by deciduous antlers, absence of gall bladder, and retention of the second and fifth metacarpals in the limbs (Randi et al. 1998, Kuznetsova et al. 2005). Three subspecies are currently recognized, namely *Rucervus duvaucelii duvaucelii* (G. Cuvier, 1823) (Western Swamp Deer, Barasingha), *R. d. ranjitsinhi* (Groves, 1983) (Eastern Swamp Deer) and *R. d. branderi* (Pocock, 1943) (Hard-ground Barasingha).

Table 1: Sub-species level distinctions (Adapted from Groves (1982); and Groves and Grubb (2011))

Characteristics	<i>R. d. duvaucelii</i> (Western Swamp Deer)	<i>R. d. ranjitsinhi</i> (Eastern Swamp Deer)	<i>R. d. branderi</i> (Hard Ground Barasingha)
Nasals	Short, relative to the snout length	Elongated	Nasals long
Rostrum	Not deep	Snout short, deep; maxilla narrow	short, but the nose not deep; maxilla somewhat broadened
Antlers	Long, slender, and not compressed or palmated	Short, thick, branching low down, with an especially shortened anterior branch; somewhat compressed, tending to be palmated	Extremely long, many branched, with a long brow tine; branching high up the beam; anterior branch especially long
Sexual dimorphism	Sexes difficult to identify	Females notably smaller than the males	Females notably smaller than the males. Adult males brown-black darker than females with distinct mane.
Tail	Relatively long and slim, with prominent white hairs on the underside	Short, with prominent white hairs on the underside	Underside white to yellow.
Ears	Large and rounded, with thick, white hair on the inside	Small, pointed, with very little white hair on the inside	Large and pointed, with thick, white hair on the inside
Feet	Splayed, with bare heels	Splayed, with bare heels	Well- knit feet, with hairy pasterns
Distribution	Gangetic plain	Brahmaputra plain	Central India

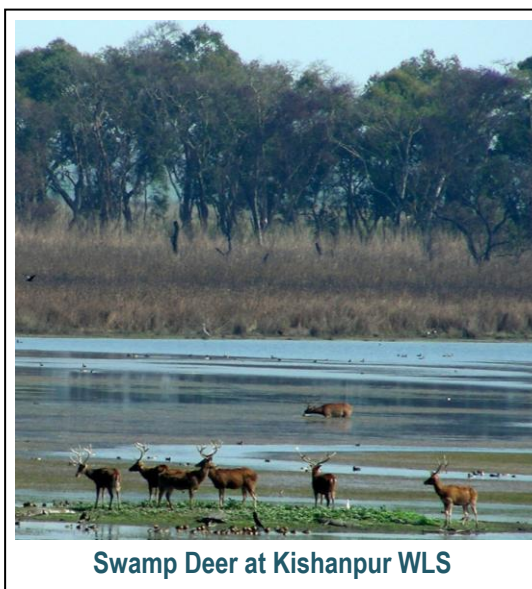
Molecular genetic studies by Kumar et al. (2017) provide further support to the sub-species level delineation of the three populations, namely *R. d. duvaucelii*, *R. d. ranjitsinhi* and *R. d. branderi*. Their study revealed a high level of variation and weak divergence among the subspecies and a moderate level of genetic heterozygosity in the wild populations.

Physical characteristics

The species has splayed spongy hooves (*R. d. duvaucelii* and *R. d. ranjitsinhi*) that enable locomotion in swampy habitat, whereas *R. d. branderi* has hard hooves (Singh 1970, Schaaf 1978, Groves 1982). Adult stags weigh between 170-280 kg and does 130-145 kg, with a shoulder height of 119-135 cm (Schaller 1967, Prater 1971). The coat is generally brown in colour, with the males being darker. The stags are chestnut coloured on the back and creamy white on the inner parts of the legs, rumps and inner side of the tail (Prater 1971). Swamp Deer exhibit marked colour and texture changes of the coat based on the season. During winter a thick brownish coat is developed that is shed with the onset of summer. The summer pelage is reddish brown in colour. A series of dark brown bands encircled with white spots runs down the whole length of the spine (Shrestha 2004). The antlers are reported only in males, measuring an average of 74cm (the largest measured was 104 cm) with the girth of 12 cm with twelve or more points (Schaller 1967).

Habitat

Swamp deer inhabit swampy grasslands and floodplains in the Indian sub-continent, and are highly dependent on the availability of water (Tewari and Rawat 2013b). They utilize variety of habitat types including open forest where grasses are present, with maximum abundance occurring in marshy and sandy grasslands (Schaller 1967, Martin 1977, Schaff 1978, Singh 1985, Qureshi et al. 1995). Forested areas are used during change of habitats for fulfilling seasonal needs (Martin 1977, Schaff 1978, Qureshi et al. 1995). The composite home range of herds varies from 10 to 30 km², annually (Qureshi et al. 1995). They travel an average distance of 2-3 km daily on an average and are reported to move upto 5-7 km during seasonal shifts (Martin 1977, Schaff 1978, Singh 1985, Sankaran 1989, Qureshi et al. 1995) with habitat use being largely influenced by food quality.



Feeding ecology

They are primarily grazer and largely feed on grasses and aquatic plants with diet composition varying seasonally. Preferred forage includes *Sacharum spp*, *Imperata cylindrica*, *Narenga porphyrocoma*,

Phragmites karka, *Oryza rufipogon*, *Hygroryza spp* and *Hydrilla spp* (Schaller 1967, Martin 1977, Schaff 1978, Singh 1985, Qureshi *et al.* 1995). The feeding time varies seasonally, in summers midday heat is avoided by feeding during early morning and late evening, while during winters feeding activity continues throughout the day (Martin 1977, Schaff 1978, Singh 1985, Qureshi *et al.*1995). They are selective during monsoon, the time of abundant food supply, and are nonselective or opportunistic feeders in summer when food is limited (Tewari and Rawat 2013b).

Social organization and behaviour

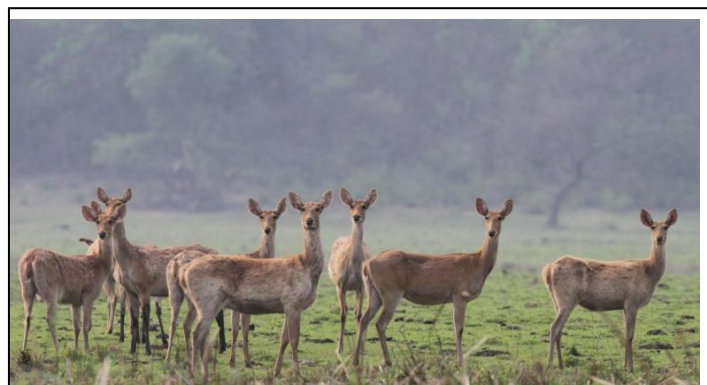
They exhibit inconsistent grouping (Schaller 1967); groups tending to break up and reassemble with different associations (Schaller 1967; Tewari and Rawat 2013b). These changes are attributed as responses to breeding cycle and food availability (Martin 1977, Schaff 1978, Singh 1984, Sankaran 1989,



Swamp deer at Jhilmil Jheel

Qureshi *et al.* 1995) with small groups or solitary individuals seen during the rutting season (late monsoon and winter) while larger groups (mean 32, range 2-250) common during summer, as a response to new flush in burnt flood plain grasslands (Schaff 1978, Qureshi *et al.* 1995).

Swamp Deer have matrilineal societies with dominant adult females usually leading mixed herds. They are polygynous with distinctive male and female linear hierarchies. During rut the males tend to defend females in estrous (Schaller 1967, Martin 1977, Schaff 1978, Singh 1985, Qureshi *et al.* 1995). The sex ratio in all three subspecies ranged between 40–80



Female herd

stags per 100 hinds (Schaller 1967, Martin 1977, Schaff 1978, Singh 1985, Sankaran 1989, Qureshi *et al.* 1995). The females appear to track male hierarchies preferring dominant or other high ranking stags for mating (Singh 1985, Qureshi *et al.* 1995).

Reproduction

They are monoestrous and monotochus (Qureshi *et al.* 2004). Females start reproducing at the age of 2–3 years and males from 4 years onwards (Schaller 1967, Martin 1977, Schaff 1978, Qureshi *et al.* 1995). Rutting starts for *R. d. duvaucelii* in August – September, early December for *R. d. branderi* and April for *R. d. ranjitsinhii*; while antler shedding begins by mid January, late April and beginning of October respectively for the three sub species (Dunbar Brander 1927, Schaller 1967, Prater 1971, Martin 1977, Schaff 1978, Singh 1985, Qureshi *et al.* 1995).

The gestation period in Swamp deer ranges from 240 to 250 days with a reproductive rate of 20 to 45 fawns per 100 hinds (Schaller 1967, Martin 1977, Schaff 1978, Singh 1985, Sankaran 1989, Qureshi *et al.* 1995). Hinds segregate from the herd to give birth in selected tall grass areas and fawns remain in this surrounding for approximately 7 to 15 days during which the hinds visit the hiding sites and make soft moaning calls for fawns to suckle (Singh 1985, Qureshi *et al.* 1995). Fawns are introduced to herd as soon as they are able to follow their mothers (Schaller 1967, Martin 1977, Schaff 1978, Singh 1985, Qureshi *et al.* 1995).

Activity patterns

The species exhibits a polyphasic activity pattern with feeding interspersed with walking and resting (Tewari 2009, Ahmed and Khan 2014). Peak grazing activity is observed during mid-day with marked reduction in resting time during winters (Ahmed and Khan 2014).

Distribution

The species is endemic to the Indian subcontinent and was once abundant across the tall wet grasslands of the north Indian Terai, the Brahmaputra flood plain and the central Indian grasslands bordering Sal forests. It has declined over the years, as a result of loss of habitat and biotic pressure over much of its

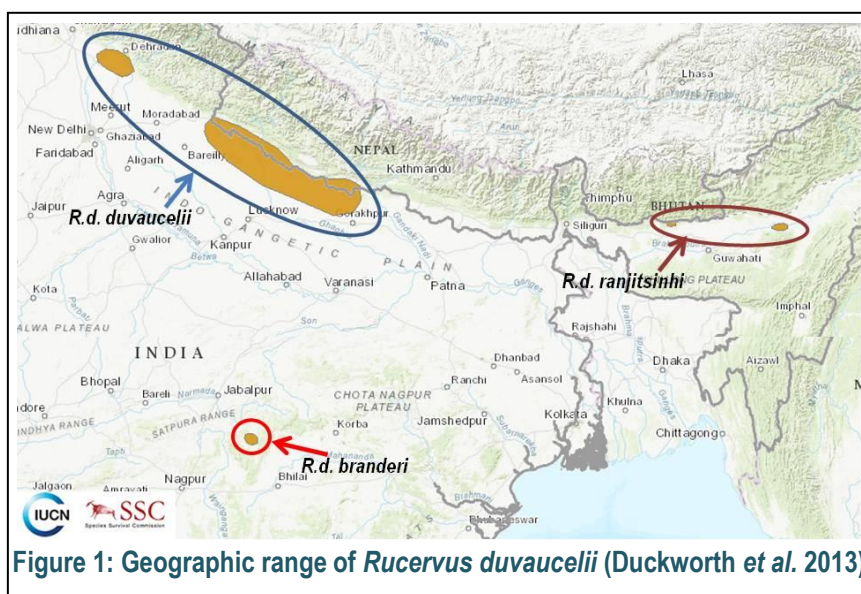


Figure 1: Geographic range of *Rucervus duvaucelii* (Duckworth *et al.* 2013)

former range. The current distribution is restricted to isolated pockets at few protected areas of north and central India, and southwestern Nepal. Dudhwa Tiger Reserve in Uttar Pradesh supports a single large population of 1200–1400 animals while in Nepal, about 2000 animals occur in Suklaphanta Wildlife Reserve and Bardia National Park. The species is reported to be extinct from Pakistan and Bangladesh (Qureshi *et al.* 2004). A small population of swamp deer (N=320) was recently rediscovered in Uttarakhand state (in 2005) at Jhilmil Jheel (Sinha and Chandola 2006).

Threats and conservation measures

The combined population of the three sub-species is estimated to be less than 5,000 animals, occupying an area of less than 2,000 km² in India and Nepal (Tewari and Rawat 2013a). They are threatened by habitat alteration, fragmentation and poaching. Isolation into small, restricted pockets increases the likelihood of localized extinctions, as has been the case in Bangladesh. Additional threats include change in river dynamics due to human developmental activities, increase in siltation and reduced flow of water during critical periods of summer (Duckworth *et al.* 2013), weed infestation (e.g. *Sesbania* spp.) (Qureshi *et al.* 1995, 2004). Qureshi *et al.* (1995). The species is accordingly included in Schedule I of the Wildlife Protection Act and listed as Vulnerable in the IUCN Redlist of threatened species.

Status in Captivity

Three sub-species of *Rucervus duvaucelii* are currently recognized, available records from holding institutions, Inventory of CZA and taxon reports from Species360 indicate that both the Indian and the global populations currently include specimens of two of the three sub-species, viz. *R. d. duvaucelii* and *R. d. branderi*. The third sub-species *R. d. ranjitsinhi* is not represented in captive collections. The website of Species 360 indicates the presence of the sub-species *R. d. duvaucelii* at 33 locations globally with a population of 467 (130.224.113). The

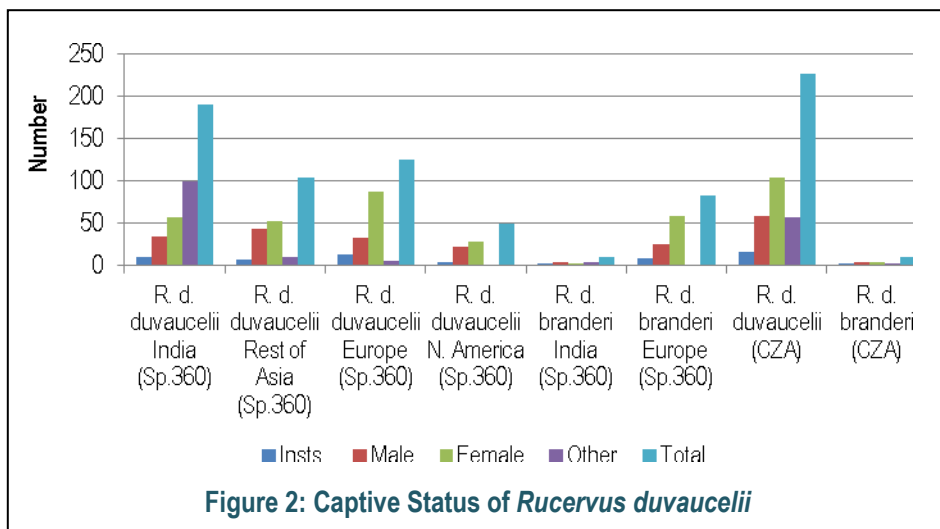


Figure 2: Captive Status of *Rucervus duvaucelii*

sub-species *R. d. branderi* is maintained at 9 locations with a population size 92 (29.60.3). The inventory of CZA records the presence of 227 (58.104.56) *R. d. duvaucelii* at 15 locations while 9 (3.4.2) *R. d. branderi* are held at Van Vihar National Park.

A cause of concern voiced in a recent publication by Kumar et al. (2016) based on molecular genetic studies suggest of an admixture of *R. d. duvaucelii* and *R. d. branderi* in the Indian captive population. The paper also highlights the need for managing distinct populations at the sub-species level in captivity for maintaining the distinctness of the separate geographic clines.

Methods

Data for the studbook of Swamp Deer (*Rucervus duvaucelii*) was collected through mailed questionnaires, field visits and websites of Species360 (Taxon reports) and Central Zoo Authority (Inventory reports). The data was recorded using MSEXCEL as the larger proportion of the information obtained was not amenable to entry in SPARKS 1.6 due to the absence of events in individual life-histories. Census trends for the population were obtained using MSEXCEL.

Scope of the Studbook

The studbook of Swamp Deer (*Rucervus duvaucelii*) includes records of all specimens held in Indian zoos for which data was made available by holding zoos and species taxon report from Species360 website.

- Lack of individual identification (marking) limited availability of information on individual life-history events for a majority of the specimens.
- Information available from a majority of the holding institutions was in the form of an inventory, with only a few zoos providing information on individuals.
- The studbook accordingly lists the year-wise inventory of specimens at individual locations.
- The mnemonics present in the SPARKS software were used for individual institutions and the same are listed in the location glossary (Appendix IV).
- Detailed demographic and genetic analysis of the population was not carried out due to data limitations. Census trends of the population since records were available are provided based on information provided by holding zoos and CZA inventory.
- Information included prior to 1995 has information missing for several years as the same is not available at the holding zoos.

Analysis

Demographic Status

The first recorded entry of the species in captivity was in 1962 with the entry of 2 (1.1) specimens at National Zoological Park, Delhi. The animals failed to reproduce and available records suggest that the animals died out in 1970. Subsequently a pair of wild origin animals of *R. d. duvaucelii* was acquired by Lucknow Zoo. The progeny of this pair of animals and subsequent inclusion of unknown origin animals at Delhi Zoo (1 male in 1994, a pair of animals in 1995 and 3 (1.2) animals in 1996), likely of wild origin are the only records available of inclusion of wild origin animals in the current captive population. The current captive population are the descendants of these 6 (3.3) animals.

The present captive population (Table 2) includes 227 (58.104.65) specimens of *R. d. duvaucelii* housed at 15 zoos and 9 (3.4.2) specimens of *R. d. branderi* housed at Van Vihar National Park, Bhopal. A perusal of Annexure I – Inventory of Swamp Deer housed in Indian Zoos and the census trends

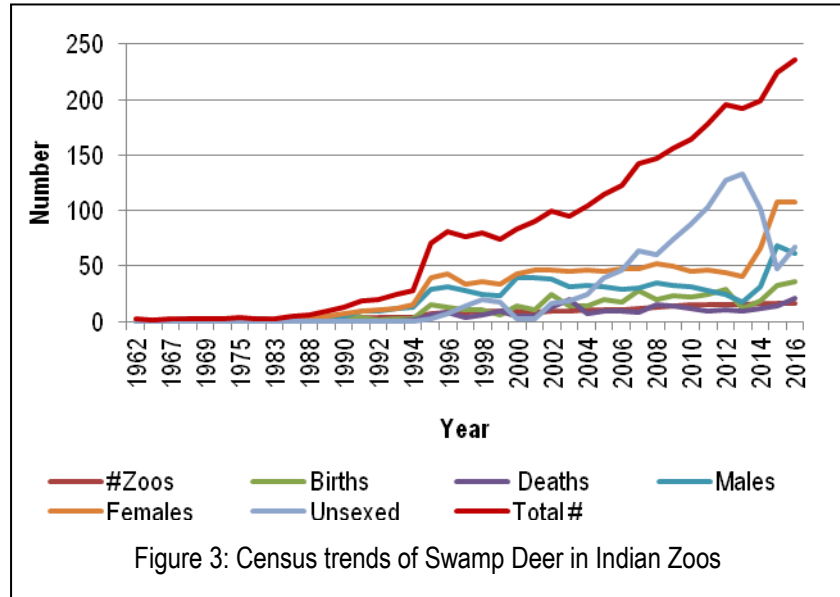


Table 2: Current captive status of Swamp Deer

Sl.	Zoo	Males	Females	Unsexed	Total
<i>R. d. duvaucelii</i>					
1.	Alipore Zoological Garden, Kolkata	2	3	2	7
2.	Arignar Anna Zoological Park, Chennai	5	6	2	13
3.	Indira Gandhi Zoological Park, Vishakhapatnam	0	1	0	1
4.	Kanan Pandari Zoo, Raipur	4	6	2	12
5.	Kanpur Zoological Park, Kanpur	7	10	3	20
6.	Mahendra Chaudhury Zoological Park	2	2	6	10
7.	Nandankanan Biological Park, Bhubaneswar	4	7	0	11
8.	National Zoological Park, Delhi	8	9	0	17
9.	Nawab Wazid Ali Shah Zoological Garden, Lucknow	10	21	42	73
10.	Nehru Zoological Park, Hyderabad	0	1	0	1
11.	Sakkarbaug Zoo, Junagadh	1	3	7	11
12.	Sanjay Gandhi Biological Park, Patna	5	10	1	16
13.	Sri Chamrajendra Zoological Gardens, Mysore	6	14	0	20
14.	Sri Venkateswara Zoological Park, Tirupati	0	1	0	1
15.	Thiruvananthapuram Zoo, Thiruvananthapuram	4	10	0	14
<i>R. d. duvaucelii</i> total		58	104	65	227
<i>R. d. branderi</i>					
1.	Van Vihar National Park Zoo, Bhopal	3	4	2	9
<i>R. d. branderi</i> total		3	4	2	9

(Figure 3) suggests that the population is continuing to grow at a steady rate with births at most locations at

regular intervals. A total of 439 births and 238 deaths have been recorded in captivity. A perusal of table 3 reveals that a significant proportion of the population is housed at a single location rendering the population vulnerable to stochastic events and the effects of overcrowding. The movement of specimens between different zoos is presented as figure 4.

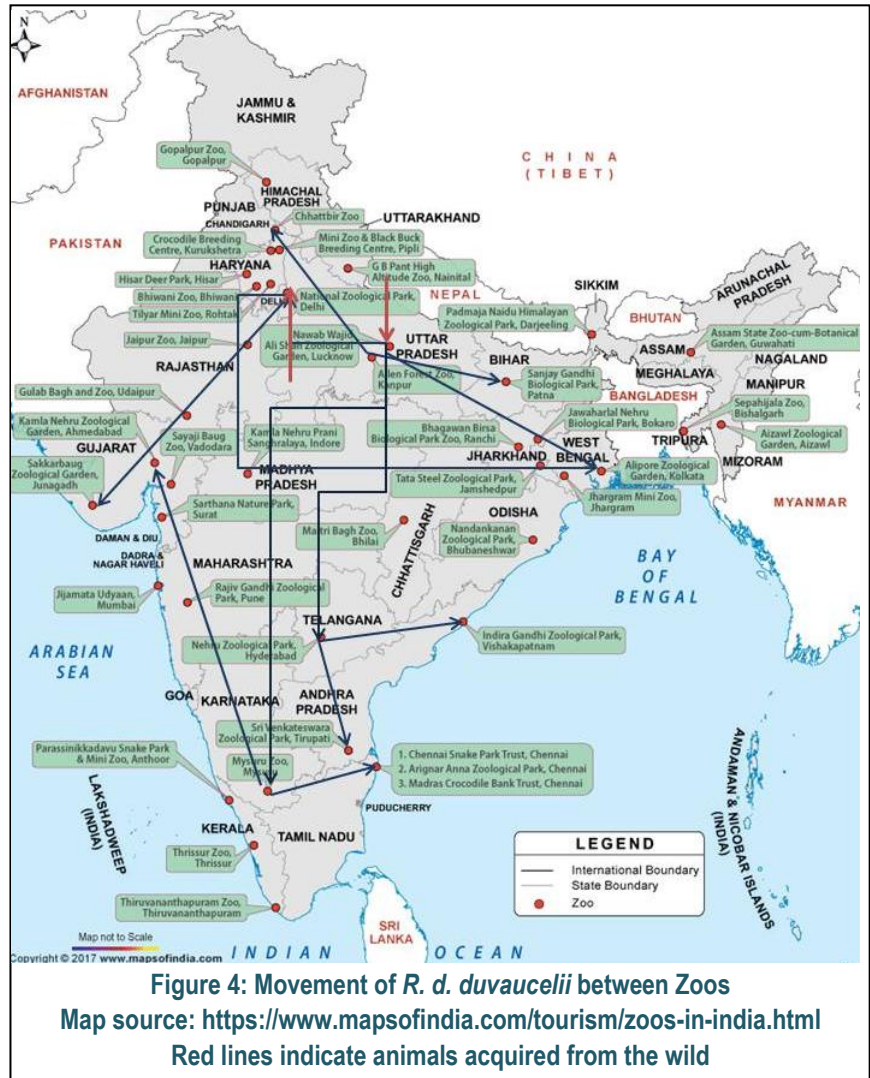
Constraints

A major constraint in the development of the studbook for the species in Indian zoos has been the lack of individual identification/ marking of individuals leading to the absence of life history events for most of the animals in the population. The lack of individual identification has also resulted in absence of information on parentage of most of the specimens.

The absence of information on life-history events and parentages limits further demographic and genetic analysis necessary for development of pairing recommendations and population targets for the population. These sections are accordingly excluded from the present edition of the studbook.

Table 3: Availability of information for development of studbook

Zoo	Individual identification	Parentage	Event records	Remarks
Alipore Zoological Garden, Kolkata	Not available	Not available	Not available	2 (0.2) received from Delhi in 2000, died in 2000 (based on records provided by Alipore Zoo). The current population at the zoo originates from 6 (2.4) animals received from Lucknow Zoo in 2002 (based on records provided by Alipore Zoo).
Arignar Anna Zoological Park, Chennai	Not available	Not available	Available	4 (2.2) Received from Mysore zoo in 2003 based on Chennai and Mysore Zoo records.



Zoo	Individual identification	Parentage	Event records	Remarks
Dr. K.Shivarma Karanth Piliikula Biological Park, Mangalore	Not available	Not available	Available	1 (1.0) based on zoo records
Indira Gandhi Zoological Park, Vishakhapatnam	Not available	Not available	Available	2.2.0 acquired from NZP, Hyderabad in 2010, based on Hyderabad Zoo records.
Kamla Nehru Zoological Garden, Ahmedabad	Not available	Not available	Available	3 (1.2) animals acquired from Mysore in 2008 based on records from Mysore and Ahmedabad.
Kanan Pandari Zoo, Raipur	Not available	Not available	Not available	7 (2.5) appear in CZA inventory in 2015 records not received from Kanan Pandari Zoo, Raipur.
Kanpur Zoological Park, Kanpur	Not available	Not available	Available	8 (6.2) animals present in 1995 (based on CZA inventory, source of animals not known).
Mahendra Chaudhury Zoological Park	Not available	Not available	Not available	2 (1.1) transferred to Chatbir from Kanpur in 2003 (based on records provided by Kanpur Zoo).
Nandankanan Biological Park, Bhubaneswar	Not available	Not available	Available	4 (2.2) acquired in 1997 from Lucknow Zoo (based on records provided by Nandankanan).
National Zoological Park, Delhi	Not available	Not available	Not available	The first pair of animals acquired in 1962 was likely of wild origin (Delhi 1); however, the pair along with progeny died out in 1983. Subsequently 3 (1.2) animals were received from Lucknow in 1988 and led to the development of the captive population (Delhi 2) at the zoo. Subsequently a pair of animals each of unknown origin were acquired 1994 and 1995. In 1996 4 (2.2) animals were again acquired from an unknown source.
Nawab Wazid Ali Shah Zoological Garden, Lucknow	Animals marked with tags	No records available	No records available	2 (1.1) animals acquired from wild in 1975 (based on records made available by Lucknow Zoo).
Nehru Zoological Park, Hyderabad	Not available	Available	Available	4(2.2) acquired from Lucknow Zoo. A pair of animals each in 1988 and 1989 (based on records provided by Hyderabad Zoo).
Sakkarbaug Zoo, Junagadh	Not available	Not available	Available	2 (1.1) received from Kanpur in 1998, 2 (1.1) received from Delhi in 2004 (based on Sakkarbaug Zoo records).
Sanjay Gandhi Biological Park, Patna	Not available	Not available	Available	4 (1.3) received from Kanpur in 2007 (based on Kanpur Zoo records).
Sri Chamarajendra Zoological Gardens, Mysore	Not available	Not available	Available	4 (2.2) received from Lucknow in 1991, based on Mysore Zoo records.
Sri Venkateswara Zoological Park, Tirupati	Transponders present	Not available	Available	3 (1.2) acquired from Hyderabad Zoo (based on records provided by Tirupati Zoo).
Thiruvananthapuram Zoo, Thiruvananthapuram	Not available	Not available	Not available	13 (4.9) animals acquired in 2014 based on CZA inventory.
Van Vihar National Park Zoo, Bhopal	Not available	Not available	Not available	Wild origin animals acquired from Kanha National Park (<i>R. d. branderi</i>)

Conclusions and Recommendations

Swamp Deer includes three sub-species viz. *R. d. duvaucelii* (western swamp deer), *R. d. branderi* (hard-ground barasingha) and *R. d. ranjitsinhi* (eastern swamp deer). The Wildlife Protection Act includes the species in Schedule I while it is listed as Vulnerable in the IUCN Redlist of Threatened species; however, the presence of geographically isolated three sub-species inhabiting habitats facing increased degradation and fragmentation necessitates intensive conservation efforts for its continued survival.

Various *in-situ* measures such as protection and habitat management are currently practiced at the various protected areas that the species inhabits. Maintenance of viable captive populations for insurance, supplementation and reintroduction at the sub-species level is an additional strategy that can assist the ongoing conservation efforts for the species.

The achievement of *ex-situ* conservation goals for the population depends on:

- Individual identification of animals using appropriate marking techniques that can be discerned from a distance.
- Ensuring maintenance of records of individual/ group life-histories and lineages.
- Planning mating choices and movement between institutions based on individual/ group lineages.
- Creation of sub-species specific infrastructure for addressing housing needs keeping in view the carrying capacity of the three sub-species at multiple locations.
- Assessing and maintaining sub-species level integrity of the captive specimens using molecular tools.
- Assessing relatedness between individuals and the heterozygosity retained by the existing population using molecular tools.
- Acquisition of additional wild origin founders for *R. d. duvaucelii* and *R. d. branderi* based on the above assessment and establishment of a captive population of *R. d. ranjitsinhi* at an appropriate location in Assam.

The effective management of captive populations is dependent on the quality of information regarding events and parentage of individuals comprising it; however, table 3 highlights critical shortcomings in this regard across most holding zoos. The likelihood sub-species level hybridization between *R. d. duvaucelii* and *R. d. branderi* is an additional cause of concern. It is accordingly suggested that zoos initiate marking of all living individuals in captivity using appropriate marking techniques along-with developing an understanding of the relationships between individuals at the level of individual institutions and between institutions using molecular genetics techniques. The knowledge of lineages and genetic heterozygosity of the captive population can then be utilized for development of appropriate breeding plans and acquisition of additional founder animals from the wild as required.

References:

1. Ahmed, K and Khan, J.A. (2014). Seasonal activity pattern of Swamp deer (*Rucervus duvaucelii duvaucelii*) in Dudhwa National Park, Uttar Pradesh, India. *Journal of Applied and Natural Science*, 6 (1): 246-253.
2. Cuvier, G. (1823). *Recherches sur les ossemens fossiles de quadrupèdes*. Nouvelle édition, Tome Quatrième. Dufour & d'Ocagne, Paris, Amsterdam.
3. Duckworth, J.W., Samba Kumar, N., Chiranjibi Prasad Pokheral, Sagar Baral, H. and Timmins, R.J. (2013). *Rucervus duvaucelii*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 11 May 2015.
4. Dunbar Brander, A. A. (1927). *Wild Animals in Central India*. Edward Arnold and Co., London, UK.
5. Ellerman, J. R. and Morission- Scott, T.C.S. (1951). *Checklist of Palearctic and Indian Mammals*. British Museum (National History), London, 810pp.
6. Gilbert, C., Ropiquet, A. and Hassanin, A. (2006). Mitochondrial and nuclear phylogenies of Cervidae (Mammalia, Ruminantia): Systematics, morphology, and biogeography. *Mol Phylogenet Evol.*, 40:101–117.
7. Groves, P. C. (1982). Geographic Variation in the Swamp Deer (*Cervus duvauceli*). *J. Bombay Nat. Hist. Soc.*, 79. 620-629.
8. Kumar, A., Ghazi, M.G.U., Hussain, S.A., Bhatt, D. and Gupta, S. K. (2017). Mitochondrial and Nuclear DNA Based Genetic Assessment Indicated Distinct Variation and Low Genetic Exchange Among the Three Subspecies of Swamp Deer (*Rucervus duvaucelii*). *Evol. Biol.* 44: 31–42
9. Kumar, V.P., Shrivastwa, A., Nigam, P., Kumar, D. and Goyal, S.P. (2016). Genetic characterization of wild swamp deer populations: ex situ conservation and forensics implications, Mitochondrial DNA Part A, DOI: 10.1080/24701394.2016.1225732
10. Kuznetsova, M. V., Kholodova, M. V. and Danilkin, A. A. (2005). Molecular Phylogeny of Deer (Cervidae: Artiodactyla). *Russian Journal of Genetics* 41, 7: 742–749
11. Martin, C. (1977). Status and ecology of the barasingha *Cervus duvauceli branderi* in Kanha National Park, India. *Journal of the Bombay Natural History Society*, 74(1): 60-132.
12. Pocock, R. (1943). The larger Deer of British India *J. Bombay Natural History Society*, 43(4): 553-572.
13. Prater, S. (1971). *The Book of Indian Animals*. Bombay: Bombay Natural History Society, 324pp.

14. Qureshi Q., Sawarkar, V.B. and Mathur, P.K. (1995). Ecology and Management of swamp deer (*Cervus duvauceli*) in Dudhwa Tiger Reserve, U.P (India). Project Report. Wildlife Institute of India, Dehradun.
15. Qureshi, Q., Sawarkar, V. B., Rahmani, A. R. and Mathur, P. K. (2004). Swamp Deer or Barasingha (*Cervus duvauceli* Cuvier, 1823). ENVIS Bulletin 7: 181–192.
16. Randi, E., Mucci, N., Claro-Hergueta, F., Bonnet, A. and Douzery, E.J.P. (2001). A mitochondrial DNA control region phylogeny of the Cervinae: speciation in *Cervus* and implications for conservation. *Animal Conservation*, 4, 1–11.
17. Sankaran, R. (1989). Status of the swamp deer (*Cervus duvauceli duvauceli*) in Dudhwa National Park (1988- 1989). Bombay Natural History Society Technical Report, No.14. 25pp.
18. Schaaf, C.D. (1978). Population Size and Structure and Habitat Relation of the Swamp Deer (*Cervus duvauceli duvauceli*) in Suklaphanta Wildlife Reserve, Nepal. Ph. D. Thesis. Michigan State University, USA, 111pp
19. Schaller, G.B. (1967). *The Deer and the Tiger*. University of Chicago Press, Chicago, USA, 370pp.
20. Shrestha, M.K. (2004). Relative Ungulate Abundance in fragmented landscape: Implications for tiger's conservation. PhD Thesis. University of Minnesota, 99pp.
21. Singh, A. (1970). The swamp deer of North Kheri. IUCN Publications (New Series), 2 (18):52-55.
22. Singh, R. (1985). Geographic variation in the barasingha or swamp deer (*Cervus duvauceli*). *Journal of the Bombay Natural History Society*, 82 (1):188-190.
23. Sinha, S.P. and Chandola, S.S. (2006). Swamp deer sighting in Uttaranchal State, India. *Oryx*, 40 (1):14-14.
24. Tewari, R. (2009). A Study on the Habitat Use and Food Habits of Swamp Deer (*Cervus duvauceli duvauceli*) in Jhilmil Jheel Conservation Reserve, Haridwar Forest Division, Uttarakhand. PhD Thesis. Saurashtra University.
25. Tewari, R. and Rawat, G.S. (2013a). Assessment of Swamp Deer Habitat in and around Jhilmil Jheel Conservation Reserve, Haridwar, Uttarakhand, India. *International Journal of Conservation Science*, 4 (2): 243-249.
26. Tewari, R. and Rawat, G.S. (2013b). Factors influencing seasonal changes in the herd size and composition of swamp deer in Jhilmil Jheel Conservation Reserve, Haridwar, Uttarakhand, India. *Int. J. of Pharm. & Life Sci.*, 4 (8): 2870-2875.

Annexure 1

Status of Captive Population of Swamp Deer across Indian Zoos

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
1962	Delhi1	1	1	0	2	Unk (Probably Wild)	Unk (Probably Wild)	Delhi	24-Oct-1962	Transfer		The animals were likely of wild origin. Source unknown relevant records unavailable
1966	Delhi1	0	1	0	1			Delhi	1-Apr-1966	Death		
1967	Delhi1	1	1	0	2	Delhi1	Delhi1	Delhi	23-Sep-1967	Birth		Parentage attributed to Delhi1. The pair of animals used to establish the population
1968	Delhi1	2	1	0	3	Delhi1	Delhi1	Delhi	10-Jul-1968	Birth		
1968	Delhi1	1	1	0	2			Delhi	11-Jul-1968	Death		
1969	Delhi1	1	2	0	3	Unk	Unk	Delhi	2-Jul-1969	Birth		
1969	Delhi1	1	1	0	2			Delhi	4-Jul-1969	Death		
1970	Delhi1	2	1	0	3	Unk	Unk	Delhi	2-Jun-1970	Birth		
1970	Delhi1	1	1	0	2			Delhi	4-Jun-1970	Death		
1975	Lucknow	1	0	0	1	Wild	Wild	Bahraich Lucknow	26/Sep/1975	Capture Transfer		As per records provided by Lucknow Zoo
1975	Lucknow	1	1	0	2	Wild	Wild	Palia Lucknow	22-Oct-75	Capture Transfer		As per records provided by Lucknow Zoo
1978	Delhi1	1	0	0	1			Delhi	24-Jun-1978	Death		
1983	Delhi1	0	0	0	0			Delhi	10-Aug-1983	Death		Senile Debility
1988	Delhi2	1	2	0	3	Unk	Unk	Lucknow Delhi	24-Mar-1988	Transfer		
1988	Delhi2	2	2	0	4	Delhi2	Delhi2	Delhi	4-Jun-1988	Birth		Parentage attributed to Delhi2. The pair of animals used to re-establish the population
1988	Delhi2	1	2	0	3			Delhi	4-Jun-1988	Death		
1988	Delhi2	2	2	0	4	Delhi2	Delhi2	Delhi	17-Jun-1988	Birth		Parentage attributed to Delhi2. The

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												pair of animals used to re-establish the population
1988	Hyderabad	1	0	0	1			Hyderabad	6-Oct-1988	Transfer	Krishna	1.0.0 acquired from Lucknow Zoo
1988	Hyderabad	1	1	0	2			Hyderabad	6-Oct-1988	Transfer	Radha	0.1.0 acquired from Lucknow Zoo
1989	Delhi2	2	3	0	5	Delhi2	Delhi2	Delhi	5-Jun-1989	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1989	Hyderabad	2	1	0	3			Hyderabad	21-Mar-1990	Transfer	Rama	1.0.0 acquired from Lucknow Zoo
1989	Hyderabad	2	2	0	4			Hyderabad	21-Mar-1990	Transfer	Sita	0.1.0 acquired from Lucknow Zoo
1990	Delhi2	2	4	0	6	Delhi2	Delhi2	Delhi	7-Aug-1990	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1990	Hyderabad	2	3	0	5	Krishna	Radha	Hyderabad	12-May-1990	Birth	Gopi	
1990	Hyderabad	3	3	0	6	Rama	Sita	Hyderabad	12-Jul-1990	Birth	Kush	
1991	Delhi2	3	4	0	7	Delhi2	Delhi2	Delhi	19/7/1991	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1991	Mysore	0	1	0	1	Unk at Lucknow	Unk at Lucknow	Lucknow Mysore	28-Oct-1991 11-Jun-1999	Transfer Death	M00687	
1991	Mysore	0	1	0	1	Unk at Lucknow	Unk at Lucknow	Lucknow Mysore	28-Oct-1991 6-Apr-2000	Transfer Death	M00688	
1991	Mysore	1	0	0	1	Unk at Lucknow	Unk at Lucknow	Lucknow Mysore	28-Oct-1991 1-Jan-1999	Transfer Death	M00689	
1991	Mysore	1	0	0	1	Unk at Lucknow	Unk at Lucknow	Lucknow Mysore	28-Oct-1991 20-Oct-2002	Transfer Death	M00690	
1991	Hyderabad	4	3	0	7	Krishna	Radha	Hyderabad	29-Apr-1990	Birth	Rana	
1991	Hyderabad	4	4	0	8	Rama	Sita	Hyderabad	6/8/1991	Birth	Unk	Stillborn
1992	Delhi2	3	5	0	8	Delhi2	Delhi2	Delhi	6-Jun-1992	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
1993	Mysore	1	0	0	1	M00687	M00689	Mysore	12-Apr-1993 23-Nov-2002	Birth Death	M00691	
1993	Mysore	1	0	0	1	M00688	M00690	Mysore Madras	1-Apr-1993 20-Dec-2003	Birth Transfer	M00692	
1993	Hyderabad	5	4	0	9	Krishna	Radha	Hyderabad	30-Apr-1993	Birth		
1994	Delhi2	3	6	0	9	Delhi2	Delhi2	Delhi	17/3/1994	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1994	Delhi2	3	7	0	10	Unk	Unk	Unknown Delhi	3-Aug-1994	Transfer		Source unknown
1994	Delhi2	4	7	0	11	Unk	Unk	Unknown Delhi	31-Aug-1994	Transfer		Source unknown
1994	Delhi2	3	7	0	10			Delhi	15-Dec-1994	Death		Traumatic shock
1994	Mysore	1	0	0	1	M00687	M00689	Mysore Madras	12-Jun-1994 20-Dec-2003	Birth Transfer	M00693	
1994	Mysore	0	1	0	1	M00687	M00689	Mysore	12-Jun-1994 12-Mar-2006	Birth Death	M00694	
1994	Hyderabad	5	5	0	10	Unk	Unk	Hyderabad	28-Jun-1994	Transfer		0.1.0 acquired from Lucknow Zoo
1995	Delhi2	3	6	0	9			Delhi	13-Jul-1995	Death		Traumatic shock
1995	Delhi2	4	6	0	10	Unk	Unk	Unknown Delhi	29-Aug-1995	Transfer		Source unknown. Approximate age 3 months
1995	Delhi2	5	6	0	11	Unk	Unk	Unknown Delhi	30-Jun-1995	Transfer		Source unknown. Approximate age 3 months
1995	Mysore	0	1	0	1	M00687	M00689	Mysore	5-Jun-1995 18-Nov-2007	Birth Death	M00695	
1995	Mysore	0	1	0	1	M00688	M00690	Mysore Madras	27-Jul-1995 20-Dec-2003	Birth Transfer	M00696	
1995	Lucknow	13	26	2	41			Lucknow				As per CZA inventory. Relevant records not available with Lucknow Zoo. 0.0.7 births and 0.0.2 deaths

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												were reported during the year
1995	Kanpur	6	1	0	7			Kanpur	~1995			As per CZA inventory
1995	Kanpur	7	4	0	11			Kanpur	~1995	Birth		As per CZA inventory
1995	Kanpur	7	2	0	9			Kanpur	~1995	Death		As per CZA inventory
1995	Kanpur	6	2	0	8			Kanpur	~1995	Transfer		As per CZA inventory, details of location transferred to NA
1995	Hyderabad	0	0	0	0			Hyderabad	~1995	Death		5.5.0 deaths as CZA inventory indicates the acquisition of 2.2.0 animals in 1996-1997
1995	Mehewa	1	0	0	1			Mehewa				As per CZA inventory. Available records indicate the presence of 1.0.0 animal till 1999 at Indira Manoranjan Van (Deer Park), Mehewa, Gorakhpur, subsequent records for the zoo are absent in CZA inventory
1995	Chhatbir	1	2	0	3			Chhatbir				As per CZA inventory (records available only from 1995-1996)
1995	Chhatbir	2	2	0	4			Chhatbir	~1995	Birth		1.0.0 birth as per CZA inventory
1995	Chhatbir	3	3	0	6			Chhatbir	~1995	Transfer		1.1.0 animals acquired as per CZA inventory
1996	Delhi2	6	6	0	12	Unk	Unk	Unknown Delhi	30-Jun-1996	Transfer		Source unknown. Approximate age 3 months
1996	Delhi2	6	7	0	13	Unk	Unk	Unknown Delhi	27-Aug-1996	Transfer		Source unknown. Approximate age 3 months
1996	Delhi2	6	8	0	14	Unk	Unk	Unknown Delhi	21-Sep-1996	Transfer		Source unknown. Approximate age 3 months
1996	Mysore	1	0	0	1	M00687/Unk	M00689	Mysore	27-May-1995 12-Oct-1996	Birth Death	M00697	
1996	Mysore	0	1	0	1	M00688	M00690	Mysore Madras	16-Jul-1996 20-Dec-2003	Birth Transfer	M00698	

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
1996	Lucknow	10	21	6	37			Lucknow				As per CZA inventory. Relevant records not available with Lucknow Zoo. 0.0.5 births and 1.3.1 deaths reported during the period
1996	Kanpur	6	3	0	9			Kanpur	~1996	Birth		As per CZA inventory
1996	Kanpur	5	3	0	8			Kanpur	~1996	Death		As per CZA inventory
1996	Hyderabad	2	2	0	4			Hyderabad	~1996	Transfer		Based on CZA inventory
1996	Chhatbir	3	2	0	5			Chhatbir	~1996	Death		0.1.0 deaths as per CZA inventory
1997	Delhi2	7	8	0	15	Delhi2	Delhi2	Delhi	27-Jun-1997	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1997	Delhi2	6	8	0	14			Delhi	28-Jun-1996	Death		Fawn; Pneumonia
1997	Delhi2	7	8	0	15	Delhi2	Delhi2	Delhi	27-Jun-1997	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1997	Mysore	0	1	0	1	Unk	Unk	Mysore	25-May-1997 8-Sept-2008	Birth Death	M00699	
1997	Mysore	0	1	0	1	Unk	Unk	Mysore	26-May-1997 28-Sept-2008	Birth Death	M00700	
1997	Mysore	1	0	0	1	Unk	Unk	Mysore	16-Jul-1997 19-Dec-2009	Birth Death	M00701	
1997	Lucknow	4	12	10	26			Lucknow				As per CZA inventory. Relevant records not available with Lucknow Zoo. 0.0.4 births and 1.2.0 deaths reported during the period
1997	Kanpur	5	3	1	9			Kanpur	~1997	Birth		As per CZA inventory
1997	Hyderabad	2	2	0	4			Hyderabad				
1997	Nandankanan	2	2	0	4			Nandankanan	24-Nov-1997	Transfer		2.2.0 acquired from Lucknow Zoo
1997	Chhatbir	5	2	0	7			Chhatbir	~1997	Birth		2.0.0 births as per CZA inventory

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
1997	Chhatbir	4	2	0	6			Chhatbir	~1997	Death		1.0.0 deaths as per CZA inventory
1998	Delhi2	6	8	0	14			Delhi	15-Jul-1998	Death		Infighting
1998	Delhi2	6	9	0	15	Delhi2	Delhi2	Delhi	16-Jul-1998	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1998	Delhi2	6	10	0	16	Delhi2	Delhi2	Delhi	25-Jul-1998	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1998	Mysore	0	1	0	1	Unk	Unk	Mysore	26-May-1998 21-Dec-2008	Birth Death	M00702	
1998	Mysore	0	1	0	1	Unk	Unk	Mysore	20-Jul-1998 22-Dec-2004	Birth Death	M00703	
1998	Lucknow	3	11	13	27			Lucknow				As per CZA inventory. Relevant records not available with Lucknow Zoo. 0.0.3 births and 2.1.0 deaths reported
1998	Kanpur	5	5	1	11			Kanpur	~1998	Birth		As per CZA inventory
1998	Kanpur	4	4	1	9			Kanpur	~1998	Transfer		As per CZA inventory, details of location transferred to NA
1998	Junagadh	1	1	0	2			Junagadh	14-Nov-1998	Transfer		1.1.0 acquired from Kanpur Zoo
1998	Junagadh	0	1	0	1			Junagadh	10-Mar-1999	Death		1.0.0 death due to brain haemorrhage
1998	Hyderabad	3	2	1	6	Unk	Unk	Hyderabad	~1998	Birth		1.0.1 fawns born as per CZA inventory
1998	Nandankanan	2	3	0	5	Unk	Unk	Nandankanan	21-Aug-1998	Birth		
1998	Nandankanan	2	4	0	6	Unk	Unk	Nandankanan	13-Oct-1998	Birth		
1998	Chhatbir	2	1	0	3			Chhatbir	~1998	Death		0.1.0 deaths as per CZA inventory, records for 1.1.0 animals from previous year not available in CZA inventory
1999	Delhi2	7	10	0	17	Delhi2	Delhi2	Delhi	19-Jun-1999	Birth		Parentage attributed to Delhi2

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												lineage. The pair of animals used to re-establish the population
1999	Delhi2	8	10	0	18	Delhi2	Delhi2	Delhi	4-Jul-1999	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
1999	Delhi2	7	10	0	17			Delhi	4-Oct-1999	Death		Infighting
1999	Delhi2	6	8	0	14			Delhi Calcutta	9-Oct-1999	Transfer		3(1.2) transferred to Alipore Zoo, Kolkatta
1999	Delhi2	5	8	0	13			Delhi	11-Oct-1999	Death		Capture myopathy
1999	Delhi2	5	7	0	12			Delhi	12-Oct-1999	Death		Capture myopathy
1999	Delhi2	5	6	0	11			Delhi	9-Dec-1999	Death		Acute impaction
1999	Mysore	0	1	0	1	Unk	Unk	Mysore	22-Feb-1999 2-Sept-2004	Birth Death	M00704	
1999	Mysore	1	0	0	1	Unk	Unk	Mysore	19-May-1999 2-Jun-1999	Birth Death	M00705	
1999	Mysore	1	0	0	1	Unk	Unk	Mysore	21-May-1999 24-Jan-2000	Birth Death	M00706	
1999	Calcutta1	0	2	0	2			Delhi Calcutta	~-Jan-2000	Transfer		Received from National Zoological Park, Delhi
1999	Calcutta1	0	1	0	1			Calcutta	14-Jan-2000	Death		Septicemia
1999	Lucknow1	3	11	12	26			Lucknow				As per CZA inventory. Relevant records not available with Lucknow Zoo. 0.0.1 birth and 0.2.0 deaths reported during the period
1999	Kanpur	6	4	0	10			Kanpur	~1999	Birth		As per CZA inventory
1999	Hyderabad	4	3	1	8	Unk	Unk	Hyderabad	~1999	Birth		1.1.0 fawns born as per CZA inventory
1999	Nandankanan	2	5	0	7	Unk	Unk	Nandankanan	6-Aug-1999	Birth		
1999	Chhatbir	1	1	0	2			Chhatbir	~1999	Death		1.0.0 deaths as per CZA inventory

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2000	Delhi2	4	6	0	10			Delhi	12-Jan-2000	Death		Infighting
2000	Delhi2	4	7	0	11	Delhi2	Delhi2	Delhi	19-Jun-2000	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2000	Delhi2	5	7	0	12	Delhi2	Delhi2	Delhi	12-Jul-2000	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2000	Mysore	0	1	0	1	Unk	Unk	Mysore	6-Apr-2000 10-Jul-2003	Birth Death	M00274	
2000	Mysore	1	0	0	1	Unk	Unk	Mysore	6-Apr-2000 5-Jul-2003	Birth Death	M00275	
2000	Mysore	1	0	0	1	Unk	Unk	Mysore	6-Apr-2000 8-Aug-2003	Birth Death	M00276	
2000	Calcutta1	0	0	0	0			Calcutta	13-Feb-2001	Death		Fracture
2000	Lucknow	14	12	0	26			Lucknow				As per CZA inventory. Relevant records not available with Lucknow Zoo. 2.1.0 births and 1.1.0 deaths reported during the period
2000	Kanpur	6	5	0	11			Kanpur	~2000	Birth		As per CZA inventory
2000	Kanpur	5	5	0	10			Kanpur	~2000	Death		As per CZA inventory
2000	Hyderabad	3	4	0	7			Hyderabad	~2000	Death		1.0.0 deaths and sex identification as per CZA inventory
2000	Nandankanan	3	5	0	8	Unk	Unk	Nandankanan	18-Jun-2000	Birth		
2000	Nandankanan	4	5	0	9	Unk	Unk	Nandankanan	18-Jul-2000	Birth		
2000	Nandankanan	4	6	0	10	Unk	Unk	Nandankanan	15-Oct-2000	Birth		
2000	Nandankanan	4	5	0	9			Nandankanan	15-Oct-2000	Death		Fawn born on 15-Oct-2000 trampled by herd
2000	Chhatbir	1	1	0	2			Chhatbir				
2001	Delhi2	5	8	0	13	Delhi2	Delhi2	Delhi	15-Aug-2001	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												re-establish the population
2001	Delhi2	5	9	0	14	Delhi2	Delhi2	Delhi	12-Sep-2001	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2001	Mysore	0	1	0	1	Unk	Unk	Mysore	26-Apr-2001 2-Feb-2003	Birth Death	M00279	
2001	Lucknow	13	11	1	25			Lucknow				As per CZA inventory. Relevant records not available with Lucknow Zoo. 0.0.1 birth and 1.1.0 deaths reported during the period
2001	Kanpur	4	6	0	10			Kanpur	1-Apr-2001	Transfer		As per zoo records
2001	Kanpur	5	6	0	11			Kanpur	8-Jul-2001	Birth		As per zoo records
2001	Kanpur	4	6	0	10			Kanpur	23-Aug-2001	Death		As per zoo records
2001	Hyderabad	5	5	0	10	Unk	Unk	Hyderabad	~2001	Birth		2.1.0 births as per CZA inventory
2001	Hyderabad	3	5	0	8			Hyderabad	~2001	Death		2.0.0 deaths as per CZA inventory
2001	Nandankanan	5	5	0	10	Unk	Unk	Nandankanan	25-Jul-2001	Birth		
2001	Nandankanan	6	5	0	11	Unk	Unk	Nandankanan	29-Aug-2001	Birth		
2001	Nandankanan	6	6	0	12	Unk	Unk	Nandankanan	12-Sep-2001	Birth		
2001	Chhatbir	1	1	0	2			Chhatbir				
2002	Delhi2	6	9	0	15	Delhi2	Delhi2	Delhi	12-Jun-2002	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2002	Delhi2	6	10	0	16	Delhi2	Delhi2	Delhi	12-Jul-2002	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2002	Delhi2	7	10	0	17	Delhi2	Delhi2	Delhi	6-Aug-2002	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2002	Delhi2	6	10	0	16			Delhi	18-Aug-2002	Death		Adult animal Septicemia
2002	Mysore	0	1	0	1	Unk	Unk	Mysore	5-Jun-2002	Birth	M00281	

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
									9-Feb-2009	Death		
2002	Mysore	0	1	0	1	Unk	Unk	Mysore	16-Jun-2002 8-Aug-2008	Birth Death	M00282	
2002	Mysore	0	1	0	1	Unk	Unk	Mysore	12-Jul-2002 8-Aug-2008	Birth Death	M00283	
2002	Mysore	0	1	0	1	Unk	Unk	Mysore	26-Jul-2002 24-Jul-2013	Birth Death	M00284	
2002	Mysore	1	0	0	1	Unk	Unk	Mysore	10-Sept-2002 25-Nov-2011	Birth Death	M00707	
2002	Calcutta2	2	4	0	6			Lucknow Calcutta	~-Mar-2003	Transfer		
2002	Lucknow	13	11	2	26	Unk	Unk	Lucknow	14-Jul-2002	Birth		As per records provided by Lucknow Zoo
2002	Lucknow	13	11	3	27	Unk	Unk	Lucknow	14-Jul-2002	Birth		As per records provided by Lucknow Zoo
2002	Lucknow	13	11	4	28	Unk	Unk	Lucknow	14-Jul-2002	Birth		As per records provided by Lucknow Zoo
2002	Lucknow	13	11	5	29	Unk	Unk	Lucknow	14-Jul-2002	Birth		As per records provided by Lucknow Zoo
2002	Lucknow	13	11	6	30	Unk	Unk	Lucknow	14-Jul-2002	Birth		As per records provided by Lucknow Zoo
2002	Lucknow	13	11	6	30*			Lucknow				*As per CZA inventory. Relevant records not available with Lucknow Zoo
2002	Lucknow	12	11	6	29			Lucknow	4-Sep-02	Death		As per records provided by Lucknow Zoo. Tuberculosis
2002	Lucknow	12	10	6	28			Lucknow	5-Oct-2002	Death		As per records provided by Lucknow Zoo. Tuberculosis
2002	Lucknow	11	10	6	27			Lucknow	11-Oct-2002	Death		As per records provided by Lucknow Zoo. Internal injury. 2.4.0 animals were transferred to other

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												zoos
2002	Lucknow	11	10	7	28	Unk	Unk	Lucknow	1-Jan-2003	Birth		
2002	Lucknow	11	10	11	32	Unk	Unk	Lucknow	1-Feb-2003	Birth		
2002	Lucknow	10	10	11	31			Lucknow	4-Mar-2003	Transfer		Transferred to Alipore Zoo
2002	Lucknow	9	6	11	26			Lucknow	9-Mar-2003	Transfer		Transferred to Alipore Zoo
2002	Kanpur	5	6	0	11			Kanpur	17-May-2002	Birth		As per zoo records
2002	Kanpur	5	7	0	12			Kanpur	21-Jun-2002	Birth		As per zoo records
2002	Kanpur	6	7	0	14			Kanpur	12-Jul-02	Birth		As per zoo records
2002	Kanpur	7	7	0	14			Kanpur	19-Sep-2002	Birth		As per zoo records
2002	Kanpur	6	7	0	13			Kanpur	3-Feb-03	Death		As per zoo records
2002	Kanpur	6	7	1	14			Kanpur	~2002	Birth		As per CZA inventory, the same not available from zoo records
2002	Hyderabad	4	6	0	10	Unk	Unk	Hyderabad	~2002	Birth		1.1.0 Births as per CZA inventory
2002	Nandankanan	7	6	0	13	Unk	Unk	Nandankanan	9-Jun-2002	Birth		
2002	Nandankanan	7	7	0	14	Unk	Unk	Nandankanan	23-Jun-2002	Birth		
2002	Nandankanan	8	7	0	15	Unk	Unk	Nandankanan	2-Aug-2002	Birth		
2002	Nandankanan	8	8	0	16	Unk	Unk	Nandankanan	5-Sep-2002	Birth		
2002	Nandankanan	8	9	0	17	Unk	Unk	Nandankanan	12-Sep-2002	Birth		
2002	Nandankanan	7	9	0	16			Nandankanan	3-Oct-2002	Death		1.0.0 death due to infighting. Male acquired from Lucknow Zoo
2002	Nandankanan	7	8	0	15			Nandankanan	3-Oct-2002	Death		0.1.0 death due to infighting. Female born on 21-Aug-1998
2002	Nandankanan	7	7	0	14			Nandankanan	15-Oct-2002	Death		0.1.0 death due to acute peripheral circulatory failure. Female born on 06-Aug-1999
2002	Nandankanan	6	7	0	13			Nandankanan	16-Oct-2002	Death		1.0.0 death due to asphyxia. Male born on 18-Jun-2000
2002	Chhatbir	1	1	0	2			Chhatbir				
2003	Delhi2	5	10	0	15			Delhi	24-Mar-2003	Death		Adult animal Tuberculosis

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2003	Delhi2	5	9	0	14			Delhi	2-Apr-2003	Death		Adult animal Gastro-entritis
2003	Delhi2	4	9	0	13			Delhi	21-May-2003	Death		Shock
2003	Delhi2	5	9	0	14	Delhi2	Delhi2	Delhi	17-Aug-2003	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2003	Delhi2	6	9	0	15	Delhi2	Delhi2	Delhi	20-Aug-2003	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2003	Delhi2	7	9	0	16	Delhi2	Delhi2	Delhi	19-Sep-2003	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2003	Delhi2	6	8	0	14			Delhi	17-Sep-2003	Death		1 Fawn; 1 adult female
2003	Delhi2	5	8	0	13			Delhi	22-Sep-2003	Death		Asphyxia
2003	Delhi2	4	8	0	12			Delhi	23-Sep-2003	Death		Shock
2003	Delhi2	3	8	0	11			Delhi	10-Oct-2003	Death		Shock
2003	Delhi2	3	7	0	10			Delhi	28-Oct-2003	Death		
2003	Mysore	1	0	0	1	Unk	Unk	Mysore	29-Jul-2003 26-Dec-2011	Birth Death	M00277	
2003	Mysore	1	0	0	1	Unk	Unk	Mysore	16-Oct-2003 30-Jul-2013	Birth Death	M00278	
2003	Lucknow	13	11	1	25			Lucknow	19-May-2003	Death		Injury & Senility; Determination of sex of 10 fawns
2003	Lucknow	12	11	1	24			Lucknow	20-Jun-2003	Death		Pulmonary TB
2003	Lucknow	11	11	1	23			Lucknow	10-Dec-2003	Death		Infighting injuries
2003	Kanpur	6	8	1	15			Kanpur	20-May-2003	Birth		As per zoo records
2003	Kanpur	6	9	1	16			Kanpur	17-Jun-2003	Birth		As per zoo records
2003	Kanpur	7	9	1	17			Kanpur	22-Jun-2003	Birth		As per zoo records
2003	Kanpur	6	8	1	15			Kanpur	4-Feb-04	Transfer		1.1.0 transferred to MCZP, Chatbir; as per zoo records

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2003	Hyderabad	4	6	0	10			Hyderabad				
2003	Nandankanan	5	7	0	12			Nandankanan	23-May-2003	Death		Male born on 2-Aug-2002 due to internal hemaorrhage
2003	Nandankanan	6	7	0	13	Unk	Unk	Nandankanan	1-Jul-2003	Birth		
2003	Nandankanan	5	7	0	12			Nandankanan	1-Jul-2003	Death		Fawn born on 1-Jul-2003 rejected by mother
2003	Nandankanan	5	8	0	13	Unk	Unk	Nandankanan	27-Aug-2003	Birth		
2003	Nandankanan	5	7	0	12			Nandankanan	17-Jul-2003	Death		Female acquired from Lucknow zoo on 24-Nov-1997 due to old age
2003	Nandankanan	4	7	0	11			Nandankanan	26-Aug-2003	Death		Male born on 29-Aug-2001 due to electrocution
2003	Madras	2	2	0	4			Madras		Transfer		Received 2.2.0 (4) animals from Mysore
2003	Chhatbir	1	0	0	1			Chhatbir				Difference 0.1.0 animals between closing stock of 2002 - 2003 and opening balance of 2003-2004 as per CZA inventory
2003	Chhatbir	2	1	0	3			Chhatbir	~2003	Transfer		1.1.0 animals acquired as per CZA inventory
2003	Chhatbir	1	1	0	2			Chhatbir	~2003	Death		1.0.0 deaths as per CZA inventory
2004	Delhi2	2	6	0	8			Delhi Jungadh	28-Feb-2004	Transfer		2 (1.1) Transferred to Sakkarbaug Zoo Jungadh
2004	Delhi2	2	5	0	7			Delhi	1-Mar-2004	Death		Compound fracture
2004	Delhi2	2	4	0	6			Delhi	11-Mar-2004	Death		Infection; shock
2004	Delhi2	2	3	0	5			Delhi	12-Mar-2004	Death		Septicemia
2004	Delhi2	2	2	0	4			Delhi	12-Apr-2004	Death		Enteritis
2004	Delhi2	3	2	0	5	Delhi2	Delhi2	Delhi	31-Jul-2004	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2004	Delhi2	3	3	0	6	Delhi2	Delhi2	Delhi	1-Aug-2004	Birth		Parentage attributed to Delhi2

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												lineage. The pair of animals used to re-establish the population
2004	Delhi2	2	3	0	5			Delhi	21-Sep-2004	Death		Multiple infection; Senility
2004	Mysore	0	1	0	1	Unk	Unk	Mysore	6-Oct-2004	Birth	M00280	
2004	Mysore	1	0	0	1	Unk	Unk	Mysore	30-Sep-2004	Birth	M00285	
2004	Mysore	0	1	0	1	Unk	Unk	Mysore	30-Oct-2004	Birth	M00286	
2004	Lucknow	11	11	5	27	Unk	Unk	Lucknow	1-Aug-2004	Birth		4 fawns born
2004	Lucknow	11	10	5	26			Lucknow	1-Aug-2004	Death		Injury
2004	Lucknow	11	10	7	28	Unk	Unk	Lucknow	1-Oct-2004	Birth		2 fawns born
2004	Lucknow	10	10	7	27			Lucknow	10-Oct-2004	Death		TB
2004	Kanpur	6	9	1	16			Kanpur	3-Jul-04	Birth		As per zoo records
2004	Kanpur	6	10	1	17			Kanpur	12-Feb-2005	Birth		As per zoo records
2004	Junagadh	1	2	0	3			Junagadh	29-Feb-2004	Transfer		1.1.0 acquired from NZP, Delhi
2004	Hyderabad	5	6	0	11	Unk	Unk	Hyderabad	~2004	Birth		1.0.0 births as per CZA inventory
2004	Madras	2	2	0	4			Madras				
2004	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2004	Chhatbir	2	1	0	3			Chhatbir	~2004	Birth		1.0.0 birth as per CZA inventory
2004	Chhatbir	1	1	0	2			Chhatbir	~2004	Death		1.0.0 deaths as per CZA inventory
2005	Delhi2	1	3	0	4			Delhi	9-Sep-2005	Death		Pulmonary Tuberculosis
2005	Calcutta2	1	4	0	5			Calcutta	9-Jun-2005	Death		Heat stroke
2005	Lucknow	10	10	9	29	Unk	Unk	Lucknow	28-Jul-2005	Birth		2 fawns born
2005	Lucknow	9	10	9	28			Lucknow	21-Oct-2005	Death		Injury
2005	Lucknow	8	10	9	27			Lucknow	17-Dec-2005	Death		Injury
2005	Lucknow	8	10	11	29	Unk	Unk	Lucknow	1-Jan-2005	Birth		2 fawns born
2005	Lucknow	4	7	22	33			Lucknow				Closing total as per CZA inventory; records not available from the zoo
2005	Kanpur	6	11	1	18	Unk	Unk	Kanpur	30-Jul-2005	Birth		As per zoo records

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2005	Kanpur	6	12	1	19	Unk	Unk	Kanpur	4-Aug-2005	Birth		As per zoo records
2005	Kanpur	7	12	1	20	Unk	Unk	Kanpur	8-Aug-2005	Birth		As per zoo records
2005	Kanpur	7	11	1	19			Kanpur	7-Jul-2005	Death		Distension of abdomen
2005	Kanpur	6	11	1	18			Kanpur	15-Jul-2005	Death		Old age
2005	Junagadh	1	3	0	4			Junagadh	11-May-2005	Birth		
2005	Junagadh	1	2	0	3			Junagadh	16-Aug-2005	Death		0.1.0 death due to congenital deformity of fawn born on 11May2005
2005	Hyderabad	5	6	1	12	Unk	Unk	Hyderabad	~2005	Birth		0.0.1 birth as per CZA inventory
2005	Nandankanan	4	8	0	12	Unk	Unk	Nandankanan	11-May-2005	Birth		
2005	Nandankanan	4	7	0	11			Nandankanan	11-May-2005	Death		Fawn born on 11-May-2005 trampled
2005	Nandankanan	5	7	0	12	Unk	Unk	Nandankanan	28-May-2005	Birth		
2005	Nandankanan	5	8	0	13	Unk	Unk	Nandankanan	10-Jul-2005	Birth		
2005	Nandankanan	5	9	0	14	Unk	Unk	Nandankanan	2-Aug-2005	Birth		
2005	Madras	2	2	0	4			Madras				
2005	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2005	Chhatbir	1	1	0	2			Chhatbir				
2006	Calcutta2	3	4	0	7	Unk	Unk	Calcutta	~Aug-2006	Birth		
2006	Lucknow	4	7	24	35	Unk	Unk	Lucknow	1-Aug-2006			2 fawns born
2006	Lucknow	4	7	26	37			Lucknow				Records of 2 fawns born during 2006-2007 obtained from CZA inventory. The same not available from zoo
2006	Kanpur	6	12	1	19	Unk	Unk	Kanpur	23-May-2006	Birth		As per zoo records
2006	Kanpur	7	12	1	20	Unk	Unk	Kanpur	24-May-2006	Birth		As per zoo records
2006	Kanpur	7	13	1	21	Unk	Unk	Kanpur	26-Jul-2006	Birth		As per zoo records
2006	Kanpur	7	14	1	22	Unk	Unk	Kanpur	28-Jul-2006	Birth		As per zoo records

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2006	Kanpur	7	15	1	23	Unk	Unk	Kanpur	14-Aug-2006	Birth		As per zoo records
2006	Kanpur	8	15	1	24	Unk	Unk	Kanpur	9/1/2006	Birth		As per zoo records
2006	Kanpur	8	16	1	25	Unk	Unk	Kanpur	3-Sep-2006	Birth		As per zoo records
2006	Kanpur	8	15	1	24			Kanpur	12-Sep-2006	Death		Old age
2006	Kanpur	8	14	1	23			Kanpur	3-Oct-2006	Death		Heart failure
2006	Kanpur	7	14	1	22			Kanpur	14-Jan-2007	Death		Respiratory failure
2006	Junagadh	1	3	0	4			Junagadh	4-May-2006	Birth		
2006	Hyderabad	5	6	1	12							
2006	Nandankanan	5	10	0	15	Unk	Unk	Nandankanan	7-Jun-2006	Birth		
2006	Nandankanan	5	11	0	16	Unk	Unk	Nandankanan	15-Jun-2006	Birth		
2006	Nandankanan	5	12	0	17	Unk	Unk	Nandankanan	22-Jun-2006	Birth		
2006	Nandankanan	5	11	0	16			Nandankanan	22-Jun-2006	Death		Fawn born on 22-Jun-2006 due to asphyxia
2006	Nandankanan	5	12	0	17	Unk	Unk	Nandankanan	5-Aug-2006	Birth		
2006	Nandankanan	4	12	0	16			Nandankanan	31-Jul-2006	Death		Male acquired from Lucknow zoo on 24-Nov-1997 due to wound in the face
2006	Nandankanan	4	11	0	15			Nandankanan	5-Dec-2006	Death		Female acquired from Lucknow zoo on 24-Nov-1997 due to internal hemorrhage
2006	Nandankanan	4	10	0	14			Nandankanan	16-Jun-2006	Death		Fawn born on 15-Jun-2006 due to pneumonia
2006	Madras	2	2	0	4			Madras				
2006	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2006	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2006	Chhatbir	1	2	0	3			Chhatbir	~2006	Birth		0.1.0 birth as per CZA inventory
2007	Delhi2	1	2	0	3			Delhi	12-Jan-2007	Death		Senility; liver cirrhosis
2007	Delhi2	1	3	0	4	Delhi2	Delhi2	Delhi	26-Sep-2007	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												re-establish the population
2007	Delhi2	1	4	0	5	Delhi2	Delhi2	Delhi	15-Nov-2007	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2007	Mysore	1	0	0	1	Unk	Unk	Mysore	2-Jul-2007	Birth	M00718	
2007	Mysore	0	1	0	1	Unk	Unk	Mysore	8-Jul-2007	Birth	M00719	
2007	Calcutta2	3	4	2	9	Unk	Unk	Calcutta	~-Oct-2007	Birth		
2007	Calcutta2	2	4	2	8			Calcutta	19-Oct-2007	Death		Senility
2007	Lucknow	4	7	28	39	Unk	Unk	Lucknow	21-May-2007	Birth		2 fawns born
2007	Lucknow	4	7	29	40	Unk	Unk	Lucknow	21-Jun-2007	Birth		1 fawn born
2007	Lucknow	3	7	29	39			Lucknow	22-Jun-2007	Death		Pyothorax
2007	Lucknow	3	7	31	41	Unk	Unk	Lucknow	6-Aug-2007	Birth		2 fawns born
2007	Lucknow	3	6	31	40			Lucknow	19-Mar-2008	Death		
2007	Lucknow	3	6	36	45	Unk	Unk	Lucknow		Birth		Records of 5 fawns born during 2007-2008 obtained from CZA inventory. The same not available from zoo
2007	Kanpur	8	14	1	23	Unk	Unk	Kanpur	25-Apr-2007	Birth		As per zoo records
2007	Kanpur	9	14	1	24	Unk	Unk	Kanpur	5-May-2007	Birth		As per zoo records
2007	Kanpur	10	14	1	25	Unk	Unk	Kanpur	16-Aug-2007	Birth		As per zoo records
2007	Kanpur	10	15	1	26	Unk	Unk	Kanpur	22-Aug-2007	Birth		As per zoo records
2007	Kanpur	11	15	1	27	Unk	Unk	Kanpur	13-Sep-2007	Birth		As per zoo records
2007	Kanpur	10	15	1	26			Kanpur	9-Feb-2008	Death		Old age
2007	Kanpur	9	12	1	22			Kanpur	17-Apr-2007	Transfer		1.3.0 transferred to SGBP, Patna
2007	Junagadh	2	3	0	5			Junagadh	25-May-2007	Birth		
2007	Hyderabad	5	8	1	14	Unk	Unk	Hyderabad	~2007	Birth		0.2.0 births as per CZA inventory
2007	Nandankanan	5	10	0	15	Unk	Unk	Nandankanan	15-Aug-2007	Birth		
2007	Nandankanan	5	9	0	14			Nandankanan	8-May-2007	Death		Female born on 12-Sept-2002 due to enteritis

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2007	Nandankanan	5	8	0	13			Nandankanan	13-Jul-2007	Death		Female born on 27-Aug-2003 due to nasal tumour
2007	Nandankanan	5	7	0	12			Nandankanan	22-Oct-2007	Death		Female born on 10-July-2005 due to nasal tumour
2007	Madras	2	2	0	4			Madras				
2007	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2007	Chhatbir	1	3	0	4			Chhatbir	~2007	Birth		0.1.0 birth as per CZA inventory
2007	Patna	0	3	0	3			Patna	~2007	Transfer		0.3.0 acquired as per CZA inventory
2007	Patna	2	3	0	5			Patna	~2007	Birth		2.0.0 birth as per CZA inventory
2008	Delhi2	1	5	0	6	Delhi2	Delhi2	Delhi	12-Aug-2008	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2008	Delhi2	1	6	0	7	Delhi2	Delhi2	Delhi	7-Oct-2008	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2008	Mysore	0	1	0	1	Unk	Unk	Mysore	18-Jun-2008	Birth	M00720	
2008	Mysore	0	1	0	1	Unk	Unk	Mysore	7-Jul-2008	Birth	M00721	
2008	Calcutta2	1	4	2	7			Calcutta	3-Aug-2008	Death		Pneumonia
2008	Calcutta2	2	6	0	8	Unk	Unk	Calcutta	~-Oct-2008	Birth		
2008	Calcutta2	2	5	0	7			Calcutta	8-Oct-2008	Death		Senility
2008	Lucknow	3	6	40	49	Unk	Unk	Lucknow	1-Aug-2008	Birth		4 fawns born
2008	Lucknow	3	6	42	51	Unk	Unk	Lucknow	23-Sep-2008	Birth		2 fawns born
2008	Lucknow	3	5	42	50			Lucknow	3-Feb-2009	Death		Old age
2008	Kanpur	10	12	1	23	Unk	Unk	Kanpur	3-May-2008	Birth		As per zoo records
2008	Kanpur	11	12	1	24	Unk	Unk	Kanpur	6-May-2008	Birth		As per zoo records
2008	Kanpur	11	13	1	25	Unk	Unk	Kanpur	17-Jul-2008	Birth		As per zoo records
2008	Kanpur	11	12	1	24			Kanpur	26-Nov-2008	Death		Injuries
2008	Ahemdabad	1	2	0	3			Ahmedabad	12-Aug-2008	Transfer		1.2.0 acquired from SCZG, Mysore

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2008	Ahmedabad	1	1	0	2			Ahmedabad	26-Aug-2008	Death		
2008	Ahmedabad	1	0	0	1			Ahmedabad	4-Oct-2008	Death		
2008	Junagadh	3	3	0	6			Junagadh	30-May-2008	Birth		
2008	Junagadh	3	2	0	5			Junagadh	12-Nov-2008	Death		0.1.0 Death female acquired from Kanpur Zoo
2008	Junagadh	3	1	0	4			Junagadh	17-Nov-2008	Death		0.1.0 death of female acquired from NZP, Delhi
2008	Hyderabad	5	9	1	15	Unk	Unk	Hyderabad	~2008	Birth		0.1.0. birth as per CZA inventory
2008	Nandankanan	5	8	0	13	Unk	Unk	Nandankanan	7-Jun-2008	Birth		
2008	Nandankanan	5	9	0	14	Unk	Unk	Nandankanan	10-Aug-2008	Birth		
2008	Nandankanan	5	8	0	13			Nandankanan	18-Nov-2008	Death		Female born on 05-Sept-2002 due to ethmoid tumour
2008	Madras	2	2	0	4			Madras				
2008	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2008	Chhatbir	2	3	0	5			Chhatbir	~2008	Birth		1.0.0 birth as per CZA inventory
2008	Patna	2	3	0	5			Patna				
2009	Calcutta2	2	4	0	6			Calcutta	15-Feb-2009	Death		Septicemia
2009	Calcutta2	2	3	0	5			Calcutta	21-May-2009	Death		Senility
2009	Lucknow	2	5	42	49			Lucknow	21-Apr-2009			Injuries
2009	Lucknow	2	5	50	57	Unk	Unk	Lucknow	7-Aug-2009	Birth		8 fawns born
2009	Kanpur	11	13	1	25	Unk	Unk	Kanpur	25-Apr-2009	Birth		As per zoo records
2009	Kanpur	12	13	1	26	Unk	Unk	Kanpur	9-May-2009	Birth		As per zoo records
2009	Kanpur	12	13	3	28	Unk	Unk	Kanpur	1-Jul-2009	Birth		As per zoo records
2009	Kanpur	12	13	4	29	Unk	Unk	Kanpur	8-Aug-2009	Birth		As per zoo records
2009	Kanpur	12	12	4	28			Kanpur	30-Aug-2009	Death		Heart failure
2009	Kanpur	12	11	4	27			Kanpur	11-Sep-2009	Death		Cardio-respiratory failure
2009	Kanpur	12	10	4	26			Kanpur	22-May-2009	Death		Respiratory failure
2009	Kanpur	11	10	4	25			Kanpur	4-May-2009	Death		Retention of urine

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2009	Tirupati	0	1	0	1			Tirupati	28-Sep-2009	Transfer		0.1.0 acquired from NZP, Hyderabad
2009	Tirupati	0	2	0	2			Tirupati	28-Sep-2009	Transfer		0.1.0 acquired from NZP, Hyderabad
2009	Tirupati	1	2	0	3			Tirupati	28-Sep-2009	Transfer		1.0.0 acquired from NZP, Hyderabad
2009	Junagadh	3	2	0	5			Junagadh	22-May-2009	Birth		
2009	Junagadh	2	2	0	4			Junagadh	27-Aug-2009	Death		1.0.0 death of male acquired from NZP, Delhi
2009	Hyderabad	5	10	1	16	Unk	Unk	Hyderabad	~2009	Birth		0.1.0 birth as per CZA inventory
2009	Hyderabad	4	8	1	13			Hyderabad	~2009	Transfer		1.2.0 transferred to SVZP, Tirupati (as per SVZP data)
2009	Nandankanan	5	9	0	14	Unk	Unk	Nandankanan	26-May-2009	Birth		
2009	Nandankanan	5	8	0	13			Nandankanan	26-May-2009	Death		Female born on 10-Aug-2008 due to head injury
2009	Nandankanan	5	7	0	12			Nandankanan	29-Aug-2009	Death		Female born on 2-Aug-2005 due to ethmoid tumour
2009	Nandankanan	5	6	0	11			Nandankanan	4-Aug-2009	Death		Female born on 07-June-2006 due to ethmoid tumour
2009	Nandankanan	4	6	0	10			Nandankanan	3-Jul-2009	Death		Male born on 15-Aug-2007 due to ethmoid tumour
2009	Nandankanan	5	6	0	11	Unk	Unk	Nandankanan	12-Sep-2009	Birth		
2009	Nandankanan	5	7	0	12	Unk	Unk	Nandankanan	18-Sep-2009	Birth		
2009	Madras	2	2	0	4			Madras				
2009	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2009	Chhatbir	2	3	2	7			Chhatbir	~2009	Birth		0.0.2 births as per CZA inventory
2009	Patna	2	5	0	7			Patna	~2009	Birth		0.2.0 births as per CZA inventory
2009	Patna	1	5	0	6			Patna	~2009	Death		1.0.0 deaths as per CZA inventory
2010	Delhi2	2	6	0	8	Delhi2	Delhi2	Delhi	11-Oct-2010	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												re-establish the population
2010	Mysore	0	1	0	1	Unk	Unk	Mysore	8-Sep-2010	Birth	M00606	
2010	Calcutta2	2	2	0	4			Calcutta	23-Jul-2010	Death		Septicemia
2010	Calcutta2	2	3	0	5	Unk	Unk	Calcutta	~Oct-2010	Birth		
2010	Lucknow	3	5	52	60	Unk	Unk	Lucknow	6-Feb-2011	Birth		3 fawns born
2010	Lucknow	3	5	54	62	Unk	Unk	Lucknow	14-Feb-2011	Birth		2 fawns born
2010	Kanpur	11	10	5	26	Unk	Unk	Kanpur	13-Apr-2010	Birth		As per zoo records
2010	Kanpur	11	10	6	27	Unk	Unk	Kanpur	19-Apr-2010	Birth		As per zoo records
2010	Kanpur	11	10	7	28	Unk	Unk	Kanpur	23-May-2010	Birth		As per zoo records
2010	Kanpur	11	10	8	29	Unk	Unk	Kanpur	8-Jul-2010	Birth		As per zoo records
2010	Kanpur	11	10	9	30	Unk	Unk	Kanpur	8-Aug-2010	Birth		As per zoo records
2010	Kanpur	11	10	10	31	Unk	Unk	Kanpur	1-Oct-2010	Birth		As per zoo records
2010	Kanpur	11	9	10	30			Kanpur	15-Dec-2010	Death		Excessive bleeding
2010	Kanpur	10	8	10	28			Kanpur	17-Mar-2011	Transfer		1.1.0 transferred to Indira Gandhi Zoo Park, Rourkela; as per zoo records. CZA inventory records 0.0.7 births, while zoo records indicate 0.0.6 births.
2010	Vishakapatnam	2	2	0	4			Vishakhapatnam	13-Apr-2010	Transfer		2.2.0 acquired from NZP, Hyderabad
2010	Vishakapatnam	2	3	0	5			Vishakhapatnam	7-Jun-2010	Birth		
2010	Vishakapatnam	2	4	0	6			Vishakhapatnam	24-Jul-2010	Birth		
2010	Vishakapatnam	3	4	0	6			Vishakhapatnam	~2010	Birth		
2010	Junagadh	1	2	0	3			Junagadh	4-Jul-2010	Death		1.0.0 death of male born on 25-05-2005
2010	Hyderabad	2	6	1	9			Hyderabad	~2010	Transfer		2.2.0 transferred from NZP, Hyderabad; recipient zoo not known. As per CZA inventory
2010	Hyderabad	2	4	1	7			Hyderabad	~2010	Death		0.2.0 deaths as per CZA inventory

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2010	Nandankanan	5	8	0	13	Unk	Unk	Nandankanan	14-Jun-2010	Birth		
2010	Nandankanan	5	9	0	14	Unk	Unk	Nandankanan	29-Jun-2010	Birth		
2010	Nandankanan	5	8	0	13			Nandankanan	1/17/2011	Death		Female born on 12-Sept-2001 due to pneumonia
2010	Nandankanan	4	8	0	12			Nandankanan	1/24/2011	Death		Male born on 9-Sept-2002 due to pneumo-enteritis
2010	Nandankanan	4	7	0	11			Nandankanan	3/4/2011	Death		Female born on 23-June-2002 due to septicemia
2010	Madras	2	2	0	4			Madras				
2010	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2010	Chhatbir	2	3	4	9			Chhatbir	~2010	Birth		0.0.2 births as per CZA inventory
2010	Chhatbir	2	3	3	8			Chhatbir	~2010	Death		0.0.1 death as per CZA inventory
2010	Patna	2	5	1	8			Patna	~2010	Birth		1.0.1 births as per CZA inventory
2010	Patna	2	3	1	6			Patna	~2010	Death		0.2.0 deaths as per CZA inventory
2011	Delhi2	2	6	1	9	Delhi2	Delhi2	Delhi	1-Apr-2011	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2011	Mysore	0	1	0	1	Unk	Unk	Mysore	18-Sep-2011	Birth	M00777	
2011	Mysore	1	0	0	1	Unk	Unk	Mysore	18-Sep-2011	Birth	M00778	
2011	Lucknow	3	5	57	65	Unk	Unk	Lucknow	1-Apr-2011	Birth		3 fawns born
2011	Lucknow	3	5	62	70	Unk	Unk	Lucknow	29-Feb-2012	Birth		5 fawns born
2011	Kanpur	10	8	11	29	Unk	Unk	Kanpur	30-Oct-2011	Birth		As per zoo records
2011	Kanpur	10	8	12	30	Unk	Unk	Kanpur	25-Nov-2011	Birth		As per zoo records
2011	Kanpur	10	8	13	31	Unk	Unk	Kanpur	14-Jan-2012	Birth		As per zoo records
2011	Kanpur	10	8	14	32	Unk	Unk	Kanpur	19-Jan-2012	Birth		As per zoo records
2011	Kanpur	10	8	15	33	Unk	Unk	Kanpur	~2011	Birth		As per CZA inventory; not available in zoo data
2011	Junagadh	1	3	0				Junagadh	21-Jan-2012	Birth		Data obtained from Taxon report obtained from Species360 website

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2011	Hyderabad	2	5	1	8	Unk	Unk	Hyderabad	~2011	Birth		0.1.0 birth as per CZA inventory
2011	Hyderabad	2	4	1	7			Hyderabad	~2011	Death		0.1.0 death as per CZA inventory
2011	Nandankanan	3	7	0	10			Nandankanan	4/22/2011	Death		Male born on 25-Jul-2001 due to ethmoid tumour
2011	Nandankanan	3	8	0	11	Unk	Unk	Nandankanan	13-Jul-2011	Birth		
2011	Nandankanan	3	7	0	10			Nandankanan	8/11/2011	Death		Female born 7-June-2008 due to internal hemorrhage and shock
2011	Nandankanan	2	7	0	9			Nandankanan	19-Jan-12	Death		Male born 29-May-2005 due to hemaorrhage in the lungs and hemo-thorax
2011	Madras	1	2	0	3			Madras	~2011	Death		1.0.0 deaths as per CZA inventory
2011	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2011	Chhatbir	2	3	4	9			Chhatbir	~2011	Birth		0.0.1 birth as per CZA inventory
2011	Patna	2	3	4	9			Patna	~2011	Birth		0.0.3 births as per CZA inventory
2011	Patna	1	3	4	8			Patna	~2011	Death		1.0.0 deaths as per CZA inventory
2012	Delhi2	2	6	2	10	Delhi2	Delhi2	Delhi	22-Aug-2012	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2012	Delhi2	2	6	3	11	Delhi2	Delhi2	Delhi	5-Sep-2012	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2012	Delhi2	2	6	4	12	Delhi2	Delhi2	Delhi	4-Oct-2012	Birth		Parentage attributed to Delhi2 lineage. The pair of animals used to re-establish the population
2012	Mysore	1	0	0	1	Unk	Unk	Mysore	10-Jul-2012	Birth	M00883	
2012	Mysore	0	0	1	1	Unk	Unk	Mysore	15-Jul-2012	Birth	M00884	
2012	Calcutta2	2	2	0	4			Calcutta	6-Mar-2012	Death		External injury and shock
2012	Calcutta2	2	3		5	Unk	Unk	Calcutta	~Sept-2012	Birth		
2012	Lucknow	3	5	64	72	Unk	Unk	Lucknow	15-Jul-2012	Birth		2 fawns born
2012	Lucknow	3	5	62	70	Unk	Unk	Lucknow	1-Feb-2013	Death		Septicemia

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2012	Lucknow	3	5	83	91	Unk	Unk	Lucknow	~2012	Birth		Records of 21 fawns born during 2012-2013 obtained from CZA inventory. The same not available from zoo
2012	Kanpur	9	8	15	32			Kanpur	~2012	Death		0.0.1 birth as per CZA inventory; not available in zoo data
2012	Vishakapatnam	3	3	0	6			Vishakhapatnam	29-Apr-2012	Death		
2012	Vishakapatnam	3	2	0	5			Vishakhapatnam	5-Oct-2012	Death		
2012	Vishakapatnam	2	2	0	4			Vishakhapatnam	20-Jun-2012	Death		
2012	Junagadh	1	2	0	3			Junagadh	10-Apr-2012	Death		0.1.0 death of female born on 4-May-2006
2012	Hyderabad	2	4	0	6			Hyderabad	~2012	Transfer		0.0.1 transferred from NZP, Hyderabad; recipient zoo not known. As per CZA inventory
2012	Nandankanan	1	7	0	8			Nandankanan	17-Aug-12	Death		Male born 18-July-2000 due to nasal tumour
2012	Nandankanan	1	6	0	7			Nandankanan	29-Aug-2012	Death		Female born on 13-Oct-1998 due to nasal tumour
2012	Nandankanan	1	7	0	8			Nandankanan	30-March-2013	Birth		
2012	Madras	0	1	0	1			Madras	~2012	Death		1.1.0 deaths as per CZA inventory
2012	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2012	Chhatbir	1	3	2	6			Chhatbir	~2012	Death		1.0.2 deaths as per CZA inventory
2012	Patna	1	3	5	9			Patna	~2012	Birth		0.0.1 birth as per CZA inventory
2013	Delhi2	5	8	0	13			Chattbir Delhi	22-Jun-2013	Transfer		
2013	Delhi2	5	8	1	14	Unk	Unk	Delhi		Birth		Dates of birth
2013	Mysore1	1	0	0	1	Unk	Unk	Mysore	23-Aug-2013	Birth	M01063	
2013	Mysore1	0	0	1	1	Unk	Unk	Mysore	20-Sep-2013	Birth	M01068	
2013	Calcutta2	1	2	0	3			Calcutta	20-Jan-2013	Death		Internal injury and hemorrhage
2013	Lucknow	3	5	90	98	Unk	Unk	Lucknow	~2013	Birth		Records of 7 fawns born during 2013-2014 obtained from CZA

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												inventory. The same not available from zoo
2013	Lucknow	2	5	89	96			Lucknow	~2013	Death		Records of deaths of a male and an unsexed animal obtained from CZA inventory. The same not available from Zoo.
2013	Lucknow	2	3	84	89			Lucknow	~2013	Transfer		Records of transfer of 2 females and 5 unsexed animals obtained from CZA inventory. The same not available from Zoo records.
2013	Kanpur	8	7	15	30			Kanpur	~2013	Transfer		1.1.0 transferred out of Kanpur Zoo as per CZA inventory; not available in zoo data
2013	Kanpur	4	6	15	25			Kanpur	~2013	Death		4.1.0 deaths as per CZA inventory; not available in zoo data
2013	Ahmedabad	0	0	0	0			Ahmedabad	~2013	Death		1.0.0 deaths as per CZA inventory; not available in zoo data
2013	Vishakapatnam	1	2	0	3			Vishakhapatnam	12-Sep-2013	Death		Trauma
2013	Junagadh	1	4	0	5			Junagadh	~2013	Transfer		0.2.0 acquired
2013	Hyderabad	2	4	0	6							
2013	Nandankanan	2	7	0	9			Nandankanan	2-Oct-2013	Birth		
2013	Nandankanan	2	6	0	8			Nandankanan		Death		Female born on 26-May-2009 due to nasal tumour
2013	Madras	0	1	2	3			Madras	~2013	Transfer		0.0.2 animals acquired
2013	Mangalore	1	0	0	1			Mangalore				As per CZA inventory
2013	Chhatbir	1	3	2	6			Chhatbir				
2013	Patna	1	3	8	12			Patna	~2013	Birth		0.0.3 births as per CZA inventory
2013	Patna	1	3	7	11			Patna	~2013	Death		0.0.1 deaths as per CZA inventory
2014	Delhi2	5	9	3	17	Unk	Unk	Delhi		Birth		Dates of birth
2014	Mysore	0	0	1	1	Unk	Unk	Mysore	5-Jul-2014	Birth	M01120	

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2014	Mysore	1	0	0	1	Unk	Unk	Mysore	31-Jul-2014	Birth	M01122	
2014	Calcutta2	2	3		5	Unk	Unk	Calcutta	12-Sep-2014	Birth		
2014	Lucknow	2	3	92	97			Lucknow	~2014	Birth		Records of 8 fawns born during 2014-2015 obtained from CZA inventory. The same not available from zoo
2014	Lucknow	2	3	95	100			Lucknow	~2014	Transfer		Records of acquisition of 3 unknown sex animals obtained from CZA inventory. The same not available from zoo.
2014	Lucknow	2	3	55	60			Lucknow	~2014	Transfer		Records of transfer of 40 unsexed animals obtained from CZA inventory. The same not available from Zoo records.
2014	Kanpur	3	8	16	27	Unk	Unk	Kanpur	~2014	Birth		0.1.1 births as per CZA inventory; not available in zoo data
2014	Kanpur	6	8	16	30			Kanpur	~2014	Transfer		3.0.0 acquired by Kanpur Zoo; as per CZA inventory; not available in zoo data
2014	Kanpur	3	8	16	27			Kanpur	~2014	Transfer		3.0.0 transferred out of Kanpur Zoo; as per CZA inventory; not available in zoo data
2014	Kanpur	1	7	16	24			Kanpur	~2014	Death		2.1.0 deaths as per CZA inventory; not available in zoo data
2014	Vishakapatnam	0	2	0	2			Vishakhapatnam	13-Oct-2014	Death		Infighting
2014	Vishakapatnam	0	1	0	1			Vishakhapatnam	5-Aug-2014	Death		Snakebite
2014	Junagadh	1	4	1	6			Junagadh	~2014	Birth		0.0.1 births, data obtained from CZA inventory report
2014	Junagadh	1	4	2	7			Junagadh	~2014	Transfer		0.0.1 acquired, data obtained from CZA inventory report
2014	Hyderabad	2	4	0	6							
2014	Nandankanan	2	5	0	7			Nandankanan	1-Aug-2014	Death		Female born on 18-Sept-2009 due

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
												to septicemia and abscess in frontal sinus
2014	Madras	5	12	3	20			Madras	~2014	Transfer		5.11.0 animals acquired
2014	Madras	4	8	2	14			Madras	~2014	Death		1.4.1 deaths
2014	Mangalore	0	0	0	0			Mangalore	~2014	Death		As per CZA inventory
2014	Chhatbir	1	3	2	6			Chhatbir				
2014	Patna	1	3	10	14			Patna	~2013	Birth		0.0.3 births as per CZA inventory
2014	Trivandrum	4	9	0	13			Trivandrum	~2014	Transfer		4.9.0 animals acquired
2014	Bhopal	3	4	0	7			Bhopal	~2014	Transfer		3.4.0 acquired from Kanha NP (Subspecies <i>R. d. branderii</i>)
2015	Delhi2	5	9	4	18	Unk	Unk	Delhi		Birth		Dates of birth
2015	Mysore	0	0	1	1	Unk	Unk	Mysore	4-Jul-2015	Birth	M01166	
2015	Mysore	0	0	1	1	Unk	Unk	Mysore	19-Aug-2015	Birth	M01177	
2015	Calcutta2	2	3		5							As per CZA inventory
2015	Lucknow	2	3	70	75			Lucknow	~2015	Birth		Records of births of 15 unsexed births obtained from CZA inventory. The same not available from zoo records.
2015	Kanpur	13	11	0	24			Kanpur	~2015			Identification of sex carried out for animals at the zoo as per CZA inventory
2015	Kanpur	13	11	1	25	Unk	Unk	Kanpur	~2015	Birth		0.0.1 birth as per CZA inventory; not available in zoo data
2015	Kanpur	12	10	1	23			Kanpur	~2015	Death		1.1.0 deaths as per CZA inventory; not available in zoo data
2015	Tirupati	0	2	0	2			Tirupati	~2015	Death		1.0.0 deaths as per CZA inventory; not available in zoo data
2015	Vishakapatnam	0	1	0	1							
2015	Junagadh	2	3	5	10			Junagadh	~2015	Birth		0.0.3 captive births, data obtained from CZA inventory report

Year	Group ID	Population				Parentage		Location	Date	Event	Animal ID	Remarks
		Male	Female	Unknown	Total	Sire	Dam					
2015	Junagadh	1	3	5	9			Junagadh	~2015	Death		1.0.0 death, data obtained from CZA inventory report
2015	Hyderabad	1	2	0	3			Hyderabad	~2015	Death		1.2.0 deaths as per CZA inventory
2015	Nandankanan	2	6	0	8			Nandankanan	16-May-2015	Birth		
2015	Nandankanan	1	6	0	7			Nandankanan	~2015	Death		As per CZA inventory
2015	Madras	5	8	0	13			Madras	~2015			As per CZA inventory
2015	Madras	5	8	1	14			Madras	~2015	Birth		0.0.1 birth as per CZA inventory
2015	Madras	5	7	1	13			Madras	~2015	Death		0.1.0 deaths as per CZA inventory
2015	Chhatbir	1	3	3	7			Chhatbir	~2015	Birth		0.0.1 births as per CZA inventory
2015	Chhatbir	1	3	2	6			Chhatbir	~2015	Death		0.0.1 deaths as per CZA inventory
2015	Patna	4	10	0	14			Patna				Sex determination of stock as per CZA inventory
2015	Patna	9	10	0	19	Unk	Unk	Patna	~2015	Birth		2.0.0 births as per CZA inventory
2015	Patna	7	10	0	17			Patna	~2015	Death		2.0.0 deaths as per CZA inventory
2015	Trivandrum	4	9	1	14	Unk	Unk	Trivandrum	~2015	Birth		0.0.1 birth as per CZA inventory
2015	Bhopal	3	4	0	7			Bhopal				
2016	Mysore	0	0	1	1	Unk	Unk	Mysore	11-May-2016	Birth	M01223	
2016	Kanpur	12	10	3	25	Unk	Unk	Kanpur	~2016	Birth		0.0.2 births as per CZA inventory; not available in zoo data
2016	Kanpur	7	10	3	20			Kanpur	~2016	Death		5.0.0 deaths as per CZA inventory; not available in zoo data
2016	Vishakapatnam	0	1	0	1							
2016	Madras	5	7	2	14			Madras	~2016	Birth		0.0.1 birth as per CZA inventory
2016	Madras	5	6	2	13			Madras	~2016	Death		As per CZA inventory
2016	Chhatbir	1	3	6	10			Chhatbir	~2016	Birth		0.0.4 births as per CZA inventory

Location Glossary

Sl.	Zoo Name	Code Used
1.	Alipore Zoological Garden, Kolkata	Calcutta
2.	Arignar Anna Zoological Park, Chennai	Madras
3.	Dr. K.Shivarma Karanth Piliikula Biological Park, Mangalore	Managalore
4.	Indira Gandhi Zoological Park, Vishakhapatnam	Vishakhapatnam
5.	Kamla Nehru Zoological Garden, Ahmedabad	Ahmedabad
6.	Kanan Pandari Zoo, Raipur	Raipur
7.	Kanpur Zoological Park, Kanpur	Kanapur
8.	Mahendra Chaudhury Zoological Park	Chatbir
9.	Nandankanan Biological Park, Bhubaneswar	Nandankanan
10.	National Zoological Park, Delhi	Delhi
11.	Nawab Wazid Ali Shah Zoological Garden, Lucknow	Lucknow
12.	Nehru Zoological Park, Hyderabad	Hyderabad
13.	Sakkarbaug Zoo, Junagadh	Junagadh
14.	Sanjay Gandhi Biological Park, Patna	Patna
15.	Sri Chamarajendra Zoological Gardens, Mysore	Mysore
16.	Sri Venkateswara Zoological Park, Tirupati	Tirupati
17.	Thiruvananthapuram Zoo, Thiruvananthapuram	Thiruvananthapuram
18.	Van Vihar National Park Zoo, Bhopal	Bhopal