

# NATIONAL STUDBOOK

## Indian Wild Ass (*Equus hemionus khur*): III Edition

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# National Studbook of Indian Wild Ass (*Equus hemionus khur*): III Edition

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## FOREWORD

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Habitat loss as a consequence of developmental activities is impacting Indian wild ass in its native habitats, ex-situ conservation is a part of the strategies that can help in ensuring sustained survival of the species in its natural habitat. Pedigree information contained in studbooks forms the basis for scientific management and ensures long term genetic viability and demographic stability of such populations.

The Central Zoo Authority (CZA) in collaboration with zoos in India has initiated a conservation breeding program for threatened species in Indian zoos. As a part of this endeavour, 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 a part of the project outcomes the WII has compiled the III edition of the National Studbook of Indian Wild Ass (*Equus hemionus khur*) housed in Indian zoos. The recommendations contained in the studbook can form basis for the long term management of the species in captivity.

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## INDIAN WILD ASS

### (*Equus hemionus khur*)

#### Species Information

The species is widely distributed across India, inhabiting open dry deciduous forests. It is solitary and shy animal, present in low densities across its distribution range. The species is identified by the presence of four horns present only in adult males. They are primarily browsers preferring nutrient rich forage.

#### Taxonomy

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Perissodactyla
Family	Equidae
Genus	<i>Equus</i>
Species	<i>hemionus</i> (Pallas, 1775)
Sub-species	<i>khur</i> (Lesson, 1827)



Mare with foal

Indian wild ass (*Equus hemionus khur*) is an odd toed ungulate of the family Equidae that comprises of seven closely related species placed in a single genus *Equus* (George and Ryder, 1986; Oakenfull *et al.*, 2000). The extant species included in the genus *Equus* include caballines or true horses (*E. caballus* and *E. przewalskii*) and non-caballines: hemionid or Asian Wild Ass (*E. hemionus* and *E. kiang*), African Wild Ass (*E. africanus* ssp.) and Zebra (*E. greyvi*, *E. burchelli antiquorum* and *E. zebra hartmannae*) (Oakenfull, *et al.*, 2000; Orlando, *et al.*, 2009).

Asian Wild Asses include five geographically isolated subspecies of *E. hemionus* and *E. kiang* (Oakenfull, *et al.* 2000; Grubb, 2005; Kaczensky, *et al.* 2011).

1. *Equus hemionus hemionus* - the Mongolian Khulan (in northern Mongolia) (*E. h. luteus* - the Gobi Khulan or Dziggetai in southern Mongolia and northern China, is probably a synonym of *E. h. hemionus*)
2. *E. h. khur* – the Khur (India)
3. *E. h. kulan* – the Turkmen Kulan (in Turkmenistan, re-introduced in Kazakhstan, Uzbekistan, Ukraine and mixed *E. h. kulan* x *E. h. onager* in Israel)
4. *E. h. onager* - the Onager (Iran and re-introduced and mixed *E. h. kulan* x *E. h. onager* in Israel)
5. *E. h. hemippus* – the Syrian Wild Ass (Extinct, formerly from the eastern shore of the Mediterranean Sea south into the Arabian Peninsula)

The taxonomy of Asiatic Wild Ass remains to be fully elucidated; however, morphological, chromosomal and mitochondrial DNA analysis suggest the placement of Tibetan Wild Ass or Kiang (*Equus kiang*), as

a distinct species (Ryder and Chemnick, 1990). The close relationship between Asiatic Wild Ass, with Kiang and Onager being considered as subspecies of *E. hemionus* (Schlawe, 1986) is not supported by recent phylogenetic studies carried out using molecular genetics and literature based super-tree and super-matrix approaches (Price and Bininda-Emonds, 2009).

### Morphology and Natural History

The Asiatic Wild Ass resembles horses most closely (Nowak, 1991). The coat colour varies ranging from light brown to reddish brown while the ventral surface rump and muzzle are white (Nowak 1991, Macdonald, 2006). A short erect mane continues as a dark brown stripe on the back occasionally with a white

**Table 1:** Morphometry and natural history traits of Asiatic wild ass

Trait	Range
Body Mass	200 – 260 kg
Body length	1.98 – 2.44 m
Breeding	Seasonal (April - September)
Average number of offspring	1
Gestation period	339 days
Weaning age	12 – 24 months
Age at sexual maturity	3 – 4 years
Longevity (free ranging)	12 years
Longevity (captivity)	26 years

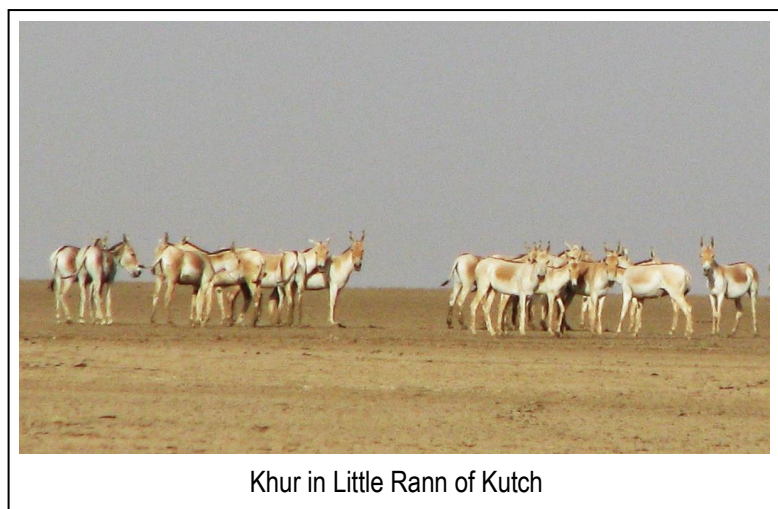
margin, with the end of the tail blackish. (Blanford, 1888 – 1891, Feh, *et al.* 2002). Each foot has a single toe with a solid hoof (Feh, *et al.* 2002). The species is characterized by a horse like head with body length ranging between 200 to 220 cm, while shoulder height ranges between 110 to 120 cm. Body weight ranges between 200 – 260 kg (Blanford, 1888 – 1891, Feh, *et al.* 2002). Foals are born after a gestation period of 11 months with a birth peak between April – September (Feh, *et al.* 2002).

### Reproduction

Reproduction in Khur is similar to other equids in that they are polyestrous with estrus recurring until conception or the end of the breeding season. Age of first reproduction is typically one to several years later for males than for females. They do not experience a lactational anestrus, and can ovulate and copulate during lactation (Asa, 2002).

### Habitat Ecology

The sub-species inhabits arid and saline thorn scrub in the Little Rann of Kutch (LRK) (Champion and Seth, 1968). An exotic thorny shrub; *Prosopis juliflora* was introduced in areas adjoining LRK during 1899 – 1900, subsequently plantation of the shrub was adopted for limiting the spread of the desert (Joshi, 1959). The area inhabited by the animal undergoes annual flooding during the



Khur in Little Rann of Kutch

monsoon season with the emergence of *Cyperus sp.* and *Scirpus sp.* (Shah, 1993).

Seasonal variation in habitat preference is observed with medium and high density scrubland being utilised during summer and winter seasons while croplands were preferred during monsoons and winter due to the concentrated availability of resources (Shah, 1993). Pods of *P. juliflora* form a major component of diet of the Wild Ass during summer, as most of the ground becomes devoid of vegetation due to trampling by cattle.

They are generalist herbivores feeding on grasses during monsoon and winter. The preferred forage species include members of the Cyperacea family during monsoons and as the vegetation dries up (during late winter and summer) dried annual graminoid species and crops form a large part of their diet. During summer they browse on *Prosopis* pods and leaves. Equids primarily feed during the day (Pratt *et.al.* 1986); however, in irrigated tracts of their habitat Khur have adapted to become more active during the night, raiding resource rich croplands (Shah, 1993). Proximity to water is another critical factor regulating spatial pattern of habitat utilization as Wild Ass similar to other equids need to drink water at least once during the day (Shah, 1993).

### **Social organization and behaviour**

Group size in the wild ass varies widely with fission-fusion occurring throughout the year. Groups consist of two primary social units, the family/breeding band consisting of multiple age classes of females, foals, yearlings and few (occasional) sub-adult males and dominant stallion and all-male groups (Shah, 1993). The group members have weak bonds except that of female-foal bond. Group fusion to form large family groups has been observed during monsoon when good quality food is abundant in the form of fresh grass (Shah, 1993).

### **Territoriality**

Dominant males defend territories throughout the year with territorial males excluding other males from their territory. Dominance hierarchy in territorial males is defined by resource availability with higher ranked males holding territories that have access to safe and maximum vegetation biomass that attract post partum cycling females (Ginsberg, 1988). Territorial stallions soil themselves with mud/slush to advertize their dominance and urinate-defecate on the edge of their territories for marking territories during the breeding period (Shah, 1993).

Territories are defended by aggressive interactions between the dominant males and challengers with the loser being ostracized. The prime males holding the best territories try to herd all mares entering their territory while excluding all-male bands. The quality of resources available in the territory attracts mares for a limited duration during the mating season, allowing the territorial males exclusive mating rights with the females (Shah, 1993).

### **Reproductive behaviour**

The reproductive behaviour of Khur is similar to other wild equids; the males are polygynous and mate with any estrous females that enter its territory while the females are polyandrous mating with a range of males whose territories they cross (Shah, 1993).

Estrous behaviour exhibited by domestic mares includes an increased frequency of urination, isolating itself from other mares and moving close to the stallion. The tail is deflected to one side or held straight out from the perineum, with a rhythmic eversion of the clitoris. The posture of estrous mares is

characterized by a slightly lowered head, ears held back and to the side, and relaxed facial muscles. In response, the stallion exhibits a flehmen response over-marking with urine. Mounting is preceded by the stallion resting its head for a brief period on the mares' hindquarters.

**Distribution**

The historical distribution of the species extended across the arid zone of north-western Indian subcontinent; however, the present distribution is restricted to the Little Rann of Kutch (LRK) in Gujarat (Corbet and Hill, 1992). The Khur presently have expanded their range from beyond LRK to the Rajasthan and Pakistan borders in the north and west and Nalsarovar Sanctuary and Bhal areas of Gujarat (Singh, 2001) along with an increase in their population (Shah, 2004).

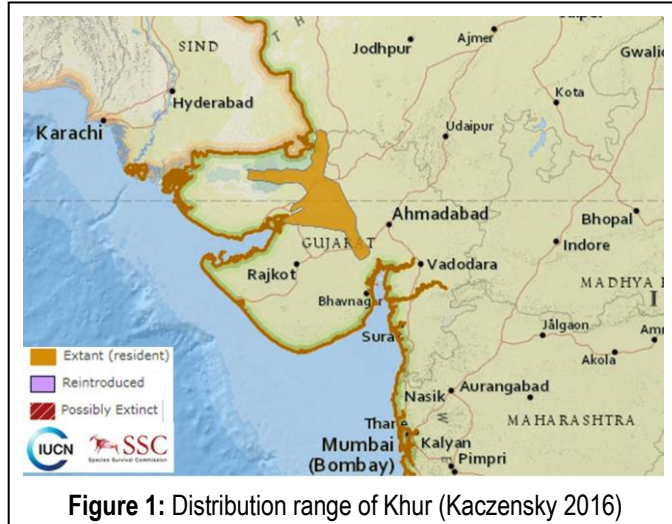


Figure 1: Distribution range of Khur (Kaczensky 2016)

**Threats and Conservation Status**

The population of Khur is vulnerable to disease threats as is evinced by outbreaks of *Surra* in 1958 and 1960 (Gee, 1963) and drought that resulted in severe population declines. Anthropogenic activities viz. construction of the Sardar Sarovar Project, grazing pressure from increased livestock presence, salt collection and land use changes are also potent threats (Goyal, *et al.* 1999; Shah, 1993; Sinha, 1993).

This species is assessed as Near Threatened (NT) because a population decline of at least 20% is projected over the next three generations, based on old prevailing and newly emerging risks, thus approaching Vulnerable (VU) under A3bcd (Kaczensky, 2015). They are listed as a Schedule I species in the Wildlife protection act (1972).

**Status in Captivity**

The species is held at 2 institutions that house 14 (8.6) specimens in India according to the ZIMS database (downloaded on 25 April 2018). The CZA inventory (Table 2) indicates the presence of 15 (9.16) specimens, at 2 Indian zoos while the data that was made available by holding zoos for the compilation of the studbook includes 15 (9.6) specimens at 2 locations.

Table 2: Status of Indian Gazelle in zoos

Zoo Name	Species360				CZA Inventory				Studbook			
	Male	Female	Unsexed	Total	Male	Female	Unsexed	Total	Male	Female	Unsexed	Total
Arignar Anna Zoological Park, Chennai	1	2	0	3	1	2	0	3	1	2	0	3
Sakkarbaug Zoo, Junagadh	7	4	0	11	8	4	0	12	8	4	0	12
<b>Total</b>	<b>9</b>	<b>6</b>	<b>0</b>	<b>14</b>	<b>9</b>	<b>6</b>	<b>0</b>	<b>15</b>	<b>9</b>	<b>6</b>	<b>0</b>	<b>15</b>

## Methods

Data on individual history was collected by means of questionnaires, zoo visits and from the websites of CZA and Species360. Questionnaires were sent to the institutions housing Indian wild ass, requesting information for each captive specimen. Data was entered in the Single Population Analysis and Records Keeping System (SPARKS v 1.66) (ISIS 2004) and subsequently exported to population management programme PMx v 1.2 (Ballou *et al.*, 2011) for further analysis.

## Scope of the Studbook

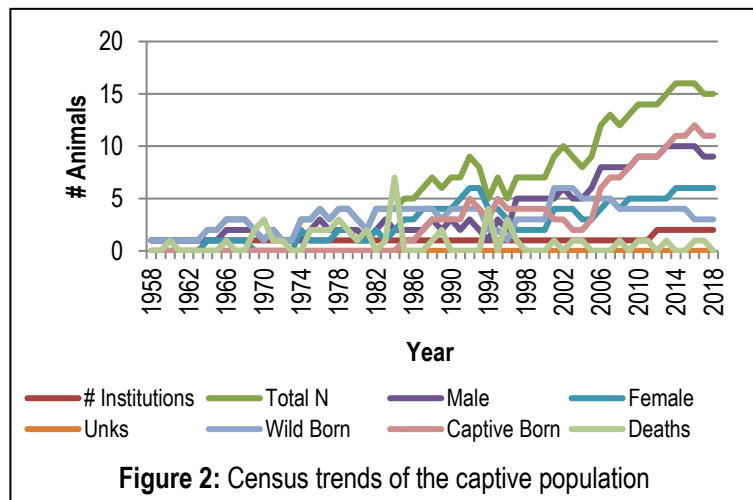
- The CZA inventory was used as a benchmark for population estimates (Table 2).
- The studbook includes all specimens present in Indian zoos for which records were available from holding institutions. Information included in the SPARKS database for Arignar Anna Zoological Park, Chennai is based on the information made available by the zoo; while, that for Sakkarbaug Zoo, Jungadh is based on the Taxon report (downloaded on 17 April 2018) of the species.
- The mnemonics present in the SPARKS software were used as names for individual institutions. The mnemonic India was used for all specimens acquired from the wild.

## Analysis

### Demographic Status

#### Historical Population

The studbook includes a total of 80 (42.37.1) specimens that have been housed at 6 Indian zoos. The first recorded entry of the species in captivity was at Sakkarbaug Zoo, Junagadh in 1958, with a wild origin male being acquired by the zoo. The population includes 53 (27.26.1) acquisitions from the wild that form 66.25% of the captive population. A total of 27 (15.12) births have occurred in captivity accounting for 33.75% of the total population. The captive births are attributed to 14 (4.10) i.e. approximately 17.5% of the captive population. The population since its inception has also witnessed 65 (33.31.1) deaths. Figure 2 and Table 3 summarize the trends of the



**Table 3: Summary of the Historical Population**

	Males	Females	Unknown	Total
<b>Studbook size</b>	42	37	1	80
<b>Acquisition from wild</b>	27	26	1	53
<b>Captive births</b>	15	12	0	27
<b>Deaths</b>	33	31	1	65
<b>Breeding individuals</b>	4	10	0	14

historical population while Annexure I includes detailed event-wise information on individual specimens.



**Living Population**

The living population includes 15 (9.6) specimens housed at 2 institutions; with 3 (2.1) wild origin specimens. The population includes 6 (3.3) animals that are proven breeders in the living population.

**Table 4:** Summary of living population

	Males	Females	Unknown	Total
<b>Living</b>	9	6	0	15
<b>Wild-born</b>	2	1	0	3
<b>Captive-born</b>	7	5	0	12
<b>Breeding</b>	3	3	0	6

Table 4 summarizes the status of the living population while Annexure II provides location-wise specimen details of the living individuals. A perusal of Table 2 and Annexure II reveals the presence of 80% of the population at Sakkarbaug Zoo, Jungadh.

**Population Vital Rates**

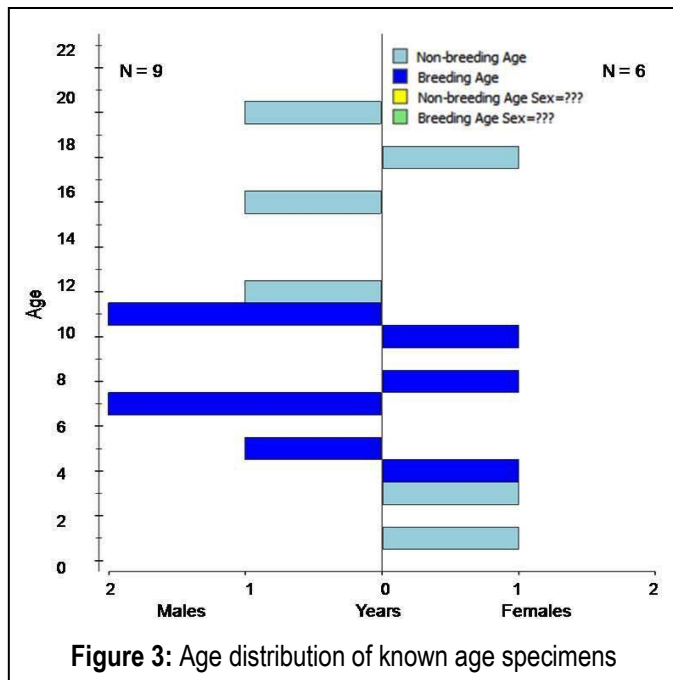
The population is currently increasing at a rate of approximately 4% annually with males showing a faster increase of approximately 6%. The captive population has a generation time of 7.6 years. The increasing population trend may be an artefact of the small sample size used to carry out the life table analysis that forms the basis for the estimation of population vital rates.

**Table 5:** Vital rates of the captive population

	Males	Females	Total
$\lambda$ : Population growth rate	1.058	1.026	1.042
T: Generation time	6.3	8.9	7.6
N 20: Population after 20 years	65.2	34.8	100

**Age Distribution**

Age distribution of 15 (9.6) known age living specimens indicates a male bias. The living population includes 8 (5.3) animals in reproductively active age classes (Figure 3). An additional 4 (3.1) specimens are also present in the reproductively senescent age classes; while, 2 (0.2) specimens are of pre-reproductive ages. A perusal of figure 3 reveals that the population has a poor representation of specimens in most age classes with limited recruitment as is indicated by the absence of specimens in the lower age classes. The age distribution of the species thus indicates an unstable population that is vulnerable to stochastic events.



**Figure 3:** Age distribution of known age specimens



## Genetic Status

Table 6 summarizes the genetic status of the living population. Analysis indicates that it originates from 4 founders although the historical population includes 54 (27.26.1) wild origin specimens. The living population of 15 specimens retains only 78.17% of the genetic diversity brought in by these 4 founders. The unequal representation of the limited genetic diversity sampled, further undermines the genetic diversity of the population leading to the representation of the genetic diversity of only 2.29 wild origin specimens. The small size of the population limits mating choices available leading to pairing of related individuals resulting individuals in the population being closely related to each other ( $F = 0.0233$ ;  $Mk = 0.2183$ ).

**Table 6:** Genetic Summary of the current population

Genetic parameters	Current
Founders	4
Living Animals	15
Percent Ancestry Known	95%
Gene Diversity (GD)	0.7817
Founder Genome Equivalent (FGE)	2.29
Mean Inbreeding (F)	0.0233
Population mean kinship (Mk)	0.2183
Ne/N	0.3556

## Pairing Recommendations

The pairing recommendations (table 7) for the species in captivity have been arrived at based on 'Mate Suitability Index' (Box 1 for details) that assesses changes in genetic diversity, differences in mean kinship and inbreeding coefficient as result of each pairing choice being exercised. Pairing recommendations have been made with the objective of having a rapid population growth. The limited genetic diversity present in the population requires supplementation with wild origin specimens that can be included once reproductive output of captive specimens is enhanced.

**Table 7:** Pairing recommendations

Dam	Location	Sire	Location	dGD	MSI
00064	JUNGADH	00078	JUNGADH	0.0069	1
00070	JUNGADH	00078	JUNGADH	0.0103	1
00077	JUNGADH	00078	JUNGADH	0.0195	1
00064	JUNGADH	00079	JUNGADH	0.0261	1
00070	JUNGADH	00079	JUNGADH	0.0286	1
00077	JUNGADH	00079	JUNGADH	0.0359	1
00064	JUNGADH	00069	JUNGADH	-0.0076	2
00064	JUNGADH	00072	MADRAS	-0.0011	2
00064	JUNGADH	00065	JUNGADH	0.0017	3
00064	JUNGADH	00066	JUNGADH	-0.0096	3
00076	JUNGADH	00078	JUNGADH	0.0165	3
00076	JUNGADH	00079	JUNGADH	0.0335	3

**Box 1: Mate Suitability Index (MSI)**

It is a numerical genetic assessment of a male-female pair that incorporates several variables into one ranking (MSI range is 1 to 7, with 1 being the most genetically beneficial).

The default value in the table is the *MSI* (Mate Suitability Index) value for each male–female pair. *MSI* is a composite score that integrates four genetic components into a single index:

**Delta GD (dGD):** Change in gene diversity (GD) of the population if one offspring is produced by the pair. Positive dGD increases the GD of the population, while negative dGD decreases GD.

**Differences in MK values (MKDiff):** Difference in the genetic value (mean kinship value) of the male and female. Breeding a pair with a large MKDiff is detrimental because it combines under-represented and over-represented genetic lines.

**Inbreeding coefficient (F):** Inbreeding coefficient of any offspring resulting from the pair (i.e., the kinship value for the pair). Inbreeding is considered to be detrimental to the fitness of the resulting offspring.

**Unknown ancestry:** The amount of unknown ancestry in the male and female. Incomplete pedigree information means that the genetic value and relatedness of a pair cannot be accurately calculated.

1 = very beneficial (genetically) to the population;      2 = moderately beneficial,      3 = slightly beneficial;  
4 = slightly detrimental, 5 = detrimental, should only be used if demographically necessary  
6 = very detrimental (should be considered only if demographic considerations override preservation of genetic diversity) “-“=  
very highly detrimental (should not be paired, due to high level of kinship of pair)

**Using Pairwise Info**

The default table of MSI values for pairs can be used to quickly assess the relative genetic value of a pair, subset of pairs, potential mates for one individual, and many other valuable data when making breeding recommendations. This can be especially helpful to quickly explore options for pairing individuals at one facility that houses numerous individuals of each sex or to quickly identify an alternative suitable mate if a recommended breeding fails.

**Source:** Traylor-Holzer, K. (ed.). 2011.

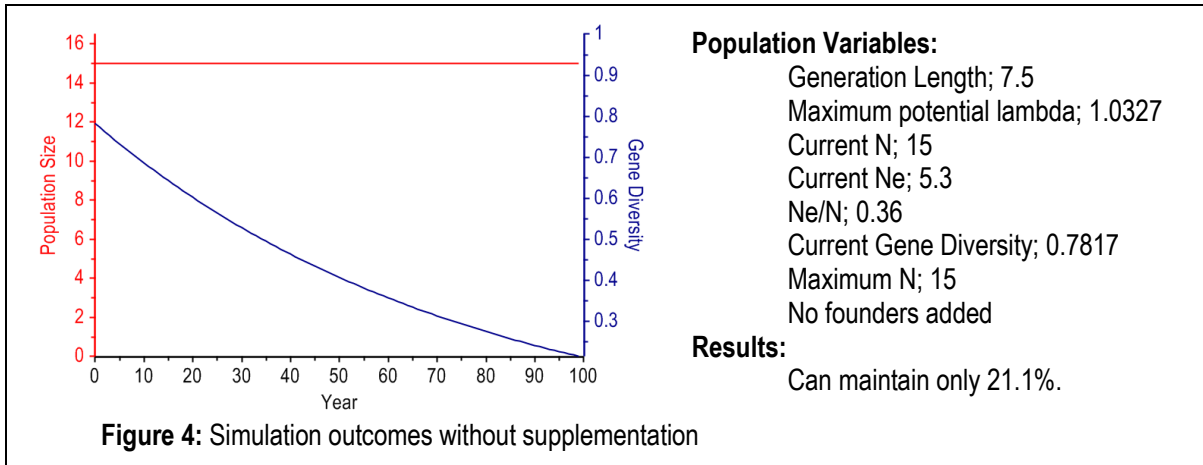
## Targets for Population Management

The current captive population of Indian gazelle includes 15 (9.6) individuals. It includes 2 (2.0) wild origin specimens, both of which are yet to contribute to the population. The population is currently increasing ( $\lambda = 1.0327$ ). The population retains a limited amount of genetic diversity (78.17% introduced by 4 founders) and includes closely related individuals (Mean Inbreeding: 0.0233 and Population mean kinship: 0.2183). Achieving conservation goals for the population is thus of critical importance.

Multiple simulations were run using PMx to determine the fate of the current population for assessing the effect of management interventions that result in an increased population growth rate desired for achieving demographic stability and supplementation with effective founders for ensuring genetic viability; over the next 100 years. The outcomes of the scenarios that were run without change and with changes (supplementation with effective founders and increasing the population growth rate) that ensure a genetically viable and demographically stable population over the next 100 years are presented below.

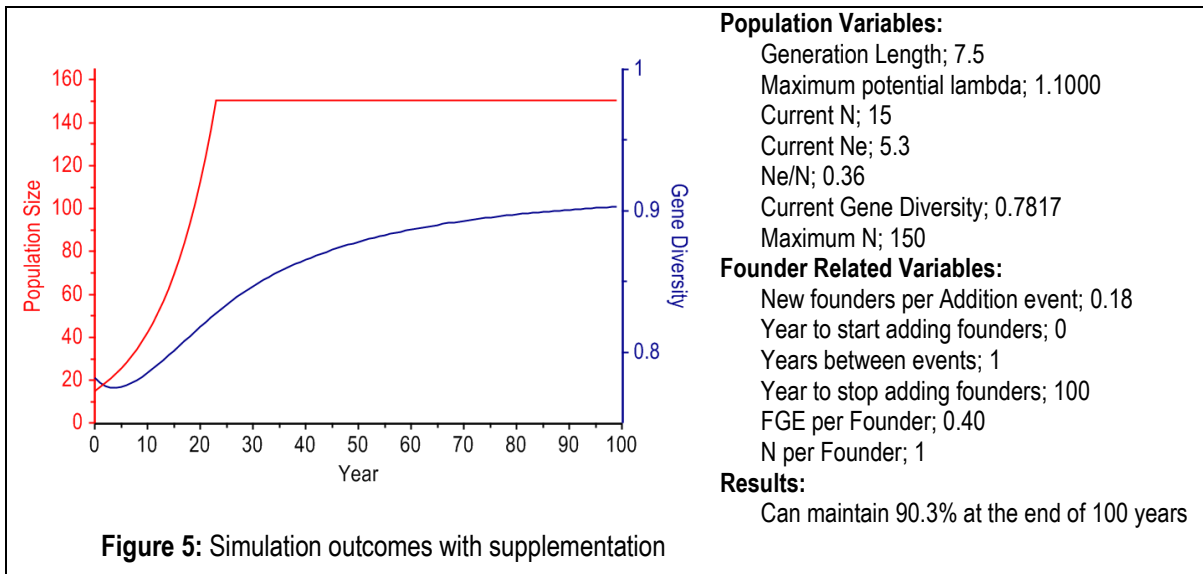
### Scenario I:

The simulation was run using the current population variables without supplementation with additional animals while retaining the current population size ( $N = 15$ ). The outcomes indicate that the captive population may persist at its current level over the next 100 years, it would; however, retain limited genetic diversity and be unable to achieve conservation goals. The population variables used and the outcomes of the simulation are presented in Figure 4.



**Scenario II:**

The outcomes of the simulation that was run with a growth rate of 10% per annum ( $\lambda = 1.100$ ) and a maximum population size of 150 specimens with supplementation by one effective founder every five years provided a population that was able to achieve the conservation goals of maintaining 90% of the genetic diversity and a demographically stable population. The population and founder related variables, and the simulation outcome are presented as Figure 5. The increase in population growth rate can be achieved by ensuring that all reproductively active specimens get an opportunity to contribute to the growth of the population.



**Conclusions and Recommendations**

Indian wild ass continues to face threats to their long term survival in their limited distribution range, due to development of linear infrastructure and expansion of agriculture in their habitats. They are accordingly listed in the Schedule I of the Wildlife Protection Act of India. Maintenance of demographically stable and genetically viable *ex-situ* populations is thus crucial for ensuring the continued survival of the species.

A review of the status of the current captive population in Indian zoos based on analysis of available pedigree records indicates that the population is extremely small (N = 15). The population is male biased

with a limited number of proven breeders. It further retains limited genetic diversity ( $GD = 0.7817$ ) originating from a small founder base ( $N = 4$ ). The small population size has resulted in individuals sharing a close relationship in the living population ( $F = 0.0233$ ;  $MK = 0.2183$ ).

Simulations run using PMx software indicate that supplementation with one effective founder every five years and increasing the population growth rate to 10% per annum ( $\lambda = 1.100$ ) and population size to 150 specimens in Indian institutions can ensure that the population remains viable over the next 100 years. The captive population of Indian wild ass therefore requires intensive management efforts towards ensuring achievement of *ex-situ* conservation goals to address the following concerns:

- i. A review of existing husbandry practices followed to address shortcomings in the same may ensure improved reproductive output.
- ii. The creation of additional holding facility to house the target population size of 150 animals.

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## Annexure I

Historical Population of Indian wild ass (*Equus hemionus khur*)

Stud# Name Local ID Tag/Band Transponder	Sex	Birth Date	Sire	Dam	Location	Date	Event
00001 1	M	????	WILD	WILD	INDIA JUNAGADH	06-Jan-58 06-Jan-58 09-Oct-72	Capture Transfer Death
00002 2	F	????	WILD	WILD	INDIA JUNAGADH	31-May-60 31-May-60 15-Nov-60	Capture Transfer Death
00003 5	F	????	WILD	WILD	INDIA JUNAGADH	18-Nov-64 18-Nov-64 19-Jul-69	Capture Transfer Death
00004 3	M	????	WILD	WILD	INDIA JUNAGADH	06-Dec-66 06-Dec-66 14-Dec-66	Capture Transfer Death
00005 4 5	M	????	WILD	WILD	INDIA JUNAGADH AHMEDABAD	06-Dec-66 06-Dec-66 31-Dec-70	Capture Transfer Ltf
00006 6	F	????	WILD	WILD	INDIA JUNAGADH	30-Oct-69 30-Oct-69 02-Nov-69	Capture Transfer Death
00007	F	????	WILD	WILD	INDIA JUNAGADH	25-May-70 25-May-70 23-Jun-70	Capture Transfer Death
00008 8	F	????	WILD	WILD	INDIA JUNAGADH	25-May-70 25-May-70 30-May-70	Capture Transfer Death
00009 9	F	????	WILD	WILD	INDIA JUNAGADH	25-May-70 25-May-70 24-Jun-70	Capture Transfer Death
00010 10	M	????	WILD	WILD	INDIA JUNAGADH AHMEDABAD	04-Jun-71 04-Jun-71 07-Jan-77	Capture Transfer Ltf
00011 11	F	????	WILD	WILD	INDIA JUNAGADH	04-Jun-71 04-Jun-71 07-Aug-71	Capture Transfer Death
00012 JULIYET	F	????	WILD	WILD	INDIA JUNAGADH	11-Oct-74 11-Oct-74 04-Sep-83	Capture Transfer Death
00013 13	F	????	WILD	WILD	INDIA JUNAGADH	11-Oct-74 11-Oct-74 22-Apr-75	Capture Transfer Death
00014 14	M	????	WILD	WILD	INDIA JUNAGADH	10-Jan-75 10-Jan-75 30-Mar-75	Capture Transfer Death
00015 15	M	????	WILD	WILD	INDIA JUNAGADH AHMEDABAD	18-Jan-75 18-Jan-75 07-Jan-77	Capture Transfer Ltf

Stud# Name Local ID Tag/Band Transponder	Sex	Birth Date	Sire	Dam	Location	Date	Event
00016 16	M	????	WILD	WILD	INDIA JUNAGADH	31-Jul-76 31-Jul-76 15-Aug-76	Capture Transfer Death
00017 17	M	????	WILD	WILD	INDIA JUNAGADH	13-Nov-76 13-Nov-76 16-Jul-81	Capture Transfer Death
00018 00018	M	????	WILD	WILD	INDIA JUNAGADH	13-Nov-76 13-Nov-76 03-Dec-76	Capture Transfer Death
00019 19	M	????	WILD	WILD	INDIA JUNAGADH	23-Mar-77 23-Mar-77 12-Sep-77	Capture Transfer Death
00020 20	?	????	WILD	WILD	INDIA JUNAGADH	05-Aug-77 05-Aug-77 19-Aug-77	Capture Transfer Death
00021 21	M	????	WILD	WILD	INDIA JUNAGADH HYDERABAD	24-Oct-77 24-Oct-77 15-Nov-77	Capture Transfer Ltf
00022 22	M	????	WILD	WILD	INDIA JUNAGADH	24-Oct-77 24-Oct-77 01-Dec-81	Capture Transfer Death
00023 23	F	????	WILD	WILD	INDIA JUNAGADH AHMEDABAD	08-Jan-78 08-Jan-78 23-Feb-78	Capture Transfer Ltf
00024 24	F	????	WILD	WILD	INDIA JUNAGADH	08-Jan-78 08-Jan-78 24-Jan-80	Capture Transfer Death
00025 25	F	????	WILD	WILD	INDIA JUNAGADH	01-Jun-78 01-Jun-78 04-Sep-78	Capture Transfer Death
00026 26	M	????	WILD	WILD	INDIA JUNAGADH	01-Jun-78 01-Jun-78 06-Sep-78	Capture Transfer Death
00027 27	M	????	WILD	WILD	INDIA JUNAGADH	01-Jun-78 01-Jun-78 23-Sep-78	Capture Transfer Death
00028 28	F	????	WILD	WILD	INDIA JUNAGADH	03-Jul-79 03-Jul-79 17-Jul-79	Capture Transfer Death
00029 29	F	????	WILD	WILD	INDIA JUNAGADH	03-Dec-79 03-Dec-79 06-Dec-79	Capture Transfer Death
00030 30	M	????	WILD	WILD	INDIA JUNAGADH NANDANKAN	01-May-81 01-May-81 30-Oct-84	Capture Transfer Ltf
00031 31	M	????	WILD	WILD	INDIA JUNAGADH AHMEDABAD	27-Jun-82 27-Jun-82 04-Sep-85	Capture Transfer Ltf
00032	F	????	WILD	WILD	INDIA	27-Jun-82	Capture



Stud# Name Local ID Tag/Band Transponder	Sex	Birth Date	Sire	Dam	Location	Date	Event
TEPUDI 32					JUNAGADH	27-Jun-82 29-Aug-04	Transfer Death
00033 HALAMAN	M	????	WILD	WILD	INDIA JUNAGADH	18-Sep-83 18-Sep-83 16-May-89	Capture Transfer Death
00034 34	M	????	WILD	WILD	INDIA JUNAGADH	18-Aug-84 18-Aug-84 24-Aug-84	Capture Transfer Death
00035 35	M	????	WILD	WILD	INDIA JUNAGADH	18-Aug-84 18-Aug-84 24-Aug-84	Capture Transfer Death
00036 36	F	????	WILD	WILD	INDIA JUNAGADH MADRAS	18-Aug-84 18-Aug-84 19-Sep-84	Capture Transfer Lf
00037 37	F	????	WILD	WILD	INDIA JUNAGADH	18-Aug-84 18-Aug-84 06-Sep-84	Capture Transfer Death
00038 38	M	????	WILD	WILD	INDIA JUNAGADH	23-Aug-84 23-Aug-84 18-Oct-84	Capture Transfer Death
00039 39	M	????	WILD	WILD	INDIA JUNAGADH	23-Aug-84 23-Aug-84 09-Sep-84	Capture Transfer Death
00040 40	M	????	WILD	WILD	INDIA JUNAGADH	23-Aug-84 23-Aug-84 11-Sep-84	Capture Transfer Death
00041 41	M	????	WILD	WILD	INDIA JUNAGADH MADRAS	23-Aug-84 23-Aug-84 19-Sep-84	Capture Transfer Lf
00042 42	F	????	WILD	WILD	INDIA JUNAGADH	23-Aug-84 23-Aug-84 18-Oct-84	Capture Transfer Death
00043 43	F	????	WILD	WILD	INDIA JUNAGADH NANDANKAN	23-Aug-84 23-Aug-84 30-Oct-84	Capture Transfer Lf
00044 jethi	F	????	WILD	WILD	INDIA JUNAGADH	23-Aug-84 23-Aug-84 19-Oct-94	Capture Transfer Death
00045 AMAR 14	M	04-Oct-85	UNK	00032	JUNAGADH AHMEDABAD	04-Oct-85 24-Feb-89	Birth Lf
00046 gajara 46	F	????	WILD	WILD	INDIA JUNAGADH	25-Oct-85 25-Oct-85 02-Oct-96	Capture Transfer Death
00047 SONIYA 16	F	27-Sep-87	00033	00032	JUNAGADH	27-Sep-87 23-Jun-94	Birth Death
00048 48	M	????	WILD	WILD	INDIA JUNAGADH	15-Jun-88 15-Jun-88	Capture Transfer

Stud# Name Local ID Tag/Band Transponder	Sex	Birth Date	Sire	Dam	Location	Date	Event
						16-Aug-88	Death
00049 RAJIV	M	13-Nov-88	00033	00044	JUNAGADH AHMEDABAD	13-Nov-88 12-Sep-91	Birth Ltf
00050 50	F	????	WILD	WILD	INDIA JUNAGADH	28-Feb-89 28-Feb-89 03-Mar-89	Capture Transfer Death
00051 john 51	M	23-Jul-89	00033	00032	JUNAGADH	23-Jul-89 04-Sep-10	Birth Death
00052 madhav 52	M	????	WILD	WILD	INDIA JUNAGADH	31-Jan-90 31-Jan-90 18-Feb-94	Capture Transfer Death
00053 revati 53	F	10-Feb-91	UNK	00044	JUNAGADH	10-Feb-91 06-Jul-01	Birth Death
00054 sujata 54	F	27-Jun-92	UNK	00046	JUNAGADH DELHI	27-Jun-92 27-May-93	Birth Ltf
00055 moti 55	M	09-Jul-92	UNK	00032	JUNAGADH DELHI	09-Jul-92 27-May-93	Birth Ltf
00056 radha 56	F	19-Jul-93	UNK	00044	JUNAGADH	19-Jul-93 15-Aug-96	Birth Death
00057 57	M	11-Jun-94	UNK	00046	JUNAGADH	11-Jun-94 11-Jun-94	Birth Death
00058 58	M	23-Jun-95	UNK	00032	JUNAGADH	23-Jun-95 15-Aug-96	Birth Death
00059 akbar 59	M	23-Jul-95	UNK	00046	JUNAGADH	23-Jul-95 11-Jun-03	Birth Death
00060 60	F	17-Aug-96	UNK	00053	JUNAGADH	17-Aug-96 10-Sep-97	Birth Death
00061 RAUDRA 10172 24 (YELLOW)	M	05-Jan-97	UNK	00032	JUNAGADH	05-Jan-97 22-Mar-17	Birth Death
00062 Begam 62	F	~ 1994	WILD	WILD	INDIA JUNAGADH	18-Aug-01 18-Aug-01 22-Sep-08	Capture Transfer Death
00063 ISHA/AYESHA 10169	F	~ 1994	WILD	WILD	INDIA JUNAGADH	18-Aug-01 18-Aug-01 05-May-16	Capture Transfer Death
00064 SITA 10170	F	~ 1999	WILD	WILD	INDIA JUNAGADH	18-Aug-01 18-Aug-01	Capture Transfer
00065 Rustam 65	M	31-Jan-02	WILD	00062	JUNAGADH	31-Jan-02	Birth

Stud# Name Local ID Tag/Band Transponder	Sex	Birth Date	Sire	Dam	Location	Date	Event
00066 ABHEE 10175	M	12-Nov-05	00065	00063	JUNAGADH	12-Nov-05	Birth
00067 PAVAN 10176	M	06-Jun-06	00065	00064	JUNAGADH	06-Jun-06	Birth
00068 RUBY 10177	F	27-Aug-06	00065	00062	JUNAGADH	27-Aug-06 13-Jan-13	Birth Death
00069 HEAVEN 10178	M	25-Nov-06	00065	00063	JUNAGADH	25-Nov-06	Birth
00070 RUSHITA 70	F	27-Oct-07	00065	00064	JUNAGADH	27-Oct-07	Birth
00071 ANGEL 71	F	29-Dec-09	UNK	64	JUNAGADH MADRAS	29-Dec-09 19-Apr-12	Birth Transfer
00072 LUKKHO/HEVEN 10521 100380	M	26-Sep-10	00065	00063	JUNAGADH MADRAS	26-Sep-10 19-Apr-12	Birth Transfer
00073 10522	M	31-Dec-10	00066	00064	JUNAGADH	31-Dec-10	Birth
00074 74	F	28-Jan-11	00065	00068	JUNAGADH	28-Jan-11 16-Mar-11	Birth Death
00075 IWA131	M	17-Jan-13	00066	00064	JUNAGADH	17-Jan-13	Birth
00076 IWA13	F	18-Jun-13	00065	00070	JUNAGADH	18-Jun-13	Birth
00077 77	F	14-Aug-14	00066	00064	JUNAGADH	14-Aug-14	Birth
00078 10173	M	????	WILD	WILD	GUJARAT JUNAGADH	08-Aug-97 08-Aug-17	Capture Transfer
00079 10174	M	08-Aug-97	WILD	WILD	GUJARAT JUNAGADH	08-Aug-97 08-Aug-97	Capture Transfer
00080 100595	F	26-Jun-16	00072	00071	MADRAS	26-Jun-16	Birth
<b>TOTALS: 80 (42.37.1)</b>							

## Annexure II

Living population of Indian wild ass (*Equus hemionus khur*)

Stud# Name Local ID Tag/Band Transponder	Sex	Birth Date	Sire	Dam	Location	Date	Event
<b>Sakkarbaugh Zoo, Junagadh</b>							
00064 SITA 10170	F	~ 1999	WILD	WILD	INDIA JUNAGADH	18-Aug-01 18-Aug-01	Capture Transfer
00065 Rustam 65	M	31-Jan-02	WILD	00062	JUNAGADH	31-Jan-02	Birth
00066 ABHEE 10175	M	12-Nov-05	00065	00063	JUNAGADH	12-Nov-05	Birth
00067 PAVAN 10176	M	06-Jun-06	00065	00064	JUNAGADH	06-Jun-06	Birth
00069 HEAVEN 10178	M	25-Nov-06	00065	00063	JUNAGADH	25-Nov-06	Birth
00070 RUSHITA 70	F	27-Oct-07	00065	00064	JUNAGADH	27-Oct-07	Birth
00073 10522	M	31-Dec-10	00066	00064	JUNAGADH	31-Dec-10	Birth
00075 IWA131	M	17-Jan-13	00066	00064	JUNAGADH	17-Jan-13	Birth
00076 IWA13	F	18-Jun-13	00065	00070	JUNAGADH	18-Jun-13	Birth
00077 77	F	14-Aug-14	00066	00064	JUNAGADH	14-Aug-14	Birth
00078 10173	M	????	WILD	WILD	GUJARAT JUNAGADH	08-Aug-97 08-Aug-17	Capture Transfer
00079 10174	M	08-Aug-97	WILD	WILD	GUJARAT JUNAGADH	08-Aug-97 08-Aug-97	Capture Transfer
<b>Total: 12 (8.4.0)</b>							
<b>Arignar Anna Zoological Garden, Chennai</b>							
00071 ANGEL 71	F	29-Dec-09	UNK	00064	JUNAGADH MADRAS	29-Dec-09 19-Apr-12	Birth Transfer
00072 LUKKHO/HEVEN 10521 100380	M	26-Sep-10	00065	00063	JUNAGADH MADRAS	26-Sep-10 19-Apr-12	Birth Transfer
00080 100595	F	26-Jun-16	00072	00071	MADRAS	26-Jun-16	Birth
<b>Total: 3 (1.2.0)</b>							
<b>Total Living: 15 (8.6.0)</b>							



```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00006
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00006
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00007
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00007
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00008
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00008
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00009
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00009
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00010
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: AHMEDABAD
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00010
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00011
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00011

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00012
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00012

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00013
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00013

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00014
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00014

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00015
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: AHMEDABAD
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00015

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00016
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:

    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00016
  
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00017
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:

    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00017
  
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00018
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:

    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00018
  
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00019
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:

    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00019
  
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00020
=====
WILD                                                    WILD
                                                    Sex: Unknown
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:

    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00020
  
```



```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00021
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: HYDERABAD
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00021

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00022
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00022

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00023
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: AHMEDABAD
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00023

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00024
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00024

```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00025
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    \  /
     \/
    00025

```



```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00031
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: AHMEDABAD
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00031
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00032
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name: TEPUDI
Tattoo:
Tag/Band: 12 (unk)
dam \      / sire
   \    /
    00032
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00033
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name: halaman
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00033
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00034
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00034
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00035
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ???
Last Location: JUNAGADH (dead)
House Name:
Tattoo:
Tag/Band:
dam \      / sire
   \    /
    00035
    
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00036
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ????
                                                    Last Location: MADRAS
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:
    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00036
  
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00037
=====
WILD                                                    WILD
                                                    Sex: Female
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:
    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00037
  
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00038
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:
    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00038
  
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00039
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:
    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00039
  
```

```

=====
Taxon Name: EQUUS HEMIONUS KHUR                      Studbook Number: 00040
=====
WILD                                                    WILD
                                                    Sex: Male
                                                    Birth Date:   ????
                                                    Last Location: JUNAGADH (dead)
                                                    House Name:
                                                    Tattoo:
                                                    Tag/Band:
    \      /
   \  dam /
    \    /
     \  /
      \ /
       V
      00040
  
```

















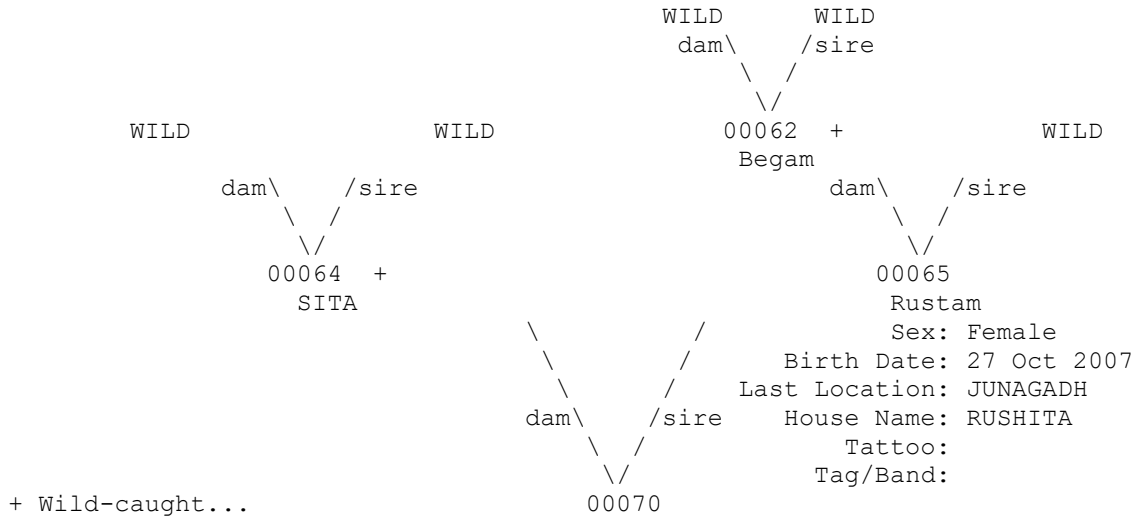


NATIONAL STUDBOOK OF INDIAN WILD ASS (*EQUUS HEMIONUS KHUR*) - III EDITION

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Taxon Name: EQUUS HEMIONUS KHUR Studbook Number: 00070

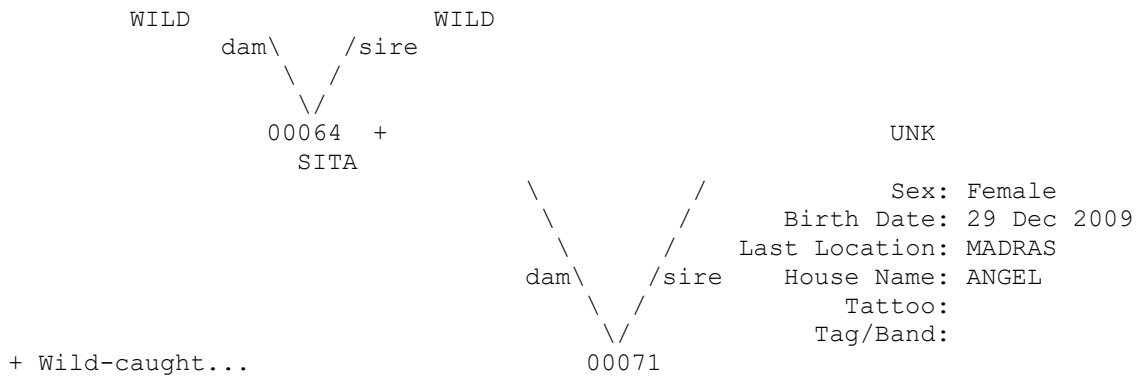
=====



=====

Taxon Name: EQUUS HEMIONUS KHUR Studbook Number: 00071

=====



=====

Taxon Name: EQUUS HEMIONUS KHUR Studbook Number: 00072

=====

