

NATIONAL STUDBOOK

Western Tragopan (*Tragopan melanocephalus*): III Edition

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Central Zoo Authority

National Studbook of Western Tragopan (*Tragopan melanocephalus*): III Edition

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FOREWORD

Western tragopan is facing threats due to habitat loss and degradation. This together with intensive poaching pressure pose a threat to their long-term survival. *Ex-situ* conservation offers an opportunity for ensuring their long-term survival. This can be ensured by scientific management to ensure their long term genetic viability and demographic stability. Pedigree information contained in studbooks forms the basis for this management.

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 part of the project outcomes the WII has compiled the II edition of the National Studbook of Western tragopan (*Tragopan melanocephalus*) in Indian zoos. The recommendations contained in the studbook will form the basis for the long term management of the species in captivity. It is hoped that the holding institutions will adopt the recommendations included in the studbook.

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WESTERN TRAGOPAN

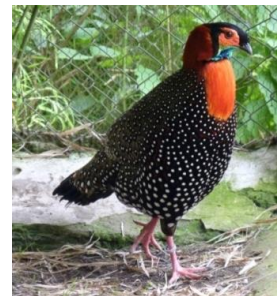
(*Tragopan melanocephalus*)

Species Information

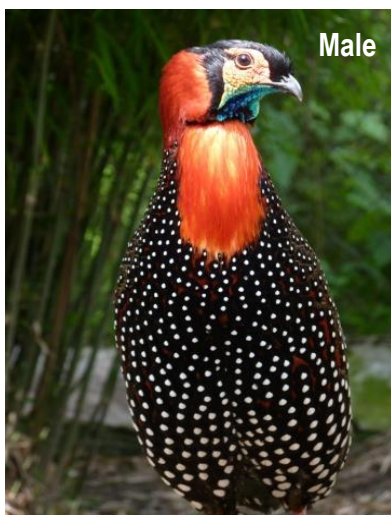
The Western tragopan (*Tragopan melanocephalus*) considered to be the rarest of all extant pheasants, is endemic to north-western Himalayas. They are medium-sized montane pheasants with a high level of dimorphism displayed by the sexes (Johnsgard, 1986). The bird has long been associated with the cultural heritage of the locals and has been named “*Jujurana*” meaning the “King of Birds”. The species’ typical elusive behaviour and severe habitat conditions have allowed limited studies to be carried out on its ecology.

Taxonomy

Class	Aves
Order	Galliformes
Family	Phasianidae
Genus	<i>Tragopan</i>
Species	<i>melanocephalus</i> (Gray, 1829)



Tragopans are a group of the five pheasant species belonging to the genus *Tragopan* Cuvier, 1829 (Phasianidae) with unresolved phylogeny. Based on a qualitative evaluation of plumage colour, Johnsgard (1986) suggested that tragopan consisted of the super-species *blythii-caboti* and *melanocephalus-satyra-temminckii*. Based on analyses of vocalizations and sexual display patterns, Islam and Crawford (1996, 1998) on the other hand suggested a descent from a single ancestral population with the three centrally distributed closely related tragopan species (Satyr, Blyth's and Temminck's) retaining primitive characteristics, while the two peripheral species (Western and Cabot's) underwent modification in vocalizations and were separated into two distinct groups. Results of molecular phylogenetic studies on tragopan by Randi *et al.* (2000); however suggested that most likely allopatric speciation generated either by fragmentation of a larger widespread ancestral population, or by dispersion and deviation of two separate populations along the Himalayan and central Chinese mountain ranges was responsible for the evolution of the current species.



Male



Female

Morphology

The species exhibits distinct sexual dimorphism (McGowan, 1994), the males are brightly coloured and larger in size, while the females have a dull appearance. The males can be described as having a black crown with a decumbent red tipped occipital crest. The face is bright red with lines of blue spots below the eyes and the throat is deep blue while the cheeks are blue-green and a black beak. A bare tumescent, dark blue tinged with purple, sac of skin called the lappet is present on the throat. A tumescent blue wattle is present above each eye that, when engorged, stands erect like a miniature horn. These fleshy horns and lappets become prominent and can be inflated and expanded during courtship displays (Delacour, 1977; Johnsgard, 1986). The neck including nape, sides, lower throat, and upper breast are red. The upper-part including wing-coverts and tertiary feathers are a dark shade of grey and have a vermiculated appearance with round black bordered white ocelli. The under-parts are black, with white ocelli and random splashes of red.

Females and yearlings have inconspicuous and similar plumages, with males being larger in size and higher on leg with variation in the black colour on head and red on neck. The females lack the red colour and the ocelli are reduced to fine streaks on the under parts and are absent from the upperparts allowing them to blend with the forest habitat.

Distribution

The species is endemic to the western Himalayas, occurring from Indus-Kohistan district, north Pakistan, east through Kashmir and Himachal Pradesh to Bhagirathi River in Uttarakhand, north-western India (Birdlife International 2013).

Habitat

The species is a habitat specialist (Ramesh, 2003) occurring in open moist deciduous and coniferous temperate forests with dense undergrowth at elevations of 2,400–3,600 m (Delacour, 1977, Grimmett, *et al.*, 1998).

They inhabit montane to sub-alpine areas with specific broadleaved (e.g., *Aesculus indica*, *Acer sp.* and *Betula utilis*) and coniferous (*Cedrus deodara*, *Pinus wallichiana*, *Abies pindrow*, *Picea smithiana*) vegetation (Duke, 1989). In Palas valley, Pakistan, they have been recorded to occupy conifer dominated temperate forests at altitudes between 2,400 and 3,350 m during spring and in oak (*Quercus baloot*) forests at altitudes of 1,735 m, during winter; indicative of lateral and altitudinal migration. The cooler northern aspects are preferred during summers while the sunny and warmer southern slopes are preferred during winters (Whale, 1996).

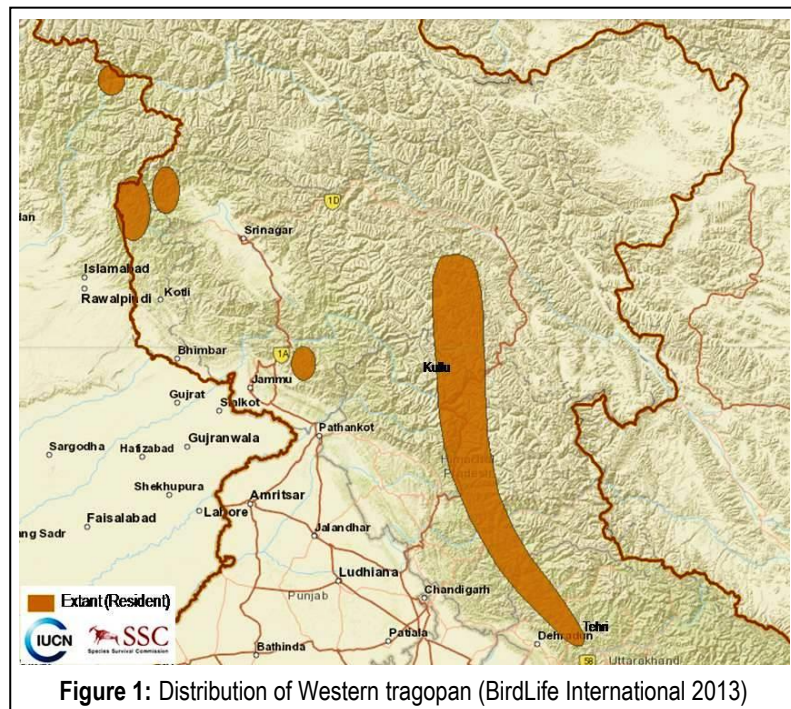


Figure 1: Distribution of Western tragopan (BirdLife International 2013)

A study by Katoch *et al.* (1997) revealed an uneven distribution through several sites with similar tree structure but varied understory structure, suggesting that variation in the latter is critical in determining its distribution. They occur in low densities and prefer extremely steep terrain, even in areas of no disturbance. They have been reported to be fairly sedentary, with preference for higher altitude coniferous forests followed by mixed deciduous and high altitude oak forests (Gaston, *et al.*, 1981, Singh and Tu, 2008).

Feeding ecology

The principal component of their diet includes sprouting oak leaves, shrubs like ringal bamboo *Arindunaria sps* and other plant materials (Johnsgard, 1986, Schales and Schales, 1994). Sheppard *et al.* (1998), from a study of museum specimens and a review of available literature on diets of pheasants, suggested that they are likely to be herbivorous, specialized in feeding on parts like leaves, flowers, bulbs and buds. They also consume berries of *Viburnum nervosum* and *Skimmia laureola*, and acorns of *Quercus semecarpifolia* and occasionally invertebrates such as grubs and insects (Ali and Ripley, 1968; Delacour, 1977; Roberts, 1991). The foraging behaviour of the bird is poorly known, except for the fact that peak periods of feeding occur during dawn and dusk, often with other pheasants.

Behaviour

The species is extremely shy and remains concealed in undergrowth and dense foliage as a means of predator avoidance. The elusive nature of the species, the dense forest and difficult terrain it inhabits has resulted in limiting information available regarding the species. Conclusions drawn from the studies carried out suggest a mean group size of 1.09 ± 0.29 ($n=45$, range 1–2) with a skewed sex ratio biased towards females (10:13). They are primarily solitary (recorded singly in 91% of occasions), except during the breeding season (Ramesh, 2003). Earlier studies suggest that the species occurs in pairs in summer and small groups in winter (Gaston, 1980; Whale, 1997) and have been recorded feeding with Himalayan Monal (Grimmett and Robson, 1986) and Koklass (Narang, 1993a).

The birds are extremely vigilant and flee at the least disturbance by flight or concealing themselves into trees or fleeing on the ground (Beebe, 1918-1922). Preferred roosting sites include both dense understory and trees (Johnsgard, 1986; Ramesh, 1995), open areas are used for preening and resting (Johnsgard, 1986). Although they are ground dwelling, a significant amount of time is spent above the ground on rocks and trees, especially at the middle of the day during winter (Whale, 1997).

Reproduction

Tragopans perform ritualized, complex courtship displays during their breeding period and male birds produce distinctive advertisement calls (a *waa* note) to attract females as well as to defend their territory from other males (Delacour, 1977; Johnsgard, 1986). During the breeding season the calls by males are uttered during dusk and daybreak at intervals of about five or ten minutes. The calls starting from late April; continue through May in the early hours of the morning (starting at 04.15 hours and reaching a peak at 05.00–05.14 hours) (Miller, 2010). The species has been observed to exercise displaced call timing with that of competing sympatric Koklass pheasant (Miller, 2010), to avoid overlapping of auditory space as both share the same habitat and breeding season.

The species is assumed to have a monogamous mating system, with males assisting in caring for the chicks (Ali and Ripley, 1968; Baker, 1930). They are highly territorial and occupy large home ranges during the breeding season. Mating generally takes place during April–June (Baker, 1932; Johnsgard, 1986), with breeding beginning in mid-May and extending to the end of June (Roberts, 1991).

The nesting of tragopan is unique among pheasants as they are the only species that are elevated nesters (Ali and Ripley, 1968; Johnsgard, 1986); however, they have also been reported as nesting on ground (Roberts; 1991; Baker; 1932). A rudimentary nest; either on the ground or in an elevated position, on trees, is constructed, often using the abandoned nests of other species (Roberts, 1991–1992). Clutch size ranges from 2-6, eggs, comprise of dull, reddish-brown eggs with faint dark brown spots, averaging 63×42 mm. in size (Johnsgard, 1986). Information regarding incubation patterns and brooding behaviour of the species is inadequate.

Table 1: Reproductive attributes of Western tragopan

Call	<i>Khuwaaah, khuwaaah, waa, waa, waa</i> (Johnsgard, 1986)
Mating System	Assumed to be monogamous (Ali and Ripley, 1983)
Breeding Season	May- early June (Johnsgard, 1986; Roberts, 1991)
Nest Site/ Type	Mainly elevated nesters (Ali and Ripley, 1968; Johnsgard, 1986)
Clutch Size	2-6. (Johnsgard, 1986)
Eggs	Pale- buff to reddish-brown feebly freckled with dark brown, averaging 63×42 mm. in size having an estimated fresh weight of 61.3g (Johnsgard, 1986)
Incubation Period	28 days
Attended by	Incubation entirely by hen (Ali and Ripley, 1983) but males have been reported to attend to chicks (Baker, 1930)

Threats and conservation measures

It is one of the four threatened members of the 11 bird species that are entirely restricted to the “Western Himalayas Endemic Bird Area” (Stattersfield *et al.*, 1998). The species is threatened by habitat degradation and fragmentation through commercial exploitation activities like timber extraction, browsing of under storey shrubs by livestock, tree lopping, and fuel wood collection (Gaston *et al.*, 1983; Jandrotia *et al.*, 1995). Disturbance in the form of graziers and collectors of edible fungi and medicinal plants (Gaston and Garson, 1992; Pandey, 1993) have been reported to interfere with nesting. Further threats include, poaching for meat and ornamentation (Islam and Crawford, 1987; Chauhan and Sharma, 1991).

The species is legally protected in both its range countries, India and Pakistan. It is protected under Schedule I, of the Indian Wildlife (Protection) Act 1972. It is listed as “Vulnerable” by the IUCN (C2a (i) ver 3.1) and in Appendix I of CITES.

The species is part of the ongoing Conservation Breeding Programme at Sarahan Pheasantry initiated by the Himachal Pradesh Forest Department and Central Zoo Authority (CZA) since 2003-04, with the objective of breeding and establishing a ‘reserve’ population in captivity. The *ex-situ* effort has been reviewed by Malviya *et al.*, (2011) and they suggest that demographically the population was growing but

unstable, while genetically it was healthy although with inequitable founder representation. However, a study by Mukesh *et al.* (2016) using molecular genetics tools indicates that the population is inbred.

Status in Captivity

The species is held at a single location the Himalayan Nature Park, Kufri in Himachal Pradesh with 23 (11.12.0) birds according to the ZIMS Database assessed on 25 April 2018. While the CZA inventory reports the presence of 37 (16.13.8) birds at two locations. The data made available by the 2 zoos housing the species for the update of the studbook records the presence of 38 (16.28.0) birds at two locations. A comparison of the status of the captive population based on the three databases is summarized in table 2 below.

Table 2: Status of Western tragopan in Indian zoos

Zoo Name	Species360				CZA Inventory				Studbook				Remarks
	M	F	U	T	M	F	U	T	M	F	U	T	
Sarahan Pheantry, Sarahan	0	0	0	0	14	13	8	35	16	20	0	36	Based on data made available by the zoo
Himalayan Nature Park, Kufri	11	12	0	23	2	0	0	2	2	0	0	2	Based on data made available by the zoo
Total	11	12	0	23	16	13	8	37	18	20	0	38	

Methods

Data on individual history was collected by means of questionnaires, zoo visits and from the websites of CZA and ZIMS (Zoological Information Management System). Questionnaires were sent to the institutions housing the bird in India, 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 and Data Quality

- The first edition of the studbook for Western tragopan (Lakshminarasimha *et al.* 2011) and the second edition of the National Studbook (WII 2015) form the basis for the current edition of the studbook.
- It includes records made available by holding zoos for the update of the studbook.

Analysis

Demographic Status

Historical Population

The studbook includes a total of 68(27.31.10) specimens that have been housed at 2 Indian zoos. The first recorded entry of the species in captivity was at Sarahan in 1993, with a captive born male being acquired by the zoo. Growth in the population has been primarily due to captive birth with wild origin specimens; [13 (7.6.0)] forming 19.11% of the captive population. A total of 55 (20.25.10) births have occurred in captivity accounting for 80.88% of the total population. Captive hatches are attributed to 15 (8.7.0) specimens that form approximately 22% of the captive population. The population since its inception has also witnessed 30 (9.11.0) deaths. Figure 2 and Table 3 summarize the trends of the historical population while Annexure I includes detailed event-wise information on individual specimens.

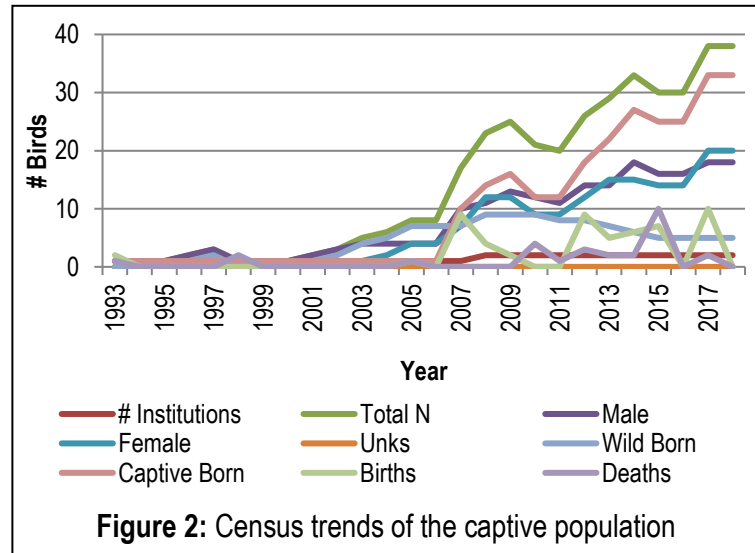


Figure 2: Census trends of the captive population

Table 3: Summary of the Historical Population

	Males	Females	Unknown	Total
Studbook size	27	31	10	68
Acquisition from wild	7	6	0	13
Captive-birth	20	25	10	55
Deaths	9	11	10	30
Breeding individuals	8	7	0	15

Living Population

The living population includes 38 (18.20.0) specimens housed at two institutions; with 5 (3.2.0) wild origin specimens. Only 23.68% or 9 (5.4.0) animals are proven breeders in the living population. Table 4 summarizes the status of the living population while Annexure II provides location-wise specimen details of the living population. A perusal of Table 2 and Annexure II reveals the presence of approximately 95% of the population at Sarahan Pheasantry, Sarahan.

Table 4: Summary of living population

	Males	Females	Unknown	Total
Living	18	20	0	38
Wild-born	3	2	0	5
Captive-born	15	18	0	33
Breeding	5	4	0	9

Population Vital Rates

The population is currently growing with females showing a faster increase. The captive population has a generation time of 7.1 years. The growing population trend is also reflected in the projected population

after 20 years with an increase of 76 individuals in the population. The accuracy of the life table analysis carried out to arrive at the conclusions is limited by the small number of known age and sex specimens in the population

Age Distribution

Age distribution of 38 (18.20) known age living specimens indicates a female bias. The living population includes 35 (16.19) animals of known age and sex in reproductively active age classes (1 – 12 years for males and 1 – 13 years for females Figure 4). It also shows the presence of 3 (2.1) specimens of post reproductive age. A perusal of table 4 and figure 3 reveals that though approximately 92% of the population is of reproductively active age only 24% of the population has so far contributed to the population. A perusal of table 5 and figure 3 indicates that the population is capable of rapid growth.

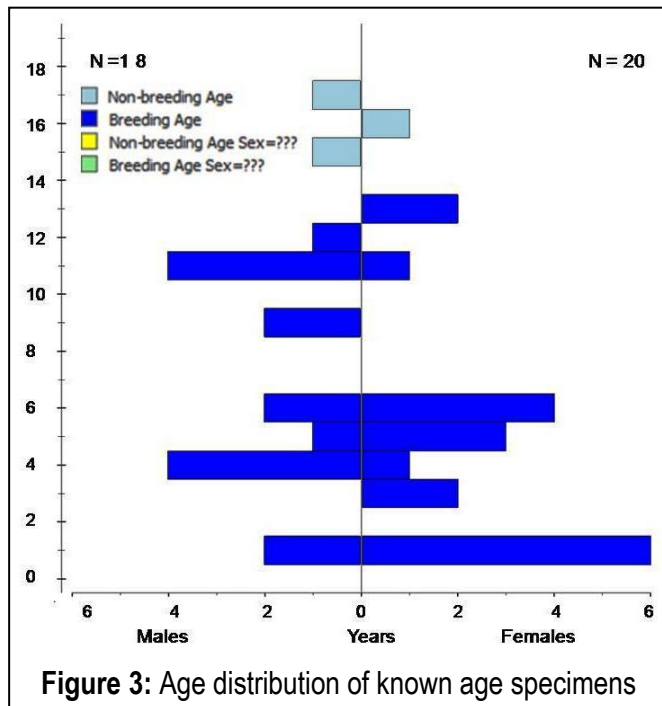


Figure 3: Age distribution of known age specimens

Genetic Status

Table 6 summarizes the genetic status of the living population. Analysis indicates that the living population includes 5 (3.2) wild origin birds that are a part of the 8 founders used to the population. The living population of 38 birds retains 87.26% of the genetic diversity brought in by the 8 founders. Limitations to effective record keeping due to inadequate marking of individual specimens are reflected in only 74% of the specimens having known pedigrees. The unequal representation of the 8 founders in the living population has resulted in the population having the founder genome equivalents of only 3.93 wild origin specimens. The unequal representation of the small founder base, relatedness between birds as is indicated by the value of population mean kinship (Mk = 0.127) is a cause for concern.

Table 6: Genetic Summary of the current population

Genetic parameters	Current
Founders	8
Living Animals	38
Percent Ancestry Known	74%
Gene Diversity (GD)	0.8726
Founder Genome Equivalent (FGE)	3.93
Mean Inbreeding (F)	0.00
Population mean kinship (Mk)	0.127
Ne/N	0.1739

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.

Table 7: Pairing recommendations

Sire	Dam	F	dGD	MSI
00014	00009	0.0000	0.0039	1
00010	00034	0.0000	0.0082	1
00010	00035	0.0000	0.0116	1
00014	00043	0.0000	0.0130	2
00047	00054	0.0000	0.0155	1

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.

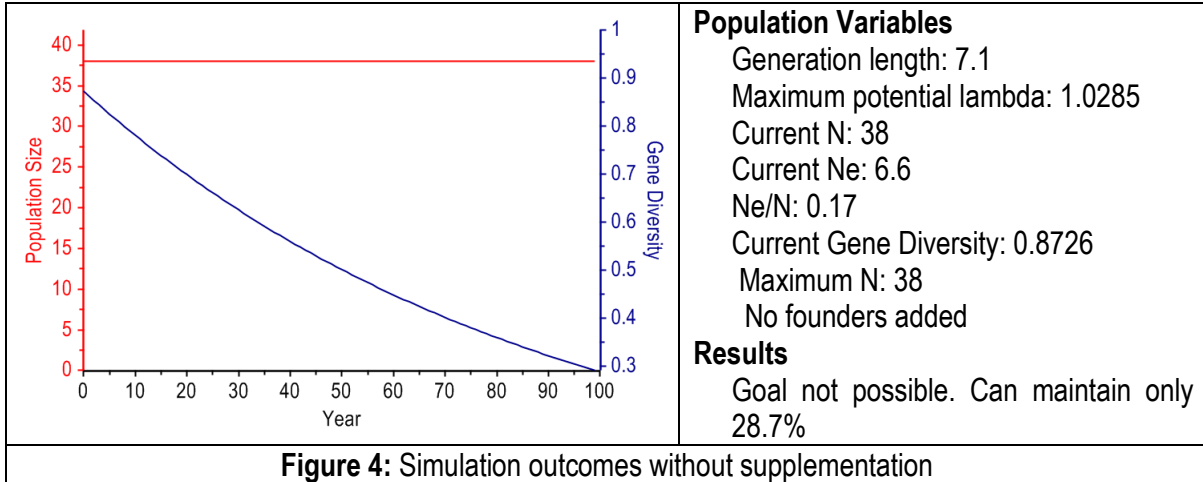
Targets for Population Management

The current captive population of Western Tragopan includes 38 (18.20) individuals. The population is currently increasing with a λ of 1.028 per annum. The long-term genetic viability of the captive population is undermined by the retention of 87.26% originating in 8 wild origin founders. Additionally, the birds share common ancestry as is indicated by the value population mean kinship (0.1274). Maintaining genetic viability in the captive population is thus critical for ensuring its long-term conservation.

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.

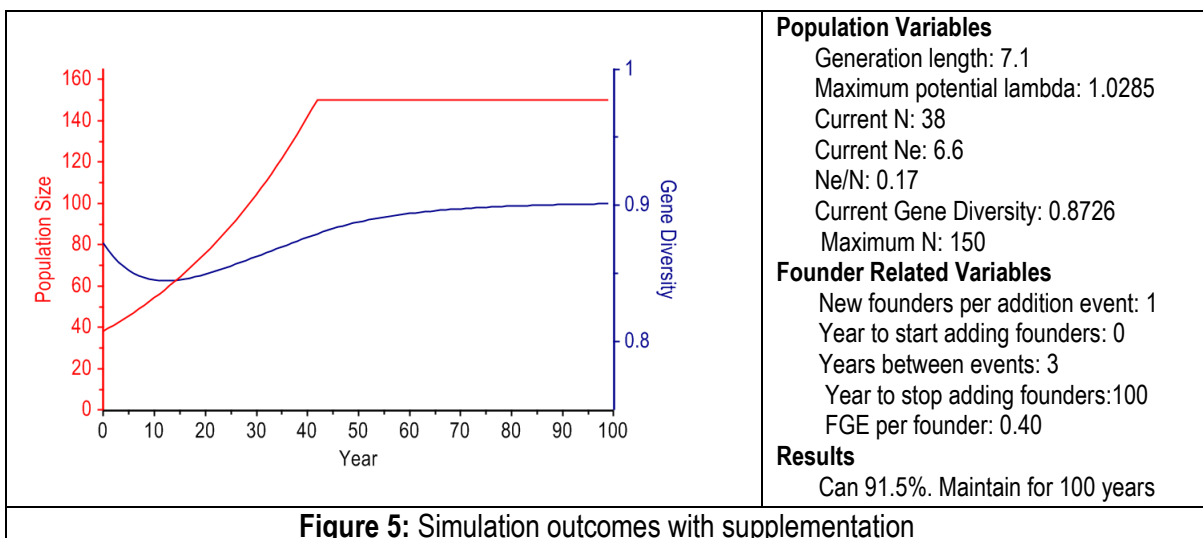
Scenario I:

The simulation was run using the current population variables without supplementation while retaining the current population size (38). The outcomes indicate that the population in captivity is likely to become extinct within 25 years due to the current rate of decline. The population variables used and the outcomes of the simulation are presented in Figure 5.



Scenario II:

The outcomes of the simulation that was with the current growth rate and a maximum population size of 150 specimens with supplementation by 1 effective founder every 3 years provided a population that was able to achieve the goals of maintaining 90% of the genetic diversity sampled and a demographically stable population. The population and founder related variables, and the simulation outcome are presented as Figures 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. The inclusion of additional effective founders should target lineages that are over-represented to ensure retention of maximum genetic diversity in the captive population.



Conclusions and Recommendations

Western Tragopan continues to face threats to its long-term survival across its distribution range and are accordingly listed in the Schedule I of the Wildlife Protection Act of India and as Vulnerable in the IUCN Red list of threatened species. The threats faced by the species remain operational and the populations across their range are showing declining trend. 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 increasing. The population is characterized by an increasing population ($\lambda = 1.028$). The population includes a limited number of proven breeders, though a majority of birds belong to reproductively active age classes. It retains 87.26% of genetic diversity originating from 8 founders that is unequally represented in the population (FGE = 3.93) birds closely related to each other (MK = 0.127).

The above concerns highlight the need for ensuring long-term genetic viability of the population. Simulations run using PMx software indicate that that can be addressed by supplementation with 1 effective founder every 3 years and increasing the population size to 150 specimens in Indian institutions can ensure that the population remains viable over the next 100 years.

An additional cause of concern for the captive population is the presence of approximately 95% of the population at Sarahan Pheasantry that renders the population vulnerable to stochastic events. It is essential that the population be distributed across multiple institutions to ensure its survival in the event of unforeseen declines at individual institutions.

References

- Ali, S. and Ripley, S.D. (1968). Handbook of the birds of India and Pakistan: Together with Those of Nepal, Sikkim, Bhutan and Ceylon. 10V, Oxford University Press.
- Ali, S. and Ripley, S.D. (1983). Compact edition of handbook of the birds of India and Pakistan. Bombay Natural History Society and Oxford University Press, Bombay, 737pp.
- Baker, E.C.S. (1930). Game-birds of India, Burma and Ceylon. John Bale and Son, London.
- Baker, E.C.S. (1932). Nidification of the birds of the Indian Empire. Vols. 1-IV: London: Taylor and Francis.
- Ballou, J.D., Lacy, R.C. and Pollak, J.P. (2011). PMx: software for demographic and genetic analysis and management of pedigreed populations (version 1.2). Chicago Zoological Society, Brookfield, IL, USA. Available from: <http://www.vortex10.org/PMx.html>
- Beebe, C. W. (1918–1922). A monograph of the pheasants. 4 vols. London: Witherby & Co
- BirdLife International (2013). *Tragopan melanocephalus*. The IUCN Red List of Threatened Species. Version 2015.2. <www.iucnredlist.org>. Downloaded on 7 July 2015.
- Chauhan, B.S. and Sharma, V. (1991). Status of Western tragopan in Himachal Pradesh, India. WPA News 34:25–28.
- Delacour, J. (1977). The Pheasants of the World. Spur Publications and the World Pheasant Association. 395 pp.
- Duke, G. (1989). The world's largest population of Western Tragopans. Report to BirdLife International, Cambridge.
- Gaston, A., Garson, P. and Hunter, M. (1981). Present distribution and status of pheasants in Himachal Pradesh, Western Himalayas. World Pheasant Assoc. J 6: 10-30.
- Gaston, A. J., (1980). Census techniques for Himalayan pheasants including notes on individual species. Journal of the World Pheasant Association 5: 40–53.
- Gaston, A.J., Garson, P.J. and Hunter, M.L. Jr. (1983). The status and conservation of forest wildlife in Himachal Pradesh, Western Himalayas. Biological Conservation 27: 291 - 314.
- Grimmet, R., Inskipp, C., and Inskipp. T. (1998). Birds of the Indian subcontinent. Oxford University Press, Delhi, India.
- Grimmett, R. and Robson, C. (1986). A preliminary survey of the Western Tragopan in Indus Kohistan and the Kaghan valley in Pakistan. Report for the National Council for Conservation of Wildlife, Islamabad, and the Zoological Survey Department, Karachi.
- ISIS (International Species Information System) (2004). SPARKS 1.54: Single Population Analysis and Records Keeping System. Eagan, MN: International Species Information System. Available from: www.isis.org

- Islam, K. (1987). Status and distribution of the Western tragopan in northeastern Pakistan. *In: Savage, C.D.W. and Ridley M.W. (eds.). Pheasants in Asia 1982.* World Pheasant Association, Reading, U.K.
- Islam, K. and Crawford, J.A. (1987). Habitat use by western tragopans *Tragopan melanocephalus* (Gray) in Northeastern Pakistan. *Biological Conservation* 40: 101-115.
- Islam, K. and Crawford, J.A. (1996). A comparison of four vocalizations of the genus Tragopan (Aves, Phasianidae). *Ethology* 102: 481-494.
- Islam, K. and Crawford, J.A. (1998). Comparative displays among four species of tragopans and their derivation and function. *Ethology, Ecology and Evolution* 10:17-32.
- Jandrotia, J.S., Sharma, V. and Katoch, S.S. (1995). A pheasant survey in the Ravi Catchment of Chamba District, Himachal Pradesh, India. *Annual Review of the World Pheasant Association 1994/95*:67–74.
- Johnsgard, P.A. (1986). *Pheasants of the world.* New York: Oxford University Press.
- Katoch, S. S., Jandrotia, J. S., & Seth, M. K., (1997). Distribution of Western Tragopan in Chamba District of Himachal Pradesh, India. *In: Annual Review of the World Pheasant Association 1996/97.* 33–39. Howman, K. C. R. (ed.) Reading, UK: World Pheasant Association.
- Lakshminarasimha R., Malviya, M. Bose, S., Dhiman, S, Nigam, P., Ramesh, K. (2011). *Studbook of Western Tragopan (Tragopan melanocephalus).* Technical Report. Wildlife Institute of India, Dehradun, pp. i-vi, 1-41.
- Malviya, M., Lakshminarasimha R., Bose, S., Dhiman, S, Nigam, P., Ramesh, K. (2011). Stocking for the future: genetic and demographic correlates of western tragopan *Tragopan melanocephalus* in captivity. *Journal of the Bombay Natural History Society*, 108(3)
- McGowan, J. K. (1994). Family Phasianidae. Pp. 434-557 *In: (del Hoyo, J. Elliott, A. and Sargatal, J. eds.) Handbook of the birds of the world, vol. 2.* Lynx Edicions, Barcelona.
- Miller, J.R. (2010). Survey of Western Tragopan, Koklass Pheasant, and Himalayan Monal populations in the Great Himalayan National Park, Himachal Pradesh, India. *Indian Bird* 6: 60-65.
- Mukesh, Garg, S., Javed, R., Sood, S. and Singh, H. (2016). Genetic evaluation of *ex-situ* conservation breeding projects of Cheer pheasant (*Catreus wallichii*) and Western Tragopan (*Tragopan melanocephalus*) in India. *Zoo Biology* 9999 : 1–5
- Narang, M. L. (1993): Searches for Western Tragopans in Himachal Pradesh, India, in 1987–89. India. *In: Pheasants in Asia 1992.* Reading, UK: World Pheasant Association. (Ed.: Jenkins, D.): Pp. 55–57.
- Pandey, S. (1993). Pheasant surveys and the conservation of protected areas in the Upper Beas Valley, Himachal Pradesh, India. Pp. 58–61 *In: Jenkins, D. (ed.). Pheasants in Asia 1992.* World Pheasant Association, Reading, U.K.
- Ramesh, K. (1995). Western Tragopan, *Tragopan melanocephalus* roosting on deodar tree, *Cedrus deodara*. *WPA-India News* 2(3): 6-7.

- Ramesh, K. (2003). An ecological study on the pheasants of the Great Himalayan National Park, Western Hiamalaya. Forest Research Institute, Dehradun.
- Randi, E., Lucchini, V., Armijo-Prewitt, T., Kimball, R.T., Braun, E.L. and Ligon, J.D. (2000). Mitochondrial DNA phylogeny and speciation in the Tragopans. *The Auk* 117(4):1003-1015
- Roberts, T.J. (1991). *The Birds of Pakistan (Volume I)*. Oxford University Press, Pakistan.
- Schales, C. and Schales, K. (1994). Galliformes. *avian medicine: principles and application*. Florida: Wingers Publ. p: 1218-1236.
- Sheppard, C., Dierenfeld, E. and Burnett, M. (1998). Recommendations for diets of captive pheasants, based on information from diets of wild birds. *WPA News*.
- Singh, S. & Tu, F. (2008). A preliminary survey for Western Tragopan *Tragopan melanocephalus* in the Daranghati Wildlife Sanctuary, Himachal Pradesh. *Indian Birds* 4 (2): 42-55
- Stattersfield, A. J., Crosby, M. J., Long, M. J. and Wege, D. C. (1998). *Endemic bird areas of the world: priorities for biodiversity conservation*. Cambridge, UK: BirdLife International (Conservation Series 7).
- Traylor-Holzer, K. (ed.). (2011). *PMx users manual, version 1.0*. IUCN SSC Conservation Breeding Specialist Group, Apple Valley, MN, USA.
- Whale R. (1996). Winter survey of Western tragopan in Pallas Valley, Pakistan. *WPA News*, No. 51. World Pheasant Association, England. Pp 2-6
- Whale, R. (1996). Survey report of Western tragopan in the Palas valley – January 1996. Himalayan Jungle Project, Abbottabad, Pakistan.
- Whale, R. (1997). Western tragopan winter survey, Palas Valley, December 1996. *WPA News* 53:2–6.

Annexure I

Historical Population of *Tragopan melanocephalus* in Indian Zoos

National Studbook No. House name Local ID Ring No.	Sex	Hatch Date	Sire	Dam	Location	Date	Event
1 Ring 2259Q ABBU	M	~ 1999	WILD	WILD	INDIA SARAHAN	~2001 ~ Jan-2001 01-Feb-2013	Capture Transfer Death
2 WTAB-1 Ring 2256Q RAJA	M	~ 2000	WILD	WILD	INDIA SARAHAN	~ Jan-2002 ~ Jan-2002 01-Nov-2011	Capture Transfer Death
3 WTJN-4 Ring 2258Q JONEY	M	~ 2001	WILD	WILD	INDIA SARAHAN	~ Feb-2003 ~ Feb-2003	Capture Transfer
4 WTNL-3 Ring 2260Q NEELU	F	~ 2001	WILD	WILD	INDIA SARAHAN	~ Feb-2003 ~ Feb-2003 18-Feb-2015	Capture Transfer Death
5 WTRN-5 Ring 2265Q RANI	F	~ 2002	WILD	WILD	INDIA SARAHAN	01-Feb-2004 01-Feb-2004	Capture Transfer
6 WTMT-7 Ring 2268Q MOTI	M	~ 2003	WILD	WILD	INDIA SARAHAN	~ Apr-2005 ~ Apr-2005	Capture Transfer
7 WTRK-6 Ring 2266Q REKHA	F	~ 2003	WILD	WILD	INDIA SARAHAN	~ Feb-2005 ~ Feb-2005 22-May-2014	Capture Transfer Death
8 WTRU-8 Ring 2267Q RUCHI	F	06-Jun-05	1	4	SARAHAN	06-Jun-2005	Hatch
9 Ring 2283Q SHALU	F	~ 2005	WILD	WILD	INDIA SARAHAN	~ Apr-2008 ~ Apr-2008	Capture Transfer
10 Ring 2284Q SANJU	M	~ 2006	WILD	WILD	INDIA SARAHAN	~ Apr-2008 ~ Apr-2008	Capture Transfer
11 Ring 2285Q PAPU	M	27-Apr-07	2	5	SARAHAN	27-Apr-2007 20-Apr-2010	Hatch Death

National Studbook No. House name Local ID Ring No.	Sex	Hatch Date	Sire	Dam	Location	Date	Event
12 WTDP16 Ring 2282Q DEEPA	F	08-Jun-07	UNK	UNK	SARAHAN	08-Jun-2007 16-May-2010	Hatch Death
13 WTSV11 Ring 2286Q SHIV	M	24-Jun-07	3	8	SARAHAN	24-Jun-2007	Hatch
14 WTGO12 Ring 2278Q GOLU	M	27-Jun-07	1	4	SARAHAN	27-Jun 2007	Hatch
15 WTPP13 Ring 2281Q GUDDU	M	27-Jun-07	2	5	SARAHAN	27-Jun-2007 20-Apr-2015	Hatch Death
16 WTSH14 Ring 2279Q NEETHA	F	27-Jun-07	2	5	SARAHAN	27-Jun-2007 11-May-2010	Hatch Death
17 WTNT15 Ring 2276Q SHEELA	F	27-Jun-07	2	5	SARAHAN	27-Jun-2007	Hatch
18 WTSM20 Ring 2289Q SEEMA	F	12-Jun-08	3	8	SARAHAN	12-Jun-2008 11-Jul-2012	Hatch Death
20 WTLT21 Ring 2290Q LATA	F	26-Jun-08	2	5	SARAHAN	26-Jun-2008 07-Jun-2015	Hatch Death
21 WTNH23 Ring 2287Q NEHA	F	30-Jun-08	3	8	SARAHAN	30-Jun-2008 02-May-2010	Hatch Death
22 WTHN22 Ring 2288Q HEENA	F	30-Jun-08	3	8	SARAHAN	30-Jun-2008 24-Apr-2015	Hatch Death
23 Ring 2291Q TEENU	M	14-Jun-09	13	17	SARAHAN	14-Jun-2009	Hatch

National Studbook No. House name Local ID Ring No.	Sex	Hatch Date	Sire	Dam	Location	Date	Event
24 Ring 2292Q MONU	M	14-Jul-09	6	16	SARAHAN	14-Jul-2009	Hatch
25 2280Q RAJA KUFRI1	M	~ Aug 2007	UNK	UNK	SARAHAN KUFRI	~ Aug-2007 27-Apr-2008	Hatch Transfer
26 KUFRI2 2277Q ANU	M	~ Aug 2007	UNK	UNK	SARAHAN KUFRI	~ Aug-2007 27-Apr-2008	Hatch Transfer
27 RING 2257Q	M	~ 1993	UNK	UNK	SARAHAN	~1993 ~2005	Hatch Death
28	?	~ 1993	UNK	UNK	SARAHAN	~1993 ~1993	Hatch Death
29	M	????	WILD	WILD	INDIA SARAHAN	~1996 ~ Jan-1996 ~ Mar-1998	Capture Transfer Death
30	F	????	WILD	WILD	INDIA SARAHAN	~ Dec-1996 ~ Dec-1996 ????	Capture Transfer Death
31	M	????	WILD	WILD	INDIA SARAHAN	~ May-1997 ~ May-1997 ~ Mar-1998	Capture Transfer Death
32	F	????	WILD	WILD	INDIA SARAHAN	~ Nov-1997 ~ Nov-1997 ????	Capture Transfer Death
33 2012_1 2305Q	M	12-Jun-12	15	9	SARAHAN	12-Jun-2012 01-Mar-2015	Hatch Death
34 2012_2 2306Q	F	12-Jun-12	15	9	SARAHAN	12-Jun-2012	Hatch
35 2012_3 2307Q	F	12-Jun-12	15	9	SARAHAN	12-Jun-2012	Hatch
36 2012_4 2308Q	M	13-Jun-12	13	17	SARAHAN	13-Jun-2012	Hatch
37 2012_5 2309Q	F	13-Jun-12	13	17	SARAHAN	13-Jun-2012	Hatch
38	M	18-Jun-12	13	17	SARAHAN	18-Jun-2012	Hatch

National Studbook No. House name Local ID Ring No.	Sex	Hatch Date	Sire	Dam	Location	Date	Event
2012_6 2310Q							
39 2012_7 2311Q	F	18-Jun-12	13	17	SARAHAN	18-Jun-2012	Hatch
40 2012_8	M	30-Jun-12	14	20	SARAHAN	30-Jun-2012 04-Jul-2012	Hatch Death
41 2012_9	?	26-Jun-12	3	8	SARAHAN	26-Jun-2012 27-Jun-2012	Hatch Death
42 2013_1 2301Q	M	12-Jun-13	15	9	SARAHAN	12-Jun-2013	Hatch
43 2302Q 2302Q	F	12-Jun-13	15	9	SARAHAN	12-Jun-2013	Hatch
44 2013_3 2312Q	F	26-Jun-13	13	17	SARAHAN	26-Jun-2013	Hatch
45 2013_4 2313Q	F	26-Jun-13	13	17	SARAHAN	26-Jun-2013	Hatch
46 2013_5	?	25-Jun-13	10	5	SARAHAN	25-Jun-2013 08-Aug-2013	Hatch Death
47 2014_1 2303Q	M	19-Jul-14	6	9	SARAHAN	19-Jul-2014	Hatch
48 2014_2 2304Q	M	19-Jul-14	6	9	SARAHAN	19-Jul-2014	Hatch
49 2014_3 1HPWLW	M	20-Jul-14	13	17	SARAHAN	20-Jul-2014	Hatch
50 2014_4 2HPWLW	M	20-Jul-14	13	17	SARAHAN	20-Jul-2014	Hatch
51 2014_5 3HPWLW	F	20-Jul-14	13	17	SARAHAN	20-Jul-2014	Hatch
52 2014_6	F	20-Jul-14	13	17	SARAHAN	20-Jul-2014 04-Dec-2014	Hatch Death
53 2015_1	F	28-Jun-15	6	9	SARAHAN	28-Jun-2015	Hatch

National Studbook No. House name Local ID Ring No.	Sex	Hatch Date	Sire	Dam	Location	Date	Event
54 2015_2	F	25-Jun-15	10	5	SARAHAN	25-Jun-2015	Hatch
55 2015_3	?	25-Jun-15	10	5	SARAHAN	25-Jun-2015 09-Jul-2015	Hatch Death
56 2015_4	?	09-Jul-15	13	17	SARAHAN	09-Jul-2015 07-Aug-2015	Hatch Death
57 2015_5	?	09-Jul-15	13	17	SARAHAN	09-Jul-2015 10-Jul-2015	Hatch Death
58 2015_6	?	09-Jul-15	13	17	SARAHAN	09-Jul-2015 09-Jul-2015	Hatch Death
59 2015_7	?	09-Jul-15	13	17	SARAHAN	09-Jul-2015 09-Jul-2015	Hatch Death
60 2017/1 8-HP	F	30-Jun-17	UNK	UNK	SARAHAN	30-Jun-2017	Hatch
61 2017/2 9-HP	F	01-Aug-17	UNK	UNK	SARAHAN	01-Aug-2017	Hatch
62 2017/3 10-HP	M	01-Aug-17	UNK	UNK	SARAHAN	01-Aug-2017	Hatch
63 2017/4 11-HP	F	06-Jul-17	UNK	UNK	SARAHAN	06-Jul-2017	Hatch
64 2017/5 12-HP	F	06-Jul-17	UNK	UNK	SARAHAN	06-Jul-2017	Hatch
65 2017/6 13-HP	F	18-Jun-17	UNK	UNK	SARAHAN	18-Jun-2017	Hatch
66 2017/7	M	02-Jul-17	UNK	UNK	SARAHAN	02-Jul-2017	Hatch
67 2017/8 15-HP	F	02-Jul-17	UNK	UNK	SARAHAN	02-Jul-2017	Hatch
68 2017/9	?	01-Jul-17	UNK	UNK	SARAHAN	01-Jul-2017 01-Jul-2017	Hatch Death
69 2017/10	?	12-Jun-17	UNK	UNK	SARAHAN	12-Jun-2017 12-Jul-2017	Hatch Death
TOTALS: 27.31.10 (68)							

Annexure II

Living Population of *Tragopan melanocephalus* in Indian Zoos

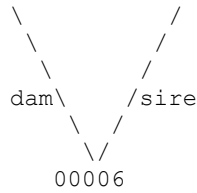
National Studbook No. House name Local ID Ring No.	Sex	Hatch Date	Sire	Dam	Location	Date	Event
Himalayan Nature Park, Kufri							
25 2280Q RAJA KUFRI1	M	~ Aug 2007	UNK	UNK	SARAHAN KUFRI	~ Aug-2007 27-Apr-2008	Hatch Transfer
26 KUFRI2 2277Q ANU	M	~ Aug 2007	UNK	UNK	SARAHAN KUFRI	~ Aug-2007 27-Apr-2008	Hatch Transfer
Total: 2 (2.0.0)							
Sarahan Pheasantry, Sarahan							
3 WTJN-4 Ring 2258Q JONEY	M	~ 2001	WILD	WILD	INDIA SARAHAN	~ Feb-2003 ~ Feb-2003	Capture Transfer
5 WTRN-5 Ring 2265Q RANI	F	~ 2002	WILD	WILD	INDIA SARAHAN	01-Feb-2004 01-Feb-2004	Capture Transfer
6 WTMT-7 Ring 2268Q MOTI	M	~ 2003	WILD	WILD	INDIA SARAHAN	~ Apr-2005 ~ Apr-2005	Capture Transfer
8 WTRU-8 Ring 2267Q RUCHI	F	06-Jun-05	1	4	SARAHAN	06-Jun-2005	Hatch
9 Ring 2283Q SHALU	F	~ 2005	WILD	WILD	INDIA SARAHAN	~ Apr-2008 ~ Apr-2008	Capture Transfer
10 Ring 2284Q SANJU	M	~ 2006	WILD	WILD	INDIA SARAHAN	~ Apr-2008 ~ Apr-2008	Capture Transfer
13 WTSV11 Ring 2286Q SHIV	M	24-Jun-07	3	8	SARAHAN	24-Jun-2007	Hatch
14 WTGO12 Ring 2278Q GOLU	M	27-Jun-07	1	4	SARAHAN	27-Jun 2007	Hatch

National Studbook No. House name Local ID Ring No.	Sex	Hatch Date	Sire	Dam	Location	Date	Event
17 WTNT15 Ring 2276Q SHEELA	F	27-Jun-07	2	5	SARAHAN	27-Jun-2007	Hatch
23 Ring 2291Q TEENU	M	14-Jun-09	13	17	SARAHAN	14-Jun-2009	Hatch
24 Ring 2292Q MONU	M	14-Jul-09	6	16	SARAHAN	14-Jul-2009	Hatch
34 2012_2 2306Q	F	12-Jun-12	15	9	SARAHAN	12-Jun-2012	Hatch
35 2012_3 2307Q	F	12-Jun-12	15	9	SARAHAN	12-Jun-2012	Hatch
36 2012_4 2308Q	M	13-Jun-12	13	17	SARAHAN	13-Jun-2012	Hatch
37 2012_5 2309Q	F	13-Jun-12	13	17	SARAHAN	13-Jun-2012	Hatch
38 2012_6 2310Q	M	18-Jun-12	13	17	SARAHAN	18-Jun-2012	Hatch
39 2012_7 2311Q	F	18-Jun-12	13	17	SARAHAN	18-Jun-2012	Hatch
42 2013_1 2301Q	M	12-Jun-13	15	9	SARAHAN	12-Jun-2013	Hatch
43 2302Q 2302Q	F	12-Jun-13	15	9	SARAHAN	12-Jun-2013	Hatch
44 2013_3 2312Q	F	26-Jun-13	13	17	SARAHAN	26-Jun-2013	Hatch
45 2013_4 2313Q	F	26-Jun-13	13	17	SARAHAN	26-Jun-2013	Hatch
46 2013_5	?	25-Jun-13	10	5	SARAHAN	25-Jun-2013 08-Aug-2013	Hatch Death
47 2014_1 2303Q	M	19-Jul-14	6	9	SARAHAN	19-Jul-2014	Hatch

National Studbook No. House name Local ID Ring No.	Sex	Hatch Date	Sire	Dam	Location	Date	Event
48 2014_2 2304Q	M	19-Jul-14	6	9	SARAHAN	19-Jul-2014	Hatch
49 2014_3 1HPWLW	M	20-Jul-14	13	17	SARAHAN	20-Jul-2014	Hatch
50 2014_4 2HPWLW	M	20-Jul-14	13	17	SARAHAN	20-Jul-2014	Hatch
51 2014_5 3HPWLW	F	20-Jul-14	13	17	SARAHAN	20-Jul-2014	Hatch
53 2015_1	F	28-Jun-15	6	9	SARAHAN	28-Jun-2015	Hatch
54 2015_2	F	25-Jun-15	10	5	SARAHAN	25-Jun-2015	Hatch
61 2017/2 9-HP	F	01-Aug-17	UNK	UNK	SARAHAN	01-Aug-2017	Hatch
62 2017/3 10-HP	M	01-Aug-17	UNK	UNK	SARAHAN	01-Aug-2017	Hatch
63 2017/4 11-HP	F	06-Jul-17	UNK	UNK	SARAHAN	06-Jul-2017	Hatch
64 2017/5 12-HP	F	06-Jul-17	UNK	UNK	SARAHAN	06-Jul-2017	Hatch
65 2017/6 13-HP	F	18-Jun-17	UNK	UNK	SARAHAN	18-Jun-2017	Hatch
66 2017/7	M	02-Jul-17	UNK	UNK	SARAHAN	02-Jul-2017	Hatch
67 2017/8 15-HP	F	02-Jul-17	UNK	UNK	SARAHAN	02-Jul-2017	Hatch
Total: 36 (16.20.0)							
Total living: 38 (18.20.0)							

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00006
 =====

WILD

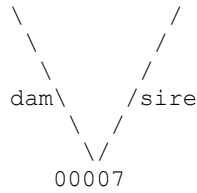


WILD

Sex: Male
 Hatch Date: ~ 2003
 Last Location: SARAHAN
 House Name: MOTI
 Tattoo:
 Tag/Band: Ring 2268Q (leg)

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00007
 =====

WILD

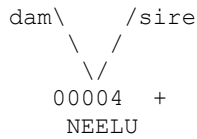


WILD

Sex: Female
 Hatch Date: ~ 2003
 Last Location: SARAHAN (dead)
 House Name: REKHA
 Tattoo:
 Tag/Band: Ring 2266Q (leg)

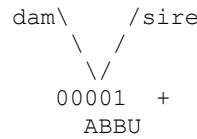
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 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00008
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WILD

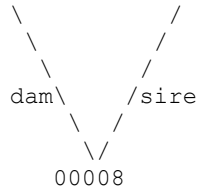


WILD

WILD



WILD

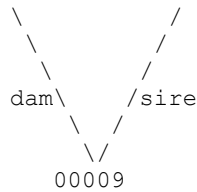


Sex: Female
 Hatch Date: 6 Jun 2005
 Last Location: SARAHAN
 House Name: RUCHI
 Tattoo:
 Tag/Band: Ring 2267Q (leg)

+ Wild-caught...

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00009
 =====

WILD

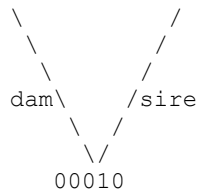


WILD

Sex: Female
 Hatch Date: ~ 2005
 Last Location: SARAHAN
 House Name: SHALU
 Tattoo:
 Tag/Band: Ring 2283Q (leg)

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00010
 =====

WILD



WILD

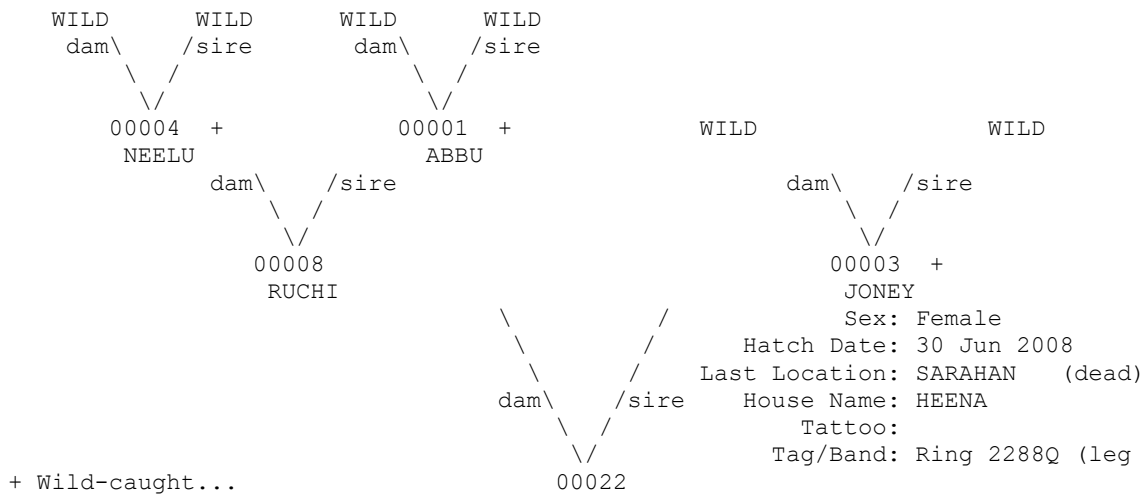
Sex: Male
 Hatch Date: ~ 2006
 Last Location: SARAHAN
 House Name: SANJU
 Tattoo:
 Tag/Band: Ring 2284Q (leg)

NATIONAL STUDBOOK OF WESTERN TRAGOPAN (*TRAGOPAN MELANOCEPHALUS*): III EDITION

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00022

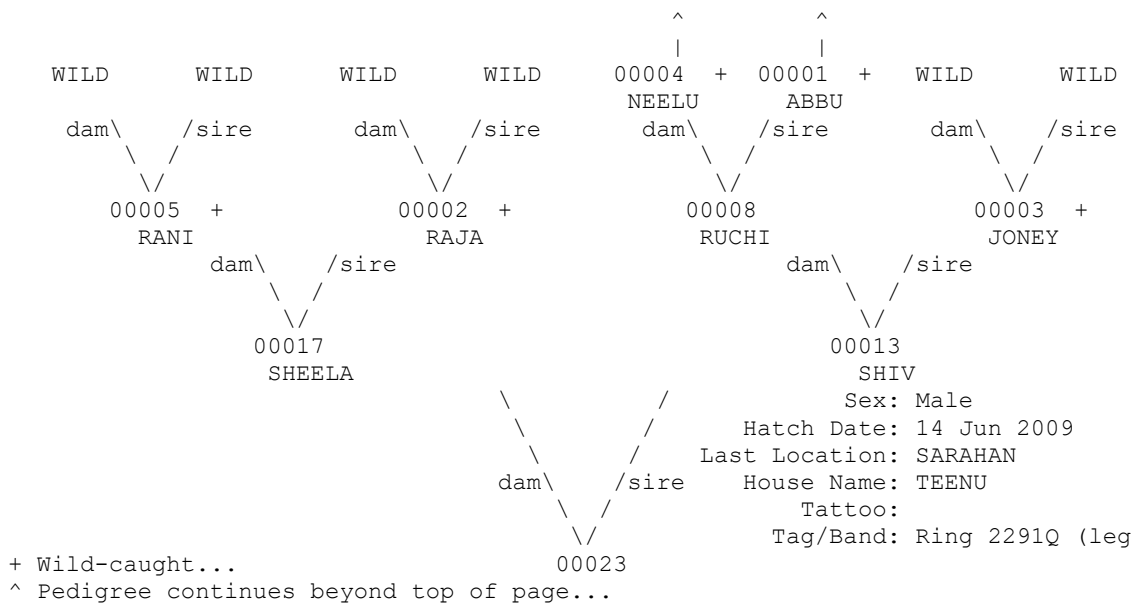
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Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00023

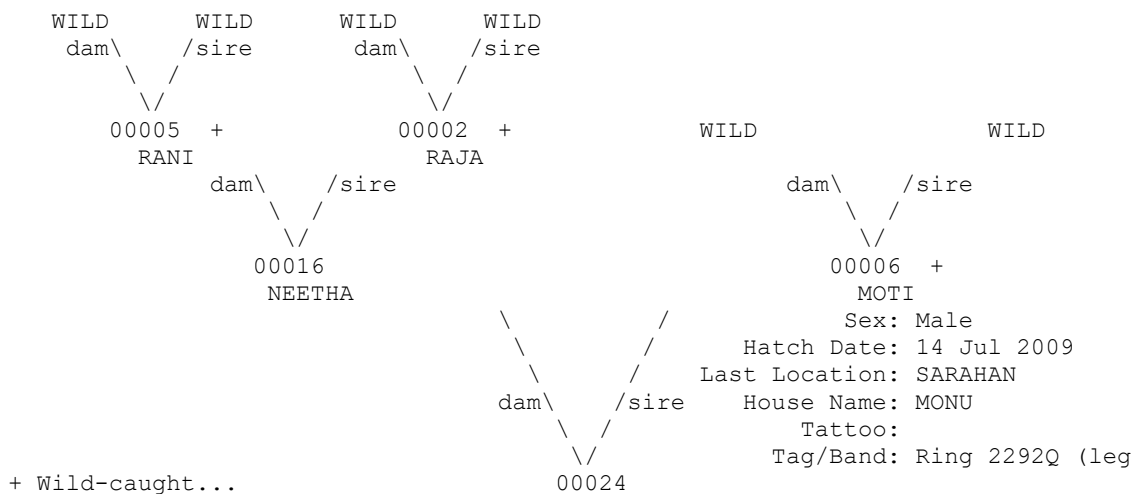
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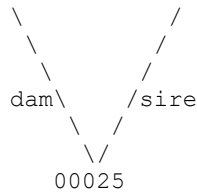
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NATIONAL STUDBOOK OF WESTERN TRAGOPAN (*TRAGOPAN MELANOCEPHALUS*): III EDITION

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00025
 =====

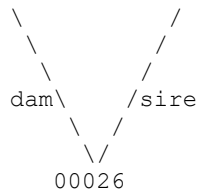
UNK



UNK
 Sex: Male
 Hatch Date: ~ Aug 2007
 Last Location: KUFRI
 House Name: RAJA
 Tattoo:
 Tag/Band: 2280Q (leg)

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00026
 =====

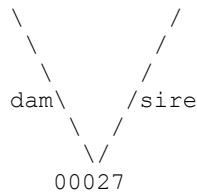
UNK



UNK
 Sex: Male
 Hatch Date: ~ Aug 2007
 Last Location: KUFRI
 House Name: ANU
 Tattoo:
 Tag/Band: 2277Q (leg)

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00027
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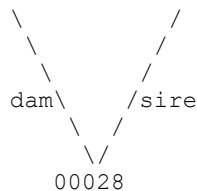
UNK



UNK
 Sex: Male
 Hatch Date: ~ 1993
 Last Location: SARAHAN (dead)
 House Name:
 Tattoo:
 Tag/Band: RING 2257Q

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00028
 =====

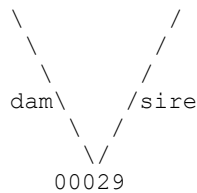
UNK



UNK
 Sex: Unknown
 Hatch Date: ~ 1993
 Last Location: SARAHAN (dead)
 House Name:
 Tattoo:
 Tag/Band:

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00029
 =====

WILD



WILD
 Sex: Male
 Hatch Date: ????
 Last Location: SARAHAN (dead)
 House Name:
 Tattoo:
 Tag/Band:

NATIONAL STUDBOOK OF WESTERN TRAGOPAN (*TRAGOPAN MELANOCEPHALUS*): III EDITION

```

=====
Taxon Name: TRAGOPAN MELANOCEPHALUS                      Studbook Number: 00030
=====
WILD                                                         WILD
                                                         Sex: Female
                                                         Hatch Date:  ???
Last Location: SARAHAN (dead)
House Name:
Tattoo:
Tag/Band:

      \      /
      dam\  /sire
           \  /
            00030
    
```

```

=====
Taxon Name: TRAGOPAN MELANOCEPHALUS                      Studbook Number: 00031
=====
WILD                                                         WILD
                                                         Sex: Male
                                                         Hatch Date:  ???
Last Location: SARAHAN (dead)
House Name:
Tattoo:
Tag/Band:

      \      /
      dam\  /sire
           \  /
            00031
    
```

```

=====
Taxon Name: TRAGOPAN MELANOCEPHALUS                      Studbook Number: 00032
=====
WILD                                                         WILD
                                                         Sex: Female
                                                         Hatch Date:  ???
Last Location: SARAHAN (dead)
House Name:
Tattoo:
Tag/Band:

      \      /
      dam\  /sire
           \  /
            00032
    
```

```

=====
Taxon Name: TRAGOPAN MELANOCEPHALUS                      Studbook Number: 00033
=====
WILD dam\  /sire WILD dam\  /sire WILD dam\  /sire WILD dam\  /sire
      \      /      \      /      \      /      \      /
      00005 +      00002 +
      RANI          RAJA
      dam\  /sire
           \  /
            00015
            GUDDU
            Sex: Male
            Hatch Date: 12 Jun 2012
Last Location: SARAHAN (dead)
House Name:
Tattoo:
Tag/Band: 2305Q

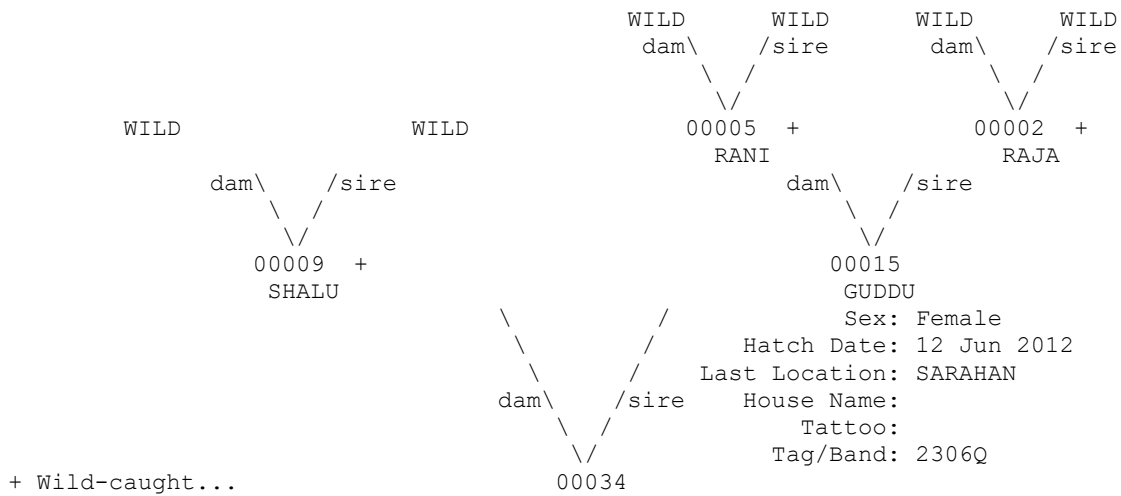
WILD dam\  /sire WILD dam\  /sire
      \      /      \      /
      00009 +
      SHALU

      \      /
      dam\  /sire
           \  /
            00033
    
```

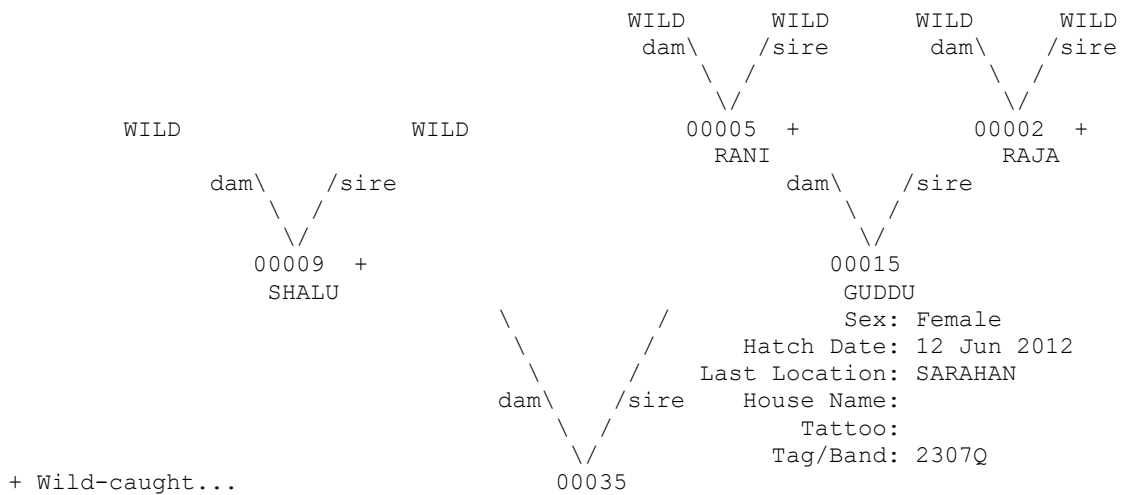
+ Wild-caught...

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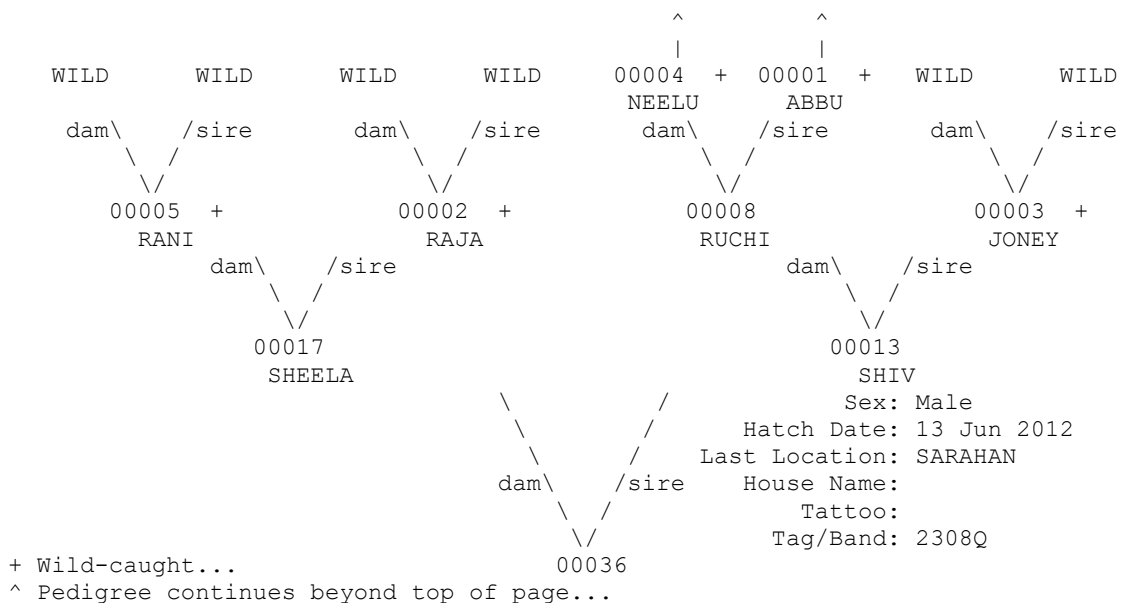
=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00034
 =====



=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00035
 =====

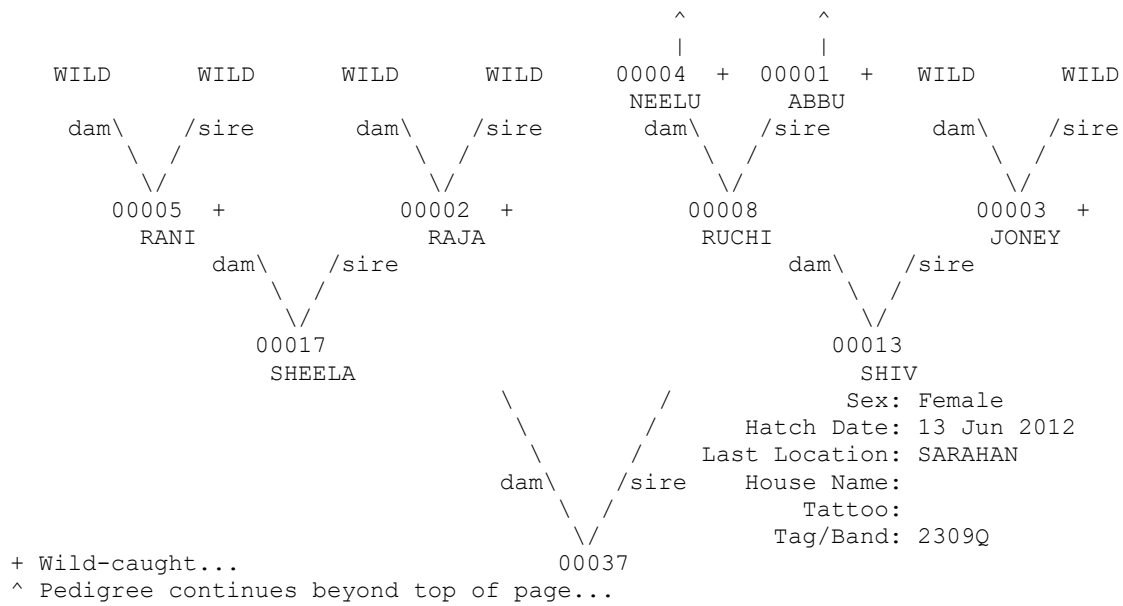


=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00036
 =====

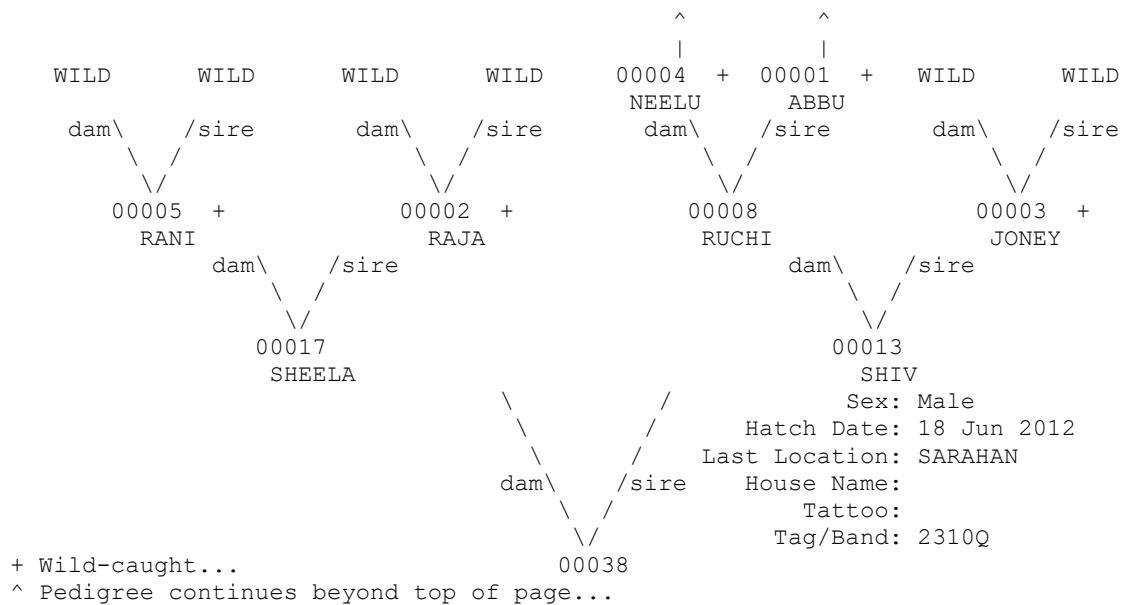


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=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00037
 =====



=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00038
 =====

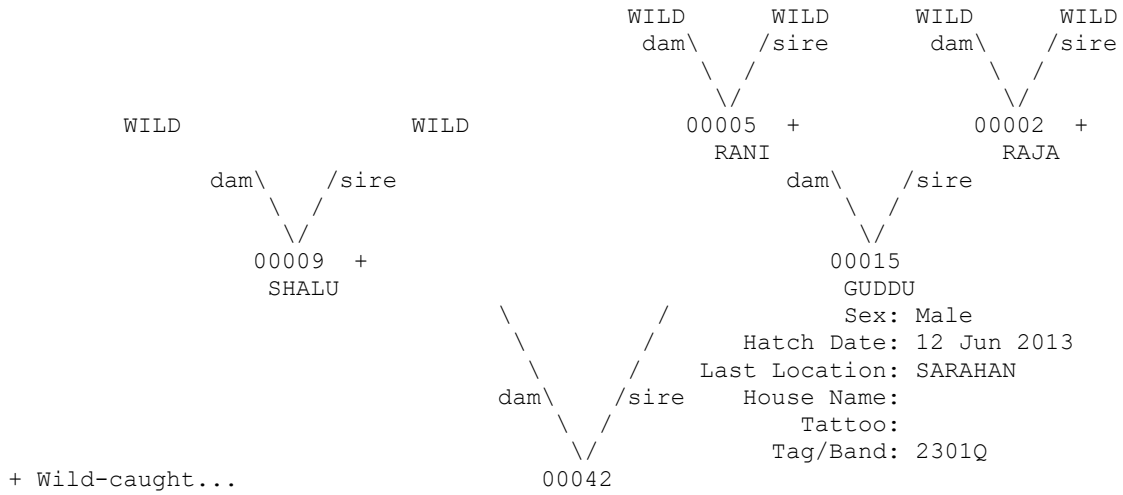


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=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00042

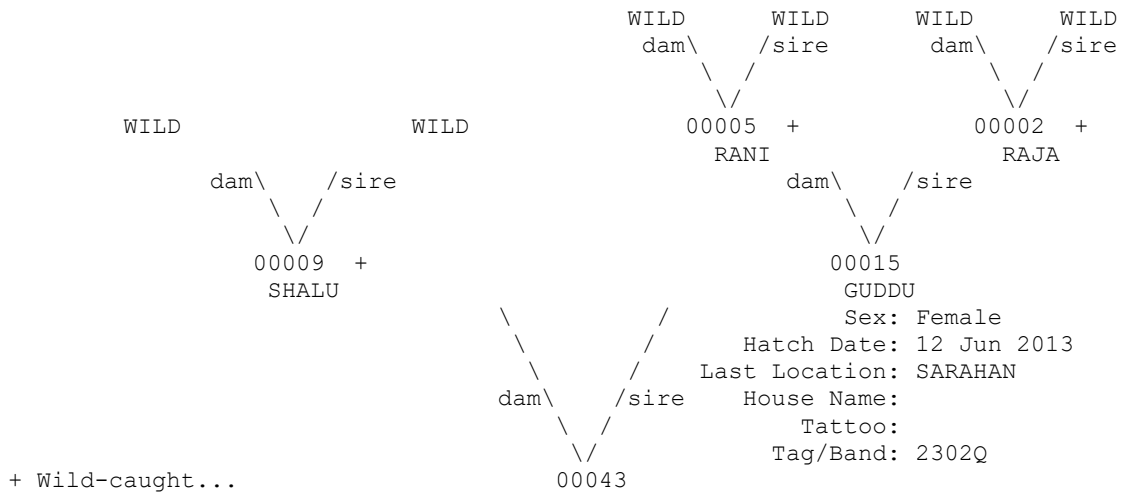
=====



=====

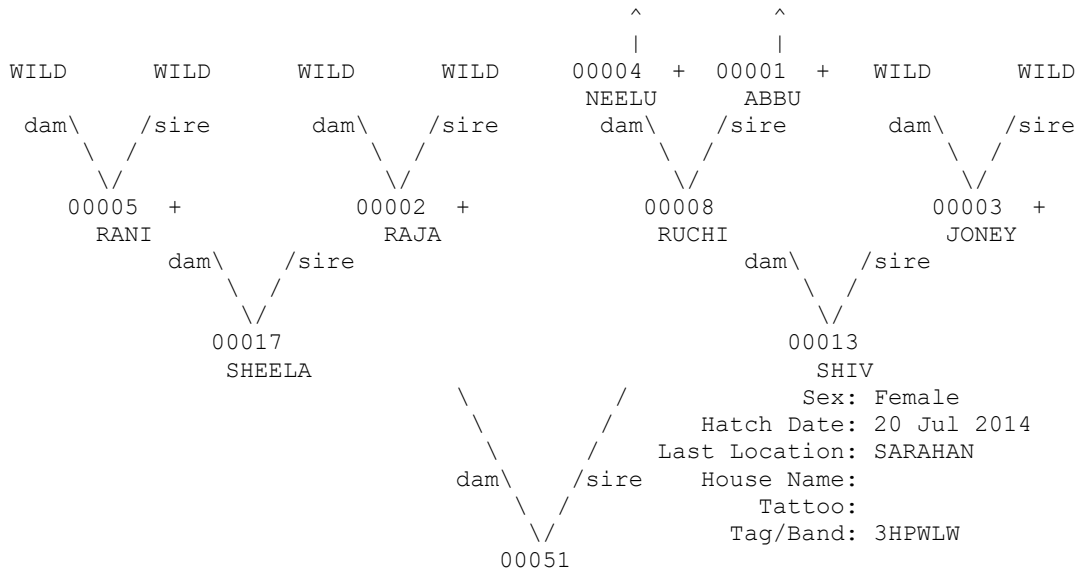
Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00043

=====



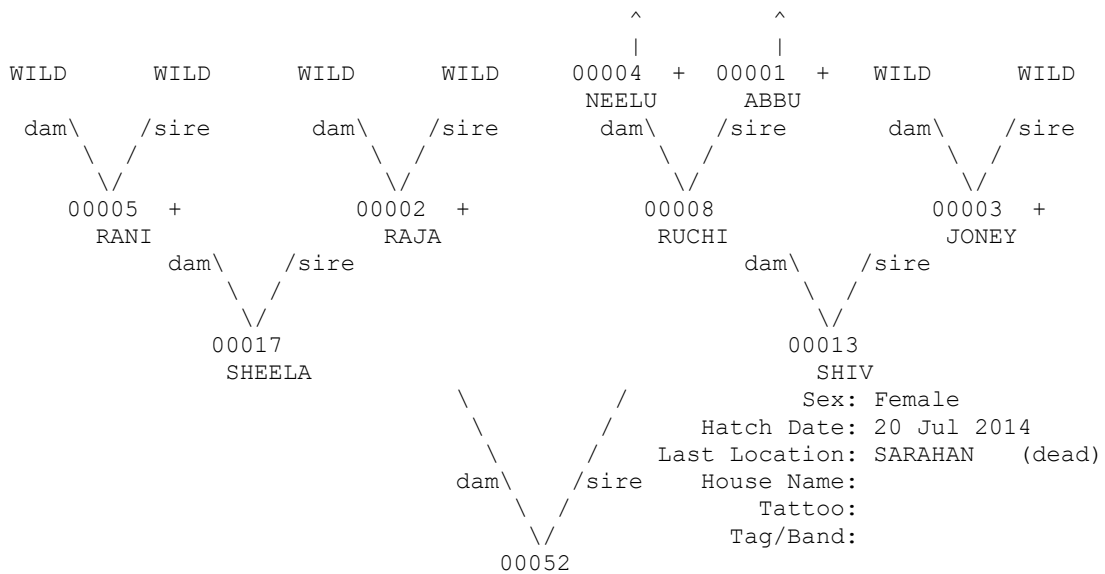
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=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00051
 =====



+ Wild-caught...
 ^ Pedigree continues beyond top of page...

=====
 Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00052
 =====



+ Wild-caught...
 ^ Pedigree continues beyond top of page...

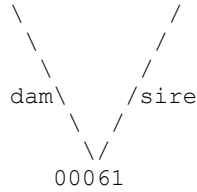
NATIONAL STUDBOOK OF WESTERN TRAGOPAN (*TRAGOPAN MELANOCEPHALUS*): III EDITION

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00061

=====

UNK



UNK

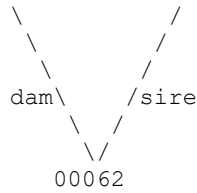
Sex: Female
 Hatch Date: 1 Aug 2017
 Last Location: SARAHAN
 House Name:
 Tattoo:
 Tag/Band: 9-HP (LEG BAND)

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00062

=====

UNK



UNK

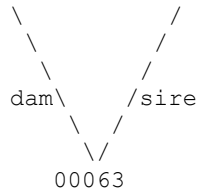
Sex: Male
 Hatch Date: 1 Aug 2017
 Last Location: SARAHAN
 House Name:
 Tattoo:
 Tag/Band: 10-HP (LEG BAND)

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00063

=====

UNK



UNK

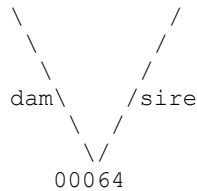
Sex: Female
 Hatch Date: 6 Jul 2017
 Last Location: SARAHAN
 House Name:
 Tattoo:
 Tag/Band: 11-HP

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00064

=====

UNK



UNK

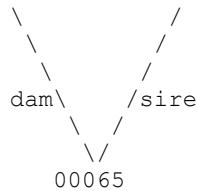
Sex: Female
 Hatch Date: 6 Jul 2017
 Last Location: SARAHAN
 House Name:
 Tattoo:
 Tag/Band: 12-HP

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00065

=====

UNK



UNK

Sex: Female
 Hatch Date: 18 Jun 2017
 Last Location: SARAHAN
 House Name:
 Tattoo:
 Tag/Band: 13-HP

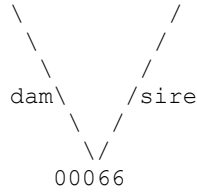
NATIONAL STUDBOOK OF WESTERN TRAGOPAN (*TRAGOPAN MELANOCEPHALUS*): III EDITION

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00066

=====

UNK



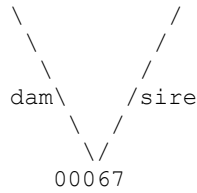
UNK
 Sex: Male
 Hatch Date: 2 Jul 2017
 Last Location: SARAHAN
 House Name:
 Tattoo:
 Tag/Band:

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00067

=====

UNK



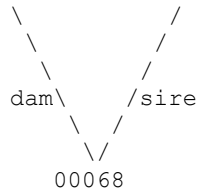
UNK
 Sex: Female
 Hatch Date: 2 Jul 2017
 Last Location: SARAHAN
 House Name:
 Tattoo:
 Tag/Band: 15-HP

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00068

=====

UNK



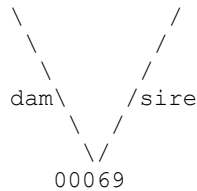
UNK
 Sex: Unknown
 Hatch Date: 1 Jul 2017
 Last Location: SARAHAN (dead)
 House Name:
 Tattoo:
 Tag/Band:

=====

Taxon Name: TRAGOPAN MELANOCEPHALUS Studbook Number: 00069

=====

UNK



UNK
 Sex: Unknown
 Hatch Date: 12 Jun 2017
 Last Location: SARAHAN (dead)
 House Name:
 Tattoo:
 Tag/Band:

Location Glossary of *Tragopan melanocephalus* studbook

MNEMONIC	Location
INDIA	All wild caught specimens
KUFRI	Himalayan Nature Park, Kufri
SARAHAN	Sarahan Pheasantry, Sarahan