

Annual Report

SARAHAN PHEASANTRY

2017

SARAHAN WILDLIFE DIVISION

WILDLIFE WING, HIMACHAL PRADESH FOREST DEPARTMENT

ANNUAL REPORT

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Sarahan Wildlife Division

Wildlife Wing, Himachal Pradesh Forest Department



ANNUAL REPORT: SARAHAAN PHEASANTRY

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Authors (in order of contribution): Lakshminarasimha R, Kunal Angrish

Photo contributions (alphabetically):

Kunal Angrish

Lakshminarasimha R

Layout and formatting: Lakshminarasimha R

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"Western Tragopan Tragopan melanocephalus male (above) and female (below) birds at Sarahan Pheasantry. Sarahan pheasantry houses the only breeding population of the species in the world"



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PREFACE

It gives me immense pleasure to see this annual report being brought out by Wildlife Division Sarahan for Western Tragopan Conservation Breeding Programme (Sarahan Pheasantry). The program has always been an area of focus for the Wildlife Wing of Himachal Pradesh Forest Department. Starting in late 1980s, the Pheasantry has undergone its share of evolution. In the process the Wildlife Wing has also learnt a great deal about the nitty-gritty's of conservation breeding. As we repeatedly mention, documentation is an indispensable part not only for of learning but also for developing institutional memory and in that sense the present document will go a long way in guiding us as we move forward. I was immensely happy and proud to see details of incubator-assisted hatching especially while noting that this work may be the first of its kind among the efforts made for conservation of Western Tragopan so far. I am happy to also note the number of chicks that we have added successfully to the programme during the last breeding season. The team definitely deserves applause for their efforts but I must also add that consistency is the hallmark of success. I hope that the team will continue with the same zeal and come back with even better results and innovative interventions.

Not just technically, but infrastructure-wise as well the breeding programme is undergoing changes. I sincerely hope that by the end of this process we stand much advanced in terms of standards required to maintain a high success rate in conservation breeding.

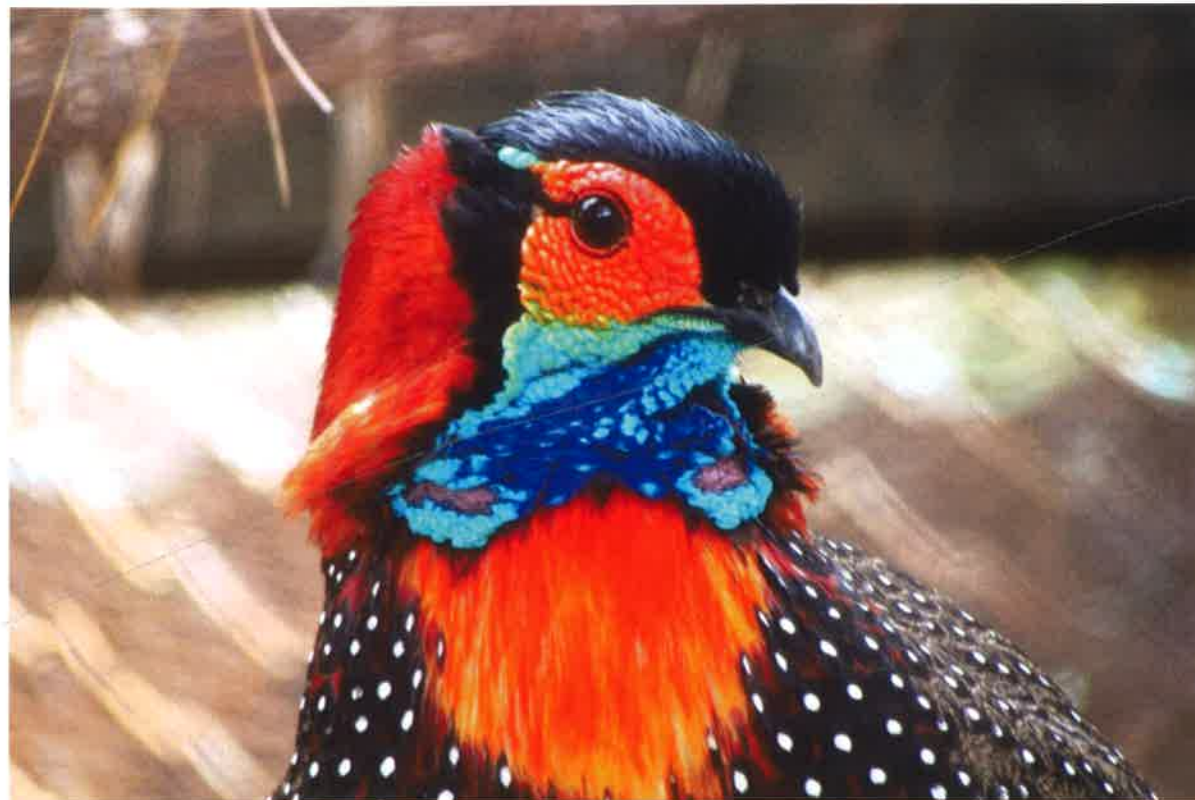
I wish the team at Sarahan Pheasantry all the best in their endeavors. My guidance, support and good wishes are of course always available to them.

A handwritten signature in blue ink, appearing to read 'Sushil Kapta', written over a horizontal line.

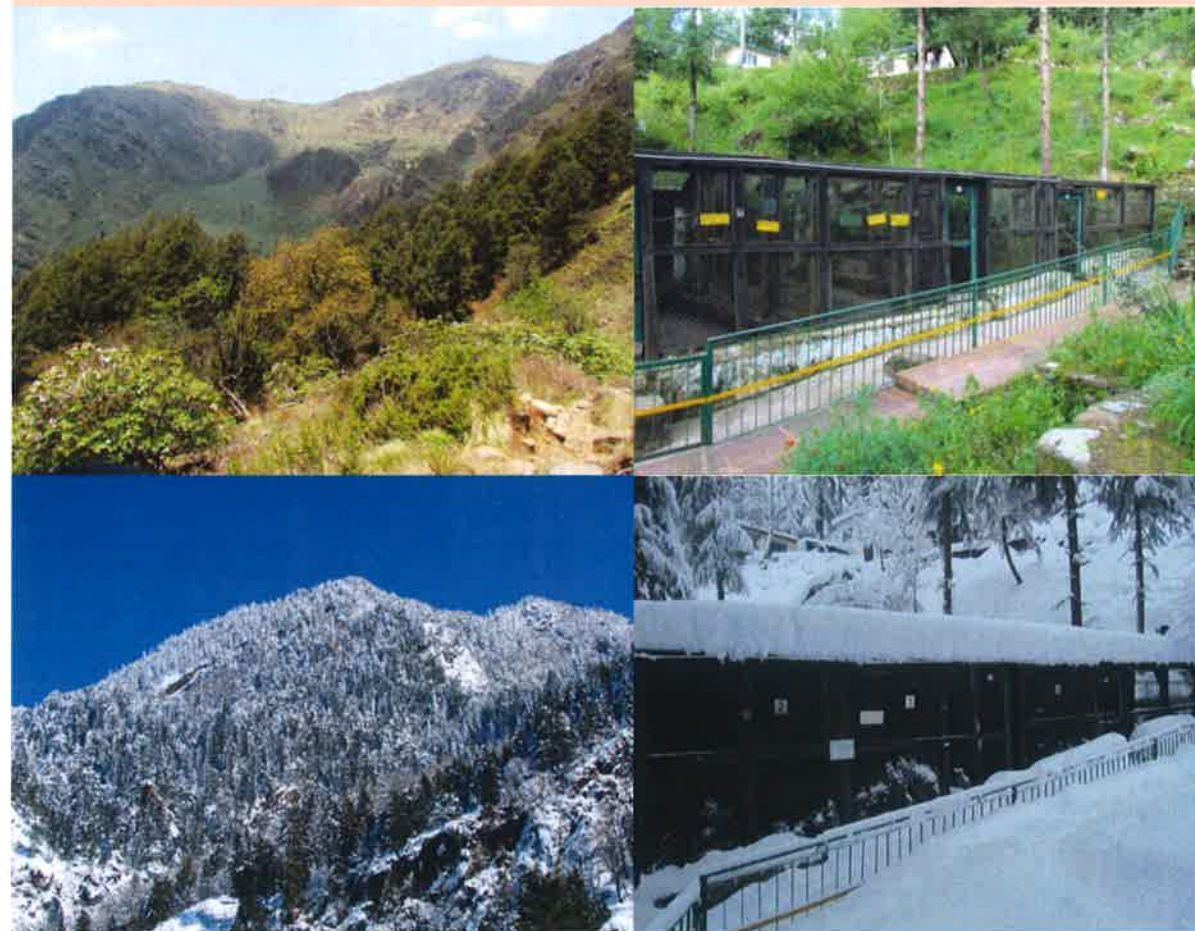
Dr. Sushil Kapta

Chief Conservator of Forests (Wildlife) South
Wildlife Wing, Himachal Pradesh Forest Department

1 INTRODUCTION



"Sarahan pheasantry is located within the distributional range of the Western Tragopan, and hence the climatic conditions are close to what the species would experience in the wild."



Western Tragopan *Tragopan melanocephalus* is a threatened endemic pheasant distributed in the north-western Himalaya. It is one of the five species in the genus *Tragopan*, four of which including the Western Tragopan occur in India. The species has a disjunct distribution in the NW Himalayas from N Pakistan (Indus–Kohistan district) to NW India including Kashmir and Himachal Pradesh (HP), and possibly the western parts of Uttarakhand. Although a global population of up to 5000 individuals was estimated by McGowan and Garson (1995), recent estimates by BirdLife International (2017) suggest fewer than 3500 individuals. However, new populations continue to be reported across its distributional range (e.g. Pakistan administered Jammu and Kashmir regions, Chamba and Gharwal regions of HP and Uttarakhand respectively) suggesting that the global population might be higher than current estimates. Because of the small and sparsely distributed population which is probably declining and becoming increasingly fragmented, the species has been categorized as 'Vulnerable' by IUCN.

The species inhabits the high-altitude temperate forests at elevations between 2400-3200m. The habitat used by the species during spring and summers majorly have spruce *Picea smithiana*, fir *Abies pindrow*, yew *Taxus baccata* and oak *Quercus semicarpifolia*. The winter habitats are generally mid-altitudinal dense coniferous or mixed mountain forests. The variations in the vegetation types of their habitats reflect, to a certain extent, the possible altitudinal movements by the species across seasons. A dense undercover is characteristic of both summer and winter habitats. Given the topographically complex nature of forests inhabited by the Western Tragopan, coupled with their elusive behavior, thorough knowledge about the species biology is lacking. Vegetative matter probably forms a principal component of their diet mainly comprising of sprouted leaves of oak, shrubs like ringal bamboo *Arindunaria sps* and other plant materials. The species, like its conspecifics, are known for their unique elevated nesting behavior. The breeding season extends from April–June, during which courtship and display, egg laying, incubation and hatching occurs. The chicks possibly stay with the mother through the winter as family flocks during which they learn important behaviors necessary for survival in the montane environment.

Western Tragopan, being a habitat specialist, is threatened by habitat disturbances (e.g., livestock grazing, minor forest produce collection) and fragmentation (e.g., change in land-use practices). As a consequence, the natural populations are small, highly fragmented and declining due to habitat loss and an overall reduction in the quality of the available habitat throughout its restricted range.

Himachal Pradesh is an important range-state and a stronghold for the Western Tragopan, where it is distributed widely in sizable populations in all three major catchments (Beas, Satluj and Ravi). It also carries a 'flagship' value on account of socio-cultural linkages with the traditional people. These attributes essentially guided the successful declaration of Western Tragopan as the 'State Bird' of Himachal Pradesh.

Conservation breeding of Western Tragopan by Himachal Pradesh Forest Department

The first attempts and keeping and breeding Western Tragopan in captivity were carried out in the early 1990's at a small rescue center, Sarahan pheasantry, situated in Sarahan Bushahr, Shimla, HP. The first captive breeding of the species was reported in 1993, from a pair of wild-born rescued birds. In the eventual years, additional attempts were made at breeding the species with sporadic success. In 2003-04, the Central Zoo Authority approved a conservation breeding project for the Western Tragopan submitted by the Himachal Pradesh Forest Department (HPFD). The projects' budget outlay was Rs. 493.90 lac, with CZA's share of Rs. 364.95 and State FD's share of Rs. 128.95. In 2007, the CZA included the Western Tragopan in the priority list of species identified for conservation breeding (Bonal 2010). Consequently, Sarahan Pheasantry was designated as the 'coordinating zoo' for the conservation breeding of the Western Tragopan.

The goal of the conservation breeding program was to captive breed and establish a 'reserve' population of the species in captivity. The term 'reserve population' is meant to signify the potential of the population to be used for species restoration *in-situ* (e.g. either for supplementation or reintroduction). During the initial years of the commencement of the breeding program, the reproductive output remained low and to address this a collaborative research project was commissioned with the Wildlife Institute of India, the aim of which was to study behavior and accordingly improve the breeding success at the centre. Currently, the program is being run under the expert guidance of a Zoo Biologist and a team of animal attendants and forest workers under the overall charge of a Forest Guard.

2 SARAHAN PHEASANTRY

The conservation breeding centre for the Western Tragopan is located at Sarahan, in the district Shimla of the state Himachal Pradesh (Figure.1). The centre is situated in a fence-protected forest land positioned distantly from human settlements at an elevation of around 2300msl. The forest land encompasses an area of nearly 12 hectares (0.12 km²). The location (Geographic coordinates: 31° 30' 25.53" N, 77° 47' 46.95") lies within the natural distributional range of the species and wild tragopans have been sighted in the pheasantry.

The centre is located adjacent to Daranghati Wildlife Sanctuary, a key distributional area for the species in Himachal Pradesh. Located approximately 60 km away from the center is Rupi-Bhawa Wildlife Sanctuary. This sanctuary contains areas where the species currently occur and also sites of historical presence. The proximity of the breeding centre to these sanctuaries could prove as a valuable site for experimental reintroduction studies. These areas are controlled by the Divisional Forest Office located in Sarahan



Figure.1: Sarahan Pheasantry

3 MANAGEMENT

In March 2017, prior to the onset of the breeding season, the captive population at Sarahan comprised of 25 individuals with 14 males and 11 females. All the females were paired and housed in off-exhibit breeding enclosures.

Enclosures and Housing

The breeding facility comprises of 11 off-exhibit enclosures (not for public viewing), some of which were constructed in 1990's, as a result of which they do not conform to modern zoo standards. Two new state-of-the-art breeding aviaries were created by redeveloping enclosures in 2015 and 2016. These new enclosures were designed keeping in view the biology of the species, management of birds and aspects of modern zoo designing (Figure.2). The new enclosures have a ground space of over 100 sq.m per breeding pair as compared to the previously available size of 42 sq.m, and with increased access to vertical space. The new enclosures also feature compartments for temporary separation of individuals, like in the case of breeding females.

Perches are placed within each enclosure at variable heights, with the highest perches having a clearance of 24-30" from the roof. The wood/branches for use as perches were carefully selected, based on their rough texture and appropriate diameter ($\geq 4-5"$). All the enclosures are planted and have natural ground cover. A sheltered indoor section is provided in each enclosure for the bird to retreat during inclement weather. Most of the species planted in the enclosure are species that occur in the natural habitat of the species such as ringal bamboo and *Buxus sps.*. Beneath the natural ground substrate, fine mesh is fixed to the ground to prevent rodents and predators (e.g. weasels) from burrowing into the enclosure. Partitions in enclosures that are adjacently placed are installed with opaque sheets covering the partition, to visually isolate breeding pairs.

All the breeding enclosures are regularly monitored using CCTV cameras. Two cameras are also used to monitor the pheasantry premises. The CCTV cameras allows close-up monitoring of the behavior of the species and most importantly allow undisturbed monitoring of breeding females during incubation and post-hatching.

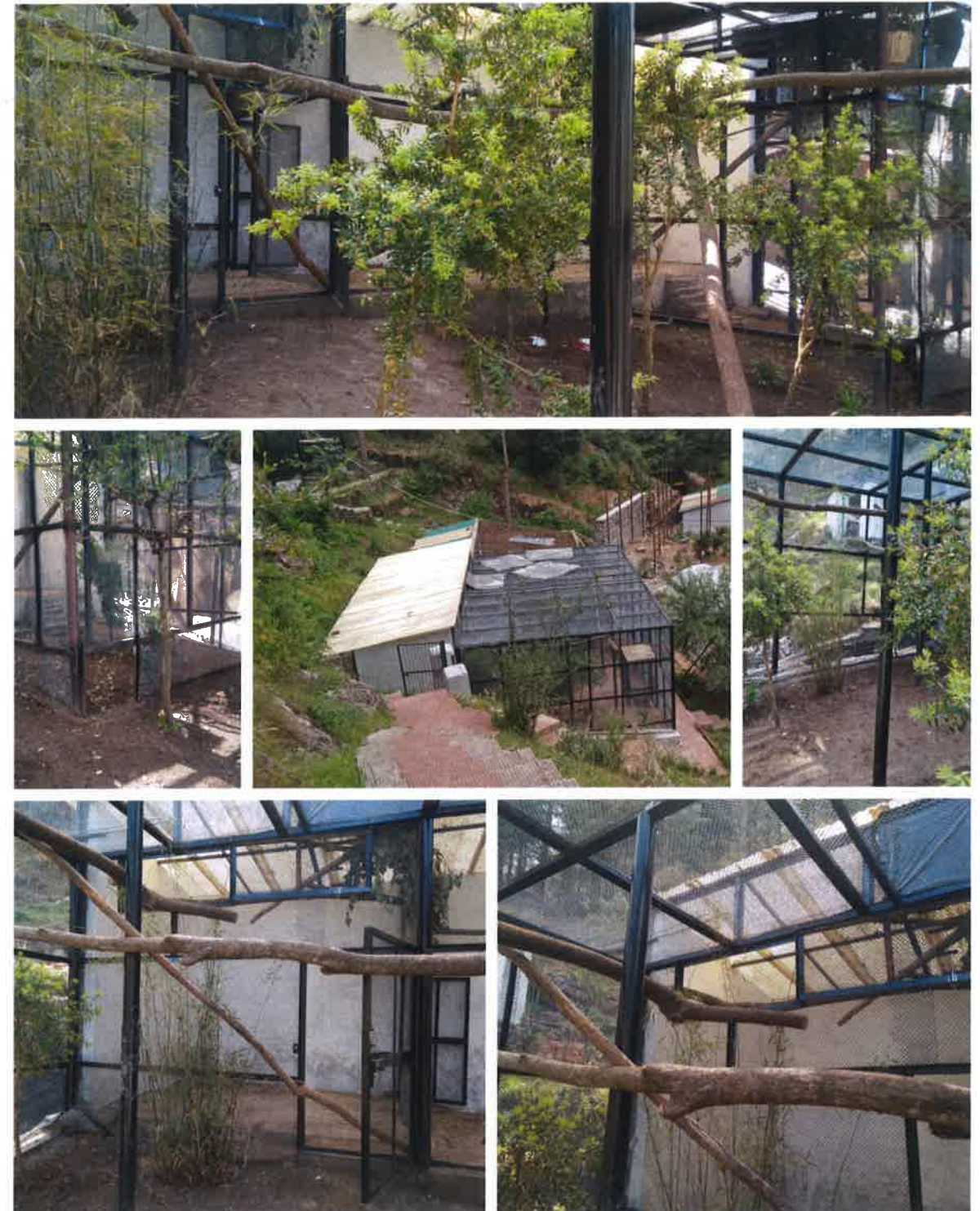


Figure.2. New enclosure constructed in the old pheasantry premises

Food and feeding

Recognizing the unique dietary specializations of the Western Tragopan, the constitution of

the diet offered to the captive birds principally contains vegetative matters in the form of a mixture of fruits, vegetables, greens and sprouts (Figure.3, on the following page). Most of the greens offered to birds are grown locally in the pheasantry premises and within the poly-house. A small quantity of hard-boiled egg is added to the diet as a substitute for animal protein. Grain and seed mix is also offered to birds. To match the natural feeding times of the birds, food is offered birds early morning (between 0600-0700h). Occasionally, wild diet items such as berries collected from the natural habitat are also offered to the birds.

General aspects of management of birds

Hygiene forms an important aspect of species management at the centre. All the enclosures are spot-cleaned everyday, and food plates and waterers are removed in the evening. A foot-bath at the entrance of each enclosures check infections from entering/exiting the enclosures. Top soil is replaced annually to prevent accumulation of infection. Perches and solid surfaces are also disinfected annually. The health of birds were closely monitored prior to the breeding season, accompanied with a course of deworming to check endoparasites.

Previously the pheasantry was closed during the breeding season (April-June) to reduce disturbance to the birds. Since 2015, six enclosures have been designated as display enclosures and three male Western Tragopan, a pair each of Himalayan Monal and White-crested Kalij pheasant are housed here for public viewing (Figure.5).



Figure.3. 1) Display enclosures at the pheasantry, 2-4) Snapshots of CCTV



Figure.4. **First Row:** Poly-house at the pheasant; **Second Row:** 1) Greens grown in the polyhouse, 2) Food offered to Western Tragopan chicks, 3) Lettuce grown in poly-house; **Third Row:** Food offered to a pair of adult birds at the Pheasantry

Studbook

A studbook forms the basis of demographic and genetic management of the Western Tragopan captive population. Each bird at the conservation breeding centre is marked using leg rings, inscribed with a unique number. Each individual bird is assigned a National Studbook number and all the information pertaining to that particular bird (e.g. parentage, acquisition history, age) is contained in the studbook. The studbook information is used to identify pairs which lead to the highest genetic diversity in the captive stock. This coupled with individuals' compatibility is used to form pairs at the centre. Two new breeding pairs were formed based on this information, in addition to five breeding pairs and one triplet which already existed. The age distribution of the breeding stock at the onset of 2017 breeding season is presented in Figure.3. It clearly depicts concentration of individuals at the base which are in breeding age-group, born during the previous breeding seasons.

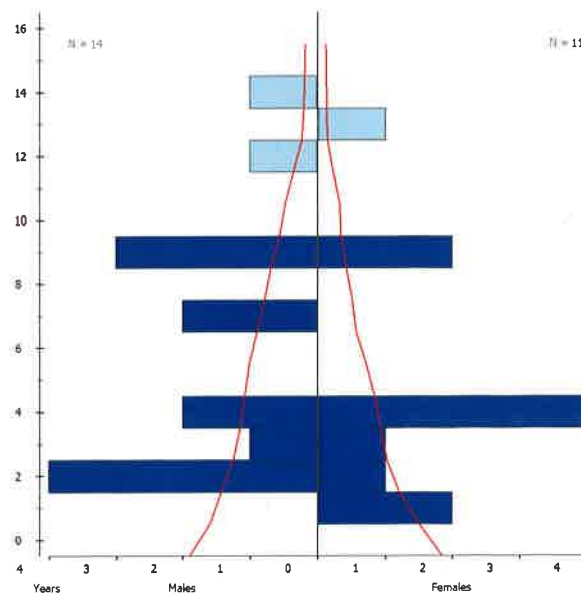


Figure.5. Age distribution of Western Tragopan captive population in March 2017

Reproductive management

A total of 33 nests were offered to all the breeding females in 11 different enclosures. Each enclosure had a minimum of 3 different nest sites to provide females multiple nesting option to choose from. The nests were cane baskets, with a diameter of about 30-40cm and a depth of about 20cm. These baskets were mounted at different locations and heights inside the enclosure, using tripods or wooden perches. Each enclosure had nests placed both in the in-

door and outdoor parts. Dried moss and fern were used as nesting material. Additionally, bundles of dry grass, twigs and bamboo leaves were placed near the nest for the female to use in nest building. The nests were camouflaged using liana and other creepers from the sides and the top. Outdoor nests were covered using water-proof plastic sheets from the top, to prevent rainwater from entering the nests. Predator proofing was given high importance as far as the positioning of the nests was concerned. All the nests had perches placed closely to facilitate the movement from and to the nesting platforms. An inclined wooden perch to the ground (ladder perches) was placed near all the nesting platforms with incubating females, to provide climbing options for chicks to return to their nest for roosting. Disturbance near the nesting platform was kept to minimum following the installation of the nesting platforms. As mentioned before, active nests were monitored using CCTV cameras.

Nesting platforms were provided by the first week of April, during which the birds start exhibiting breeding behaviors such as territorial vocalizations by males and courtship display. Egg laying starts by the third week of April, followed by incubation in May and hatching during June-July.



Figure.6. Nesting platforms offered to the breeding females

4 BREEDING RESULTS 2017

Females and egg laying

During the 2017 breeding season, a total of 32 eggs were laid by nine breeding females. All the eggs were normal and no instance of abnormal eggs (thin-shelled, under-sized eggs) were reported. This is a significant achievement with reference to improvement in the reproductive health of females, as thin-shelled eggs constituted a significant proportion of the total eggs laid in the previous breeding years (Figure.7). It is evident from the figure, that the changes in the husbandry regimes following 2012 have contributed significantly in improving the health of the birds at the pheasantry. Also to note is the normalization of the clutch size, i.e. the number of eggs laid by each female per breeding season is close to the natural clutch size of the species.

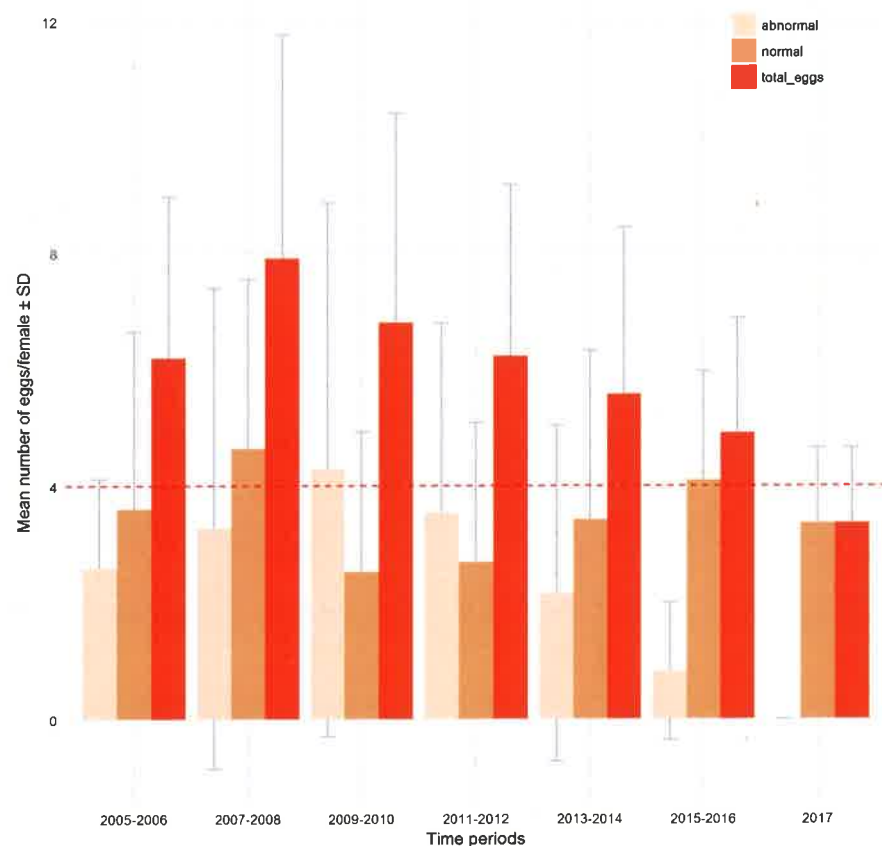


Figure.7. Pattern of egg-laying in breeding females between 2005 and 2017. Dashed horizontal line indicates the clutch size of the species in the wild.

Incubation and Hatching

Eight breeding females showed natural incubation behavior, of which, two were from the newly formed pairs. Five females successfully incubated and hatched chicks and the remaining three completed the incubation but without hatching. Two females occupied indoor nests and the remaining used outdoor nests.

One of the females abandoned its nest (with three eggs) for unknown reasons and these eggs were harvested and incubated artificially. In addition to this, 10 abandoned eggs from other females were also collected during the early part of the breeding season. None of the eggs were collected from active nests or with the purpose of inducing double-clutching in females. This was the second attempt to artificially incubate Western Tragopan eggs at the pheasantry, the first attempt (during mid-2000) having produced no successful results. The eggs were incubated using Brinsea Octagon[®] 20 advance incubator using standardized settings of temperature and humidity over a period of 30 days. The chicks were reared in specialized thermo-regulated brooder cages for a period of 6-8 weeks before being transferred to outdoor enclosures. Of the 13 eggs that were incubated artificially, four chicks hatched of which three survived. This is the first ever known record of successful *artificial hatching and assisted rearing* of Western Tragopan chicks.



Figure.8. A naturally hatched and reared Western Tragopan chick (1 week old) at the pheasantry

In total, eleven chicks were born during the 2017 breeding season — seven naturally hatched and reared by Tragopan hens and four incubator-hatched and assist reared. Three chick mortalities were recorded: two chicks due to predation by weasel and lack of brooding by mother hen, and one still-hatch from the incubator. *Eight chicks (five naturally reared and three assist-reared) are surviving as of October 2017.*

Population status (as of October 2017)

Following the 2017 breeding season, the Western Tragopan captive population at the pheasantry now consists of 33 individuals (14 males, 11 females and 8 juvenile birds). The breeding success achieved during 2017, contributed significantly to the growth of the captive population (see Figure.10, on the following page). The decreased population growth rate observed during the last two years was mainly due to mortalities of the older individuals from the captive stock, including both wild-rescued and captive-born individuals, and events like this have highly pronounced effects in small captive populations, such as this (Snyder et.al. 1996). Given the large number of young individuals (including those born in 2017) which currently constitute the captive stock (also see Figure.5), optimal population



Figure.9. Artificial incubation and assisted rearing facility at Sarahan Pheasantry

growth can be expected in the following years.

Table.1. provides an overview of important demographic and genetic parameters of the Western Tragopan captive stock at Sarahan Pheasantry. The population growth rate is above the stable value—1 indicating that the population is growing. The current and potential gene diversity are 90% and 93% respectively, which conform to the globally accepted standards for genetic diversity to be maintained in captive populations bred for conservation purposes (Ballou et.al. 2010).

Summary statistic	Value
Population	14♂:11♀:8 juveniles
Population growth rate	1.091 (1=stable)
Generation length (T)	6.4 years
Founders	8 (5♂:3♀)
Current gene diversity	90%
Potential gene diversity	93%

Table.1. Demographic and Genetic profile of the Western Tragopan

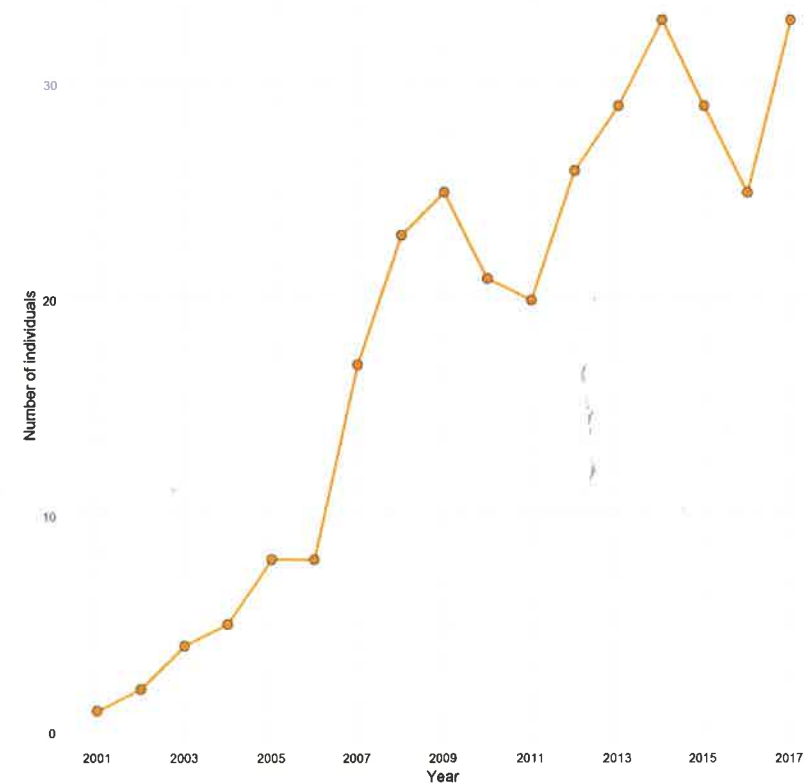


Figure.10. Census trend of the Western Tragopan captive population: 2001-2017

5 FUTURE PERSPECTIVES

The approach at the centre strongly adopted the principle of ‘*adaptive management*’ (McCarthy and Possingham 2007), to plan and take robust decisions under uncertain conditions and consequently learn via systematic monitoring, and further applying what is learnt to optimize the decisions.

Viability of small captive populations, especially those with fewer than 100 individuals is low (Traill 2010). With just over 30 individuals at Sarahan Conservation Breeding Centre, the priority is to increase the size of the collection by promoting breeding in reproductively active individuals. A husbandry regime close to the behavioral ecology of the species, such as the one currently in practice, which allows the expression of natural breeding behaviors and reduced stress levels, promotes better breeding as demonstrated.

The Western Tragopan Conservation Breeding Plan (Lakshminarasimha R 2014) recommended to address the reproductive problems (females producing abnormal eggs) faced by the captive stock. The breeding results described in the previous chapter are indicative of improved reproductive performance of females, especially given that no abnormal eggs were recorded during the 2017 breeding season. Also, the breeding success observed during 2017, offers a positive outlook to the breeding program.

Infrastructure

Given that the target is set at expanding the population in the proximate future, the immediate requirement is to develop the infrastructure in order to offer optimal housing conditions to the birds. Two approaches are being undertaken to address this.

1. *Redevelopment of old aviaries*: The existing facility for housing Tragopans were created more than two decades ago and do not conform to modern zoo keeping standards. To address this, old aviaries are being redeveloped into state-of-the-art facilities (as described before) in a phased manner. Currently, five old enclosures are being redeveloped to two new enclosures in consonance with modern zoo standards and parameters set by CZA for housing the birds in a conservation breeding facility. The tenders for the same

were floated and successfully awarded. The work is scheduled to be completed by January, 2018, after which birds can be paired and housed in the facility.

2. *Construction of satellite facility*: A satellite facility approximately 500m upstream to the existing facility is being developed. A total of six aviaries are planned to be established at this site, which can house 12 breeding pairs. It is envisaged to have the satellite facility functional by the 2019 breeding season. Currently, three aviaries have been constructed (see Figure.11), and tenders for the construction of the three remaining aviaries have been successfully awarded. The construction work is scheduled to be completed by July 2018. This will be followed by activities such as enclosure enrichment, fencing, CCTV installation and addition of other peripheral infrastructure. The satellite facility is intended to serve as a back-up facility for housing a sub-population which can serve as an “insurance”, should the main stock face extinction risk due to stochastic natural reasons like disease outbreak, poor reproductive success or inclement weather.

Given the success achieved with artificial incubation and assisted rearing, a stand-alone facility is planned to be developed for this purpose. This facility will feature additional incubators, system for creating a sterile environment, improved chick-rearing cages and attendant’s room. An operational facility of this nature is envisaged to be developed by the 2018 breeding season.



Figure.11. Aviary at the satellite facility being established at Sarahan pheasantry.

The existing veterinary facility will be operationalized by addition of basic equipment such as microscope and reagents, for enabling basic in-house diagnostics. Before the start of the 2018 breeding season, the facility will be equipped for ecto- and endo-parasitic screening, soil & water testing and other basic tests.

Demographics, Genetic Management and Husbandry

Studbook of the captive Western Tragopan is regularly updated using SPARKS (Single Population Analysis and Record Keeping System) program and further analyzed using PMx (version 1.4.7) (Ballou et al. 2010). The results of this analysis are used for managing the captive stock for retaining maximum genetic diversity and ensuring low degree of relatedness among newly born individuals. The immediate demographic goal is to ensure that each wild-born individual and founder have a minimum of 10 descendants (Ballou et al. 2010). For achieving this, pairing of individuals with more than one mate (either a single male mates with multiple females or vice versa) is adopted with some breeding wild-born individuals. This ensures that wild-born birds have an increased chance to breed successfully. This system also compensates for the slightly higher number of females in the collection and in increasing the number of pairs available per unit time. The genetic diversity is planned to be maintained at close to 90% for the next ten years. As the current captive population is founded with low number of wild-born individuals, addition of new genetic material may be



Figure.12. Sarahan Pheasantry staff. Front Row (left to right): Roshan, Kajal Joshi, Rita, Puran Bahadur. Back Row (left to right): Narasimha, Ravinder, Neela

necessary in near future and innovative methods (those which do not disturb natural populations) are being explored for this purpose.

A standardized husbandry protocol has been developed at the centre during the course of the collaborative research project with the Wildlife Institute of India (2011-2014). The husbandry regime in practice has yielded good results and hence it will be adopted in future. Details of the husbandry regime are provided in Western Tragopan Conservation Breeding Plan (Lakshminarasimha R 2014).

Personnel and Record Keeping

The management at the centre is science-based and overseen by a qualified and trained zoo biologist. In addition to this, zoo keepers posted at the centre have long-term experience of working at the species. As stress management forms a very important component for maintaining this species in captivity, keepers are regularly sensitized specifically in this aspect. This would involve avoiding movement in proximity to the birds, providing opportunity to birds to avoid keepers when working inside the enclosures as this can lead to stress and fleeing responses (speedy flights) which may injure the birds.

Education and Outreach

Publicizing about the animal and the need to conserve it is an integral part of a conservation effort. Three species of pheasants are housed in display enclosures which are open to public and in the due course, the facility can be developed as a knowledge centre for Himalayan pheasants. This will be complemented with the addition of an interpretation centre, which is planned to be established at the entry of the pheasantry. Survey of the area has been done by experts as well as engineering staff of the Circle and efforts in this direction are in full swing.

The pheasantry also regularly hosts Forest Guard batches from Chail and Sundernagar as well as students from nearby schools. A visit of the pheasantry followed with talks by the DFO, Zoo biologist and Forest Guard-in-charge on pheasants, pheasantry, experience of working in ex-situ facility added to the training and knowledge of guards and students respectively. World Wildlife Day was also celebrated within the premises of the Pheasantry.

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