

## Distribution of Himalayan Musk Deer (*Moschus chrysogaster*) in Neelum Valley, District Muzaffarabad, Azad Jammu and Kashmir

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**Abstract:** To study the present and past distribution of Himalayan musk deer (*Moschus chrysogaster*) Survey in Neelum valley, District Muzaffarabad, Azad Jammu and Kashmir was conducted from April to November 2002, Findings show that Musk deer is distributed throughout the Neelum valley. Poaching, deforestation and trans human grazing resulted in scattering of population of the musk deer (*Moschus chrysogaster*) into separate pockets. Population of the musk deer (*Moschus chrysogaster*) recorded from the area is 120 animals. Investigation indicates Musk deer (*Moschus chrysogaster*) resides at low altitude as compared to other areas reported from Pakistan. Seasonal migration of musk deer (*Moschus chrysogaster*) was also noted as a result of Trans-human grazing in summer in summer. To conserve the dwindling population of musk deer (*Moschus chrysogaster*) from Neelum Valley there must be expansion of Salkhla game reserve up to palri and Gail along with the law enforcement and awareness campaign.

**Key words:** Musk deer, Neelum valley, wildlife, Machiara national park, Azad Kashmir

### INTRODUCTION

The Musk deer belongs to the family Moschidae and genus *Moschus* one of the most primitive deer like ruminants. Characteristics such as well developed canines and absence of cranial appendages is considered to be evolutionary primitive<sup>[1-3]</sup>. Musk deer are stockily built animals with small heads. The hind legs about 5 cm larger than the fore legs, indicating a tendency to move by leaping. The musk deer possess a gall bladder, which is bovide characteristic and female musk deer have only one pair of teats unlike most advanced deer, which have two pairs<sup>[4]</sup>.

It is a solitary territorial animal<sup>[5]</sup>. Musk deer uses latrines for defecation, which may be used by more than two animals. It is corpuscular in habit i.e. active at dusk and dawn<sup>[5]</sup> the gestation period is 160 days. Birth of young (usually single) occurs in June or July. Elongated dewclaws and low weight on track facilitate to climb trees and movement on snow<sup>[4]</sup>.

The genus *Moschus* is distributed sporadically throughout the forested mountainous parts of Asia, from just north of the Arctic Circle southward to the northern edge of magnolia and to Korea. Further south, avoiding to

Gobi desert, the musk deer occur to china, Burma, Assam and the Himalayan region<sup>[1]</sup>. Three species of Musk deer are recognized, following taxonomic revision of the genus by Groves<sup>[6]</sup> and more recently by Grubb<sup>[7]</sup>. *Moschus moschiferus* in USSR, Northern china and Korea; *M. berezovskii* southern china and Northern Vietnam and *M. chrysogaster* in western china, Tibet and the Himalaya. It is also present in northern Vietnam<sup>[8]</sup>. Green<sup>[5]</sup> considers Himalayan Musk Deer to be *Moschus chrysogaster* and gives its distribution. A fourth species *M. fuscus* lives in the eastern Himalayas in Bhutan, china, India, Myanmar and Nepal<sup>[9]</sup>.

The species still occurs in Dachigam Sanctuary<sup>[10]</sup>, Pir pinjal, Kishanganga\* valley and catchments area of river Chanab<sup>[11]</sup>. Green found the fresh signs of musk deer in Dachigam sanctuary between 2710 and 3110 m and in Pir Pinjal, between 2530 and 2650 m.

Formerly the species was common in Chitral<sup>[12]</sup>. Stockley succinctly summarizes its distribution as follows: 'From Gilgit southwards throughout the Himalayas, between 2133 and 3962 m where ever there is scrub jungle<sup>[13]</sup>. In the western Himalaya in sub-alpine zone ranges between 3350 to 3960 m with a mean annual temperature of about 50°F and annual rainfall between 8.5

to 65 cm, annual snowfall varies from 1.8 to 5.4 m<sup>[14]</sup>. In Pakistan, the Himalayan musk deer inhabits sub alpine scrub zone above coniferous forests<sup>[15]</sup>. By the late 1960s it remained around Astor and in Chilas District of Gilgit<sup>[15]</sup>. Scully reported in 1881 that the Himalayan musk deer was common in Gilgit particularly Astor valley, According to the Raja of Gupus of<sup>[16]</sup> the species occurred in all ravines south of the Gilgit River until independence in 1947. In Biltastan the species is believed to be widespread especially in Hushe valley<sup>[15]</sup>. Now it is considered rare throughout this state and occurs mainly in the mountains east of Drosh<sup>[15]</sup>. The species also present on the Indus Kohistan in September<sup>[15]</sup>. Signs of musk deer were found at two locations in Panjkora valley during a survey of Dir Kohistan in September 1980<sup>[17]</sup>. The species also survives in Salkhala sanctuary (Game Reserve) where a musk deer was seen in 1983 (T. J. Roberts, pers. Comm.). The best population is considered to be in Machiara Game reserve (Recently Wildlife National Park) Azad Kashmir. Musk deer has also recorded in Kabkot Nallah by Khalid *et al.*<sup>[18]</sup>.

The purpose of this study is to present recent information about the known distribution of Himalayan musk deer in Neelum valley.

#### MATERIALS AND METHODS

Survey was conducted from April to November 2002 in Neelum valley to collect the data on distribution of Himalayan musk deer (*Moschus chrysogaster*) in Neelum Valley. Survey was carried out from dawn to dusk. Area was divided into eleven localities, out of which nine localities were surveyed with the assistance of *Shikaries* (local hunters/poachers) and wildlife staff. Every effort was made to locate the musk deer in the habitat. Evidences, such as latrines were detected to collect droppings and hair. Grazed fields and footprints also noted. Fecal materials of leopard (*Panthera pardus*) with undigested hair of musk deer collected as evidence of presence both predator and pray. As a result of predation remains of musk deer also collected and labeled. Photographs of footprints, *Thahi* (Resting-place of Musk deer) and grazed fields were also made.

During the survey average of ten diurnal hours were spent in the habitat of musk deer. For the entire evidence altitude, date and time noted and notes also taken. Plants were collected from 200 m around the direct and indirect evidences, pressed in presser papers and were dried carefully. The collected plants were identified with the

help of literature<sup>[19]</sup>. Further identification was done by comparing the collected plants with the collection in Herbarium, Department of Botany, University of Azad Jammu and Kashmir Muzaffarabad.

Information also collected by the locals, hunters and wildlife staff. Any information considered to be unreliable was disregarded.

During the field survey binocular of 8x40 were used intensively while camera with zoom lens Olympus AZ300 38:1:105x along with Minolta SR T101b used.

#### RESULTS AND DISCUSSION

Along with the field visit sum of 44 people was interviewed that belong to different age groups. They are related to different occupations that include hunters 59.0% (n=26), guides % (n=10), wildlife staff 10% (n=8).

Study revealed that population of Himalayan musk deer is distributed through out the Neelum valley, From Machiara National Park to Hanthi. At the both sides of the River Neelum. Evidences show that lowest altitude at which Musk deer resides is 2,270 m asl. in forest attached to village Palri (Locality 7). The highest point noted for musk deer population is 3860 m asl. in Ghamot wildlife game reserve.

During survey on April 23, 2002 in Co. 14 of locality 7 a musk deer was sighted at 2,680 m asl. in coniferous forests. Dead remains of a musk deer were also collected at 2270 m in Co.14 of locality 7.

In forest attached to village Borrr at 2,560 m asl a musk deer was seen at 11:30 A. M. Pakistan standard time. In Co.25 of locality 1 remains of musk deer was also recorded at 2969 m asl that was killed by the poachers. Total of 42 evidences was recorded out of which 4 are direct evidences as physical sighting an dead remains while 38 are indirect evidences as resting beds, foot prints and fecal deposits.

Results show that population of musk deer in Neelum valley is declining rapidly as a result of increasing poaching pressure. During the war of liberation in 1947-48 intense military activities also cause disturbance to wildlife habitat. Since 1990 continued cross \*Loc. shelling and firing is also responsible for wildlife declination. It is also noted that at right bank of the Neelum river where the human population of surveyed villages is 39458, percentages of Musk deer is 45.83% (n=55) while at the left bank of river Neelum human population is 21879 and the percentage of animals existing is 54.16% (n=65) clearly shows that humans are major predators of Musk

Table 1: Data showing general information about the natural resources of Neelam valley and its exploitation by different stakeholders

Villages surveyed	# Of sub-villages	Human population	Forest area (Acres)	Total no. of livestock holdings per village	Present musk deer population
Palri	4	2869	5685	1752	10
Machiara	28	24030	33437	24030	22
Hanathi	2	810	13015	1400	20
Ghamot	5	1500	673860	2581	16
Sarian	8	4000	26859	4077	9
Lari	4	5000	9567	6590	8
Gail	4	7200	10297	5950	12
Borr	2	1500	13238	4864	11
Salkhla	4	9500	1998	5250	12
Total	61	56409	787956	56494	120

Table 2: Directory of plant species found within 200 meters on musk deer direct sightings (n=4) and indirect evidences, i.e., on spotting of beds (n=07) or fecal deposits (n=18), Foot prints (n=13) and list of other animals reported from the area

Villages surveyed	Evidences	Plants
Palri	Direct observation in Palri (n=01) I indirect observation as fecal deposits (n=04) as foot prints (n=04)	<i>Picea smithiana, Abies pindrow, Taxus baccata, Prunus carmota; Stipp spp. Pousa annu, Parrotia jaquamontiana, Vibernum nervosum, polygonum amplaxicaul, Acer cacium, Taraxacum officinal</i>
Machiara	Direct observation in machiara Co 9A as killed by Common leopard (n=01) Indirect observation as fecal deposits (n=02) as bed/ resting place (n=01) As foot prints (n=03)	<i>Picea smithiana, Abies pindrow, Taxus baccata, Salix alba, Geranium wallichiana, Parrotia jaquamontiana, Polygonum amplaxicaul, Nalieriana wallichii, Saxifraga ciliata, Sassuria lappa, Veleriana spp. Skimmia laureola, Polygonum amplaxicaul, Rhododendron companulatum, Viola spp., Rosa muschata</i>
Hanathi	Direct observation in Hanthi(n=1) Indirect observation as fecal deposits (n=02) as bed/ resting place (n=01)	<i>Picea smithiana, Abies pindrow, Taxus baccata, Salix alba, Geranium wallichiana, Parrotia jaquamontiana, Polygonum amplaxicaul, Nalieriana wallichii, Saxifraga ciliata, Sassuria lappa, Veleriana spp. Skimmia laureola, Polygonum amplaxicaul, Rhododendron companulatum, Viola spp., Rosa muschata</i>
Ghamot	Indirect evidence in Ghamot as fecal deposit (n=02)	<i>Betula utilis, Juniperus communis, Picea smithiana, Abies pindrow, Aconitum hetrophylum, Saxifraga ciliata, Sassuria lappa, Nalieriana wallichii, Podophyllum emodi, Macrotomia benthami, Viola spp</i>
Sarian	Indirect evidence in sarian As fecal deposit (n=01)	<i>Picea smithiana, Abies pindrow, Taxus baccata, Acer cacium, Pousa annua, Parrotia jaquamontiana, Polygonum amplaxicaul, Vibernum spp.</i>
Gail	Indirect observation in Lari as fecal deposits (n=02) as bed/ resting place (n=01) as foot prints (n=02)	<i>Picea smithiana, Abies pindrow, Taxus baccata, Acer cacium, Acer pictum, Viola spp., polygonum amplaxicaul, Podophyllum emodi, Ajuga parviflora, Nalieriana wallichii, Vibernum nervosum, Geranium wallichiana</i>
Borr	Direct observation in Borr(n=01) Indirect observation as fecal deposits (n=02) as bed/ resting place (n=02) as foot prints (n=01)	<i>Picea smithiana, Abies pindrow, Taxus baccata, Acer cacium, vibernum spp., Jaglans regia, kimmia laureola, Rheum emodi, Polygonum spp., Saxifraga ciliata, Viola spp.</i>
Salkhla	Indirect observation in Salkhala as fecal deposits (n=02) as bed/ resting place (n=01) as foot prints (n=02)	<i>Abies pindrow, Picea smithiana, Taxus baccata, Acer cacium, Vibernum spp., Berbris aristidae, Skimmia laureola, Viola spp., Polygonum amplaxicaul, Betula utilis, Rosa muschata, Polygonum alpinum</i>

deer in the area. That is why the species is being endangered in Neelum valley.

Potential priority habitat for food noted is sub alpine birch forest and mostly mix coniferous forest. The dominant vegetation noted in the habitat is *Abies pindrow, Picea smithiana, Ttaxus baccata, Acer cacium, Vibernum spp. Berbris aristidae, Skimmia laureola, Viola spp Polygonum amlaxicaul, Betula utilis, Rosa muschata, Saxifraga cialata, Polygonum alpinum, Pousa annua, Parrotia jaquamontiana, Bergina cialata* (Table 2).

Neelum valley in the Administration department and official record of forest department of A.J&K, start from Noseri (42 km in the north of Muzaffarabad) but in the present study Neelum valley is considered from Domail Muzaffarabad (the point where river Neelum joins to

Jehlum river). Along with field visits the people interviewed were of different age groups and professions. Which gave the information about the musk deer's present and previous distribution in the area.

Musk deer is shy, solitary and territorial animal. It is crepuscular (active at dawn and dusk). It uses latrines for defecation. More than one animal may use single latrine. Droppings are covered with debris in the autumn<sup>[5]</sup>. In my study footprints of musk deer were traced for indirect evidences while fecal pellets and hair as direct evidence. During the survey it is noted that the fecal pellets were covered with debris. Average covered area of latrines noted was 1.5 m<sup>2</sup>. Being the solitary animal a musk deer was physically sighted at 2680 m asl and fecal deposit noted at 2270 m asl. In co 14 forest attached to the village palri a musk deer also sighted at 2720 m asl. in co. 12 of

locality 4 between two *Behk* (seasonal villages) *Danna* and *Pherthy*, at 11:00 A M Pakistan standard time. The animal darts off by leaping and gives no chance to take snap. Near the same place a grazed field of *skimmia laureola* was noted as a result of intensive grazing by musk deer during winters. *Skimmia laureola*, *Abies pindrow*, *picea smithiana*, *Taxus baccata*, *salix alba*, *Rosa moschata* along with the patches of *Betula utilis* are indicator forest type of musk deer's habitat in Neelam valley.

While according to Khalid *et al.*<sup>[18]</sup> musk deer remains usually above 10,000 ft (3000 m) asl. even in mid winter but this statement is not applicable in the case of Neelam valley. Musk deer (*Moschus chrysogaster*) spend winter season in mixed coniferous forests under the branches of *picea smithiana*, *Taxus baccata* and sometimes *Abies pindrow*. According to local poachers the branches provide shelter to animal from predators and heavy snowfall. The lower branches also serve as food for the animal when there is snow cover everywhere and climatic conditions are severe. The undigested leaves of *Taxus baccata* noted in the mouth and esophagus of musk deer killed by unknown predator in forest attached to village palri at 2270 m asl. while the remains of an animal were noted at 2969 m asl. in forest attached to village Hanthi in Graze valley that was killed by the poachers during winter snow fall in year 2002 in co. 24 of (locality 1).

The undigested hair of musk deer noted in the fecal material of leopard in Machiara National Park in forest block Kutla (Locality 11) site Co.9A at 2980 m asl.

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