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STATUS OF SNOW LEOPARD AND PREY SPECIES IN TORKHOW VALLEY, DISTRICT CHITRAL, PAKISTAN

J. U. Din and M. A. Nawaz *

Snow Leopard Foundation, Pakistan, 17- Service Road North, I-8/3, Islamabad
*Department of Animal Sciences, Quaid-I-Azam University, Islamabad
Corresponding author e-mail: ali.nawaz@slf.org.pk

ABSTRACT

The study was conducted from June – October 2007 and was aimed at assessing the status of snow leopard, its major prey base, and the extent of human-snow leopard conflict in northern Chitral (Torkhow Valley). Snow leopard occurrence was conformed through sign surveys using Snow Leopard Information Management System (SLIMS) protocol. Based on the data collected the number of snow leopards in the study area (1022 km²) was estimated to be 2-3 animals. Highest sign density was seen in Shah Junali (12.8/km), followed by Ujnu Gol (5.8) and Ziwar Gol (2.8). Extrapolating these estimates to the entire Chitral District, gives a population estimate of 36 snow leopards for the district. The livestock depredation reports collected from the area reflected 138 cases affecting 102 families (in a period of eight years, 2001-2008), indicating existence of serious human-snow leopard conflicts. Using point count method during the rut season, a total of 429 Himalayan ibex were counted in the area. The ibex is the only wild ungulate and primary prey for snow leopards in the study. Other carnivores recorded from the area included wolf, jackal, and fox. Major threats to the survival of wildlife especially snow leopard are retaliatory killing (shooting, poisoning), poaching, loss of natural prey, habitat degradation (over grazing, fodder and fuel wood collection), and lack of awareness.

Key words: Snow leopard, ibex, Chitral, Panthera unica.

INTRODUCTION

Snow leopard (*Uncia uncia*) classified as critically endangered species in Pakistan IUCN (2010) is disappearing from many parts of its formally vast range of 1.2 to 1.6 million km^2 in Asia (McCarthy and Chapron, 2003). The historical range of snow leopard is restricted to the mountains of Central Asia, with core areas in the Altay, Tien Shan, Kun Lun, Pamir, Hindukush, Karakoram, and Himalaya ranges (Hussain, 2003). The actual status of the species is largely unknown; however, there might be 4,000-6,500 snow leopards throughout its range (McCarthy and Chapron, 2003). Even its currently occupied range is poorly mapped because of limited funding, lack of trained wildlife biologists, and difficult logistics that severely constraint surveys across the snow leopards inhospitable habitat (Jackson and Hunter, 1993)

In Pakistan, the snow leopard inhabits comparatively arid alpine region including Chitral, Dir, Sawat, and Kohistan districts of Khyber Pakhtunkhwa (KPK), Gilgit and Baltistan districts of Northern Areas (NAs) and Neelam district of Azad Jammu and Kashmir (AJK) (Malik, 1995). It is sparsely distributed in northern isolated mountain valleys of Chitral (Schaller -1977) and has been regularly reported from Chitral Gol National Park since 1989.

Fox (1994) estimated snow leopard range in Pakistan to be 80,000 km^2, and Schaller (1976) placed its number at 100-250. Schaller surveyed a 300 km^2 area in Chitral known for Snow leopard, but found evidence of only 4-5 individuals. The Snow Leopard Conservation Programme, jointly run by the Snow Leopard Trust and WWF-Pakistan, has confirmed the presence of snow leopard in 12 valleys of the district Chitral through Snow Leopard Information Management System (SLIMS) surveys Snow Leopard Trust (SLT, 2001-2007).

The current study attempted to gather information on snow leopard status, its prey base and habitat, besides collecting information on the major threats faced by the cat in the Torkhow Valley. The information gathered through this study is expected to help conservation efforts for the species in the area.

MATERIALS AND METHODS

Study Area: The current study was focused on three sub-valleys (Zewar Gol, Ujnu Gol, Sha Junali) of the Torkhow Valley, which is one of the biodiversity rich areas of district Chitral (Fig. 1). The Torkhow Valley lies at a distance of about 190 kilometers towards northwest of Chitral town. It is part of the Hindu Kush mountain range, represents highly rugged terrain, with elevation ranging from 2000 m to above 6000 m. The Torkhow valley is bounded by Wakhan corridor on northwest, Terich valley on west, and Qagh Lasht plateau on south. The valley is remote with low human density, and represents one of the pristine habitats in Pakistan. However, despite of its great potential, status and

diversity of mammals in this valley has to be explored yet.The study area lies out of the monsoon range, and characterized as cold and arid zone. Most of the precipitation occurs in winter in the form of snow. Livestock rearing and subsistence farming are the major sources of income. The valley comprises of dry alpine habitats and harbors a variety of plant and animal species of Palearctic affinities. Dominant plant species include *Betula utillis* (Birch), *Juniperus excelsa* (Juniper), *Salix spp., Poplar spp., Ephedra spp*., Russian olive, *Artemisia spp*., wild sedges and grasses. Major wildlife include Snow leopard (*Uncia uncia*), Himalayan lynx (*Lynx lynx*), wolf (*Canus Lupus*), jackal (*Canus aureus*), Common red fox (*Vulpes vulpes*), Himalayan ibex (*Capra ibex sibirica*), hare, (*Ovis oitolus*), Long-tailed or Kashmir marmot (*Marmota caudata*), snow cock (*Tetraogallous himalayensis*), and Chukar partridge (*Alectoris chukar* (Roberts 1997).

Data Collection: *Interviews and Questionnaire surveys:* Questionnaire surveys and observations to assess the occurrence and distribution of predators have widely been used in Europe and North America (Fuller *et al*., 1992 and Martizanis, 1994). Focused group interviews and semi structure questionnaires were used as survey tools to get the information on snow leopard sighting, depredation, and major threats to the snow leopard in the survey area. These surveys also helped identify priority areas for SLIMS surveys.

SLIMS Surveys: To assess the relative abundance of snow leopard in the study area we applied Snow Leopard Information and Management System (SLIMS) survey technique developed by the Snow Leopard Trust, which is a standardized field technique for assessing snow leopard, prey and habitat status in different parts of its range. Transects were placed on the potential snow leopard its hotspots and data were decoded as per SLIMS standards (Jackson and Hunter, 93). Surveys were conducted at the three sites in June, July, August, and October, 2008.

Ujnu Gol was surveyed in the first week of July and seven transects were laid out. Major topographic features of the site were rugged snow caped peaks, cliffs, sharp ridges at lower altitudes, and alpine meadows. The minimum and maximum elevation noted during the transect walk were 3971 and 4088 with mean elevation of 3153 m and 3325 m at the start and end of the transects respectively. Overall transect length was 3.28 km with a mean of 469 m for this survey site. Transects length were kept less than a kilometer, following the SLIMS protocol. Sha Junali was visited in August 2008. Six transects with a total length of 5.29 km were searched for snow leopard signs. Mean transect length measured was 882 m with an elevation ranging from 3750 to 3996 m at the start and end of transects, respectively. The shortest transect measured 325 m while the longest transect length was 850m. Topography varied consisting of alpine meadows leading to the permanent glaciers. Ridge lines were associated with the streams running down from the glacier melt. Majority of transects were ridgelines followed by glacier and cliff bases.

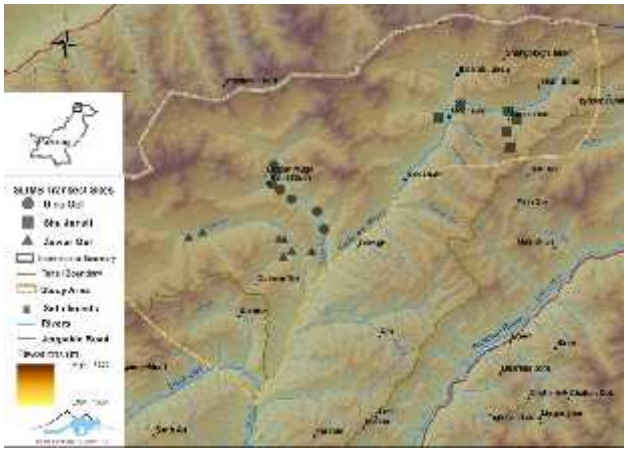

Figure 1. Map of the study area showing locations of the SLIMS transects.

Zewar Gol was visited in the second week of October 2007. It is a deep narrow valley which bifurcates into many similar landscapes each leading towards a separate permanent glacier. Eight transects were walked with the total transect length of 7.24 km and mean transect length of 905 m. Mean elevation ranged 3239 to 3550m. Transects length varied from 255 to 1430 m.

Distribution and abundance of snow leopard and its prey base was analyzed using SLIMS manual: it assumes that the greater the density of sign, the greater the relative abundance of snow leopard within a particular area. The snow leopard numbers were estimated by computing the average sign frequencies for each survey block, and classifying these according to the relative density classes i.e. high = more than 20 signs per kilometer, medium = 5 - 20 signs per kilometer, and low = less than 5 signs per kilometer. High density sign sites could be indicative of snow leopard densities as high as 10 or more cats per 100 km^2, while low density sites may have only one or two cats in the same area.

Ungulate Surveys: Point method (direct counting) was used for assess the population of major prey species (Himalayan Ibex) of snow leopard in the study area. Counting was made from the selected observation points and each observation site was set depending upon the visibility and topography of area and data was summed up to represent the over all population status in each site and the whole survey block subsequently. Surveys were conducted in the peak rut season i.e. last week of December. Binoculars and spotting scopes were used to visualize animals. Literature was consulted to compare the trend in population of the species over time.

RESULTS

Questionnaire Survey: The questionnaire surveys (n=150) helped enlist depredation cases, and threats to the snow leopard. The respondents included field staff of the KPK Wildlife Department, hunters, herders, and localites that had interest in wilderness. One hundred and thirty eight losses of livestock due to snow leopard, affecting 102 households were reported during a period of eight years i.e. 2001 to 2008. Highest losses were reported from Zewar Gol followed by Sha Junali, and Ujnu Gol, respectively. Furthermore, cattle made (Fig. 2) 21%, goat 68%, and sheep made 11% of the total losses to predation by the snow leopard at three sites.

Major threats to snow leopard were reported to be human induced and economically fueled and included retaliatory killing (shooting & poisoning), poaching for meat, pelt and bones, loss of natural prey-base, loss of habitat, lack of awareness and explosion of human population. Threats were ranked according to their intensity, based on community responses (Fig. 2).

SLIMS Surveys: Twenty-one transects using SLIMS were placed in the survey block having a total length of 15.36 km with mean transect length of 732m. A total onumber of sites was with a mean of 2.76 (range: 1-5) sites per transect. A total of 90 signs were recorded (1-9 signs per. The sign density was estimated at 5.86/km², indicating a low density of the cat in the survey area. Moreover, scrape frequency was highest (42%) followed by pugmark (31.11%), feces (14.44%), and rock scent (12.22%), respectively. All of the recorded signs were old and weathered, hence categorized into the two age classes following the SLIMS protocol i.e. age class 0 (62%) and age class 1 (38%). This suggests lack of recent visits of the cat to the study area.

The snow leopard sign density was highest in Shah Junali, followed by Ujnu Gol, and Ziwar Gol (Table 1). However, this difference was not statistically significant (χ^2=0.0264, P=0.9869). Details of SLIMS findings in three valleys is described below.

Ujnu Gol: Twenty-three sites containing 42 signs with 16 pugmarks (42.86%), 15 scrapes (35.71), and 6 scats (14.29%) were reckoned while searching for snow leopard's signs in seven transects. Sign density of all transects for this survey site was 12.79, and signs belonged to either age class 1 (67%), or age class 1 (33%).

Sha Junali: Six transects with average transect length of 882m were searched for snow leopard signs. Fifteen signs including two pugmarks (13.33%), 10 scrapes (66.67%), and three scent spray sites (20%) were reckoned in 11 sites with an average of 1.83 sites per transect. All the signs represent only two age classes i.e. age class 0 (73%) and 1 (27%).

Zewar Gol: We observed 33 signs in the 24 sites of the eight transects walked. Mean transect length was 905m. Signs recorded were of either age class 0 (54%) or 1(56%). Pugmarks constituted 24.2%, scrapes 39.4%, feces 21.2%, and rock scents 15.2% of the total signs recorded.

Ungulate Surveys: Total count for the Himalayn ibex in the study area was 429 animals; 128 in Zewar Gol, 184 in Ujnu Gol, and 117 in Sha Junali (Fig. 4). There were 29% males in the population, 34% females and 37% fawns. However, sex ratio was not significantly different from 1:1 (χ^2=0.2733, P=0.6011).

Other Wildlife Observed: The other observed wildlife (through signs and sightings) include wolf (*Canis lupus*), jackal (*Canis aureus*), Common red fox (*Vulpes vulpes*), Cape hare (*Lepus capensis*), Long-tailed or Kashmir marmot (*Marmota caudata*), snow cock (*Tetraogallous himalayensis*), and chukar partridge (*Alectoris chukar*). Marmots were more abundant in Sha Junali, whereas scats of fox were common everywhere.

DISCUSSION

This study provided the first ever density estimates of snow leopard from the Torkhow Valley, which lies in the north of Chitral district. Based on the sign densities observed and comparing them with the standard SLIMS estimates we expect the occurrence of 2-3 snow leopards in the study area of 1022 km².

Relative abundance of snow leopard in this study area is low, however, it is comparable to the densities reported from other parts of the district. SLIMS surveys conducted in the Chitral Gol National Park in 2008 (SLT, 2008) showed a mean sign density of 5.86, which is very close to that in our study area. Similarly, SLIMS surveys conducted in 12 other valleys of Chitral (SLT, 2001-07) revealed low and comparable densities. Furthermore, the first ever GPS collared snow leopard captured form Chitral Gol National Park (SLT, 2008) indicated a home range of the cat over 1500 km^2, supporting our observation of low sign density in the area.

Malik (1995) estimated the number of snow leopard in the KPK to be 76. Utilizing our estimates (2.5 animals/1022 km^2) for Torkhow Valley, the population for the Chitral district (14850 km^2) could be projected at 36 animals. The study area also hosts a sizeable population (429 animals) of primary prey of the snow leopard, which is a good indicator of a healthy habitat. Moreover, our estimates for the Himalayan ibex are not much different from the reports of the KPK Wildlife Department (KPK Wildlife Department, 2004-07).

KPK Wildlife Department received 59 claims for the losses of 303 livestock head mostly sheep and goat form Chitral and other parts of KPK in a period of

ten years (Malik 1995). Present study indicates existence of stern human-predator conflicts in the Torkhow Valley, by documenting annual loss of 17 heads of livestock. This situation creates a serious threat to the snow leopard as people tempt to kill the cat in retribution. A few instances of such killings have been reported from Chitral as well as northern areas, however, many of such incidences go unnoticed (Ahmad, 1994). Fortunately, there were no reports of snow leopard killing in the area, yet the depredation issue makes the species vulnerable in the study area. We suggest initiation of a community based conservation program in the study area to address this grave issue.

During the questionnaire surveys, it was noticed that the locals are unaware of the ecological importance of the wildlife particularly role of carnivores, consequently, a revulsion against carnivores was noticed in the community. This issue could be addressed through an conservation education program, which must target students, teachers, as well as the general community.

This study confirms presence of the snow leopard in the area. However, it would be useful to repeat these transects periodically that would allow to better understand variation in density of the species over the time. Over 50% of the snow leopard range in Chitral District, including the study area, borders with the Afghanistan. Similar surveys on other side of the border would help understand movement of the species.

Table 1: Sign Frequencies of Snow Leopard in SLIMS Surveys.

		Sites	Signs	Pug	Scrapes	Feces	Rock scent
Ujnu Gol							
	Total	23	42	16	15	6	3
	Average	3.29	6	2.57	2.14	0.86	0.43
	Minimum	2	5	2	1	0	0
	Maximum	5	9	3	4	2	1
	Sign/km		12.79	5.48	4.57	1.83	0.91
Sha Junali							
	Total		11	15	2	10	3
	Average		1.83	2.5	0.33	1.67	0.5
	Minimum		1	1	0	1	0
	Maximum		2	4	1	3	1
	Sign/km			2.84	0.38	1.89	0.57
Zewar Gol							
	Total	24	33	8	13	7	5
	Average	3	4.13	1	1.63	0.88	0.63
	Minimum	2	2	0	1	0	0
	Maximum	4	7	2	2	5	1
	Sign/km		4.56	1.1	1.8	0.97	0.69

Figure 2. Snow leopard depredations in Torkho Valley, Chitral during 2001-2008.

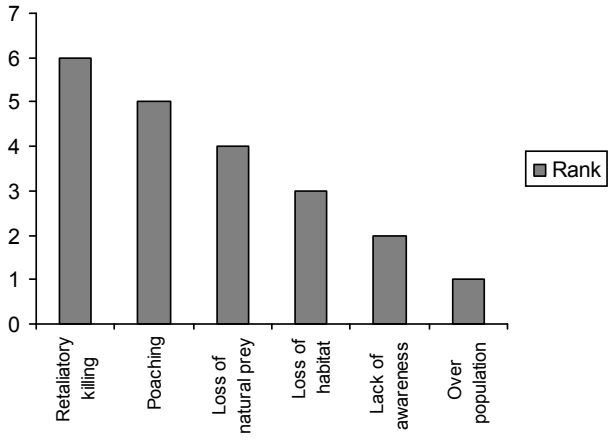

Figure 3. Ranking of threats to wildlife in the Torkho Valley, Chitral District, Khyber Pakhtunkhwa, Pakistan.

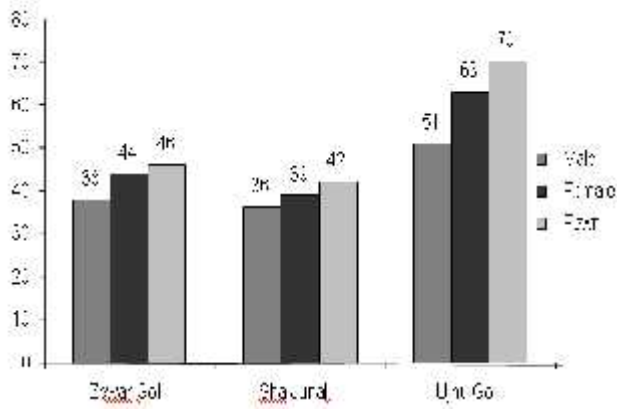

Figure 4. Population status of the Himlayn ibex in the Torkho Valley, Chitral.

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