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The Eurasian lynx, listed Near Threatened in IUCN Red List, has one of the widest ranges of all cat species. Its Himalayan populations are known to be distributed in northern Pakistan, including Chitral district. However, actual status of the species and its real distribution limits are not known in Pakistan. This study provides an assessment of the status and distribution of the Himalayan Lynx in Chitral District, NWFP along with intensity of its conflicts with humans. Lynx occurrence was confirmed through public reports and livestock depredation cases were documented in five tehsils of the district. One hundred and sixty-four reports of lynx occurrence and 214 incidents of livestock depredation were recorded from 2001-2008 in an area of 14,850km2 of the district. Highest reports were from the Mastuj and lowest from the Torkhow tehsil. Livestock especially sheep lambs and goat kids were the major victims of lynx attack followed by poultry. This livestock loss means an economic hardship for the poor communities, thus, is a major source of human-cat conflicts. The prime threats to the existence of carnivores were retaliatory killing, loss of natural prey-base, loss of habitat, overpopulation, and lack of awareness and support.

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STATUS OF THE HIMALAYAN LYNX IN DISTRICT CHITRAL, NWFP, PAKISTAN

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ABSTRACT

The Eurasian lynx, listed Near Threatened in IUCN Red List, has one of the widest ranges of all cat species. Its Himalayan populations are known to be distributed in northern Pakistan, including Chitral district. However, actual status of the species and its real distribution limits are not known in Pakistan. This study provides an assessment of the status and distribution of the Himalayan Lynx in Chitral District, NWFP along with intensity of its conflicts with humans. Lynx occurrence was confirmed through public reports and livestock depredation cases were documented in five tehsils of the district. One hundred and sixty-four reports of lynx occurrence and 214 incidents of livestock depredation were recorded from 2001-2008 in an area of 14,850km^2 of the district. Highest reports were from the Mastuj and lowest from the Torkhow tehsil. Livestock especially sheep lambs and goat kids were the major victims of lynx attack followed by poultry. This livestock loss means an economic hardship for the poor communities, thus, is a major source of human-cat conflicts. The prime threats to the existence of carnivores were retaliatory killing, loss of natural prey-base, loss of habitat, overpopulation, and lack of awareness and support.

Key words: Chitral, Depredation, Himalayan Lynx, Population, Status

INTRODUCTION

Lynx is one of the 36 felid species found worldwide. Genus lynx consists of three species i.e. Canada lynx, Iberian lynx, and Eurasian lynx distributed over major part of the globe. The Eurasian lynx *(Lynx lynx; Linnaeus 1958)* is the largest of the lynxes and listed Near Threatened (NT 3.1) in IUCN Red List (Global: Category 5b. Regional (Asia): Category 3. Regional (Europe): Category 2). It is found in the southwestern part of the lynx's range (southern Europe, Asia Minor (including Northern Pakistan) and the Caucasus (Heptner and Sludskii, 1972).

Adult males weigh on an average 21.6 kg (n= 103), while females are slightly smaller at 18.1 kg (n=93). The Eurasian lynx has relatively long legs, and large feet which provide a "snowshoe effect," allowing for more efficient travel through deep snow. In winter, the fur grows very densely on the bottom of the feet (Formozov, 1946). Mating season is February-April, births May-June (Europe, Russia: Kazcensky, 1991, Kvam, 1990) and gestation period is 69 day (Hemmer, 1976). Age at first reproduction is 20-24 months and longevity up to 17 years (Breitenmoser *et al.,* 1993).

Specialization for different prey (Lagomorphs, deer, rodents and livestock) has led to a divergence in life history and social and spatial organization in lynxes. Unlike the Canada lynx, the Eurasian lynx has a "phenotype set" typical of a large felid (Sunquist and Sunquist, 1989): it is large, long-lived, kills prey at least half its own body weight, forages over wide areas, and generally exists at low densities.

In Europe and Siberia, lynx are associated primarily with forested areas which have good ungulate populations (Haller and Breitenmoser, 1986; Breitenmoser and Haller, 1987). In central Asia, lynx occur in more open, thinly wooded areas (Heptner and Sludskii, 1972 and Tan, 1984). Lynx are probably found throughout the northern slopes of the

Himalayas, have been reported both from thick scrub woodland (Chundawat, 1990) and from barren, rocky areas above the tree line (Roberts, 1997). On the better-forested southern Himalayan slopes, the only record is a sighting in alpine tundra (4,500 m) from the Dhaulagiri region of Nepal (Fox, 1985). Lynx occur locally over the entire Tibetan plateau, and are found throughout the rocky hills and mountains of the central Asian desert regions (Heptner and Sludskii, 1972). The Eurasian lynx has one of the widest ranges of all cat species, with approximately 75% of the range within the borders of Russia. Lynx have been recorded as far north as 72" N, near the edge of the continental landmass (Zheltuchin, 1992).

In Central Asia, the Eurasian Lynx is also native to the Chinese provinces of Gansu, Qinghai, Sichuan and Shaanxi, as well as to Mongolia, Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, Tajikistan, and to Northern Pakistan (Roberts, 1997).

In Pakistan, lynx has been reported from Chitral District in NWFP and Gilgit Baltistan. However, all the reports are based on anecdotal information or expert

judgment and no attempt have been made to document its occurrence and distribution on scientific basis. Therefore, the available information has limited reliability. This study aimed at collecting first ever information on this elusive species in District Chitral, Pakistan. Major objectives of the study were: to determine the occurrence and distribution of lynx in Chitral district, and assess human-lynx conflicts.

MATERIALS AND METHODS

Study Area: The study was stretched over the entire district of Chitral, which is the northern most district of North West Frontier Province (NWFP) of Pakistan covering an area of 14850 square kilometers and lies between 71º 12' – 73º 53' east longitude and 35º 13' – 36º 55' north latitude (Fig: 1). The district is a mountainous tract and situated in the famous Hindu Kush mountain range with elevation ranging from 1067m at Arandu to 7682m at Terichmir, the highest peak of Hindu Kush. This variation in altitude divides Chitral into 30 beautiful valleys with total population of over 360,000 heads living in 42500 households (GoP, 1998). It is surrounded by the Wakhan, Badkhshan, Asmar and Nooristan area of Afghanistan in the north, west and south-west. On its southern boundary lies Dir. In the east lie Gilgit and Swāt Kohistan.

Fauna of Chitral has affinities to Palearctic Faunal Region with only a slight oriental mix from the south. Dry and arid temperate climate has been compensated for its species richness by great altitudinal variation. The migratory corridor status of the valley has contributed further to seasonally rich biodiversity of the district.

People are generally poor and the major sources of income include livestock rearing and subsistence farming. The boulder strewn meadows are used as grazing lands. Thus the socio-economic factor coupled with ethnical, cultural, traditional, and religious factors have a direct bearing on the mountain ecology. The most crucial are those directly causing loss of biodiversity. This may be either due to heavy dependence of communities on a resource or lack of awareness about its sustainable use. Overgrazing of pastures, inappropriate slope cultivation, poaching of wild animals, destruction of forests, and the consequent erosion and high sediment loads in rivers, are just of a few factors threatening the fragile mountain ecosystem of Chitral district. One of the most important and neglected factor associated with these problems is the lack of awareness of the importance of biodiversity and its sustainable harvesting.

Data Collection: We divided the study area in to six blocks to systematically cover the entire district, and each block corresponded to one Tehsil of the district on the basis of old administrative set up of the district. Major data sources set were; (a) questionnaire surveys & group interviews (b) depredation surveys (c) literature review and consultation with cat experts. The information was collected for the period of eight years i.e. 2001 to 2008.

(a) Questionnaire Surveys: Questionnaire surveys and observations to assess the occurrence and distribution of predators have widely been used in Europe, North America, and Asia (Fuller *et al*., 1992, Martizanis 1994, and Mishra, 1997). Detailed semi-structured questionnaires and data sheets were developed to collect data on lynx population, occurrence, predation, major threats, habitat conditions, food preferences, status of pastures and livestock. The major respondents included field staff of the NWFP Wildlife Department, herders, shepherds, hunters and naturalists.

(b) Depredation Surveys: Where large carnivores occur together with free-ranging livestock, predation is likely to exist. This is among widely applicable method in European countries which pay compensation for livestock predation (Kaczynski, 1996). Lynx predation reports on livestock were collected throughout the study area to document intensity of predation. Two other predators (snow leopard *Uncia uncia* and wolf *Canis lupus*) exist in the study area, therefore we ensured that the recorded predations are caused only by lynx. Being a felid species, lynx suffocates prey species by canine punctures on neck, and this characteristic helps distinguish its predations from canids such as wolf which usually attack posterior part of the prey's body. Smaller prey size (mostly lambs) differentiates predation of lynx from snow leopard.

RESULTS

Occurrence and Distribution: Out of 248 informants, 66% (n=164) indicated the occurrence of Himalayan lynx in different parts of the district during the last eight years, i.e. 2001 to 2008 (Table. 1). Highest lynx occurrence (34.76%) was reported in Mastuj, while the lowest reports (0.76%) were noted in Torkhow. The average sighting of the cat made by informants for entire district in a period of eight years was 0.61 (SD=0.21). Lowest public sightings (0.25 per informant) were reckoned in Torkhow, while the highest (0.81) was in Mastuj. However, difference in lynx densities among different tehsils of the district was not significant (χ^2 =0.995, P= 0.962, df= 5). Field staff of the NWFP wildlife department (47%) and shepherds (32%) reported most of sightings, hunters contributed 8% and general public rest of 13%.

Majority of lynx reported sightings (85%) were at dawn and dusk indicating the nocturnal behavior of the species. Similarly, most of the lynx sightings (78%) were associated with shrub lands near winter pastures followed by broken rocks and meadows along the pony treks of summer pastures. More than 90% of reported lynx

sightings were of a single animal, indicating that the cat is solitary by nature. These sighting reports were collected from the mountain range with elevation ranging from 1,067m at Arandu to 3,000-5,000 m in Terich and Laspur Valleys, suggesting that the elevation range of the species could be 1,000-5,000 m. However, this needs to be verified through studies on habitat preference and movements.

Major threats to lynx documented during the study were human induced and economically fueled; included retaliatory killing (shooting, trapping, and poisoning), poaching for pelt and bones, loss of natural prey-base, loss of habitat, lack of awareness, and explosion of human population. Threats were ranked on the basis of their intensity as per informants.

Depredations: We were able to record 214 depredation cases of livestock from various localities of Chitral during the 8 years period (Table 2). The highest no of losses (27.93%) were recorded from Mastuj, while the lowest (0.79%) was noticed in Torkhow with the average damage to livestock of 41.16% (Fig: 2). Domestic goats made up 43%, sheep 25%, and poultry 19% of the total depredation cases reported..

DISCUSSION

Knowledge of the distribution area of species is a fundamental tool in studies focusing on the conservation and management of natural heritage (Palomo and Gisbert, 2002). Carnivores' distribution is hard to establish (Lovell *et al*., 1998) since carnivores are difficult to observe, identify in the field, often nocturnal, and found in low densities. Questionnaires are often used as a source of information on the distribution (Berg *et al*., 1983) and population trends (Carrier and Beebee, 2003) of several species, especially carnivores, being used to collect data on hunting activities (Crete and Messier, 1987). Lynx occurrence and distribution during this study was confirmed using questionnaire and depredation surveys as primary tools of data collection.

Roberts (1997) gives the details of an adult specimen from Boni, Chitral (has been mentioned Bunir in Mammals of Pakistan) and also mentioned pelt trade in Chitral district. Similarly, Hess (1993) saw a lynx in Chitral Gol. One hundred and sixty-four informants reported sightings in a period of eight years (2001-2008), with dominant majority (84) from the Mastuj tehsil. During the current study a lynx cub was captured in Thunic village of Lotkoh valley in November 2007 that weighed 7.71 kg. In Chitral subdivision the majority of sightings were from Tooshi Game Reserve, in the buffer zone of Chitral Gol National Park, Gahirat and Golain Gol Game Reserves, Koghuzi Gol, Shishikoh, Arkari Game Reserve, Gobor, Munor, Begusht, and Muran valleys. In Mastuj subdivision the bulk of reports were from Boni to Yarkhon and Laspur valleys. Highest reports were from the alpine meadows and shrub lands, indicating that Himalayan lynx, unlike other species of the same genus, probably avoids dense forests. This observation is in conformity with the reports of Roberts (1997).

Himalayan lynx partly hides or buries its prey provided that the prey is large animal and couldn't be consumed at once (Korschgen, 1969). A very similar observation was made on 18th December 2007 at Tooshi-Shasha Community Game Reserve, where an adult lynx killed a markhor lamb and took the corpse up the ridge under an oak tree and tried to hide the posterior part of the prey. It was also observed that the lynx jumped at about 12 feet to capture the prey. Canine punctures were also visible on either side of the neck region of the lamb indicating the cat suffocated the prey as other felids like snow leopard.

Evidence of increased livestock depredation by large carnivores in the Himalayas and Hindu-Kush mountains has been attributed to the increasing population of the livestock (Jackson and Hunter, 1996; Mishra, 1997; Hussain, 2003), and this issue need to be addressed for an appropriate management of protected areas in the region (Namgail *et al*.,2007). The depredation on livestock reflects either the non-availability or thin natural prey base, which is due to poaching of prey species (like ibex), overgrazing of pastures, habitat loss, and food competition. Changing climatic conditions like global warming and low precipitation coupled with uncontrolled human population growth is also contributing to the decline of wild species in the alpine highlands.

Since, livestock rearing is the major source of income of the highland communities; it makes the prime cause of human-wildlife conflict in the alpine zones of the world. Total livestock population of Chitral district is 1,294,646 animal heads including 173,262 cattle, 188,822 sheep, 2 camel, 9, mule, 590,022 poultry, 279 buffalos, 335,780 goats, 1,194 horses, and 5,276 asses (source: NWFP Livestock Department). This huge number of domestic stock is utilizing alpine and sub alpine meadows, which are also the only source of food for the wild ungulates and other wildlife species. Thus livestock rearing presents the prime cause of human-wildlife conflicts in the area.

During this study efforts were made to get data on the occurrence of other carnivore species as well. Other carnivore species enlisted during the study include wolf, snow leopard, jackal (*Canis aureus*), fox (*Vulpus vulpus*), and leopard cat (*Prionailurus bengalensis*).

Conclusion and Recommendations: Based on the findings of this study, we suggest that using this study as a baseline (1) detailed surveys need to be conducted to assess the relative abundance of the species, and (2) in

the areas of higher abundance camera trapping and capture/ collaring studies are prerequisite to assess the absolute abundance and home range of the species. To reduce the human-predator conflict and promote sense of resource stewardship in the communities, community based conservation projects need to be initiated in one of the high depredation zone. Improving natural prey base will help reduce predation on livestock, thus drive down conflicts with communities. A well-targeted conservation education and awareness program will help to develop nature friendly attitudes and practices in the stakeholders.

Table 1: Lynx occurrence in Chitral District, based on public sightings made during 2001 to 2008

Tehsil	Area in Km^2	No. of Informants	No. of Lynx Reported	Animals sighted per informant
Mastuj	3357	70	57	0.81
Lotkoh	2260	58	38	0.66
Mulkhow	2937	34	25	0.74
Chitral	1615	54	24	0.44
Drosh/Arandu	2583	24	18	0.75
Torkhow	2098	8	2	0.25
Total	*14850*	*248*	*164*	*0.61 (Average)*

Table 2: Livestock depredations by lynx, recorded in Chitral District during 2001 to 2008

Location	Sheep	Goat	Poultry
Mastuj	34	17	3
Lotkoh	10	30	10
Mulkhow	8	3	15
Chitral	5	43	10
Drosh	4	10	10
Torkhow	1	1	0
Total	**62**	**104**	**48**

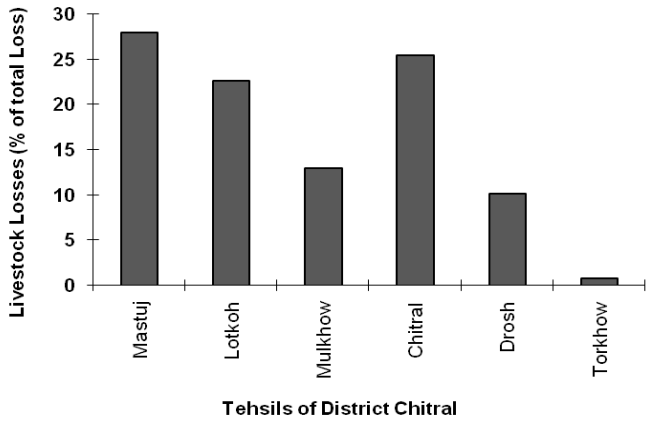

Figure 2. Relative intensity of Lynx depredations in different parts of Chitral district, NWFP

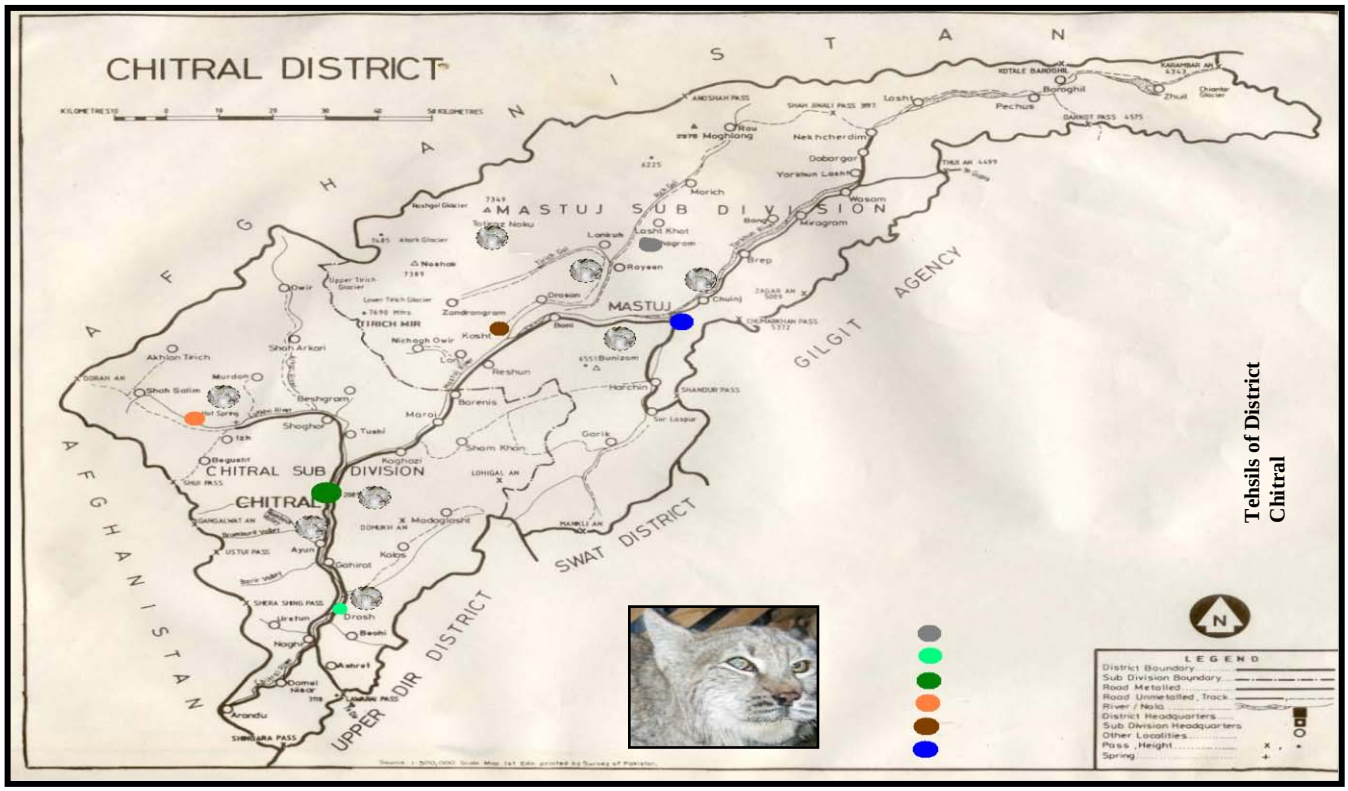

Figure 1. Map of the study area.

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