

Current status of brown bears in the Manasalu Conservation Area, Nepal

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Abstract: Although brown bears (*Ursus arctos*) are rare in the Himalayan region, populations have been documented in alpine habitats of Pakistan and India. Brown bears were once known to exist in both Nepal and Bhutan, but current information on their numbers and distributions was lacking. We document the presence of brown bears in the Manasalu Conservation Area (MCA) in Nepal using field surveys and interviews with local people. We were able to confirm the existence of a remnant population based on finding bear scat and locations where bears excavated for Himalayan marmots (*Marmota himalayana*). Based on interviews with local people, it appeared that the presence of brown bears in the area is relatively recent and likely a result of immigration of bears from the Tibetan Autonomous Region. Interviews with local herders also indicated that livestock losses from brown bear predation amounted to approximately 318,000 Nepali rupees (US \$4,240) from February 2006 through July 2008.

Key words: brown bear, distribution, livestock depredation, Nepal, *Ursus arctos*

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The brown bear (*Ursus arctos*) is the most widely distributed ursid in the world (Servheen et al. 1999, Schwartz et al. 2003). Historically, the species ranged across a large portion of North America, including northern Mexico, throughout Europe, Asia, the Middle East, and even across North Africa. Status

of the brown bear varies throughout the world from endangered to common; they are listed as vulnerable under criteria C2a(i) version 3.1 (<http://www.iucnredlist.org/apps/redlist/details/41688/0>) in the IUCN (International Union for the Conservation of Nature) Red List. They are also listed in Appendix II of the Convention on International Trade in Endangered Species (CITES). The species is endangered in many regions in Asia, where small, isolated populations exist mostly in remote mountainous areas (Servheen 1990, Servheen et al. 1999).

Remnant populations of brown bears are scattered across many portions of Asia; however, very little is known about numbers or connectivity. In Pakistan, there are an estimated 150–200 bears in 7 populations in the Himalaya, Karakoram, and Hindu Kush Ranges, but only one has >20 individuals (Nawaz 2007). In India, brown bears exist in 23 protected areas and 35 localities in the northern states of Jammu, Kashmir, Himachal Pradesh, and Uttarakhand, but they are regarded as common in only 2 protected areas. Nationally, there are an estimated 500–750 individuals (Sathyakumar 2001, 2006). In China, brown bears exist in poorly defined populations in the west and north-east, with estimates of 6,000 and 1,000 in each of these regions, respectively (Gong and Harris 2006).

The Himalayan brown bear (*U. a. isabellinus*), a subspecies that represents an ancient lineage of the brown bear (Gong and Harris 2006, Galbreath et al. 2007), was distributed over the Greater Himalaya region. Conservation efforts have been hindered by the lack of information about its current status (Servheen et al. 1999). This subspecies is thought to occur at very low densities in the alpine regions of the Greater and Trans Himalayan regions of India (Sathyakumar 2006). Nothing is known about the distribution and abundance of brown bears in Nepal, and the species has not been recorded in Bhutan to the east since the 1950s (S. Sathyakumar, unpublished data). The bear populations in Nepal and Tibetan Autonomous Region of the People's Republic of China (TAR) belong to a separate subspecies (*U. a. pruinosus*) not connected to the bear population in India (*U. a. isabellinus*) because of a gap in the distribution between western Nepal and India (Galbreath et al. 2007).

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In Nepal, brown bears are thought to be distributed in the Annapurna and Manasalu Conservation Areas, Shey-Phoksundo National Park (unconfirmed), and corridors connecting these areas. Locally, the brown bear is known as ‘Tingting’ in the Gorkha area of Manasalu Conservation Area and ‘Mithe’ or ‘Deme’ in the Upper Mustang area of Annapurna Conservation Area. Brown bears are sometimes referred to as ‘Yeti’ in the region. The National Park and Wildlife Conservation Act 2029 (Government of Nepal 1982) prohibits killing endangered flora and fauna, including brown and Asiatic black bears (*Ursus thibetanus*). Nepal has established national park, reserve, and conservation areas for the conservation of endangered flora and fauna, but many species are severely depleted due to exploitation, pollution, habitat destruction, poaching, and human and livestock pressures in natural habitats (Government of Nepal 2002). Both bear species are believed to be depleted due to poaching and habitat destruction (Government of Nepal 2002), but information is inadequate to make such a determination. We initiated this study to investigate the potential presence and distribution of brown bears in Manasalu Conservation Area using field surveys and interviews with local people. We also gathered data on human–bear conflicts.

Study site

Our study site was the Manasalu Conservation Area, Nepal (Fig. 1), which covers 1,663 km² and consists of a mosaic of habitat for 33 mammal, 110 bird, 11 butterfly, and 3 reptile species (Shrestha 1997, Government of Nepal 2002). There are approximately 2,000 species of plants, 11 types of forests, and over 50 different medicinal plants. The bio-climatic zones vary from sub-tropical to nival (>5,000 m). The altitude ranges from 600 m to the summit of Manasalu (8,163 m). The Manasalu region has 6 climatic zones. Our study area was located in 3 zones: sub-alpine, alpine, and arctic, all >3,000 m. In the sub-alpine zone, winters are very cold and summer mean temperature reaches 6–10°C. The alpine zone is mostly open meadows. The arctic climatic zone is >4,500m with snow line at 5,000 m. Monsoons (Jun–Sep) provide three-fourths of the total precipitation. Post-monsoon (Oct–Feb) is usually dry. Average precipitation is around 1,900 mm/year. The southern part of the region

remains cloudier and wetter than the upper sub-alpine and alpine areas (Government of Nepal 2002).

Methods

Presence and absence survey

During April–July 2008, we conducted a presence and absence survey in Manasalu. First we interviewed local people to identify potential locations where brown bears resided. Based on this, we decided to focus our survey efforts in the Sama Village Development Committee (VDC) area. We carried out field surveys by walking along livestock and human trails in the most likely habitat (i.e., convenience sampling). We verified the presence of brown bears with clearly identifiable sign including tracks, scats, and excavations made to capture Himalayan marmots (*Marmota himalayana*). We assumed all bear scats found were from brown bears because the area we searched was well above treeline and outside the known range of the Asiatic black bear (Shrestha 1997). We also documented body parts of bears that were shown to us by local people and that could be related to time and place of collection, and considered them recent evidence of bear presence. We photographed and measured all specimens. Finally, we considered interactions between bears and people, including depredation of crops and livestock, as evidence of bear presence when we had reasonable assurance that bears were indeed involved. We focused on brown bears, but we also collected information on Asiatic black bears (not presented here) to provide baseline information for further research and management. We showed photographs of the 2 bear species to local people during interviews to help ensure they knew the difference between species.

Livestock depredation data

We interviewed local villagers and herders from the 3 villages of Sama, Lho, and Prok VDC to document bear depredation of livestock. We only considered livestock depredations that occurred from February 2005 through July 2008. Because brown bears are the only possible predator occurring within potential brown bear range in the Manasalu Conservation Area, we assumed that all livestock depredation within this area was directly associated with brown bears. To our knowledge there are no snow leopards (*Uncia uncia*) or other large predators in the Samdo area of Manasalu Conservation Area.

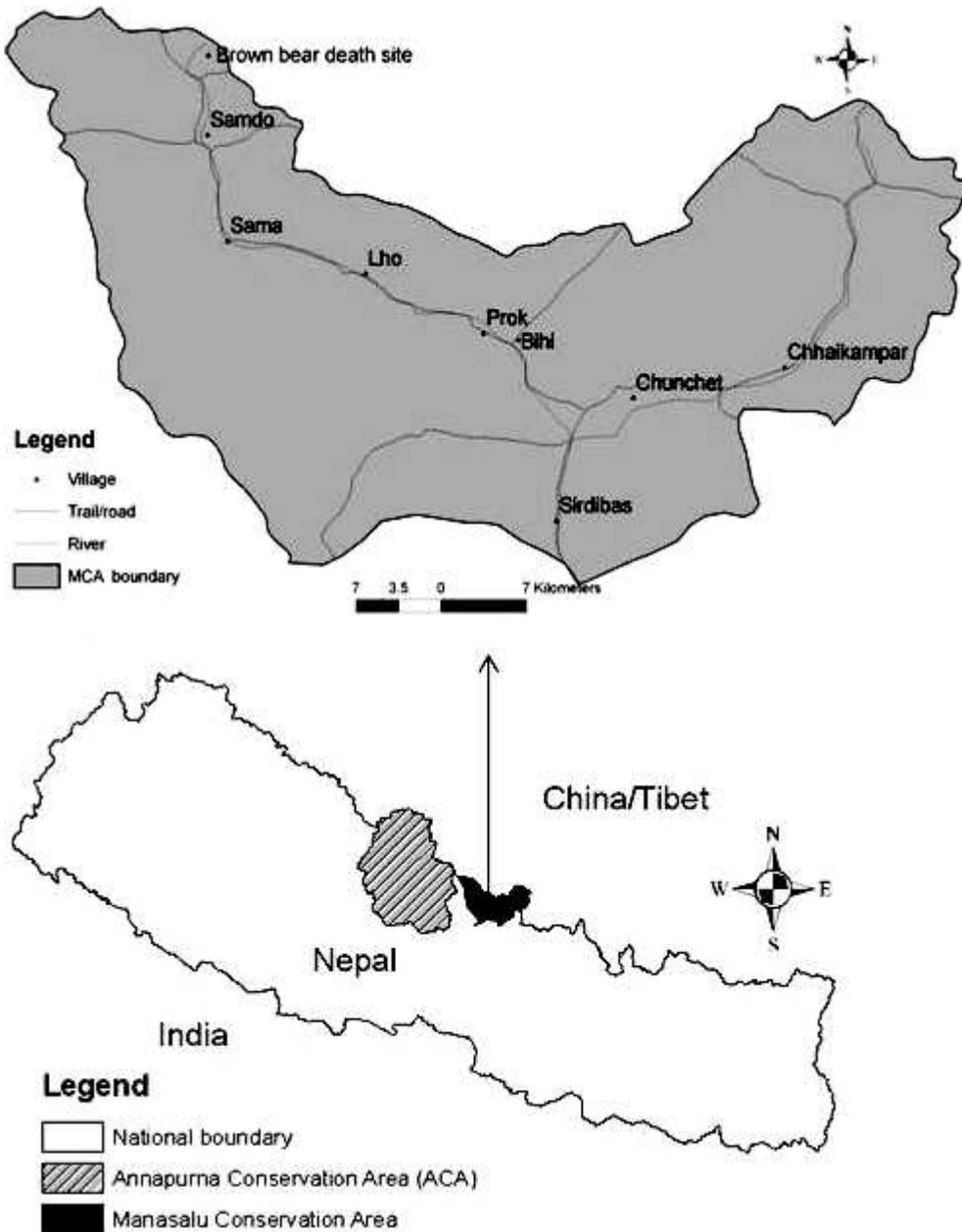


Fig. 1. Manasalu Conservation Area, Nepal (top) showing the survey area and brown bear death site and protected areas of Nepal (bottom).

We attempted to verify the response of individual herders by independently interviewing family members or others from the area, because some pastoralists' have a propensity to exaggerate numbers of livestock killed by predators, perhaps in the hope of compensatory remittance from authorities. We estimated prevailing market value for each type

of livestock by interviewing herders and on the basis of local selling and buying rates. The income of local people was estimated to be between \$20 and \$100 US/month in 2008 (we converted from Nepali rupees to \$US using the exchange rate prevailing in 2008). We plotted field data and local information to develop a distribution map of brown bears in the

Manasalu Conservation Area using ArcMap (version 9.1, ESRI Inc., Redlands, California, USA) software.

Results

Presence and absence survey

We walked >200 km of trails within the Manasalu Conservation Area. We did not see any brown bears, but documented 29 scats and 67 marmot digs. Brown bear scats (0.3 bear scats/km²) and digging (0.8 digs/km²) were found in 7 areas (Chhewang, Gyala, Lajun, Mayoal, Rongcha, Mendethang, and Wachhang) above Samdo village.

We interviewed 287 individuals (including 19 visitors from TAR) from the Samdo, Sama, Lho, Prok, and Bhimtang areas. Samdo, Sama, Lho, and Prok are close (<10 km apart) to each other, whereas Bhimtang is about 27 km distant from them. However, in these areas people frequently visit each village for business purposes; they also use the Samdo area for livestock grazing. One hundred and seventy nine people we interviewed reported observing brown bears in Sama (specifically, in the Gyala, Mayoal, Yaguthang, Chhetang, and Lajung areas). Based upon the plotted locations of reported sightings, we concluded that a single brown bear was first observed in 2005 (Gyala area), with 2, 4, and 9 different individuals sighted in 2006, 2007, and 2008, respectively. Local people interviewed felt that the brown bears they observed in Nepal moved into the Manasalu Conservation Area from the TAR. The general belief was that presence of brown bears in the Manasalu Conservation Area was quite recent; the number of observations seemed to have increased each year. Based on our interviews, we ascertained that there were likely 9 brown bears (5 adults, 4 cubs) in the Samdo area. These bears were observed between February and June, 2008 when people collected *Cordyceps sinensis* (locally called Yarshagumba, see <http://www.brtf.org.np/information/publication/41/>). Additional sightings occurred during October–December, when livestock were moved to lower elevations outside the Manasalu Conservation Area and human activities were low.

The consensus of the 19 TAR people we interviewed (who also use areas within Manasalu) was that they believed there to be 20–30 brown bears in the Qurung district of TAR adjacent to Sama. People from the Nepal side felt the area within Nepal



Fig. 2. Skull of brown bear found in Sama Area of Nepal. The eruption of the upper canine teeth is incomplete (length about equal to 3rd incisor), suggesting this bear was a juvenile.

was more secure for brown bears because of higher levels of poaching in the TAR. They reported that, within the TAR, people set traps and snares to kill or capture cubs of brown bears and snow leopards for sale. One respondent reported selling a brown bear cub for 1,500 Chinese yuan (¥) (US\$220). The respondents from TAR indicated that brown bear predation on livestock was a problem there and as a consequence, livestock herders used poison to kill brown bears. They reported that at least 2 brown bears were known to have been poisoned in December 2007, one in the TAR and the other in Gayal area in Nepal (Fig. 1). People we interviewed in Sama also blamed herders from TAR. The skull of one specimen suggested it was a young bear (Fig. 2).

Brown bears and human conflict

The herders we interviewed reported losing 29 livestock between February 2005 through July 2008 (Table 1). Most were yak calves (<1 year); the remainder were horses or mules. Local people suggested depredation of their livestock had increased during this period. They reported that there were no other predators but brown bears (snow leopard, wolf [*Canis lupus*], Eurasian lynx [*Lynx lynx*]) in the Samdo region.

Our sense was local people had generally negative attitudes toward bears because of their perceptions about livestock predation. Interviews suggested little awareness about brown bear conservation issues. Based on our analysis of livestock depredation, we

Table 1. Livestock depredation by brown bears in Manasalu Conservation Area, Nepal, February 2005–July 2008, as reported by respondents to a questionnaire survey ($n = 287$). Costs are in Nepali rupees (1 US\$ = 75 Nepali rupees [NR] in 2008).

Livestock type (n)	Location	Cost/animal, NR	Total cost, NR ^a	Year	Livestock age (years)
Horse (1)	Larke Pass	25,000	25,000	2008	4
Horse (3)	Mayal	24,000	72,000	2008	3
Yak (2)	Rengchu	8,000	16,000	2007	0.67
Yak (3)	Chhetang	8,000	24,000	2007	0.67
Yak (9)	Samdo	6,000	54,000	2008	<1
Yak (4)	Lajung	9,000	36,000	2007	1
Mule (2)	Yaguthang	13,000	26,000	2008	7
Mule (1)	Samdo Danda	13,000	13,000	2006	5
Mule (4)	Gyala	13,000	52,000	2006	3
	Mayol			2008	
	Yaguthang				
	Chhetang				
Total (29)			318,000		

^aBased on consultation with local people during interviews.

estimated a financial loss of approximately 318,000 NR (US \$4,240) from February 2005 through July 2008 (Table 1).

Discussion

Our survey indicated that brown bears occupy part of Manasalu in Nepal, but that numbers are quite low. Local herders indicated that the brown bears observed in this area were recent immigrants from TAR. Because of local religious beliefs, local people do not kill marmots; this likely contributes to their abundance. Preliminary scat analyses suggested that marmots constituted a major food for brown bears in this area.

Our interviews with local herders suggested they were more concerned with the health and safety of their livestock than conserving this remnant population of bears. This observation was consistent with observations made by Stubblefield and Shrestha (2007) in Nepal where locals viewed Asiatic black bear primarily as agricultural pests. Although legislation protects brown bears in Nepal, conflicts between bears and herders will likely require an approach that considers both brown bear conservation and maintaining the livelihoods of local peoples. Such an approach might be patterned after the successful management program in Deosai National Park, Pakistan, where increased protection of a remnant brown bear population has resulted in annual population growth of about 5% since the program's inception (Nawaz et al. 2008). Long-term success of any brown bear conservation program

requires minimizing human-caused mortality, especially to adult females. To reduce killing and improve acceptance of brown bears by local people, we suggest exploring a payment program that compensates local herders for lost livestock (with strict controls to minimize abuse). Improved forage production near villages or the use of guard dogs to protect livestock might also be beneficial. The annual costs of a compensation program would be reasonable (about \$1,500 US based on reported losses) and might be covered by a non-government organization similar to the Defenders of Wildlife program in North America, which compensates for livestock losses due to grizzly bears and gray wolves.

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