

Status of the brown bear in Pakistan

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Abstract: As in the rest of their range in Southern Asia, brown bears (*Ursus arctos*) are poorly studied in Pakistan. Historically, brown bears occupied almost the entire range of the mountains of northern Pakistan, approximately 150,000 km². Their populations are declining and have gone extinct from some areas in the past 50 years. Brown bears are now distributed over 3 major mountain ranges and 4 intermountain highlands. The bears' range in Pakistan falls under 3 administrative divisions, and, as wildlife management is a provincial subject in Pakistan, these administrative divisions have separate governing legislation. Bears are legally protected, however, and recently designated as critically endangered in IUCN's Red List of Mammals of Pakistan. Seven populations probably persist in the Himalaya, Karakoram, and Hindu Kush ranges; the Deosai Plateau in western Himalaya hosts the only stable population. The sizes of these populations do not exceed 20 individuals, except for Deosai National Park, where 43 bears were counted in 2006. Seven national parks and many wildlife sanctuaries and game reserves, which provide legal protection to bears, have been established in the northern mountains of Pakistan. Populations in Pakistan are probably connected to those in India (to the east), China (to the north), and Afghanistan (to the west). Growing human population, expanding infrastructure, increasing number of livestock, and increasing dependency on natural resources, particularly alpine pastures, are key threats. Poaching for its commercial parts and for cubs, and growing unmanaged tourism also contribute to population decline. The population has become conservation dependent, and actions like effective management of protected areas, better management of natural resources, and environmental education need immediate attention.

Key words: brown bear, conservation, Himalaya, Pakistan, population, South Asia, *Ursus arctos*

Ursus 18(1):89–100 (2007)

Worldwide, numbers and distribution of brown bears (*Ursus arctos*) have declined by about 50% during the past 100 years (Servheen 1990). The species is most endangered, but the least studied, in Asia, where small isolated populations exist mostly in remote mountainous areas (Servheen 1990, Garshelis and McLellan 2004). In Asia the brown bear populations of Turkey, Iraq, Iran, Afghanistan, Turkmenistan, Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, China, Mongolia, Pakistan, India, and Nepal are sparse and often isolated (Servheen 1990, Sathyakumar 1999, Servheen et al. 1999, Can and Togan 2004, Garshelis and McLellan 2004, Mishra and Fitzherbert 2004).

The Himalayan brown bear (*Ursus arctos isabellinus*) is the brown bear subspecies present in Pakistan. Brown bears are given a variety of names in the Indian subcontinent including *drenmo* in the northern

areas of Pakistan (in Balti), and more specifically *spang drenmo* (spang = grass) or vegetarian bear. This is in contrast to *shai drenmo* (shai = meat), which is sometimes used for Asiatic black bears (*Ursus thibetanus*). In contrast, brown bears on the Tibetan Plateau are known to have a primarily carnivorous diet (Xu et al. 2006), with the plateau pika (*Ochotona curzoniae*) as the primary prey.

Although the brown bear is not considered to be as impressive as big cats (*Panthera* sp.), it has an impact on culture and beliefs, and many bear body parts are believed to have magical medicinal power, acknowledging the strength of the bear. In Muslim culture it is not permitted to eat carnivores (they are considered *haram*), therefore people cannot directly consume bear meat and other parts. Interestingly, people who want to gain strength from bears find a way around this restriction by feeding the fat of the bears to birds, particularly roosters, then eating those birds.

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The bear is considered an ugly, yet funny and strong animal in Pakistan, where they are still used in bear baiting events (Joseph 1997), during which a bear is tied to a stake with a short chain, and one or more bull terriers are let loose upon it. The bear usually wins, but at a great cost to itself and to the dogs. Rich feudal lords in rural areas provide the bull terriers and organize the fights, whereas *qalanders* (gypsies) train and provide the bears. Bear baiting events used to be big traditional events in Pakistan, and involved a lot of people and money. The number of baiting events has fallen with time, and there has been a strong campaign in recent years to end this cruel sport. Asiatic black bears are the major victims, while brown bears are involved in 10–15% of baiting events (B. Khanum, World Society for Protection of Animals, Islamabad, Pakistan, personal communication, 2006). Bear baiting is illegal under Prevention of Cruelty to Animals Act of 1890 (Joseph 1997), which was reinforced through a presidential order in 2001.

Monitoring of bears in the Deosai Plains (Himalayan Wildlife Foundation 1999) and interviews with people in local communities during the present surveys confirm that brown bears in Pakistan are not very aggressive animals, that they hardly ever attack people or prey on livestock, and that consequently they are not as loathed as are snow leopards (*Uncia uncia*) and wolves (*Canis lupus*). However, locals still feel that bears compete with their livestock for scant resources in alpine meadows, fear their unpredictability, and resent them for not being edible according to their traditions.

Data concerning the distribution and status of brown bears in Pakistan are scarce, patchy, and outdated, and no status report has been published in the last 5 decades. Data gathering in bear habitat is difficult due to rough terrain, poor access, harsh climatic conditions, and expensive logistics. For example, surveying glacial areas in the Karakoram Range requires trekking for weeks. This paper attempts to provide the presents status of the brown bear in Pakistan. Though the estimates provided are crude, they provide benchmark information for planning conservation interventions for this threatened carnivore.

Study area

The study area is the brown bear's distribution range in Pakistan (Fig. 1), which is distributed over 3

major administrative divisions. The Northern Areas (NAs) are administered directly by the federal government through the Ministry of Kashmir Affairs and Northern Areas, States, and Frontier Regions (MoKANA). The eastern part lies in the state of Azad Jammu and Kashmir (AJK) and is separated by a Line of Control (LOC) from Indian Kashmir. The North West Frontier Province (NWFP), commonly called *Sarhad*, covers the southern and western part of the bear range.

The area is rugged, dominated by one of the most mountainous landscapes in the world. Elevations start at 1,000 meters in the south and rise above 6,000 meters in the north. Over 60% of the area is above 3,000 meters. The landscape is characterized by 3 major mountain ranges (the Western Himalaya, the Karakoram, and the Hindu Kush), and 4 north-south oriented intermountain highlands (the Hindu Raj, the Swat Kohistan, the Indus Kohistan, and the Kaghan-Neelum) (Woods and Kalpatrick 1997). Climatic conditions vary widely in the study area, ranging from arid and semi-arid cold desert in west to the monsoon-influenced moist temperate zone towards east. Annual temperatures in valleys may vary between -10°C to 40°C . Vegetation zones are also diverse, mainly represented by alpine desert, alpine meadows and scrub, and coniferous forests. Human land use has a characteristic altitudinal pattern. Human settlements, roads, and irrigated cultivation are concentrated along the valley bottoms. Between 2000–3000 m are summer villages, with summer pastures and crops. Alpine pastures start about 3,000 m and go up to the snow line, usually at 5,000 m (Ehlers and Kreutzmann 2000, GoP and IUCN 2003).

Human density is as low as 12 people/ km^2 in the NAs and rises gradually southward up to 252/ km^2 in Mansehra District (Population Census Organization 2001, GoP and IUCN 2003). Despite the overall relatively low population density, the area is a mosaic of cultures and languages, with 11 languages spoken (Urdu, English, Kashmiri, Balti, Shina, Burushahki, Chitrali, Kafri, Kohistani, Pushto, and Punjabi).

Methods

Information was gathered through field surveys, interviews, and secondary data. Primary data were collected in the field by the staff of the Himalayan Wildlife Foundation (HWF) in AJK and parts of NAs and NWFP (Table 1). During these surveys,

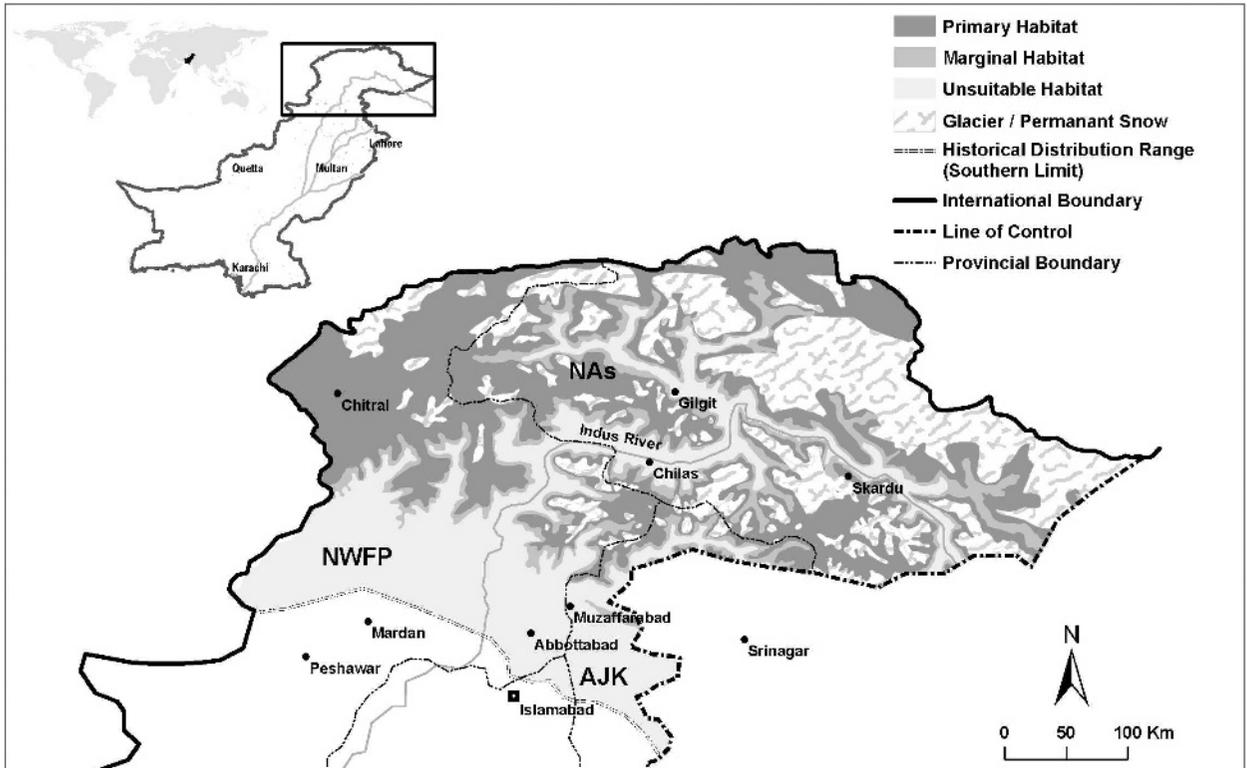


Fig. 1. Potential habitat of the brown bear in Pakistan, 2006.

line transects were placed to record sightings and signs of brown bears, and local people were interviewed. Line transects were usually 10–15 km long, and type of sign included scats, footprints, hair, digging, marks on trees, and damage to crops. The HWF gathered particularly good information from areas in the vicinity of Deosai, such as Gultari, Astore Valley, and also from the slopes of Nanga Parbat Peak and the Kaghan Valley. I also obtained data from the staff of the Deosai brown bear project who collected data relevant to the presence of bears as they worked in the region between 1994 and 2005.

I did not use a structured questionnaire for the interviews; rather, I targeted people in local communities, mountain nomads (*gujjars*), field staff of wildlife or forest departments, tourist operators (particularly for glacier areas), wildlife biologists, and relevant institutions and organizations. The field teams helped in collecting information from local communities and nomads, whereas the office-based relevant personnel were interviewed by me. I consulted personnel from Northern Areas Forestry, Parks and Wildlife Department (NAFWD), NWFP

Wildlife Department (NWFPWD), AJK Department of Fisheries and Wildlife (AJKWD), National Council for the Conservation of Wildlife (NCCW), Pakistan Museum of Natural History (PMNH), Zoological Survey Department (ZSD), military on the India–Pakistan border, the Himalayan Jungle Foundation, The World Conservation Union (IUCN), and World Wide Fund for Nature Pakistan. I obtained additional secondary data from published and unpublished literature. I used *Survey of Pakistan* topographical maps (Survey of Pakistan 1997) to estimate potential brown bear habitat in Pakistan. The historical distribution range is based on Erdbrink (1953) and Servheen (1990), which I adjusted using the topographical maps and reported evidence.

Results

Historic range

U. a. isabellinus historically occupied the western Himalaya, the Karakoram, the Hindu Kush, the Pamir, the western Kunlun Shan, and the Tian Shan

Table 1. Field surveys conducted by the teams from Himalayan Wildlife Foundation for determining status of the brown bear, 1993–2006.

Details of survey	Date	Length (days)	Methods	Areas covered	Documentation
Annual census of the brown bear population in Deosai National Park, Northern Areas	1993–2006	15–20 days each year	Line transects, observations of individuals	Deosai National Park	Counted 43 individuals in 2006
Large mammal surveys in the Neelum Valley, AJK	Aug–Sep 2005 Aug–Sep 2006	2005: 9 days 2006: 21 days	26 line transects 35 interviews	Dudgai, Gurez, Haimat, Pulwai, Sardari, Shontar, Surgun, and Gumot	2005: 5 bears sighted, 2 bears reported illegally shot 2006: 17 signs recorded for black and brown bears, 5 confirmed for brown bears
Wildlife surveys in the Minimerg Valley, Northern Areas	Sep 2005 Oct 2006	2006: 8 days 2005: 15 days	11 line transects 6 interviews	Dudgai, Minimerg, Shaban Top	10 sightings, 14 signs recorded
Wildlife survey in the Siran Valley, NWFP	23–30 Sep 2006	8 days	4 transects 15 interviews	Siran Valley, District Mansehra	No evidence for brown bears. Local people reported extirpation from the area.
Reconnaissance survey of the Neelum Valley, AJK	Nov 2005	8 days	3 line transects 12 interviews	Gumot National Park, Kel, Shontar and Gurez valleys	3 signs recorded; local people reported sightings
Survey of the Central Karakoram National Park (HBP, unpublished report, 2005), Northern Areas	15 Sep–15 Oct 2005	30 days	2 transects 61 interviews	13 valleys: Hushe, Thalley, Shigar, Askole, Arandu, Tormik, Stak, Haramosh, Gilmit, Minapin, Hoper, Hispar, and Shimshal	Bear presence reported in Shigar, Braidu (Ho Nala), and Baltoro glacier areas
Survey of Biafo and Panmah glaciers in Karakoram Range, Northern Areas	Aug 1998	12 days	Long tracking	Biafo and Panmah glaciers	Sighting of 1 bear, and 2 signs
Survey of Bar Valley, Gilgit	Jun 1997	10 days	Long tracking	Bar Valley	Signs of 1 female with cub, and 1 large bear were recorded

ranges in southern Asia. In Pakistan the subspecies ranged over the approximately 150,000 km² northern part of the country. They have been reported in several localities in the western Himalaya, including the Neelam Valley north of Machiara National Park, the Kaghan Valley, the Astore Valley, Nanga Parbat, and the Deosai Mountains. Their presence was also recorded in peripheral valleys, high meadows, and glaciers in the Karakoram, Hindu Kush, and Pamir ranges (Schaller 1977, Rasool 1982, Wege 1988, Roberts 1997), as well as on the inter-mountain highlands of Indus Kohistan, Swat Kohistan and probably Hindu-Raj mountains (Servheen 1990, Roberts 1997). Bears also occurred in the south as far as the Hazara (Roberts 1997) and Waziristan areas (Ellerman and Morrison-Scott 1951), but seem to be extinct there now.

Potential habitat

In the Himalaya, brown bears inhabit mainly sub-alpine and alpine areas between 2,600 and 5,000 m (Schaller 1977, Roberts 1997, Sathyakumar 1999), where blue pine (*Pinus wallichiana*) forests (spring and fall) and alpine meadows (summer) are their primary habitats. Areas above these elevations are usually permanently covered with snow and are not suitable bear habitat. Alpine meadows are limited in the southern part of the range of brown bears in Pakistan, but forests become more prevalent, for instance in the Neelam and Kaghan valleys, where brown bears are sympatric with Asiatic black bears. Dominant tree species are blue pine, spruce (*Picea smithiana*), silver fir (*Abies pindrow*), and deodar (*Cedrus deodara*). Broadleaved trees that are inter-mixed with conifers, particularly in the riparian zones, include *Aesculus indica*, *Ulmus wallichiana*, *Juglans regia*, *Quercus floribunda*, *Acer caesium*, and *Prunus cornuta*. In Pakistan, the area where alpine meadows are prevalent (between 3,000 and 4,600 m) covers about 51,000 km², whereas the blue pine zone (2,600–3,000 m) covers about 19,000 km². Therefore, I infer that the potential habitat for brown bears in Pakistan is approximately 70,000 km² (Fig. 1). This may be an overestimate, as the western part of the range is dry and forest cover there is quite low.

Present population status

Brown bears have been extirpated from the majority of their historical range in Pakistan and currently exist only in small pockets. Today approx-

imately 150–200 bears may survive in Pakistan in 7 populations. Connectivity among these populations is limited and some are completely isolated. Populations and subpopulations have been defined following Zedrosser et al. (2001). The present status of the Pakistani brown bear populations is summarized in Table 2 and Fig. 2.

Northern Areas. Three populations and 5 subpopulations can be identified in NAs (Fig. 2, Table 2). The Himalayan population is the largest, followed by the Karakoram population, whereas the Hindu Kush population is very small.

The western Himalaya in NAs hosts 3 subpopulations, referred to as the DNP, Minimerg, and Nanga Parbat. The DNP is the largest subpopulation, consisting of about 40 individuals. This subpopulation occupies the main Deosai Plateau and surrounding 6 valleys: Karabosh, Dhappa, Shilla, Shagarthang, Bubind, and Chillam. The Minimerg subpopulation exists east of the Deosai along the line of control (LOC). It covers the localities of Burzil Pass, Shaban Top, Gultari, Minimerg, and Kamri. This area is characterized by narrow valleys, steep slopes, and some good forest stands. A bear was shot on Shaban Top in 2000, the HWF staff recorded bear sign frequently in the Gultari area during the last 6 years, and a bear was sighted in early spring 2003. I observed a female with a cub in the Minimerg Valley during the September 2005 survey, and HWF staff frequently encountered bear sign in the Dudgai and Kamri areas. Local villagers reported many bears in the area, and an officer of the Pakistan Army reported a bear crossing the LOC between Indian Kashmir and NAs of Pakistan in 2004. Approximately 10–15 individuals occupy this area. The third subpopulation of Himalaya is present around the slopes of the Nanga Parbat Peak, including localities such as Babusar Pass, Raikot Valley (Fairy Meadows), Astore Valley, and Rattu, Kalapnai. I estimate about 10 bears in this area.

Two subpopulations of brown bears are found in the Karakoram Range: one in the Central Karakoram National Park (CKNP) and the second in the Khunjerab National Park (KNP). In CKNP brown bears are reported in low densities from Shigar, Baraldu (Ho Nala), and Baltoro Glacier (Hagler Bailly Pakistan, 2005, Central Karakoram Protected Area: Volume II baseline studies, Draft Report Prepared for IUCN Pakistan, Karachi, Pakistan) and also from Nagir, Chaprote, Bar Nallah (Rasool 1982, 1991). Observation of one bear and some sign

Table 2. Distribution of brown bear in Pakistan, approximate population size and trend, 2006.

	Province	Population	Sub-population	Localities	Approximate size	Status
1a	Northern Areas	Himalayan	Deosai National Park (DNP)	DNP and surrounding valleys; Karabosh, Shilla, Dhappa, Sadpara, Shagarthang, Bubind, and Chilam	40–50	Stable
1b			Minimergh	Minimergh, Burzil, Kamri, Shaban Top	10–15	Declining
1c			Nanga Parbat	Astore and Raikot valleys, Rattu, Kalapani	10	Declining
2a		Karakoram	Central Karakoram National Park	Shigar (Braldo, Basha), Glaciers (Baltoro, Biafo, Panmah), Nagir, Chaprote, Bar Nallah, Kilik, Minteka	25	Declining
2b			Khunjerab National Park	Barakhun nullah, Khunjerab Pass, Sherlik area near Oprang River	10–15	Declining
3a		Hindu Kush	Ghizer	Ghizer, Singal, Chassi	10	Declining
3b			Karambar	Karambar Lake, Karambar River (behind the Chiantar Glacier, close to border with Afghanistan)	5–10	Declining
3c	North West Frontier Province		Tirch Mir	Upper part of Yarkhan River, and along the border with Afghanistan	5–10	Declining
3d			Chitral	Chitral Gol National Park	Extinct	Extinct
4		Kalam			~5	Declining
5		Indus Kohistan		Palas Valley and adjacent areas	~5	Declining
6		Kaghan		Kaghan Valley including Dodopat National Park	8–10	Declining
7		Hazara		Siran Nalla	Extinct	Extinct
8	Azad Jammu and Kashmir	Machhiara National Park			Extinct	Extinct
9a		Neelam Valley	Gumot	Gumot National Park, Surgun Valley	5–10	Declining
9b			Shontar Valley		~5	Declining
9c			Gurez Valley	Taobat, Halmat, Gugai	10–15	Declining

were recorded from Biafo and Panmah glaciers (Himalayan Wildlife Foundation 1999, W.L. Gaines, US Forest Service, Wenatchee, Washington, USA, personal communication, 2005), and also some sign from the Bar Valley during a survey in 1997. A population of 25 bears may roam in the vast area of CKNP. In KNP, bears have been reported from Barakhun Nullah, Khunjerab Pass, Sherlik area near Oprang River, Kilik, and Minteka (Schaller 1977, Wegge 1988, Ahmed 1989, Rasool 1991). One bear was observed in Khunjerab Nullah (Z.B. Mirza, Centre of Environment Research and Conservation, Islamabad, Pakistan, personal communication, 2005), and recently a brown bear was photographed with a remote camera set to record snow leopards. The population in KNP is probably 10–15 individuals.

The third population exists in the Hindu Kush Range, with 3 declining and 1 extinct subpopulations. Schaller (1977) collected 6 bear scats from the Karambar Lake, located at the source of the Karambar River, behind the Chiantar Glacier, close to the border with Afghanistan (Wakhan Corridor). In the Gizer area, bears may exist in the main Gizer Valley, and also in Singal and Chassi (Rasool 1991).

Each of the Ghizar and Karambar subpopulations probably consists of 8–10 bears.

Azad Jammu and Kashmir. Brown bears in Northern Kashmir are restricted to the Neelam Valley, in the recently created District Athmakam (old District Muzaffarabad). Alpine and sub-alpine pastures are 2 major categories of the land use in this area, where the habitat is under heavy grazing pressure and over time the productivity and biodiversity has declined. Brown bears are unlikely to inhabit areas south of Gumot National Park because there is no suitable habitat available. Presently they occupy only the northern part of this valley including the Gumot, Shontar, and Gurez valleys, and the Kel Area. The Gurez Valley particularly has excellent habitat conditions and bear signs were encountered more frequently in this area. Relatively intact forest (with dominant species as *Pinus wall-ichiana*, *Picea smithiana*, *Abies pindrow*, and *Cedrus deodara*) along the left bank of the Neelam (Kishangana) River is of high importance for brown bears, particularly in the Hanthi, Halmat, and Gugai areas. This area is along the LOC between India and Pakistan. An HWF team observed 3 bears in the Surgun Valley (including a female with a cub) and 2

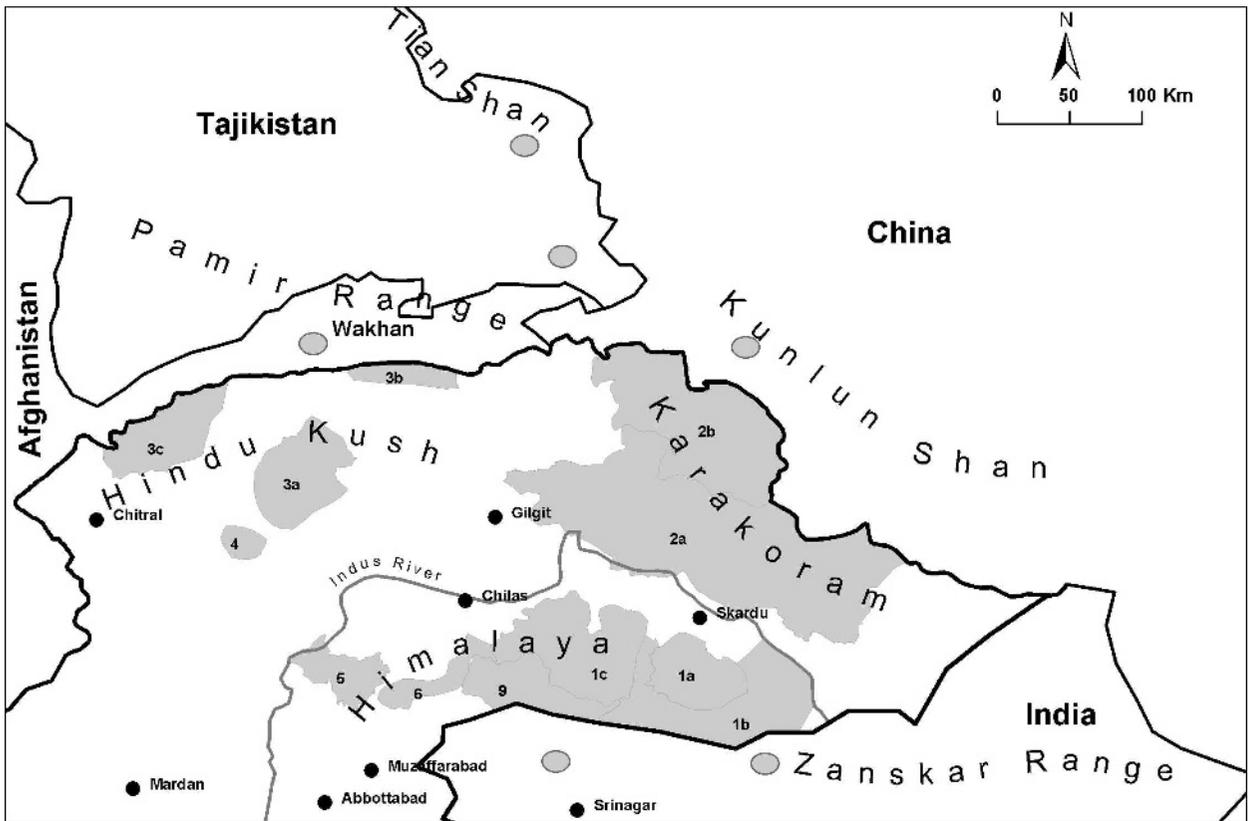


Fig. 2. Distribution of brown bear populations in Pakistan, 2006. Grey circles represent populations reported outside Pakistan. Numbers refer to brown bear populations and sub-populations from Table 2.

bears in the Gurez Valley, and spoor was collected from the northern part of the Neelam Valley during 2004–2006. Local people and nomads (*gujjaras*) also report frequent sightings of brown bears in this area. Two brown bears were illegally shot in Gurez Valley in August 2005 by a local hunter. A dead brown bear was found buried in debris; this bear probably died during the 2005 earthquake. The brown bear population is estimated at 20–25 individuals in this valley.

NWFP Province. The North West Frontier Province (NWFP) spans slightly over 100,000 km², with elevations ranging from 250 m to >3000 m (GoNWFP and IUCN 1996). Brown bears are restricted to northern NWFP, adjacent to the NAs populations. Brown bears occupy the Hindu Kush Range in the northern part of the Chitral District, the Kalam area in Swat Kohistan, Kaghan Valley, and Pallas Valley in Indus Kohistan (Arshad 2003). There are 3 populations (Kalam, Indus Kohistan, and Kaghan) and 2 subpopulations (Tirch Mir, Chitral) of the Hindu Kush population in NWFP. A

population reported from Siran Nalla in Hazar District, and the subpopulation in Chitral Gol National Park are extinct (Schaller 1977, Mirza 2003). A small subpopulation of Tirch Mir still persists in the headwaters of Yarkhun and along the Afghan border. Fulton (1903) reported that brown bears were common in Turkho and Yarkhun valleys, and also Schaller (1977) observed some signs in this area. Local staff of the IUCN's Mountain Areas Conservancy Project (MACP) project also believes some bears are surviving in this area.

Regional connectivity. Brown bears survive in all neighboring countries; however, their range is no longer contiguous. Populations in the entire region are largely fragmented, but some populations may have some gene flow. Pakistani populations, which occupy the southern limit of the brown bear distribution, seem to have limited contact with neighboring populations toward the north and east.

Toward the east, brown bears exist in India and perhaps in Nepal (Gurung 2004). In India, they are

confined to the northwestern Himalaya in Jammu, Kashmir, Himachal Pradesh, Uttar Pradesh, and Sikkim, but there is poor information on population status from most of the range (Sathyakumar 1999, 2001; Johnsingh 2003; Kaul et al. 2004). Points of contact between the Indian and Pakistani populations are the Zaskar and Ladakh ranges and the Gurez Valley (northern part of the Neelam Valley). Exchange through the Karakoram Range is unlikely, because brown bears do not exist on the Indian side of this range (S. Sathyakumar, Wildlife Institute of India, Dehradun, India, personal communication, 2005). Our recent observations in the Neelam and Minimergh valleys reveal that animals cross the Indian–Pakistan border. Military presence and tension on the LOC have been beneficial in a way, because it restrained the expansion of human population and related infrastructure and halted natural resource depletion in these areas since partition in 1947.

Toward the north and northwest, brown bears occupy the Kunlun and Tian Shan ranges. A number of studies have documented presence of brown bears in the Tian Shan Range, including parts of Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, and China (Ministry of Environmental Protection 1998, Glukhovtsev and Yermekbayeva 2001, P. Wegge, Norwegian University of Life Sciences, Ås, Norway, personal communication, 2006), where it is sometimes referred to as the Tian Shan brown bear (Dexel 2002). Vaisfeld and Chestin (1993) estimated 2,000–3,000 bears in the Central Asian states, and described 3 subspecies. In Tajikistan, an estimated 700 brown bears occur in the Pamir and Alai mountains (Vaisfeld and Chestin 1993). Brown bear signs were observed in a recent survey in the Wakhan Corridor in northeastern Afghanistan (Mishra and Fitzherbert 2004). The bear population in the Wakhan Corridor is a crucial link between the Hindu Kush population in Pakistan and the Central Asian populations. Brown bears also survive in Kunlun Shan in China (Schaller 1998, Harris and Loggers 2004). Brown bear movement is likely to occur between the Karakoram and Kunlun ranges, as they are adjacent and both are occupied by bears.

Considering the geomorphology of the area and the reported evidence, I conclude that the Pakistani populations of brown bears exhibit regional connectivity primarily through 3 corridors: the Himalayan population is connected to the populations in Zaskar and Ladakh ranges in India, the Kara-

koram population has connectivity with Kunlun Shan in China, and the Hindu Kush population is connected to bears in the Tian Shan Range through the Pamir population in the Wakhan Corridor (Afghanistan) and Central Asia (Fig. 2).

Discussion

Brown bears in Pakistan are declining because of habitat loss and fragmentation, human-induced mortality, commercial poaching for the sale of bear parts, bear baiting, and poaching of bear cubs for sale to gypsies.

Habitat threats

Pakistan became the world's ninth most populous country in 1994, and, at 2.1% per year in 1998, has one of the world's highest population growth rates (Population Census Organization 2001). The population has reached 142.5 million, from 16.6 million in 1901, and is projected to double by 2035 (Faizunnisa and Ikram 2002). This human pressure is obvious even in NAs, where population growth rate has been estimated at 2.47% per year (GoP and IUCN 2003) and where the population has quadrupled since the creation of the state in 1947 (Ehlers and Kreutzmann 2000). The environmental consequences of rapid population growth are pervasive, and the increases in demands for natural resources and their subsequent depletion have many consequences for bears and other wildlife. The increase in the size and number of settlements, expansion and improvement in infrastructure, transformation of land use, and attenuation of forest cover are the major factors which contributed to the significant shrinking and fragmentation of the bear habitat during the last 5 decades. Forests are being cut for timber and firewood and cleared for increasing areas for cultivation. Bears utilize alpine meadows more than any other vegetational zone in NAs, where they constitute around half of the available land. However, in NAs such meadows have experienced accelerated transformation in the last 2 decades (Kreutzmann 1991, 1995). The natural grazing areas were estimated at 3.6 million ha in 1950, and were considered largely sufficient for a livestock population of 1.12 million animal units (Ehlers and Kreutzmann 2000). With livestock estimated at over 2 million in 1998, a shift in the availability of high altitude pastures has been observed, from abundant to 30% deficient (Ehlers and Kreutzmann 2000).

This has resulted in an obvious numeric and spatial expansion in nomadic and transhumance grazing in alpine pastures.

Threats to bears

Hunting has been a traditional practice in most of the bear range in Pakistan. Increasing accessibility and number of vehicles has increased the hunting of wildlife. As a consequence, bears and other large mammals have been largely eliminated in the areas near settlements. Despite the ongoing protection efforts in areas like Deosai National Park, human-induced mortality continues and a minimum of 9 bears were killed in the 10-year period 1996–2005, (3 males, 4 females, and 2 cubs). Bears have been hunted for sport (usually by military officers), persecuted by villagers who feel their livestock is threatened, and more recently killed for commercial purposes. At least 5 sites were identified in Gilgit, Sakardu, and other towns along the Karakoram Highway (HWF 1999) where bear fat was sold on a regular basis for about 60 Pakistan Rupees (PKR) per *tola* (16 grams) (US\$ 62.5/kg; 2006 rate). It is estimated that bear parts from an adult bear could fetch as much as PKR 75,000 (US\$ 1,250; 2006 rate) in a local market (Himalayan Wildlife Foundation 1999), which is much higher than the annual income of a typical wage earner in the NAs. This provides a strong incentive for bear poaching. Female bears are also killed to capture their cubs for sale to gypsies. Cubs of the year are preferred, as they are easy to train for bear displays and baiting events. Nomad graziers (*gujjars*), who travel all the way from the plains to the mountains with their livestock, are known to be involved in this business in addition to other illegal activities, like collection of medicinal plants. Graziers are suspected to transport poached wildlife down to the plains.

Threats of changing climate

Brown bears are potentially threatened by impacts of climate change. Potential threats include loss of habitat, decline in food supply, habitat shift to non-protected areas, and increased competition with humans. The major habitat of brown bears in Pakistan is the alpine cold desert zone that lies in the alpine tundra biome. The computer simulation model BIOME3 predicted changes in the size and location of forest ecosystems and biomes of Pakistan under the influences of climate changes (increase in temperature and rainfall scenarios) in the year 2020

and 2040–50 (Hagler Bailly Pakistan 1999). In general, the model predicted a positive effect on the forests of Pakistan, but alpine tundra, which covers about 6.8% of the total area, would be reduced to 4.6% by the year 2020. A northward and upward shift of all biomes is predicted. The coniferous biome is expected to expand at the expense of alpine tundra. Brown bears already suffering habitat degradation and fragmentation by anthropogenic activities will face further shrinkage of habitat, and this could have serious consequences on their survival.

Management framework

Pakistan has ratified the Convention on Biological Diversity (CBD), and as a follow up, developed the National Conservation Strategy (NCS) and Biodiversity Action Plan (BAP) for environmental protection and biodiversity conservation. Wildlife conservation is the responsibility of the provinces in Pakistan, and each province has its own legislation, which is implemented by its respective wildlife or forest department. The brown bear range in northern Pakistan is managed by 3 provincial departments: the NAs Forestry, Parks and Wildlife Department; the NWFP Wildlife Department; and the AJK Department of Fisheries and Wildlife. The National Council for Conservation of Wildlife (NCCW) in the Federal Ministry of Environment, Local Government and Rural Development is responsible at the national level for the coordination of the provincial conservation programs in order for Pakistan to fulfill its international obligations and agreements regarding biodiversity conservation.

Three wildlife laws are effective in northern Pakistan: the Azad Jammu and Kashmir Wildlife Act (1975), the Northern Area Wildlife Preservation Act (1975), and the NWFP Wildlife (Protection, Preservation, Conservation and Management) Act (1974). These acts provide the basis for the creation of protected areas in 3 fundamental categories: national parks, wildlife sanctuaries, and game reserves. All provinces have made considerable process in the establishment of protected areas (PAs) that provide legal cover for the protection and conservation of a variety of wildlife; 7 national parks, 8 wildlife sanctuaries, and 10 game reserves have been established in brown bear range in Pakistan (Fig. 3). These PAs cover the majority of the existing brown bear populations and provide them with legal protection against hunting and other

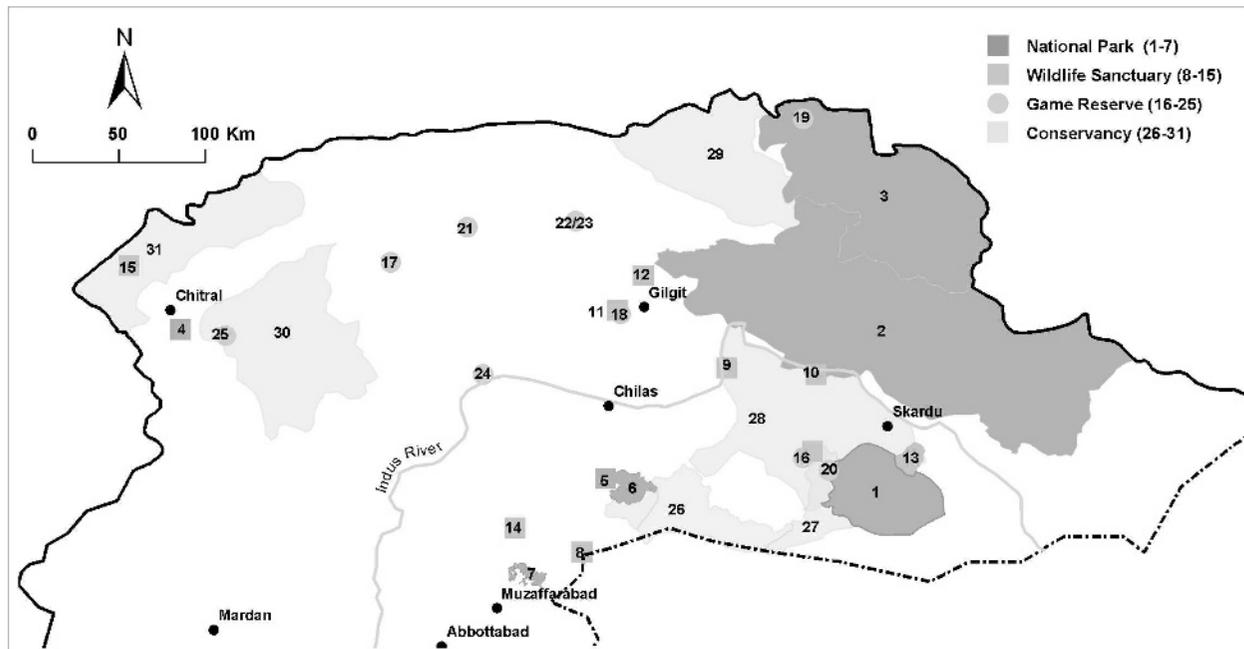


Fig. 3. Network of protected areas in Northern Pakistan, 2006.

threats. However, except for a few of those areas including the DNP and the KNP, which are effectively managed, these PAs unfortunately just exist on paper. They were created haphazardly and face problems like weak law enforcement, poor institutions and infrastructure, and lack of adequate resources. Among a total of 25 PAs in northern Pakistan, 16 lack basic baseline information, 22 do not have any management plan, and 19 are without any management infrastructure.

Conservation recommendations

The bear population in Pakistan has shrunk radically and continues to decline in its entire range, with only the exception of Deosai National Park. Immediate efforts are needed to ensure its long-term survival, which will be more effective if taken jointly by the state departments, non-governmental organizations (NGOs), research institutes, and communities.

Because most existing bear populations are covered either by the PAs or conservancies, there is no need to create additional protected areas, at least in the short term. However, with limited financial resources and ineffective protection and management systems, these PAs carry little meaning. The World Conservation Union (World Conservation Union 2000) reviewed PAs of Pakistan, and through

a process of wide consultation (Ghazali and Khairi 1994) developed a comprehensive action plan framework for strengthening the PAs system and improving its efficiency. The framework identifies priorities for actions and investment, sets definable and measurable goals, and can be smoothly integrated into long-term national policy. The only thing lacking is its implementation and adoption by the concerned departments and authorities.

Carnivores as a whole are considered odious and it is usually difficult to generate support by local communities for their conservation. People always question such efforts because, unlike ungulates, carnivores don't have any meat value and pose a threat to humans and livestock. Environmental education is an important instrument to change perceptions and attitudes. Launching education and awareness initiatives that cater to local communities, staff of the PAs, visitors, and the general public can bridge the knowledge gap and be vital to achieving synergy in conservation efforts. Trophy hunting in Pakistan is an increasingly popular tool for conservation through community participation. Presently based on 5 ungulate species, this program has generated substantial revenue which has been shared with local communities. The trophy hunting program has been effective in rehabilitating populations of wild

ungulates; however, its contribution to the conservation of biodiversity as a whole is limited. The programs' impact on bears is perhaps neutral, while other predators like snow leopards and wolves have been negatively affected (Hussain 2003). This program can play a significant role if conservation of carnivores is integrated in the approach. For example, linking trophy hunting quotas, which are fixed by the federal government annually, to the populations of threatened carnivores in addition to the population of trophy animal, would be an effective step.

Human population growth, infrastructure development, forest depletion, and many other related factors have consequences for the bear population. The growth in number of livestock and increasing dependency on alpine pastures is the major threat to bears, and increasingly generates human–bear conflicts. Appropriate management of this issue will largely determine the future of this species in many areas.

Management of the Himalayan brown bear on an international scale is central to ensure its survival in the long run. The Neelum Valley and the Pamir Knot are 2 ideal venues for cross-border cooperation for conservation. The Neelum Valley has been designated as a conservancy and a proposal is being worked out to create 2 new protected areas in its northern segment (Gugai and Gurez National Parks). Protection on the other side of the LOC in India would help conservation across the natural range and uphold the possibility of bear movements in the future. A peace park around the Pamir Knot (the area in northern Pakistan where all mountain ranges come together), involving Afghanistan, Tajikistan, China, and Pakistan, is also under consideration (U. Khalid, NCCW, Islamabad, Pakistan, personal communication, 2005). Dr. G. Schaller has been instrumental for this initiative, and the conservation of Marco Polo sheep (*Ovis ammon polii*) is its primary target. If this proposal is successful, this park will not only potentially allow for an increase in the bear population, but also safeguard the corridors with the Kunlun and Tian Shan ranges.

Deosai National Park should remain the focus of conservation efforts, because the future of the brown bear in the country will largely depend on stability in this park. The role of the Deosai population is somewhat analogous to a mainland or source population in a metapopulation context. It is important to work simultaneously on improving habitat quality in Deosai and on improving its connectivity with neighboring populations. Better

connectivity will protect populations from inbreeding depression and will increase the colonization rate in the Himalaya. Suitable corridors in the range should be identified and maintained to facilitate dispersal.

Acknowledgments

The field work for this study was supported by the Himalayan Wildlife Foundation, Islamabad. R. Rajput, M. Yunus, G. Murtaza, Noor Kamal Khan, and many other personnel from the HWF, NAFWD, and AJKWD helped in data collection. J.E. Swenson provided guidance and edited the manuscript, A. Zedrosser and O. Støen gave valuable comments. I am grateful to all respondents who shared their observations. Thanks to the editors who provided constructed criticism and suggested useful changes.

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Received: 28 February 2006

Accepted: 2 September 2006

Associate Editor: O. Huygens