Journal of Bioresource Management

Volume 2 | Issue 2 Article 1

Bears in Pakistan: Distribution, Population Biology and Human Conflicts

Fakhar -i- Abbas
Bioresource Research Centre, Isalamabad, Pakistan, fakharabbas@hotmail.com

Zahid Iqbal Bhatti
Punjab Wildlife Department, Lahore, Pakistan

Jibran Haider
Gilgit Baltistan Forest Department, Gilgit, Pakistan

Afsar Mian
Bioresource Research Centre, Islamabad, Pakistan

Recommended Citation

Abbas, F. -., Bhatti, Z. I., Haider, J., & Mian, A. (2015). Bears in Pakistan: Distribution, Population Biology and Human Conflicts, *Journal of Bioresource Management, 2* (2).
DOI: 10.35691/JBM.5102.0015
ISSN: 2309-3854 online

Bears in Pakistan: Distribution, Population Biology and Human Conflicts

J. Bioresource Manage. (2015) 2(2): 1-13.

BEARS IN PAKISTAN: DISTRIBUTION, POPULATION BIOLOGY AND HUMAN CONFLICTS

Fakhar-i-Abbas[1,4*], Zahid Iqbal Bhatti[2], Jibran Haider[3] and Afsar Mian[1,4]

[1]Bioresource Research Centre, 34-Bazaar Road, G-6/4, Islamabad, Pakistan
[2]Punjab Wildlife Department, Lahore, Pakistan
[3]Gilgit Baltistan forest Department, Gilgit, Pakistan
[4]Institute of Natural and Management Sciences, Rawalpindi, Pakistan.
[*]Email: fakharabbas@hotmail.com

ABSTRACT

We conducted questionnaire based interviews (n = 1873) of respondents coming from 258 localities about bear tracts in northern parts of Pakistan in 2012-2014 to study Himalyan brown (*U. arctos isalbellinus)* and Himalayan black *(U. t. laniger)* bears. Brown bears were more frequent in northern latitudes (northern Chitral, Ghizer, Gilgit and Skardu), while black bears were widely distributed in southern latitudes (Battagram). Both brown and black bears are present in central latitudes (Astor, Diamir, Kohistan and Mansehra). We identified 34 populations of brown bears; a large population in the Deosai Plateau and small to very small populations in other localities. We identified 9 isolated meta-populations sharing common gene pools; 7 (Bomborat, Gias, Chowgram, Laspur-Malkov, Koshi-Palas, Phunder-Yasin, Khunjerab) very small with serious inbreeding and threat of extinction, while Deosai and Diamir-Astor populations were large but were expected to have a high level inbreeding. Black bears were present in 45 localities; larger populations in three localities of Battagram (Nagram, Rahing and Shamli). We identified 6 meta-populations of black bears; Kohistan-Batagram-Mansehra, Diamir-Astor and south Chitral meta-populations were large; but 3 other populations (Thack, Hisper-Minipin and Chasma) were small/very small, possibly having high inbreeding. Bears raid standing maize crops (regular and severe in 2 localities and irregular and severe in 6) and fruit (apricot, grape, mulberry and walnut). Average annual bears depredation of 54 cattle, 188 goat/sheep, 4 yaks, and 9 horses/donkeys/mules were reported, inflicting an economic loss of Pak Rs. 2,840,000 (US$ 28,400) to the livestock farming community. Respondents reported 4 incidences of bear attack (1 killed, 3 injured) and 2 cases of cub poaching during 2013.

Keywords: Distribution, populations, meta-population, isolation, crop damage, livestock predation, damage, bear-human conflict.

INTRODUCTION

Family Ursidae is represented in the fauna of Pakistan by 3 subspecies, viz., Baluchistan black bear (*Ursus thibetanus gedrosianus*), Himalayan black bear (*U. t. laniger*) and Himalayan brown bear (*U. arctos isalbellinus*) (Roberts 1997). Baluchistan black bears persisted in Khuzdar, Suleiman range, Toba Kakar range and Kalat (Balochistan) till the 1950's but has declined to an almost extinction level (Schedule II; CITES 2014); the population around Khuzdar is probably surviving. This subspecies is adapted to hotter conditions and demands serious studies/conservation measures, but political disturbances limit such efforts. Himalayan brown and Himalayan black bears were widely distributed in the hills/valleys of the Himalayas, Karakoram and Hindu Kush ranges, but recent decline has restricted their populations to selected pockets (Woods and Kalpatrick 1987, Schaller 1977, Roberts 1997).

The Himalayan brown bear has wide global distribution, from Turkey through Iraq, Iran, Afghanistan, Turkmenistan, Tajikistan,

Uzbekistan, Kyrgyzstan, Kazakhstan, China, Mongolia, Pakistan, India and Nepal (Servheen 1990, Sathyakumar 2001, Sevheen et al. 1999, Can and Togan 2004, Garshelis and McLellan 2004, Mishra and Fitzherbert 2004). In Pakistan, Nawaz (2007) recorded brown bear populations from 15 localities, viz., Deosai, Minimerg, Nanga Parbat, Central Karakoram National Park, Khunjrab National Park, Ghizer, Karanbar, Tirch Mir, Kalam, Palas, Kaghan, Gumot, Shontar and Taobat, surviving at 2,500-5,000 m above sea line (asl). The Deosai plateau population has recently received the attention of researchers/conservationists; the population declining to 19 in 1993 (HWF 1994) increased to 40-50 in 2006 (Nawaz, 2007). Protection afforded in Khunjerab National Park increased the population of 7 in 1997 (Shafi and Ali 1998) to 10-15 in 2006 (Nawaz 2007). All other populations were believed to be declining (Nawaz 2007). Molecular biology studies on the Deosai population indicated high homozygosity and movements of individuals between adjacent populations (Bellemain et al. 2007).

The Himalayan black bear has a restricted global distribution range; from Bhutan through Kashmir, Sikkim to Pakistan (Roberts 1997). This subspecies was present in all hills/valleys holding temperate forests in northern Pakistan at 1,500-4,000 m asl. Black bears attracted little attraction of researchers/conservationists and casual sighting records indicated the presence of viable populations in the Neelam Valley (Azad Jammu and Kashmir), Sari and Soghran, lower Kaghan, north Dir, south Chitral (Khyber-Pukhtunkhwa), Gilgit and Randu Valley (Gilgit-Baltistan) until the 1950's (Roberts 1997). Himalayan black bears in Pakistan are believed to have witnessed a sharp decline during the last 40-50 years, but no supportive data is available (Sheikh and Molur 2005).

Bears cause depredation of and habitat competition with livestock (Joseph, 1997). Cub poaching (for bear baiting and street dancing) and adult killing (for national/international trade of parts) involve many people and a lot of money, which goes against future survival of the bears. With appreciable decreases in bear-baiting events in Pakistan, through joint efforts of the Bioresource Research Centre-Pakistan (BRC) and the World Society of Protection of Animals (WSPA), cub poaching is gradually becoming unattractive business venture. Bear killing, however, continues primarily as an offshoot of the human-bear conflict and secondarily for trade of its parts.

Both Himalayan brown and Himalayan black bears have a vulnerable status in Pakistan, with populations decreasing in size and ranges of distribution shrinking (Sheikh and Molur 2005). This can lead to increased fragmentation/isolation, inbreeding, genetic fixation and erratic chance fluctuations in populations (Lacy 1997, Frankham et al. 2002), and limited dispersal, access to food and protection; all having serious consequences for their future survival. Protection and conservation may increase the number of heads in an isolated population, yet such populations may dwindle to extinction under a bottleneck effect. Therefore, future management of bear populations in Pakistan requires an early assessment of existing distribution, status, and isolation for providing proper population management guidelines, along with lowering the extent of retaliatory human killing of bears as part of the human-bear conflict.

Keeping to the urgency, we planned the present study to collect basic information on distribution, decline, isolation and human conflict of the Himalayan brown and black bears of Pakistan. We adopted to collect bear-related local wisdom, through a questionnaire based survey in the potential bear tracts. Human inhabitants of hilly Pakistan have high

dependence on wild resources; as hunters, grazers, or subsistence farmers, they are keen observers of changes in nature and the wild resources of their area. Their observations, extending over a longer period of time and deeper association with nature, have sufficient basis of reliability if suitably collected and analyzed (Jhalla and Giles 1991, Fakhar-i-Abbas et al. 2013). Information collected through questionnaires is not a substitute for direct scientifically collected information, however, collection of field data on bears is difficult (rough terrain and poor accessibility, harsh climate, expensive logistics: Nawaz et al. 2008; population scattered over wide area and nocturnal in habit: Roberts 1997) and time-consuming. Bears, especially the Himalayan black, are data deficient in Pakistan, requiring some benchmark information on distribution and human conflict, which can be used in envisaging a short term range management action plan of conservation requiring public awareness and motivation. The location and distribution of physical and habitat barriers between bears population helps in suggesting possible isolation existing between populations. Information collected under the present attempt can also be used in future planning of field studies and the generation of more reliable data.

Study Area

Potential Himalayan brown and Himalayan black bear tracts in Pakistan fall under three administrative provinces (35.35°N 75.9°E), viz., Gilgit-Baltistan (Gizer, Gilgit, Chilas, Astore, Baltistan, Khuplo), Azad Jammu and Kashmir, and Khyber-Pukhtunkhwa (Chitral, Kohistan, Batagram, Diamir, Mansehra, Batagram, Dir, Swat). Swat, Dir, and Azad Jammu and Kashmir were not included in the present study due to different conditions. The area is hilly and mountains originating from three ranges the radiate from the Pamir Knot, viz. the Himalayas radiating in the east, the Karakorum in the northwest, and the Hindu Kush in southwestern directions. Altitudes vary from about 1,000 m asl in the south to 8,611 m asl in the north with potential bear tracts falling at 1,500-5,000 m asl (study area). Mountain slopes are steep and eroded in the north and relatively gentle in the south. Hill folds are associated with valleys of different dimensions and orientation (inter-mountain highlands) having water courses draining into a main stream/river. Different valleys are interconnected to varying degrees and, depending upon the altitude, provide habitat corridors of different sizes for the movement of bears (Woods and Kalpatrick, 1997). The summer monsoon is higher in southern and eastern parts (Himalayas), and the winter monsoon (mostly as snow falls, ensuring ground water recharging) is scanty but more frequent in northern and western parts (Karakorum and Hindu Kush). Valleys, receiving snow melt, mountain wash, and the flow of springs, hold good vegetation and provide pasture for livestock and habitat for wild animals (including bears).

Human habitation (scattered houses/small villages; few larger towns) and communication links are generally restricted to lower altitudes and valleys. Scattered nomadic livestock grazer camps appear during summer at higher altitude pastures. The human population mainly depends upon subsistence agriculture (maize major summer crop; scattered fruit trees; apricot, mulberry, grapes and walnut) and livestock grazing (sheep/goat, cattle, horse/donkey/mule, yak). The number of livestock heads, area under cultivation, and logging/deforestation is increasing with the passage of time to meet the needs of the growing human population and demands for amenities of modern life.

METHODOLOGY

Sampling

We undertook a reconnaissance survey of the northern hilly parts of Pakistan, except

for Swat, Dir, Federally Administered Tribal Areas and Azad Jammu and Kashmir, guided by Roberts (1997) and Wildlife and Forest Departments, to gather information on present/historic presence of bears. We intensively travelled along the available logistics in potential bear tracts to approach volunteers permanently settled in the area and willing to share their wisdom in present survey. We conducted 1,873 questionnaire based interviews of volunteers (hunters, farmers, grazers, wildlife/forest staff, and wildlife enthusiasts) from 2012 to 2014, mainly during the summer. We identified 258 different valleys in the bear tracts and assigned each volunteer to one of these valleys (Figure. 1). We obtained verbal informed consent of each volunteer for his participation in this survey after appraising him about the purpose of the survey and assuring him the confidentiality of his personal information except for its use for the present study. We recorded GPS generated coordinates of all interview sites which were used these to map the location of localities.

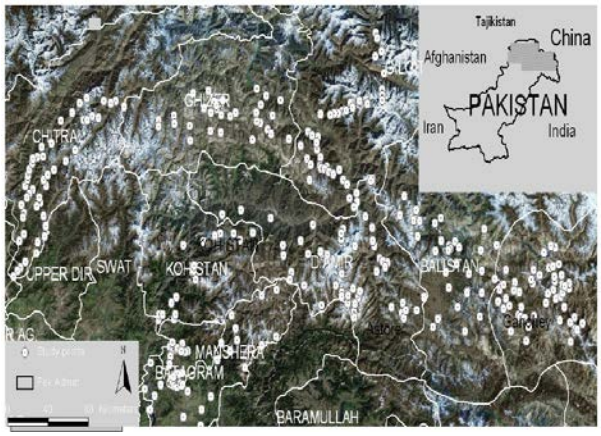

Figure 1: General topography of northern Pakistan showing position (dots) of sampled localities.

We tested a predesigned questionnaire (in Urdu, the national language) under field conditions and adjusted it after receiving feedback. The questionnaire contained questions on estimates of the population in the locality, numbers, sex (adult males and female), and age (cubs and adults) of bears sighted at different occasions during the last 4-5 years, as well as bear status and decline, crop damage pattern/frequency, bear caused livestock depredation during the last year, recent bear attack on man, and killing/poaching of cub/bear. Our pre-trained workers, acclimatized to local conditions, languages and cultures, conducted the interviews and recorded the responses. We also asked each interviewee to identify a set of colored photographs of important local wild animals/plants and marked the scores on correct identification.

Data Management and Analysis

We used personal information/profession of respondent (possibility of exposure to wilderness), correct identification of photographs of local animals/plants, responses to countercheck the questions (estimates, frequency of sighting, abundance, damage, odd responses to many questions) to check the reliability of the information conveyed by each respondent. We excluded questionnaires having responses with doubtful reliability (n = 136) from the analysis, and subjected 1,737 questionnaires to analysis. We grouped 258 initially identified valleys to 70 localities having freely interbreeding (Mendelian) populations of bear species, based on proximity (10-15 km) of valleys, similarity in bear species reported, reasonably close estimate on bear populations/human conflict, and continuity of bear habitat. We regarded localities with no recent sighting/bear conflict but having sightings within living memories as localities with recent bear extinction (after the 1950's). Localities with some possibility of bear presence but having no recent sightings were considered as near-extinction localities and localities with recent sightings/conflicts as localities with extant bear populations. We developed distribution maps of extinct, near extinct, and extant populations of brown and black bears using GPS generated coordinates

and possible distribution of bear habitat, and calculated the areas under each class using Google maps. We then worked out the change in bear occupancy since the 1950s. We used the population distribution maps in conjunction with location, extent, and possible efficacy of physical and biotic barriers to group populations into meta-populations, each having possibilities of inter-population movements and sharing of a common gene pool.

We excluded the odd (outliers) or vague (too many, many, few, etc.) estimates on bear population from the analysis. We averaged and rounded to whole numbers the minimum and the maximum numbers of bears estimated by different respondents from a locality. We used the average estimated minimum-maximum numbers in each locality to classify each population/meta-population as very small (1-2), small (3-5), medium (10-20), large (30-80) or very large (>90).

No numerical estimates were possible on crop damage, therefore, we categorized crop damage as severe (regular and serious), mild (regular but tolerable), and minor (occasional in some years and tolerable). We considered the lowest number of reported depredation of each livestock species by any of the respondents as estimated annual loss (killed or seriously injured) of the livestock species in the locality. Reports on bear attacks on man and bear killing/poaching (usually repeated by many respondents from more than one locality) were taken as such. Economic loss sustained by the livestock famer community through livestock depredation was calculated on the average market price of different livestock species in the local market.

RESULTS

Population Distribution

In Table 1 we present average estimates on populations of brown and black bears and human-bear conflict, based upon responses of respondents from different broad localities. The brown bear was more frequent in comparatively northern latitudes, viz., northern Chitral, Ghizer, Gilgit and Skardu, while the black bear was more frequent in southern latitudes, viz., Batagram. Both brown and black bears are present in central latitudes, i.e., central Chitral, Astore, Diamir, Kohistan and Mansehra (Figure 2, Figure 3).

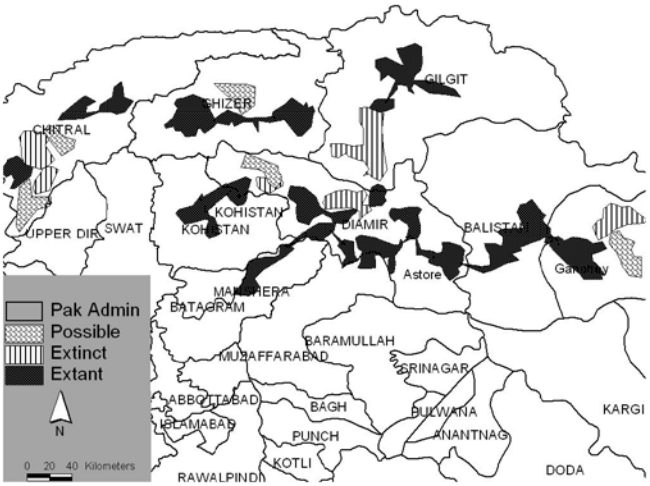

Figure 2: Distribution of brown bear populations in northern Pakistan during 2012-14.

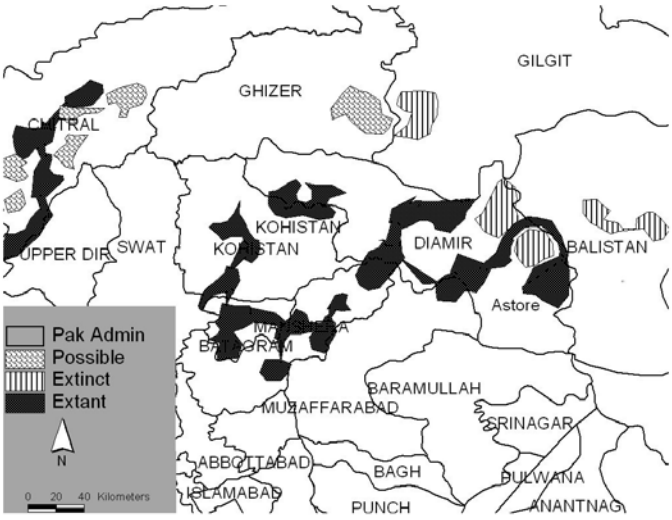

Figure 3: Distribution of Himalayan black bear populations in northern Pakistan during 2012-14.

We identified 34 populations of brown bear, maintaining varying levels of isolation

Table 1: Summary of respondent information on Himalayan brown and Himalayan black bear population estimates and human-bear conflict in different localities of Pakistan during 2012-2014. Mai = maize, Apr= apricot, Mal= mulberry, Gra = Grapes, Wal =Walnut, Cat= cattle, Goat= goat/ sheep, oth = others (Y=yak, H=horse/donkey/mule); M = mother, Ext = extinct, * = unknown.

Locality	Population Estimates (#)		Human Conflict									
			Crop Damage					Livestock claims			Man Attack	Bear Killed/ Poached
	Brown	Black	Mai	Apr	Gra	Mal	Wal	Cat	Goat	Oth		
Chitral												
Laspur	4-7	-	-	-	-	-	-	3	-	Y		
Malkow	3-4		-	-	-	-	-	2	-	-		
Baranesh	-	Ext	-	-	-	-	-	-	-	-		
Chasma	-	2-3	-	-	-	-	-	-	+	-		
Bakarabad	-	Ext	-	-	-	-	-	-	-	-		
Danin	-	2-3	+	-	-	-	-	-	1	-		
Chitral	Ext	1-2	+	-	-	-	-	-	-	-		
Ayun	-	Ext	-	-	-	-	-	-	-	-		
Bamborat	1-2	4-6	+++	-	-	-	-	1	+	-		
Succo	Ext	7-8	++	-	-	-	-	-	-	-	Kill	
Baroze	-	4-5	+++	-	-	-	-	-	-	-		
Drosh	*	4-6	-	-	-	-	-	1	1	-		
Arundo	-	12-15	-	-	-	-	-	5	10	-		
Gilgit												
Phundar	6-8	-	-					1	2	H		
Yasin	2-3	-						-	-	-		
Galaper	-	Ext	+					-	-	-		
Jaglot	-	Ext	-					-	-	-		
Chakarkot	Ext	Ext	-					-	-	-		
Bagrote	Ext	-	-						-	-		
Chalat	1-2	-	-					1	-	-		
Lassan	-	Ext	-					-	-	-		
Hisper	1-2	3-4	-					1	-	-		
Manipin	1-2	4-6	-					1	1	-		
Gulmatti	4-6	-	++					1	1	-		
Khunjerab	8-10	-	-	++				1	2	3 Y		
Diamir												
Kirja	-	3-4	+++	++	++			2	10	-		
Tangir	4-5	11-15	+++	++				1	10			
Dural	-	10-12	+++	++	++			2	10	-		
Hudure	4-5	11-13	+++	++	++			2	8	-		
Gias	2-3	12-15	+++	++	++			2	5	-	Attack	
Gonar Farm	Ext	Ext	-					-	-	-		
Goharabad	Ext	3-4	-					2	10	-		
Thack	12-14	4-6	+++					2	8	H		
Astore												

Bolan	4-5	6-7	++					-	5	-		Black
Gudai	1-2	5-6	++					1	4	-		
Makial	6-7	4-5	++					2	3	-		
Pakora	6-7	8-10	++					1	4	-		
Ratto	5-6	5-7	++					1	4	-		
Chawgham	7-8	3-5	-					-	8	-		
Minimerg	8-10	5-7	++					2	6	-		
Bonji	Ext	Ext	-					-	-	-		
Harcho	*	5-6	++					-	-	-		
Dayal	1-2	Ext	-					-	1	-		
Eidgah	2-5	4-8	++					1	4	-		
Skardu												
Astak	-	Ext	-					-	-	-		
Kachura	3-4	-	-					-	-	-		
Shigar	-	3-4	-	+	+	+	+	1	2	-		
Deosai	56-62	-	-					-	-	-		
Khomag	2-3	-	-					-	-	-		
Talas	Ext	-	-					-	-	-		
Mirzagound	Ext	-	-					-	-	-		
Hushay	Ext	-	-					-	-	-		
Kohistan												
Kandia	*	14-18	-	+		+		2	8	-		
Sumar	*	16-18	-	+		+		1	4	-		
Koshi	7-8	18-21	-	+		+		4	4	-		
Harban	-	10-15	-	+		+		1	6	-		
Pattan	-	11-14	-	+		+		1	6	H		
Palas	4-6	13-15	-	+		+		2	4	6H	Attack	M+Cub
Dubair	-	11-15	-	+		+		2	2	-		
Mansehra												
Sachan	3-4	5-8	+					-	2	-		
Jabori	3-5	8-10	++					-	1	-		
Kamalabad	1-2	12-17	++					-	2	-		
Kawai	8-10	13-15	++					-	2	-		
Paris	8-10	17-22	-					-	+	-		
Balakot	4-6	12-15	++					-	1	-		
Batagram												
Nagram	-	45-54	+					-	5	-		
Rashing	-	32-37	+					-	5	-		
Shakarga	-	16-19	++	+	+			-	10	-	Attack	
Shimli	-	29-35	++	+				-	8	-		
Pamel	-	2-3	++					-	-	-		

with other populations. The Deosai Plateau held a large population. Medium populations were present in 5 (Khunjerab, Thack, Minimerg, Kawai, and Paris) localities, while 14 localities held small and 15 very small populations (Table 1). We could organize 34 populations into 9 isolated meta-populations, with possibilities of varying levels of bear movements within a meta-population. A large single meta-population was distributed over a wide tract of Skardu-Astore. A medium sized meta-population was distributed over

Mansehra-Diamir tracts. Meta-populations of Laspur-Malkov, Koshi-Palas (Kohistan), Phundar-Yasin (Ghizer), and Khunjrab were small. Very small isolated populations/meta-populations were present in Bomborat (central Chitral), Gias (Diamir), and Chowgham (west Astore) (Figure. 2).

We identified 45 populations of black bear (Table 1). Large populations survived in We organized 45 populations into 6 meta-populations. A very large meta-population was present over a wide area of Kohistan, Batagram, and Mansehra. A large meta-population was distributed over Diamir-Astore tract and a medium meta-population in south Chitral. Two small isolated meta-populations existed in Thack (Diamir-Kohistan) and Hisper-Minipin (Gilgit) and a very small isolated population/meta-population survived in Chasma (central Chitral) (Figure. 3).

Decline

We calculated that Himalayan brown bear occupancy extended over 17,031 km^2 until 1950. Present occupancy of the extant population of brown bear was over 12,147 km^2, while it was near extinction over 2,266 km^2 and extinct over 2,678 km^2. This suggested a contraction of brown bear occupancy by 15.7% after the 1950's and another 13.3% of the area has remote possibilities of a brown bear presence.

Our calculations suggested that Himalayan black bear occupancy extended over 11,837 km^2 until the 1950's. Occupancy of the extant population black bear had contracted to 7,925 km^2, while the species faced extinction over 2,180 km^2 and was at near extinction level over 1,732 km^2. This indicated 18.4% contraction in the occupancy of the black bear and was at almost extinct over 14.6% of its previous occupancy.

Human Conflict

3 localities of Battagram, viz., Nagram, Rashing, and Shamli. Medium populations were present in 17 localities (Arundo, Tangir, Durel, Hudure, Gias, Kandia, Sumar, Koshi, Harden, Pattan, Palas, Dubair, Kamalabad, Kawai, Paras, Balakot, and Shakarga). Allother populations were small or very small.

***Crop damage*:** Maize was the most vulnerable crop to bear damage. Bear troops regularly raided standing maize crops inflicting severe damages in 2 localities of Chitral (Bamborat and Baroze) and 6 localities of Diamir (Kirja, Tangir, Dural, Hudure, and Gias). Moderate damage has been suggested for 17 localities (Chital 1, Ghizar 1, Astor 8, Mansehra 4; Battagram 3), while damage remained low and tolerable in 5 localities. Bear-caused damage has also been reported for apricots, grapes, mulberries, and walnuts (medium: Diamir 5 localities; low: Dassu 7 localties, Battagram 3, Skardu 1) (Table 1).

***Livestock depredation*:** Estimates on reported livestock depredation (Table 1) suggested an annual loss (killed or seriously injured) of 54 cattle, 188 goat/sheep,4 yak, and 9 horses. No loss of poultry was reported. Livestock depredation was higher in Diamir (75 heads), Astor (47), Kohistan (54), and Battagram (28).

Based on the number of livestock heads killed/injured (Table 2), we estimated an annual economic loss of Pak Rs. 2,840,000 (US$ 28,400) faced by the livestock farming community during 2012-14. The losses were higher in Kohistan, Diamir, Chital, Gilgit, and Astore, medium in Batagram, and low in Mansehra and Skardu (Table 2).

***Human attack and cub poaching*:** Respondents reported 4 recent bear attacks on man, of which one (Succo, Chitral; by black bear) did not survive the fatal injuries, while the other 3 sustained major injuries.

Only 2 cases of cub poaching have been reported. One black cub was poached from Bolan (Astore), which died during transportation to the market place. Another black cub was poached from Palas (Kohistan) after killing the mother.

DISCUSSION

Population Distribution and Status

Isolated small populations may face serious consequences through inbreeding, population fixations, and erratic population fluctuations (Lacy 1997, Frankham et al. 2002). A study on population isolations requires extensive non-invasive sampling (hair with root hair, feces)

Table 2: Estimates on bear caused annual monetary losses (Pak Rupee X 1,000) to livestock farmers in different districts, based on average local market unit prices (in parenthesis with livestock species) and the minimum claimed damage (Table 1). Horse includes donkey and mules.

District	Cattle (30/head)		Sheep/Goat (4/ head)		Yak (70/head)		Horse (20/head)		Total Value
	#	Value	#	Value	#	Value	#	Value	
Chitral	13	390	12	48	1	70	-	-	**508**
Gilgit	6	180	6	24	3	210	1	20	**434**
Diamir	13	390	61	244	-	-	1	20	**654**
Astore	8	240	39	156	-	-	-	-	**396**
Skardu	1	30	2	8	-	-	-	-	**38**
Kohistan	13	390	34	136	-	-	7	140	**666**
Mansehra	-	-	8	32	-	-	-	-	**32**
Batagram	-	-	28	112	-	-	-	-	**112**
Total	**54**	**1,620**	**190**	**760**	**4**	**280**	**9**	**180**	**2,840**

and analysis using molecular markers. Such studies are expensive, time consuming, and requiring some bench-mark information on population distribution, isolations, and status of population to support populations sampling. The present effort provides some insight into the existing situation, using a fast and low cost method of collecting local wisdom through questionnaire based interviews. For arriving at more reliable conclusions we: 1. Extensively surveyed the bear tracts to identify the actual bear tracts, 2. Interviewed 1873 individuals at different places, 3. Filtered each questionnaire to screen out (136) the non-serious or unreliable responses, 4. Identified 258 valleys and assigned each questionnaire to one of these valleys based on the proximity of the interview site, and reasonable closeness of the information conveyed, 5. Grouped 258 valleys into 70 localities having continuity of bear habitat, closeness of estimated population/bear caused damage, supposedly to have freely interbreeding bear population, 6. Identified meta-populations comprising of individual populations, having inter-population movements of bears and sharing of the common genetic pool, 7. Isolation between meta-populations was ultimately analyzed by looking at population distribution in conjunction with possible barriers and habitat corridors for bears. Possibilities of gene flow between the Deosai population and its adjacent populations of brown bears have been indicated, using molecular biology techniques (Bellemain et al. 2007), which indirectly supports our identification of meta-populations.

Of 9 meta-populations of brown bear, 7 were very small (Bomborat, Gias, and

Chowgham) or small (Laspur_Malkov, Koshi-Palas, Phundar-Yasin, and Khnujrab). These populations are probably under serious inbreeding and require immediate attention before they dwindle to extinction. Mansehra-Diamir (medium) and Skardu-Astore (large) meta-populations can be regarded as good populations with brown bear standards, yet are not large enough to have random and panmictic matting. Higher homozygosity and population fixation in the Deosai population has already been indicated in a recent study using molecular markers (Bellemain et al. 2007), which can be ascribed to bottleneck effect of the recent population buildup after declining to very low levels (19 in 1993; HWF 1994) and inbreeding. This suggests that management through controlling bear depredation/poaching and habitat protection alone is not sufficient to ensure continued future survival of the Himalayan brown bear in Pakistan. Limited selection under genetic fixation (Frankkham et al. 2002) increases the probability of extinction (Soule 1987), as has been reported for populations of rhinoceros (*Rhinoneros unicornis,* Hedrick 1992), Siberian tiger (*Panthera tigris*; Hedrick 1992), and northern elephant seal (*Mirounga angustiris*; Bonnell and Selander 1974).

No study is in hand on population levels and isolation in Himalayan black bears in Pakistan. Three black bear populations are very small (Chasma) or small (Hisper-Minipin and Thack) and are under serious inbreeding and threat of early extinction. Other 3 meta-populations (Batagram-Kohistan, Astore-Diamir, and Chitrla) are probably in better shape; large with lower inbreeding, distributed over wider areas, having a number of contributing populations (ecotypes) and probably higher genetic diversity.

Decline

Direct data on population decline is not available. Indirect data available under the present study suggests some 30% contraction in bear occupancy (brown: extinction 15.7% + near extinction 13.3% = 29.9%; black: extinction 18.4% + near extinction 14.6% = 33%) during the recent past (during last 30-40 year). We assume that contraction in occupancy is a direct indicator of population decline. This decline is rather high and special efforts are immediately required to confirm this fact and to undertake serious studies on the causes of such a decline. Habitat contraction, human interference in bear habitat, cub poaching and killing of mothers, and human retaliatory killings, etc. have been frequently suggested as causes of bear decline (Sheikh and Molur 2004), but without supportive data.

Human Conflict

We could not specifically attribute damage to bear species. Raiding of standing maize and fruit plantations has been reported from different localities. Crop damage is also inflicted by wild boars (*Sus scrofa*) and jackals (*Canis aureus*), and can be confused with bear caused damage. However, local farmers having the experience of ages supported by sighting of wild animals (bear/ boar/ jackal) in the field usually have high levels of certainty for their claim. Asiatic black bears have been indicated as a primary agricultural pest in Nepal (Stubblefield and Shrestha 2007).

We developed very conservative estimates on bear caused damage to livestock, and accepted the lowest claim for depredation of a livestock species for a locality. Common leopard (*Panthera pardus*), snow leopard (*P. unicia*) and wolf (*Canis lupus*) depredation is also sometimes ascribed to bear depredation, however local inhabitants can differentiate bear caused depredation and have support of field evidences. We recorded annual losses of 54 cattle (cow/buffalo), 188 goat/sheep, 4 yaks, and 9 horses, with economic losses of Pak Rs. 2,840,000 (US$ 28,400) to the farming community, based upon average village market prices. Khan (2014) suggested depredation of 16 sheep/goats, 2 cattle, and 3

horses during 2012 in the Gurez Musk Deer National Park (Azad Jammu Kashmir, Pakistan) by a population of 11 brown bears. Farmers in the Manasalu Conservation Area (Nepal) claimed US $1,500 as compensation for confirmed brown bear caused livestock mortality/injury (Achyut et al. 2010). Annual losses of US$ 5,910 was inflicted by livestock depredation by 18 brown bears (*U. arctos*) in Central Zagros, Iran (Qashqani et al. 2014). The presently calculated monetary losses are comparatively low when compared with similar losses in other parts of the bear tract, which can be ascribed to our adoption of a careful and very conservative approach of evolving present estimates.

Increases in the human-bear conflict is a global problem (Apker 2003) and is associated with increasing human population (Hobbs and Stoops 2002, Baruch-Mordo et al. 2008). Subsistence agriculture and livestock farming are main stays of the rural economy in hilly areas of Pakistan. With increasing human population and contracting biotic resources, importance of agriculture and livestock in the rural economy is increasing, and thence human reaction to bears, damaging both crops and livestock. Recent extension in logistics, market accessibility (grapes, apricot) and the advent of modern technology for value addition/preservation, (dried mulberry and apricot) the importance of fruit crops has also increased. Lowered prey base in the wild and habitat contraction under increasing human intrusion into the wild habitat attracts bears towards human habitations (Bargali et al. 2005, Bargali 2012). Fear of bears raiding agricultural fields and livestock barns is a source of continuous mental torture for local farmers, spending their nights at alert and vigilant, guarding their fields/barns with dogs, ammunition, and other repelling devices. Serious efforts are required to understand the nature of the problem and in finding ways of developing a peaceful coexistence between bears and the human inhabitants.

Not many bear attacks on man have been reported. Bear attack on man is widely circulated news, and therefore, 4 reported attacks probably indicate little fear of bear attacks on man. With the advent of safer motorized travel, limited travel during late night, and a lowered bear population, there has been a lowered frequency of bear attack on man.

Cub poaching and bear killing is a secretly managed activity, and therefore remains under-reported. Cub poaching has definitely decreased during the last decade due to strict measures by wildlife departments and drying interest in bear baiting. However, we have reasons to suggest that poachers still claimed more than 2 cubs in a year, as has been indicated by the respondent's responses.

ACKNOWLEDGEMENTS

Thanks to field workers and volunteers for support in data collection.

REFERENCES

Abbas F, Rooney TP, Mian A (2013). Grey wolf in Gilgit-Baltistan, Pakistan: distribution, abundance and persecution. Canid Biol. Conserv. 16, 18-24.

Achyut A, Sathyakumar S, Schwartz CC (2010). Current status of brown bear in the Manasalu Conservation Area, Nepal. Ursus 21, 109-114

Apker JA (2003). Colorodo status report: Western Black Bear Management Workshop 8, 14-20

Ballemain E, Nawaz MA, Valentini A, Swenson JE and Taberlet P (2007). Genetic tracking of browm bear in northern Pakistan and implications for conservation. Biological Conservation 134, 537-547.

Bargali, HS (2012). Distribution of different speacies of bear and status of human-bear conflict in the State of UttaraKhand, India. Adv. Biol. Res. 6, 121-127.

Bargali, HS, Akhtar N, Chuuhan NPS (2005). Characteristics of sloth bear attack and human casualities in North Bilaspur forest division, Chhattisgarh, India. Ursus. 16, 263-267.

Baruch-Mordo, S, Breck W, Wilson KR, Theobald DM (2008). Spatiotemporal distribution of black bear-human conflicts in Colorado, USA. J. Wildl. Manag. 72, 1853-1862.

Bonnell, ML, Selander RK (1974). Elephant seal genetic variation and near extinction. Science. 184, 908-909.

BRC (2014). Bioresource Research Centre, End Bear Baiting – Activity Report (unpulished)

Can OE, Togan I (2004). Status and management of brown bear in Turkey. Ursus. 15, 48-53.

CITES (2014). Appendices I, II and III. < http://www.cites.org/eng/app/appendices.php>. Downloaded on 09 October 2014

Frankham F, Balou JD, Briscoe DA (2002). Introduction to Conservation Genetics. Cambridge University Press, Cambridge, UK.

Garshelis D, McLellan B (2004). Bear Specialist Group Notes: Where are the bears! Int. Bear News 13, 10-11

Hedrick FW (1992). Genetic conservation in captive populations and endangered species. In: Jain SK, Btaford (Eds.), Applied Reproductive Biology. Kluwer, Dordrecht, Netherlands, pp. 45-68.

Hobbs F, Stoops N (2002). Demographic trends in the 20th century. U.S. Census Bureau Report Series CENSR-4, Washington D.C., USA.

HWF (1994). Deosai brown bear report, 1998. Final Report. Himalayan Wildlife Foundation, Islamabad, Pakistan.

Jhala YV, Gile Jr. RH (1991). The status and conservation of wolf in Gujrat and Rajastan, India. Conserv. Biol. 5, 476-483.

Joseph J (1997). Bear baiting in Pakistan. World Society for Protection of Animals, London, UK.

Khan LA (2014). Ecology and human-Himalayan brown bear (*Ursus arctos isalbellinus*) conflict in Musk Deer National Park, Azad Jammu and Kashmir. M.Phil. thesis, Department of Zoology, University of Azad Jammu and Kashmir, Muzaffarabad, Pakistan.

Lacy RC, Horner BE (1997). Effects of inbreeding on reproduction and sex ratio of *Rattus villosissimus*. J. Mammal. 78, 877-887

Mishra C, Fitzherbert A (2004). War and wildlife: a post-conflict assessment of Afghanistan's Wakhan Corridor. Oryx. 38, 102-105

Nawaz MA (2007). Status of the brown bear in Pakistan. Ursus. 18, 89-100.

Nawaz MA, Swenson JE, Zakaria V (2008). Pragmatic management increases a flagship species, the Himalayan brown bear, in Pakistan's Deosai National Park. Biol. Conserv. 141, 2230-2241.

Qashqei AT, Karami M, Etemad V (2014). Wildlife conflicts between humans and brown bears, *Ursus arctos*, in the

Central Zagros, Iran. Zool. Middle East. 60, 107-110.

Roberts TJ (1997). The Mammals of Pakistan (revised ed.). Oxford University Press, Karachi, Pakistan. pp 525.

Sathyakumar S (2001). Status and management of Asiatic black and Himalayan broen bear in India. Ursus. 12, 21-30.

Schallar GB (1977). Mountain Monarch: Wild Sheep and Goats of Himalayas. The University of Chicago Press, Chicago and London.

Servheen C (1990). The status and conservation of the bears of the world. International Association of Bear Research and Managementt Mongraph series No. 2.

Shafiq MM, Ali A (1998). Status of large mammal species in Khunjerab National Park. Pak. J. For. 48, 91-96.

Sheikh KM, Molur S (Eds.) (2004). Status and Red List of Pakistan's Mammals; Based on the Conservation Assessment and Management Plan. IUCN, Islamabad, Pakistan. pp 312.

Soule ME (Ed.) (1987). Viable Populations for Conservation. Cambridge University Press, Cambridge, UK.

Stubblefield CH, Shrestha M (2007). Statsu of Asaiatic black bears in protected areas of Nepal and effects of political turmoil. Ursus. 18, 101-108.

Woods CA, Kalpatrick WC (1997). Biodiversity of small mammals in mountains of Pakistan. pp. 437-467. In: S.A. Mufti, C.A. Woods, and S.A. Hasan, (Eds.). Biodiversity of Pakistan. Pakistan Museum Natural History, Islamabad, Pakistan, and Florida Museum of Natural History, Gainesville, Florida, USA.