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BIODIVERSITY CONSERVATION IN AFGHANISTAN

Status of Mammals in Wakhan Corridor, Afghanistan

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Contents

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Marco Polo (1254 – 1324)
From 'The Travels – The Road to Cathay'

"When the traveler leaves Badakhshan, he goes twelve days journey east –north-east up a river valley belonging to the brother of lord of Badakhshan, where there are towns and homesteads in plenty, peopled by a warlike race of Moslems. After these twelve days he reaches a country called Wakhan of no great size, for it is three days journey across in every way. The people, who are Moslems, speak a language of their own and are doughty warriors. They have no ruler, except one, whom they call 'nona' that is 'count' in our language, and are subject to the lord of Badakhshan. They have wild beasts in plenty and game of all sorts for the chase.

When the traveler leaves this place, he goes three days journey towards the north-east, through mountains all the time, climbing so high that this is said to be the highest place in the world. And when he is in this high place, he finds a plain between the mountains, with a lake from which flows a very fine river. Here is the best pasturage in the world; for a lean beast grows fat in ten days. With game of every sort abounds. There are great quantities of wild sheep of huge size. Their horns grow as much as six palms in length and are never less than three or four. From these horns the shepherds make bowls from which they feed, and also fences to keep in their flocks. There are innumerable wolves, which devour many of the wild rams. The horns and bones of the sheep are found in such numbers that men build cairns of them beside the tracks to serve as landmarks to travelers in the snowy season."

BACKGROUND

Natural resource conservation is a critical component for reconstruction and development in Afghanistan. With over 80% of Afghanis dependent on the country's natural resource base, long term stability will be directly dependent on sustainable management of natural resources. Despite the isolation of rural communities in Afghanistan, issues here are not just a matter of local concern. Afghanistan plays a critical role on the global political stage, especially given the existence of nearby borders with China, Pakistan and Tajikistan. This is a volatile region and cultural dissolution can have regional and even global repercussions. If environmental conditions continue to degrade, people will no longer be able to carve a living out of the fragile steppe, desert and mountains as they did for centuries. Poverty will spread, communities and cultural practices will dissolve, and rural migration will further dissolve cultural connections and negatively affect neighboring communities and regions.

Afghanistan is heading towards peace and prosperous future. Already 3.7 million Afghans have returned from refugee camps since the Taliban's rule ended in November 2001. It is an epic pilgrimage of an entire people, from wizened old men and women to small children born far from their homeland. They are carrying the poles of their refugee shacks, their goats, their woven clothes and pots and pans, returning to their villages and farms to begin life anew.

By August, 2004 some 500, 000 had returned back to their homes. In July alone, 120, 000 people came home – without fanfare or press coverage, joining the biggest voluntary repatriation of refugees in modern world history.

Considering the issues and the fragile status of Afghanistan, both in terms of environmental and political issues a three year biodiversity project "Biodiversity Conservation in Afghanistan" was funded by USAID. ISLT was given mandate to take survey component of the project in the Wakhan Corridor. This report details the results of three phases of mammalian survey carried in Proposed Big Pamir Wildlife Reserve in the Big Pamir region and Waghjir of Wakhan Corridor. The main objective of the project is to undertake a thorough survey of large mammals and other fauna in three key areas in the Wakhan Corridor of northeast Afghanistan: 1) the Big Pamir Wildlife Reserve, 2) the eastern end of the Little Pamir and 3) the eastern strip of the Waghjir Valley.

EXECTIVE SUMMARY

During the first phase of survey mammal team surveyed the Proposed Big Pamir Wildlife Reserve encompassing an area of 679.38 km^2. The mammal team reported the presence of 8 large mammalian species out of the 9 mammalian species as reported earlier by Petocz (1978). Out of the 8 species found in the area, Snow Leopard (*Uncia uncia)* and Marco Polo Sheep (*Ovis ammon polii)* are globally threatened. Overall mammal team reported the presence of 10 mammalian species from the area. Altai Weasel (*Mustela altaica*) is new addition to the species checklist of the Afghanistan reported during the present survey from the Wakhan valley.

During first phase of survey mammal team surveyed 11 valleys and confirmed the presence of snow leopard from the 10 valleys. Information about the presence/absence and abundance estimation of the snow leopard was collected from the 15 sign transects in all the 11 valleys surveyed during the survey period. We estimated the presence of 1 – 2 snow leopards per square kilometer which gives an estimate of 6.78 – 13.56 cats for the Proposed Big Pamir Wildlife Reserve. This may be an underestimate because the survey time was late as almost all the herders had already moved deep inside resulting in destruction of signs.

The team reported the presence of Marco Polo Sheep from the 3 valleys out of the 11 valleys surveyed. Record of the presence of the Marco Polo sheep from the Nakchrishitk valley is an addition to the previous records. Marco Polo has been reported first time from this valley during the present survey. Based on time series analysis we expect presence of 211 animals in the Proposed Big Pamir Wildlife Reserve. The present Marco Polo habitat is highly grazed and this needs to be immediately stopped.

Based on the measurement of 59 horns from the Proposed Big Pamir Wildlife Reserve, the animals are usually dead by the time they reach to an age of 4 – 7 years, an age when most animals have not achieved the notable horn length – the ideal trophy.

Presence of Long Tailed Marmot (*Marmota caudata)* in all the valleys surveyed is good sign to reduce the conflict by the predators during summer months. Regression equation was developed to estimate the number of marmots based on the number of holes counted in any area. The equation is Y (population Size) = 0.457 (.075 SE) Total Number of Marmot Holes + 3.107 (.899 SE). The equation explained 49% of the variation.

Other species reported during the survey are Wolf (*Canis lupus*), Brown Bear (*Ursus arctos*), Siberian Ibex (*Capra ibex siberica*), Himalayan stoat or Ermine (*Mustela erminea*), Red Fox (*Vulpes vulpes*) and Cape Hare (*Lepus capensis*).

During the second phase of survey the mammal team assessed the magnitude of the conflict. The total loss of livestock due to predators is only 0.65% whereas loss due to extreme weather is 8.85% during winter 2006.

During the 3rd phase of survey highest number of Marco Polo were reported from the Wakhan after 3 decades of war. Mammal team counted 210 Marco Polo in Big Pamir Wildlife Reserve and 191 from the Waghjir Valley.

During the survey period from 2006 – 2007 ISTL team collected 94 scats of snow leopard, 84 scats of wolf and 13 scats of red fox and these scats where analyzed for food habits of these carnivores.

During the project duration two capacity building programs were organized, one in Kabul Afghanistan and one in Aligarh Muslim University, Aligarh India.

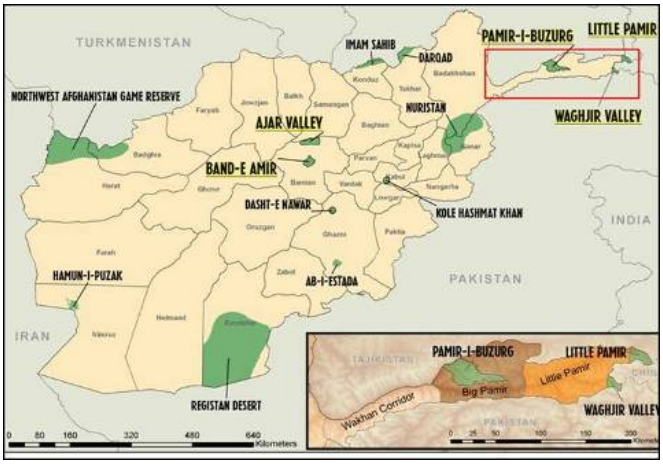
GENERAL INTRODUCTION

Wakhan is a strategic strip in the north-east of Afghanistan. Its length comes to 300 km while its breadth ranges from 20 – 60 kms. The area links Afghanistan with Pakistan in the south, Tajikistan in the north and China in the east. Historically Wakhan is a part of Badakhshan which was an independent state until 1883, when Amir Abdul Rehman Khan merged it with the Kingdom of Afghanistan under the 1873 treaty of Czarist Russia and British India (Anon, 1987: P – 13). In 1895, the Afghan panhandle was given the status of buffer zone and its administration was entrusted to the Afghan Amir, for which he received an annual subsidy of 5,000 pounds sterling from British India (Khalid, 1989)

The reason for creating the buffer zone between the borders of Russia and India was the well known Russio-phobia of the British who then ruled the sub-continent. The idea was shared and equally supported by the Russians, because they were also interested in having safe borders to their south. The people of the Wakhan and the Afghan Pamirs had to suffer in the best interest of their great neighbors who had been termed “the bear” and “the wolf” by Amir Abdur Rehman Khan (Faizi, 1996).

Wakhan Corridor

The Hindu Kush/Himalayan mountain system of south asia includes several mountain ranges, including the Great Himalaya, the Karakoram, the Hindu Kush, and the Pamirs, which extend over 3,500 km and across nine countries (from Afghanistan in the west to Myanmar in the east). These four great mountain ranges meet on the borders of Pakistan and Afghanistan. The formation of this relatively young mountain system during the Tertiary age created new habitats and dispersal routes for flora and fauna. Consequently, life in these mountains became influenced by elements from five biogeographical subregions, the Mediterranean and the Siberian (of the Palaearctic region), west Chinese, Indochinese and Indian (Oriental) (Mani, 1974; Schaller, 1977). The fauna of this mountain system is largely Oriental towards the east, while it gets mixed with Palaearctic elements in the west. Among the large mammals in the high mountains, large carnivores such as the snow leopard, the wolf, and the brown bear are Palaearctic, and so are their main prey, the wild goats and wild sheep. Among the species of mountain ungulates are the markhor (*Capra falconeri*), the ibex, the arghali and the urial, each of which reaches west into Afghanistan.



The western limit of this mountain system is defined by the Hind Kush range, which on its eastern side is contiguous with the Karakoram. Straddled between the Hindu Kush in the south and the Alai in the north is the Pamir range, spread over Tajikistan, Western China and the Wakhan Corridor in the Eastern Afghanistan. The Wakhan Corridor, and in particular its eastern end in the Pamir Knot, has always been one of the most remote and least accessible corners of Afghanistan (Figure 1).

Figure 1: Map of Afghanistan showing Wakhan Corridor and Propose Protected Area. Inset shows Wakhan corridor and its proposed protected areas

Wakhan and the Pamir Knot

The Wakhan Corridor is located between 36° 59′ N to 70° 29′ N and 72° 45′ E to 73° 30′ E. Approximately 210 km east to west and between 20 km and 60 km north to south between the frontiers with Tajikistan and Pakistan encompassing an area of 10,300 square kilometers.

The historical and political background of the Wakhan Corridor seems to fit awkwardly into the great knot of mountains where the Hindu Kush, the Pamirs and the Karakoram ranges meet.

This strange panhandle of land jutting out of the northeast corner of Afghanistan came into being as an integral part of Afghan territory only as the result of frontier wrangling between imperial Russia and Imperial Britain in the 1880s and 1890s, a period during which Czarist Russian forces consolidated their control over the Central Asian Khanates and Emirates. Imperial Britain, in response moved up from the Indian plains into the mountain principalities now incorporated in Chitral and the northern areas of Pakistan.

Geographic Description of the Wakhan Corridor

Population

The total population of the Wakhan/Pamir area, with approx 1335 households, is thought to be 10, 590 people (UNEP, 2003). Of these the majority are Wakhi farmers and herders inhabiting the main Wakhan strip between Ishkeshem and the Qala Panja and thereon up the Wakhan valley as far as Sarhad-e-Broghil. These include herding families who use the western valleys of the Big Pamir and the Little Pamir. The number also includes between 210 and 240 (depending on the source) households of yurt-(domed felt tent) dwelling Kyrghyz herders, or an estimated total population of about 1100-1300. Of these, possibly as many as 140 ± households live in the northeastern valleys of the Big Pamir, and approximately 100 ± households live in the little Pamir.

Frontiers

The northern boundary of the 'corridor' with Tajikistan is formed by the Amu Darya river, which is known along this stretch as the Panj, at least as far upstream as where it is joined by the Wakhan River at the western end of the Pamir Knot. From this point upstream it is known as the Pamir, as far as its headwaters and source in Zor Kol Lake, which lays claim to being main source of the Amu Darya or Oxus River.

The southern frontier with Pakistan runs along the ridge and watershed of the mountains, which make the easternmost spurs of the Hindu Kush range until they merge in a jumble of high mountains and glaciers where the Pamir and the Karakoram ranges meet on the borders of China, Afghanistan and Pakistan.

Three Divisions of Wakhan
Wakhan Corridor, Big Pamir and Little Pamir

The Wakhan Corridor can be roughly divided into three parts. The main Wakhan strip lies between the district centre and the border station of Ishkeshem at the western end and the village of Qala Panja at

the eastern end, which is situated at the confluence of the Wakhan and Pamir headstreams. East of the confluence of the rivers likes the Pamir Knot, with the Big Pamir comprising the westernmost and highest block of the mountains in the knot, separated from the Tajikistan Pamir by the deeply incised valley of the Pamir River. The southern and easternmost block of the mountains in the knot is the Little Pamir, which is defined by the upper valley and headwaters of the Wakhan River (Figure 2).

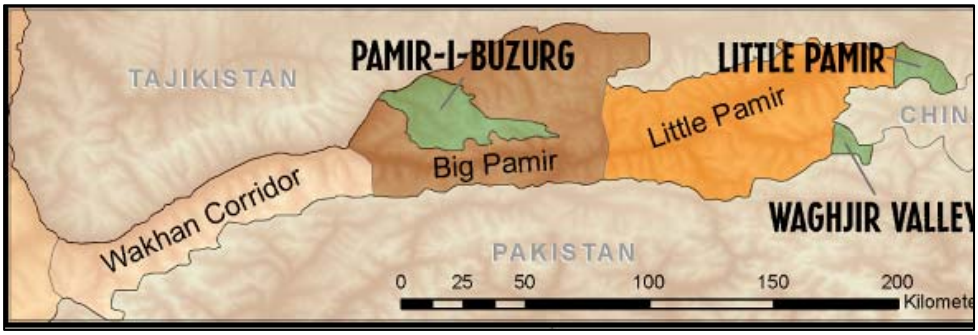


Figure 2: Map showing three divisions of Wakhan

Main Wakhan Corridor: The main Wakhan corridor is comprised of a narrow strip of riverine terrace along the left bank of the Ab-e-Panj River, flanked to the south by the easternmost spurs of the Hindu Kush mounts and crossed by many stony fans and flood washes issuing from these ranges. It is about 110 km long from east to west and seldom more than 20 km broad between the Tajikistan and Pakistan frontiers. The whole of this selection incorporates about 2200 km^2. The mountains which form an almost impassable barrier along the southern frontier rise to snow-covered peaks and ridges of 6,000 meters and above, with glaciers and deep, steep, rocky valleys, which occasionally give access through to Chitral on the Pakistan side. These valleys are used as summer grazing ground for livestock belonging to the villages living along the line of the river, and are also home to mountain ungulates such as ibex and urial and their main predators, the snow leopard and wolf. Red fox (*Vulpes vulpes*), lynx (*Lynx lynx*), various small wildcats and martens also occur here as well as their prey, the cape hare (*Lepus capensis*), marmots and a variety of small rodents, voles and mice. The area was never previously considered as a part of a national park or reserve, but the area is considered as the strong hold for the snow leopard and should be given serious consideration for the long term conservation of snow leopard and its associated prey species.

Along the river between Ishkeshem and Qala Panja there are about 18 or 19 agriculture/herding settlements of various sizes, inhabited by people speaking the local Wakhi language. They adhere to the Ismaili branch of the Muslim faith and are followers of the Aga Khan. The district centre and seat of the *Woluswal* or District Governor of the Wakhan is in the villages of Khandud, two-thirds of the way to Qala Panja. Qala Panja is the traditional seat of the family of influential hereditary Sayeds, whose head is the local Ismaili religious and social leader or 'Shah' of the Wakhan. The Wakhis are transhumance herders and farmers, owing cattle, sheep and goats (particularly towards the Pamir) also yaks and Bactrian camels. They cultivate crops of wheat, barley and millet which is cultivated in rotation with pulses such as broad beans baghala (*Vicia faba*), field peas myshyng (*Pisum sativum*), grass pea patak (*Lathyrus sativus*) and small garden plots of potatoes. All crops are spring sown. A few apricot and apple trees are found in some villages but the area is generally too high for fruit production.

Along this strip can also be found some broad 'chaman' or boggy sedge and grass pastures used by the local villagers for common grazing. A fringe of scrubby brushwood covers much of the wetter ground with dwarf willow (*Salix sp.*), buckthorn (*Hippophae sp.*) and tamarisk (*Tamarix sp.*) which in addition to dung fuel provide fuelwood to villagers. Some villages have small plantations of poplar and aspen (*Populus sp.*) for local use in construction as well as for sale as timber.

The area is characterized by chronic poverty and food deficit as well as having a history of opium addiction and other multiple problems associated with poverty, poor diet, harsh climate and isolation. At the eastern end of the valley many Wakhi herding families use the Big Pamir as seasonal grazing ground for their livestock in the summer months and some even use parts of the Big Pamir during winter as well.

The mountains are characterized by the presence of woody species such as *Artemisia.* Some low scrub composed of *Ross spp.* and *Barberis spp.* appears in places where there is enough moisture and in some places there are the remnants of scattered juniper (*Juniperus sp.*) forest.

Agriculture and settlements lie along the line of the Panj River at altitudes between 2600 – 3000 m. The winters are characterized by intense cold and icy winds drawn down the funnel of the Panj valley. On occasions there are heavy snowfalls, but generally the road is clear or swept clear by the winds.

The road between Ishkeshem and Qala Panja and beyond was contrasted in the 1950s – 60s. Of course in bad condition but remains nonetheless a four-wheel-drive road and annually destroyed by the floods where it crosses the innumerable flood washes.

Big Pamir: The Big Pamir comprises the main block of mountains at the western end of the Pamir Knot between the fork of the Pamir and Wakhan rivers. The Big Pamir comprises a block of high mountains and plateaux of about 4 500 km^2 , about 100 km from east to west and between 20 and 60 km broad from north to south between the valleys of the Pamir and Wakhan rivers.

This is home to the Marco Polo sheep as well as ibex, snow leopard, brown bear, lynx, wolf and fox, the long tailed marmot (*Marmota caudate*), various wildcats, martens, weasels, otters, hares, pikas and small rodents (Petocz and others, 1978).

The highest ranges rise to between 6,700 – 6,900 m and are characterized by perpetual snow and glaciers from which streams drain north into the Pamir and south into the Wakhan River. The northwestern and southern slopes of these valleys provide grazing ground for Wakhi herding families with settled homes in the villages at the eastern end of the main Wakhan strip and in the settlements along the Wakhan Valley between Qala Panja eastwards to Sarhad-e-Broghil. The northeastern section of the Big Pamir Mountains is inhabited by yurt-dwelling Turkic Kyrghyz herding families, living all the year in their felt yurts, tending their flocks of sheep and goats as well as cattle, yaks, and Bactrian camels and moving seasonally over the mountain range. The area is highly grazed by the livestock of these families and looks one of the most overgrazed ecosystems. There are no signs of large mammals in this region of the Big Pamir except some smaller rodents and abundance of Marmots in pastures. The area is occasional visiting place for the wolves also (probably).

Between Qala Panja traveling eastwards up the Wakhan valley as far as Sarhad and between the junction of the Pamir and the Wakhan there are about thirty settlements, most quite small and

consisting of only a handful of houses, established along the alluvial river terraces and fans. As in the main Wakhan strip this area is inhabited by Wakhi-speaking farmers and herders cultivating wheat, barley, pulses and a little millet and potatoes. Barley becomes the main – indeed the sole-crop in the middle altitude aylaq (summer camp) between 3,400 – 3,600 m. Wheat is the dominant cereal crop up to 3,400 m, with barley above this altitude.

The two rivers are fringed for much of their length by scrubby woodland of willow with scattered birch (*Betula sp.*) and extensive thickets of sea buckthorn, rose, and occasional thickets of currant bushes (*Ribes sp.*).

The main mountain grazing slopes up to 4,000 m are dominated by perennial species such as *Artemisia, Astragalus, Ephedra, Cousinia and Oryzopsis* with grasses such as *Stipa* and ephemerals such as *Poa.* The famed Marco Polo sedge meadows or rather sedge pastures on the higher valley flats are dominated by *Carex, Kobresia* and fescues (*Festuca spp*). The slopes above 4,800 m have a rich alpine flora including *Thymus, Saxafraga, Aster, Potentilla, Pedicularis, Primula* and others.

Little Pamir: The Little Pamir consists of two main mountain ranges at the eastern end of the Pamir Knot, divided by the Waghjir Valley. The area lies upstream and east of Sarhad-e-Broghil and to the south of the upper Wakhan River, bordering on Pakistan (Hunza and Gilgit) and the Karakoram Valleys to the south, and with China (Xinjiang-Uigur Autonomous Region) to the east. It comprises a high mountainous area with ridges and peaks rising between 6,500 to 7,000 m, the highest peaks being those along the short Afghan frontier with China.

The Little Pamir is divided into two halves east and west by the Waghjir Valley and pass (4,850m) that gives access to Pakistan's northern areas Gilgit and Hunza. Another high pass, the Yuli Pass (4,872 m) leads into China with access to the ancient Silk Road cities of Tash Gorgan and kashgar. On the northern border, east of Zor Kol Lake the frontier with Tajikistan is marked by a range of glacier-filled mountains, high plateaux, and alpine lakes which is in effect an extension of the Big Pamir range.

Although the western end of the Little Pamir is used to some extent by Wakhi herders from the Sarhad and upper Wakhan for seasonal grazing, the Little Pamir is mainly the home of the yurt-dwelling, Turkic speaking Kyrghyz and their heads. Although about 1,200 of the Little Pamir Kyrghyz fled to Pakistan in 1978, later to be settled in eastern Turkey under a UN/Turkish government-assisted programme, some 100± families remain with considerable numbers of grazing animals.

The Kyrghyz share the Little Pamir with Marco Polo sheep, which occur in larger number than in Big Pamir (Schaller, 2004), ibex and other wild animals. Waghjir Valley is considered to have the good population of Brow Bear with occasional sightings of the Marco Polo sheep. The main trade and commercial outlets of the inhabitants of the Little Pamir are with Gilgit in Pakistan and to a limited extend with Tash Gorgan in China. They are reported to be well-off in terms of herds and flocks, but afflicted by widespread addiction to opium.

Previous Work in Wakhan

The Pamir Mountains have been an area of special interest to the Afghan government and international organizations. The focal point of this interest has been the Marco Polo sheep and a trophy-hunting

programme of ram that was started in 1968 in the Pamir-i-Buzurg. This resulted in many surveys and studies in the region (Petocz, 1973a; Skogland and Petocz, 1975). Three comprehensive reports stand out in presenting a comprehensive description of the status of wildlife and its management in the Afghan Pamirs before the Soviet invasion and form the baseline information regarding the wildlife of the Pamirs (Petocz, 1978a; 1978b; and Petcoz and others, 1978). From 1978 there has been no record of any study about the status of wildlife in the Pamirs. During the year 2003 UNEP team (Fitzherbert, A., Mishra, C., and Khairzad, A.) made a quick assessment of the Big Pamir Wildlife Reserve. The team spent few days in the main Shikargah valley. After that George Schaller during the year 2004 made a detailed survey of the Afghan Pamirs especially for the Marco Polo Sheep. Schaller surveyed 13 valleys in the Little Pamir including the Waghjir that extends to the China border and also has a pass leading into Pakistan. Schaller was not able to survey the Big Pamir but surveyed the lower half of the Shikargah valley, the main valley of the so called Big Pamir reserve and the base for foreign hunters in the 1970s.

Present Work

The present survey is the part of the three year project 'Biodiversity Conservation in Afghanistan' funded by USAID, implemented by Wildlife Conservation Society. The first year report is the outcome of the three field sessions carried in the Wakhan from July 2006 to August 2007. During the first phase of the project Big Pamir Wildlife Reserve was surveyed during summer 2006 for two months and for one month during the summer 2007. Waghjir valley was surveyed during the summer 2007 where as the house hold survey was carried during post winter (April 2007) for assessment of the loss of the livestock to the predators during the winter season.

FIRST PHASE OF SURVEY (SUMMER 2006)

First phase of survey was carried from 18th August 2006 to 20th September 2006 (34 days in the field excluding the travel) in the Proposed Big Pamir Wildlife Reserve. As reported in the literature hardly any animal has been reported east of the Ali Su Valley (37 16 N, 73 00E) except for stragglers. The only record dates back to 1978 when Petocz *et. al.,* reported 192 animals. The Ali Su River is easternmost boundary of the Proposed Big Pamir Wildlife Reserve. Considering the records I emphasized to the proposed Big Pamir Wildlife Reserve for large mammal during the first field season.

During the first phase of survey mammal team reported the presence of all the large mammal species as reported by Petocz (1978a) except Himalayan Lynx (*Lynx lynx isabellina*). Table 1 gives the details of species reported during the first phase of mammal survey from Proposed Big Pamir Wildlife Reserve.

Table 1: Mammalian species of Proposed Big Pamir Wildlife Reserve, Afghanistan with their IUCN Red List status (IUCN, 2002) and number or evidences recorded

Mammalian Species	IUCN Status	Number seen/evidences recorded
Snow leopard *Uncia uncia*	Endangered	Scats, tracks
Brown bear *Ursus arctos*		Scats, tracks
Wolf *Canis lupus*		01, scats, tracks
Red fox *Vulpes vulpes*		05, scats, tracks
Marco Polo sheep *Ovis ammon polii*	Vulnerable	85
Ibex *Capra (ibex) siberica*		162
Long tailed marmot *Marmota caudata*	Near Threatened	364
Cape hare *Lepus capensis*		05
Himalayan stoat (Ermine) *Mustela erminea*		04
Altai Weasel *Mustela altaica*		01 (**New Addition to Afghanistan's Sp. Checklist)**

Figure 3 below shows the routes taken by the mammal team to survey the Proposed Big Pamir Wildlife Reserve during the first phase of survey.

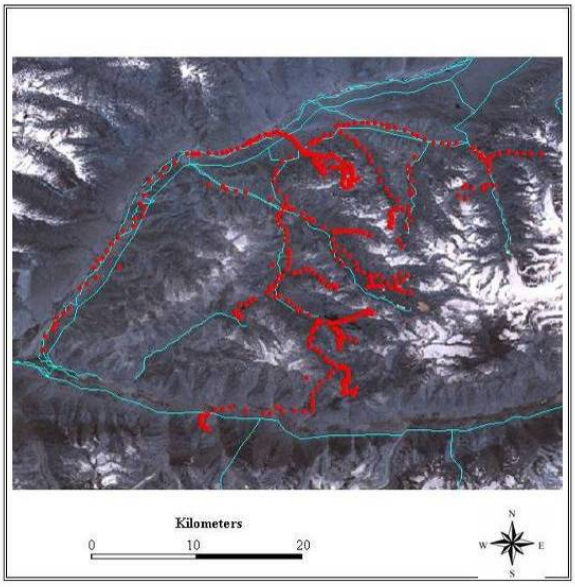


Figure 3: Routes taken by the mammal team to survey Proposed Big Pamir Wildlife Reserve during first phase of survey

Snow Leopard (Status and Distribution)

Introduction

The snow leopard is the only member of the genus *Uncia.* Its classification in the separate genus from the other big cats is justified by its unique hyoid apparatus (a series of skeletal elements which supports the base of the tongue) (Hast, 1989). The distinction between the "big cats" and "small cats" is not based on size, as the term suggests, but on the type of hyoid. In big cats this has cartilaginous portions where as in the small cats; the hyoid is completely ossified or bony. The hyoid and a series of thick fibrous pads on the vocal cords of big cats enable them to roar, but they are unable to purr continuously. The hyoid of snow leopard is only partly calcified and the vocal folds only slightly thickened, so that snow leopards are unable to roar, or purr, continuously.

Snow leopards live in rugged mountainous terrain and are associated through most of their range with arid and semi-arid shrubland, grassland or steppe (Fox, 1989; Jackson, 1992). They are generally found at elevations between 3000 to 4500 m, although they occasionally go above 5500 m in the Himalayas, and can be found between 600 to 1500 m at the northern limit of their range. They are extremely well-adapted for life in steep, high and rocky terrain, with short forelimbs, long hind limbs and large paws for walking on snow. Their tails are extremely long (up to 75 – 95% of the length of the rest of the body) and this adaptation not only assists balancing, but the thick tail can be wrapped around the body to protect the animal from the cold. An enlarged nasal cavity and well developed chest allow snow leopards to cope with the cold, high-mountain air and long body hair with dense, wooly under-fur traps warmth (Fox, 1989; Jackson, 1992; Nowell and Jackson, 1996).

Snow leopards are known to live up to 12 years in captivity (Blomquist and Sten, 1982), but are unlikely to reach half of this range in the wild. Adults can usually weigh 35 to 55 kg. They reach sexual maturity between two and three years old and mate in late winter. Litters, usually of 2 – 3 young are born in late spring.

Snow leopards are opportunistic predators capable of killing animals' up to three times their own body weight (Schaller, 1977; Fox, 1989). There are regional differences in prey taken, but snow leopards most commonly hunt wild sheep and goats such as Blue Sheep *Pseudois nayaur,* Argali *Ovis ammon,* Urials *Ovis vignei,* Siberian ibex *Capra ibex.* Smaller animals such as pikas *Ochotona spp,* zokors *Myospalax spp.* (also known as sailongs) and marmots *Marmota spp.* also constitute important prey species, especially during summer months (Schaller *et al.,* 1988). Predation on domestic livestock can be significant and in several regions

this has been directly attributed to a decreased availability of wild prey and increased human and livestock encroachment into snow leopards habitat (Nowell and Jackson, 1996).

Snow leopards are listed as endangered on the IUCN Red List in that they do not meet the standards of Critically Endangered but are projected to decline by 50% or more over next three generations due to potential level of exploitation (trade in pelts/bones and conflict with livestock), and due to declining: 1) area of occupancy, 2) extent of occurrence and 3) quality of the habitat (prey depletion). They appear in Appendix I of both CITES and Convention on Conservation of Migratory Species of Wild Animals (CMS).

Snow leopards are protected nationally over most of its range countries such as China, Bhutan, Nepal, India, Pakistan, Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, Russia and Mongolia, with the exception of Afghanistan. However, in some countries the relevant legislation may not always be very effective, e.g. because penalties are too low to function as deterrent or they contain some significant loopholes.

Distribution and Population

Snow leopards are distributed in relatively low numbers in high mountain ranges of Central Asia and the Himalayan region. They are most numerous in Tibet (Xizang) Autonomous Region and other parts of China, but their range includes territories in eleven other countries: Afghanistan, Bhutan, Kazakhstan, India, Mongolia, Nepal, Pakistan, the Russian Federation, Tajikistan, and Uzbekistan. The species is extinct in several areas of its former distribution. Snow leopard has extremely patchy distribution and although their range extends over a large area (more than 2.3 million km^2), their fragmented population occupy an area not more than 1.6 million km^2 (Jackson and Hunter, 1996).

Worldwide population estimate for the species range between about 4000 and about 7000 animals. But it is important to note that this estimate was based on the data collected several years ago and that some populations cold be at lower levels now than at the time when the population was estimated. There have been numerous reports of population decline in most parts of the species distribution range over the last decades. Snow leopard was included in Appendix I of CITES, recognition that it was "threatened with extinction" (Anon, 1979). The species is also classified as endangered in the 2002 *IUCN Red List of Threatened Species* (Anon, 2002b, Nowell, 2002) and has been so classified in IUCN Red List since 1988. According to the 2002 Red List, its predicted population trend is downward.

Distribution of Snow Leopard in Afghanistan

Snow leopard inhabits areas of Hindu Kush range (in northeast Afghanistan). They are to be found in the north-western and central parts of the mountain range as well as easternmost parts which extend into Wakhan (Adil, 1997). It is not known how many snow leopards are in Afghanistan, but based on an estimate of the available habitat, it has been calculated that there are around 100 – 200 of the animals. Wildlife in general is considered to have been affected by long term environmental degradation in Afghanistan, exacerbated by two decades of conflict and a corresponding collapse of local and national forms of governance. The present report gives first ever details about the status of snow leopard in Afghanistan. The report is the result of first session of field work carried in Proposed Big Pamir Wildlife Reserve Afghanistan under the project Biodiversity Conservation in Afghanistan funded by USAID and implemented by WCS (Wildlife Conservation Society).

Status of Snow Leopard in Afghanistan

No up-to-date information is available on the legal status of Snow leopard in Afghanistan. After the military intervention in Afghanistan, launched after 11 September 2001, the Agreement on the Provisional Arrangements in Afghanistan Pending the Re-establishment of Permanent Government Institutions, signed in Bonn, December 2001, (the "Bonn Agreement") established the Afghan Interim Authority (UNEP, 2003). Under this authority, the country's legal system still operates within the context of the constitution enacted by the monarchy in 1964. Existing laws stand, provided that they are not inconsistent with the Bonn Agreement. In this regard, the *Nature Protection Law* of 1986 (amended in 2000) and the *Hunting and Wildlife Protection Law* of 2000 provide an important framework for governance, but a post conflict environmental assessment undertaken by UNEP in 2002 concluded that, "the legal status of all protected animals in Afghanistan in currently in question and no management is taking place to protect and conserve their ecological integrity" (UNEP, 2003). A project initiated by UNEP to draft legislation for environmental protection has been submitted to the Government of Afghanistan for approval. In the absence of new environmental laws, the transitional authority in Afghanistan has issued various decrees banning hunting and timber harvesting, but difficulties have been reported in the enforcement of these decrees (UNEP, 2003).

Methodology

Standard sign transects (Sign Surveys) were used to estimate the Presence/Absence and Relative Abundance or Relative Density of the Snow Leopards in Proposed Big Pamir Wildlife Reserve. Standard SLIM (Snow Leopard Information Management System) formats were used to recode the information of snow leopard signs. Snow leopard sign consists of scraping, scent-sprays on rocks, vegetation and tree trunks, feces and urination (usually deposited at or near scrape sites) and the occasional claw-rake left on a rock face, log or upright tree trunk. Tracks are most readily visible when the ground is covered with soft, fresh snow. Under these circumstances, individual animals can be tracked for long distances.

Sign Placement

Snow leopards tend to leave signs in relatively predictable places, such as at the base of cliffs, besides large boulders, on knolls and promontories, at bends in trails, or along other well defined landform edges (Schaller, 1977; Koshkarev, 1984; Mallon, 1987; Ahlborn and Jackson, 1988, Fox, 1989). Landform edges are defined as the sharp point of contact between two topographic features, such as sharply profiled ridgeline that leads down toward a stream confluence, the entrance to a steep-sided gorge, the edge of a steep, abruptly river bluff and the base of a cliff. Sites with poorly defined topographic features and no obvious landscape edge tend to be used much less.

Assumptions of Sign Surveys

Following are basic assumptions regarding snow leopard marking behaviour and use of signs to estimate relative abundance:

1. Because signs are long-lived, relatively easy to locate and can be roughly aged, they can be used to predict snow leopard presence and visitation rates.

2. Individuals of comparable sex and age class mark at similar frequencies and patterns.

3. Different visit rates to marking sites of similar character are assumed to reflect differences in the number of individual snow leopards present, as well as the sex and age composition of the resident and transient populations.

4. Intensity of marking is assumed to be greatest in areas of home range "core overlap" (From Nepal Study)

5. Signs can be aged consistently if the following characteristics are taken into account: differences in marking substrate and weathering rates due to exposure, climatic regime or other disturbances, and resulting sign longevity.

6. The habitat and travel lane preferences are also representative of the species behaviour and marking patterns (From Nepal Study).

7. Carnivore species can be accurately identified from their sign, an assumption that could be violated if observers are inadequately trained to do that.

Sampling Strategy

Special areas or search sites were located within each valley for placing or running sign transect. Number of sign transects in each valley was determined by the area of the valley. Information from the local people and reconnaissance survey was used to locate the best areas for carrying the sign transect. Transects were run in both high density and low density areas to get an idea of abundance in each area. I preferred to carry many short transects than less number but long sign transects. Short transects require less time and studies have indicated that the odds of finding sign declines markedly as transect length increases (Ahlborn and Jackson, 1988). Long transects are more likely to cross habitat or landform boundaries, making the data more difficult to interpret and assign to a particular terrain type or relative density class.

We slowly walked along the each designated transect and searched for snow leopard signs within a 5m wide strip on either side of the line of travel and recoded the data in standard SLIM formats. Standard protocols of recording the signs as provided by SLIM were followed to record the snow leopard signs.

Mammal Team ready for carrying the Sign Transect on the Ridge Line

For each sight other than signs of the snow leopard other parameters recorded were: elevation (meters), aspect (categories), slope steepness (degrees), dominant rangeland use, habitat and

vegetation types, landform ruggedness, dominant topographic features, and the name of the topographic feature that has been marked by the cat.

Supplementary information such as livestock grazing, loss of livestock to predators, hunting and other information derived by questioning local people was also noted down for each valley surveyed during the survey period.

Results and Discussion

During first phase of survey in Proposed Big Pamir Wildlife Reserve we surveyed 11 valleys. Snow leopard presence was confirmed in 10 out of the 11 valleys surveyed. The details of the valleys surveyed and source of information about the snow leopard presence is given in Table 2. In the first phase of mammal survey evidences of snow leopard was recorded from 6 valleys out of 11 valleys surveyed. Whereas as local people reported the presence of snow leopard from 10 out of the 11 valleys surveyed.

The absence of snow leopard from the main Shikargah valley is not in accordance with what I presume. In fact Shikargah valley is accessible till some limit. After that the area is covered by glaciers and rugged mountains which make the valley un-accessible from the Shikargah side. We have found snow leopard signs from the other side of the valley just few hundred meters from the ridge line of the Shikargah valley.

Table 2: Details of valleys surveyed in first phase of Mammal Survey and Snow Leopard Occurrence

S. No.	Name of Valley	Evidences Recorded (During Present Survey)	Presence Confirmed (By Local People)
1.	Wagji Valley	No	Yes
2	Nakchrishitk	Yes (Feces)	Yes
3	Ali Su	Yes (Feces, Pug marks)	Yes
4	Aba Khan	Yes (Feces, Pug marks)	Yes
5	Shikargah	No	No
6	Wuzed	Yes (Feces, Pug marks)	Yes
7	Kund-a-Thur	Yes (Feces, Scrapes, Pugmarks)	Yes
8	Asan Katich Left	No	Yes
9	Asan Katich Right	Yes (Feces)	Yes
10	Kusk Valley	No	Yes
11	Kali Uoos Valley	No	Yes

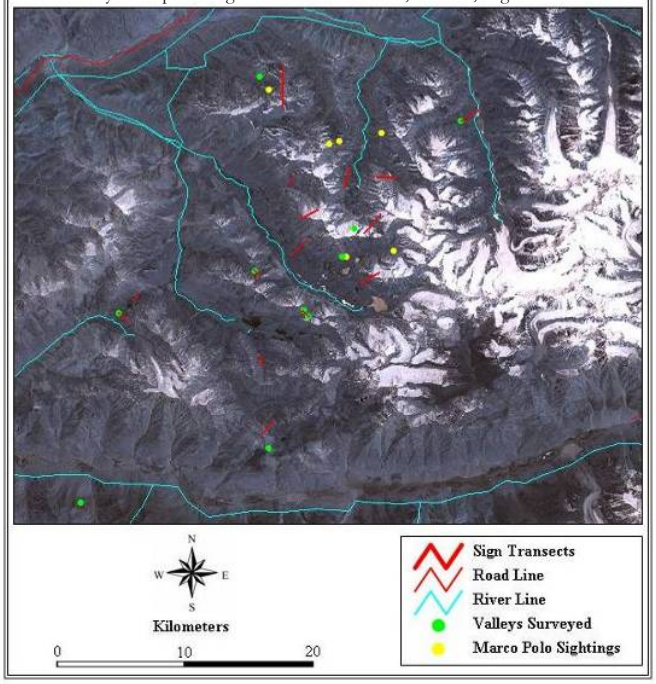
During the survey period we collected information from 15 sign transects in 10 different Valleys. Out of 15 sign transects, signs were located from 7 sing transects where as no sign of snow leopard was located from 8 other transects. The details of sign transects along with number of signs is given in Table 3.

Table 3: Details of Sign Transects with number of Signs recorded from them during first phase of Mammal Survey

S.No.	Transect ID	Length (Kms)	Valley	Number of Signs		
				Tracks	Scrapes	Feces
1	2001	2	Nakchrishitk	0	0	2
2	2002	1.25	Ali Su	2	0	10
3	2003	1.12	Aba Khan	1	0	1
4	2004	1	Aba Khan	2	0	8
5	2005	0.3	Shikargah	0	0	0
6	2006	0.7	Shikargah	0	0	0
7	2007	0.8	Shikargah	0	0	0
8	2008	0.5	Shikargah	0	0	0
9	2009	0.6	Shikargah	0	0	0
10	2010	0.75	Wuzed	4	1	1
11	2011	0.45	Wuzed	0	0	0
12	2012	0.5	Kund-a-Thur	2	0	4
13	2013	0.55	Asan Katich Left	0	0	6
14	2014	0.51	Asan Katich Right	0	0	0
15	2015	0.88	Kusk	0	0	0
Total		**11.910**	**08 Valleys**	**11**	**01**	**32**

The total length of the sign transects surveyed during the first phase of the survey was 11.91 kms with the mean transect length of 0.794 kms. The length of the smallest sign transect was 0.3 kms where as the length of the largest sign transect was 2 kms. Out of the 15 transects tracks were present on 5 transects where as scrapes were present on just a single transect and feces (scats) were present on 7 sign transects. Figure 4 shows the location of the sign transects.

Figure 4: Distribution of sign transects carried during first phase of mammal Survey in Proposed Big Pamir Wildlife Reserve, Wakhan, Afghanistan



Density of signs estimated for the Proposed Big Pamir Wildlife Reserve came to be 3.69 signs per kilometer for all transects monitored. The highest number of signs where found from Ali Su and Aba Khan Valleys with 7.12 signs per kilometer. The figures suggest high density of the signs from these two valleys as compared to other valleys surveyed. But the fact is that there has been no destruction of signs in these two valleys. There has been very low movement of livestock in these two valleys after the winter. These two valleys are reserved for the winter grazing for the livestock. There is no grazing in these valleys during the summer months. So the possibility of destruction of signs is very low from these valleys as compared to others.

Considering this estimate to be conservative I expect the signs from all the valleys surveyed during the first phase to be somewhere 8 - 12 signs per kilometer. We started our first phase of survey in late summer (18th August to 20th September) when almost all the livestock has moved inside all the valleys resulting into the destruction of signs.

Based on time of the survey and number of signs per kilometer and adding the possibility of correction factor associated with the time of the survey (Late Summer) I estimate 5 signs per kilometer which gives an estimate of 1-2 snow leopard per 100 square kilometers. Proposed Big Pamir Wildlife Reserve encompasses and area of 679.38 Km^2 and will be having an estimate of 6.78 – 13.56 cats. This is the preliminary estimate and will be confirmed after more surveys in the near future.

Snow Leopard Pug mark – Ali Su Valley

Snow Leopard Pug mark – Wuzed Valley

Limitations with the Survey and Future Plan

Survey was carried during the late summer season, the time which is not very good for finding the signs of the cat. This was the only limitation associated with the survey. Next phase of the survey we are planning is late winter. It is the season when the cats are more active (breeding onset) and the frequency of the marking is high and expect very good results.

Management Issues

Depredation by the snow leopard as reported by people especially the surplus by the by the snow leopard in the Wakhan corridor is one of the most important aspect to be tackled if the species has to be conserved. People report the killing by the snow leopard to be common especially during the winter months and also the kills of the cats in vengeance to the live stock loss. In Wakhan area the traditional and livestock production systems are an important form of land use and means of livelihood. The levels of livestock predation by large carnivores such as snow leopard and wolf are believed to be substantial. Retaliatory persecution of the snow leopard is one of the most wide spread and direct threat to the species (McCarthy, 2000; Spearing, 2000, Jackson and Wangchuk, 2001). Considering the family income the live stock loss will have tremendous effect on the livelihood of the inhabitants of the Wakhan Corridor.

At the present we did not have any quantification of the loss of livestock to the predators. We have just the occasional records of the livestock loss. The quantification of actual loss vis-à-vis family profile needs to be quantified for the effective management for the Wakhan Corridor in general and Proposed Big Pamir Wildlife Reserve in Particular. In the future surveys and especially in winter surveys the

mammal survey team will quantify the magnitude of the livestock loss. The post winter livestock assessment gave different picture about the depredation problem in the main Wakhan corridor.

Providing the compensation will be one of the measures for the management of these issues and providing with alternative strategies such as use of guarding dogs, predator proof corrals and roofed stables. It is significant that the most of the losses to snow leopard in the Wakhan Corridor were reported in winter, when the predators entered the corrals and caused extensive surplus killing of the livestock.

In many areas within the snow leopard distribution range ISLT has helped people to built predator proof corrals, a low budget exercise that completely eliminates the surplus killing. An initiative of providing predator proof corrals and compensatory schemes will be most feasible strategies for the high poverty inhabitants of the Wakhan Corridor.

Marco Polo Sheep (Status and Distribution)

Introduction

Ever since Marco Polo first noted "great quantities of wild sheep of huge size" in 1273 while crossing the Afghan and Tajik Pamirs on his way to China, the world has been intrigued by *Ovis ammon polii,* the Marco Polo sheep, the grandest of all argalis. These sheep inhabit the high rolling uplands and broad alpine valleys at elevation up to 5000 m of the Pamirs, a plateau that is high. The borders of four countries – Afghanistan, Pakistan, Tajikistan and China meet at this knot of mountains, and the Marco Polo sheep wanders from one country to another (Schaller, 2004). The historic range of Argali (*Ovis ammon)* includes Kazakhstan, Kyrgyztan, Tajikistan, Uzbekistan, Southern Siberia, Mongolia, North Central and Western China including Tibet, Nepal and the Himalayan portion of Afghanistan, Pakistan and India. The species generally forages in broad valleys, high pastures, cold deserts and seek refuges in the adjacent mountains (Valdez, 1982).

Marco Polo Rams in Aba Khan Valley on 29th August 2006

Argali is the largest of the wild sheep of Asia and is classified as vulnerable in the 2003 IUCN Red list of Threatened species. Different sub-species are classified at higher levels of threat throughout its range except in Kyrgyztan, Tajikistan and Mongolia where it is designated as threatened. The argali has declined significantly, though the substantial and relatively secure herds are thought to exist in parts of the three countries specified.

Within Afghanistan territory only one subspecies occurs, the Marco Polo Sheep (*Ovis ammon polii*). It is recognized by the very long outward curving horns, developed in the mature males. A fully mature ram is surely one of the most impressive representatives of the entire subfamily Bovidae, being not only the bearer of massive spiraling horns which can span a man's outstretched arms but also being almost twice the height and size of most other wild and domestic sheep. The Marco Polo sheep is not as massive as the Tibetan argali and Lydekker (1907) estimated the weight of an adult ram as 140 kg, whilst Prater (1965) gave the weight of ram up to 113.5 kg (Roberts, T. J., 1997).

In summers the short coarse body hair is sandy-reddish color with the face and breast having an admixture of grey and white hairs. The legs and body are creamy white without any darker pattern on the frontal part of the shin such is found in the ibex (*Capra ibex sibrica)* or Bharal (*Pseudois nayauri)*. In

winters, because of thicker under wool, the animals look bulkier and slightly grey, with much white about the neck and chest especially in old rams. Not surprisingly the neck in the rams tends to be heavy and muscular. The tail is short and bushy and in both sexes the legs appear relatively long slender when compared with the wild goats. There is a more extensive white area in caudal region as compared to the Urial, but this patch is not so conspicuous as in North American bighorn sheep (*O. canadensis*). There are no longhaired chest ruffs in the rams as in the various races of Urial.

Adult females bear horns up to 13 cm in length with slight annulations or wrinkles in the proximal part. In mature rams, the horns curve outwards describing more than a complete arc, their distal quarter or third forming another turn. They are broad and massive at their base.

During the first phase of survey mammal team survey mammal team surveyed 11 valleys for the presence of Marco Polo Sheep in the Proposed Big Pamir Wildlife Reserve. Considerable time ranging from 3 – 8 days was spent in each valley to locate the presence of the Marco Polo Sheep and other associated mountain ungulates.

Distribution and Status

In general Marco Polo Sheep is an inhabitant of very high mountain plateau regions subjected to very severely cold winds and rather arid climatic conditions throughout the year. There is some seasonal migration either to lower valleys or more southern facing mountain slopes in winter. In both cases avoidance of deep snow is probably a major factor determining their seasonal movement. They are found from 4500 m above sea level and upwards and in the Pamir range of mountains even up to 6100 m. they avoid steep cliffs and precipitous rocky areas.

During the first phase of mammalian survey, Marco Polo Sheep was reported from 3 valleys out of the 11 valleys surveyed during the survey period. Table 4 gives the details of the valleys surveyed during first phase with records of presence of Marco Polo Sheep. The table also shows the records of previous sightings in the Proposed Big Pamir Wildlife Reserve and Figure 5 shows the location of sightings on the map (Toposheet) of the area.

Table 4: Details of valleys surveyed in first phase of Mammal Survey in Proposed Big Pamir Wildlife Reserve

S. No.	Name of Valley	North	East	Marco Polo Sightings
1.	Wagji Valley	37 06 50.3	72 45 23.7	
2	Nakchrishitk	37 13 08.6	72 58 17.3	This Survey
3	Ali Su	37 11 24.5	73 06 50.2	
4	Aba Khan	37 07 19.1	73 02 16.8	This Survey; Petocz *et al.* 1978
5	Shikargah	37 06 12.6	73 01 48.0	This Survey, Schaller 2004, Fitzherbert 2003
6	Wuzed	37 04 06.0	72 52 18.0	
7	Kund-a-Thur	37 05 43.6	72 58 04.9	
8	Asan Katich Left	37 03 59.3	73 00 18.8	
9	Asan Katich Right	37 04 10.9	73 00 10.3	
10	Kusk Valley	36 58 54.5	72 58 39.8	
11	Kali Uoos Valley	36 56 51.4	72 50 41.6	

During the survey period mammal team had 7 sightings of the Marcopolo Sheep from three valleys. Mammal team spent 129 hours in the field and extensively searched an area of 289 km^2 in 11 valleys.

Total of 85 animals were located from these valleys. The details of sighting along with the number of animals seen are given in Table 5.

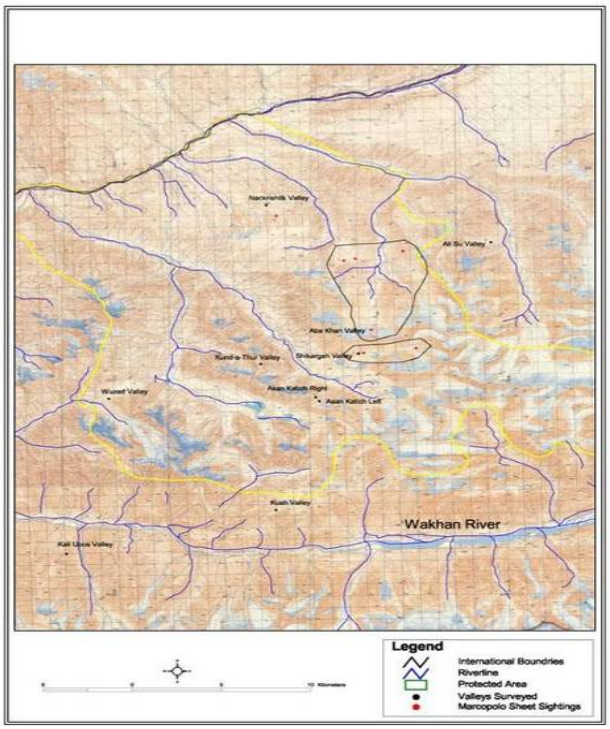


Figure 5: Valleys surveyed and Marco Polo sighting during first phase of mammal survey in Proposed Big Pamir Wildlife Reserve

Table 5: Details of Marco Polo Sheep sightings during the first phase of survey in Proposed Big Pamir Wildlife Reserve

S.No.	North East	Valley	Number of Animals			Habitat
			Male	Female	Fawns	
1	37 12 38.4 72 58 40.4	Nakchrishitk	-	10	6	Sedge Meadow, Alpine Steppe & Heaths
2	37 07 19.1 73 02 16.8	Aba Khan	9	-	-	Sedge Meadow, Alpine Steppe & Heaths
3	37 10 38.9 73 01 40.5	Aba Khan	-	5	1	Sedge Meadow, Alpine Steppe & Heaths
4	37 10 32.9 73 01 14.8	Aba Khan	-	8	-	Sedge Meadow, Alpine Steppe & Heaths
5	37 11 00.0 73 03 29.5	Aba Khan	-	7	-	Sedge Meadow, Alpine Steppe & Heaths
6	37 06 14.1 73 01 59.7	Shikargah	9	-	-	Sedge Meadow, Alpine Steppe & Heaths
7	37 06 27.8 73 03 59.5	Shikargah	30	-	-	Sedge Meadow, Alpine Steppe & Heaths
Total		**3 Valleys**	**48**	**30**	**7**	

The eastern part of the Big Pamir, the one occupied by the Kirghiz, appears to be devoid of the Marco Polo Sheep except for occasional stragglers from Tajikistan (Schaller, 2004). In general, animal are now resident to east of the Ali Su valley except for stragglers. Petocz *et al.* (1975) recorded 308 animals in former Big Pamir hunting concession. UNEP team sighted 34 Marco Polo Sheep (Mixed herd of 28 animals including several lambs and a herd of 6 lambs) in Shikargah valley during their Wakhan Mission (Mishra and Fitzherbert, 2004). Where as Schaller (2004) sighted 75 animals mostly females and young animals in the lower Shikargah valley in two days. In this survey we sighted 85 animals from three valleys in the Proposed Big Pamir Wildlife Reserve. At the time of our survey the Marco Polo sheep is segregated by sex. Males remain close to the snow line where as females disperse far from there wintering or breeding grounds. The skewness of sex ratio 48:30 (1.6 males : 1 females) from our

sighting record is because of the time of the sampling. The skewed sex ratio towards the males during the survey is an indication of the existence of the healthy population in the Proposed Big Pamir Wildlife Reserve. Petocz *et al.* (1978) reported the sex ratio of 1:1.625 from the Big Pamir and 1:1.629 from the Small Pamir segment. The Sex ratio in both Big Pamir and Small Pamir are almost equal. Using the sex ratio as predicted by Petocz *et al.,* (1978) on the data collected during the first phase of the survey we estimate the population of 211 animals from the Proposed Big Pamir Wildlife Reserve (PBPWR). Table 6 gives the details of animals expected to be present in the Proposed Big Pamir Wildlife reserve based on the sex ration of previous study.

Table 6: Animals expected in the present survey based on sex ratio of previous studies

Location	Sex Ration	Reported By	Number of Animals	Animals Expected (Time Series Analysis)
Big Pamir	1:1.625	Petocz *et al.,* 1978	500	-
Small Pamir	1:1.629	Petocz *et al.,* 1978	760	-
PBPWR	1.6:1	This Report	85	211

In general it is expected that Big Pamir Wildlife Reserve still holds the good population of the Marco Polo sheep. Since it was the time when the females are dispersed in wider area and males very close to the snow line. This may be the reasons associated with the skewed sex ration towards the males in the Big Pamir Wildlife Reserve. In the next surveys we will try to explore all the areas of the Big Pamir, Small Pamir and Waghjir Valley in all the reasons. The next surveys in the Wakhan Corridor will give the clear status of the species in the area.

The total count for the Afghan Pamirs (Both Big and Little) as expected by the Schaller is around 1000 Marco Polo Sheep. Schaller (2004) has expected a definite decline in population in eastern Big Pamir since the 1970s and a modest one in the Little Pamir region of the Wakhan Corridor.

During the present survey in the Big Pamir region, there is an important concern for the species. The wintering areas of the Marco Polo Sheep (especially females and young) in the western part face intensive livestock grazing. Not only are pastures grazed by a high density of livestock such as sheep, goats, horses, yaks, camels and donkeys through out the summer, but in fact, the herders stay back with their flocks of sheep and goats right through winter. In addition to the possible competition for forage with the Marco Polo sheep in the winter, persistent and intensive livestock grazing and trampling have already caused considerable degradation of the pasture.

One of the most important issues noticed during the survey period are as:

People residing in the Nakchrishitk valley exploit the same valley and its adjoining valleys during the summer. Heavy grazing in this valley during the summer season results into depletion of resources for the winter season. Higher reaches of this valley are little bit safe which are exploited by the wide dispersing females of the Marco Polo and other mountain undulates.

During the winter season the people residing in the Nakchrishitk valley shift their live stock to Ali Su and Aba Khan Valleys which are left unattended during the summer months. But these valleys are exploited by the people during the winter season. Higher reaches of these two valleys are available to the Marco Polo rams during the summer but during the winter some migration is expected by the sheep to the

lower elevations. But the area is not available during that period the possibility of extreme competition for forage in these two valleys is expected.

Once the hunting ground the main Shikargah valley, the strong hold of the Marco Polo Sheep is now most exploited valley. Full length 8 – 10 kms of the valley is highly grazed during the summer months and people do not move their livestock during the winter months. There is round the year grazing in this valley which puts extreme pressure on the resources for Marco Polo sheep and other mountain ungulates. During the present survey I spend 8 days in the main Shikargah valley. During the first two days I was unable to have any sighting of the Marco Polo sheep from the valley. The nearest *Ilock* or the camping place is at the base of the valley where from it takes 2 hours to reach at the end of the valley. Starting early morning just after 15 minutes after the sunrise towards the main valley we where not able to have any sighting of the Marco Polo Sheep. After that on the other days we started two hours before the sunrise and expected ourselves at the end of the valley before the sunrise and this resulted in the sightings of the sheep. The account gives the situation present in the Shikargah valley. Marco Polo Sheep are active very early in the main Shikargah valley as soon as the movement of the people and livestock starts they move to safer and undistributed areas and take refuge during the day time. The valley once used to hunt the Marco Polo Sheep because of their abundance and easy sightings now plays hide and seek.

There is an urgent need for the management of grazing protocols for the local people inhabiting these areas for the continued survival of the Marco Polo sheep and its associated mountain ungulates and apex predators such as Snow Leopard and Wolf.

Measurement of Marco Polo Sheep Horns

During the present survey the mammal team aged 59 male horns from the Proposed Big Pamir Wildlife Reserve. In the Big Pamir, the horns are been used to mark the tombs and certain specific features. In the Aba Khan valley they were scattered here and there. In the main Shikargah valley not many horns were found as expected. All the horns were in poor condition, too weathered to age and measure accurately. The main haul of the horns was found in the Ali Su *Ziyarat* in the Ali Su valley used to mark the Saint's Place, where the people still go and slaughter their goat or sheep in memory of the Saint. The horns of the males can be aged accurately by the number of "rings". These are created when horns almost cease to grow during winter. Table 7 gives the details of the measurements of the horns and the data is compared with the similar data from Little Pamir, Afghanistan (Schaller, 2004) and Tajikistan (Schaller, 2003).

Table 7: Age at death of males and measurement of the horns

Age (Years)	Big Pamir		Little Pamir	Tajikistan
	No. of Horns	Average Measurements	No. of Horns (Schaller, 2004)	No. of Horns (Schaller, 2003)
1 – 2	-	-	-	1
2 – 3	3	81 ± 2.08	2	1
3 – 4	6	95.83 ± 1.89	3	6
4 – 5	10	103 ± 0.95	7	17
5 – 6	15	110.33 ± 2.09	13	16
6 – 7	12	126.25 ± 1.57	10	3
7 – 8	8	140.37 ± 1.10	7	5
8 – 9	3	146.66 ± 3.33	-	4
9 – 10	2	149 ± 1	-	1
Total	**59**		**42**	**54**

The details of the descriptive statistics of the horn measurements of different age categories of Marco Polo Sheep horns from the Big Pamir Wildlife Reserve are given in Table 8.

Table 8: Descriptive Statistics of horn measurements of the Marco Polo Sheep from Big Pamir Wildlife Reserve

Statistics	Age Category (In Years)								
	1 – 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8	8 – 9	9 – 10
Mean Length (cm)	0	81	95.83	103	110.33	126.25	140.38	146.66	149
Standard Error	0	2.08	1.88	0.95	2.08	1.57	1.10	3.33	1
Standard Deviation	0	3.60	4.62	3.01	8.05	5.43	3.11	5.77	1.41
Sample Variance	0	13	21.33	9.11	64.81	29.48	9.70	33.33	2
Minimum Length (cm)	0	78	90	98	99	120	135	140	148
Maximum Length (cm)	0	85	103	108	123	137	145	150	150
Sum (cm)	0	243	575	1030	1655	1515	1123	440	298
Count	0	3	6	10	15	12	8	3	2
Largest (1) (cm)	0	85	103	108	123	137	145	150	150
Smallest (1) (cm)	0	78	90	98	99	120	135	140	148
Confidence Limits (95%)	0	8.96	4.85	2.16	4.46	3.45	2.60	14.34	12.71

Massive Marco Polo Horns from Proposed Big Pamir Wildlife Reserve

From the statistical figures from the above two table I am in accordance with the conclusions that Schaller (2004) has put forward. The conclusions from the Schaller's findings area:

1) Longevity of Marco Polo sheep, as of all argalis is relatively short. Few animals live longer than 9 years and exceptionally only as long as 10 years, a point also stressed by other Marco Polo researchers in the region (Petocz, 1978b; Schaller *et al.* 1987; Fedosenko, 2000; Schaller, 2004).

2) Male Marco Polo sheep are usually dead by the time they reach 4 – 7 years, an age when most have not achieved the notable horn length.

Data presented by Petocz *et al.* (1978a) suggests that a greater proportion of males reached a large horn size during the 1970s than found today the view also supported by Schaller (2004). This attributes to the factors which are responsible for the growth of the horns and the most important factor responsible is the availability of the nutritious forage during the summer months when the maximum growth of the horns takes place. Due to the intensive competition with the livestock during the summer months the Marco Polo Sheep is not able to forage upon the nutritious forage as required for the horn growth. Which indirectly indicates the decreasing productivity of the alpine vegetations and intensive competition?

Management Issues

The Proposed Big Pamir Wildlife Reserve still holds the good population of the Marco Polo Sheep. The management issues related to the species will be just to reduce the grazing in the Marco Polo Habitat. A comprehensive grazing policy is the need for the conservation efforts for saving the Marco Polo.

The Wakhi occupy the western part of the Big Pamir, considerable part if which was once included in the so-called Big Pamir Wildlife Reserve encompassing an area about 679.38 Km^2. Although designated a reserve, it has never been legally established and functioning as a hunting reserve for foreigners, managed by the Afghan Tourist Organization, between 1968 and 1977 (Petocz, 1978b). Before that, part of the area, the Tulibai Valley, was a royal hunting reserve of the former king Mohammad Zahir Shah. Petocz (1978b) prepared a management plan for the reserve, which could still be a basis for conservation efforts today. A principal concern was overgrazing by the livestock in the critical Marco Polo sheep winter range. The plan suggests limiting livestock grazing in the certain locations and compensating households. It also urged the government to give some funds from trophy hunts ($13,000 per hunt in 1975 with maximum of 12 animals) to local communities. During the 1970s the Wakhi did not keep livestock in the mountains during winter. Now many do so and this has further complicated the situation. Presently the live stock grazing in the Big Pamir Wildlife Reserve is one of the major concerns for the conservation of the Marco Polo Sheep.

Strategy for the conservation of this magnificent animal depends upon establishing control of the area and total ban on grazing by the domestic animals in the Marco Polo habitat. In future, the central part of the range of the Marco Polo sheep should be totally protected as the National Park. One more important aspect is the management of the disease in the local live stock so that there is very low possibility of chance transmission of any disease such as rinderpest, from local livestock to the wild populations of the Marco Polo sheep. The total population of the Marco Polo is small and restricted, therefore any such outbreak will have the devastating effect on the population. The population is susceptible to almost elimination by the disease.

Other Mammalian Species

In the first phase of survey mammal team reported the presence of 9 species in the Big Pamir Wildlife Reserve. The account below gives the details of all the mammal species except Snow Leopard and Marco Polo Sheep from the Big Pamir Wildlife Reserve.

Long Tailed Marmot (*Marmota caudata)*

Marmots are the largest rodents. Belonging to the Sciuridae family, like squirrels they are heavy set with a flat head, a prominent sagittal chest and a long tail.

The marmot is the gregarious species living in large colonies. It excavates a system of burrows in which several animals may live. There are several entrances to the burrow system. They are diurnal and come out of their borrows to bask in the sun and feed on nearby vegetation. They are herbivores feeding on a variety of grasses, flowers, bulbs and shrubs such as Artemisia (Ognev, 1940). The long-tailed marmot spends long hours feeding the spring and summer months as a result of which they build up sub-cutaneous fat reserves. With the onset of the cold weather they go into hibernation. When they sense danger a member of the colony gives a warning signal by whistling sharply. This alerts others to the danger. They flee when the source of the danger gets close. When resting they sit on their haunches to get better view of their surroundings. Despite their apparent bulkiness they are swift and can scamper over rocks without difficulty.

They are widespread throughout the montane biotopes of Afghanistan. Both Schaller (2004) and Fitzherbert *et al.,* (2003) where unable to record the number of animals in the Big Pamir as the animal were in the phase of hibernation during their survey. But reported the abundance of the animals based on signs. They are key summer prey species of the major predators (Wolf, Bear and probably other predators) (Schaller, 2004). Their abundance is one of the important factor for minimizing the conflict and effective management of the Big Pamir Biosphere Reserve. They are not harvested by the local people except for few hunts by the dogs of the villagers. This resource if abundant in the Pamirs will reduce the conflict with the local communities during the summer months.

During the first phase of survey mammal team had sightings of Marmots from the all the valleys surveyed (Table 9). The frequency of sighting decreased as the survey progressed because of the arrival of the hibernations period. However during the first phase mammal team collected intensive data on the number of the marmots in four valleys namely Nakchrishitk, Ali Su, Aba Khan and Shikargah. The details with number of colonies in these valleys are given in Table 10. We actually counted number of holes in the main four valleys of the Proposed Big Pamir Wildlife Reserve and actually counted number of individuals in the stretch where we counted number of holes.

Table 9: Details of Marmot sightings during first phase of survey

S. No.	Name of Valley	No. of Colonies	No. of Individuals
1.	Wagji Valley	02	08
2	Nakchrishitk	09	81
3	Ali Su	07	59
4	Aba Khan	09	77
5	Shikargah	07	52
6	Wuzed	06	28
7	Kund-a-Thur	05	19
8	Asan Katich Left	02	12
9	Asan Katich Right	03	16
10	Kusk Valley	02	09
11	Kali Uoos Valley	01	03
Total		**53**	**364**

Table 10: Details of Marmots from four valleys from BPWR Wakhan, Afghanistan

Valley	Number of Colonies	Number of Individuals	No. of Holes in each Colony
Nakchrishitk			
	01	06	07
	02	12	14
	03	09	11
	04	14	16
	05	08	09
	06	09	10
	07	06	06
	08	08	11
	09	09	12
Ali Su			
	01	07	07
	02	08	10
	03	09	12
	04	12	13
	05	06	09
	06	09	11
	07	08	10
Aba Khan			
	01	06	09
	02	09	12
	03	08	12
	04	12	20
	05	08	14
	06	06	11
	07	09	17
	08	10	18
	09	09	17
Shikargah			
	01	06	09
	02	07	11
	03	08	10
	04	05	07
	05	09	13
	06	09	12
	07	08	11
Valleys 4	**Colonies 32**	**Individuals 269**	**Holes 371**

The basic idea for counting the number of marmot holes and individuals is to develop the regression equation for the same. The development of the regression equation will help to estimate the number of the animals even if the surveyor does not have any direst sightings of the animals.

Relationship between Marmot Numbers with Number of Marmot Holes

Regression equation explained 49% of the variation in the observations of number of marmot holes and number of individuals counted. The best fit line could be theoretically applied to any number of marmot holes to predict the number of individuals (Figure 6). The relationship is defined by the equation:

Y (Population Size) = 0.457 (.075 SE) Total Number of Marmot Holes + 3.107 (.899 SE)

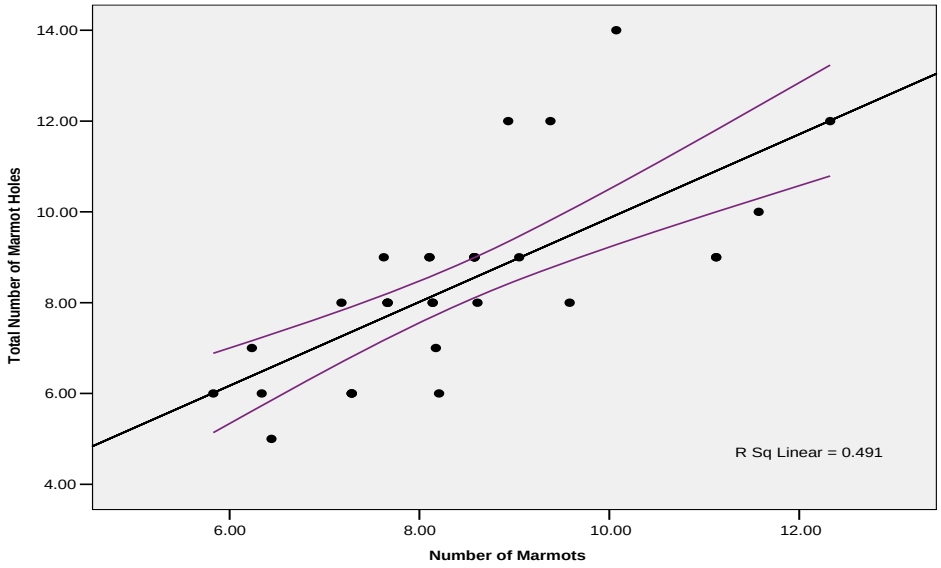


Figure 6: Regression between the mean marmot population and the total number of marmot holes **(R^2 = 0.491)**. The error bare are the standard 95% Confidence Limits

Of course the equation derived by the regression equation proves to be 50% accurate, but the equation can be modified in the coming seasons by adding more data and standardization of the equation for the future research.

Himalayan Stoat (Ermine) *Mustela erminea*

The ermine has a long cylindrical body with short limbs which are armed with sharp claws. It has a blunt muzzle, rounded ears and dark black eyes. Body colour is chestnut brown. The chin, throat and undersides are creamy white with slendrical tail having conspicuous black tip.

Himalayan Stoat (Ermine) *Mustela erminea*

It is solitary animal which mainly feeds on rodents, pikas, birds and insects. It lives in burrows dug by rodents and is capable of pursing voles in their burrows because of its small size. It is capable of swimming as well as climbing trees.

Found in the alpine zones of northern Badakshan. Naumann's (1973) observations include the valleys of Darwaz peninsula.

During the present survey we had four sightings of the ermine from three different valleys. The details of sighting are given in Table 11.

Table 11: Details of Ermine during first phase of survey

S. No.	Name of Valley	No. of Individuals
1	Nakchrishitk	02
2	Ali Su	01
3	Asan Katich Right	01
Total		**04**

Red Fox (*Vulpes vulpes)*

The red fox has dense and heavy fur with long hairs. The dominant colour of this widespread fox is red-brown, though Afghan specimens tends to be more yellowish than the European races. The bushy tail is red-brown with a white tip.


Red fox from Shikargah valley

The red fox is solitary animal which is largely nocturnal. In winter it hunts during the day time in arid areas capturing rodents, reptiles, and small birds. The diet also includes insects and fruits.

The most common carnivore species, the red fox is widespread in habitats ranging from the southern deserts to the Pamir tundras. But in the recent survey and the surveys by Fitzherbert *et al.,* (2003) and Schaller (2004) the species was not as common as described earlier by Habibi (2003). The species is under tremendous pressure because of increasing value of its fur. If the situation continues like this in Afghanistan, the species will be soon a rare from the limits of the Afghanistan.

During the present survey we recoded the presence of red fox from the 4 valleys out of the 11 valleys surveyed during the first phase of the survey. Table 12 gives the details of the presence of the red fox from different valleys during the survey period. According to locals the red fox is widespread species and is almost found in all the valleys. The number of the sightings during 35 days of the field, it self explains the rarity of the sightings of the species. Both Fitzherbert *et al.,* (2003) and Schaller (2004) just reported the presence of few signs of the species during the survey period.

Table 12: Details of Red Fox presence during first phase of survey

S. No.	Name of Valley	Direct Sightings	Evidences
1	Ali Su	01	Scats
2	Shikargah	03	Tracks
3	Wuzed	-	Scats
4	Asan Katich Left	01	Tracks
Total		**05**	

Brown Bear (*Ursus arctos)*

The brown bear has a reddish brown colour. It has massive head with small rounded ears. The limbs have long claws, whitish or pale brown in colour. Brown bears are solitary and each individual occupies a territory of its own. It is an omnivorous animal feeding on a variety of foods including fruits, bulbs, and roots of plants, insects, fish, rodents and small crustaceans (Roberts, 1997).

Fresh Brown Bear Scat from Ali Su Valley

Brown bears leave conspicuous signs of their presence especially when they excavate marmot burrows. During the survey period we had very good record of very fresh signs of the bear from the Proposed Big Wildlife Reserve especially from Ali Su and Aba Khan Valleys. Schaller (2004) was unable to evaluate the status of the bear from the Big Pamir except seeing fresh tracks on snow in the Shikargah valley. As per the Fitzherbert *et al.* (2003), Pamirs has the healthy population of the bears. They saw the droppings of adult and young at a summer camp in the Big Pamir. The species is not in direct conflict with the local communities in the Wakhan area.

Brown Bear Carcass from Kund-a-Thur Valley

During the first phase of survey we recorded the presence of fresh signs from 4 valleys out of the 11 valleys surveyed. Very fresh signs such as scats, digging of the marmot holes, tracks from the three out of the 4 valleys in which presence was confirmed. In the Kund-a-Thur valley we saw the carcass of the dead bear. As per the villager the bear was found dead inside the *Ilock* in the previous winter. They were unable to assign any cause to the death of the bear.

Table 13 gives the details of bear records from the Big Pamir Wildlife Reserve during the first phase of mammal survey.The species was not reported to cause any damage to livestock, although observations of scavenging on livestock were reported (Fitzherbert, 2003). Bears apparently do not cause any serious damage to crops either. Herders claimed that they are as much scared of the bears as the bears are scared of them.

Hind foot of the Brown Bear

Table 13: Details of Brown Bear presence from the Big Pamir Wildlife Reserve

S. No.	Name of Valley	Evidences	Fresh/Old
1	Ali Su	Scats, Cave, Digging	Fresh
2	Aba Khan	Scats, Digging	Old/Fresh
3	Shikargah	Scats	Old
4	Kund-a-Thur	Carcass	8 months old

Wolf (*Canis lupus)*

The wolf is the major predator on wild and domestic hoofed animals. Predation on livestock is especially prevalent in winter with most of the households loosing animals each year at that time. Wolves may approach encampments closely to attack sheep and goats.

Wolf Sighted in Aba Khan Valley

People reported the occurrence of the wolves all along the Wakhan Corridor and especially the Big Pamir area which was surveyed during the first phase. All the 20 families interviewed during the first phase of the survey in the Big Pamir Wildlife Reserve reported the conflict to be more intense with the wolf as compared to the snow leopard. In contract to the Snow leopard the Pamirs seemed to be the stronghold for this species. It is the wolf that is mainly responsible for frequently killing of livestock, but the species is not engaged in surplus killing.

During the survey we reported occurrence of wolf from the 4 valleys out of the 11 valleys. We had one sighting of the wolf from the Aba Khan valley. During the survey period we collected 70 scats of the wolf and we will be analyzing them soon for studying the food habits of the wolves. Table 14 gives the details of occurrence of the wolf reported from the Big Pamir Wildlife Reserve during the first phase of the mammal survey.

Table 14: Details of the occurrence of wolf from Big Pamir Wildlife Reserve

S. No.	Name of Valley	Evidences	Fresh/Old
1	Ali Su	Scats	Fresh/Old
2	Aba Khan Sighting,	Scats, Tracks	Old/Fresh
3	Shikargah	Scats	Old
4	Wuzed	Tracks	Fresh

Siberian Ibex (*Capra ibex sibericus)*

Of the three wild ungulates in Wakhan, ibex is most widely distributed species. Ibex occurs in the steep upper slopes of all mountains in the Pamirs, often in the areas that Marco Polo sheep do not inhabit. We sighted the herds of the ibex almost in the all valleys during our survey period in the Proposed Big Pamir Wildlife Reserve, where they occur on very steep rocky slopes and cliffs that area interspersed with more rolling steep habitat. Table 15 gives the details of ibex sightings in the Proposed Big Pamir Wildlife Reserve during the first phase of the mammal survey. During the survey we had sightings of 10 herds of the ibex from 7 valleys surveyed and counted 162 animals.

Table 15: Details of Ibex sightings during first phase of survey in PBPWR

S. No.	Name of Valley	Number of Herds	No. of Individuals
1.	Wagji Valley	02	38
2	Nakchrishitk	01	01
3	Ali Su	02	05
4	Aba Khan	02	20
5	Shikargah	01	06
6	Kund-a-Thur	01	56
7	Kusk Valley	01	36
Total		**10**	**162**

Unlike the Marco Polo Sheep, the ibex apparently do not migrate much across the different altitudinal zones, and the steeper ibex habitat did not seem to be much affected by the livestock grazing in the Big Pamir. Ibex is one of the common species hunted in the Wakhan Corridor as admitted by the local inhabitants during the interviews.

During the survey the mammal team counted 162 animals. Out of the 162 animals, 59 were adult males, 34 sub-adult males, 51 adult females, 20 sub-adult females and 7 young ones. The lowest herd size during the survey

Ibex from the Proposed Big Pamir Wildlife Reserve

was one animal were as the biggest herd was of 56 animals. Figure 7 shows the number of animals of different age and sex reported from PBPWR during first phase of mammal survey.

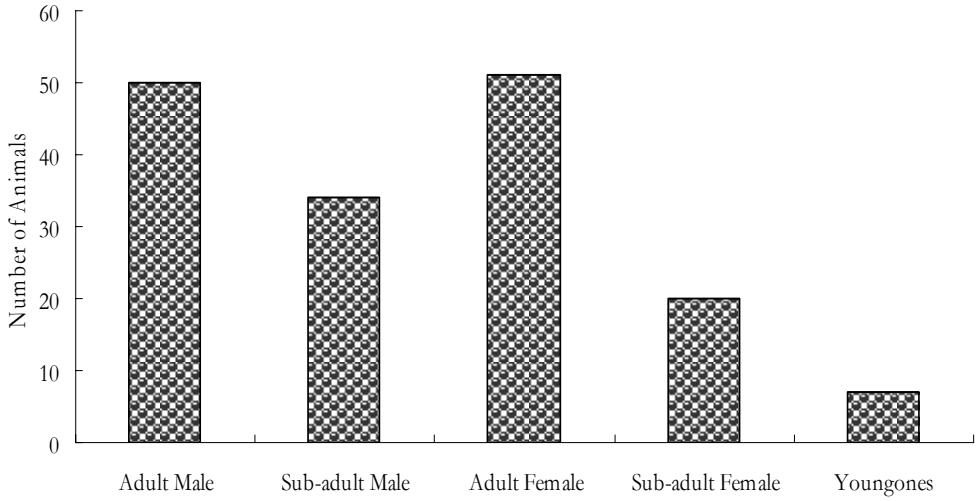


Figure 7: Number of Ibex in different Age and Sex Categories

Cape Hare (*Lepus capensis*)

During the field surveys in 1977 Cape hare was commonly observed (Habibi, 1977) in the alpine Pamir valleys. But during the recent surveys the sightings are not so common. UNEP team during their Wakhan mission had sighting of one individual. During the present survey we had five sightings of the species one from the Wuzed Valley and four sightings from the Ali Su Valley.

Altai Weasel (*Mustela altaica)*

During the field survey we have one sighting of the altai weasel (*Mustela altaica*) from the main Wakhan valley. This is the first record of the species from the Afghanistan. The weasel is sandy-yellow above and creamish-yellow below. It has a flat, narrow skull, and a long cylindrical body. Its long, spindly tail is the same colour as its back and its paws are conspicuously white. It has brown tail with no black tip.

Mustela altaica from Wakhan Valley

Other Records

We only heard of Lynx but did not have any evidence of the animals from the Proposed Big Pamir Wildlife Reserve. We had the good sightings of the Snow cocks from four valleys namely Sargaz Valley, Asan Katich valley, Kund-a-Thur and Kusk Valleys where we used to count 30 – 50 cocks during 4 -5

hours of field session in the morning without too much emphasizing to exclusively search for them. These valleys seem to be the strong hold for the species.

DISCUSSION

Compared to many other areas in Afghanistan, the present status of wildlife in the Wakhan Corridor and the regions conservation potential are very encouraging. The corridor's recent history and occupation by the Northern Alliance forces meant that wildlife was spared devastation from bombings and landmines. With six species of carnivores and four species of herbivores reported from the region during the present survey, the region provides a fine representation of the high altitude wildlife of the mountains of the South and Central Asia. The present survey first ever reports the presence of Altai Weasel from the Afghanistan. Together with these facts the regions seems to support species which are unique to the area; this renders the Wakhan Corridor one of the global conservation hotspots.

Still, there are important concerns about the wildlife conservation in Wakhan Corridor. Localized degradation of the pastures in the Big Pamir threatens the Marco Polo Sheep. Intensive livestock grazing can have the devastating effect on the ecosystem. It can reduce the availability of the resources to the wild herbivores and also results in change in plant cover and species composition over the long time.

The degradation of the mid-elevation pastures in the Western part of the Big Pamir threatens the traditional wintering habitat of the Marco Polo sheep, especially of females and young (Petocz and others, 1978). Concerns about the impact of the livestock grazing on Marco Polo Sheep populations were expressed earlier by Caughley (1970), who cautioned that if the female population showed signs of reduction in fecundity, the livestock density would have to be reduced.

In the present survey we observed that, people almost now stay throughout year in the area. The problem of the grazing is too intense. People even use few valleys on rotational basis like Ali Su and Aba Khan. Higher altitude summer pastures are in good shape but the wintering areas when the forage is limited are not in a position to support the good number of the wild ungulates especially the Marco Polo Sheep.

The three main valleys namely Aba Khan, Ali Su and Shikargah need to be maintained exclusively for the Marco Polo sheep and it is urgent to stop all the biotic interferences in these valleys. These valleys need special attention for the sake of conservation of the Marco Polo sheep.

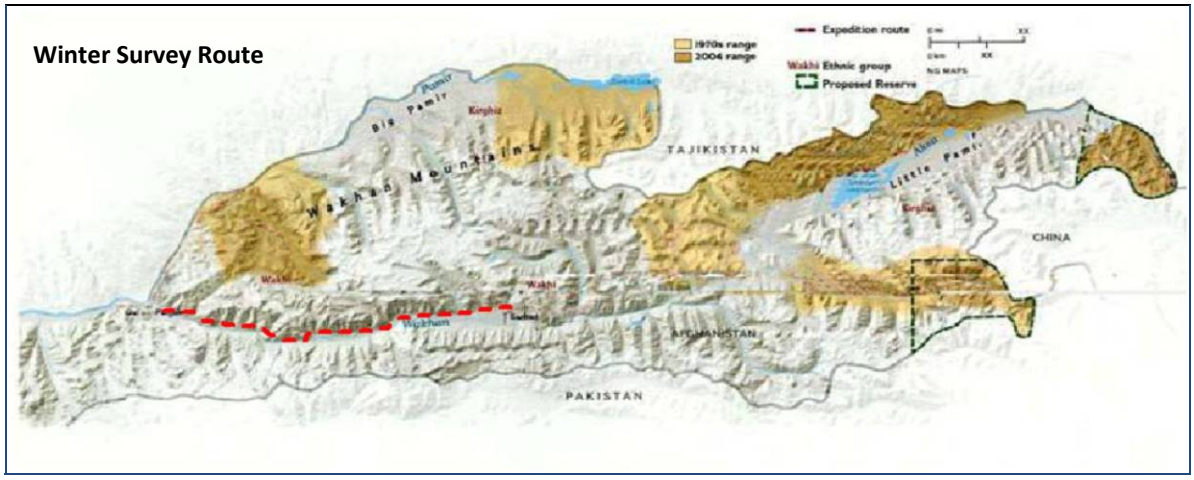
Other possible issue in the area is livestock depredation by the Wolves and Snow leopard. Effective measures should be taken to minimize the loss and to provide the local people with some alternatives.

In-spite, of these situations Wakhan still has the potential to be one of the best reserves of the world in terms of its specific mammalian species and it is worth to conserve biodiversity of the area.

SECOND PHASE OF SURVEY
POST WINTER CONFLICT ASSESSMENT (APRIL 2007)

Post winter conflict assessment for the loss of live stock to the predators (Snow Leopard and Wolf) was carried in the month of April 2007. 20 days in the month of April were spent in the main Wakhan Valley and all the 53 villages in the main Wakhan Valley were surveyed. The main objective of the survey was to assess the magnitude of the loss during the immediate winter and to assess the magnitude of the livestock within the Pamir's during the winter season.

A well defined data sheet was designed to carry the survey. Data sheet was translated into local language for the ease of interview. The specific questions which have impact on the final out of the results were asked many times during the interview in different ways.



During the survey period information on the wild species presence around the villages was also confirmed. Snow leopard attacks near the Sargez village lead to the death of one Yak and injured couple of them. Snow Leopard was continuously sighted around the villages namely Kret, Kugzet, Sargez, Qila-e-Wust, Shelk, Kipkut, Wuzed and Pakuy. One snow leopard was killed by one of the local villages in the village Qila-e-Wust. Villagers reported the killing of the Snow Leopard by stones but the Leopard had the clear shot of the bullet at its neck. I think AK-47 was used to shot the leopard. Presence of Snow leopard is always confirmed around the mountains of the Qila-e-Wust village.

The overall loss of livestock to Predators during the winter is only 0.65% of total stock mortality, whereas the loss due to extreme weather is 8.85%.

Of interest is the evidence that Snow Leopards only killed 22 goats and sheep as opposed to 27 Yaks. Yaks are high altitude animals and this suggests that this predation is accidental when Yaks are left out

untended. By comparison wolves killed 38 Yaks and 137 sheep and goats. Table 16 below gives the details of the loss of livestock in the Wakhan.

Table 16: Details of Livestock Loss in Wakhan Corridor during winter 2006

Animal	Total Number of domestic animals	Losses to Snow Leopards	Losses to Wolves	Losses to Extreme Weather
Goats/Sheep	32,206	22	137	2784
Yaks	1,689	26	38	130
Horses	638	01	10	49
Cows	4,327	07	09	443
Donkeys	2,029	00	16	261
Camels	105	00	02	00
Total	**40,994**	**56**	**212**	**3631**

Concerns on pasture usage change detected during the Post Winter Survey in Wakhan

Pastoralists, who used to move away in winter, now stay in the area throughout year. This is a matter for concern as it has impact grazing. This continuous camping of the people in the main valleys during the winter results in the overgrazing of the middle altitude pastures and these are important for Marco Polo sheep.

Thought to Review

Overall, the loss of livestock to the predators in Wakhan is not the issue at present, the death of the livestock by the extreme weather is far more as compared by the predator loss. WCS is already working on the issues of disease transmission and the parasite load in the livestock and hope that some solid findings will be out to determine the causes of loss during winter, whether it is by diseases or by extreme conditions. If by weather conditions some strategies should be put for that particular aspect of the loss.

The continued use of high altitude pastures during the winter season is of high concern for the survival of the Marco Polo Sheep. People have now adapted to keep their live stock in the main Pamir's during the winter also. There should be some incentive packages for the local people so that they bring their livestock out of the Pamir's during the winter season.

The strong evidences of the presence of the Himalayan Lynx around the mountains of villages Kret was also reported during the post winter survey.

THIRD PHASE OF SURVEY (SUMMER 2007)

The summer 2007 survey of the proposed Big Pamir Wildlife Reserve and Waghjir Valley of the Wakhan region reported the presence of higher numbers of Marco polo Sheep following almost 3 decades of war. More than 50 days were spent for monitoring the high altitude sheep which is always seen at an altitude above 4500 m/sea level. During the present survey mammal team reported the presence of 116 MP Sheep (Females 39, Young 29, Adult males 24, Sub-adult males 24) in the Proposed Big Pamir Wildlife Reserve. The area was reported to have 192 animals in 1973 (Petocz, 1978) and 106 (64 Adult males and 42 Sub-adult males) males in the Waghjir valley. The Waghir area was reported to have more than 100 animals during 1970's as reported by Petocz 1978. The other survey of the Waghjir (Schaller, 2004) reported the presence of only 4 animals in the valley.

Summer 2007 Survey Route

Table 17 below shows the total number of Marco Polo argali (*ovis ammon poli*) seen with a conservative estimate of the actual numbers of animals present in the two areas of the Afghan Pamir's.

Table 17: Number of Marco Polo seen during summer 2007 in PBPWR and Waghjir Valley

MP Sheep Observed	Proposed Big Pamir Wildlife Reserve		Waghjir Valley	
	Total Observed	Conservative Estimate	Total Observed	Conservative Estimate
Adult Males	31	24	120	64
Sub-adult Males	40	24	71	42
Females	85	39	0	0
Young	54	29	0	0
Total	**210**	**116**	**191**	**106**

During this survey the Mammal Team reported the presence (in the Pamirs) of all the large mammal species as reported by Petocz (1978) except Himalayan Lynx. But the team reported evidence of this specie in the Hindukush Mountains of Wakhan, Afghanistan. During the survey period mammal team sighted six brown bears from the Proposed Big Pamir Wildlife Reserve. One Sighting was that of the Female with two young ones where as other sighting was again of the female but with older young ones. First sighting was from the Abakan Valley where as the second sighting was from Shikargah valley.

Table 18 below gives the details of various species of animals reported from Proposed Big Pamir Wildlife Reserve and Waghjir Valley during summer 2007.

Table 18: Mammalian species of Proposed Big Pamir Wildlife Reserve and Waghjir Valley Afghanistan with number or evidences recorded during Summer 2007

Mammalian Species	**Number seen/evidences recorded**	
	Propose BPWR	**Waghjir Valley**
Snow leopard *Uncia uncia*	Scats, tracks	Scats
Brown bear *Ursus arctos*	06, Scats, tracks, Diggings	Diggings
Wolf *Canis lupus*	scats, tracks	1 Dead Wolf, Scats
Red fox *Vulpes vulpes*	scats, tracks	Scats
Marco Polo sheep *Ovis ammon polii*	210	191
Ibex *Capra (ibex) siberica*	112	0
Long tailed marmot *Marmota caudata*	288	155
Cape hare *Lepus capensis*	08	12
Himalayan stoat (Ermine) *Mustela erminea*	05	0
Altai Weasel *Mustela altaica*	02	0

Preliminary analysis of the field data revealed excellent birth rate in the population of Marco Polo of the Big Pamir Biosphere Reserve. Presence of 29 young ones with 39 females in the population is the indication good fawning season which indicates that 74.35% of the females we observed where with their young ones. Table 19 & 20 below gives the details of Marco Polo Sightings from the Proposed Big Pamir Wildlife Reserve and Waghjir respectively.

Marco Polo Sheep from Waghjir Valley

Table 19: Records of Marco polo during summer 2007 field season from Proposed Big Pamir Wildlife Reserve

Date	Adult Male	Sub-adult Male	Females	Young	Total	Conservative Estimate
28.06.2007	0	4	0	0	**04**	**00**
28.06.2004	0	0	2	0	**02**	**00**
30.06.2007	0	0	16	7	**23**	**00**
30.06.2007	0	9	0	0	**09**	**09**
30.06.2007	0	0	4	3	**07**	**07**
30.06.2007	0	0	6	6	**12**	**00**
01.07.2007	0	0	6	6	**12**	**12**
01.07.2007	0	0	6	6	**12**	**12**
01.07.2007	0	0	23	14	**37**	**37**
03.07.2007	0	0	6	5	**11**	**00**
03.07.2007	0	0	6	5	**11**	**00**
03.07.2007	0	0	10	2	**12**	**00**
04.07.2007	4	0	0	0	**04**	**04**
05.07.2007	7	0	0	0	**07**	**00**
05.07.2007	0	6	0	0	**06**	**06**
05.07.2007	0	4	0	0	**04**	**04**
05.07.2007	8	1	0	0	**09**	**09**
06.07.2007	12	0	0	0	**12**	**12**
07.07.2007	0	4	0	0	**04**	**00**
08.07.2007	0	8	0	0	**08**	**04**
09.07.2007	0	4	0	0	**04**	**00**
	31	**40**	**85**	**54**	**210**	**116**

Table20: Records of Marco polo during summer 2007 field season from Waghjir

Date	Adult Male	Sub-adult Male	Yearling Male	Total	Conservative Estimate
20.07.2007	0	4	9	**13**	**0**
21.07.2007	0	6	9	**15**	**15**
21.07.2007	0	3	0	**3**	**3**
22.07.2007	25	0	0	**25**	**25**
22.07.2007	8	4	0	**12**	**12**
22.07.2007	0	6	0	**6**	**6**
22.07.2007	4	0	0	**4**	**4**
22.07.2007	0	2	1	**3**	**3**
23.07.2007	25	0	0	**25**	**0**
24.07.2007	9	0	0	**9**	**0**
24.07.2007	0	0	2	**2**	**2**
24.07.2007	6	0	0	**6**	**6**
24.07.2007	1	0	0	**1**	**0**
24.07.2007	6	0	0	**6**	**0**
25.07.2007	30	0	0	**30**	**21**
26.07.2007	6	0	0	**6**	**0**
26.07.2007	0	0	7	**7**	**7**
26.07.2007	0	0	11	**11**	**2**
27.07.2007	0	0	7	**7**	**0**
	120	**25**	**46**	**191**	**106**

The analysis of the data revealed the absence of the females from the Waghjir Population. No females have been seen during the survey from the Waghjir valley.

The most striking question after surveying the Waghjir was where the females are. Pectoz earlier reported presence of 100 Marco Polo from the valley where as Schaller and Mock during their visits reported not more than 10 individuals from the valley.

During the summer 2007 field session we made independent observation of 19 groups of Marco Polo counting 106 – 191 individuals. The most striking about the Waghjir was the absence of females from the area. All the animals encountered were males only. I tried to check both the passes namely Dilsang which leads to Pakistan and Waghjir which leads to China to see the possibility of any females in the area. The Dilsang on the higher reaches close to the Pakistan border is not the good Habitat for the Marco polo, may be further down towards the Pakistan it may be same as that of the Afghanistan where as the China side is equally good. We were able to see the pellets on other side also.

The Waghjir population if connected to China or Pakistan will be considered as one of the important populations of the Marco polo in the Pamir's which may sustain a surviving gene pool in the long run. We have already collected 35 samples from the Waghjir for the genetic analysis and hope if Dr. Rich Harris (Marco Polo Team) will be able to get some samples from the other side's close to the Waghjir then it will be easy to link the male population of the Waghjir to its source population.

Other striking feature of the Waghjir is total absence of livestock during summer and human from the area. But the area where we counted 106 – 191 male Marco polo will hold more than 500 unattended yaks during the winter season, where the Marco Polo will go at that time needs further evaluation.

Higher reaches of Waghjir is not a suitable snow leopard habitat, but the middle portion of the valley is good where we found moderate evidences. Ibex is rare in valley where as bears and wolves frequent the area.

The sign survey carried in the Waghjir valley gave 4.2 Signs per Sq. Kilometer which gives the conservative estimate of 1 – 2 Snow Leopards per 100 Sq. Km in the Waghjir Area.

Issue about the Proposed Boundary for the Waghjir Area

The proposed boundary for the reserve needs further evaluation. As per my understanding of the area we should put the boundary on map in such a manner so that it includes Dilsang Pass within the limits of protected area. The present boundary of the reserve does not covers the area from which the Marco Polo use during the summer season.

FOOD HABITS OF CARNIVORES FROM WAKAHN

While traveling through Proposed Big Pamir Wildlife Reserve and Waghjir Area for survey of large mammals, I was able to collect the scats of three carnivores namely Snow Leopard, Wolf and Red Fox. During the survey period from 2006 – 2007, I was able to collect 94 Snow Leopard Scats, 84 Wolf Scats and 13 Red Fox Scats.

Scat Analysis

Scat analysis is indirect, non-invasive and unbiased technique for recording frequency of occurrence of different prey species in the scats of carnivores and hence it is most widely used (Shahi, 1982; Johnson *et al.,* 1983; Leopold and Krausman, 1986; Jhala, 1993; Mukherjee *et al.,* 1994a, b; Jethva *et al.,* 1997; Spaulding *et al.,* 1997; Jhala, 2001; Jethva, 2002; Habib, 2007).

Identification of Scats

Carnivore scats are often identified by size, shape, odor, colour and signs associated with scats such as scrapes and footprints (Quinn and Jackman, 1994). Combinations of characteristics like associated signs, odor is important to identify scats. Scats of ambiguous identity were discarded.

Collection and Preservation of Scats

Scats were collected in frequently traveled areas during the study period. The scats were collected in polythene bags, labeled and sun-dried in the field. Information on habitat, substratum where scat was found and its GPS location were also recorded.

Identification of Prey Remains from Scats

Standard methods for scat analysis from time to time were followed which have been used by various workers (Koppiker and Sabnis, 1976, 1977; Korschgen, 1980; Johnson *et al.,* 1983; Leopold and Krausman, 1986; Reynolds and Aebischer, 1991; Mukherjee *et al.,* 1994a, b; John *et al.,* 1996; Spaulding *et al.,* 1997; Habib, 2007).

1. Scats were crushed and carefully observed for the presence of indigestible macro components such as bones, claws, feathers, beaks, scales, hooves and other indigestible vegetable matter.

2. After identification of macro components the hair remains were washed in warm water over a sieve to remove soil and calcium present in the scat.

3. The washed scats were dried for further collection of hair and their microscopic examination to identify prey species.

4. Hairs were thoroughly mixed and randomly picked for slide preparation. Before slide preparation hairs were also treated with Xylol (50 % Ethyl Alcohol and 50 % Xylene) when they carried more dirt or undigested food particles.

5. Reference slides for cuticular pattern and medulla were prepared for all potential prey species occurring in the study area.

6. The combination of hair characteristics such as medullary and cuticular pattern, were primarily used for identification of most of the mammalian species from scats. However, occasionally medulla to hair width ratio was also used to identify prey species represented in scats.

Slides of hair picked up randomly from scats were prepared in DPX medium for examining cuticular and medullary characteristics. All these characteristics were compared with permanent slides to identify different prey species (Keogh, 1983).

In case of Snow Leopard maximum scats (n = 85) contained prey remains of only one species (90 %) whereas remaining 9.6 % (n = 9) contained remains of two prey species. In case of Wolf maximum scats (n = 80) contained prey remains of only one species (95 %) where as remaining 5% (n = 4) contained remains of two prey species. In case of Red Fox all the scats contained only remains of single prey species (Figure 8).

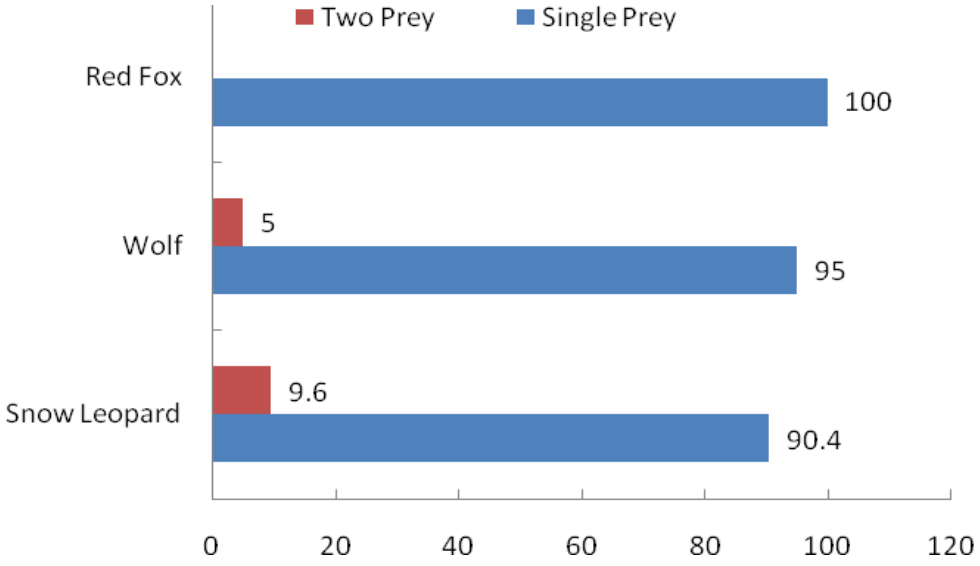


Figure 8: Percentage of prey items detected in carnivore scats (n = 191) between 2006-2007

Percent occurrence of different prey items in the Snow Leopard scats of Wakhan suggested that the leopards are largely dependent on natural prey, which constituted 89.3% of its diet whereas only 10.7 % of its diet was represented by livestock. Among natural prey Marco Polo sheep constituted major portion (33 %) of the diet followed by Marmots (29.1 %) and Ibex (18.4 %) where as among livestock category the maximum contribution was by goat and sheep which accounted for 2.9 % each. The percent occurrence of different prey species along with 95% Bootstrap confidence intervals is given in Table 21.

Percent occurrence of different prey items in the Wolf scats of Wakhan suggested that Wolves too are largely dependent on natural prey, which constituted 65.9 % of its diet whereas 34.1 % of its diet was

represented by livestock. Among natural prey Ibex constituted major portion (23.9 %) of the diet followed by Marmot and Marco Polo (18.2 % each) where as among livestock category the maximum contribution was by sheep which accounted for 12.5 % followed by Yak 9.1 % and Cattle 8 %. The percent occurrence of different prey species along with 95% Bootstrap confidence intervals is given in Table 22.

Percent occurrence of different prey items in the Red Fox scats of Wakhan suggested that Red Fox is totally dependent of small mammals such as Rodents and Marmots. Rodents contributed 61.5 % and Marmots contributed 23.1 %. The occurrence of the Yak may be the rare case of scavenging. The too small sample size in case of red fox scats does not provide any solid inference. The percent occurrence of different prey species along with 95% Bootstrap confidence intervals is given in Table 23.

Table 21: Percent Occurrence of Different Prey Species and 95% Bootstrap Confidence Intervals for Snow Leopard Scats from Wakhan Afghanistan (N = 94)

Prey Item	Frequency of Occurrence	Percent Frequency of Occurrence	95 % Bootstrap Confidence Limits
Marco Polo	34	33.0	0.266 – 0.468
Ibex	19	18.4	0.14 – 0.296
Cape Hare	7	6.8	0.021 – 0.138
Marmot	30	29.1	0.223 – 0.426
Rodent	2	1.9	0 – 0.053
Yak	2	1.9	0 – 0.053
Goat	3	2.9	0 – 0.074
Sheep	3	2.9	0 – 0.074
Cattle	2	1.9	0 – 0.053
Unidentified	1	1.0	0 – 0.032

Table 22: Percent Occurrence of Different Prey Species and 95% Bootstrap Confidence Intervals for Wolf Scats from Wakhan Afghanistan (N = 84)

Prey Item	Frequency of Occurrence	Percent Frequency of Occurrence	95% Bootstrap Confidence Limits
Marco Polo	16	18.2	0.119 – 0.274
Ibex	21	23.9	0.155 – 0.339
Cape Hare	4	4.5	0.012 – 0.095
Marmot	16	18.2	0.113 – 0.274
Rodent	1	1.1	0 – 0.036
Yak	8	9.1	0.036 – 0.155
Goat	3	3.4	0 – 0.083
Sheep	11	12.5	0.06 – 0.208
Cattle	7	8.0	0.036 – 0.155
Unidentified	1	1.1	0 – 0.036

Table 23: Percent Occurrence of Different Prey Species and 95% Bootstrap Confidence Intervals for Red Fox Scats from Wakhan Afghanistan (N = 13)

Prey Item	Frequency of Occurrence	Percent Frequency of Occurrence	95% Bootstrap Confidence Limits
Marmot	3	23.1	0 – 0.462
Rodent	8	61.5	0.308 – 0.846
Yak	1	7.7	0 – 0.231
Grass	1	7.7	0 – 0.231

CAPACITY BUILDING PROGRAM

First capacity building program was carried in Kabul from 31st July 2006 to 9th August 2006. The details of the program are given below:

REPORT ON VISIT & ACTIVITIES OF ISLT TEAM IN KABUL

The following is brief report of activities of the ISLT team regarding training program for Afghan students and government counterparts and preparation of wildlife survey of Great Pamir in Wakhan Corridor. Dr. Jamal A. Khan and Mr. Bilal Habib arrived in Kabul on 31st July 2006 and Mr. Rashid H. Raza joined the team on 1st August 2006. Following is the brief detail of activities carried out by the team from 31st July 2006 to 10th August 2006:

31st July 2006. Arrival in Kabul at 12.30 p.m. and checked in park palace guest house. Meeting with Dr. Peter Smallwood and discussion on training program later in the day. Dr. Jamal A. Khan and Bilal Habib prepares a list of items required for wildlife survey to be procured in Kabul.

1st August 2006. Preparation of course material for the training program. Mr. Rashid Raza arrives in Kabul and another meeting and discussion with Dr. Peter Smallwood regarding the training program and wildlife survey in Wakhan. Dr. Jamal A. Khan and Mr. Bilal Habib has a meeting with Mr. Inayatullah, Field Co-ordinator regarding the procurement of equipment accessories and logistics of the survey.

2nd August 2006. Teaching and Training program starts with a total 13 Afghan students and government counterparts attending the program. Dr. Jamal Khan delivers two following lectures with translation side by side by Mr. Jawid:

L1. Introduction to components of biodiversity and their conservation
L2. Introduction to in-situ and ex-situ conservation strategies

The participants are provided Dari translation of the lectures. Mr. Jawid translates the lectures to participants in Dari. Mr. Bilal Habib and Mr. Inayatullah procure equipment accessories from Market. Mr. Rashid and Mr. Bilal attended First Aid Remote Assistance Training Program in afternoon session from 1400 hours to 1800 hours.

3rd August 2006. The teaching and training session continues on 3rd August 2006 from 8:30 am to 1300 hours and following lectures are delivered:

L3. Role of local communities in biodiversity conservation
L4. Role of international organizations, legal instruments, treaties etc. in biodiversity conservation
L5. Structure of ecosystem
L6. Concept and attributes of community
L7. Ecology, biology and conservation of mammals

Mr. Rashid and Mr. Bilal attended the attended First Aid Remote Assistance Training Program in afternoon session from 1400 hours to 1800 hours. The SLIMS format are given for Dari translation.

Procurement of equipment accessories and camping equipment for local student and govt. counterparts continues.

4th August 2006. Friday a holiday for participants.

5th August 2006. The teaching and training session continues on 5th August 2006 from 8:30 am to 1300 hours and following lectures are delivered:

L8. Ecology, Biology and conservation of birds
L9. Introduction to field equipment used in wildlife studies
L10. Introduction to field sampling techniques in wildlife studies (three lectures merged into one)

Mr. Rashid and Mr. Bilal attended First Aid Remote Assistance Training Program in afternoon session from 1400 hours to 1800 hours.

6th August 2006. The teaching and training session continues on 6th August 2006 from 8:30 am to 1300 hours and following lectures are delivered:

L11. Field techniques for abundance estimation of mammals
L12. Field techniques for abundance estimation of birds
L13. Introduction to data summarization, analysis and presentation
L14. Introduction to measures of central tendency and dispersion

First Aid Remote Assistance Training Program for Rashid and Bilal continues in afternoon session from 1400 hours to 1800 hours. Discussion with Dr. Peter Smallwood regarding evaluation procedure.

7th August 2006. Dr. Peter Smallwood addresses the participants regarding the entire evaluation procedure followed by lecture by Dr. Jamal

L15. Concept of confidence interval, accuracy and precision

Mine training program attended by all local participants and ISLT team (Dr. Jamal, Mr. Bilal and Mr. Rashid) from 14 hours to 17 hours. Purchase of equipment accessories continues by the ISLT team.

8th August 2006. Dr. Jamal Visits Faculty of Agriculture and interacts with teachers and students. Dr. Jamal delivers a brief lecture and distributes course material prepared by the WCS Afghanistan to students. Dr. Jamal, Mr. Bilal, Mr. Rashid along with Mr. Inayatullah spends the entire afternoon in procuring all the remaining items for survey accessories. Preparation for field survey complete. Training session of ISLT team with Mr. Peter J. Bowles on use of satellite phone and mode of communication between ISLT team and WCS headquarter.

9th August 2006. Mr. Inayatullah and three participants along with survey equipment depart for field in the morning by road. ISLT team completes all other remaining formalities prior to departure for Wakhan.

10th August 2006. Mr. Bilal Habib and Mr. Rashid Raza along with 4 Afghan students and govt. counterparts leave for field by Air. Dr. Jamal A Khan leaves for New Delhi.

SECOND CAPACITY BUILDING PROGRAM

2nd International and Training and Capacity Building Program in Wildlife Biology and Biodiversity Conservation were organized at Department of Wildlife Sciences, Aligarh Muslim University from 6th January to 20th January 2007.

The course was based on 26 Lectures, 10 Laboratory Exercises, 10 Remote Sensing and GIS Exercises. The course was followed by 3 days visit to Corbett Tiger Reserve where the basic techniques of the field where demonstrated to the participants. Seven participants from the Afghanistan participated in the course, three where students from the Kabul University and Four where Govt. Counterparts.

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