

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

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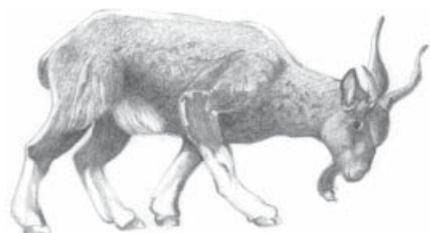
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# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Markhor – *Capra falconeri*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. falconeri</i>
Habibi (2003).	Conifer forests, stony ravines, cliffs and gorges at an elevation of 1,000 – 4,000m
IUCN - Valdez (2008).	<p><b>3 major habitat categories listed:</b> temperate forest; temperate shrubland; rocky areas.</p> <p><i>C. falconeri</i> is adapted to mountainous terrain between 600m and 3,600m elevation. The species is typically found in scrub forests made up primarily of oaks (<i>Quercus ilex</i>), pines (<i>Pinus gerardiana</i>), and junipers (<i>Juniperus macropoda</i>), alternating seasonally between grazing (summer) and browsing (winter).</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. falconeri</i>
Wildlife of Pakistan (1999g).	<i>C. falconeri</i> inhabits sparsely wooded mountains in northern and western Pakistan.
Nowak (1999).	<i>C. falconeri</i> is adapted to medium-high mountainous terrain between 600m and 3,600m around and above the tree line. It is sometimes found in steep gorges, rocky areas, arid country, scrub forests, or grassy meadows.
Bhatnagar (date unknown).	<p><i>C. falconeri</i> occurs in low to mid elevations, open and slightly wooded arid tracts in the Trans-Himalaya and parts of the Greater Himalaya. Individuals may migrate up to 4,000m in summer, but essentially remain in areas where rugged valleys and mountains are available at approximately 2,200m.</p> <p><i>C. falconeri</i> distinctly avoids areas with high snow cover. The species lacks underwool and thus avoids excessively cold areas, but can tolerate temperatures reaching up to 45°C.</p> <p>The species is an efficient negotiator of steep cliffs and uses this terrain to escape predators.</p>
Schaller & Khan (1975).	Early studies of <i>C. falconeri</i> indicated that the species requires the presence of cliffs to escape danger, low levels of moisture (especially areas without deep snow) and range below 2,200m where winter temperatures are milder.
Petrocz & Larsson (1977).	A survey of <i>C. falconeri</i> in Nuristan demonstrated that the species remained within coniferous forest habitat or on exposed slopes in alpine

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Source of Information	Habitat Descriptions for <i>C. falconeri</i>
	steppes, and that their movements were limited by human land-use.
<b>Animal Info (2008).</b>	<p><i>C. falconeri</i> occupies arid cliffside habitats in sparsely wooded mountainous regions at altitudes ranging from 700m, up to 4000m in the summer.</p> <p><i>C. falconeri</i> avoids cliffside habitats in sparsely wooded mountainous regions and deep snow.</p>

**WCS Survey Results:** During a survey of the Eastern forests during 2008, WCS found solid evidence of *C. falconeri* within the province of Nuristan. Three direct sightings were made, all between 1,750 – 2,047m within evergreen oak forests and alpine areas (Karlstetter, 2008). Hunter surveys also conducted by WCS in Nuristan during 2007, found *C. falconeri* to be the most commonly hunted species in the Eastern forests – primarily for trophy and consumption purposes (Johnson & Wingard, 2008).

**WCS/PoWPA Public Consultations:** Community participants at the PoWPA Public Consultations held during May – July 2009, noted that *C. falconeri* was present in the following provinces/districts:-

- Nuristan Province
- Kunar Province (particularly in Shegal, Manogi, Chapadara and Ghazi Abad districts)

### Information for Markhor (*Capra falconeri*) distributional model

Designated ecoregion codes (see Table 3 of report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1306	Degenerate forests/high shrubs	700 – 4,000m	Summer precipitation - since <i>C. falconeri</i> relies on grazing grass and forbs during the summer and spring, refine by excluding all areas that received less than 5mm of average monthly rainfall during Jun – Aug 2007.
PA1307			
PA0506	Natural forest (open cover)		
PA0808	Rangeland		Snow depth - since <i>C. falconeri</i> avoids areas with deep snow cover, refine by excluding all areas with an average 8-day snow depth of more than 80cm during Jan 09.
PA1005	Rocky outcrop / bare soil		
PA1006			Extend buffer around Habibi's range to 200km.
PA1012			
PA1014			
PA1018			
IM0502			

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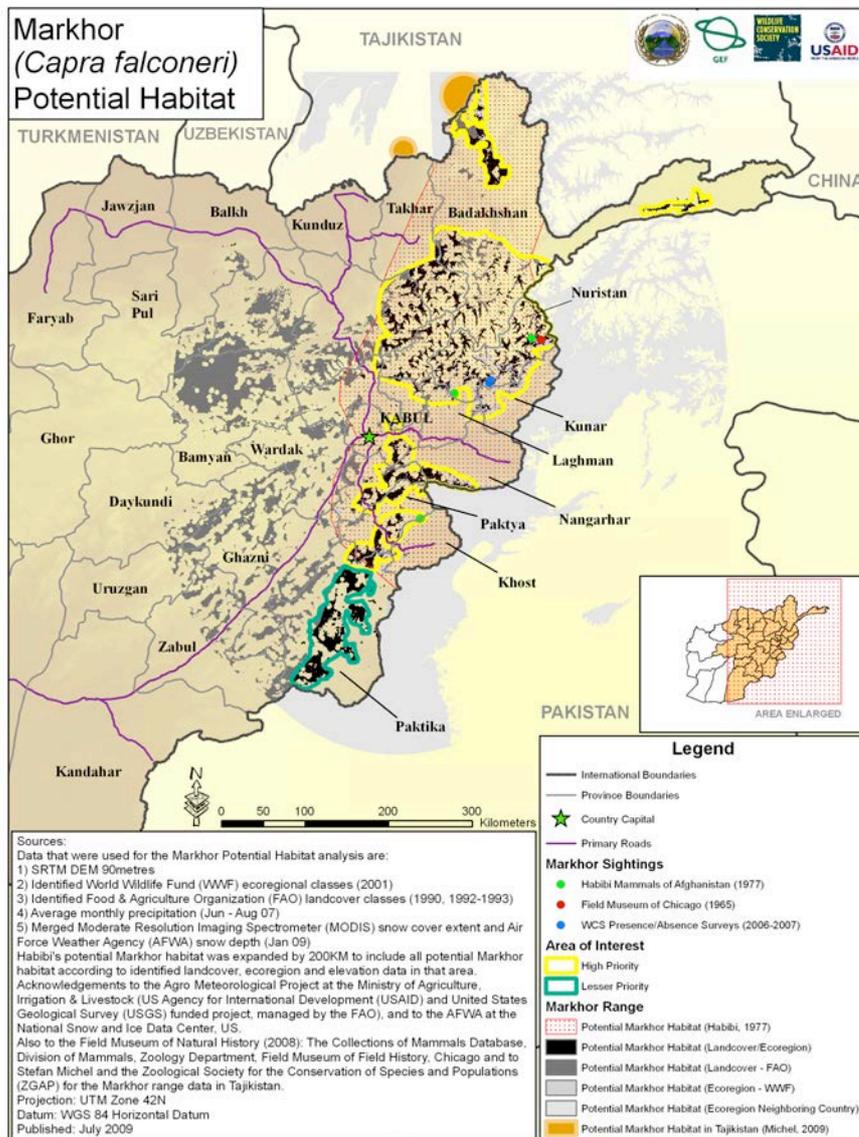


Figure 1: Markhor (*Capra falconeri*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Snow leopard – *Uncia uncia*



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## Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>U. uncia</i>
Habibi (2003).	Alpine valleys and meadows, conifer forests at an altitude of 3,000 – 5,000m.
IUCN – Jackson et al. (2008).	<p><b>6 major habitat categories listed:</b> boreal forest; temperate shrubland; subtropical/tropical high altitude shrubland; temperate grassland; subtropical/tropical high altitude grassland; rocky areas.</p> <p><i>U. uncia</i> are closely associated with alpine and sub-alpine ecological zones, favoring steep terrain, well-broken by cliffs, ridges, gullies, and rocky outcrops. However, in Mongolia and Tibet they may occupy relatively flat or rolling terrain as long as there is sufficient hiding cover. In the Sayan mountains of Russia and parts of the Tien Shan range of China, they are found in open coniferous forest, but usually avoid dense forest.</p> <p><i>U. uncia</i> generally occur at elevations of 3,000-4,500 m, except at their northern range limit, where they are found at lower elevations (900-2,500 m). Low temperatures and high aridity makes its habitat among the least productive rangeland systems, with prey populations consequently occurring at relatively low densities.</p> <p>The species' principal natural prey species are blue sheep (<i>Pseudois nayaur</i>) and Asiatic ibex (<i>Capra sibirica</i>) whose distribution coincides closely with <i>U. uncia</i> range.</p>

## Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>U. uncia</i>
IUCN/SSC Cat Specialist Group (2008b).	<i>U. uncia</i> frequents long narrow mountain systems and areas of montane habitat scattered throughout a vast region. Throughout their range, they are associated with arid and semi-arid shrubland, grassland or steppe. They prefer steep terrain broken by cliffs, ridges, gullies and rocky outcrops and generally avoid dense forest. In general, <i>U. uncia</i> tends to move, bed and mark along linear topographic features, such as major ridgelines, cliff edges, gullies, and the base or crest of broken cliffs.
McCarthy & Chapron (2003).	<p>Reports suggest that <i>U. uncia</i> migrate to lower elevations during winter in northern Pakistan, the Tien Shan Mountains in China, ranges in Russia and parts of India, following movements of their primary prey species such as <i>C. sibirica</i> and <i>C. falconeri</i>. <i>U. uncia</i> prefers steep terrain broken by cliffs, ridges, gullies and rocky outcrops, although they may traverse relatively gentle country, especially if ridges offer suitable travel routes and shrubs or rock outcrops provide sufficient cover.</p> <p>The species shows a strong preference for irregular slopes in excess of 40° and well-defined landform edges, such as ridgelines, bluffs and ravines.</p> <p>Total potential habitat (estimated occupied habitat) in Afghanistan is 117,653 km<sup>2</sup>. 32,748km<sup>2</sup> of that is considered 'good' habitat, 84,905km<sup>2</sup> is considered 'fair'.</p>
UNEP-WCMC	Mountainous habitat, including ridges, gullies and rocky outcrops, arid

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Source of Information	Habitat Descriptions for <i>U. uncia</i>
(2008).	and semi-arid shrubland, grassland and steppe are favored habitats of <i>U. uncia</i> .
McCarthy et al. (2005).	In some parts of its range, <i>U. uncia</i> inhabits coniferous forests and will use other terrain if sufficient cover is provided, but usually these are avoided.
Nowak (1999).	<i>U. uncia</i> is found in the high mountains of Central Asia. In summer, it occurs commonly in alpine meadows and rocky areas, at elevations of 2,700-6,000m. In winter, it may follow its prey down to forests below 1,800m. The species sometimes dens in a rocky cavern or crevice.
Hemmer (1972).	Generally, <i>U. uncia</i> lives in high mountain regions from the belt of alpine meadows, treeless rocks and snow deposits to the belts of juniper and spruce forests, and bush vegetation. Their sleeping or resting quarters are made in rocky caverns, crevices of rocks and secluded clefts.

**WCS Survey Results:** During a WCS survey in 2004, WCS teams were informed by local communities that *U. uncia* is present in low numbers within the western Pamirs and only occasionally reported from the eastern Pamir (Schaller, 2004). WCS also conducted transect surveys within 11 valleys of the proposed Big Pamir Wildlife Reserve. Overall 44 signs were found in the 15 sign transects and *U. uncia* presence was confirmed in 10 out of the 11 valleys surveyed. Based on estimates of signs per kilometer and size of the area, WCS research teams estimated that the proposed Big Pamir Wildlife Reserve should ideally have an estimated **6.78 – 13.56 Snow leopards** (however, this is a preliminary estimate and will be confirmed after more surveys in the near future) (Habib, 2006).

Based on the occurrence of sightings and records of the conflict from the main Wakhan Valley, WCS research teams were able to map the high priority areas for the conservation of *U. uncia*, with high priority areas being in the lower portion of the Upper Wakhan and the middle portion of the Lower Wakhan (the areas around the villages of Kret, Kugzet, Sargez, Qila-e-Wust, Shelk, Kipkut, Wuzed, Pakuy and Khandud are considered to be the potential Snow leopard areas, based on sightings and conflict records). Signs were seen by the WCS team in both the proposed Big Pamir Wildlife Reserve (scats and tracks) and Waghjir Valley (scats), however the higher reaches of Waghjir Valley are not considered suitable *U. uncia* habitat (Habib, 2008).

Interviews with local residents during WCS surveys in the Eastern forests also suggested that *U. uncia* may still occupy certain key areas in Nuristan (Karlstetter, 2008).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *U. uncia* was still present in the following provinces/districts:-

- Laghman Province (particularly in Alingar, Norulam and Kalman)
- Nangarhar Province (in Safed Koh)
- Nuristan Province
- Kunar Province (according to the local communities, *U. uncia* is decreasing in number here because of hunting for its fur)

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## Information for Snow leopard (*Uncia uncia*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Degenerate forests/high shrubs	1,500 – 6,000m	Slope - prefers steep terrain in excess of 30 degrees so exclude any areas that are less than 30 degrees.  Range data from WCS, the Panthera Foundation, Snow Leopard Trust (SLT) and Snow Leopard Network (SLN) used at a Range-Wide Conservation Planning Conference for the Snow Leopard held in China (2008).
PA1307	Natural forest (open cover)		
PA1309	Permanent snow		
PA0506	Rainfed crops (sloping areas)		
PA1004	Rangeland		
PA0808	Rock outcrop/bare soil		
PA1005			
PA1006			
PA1012			
PA1014			
PA1322			
IM0502			

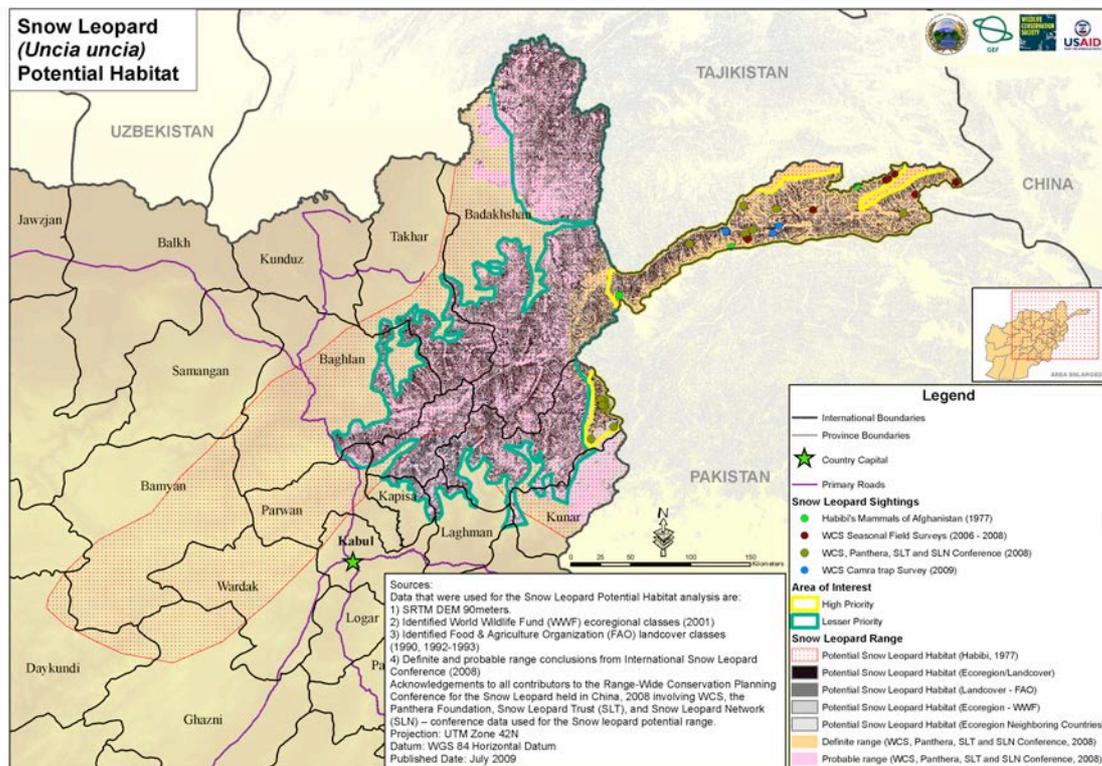


Figure 2: Snow leopard (*Uncia uncia*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Pallas cat – *Otocolobus manul*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>O. manul</i>
Habibi (2003).	Rocky and treeless dry stony plateaus. <i>O. manul</i> also lives in the steppes and deserts, particularly in the regions of Baluchistan. Also occupies alpine and sub-alpine valleys of mountainous regions at elevations of between 1,500 – 3,500m.
IUCN – Ross et al. (2008).	<p><b>4 major habitat categories listed:</b> boreal shrubland; temperate grassland; rocky areas; cold desert.</p> <p><i>O. manul</i> is adapted to cold, arid environments and, although it has been found at altitudes of up to 4,800m, it does not occur at such high elevations as Snow leopard (<i>U. uncia</i>), and is more strongly associated with flat, rolling grass and shrub steppe and south-facing slopes where deep snow cover does not accumulate. Much of their habitat is montane.</p> <p>During a study of <i>O. manul</i> in Central Mongolia, the species was found to have a strong association with rocky, steep areas and was rarely found in open grassland.</p> <p><i>O. manul</i> is generally absent from lowland sandy desert basins, although it may penetrate these areas along seasonal river courses.</p> <p>Typical habitat for <i>O. manul</i> is characterized by an extreme continental climate – little rainfall, low humidity and a wide range of temperatures. They are rarely found in areas where the maximum mean ten-day snow cover exceeds 10cm, and a continuous snow cover of 15-20cm marks the ecological limit for this species.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>O. manul</i>
Nowell & Jackson (1996).	In Baluchistan (Pakistan), <i>O. manul</i> has been recorded from the montane juniper steppe and may be patchily distributed within similar habitats in the Central Hindu Kush in Afghanistan.
IUCN/SSC Cat Specialist Group	Stony alpine desert, grassland habitats, rocky steppes and stony outcroppings form the only habitats <i>O. manul</i> is found within, and the

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>O. manul</i>
(2008a).	species is rarely seen in lowland areas. Also, <i>O. manul</i> does not live anywhere where deep snow accumulates.
Heptner & Sludskii, (1972).	Exposed rock outcrops or expanses of talus are a strong characteristic of <i>O. manul</i> habitat.
Heptner & Sludskii (1992).	<i>O. manul</i> seems to prefer rocky areas and ravines to the open steppe, providing protection from predators in what is otherwise a very open and exposed habitat.
The Wildlife of Pakistan (1999d).	<i>O. manul</i> is adapted to cold arid environments, but it is relatively specialised in its habitat requirements. It is found in stony alpine desert and grassland habitats.
Nowak (1999).	<i>O. manul</i> inhabits steppes, deserts and rocky country to elevations of more than 4,000m.
Munkhtsog et al. (2004).	<i>O. manul</i> is distributed in uplands, hilly areas, grassland steppe and semi-desert regions of Central Asia. Its distribution coincides with regions that experience large changes in annual and daily temperature, dropping as low as -40 degrees Celsius, and where deep snow does not accumulate.

**WCS Survey Results:** During spring and summer surveys to Dasht-e Nawar during 2007, WCS research teams had direct sightings of *O. manul* within the region (marked on the species range map) (Ostrowski et al., 2008a). Interviews conducted by WCS in the areas of Imam Sahib, Aye Khanum and Darqad wetlands suggested that the occurrence of *O. manul* in these sites is extremely low, however there is a slight chance that the Turgai forest of Darqad may still contain populations (Ostrowski et al., 2008b).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *O. manul* was present in the following provinces/districts:-

- Khost Province
- Laghman Province (particularly within the mountains)
- Sari Pul Province (within the Panjab Sanmarak Mountains)
- Nuristan Province
- Paktya Province
- Kunar Province

### Information for *O. manul* Distributional Model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Rangeland	1,500 – 4,800m	Snow depth - since <i>O. manul</i> avoids areas with deep snow cover, refine by excluding all areas with an average 8-day snow depth of more than 50cm during Jan 09.
PA1306	Rock outcrop / bare soil		
PA1004	Sand covered areas		
PA0808			Summer precipitation – since <i>O. manul</i> is known to live in arid areas, exclude all areas that received more than 35mm of monthly summer rain on average
PA1005			
PA1006			

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA1012			during June - August 2007.
PA1014			Extend buffer around Habibi's range to 400km.
PA1322			
IM0502			

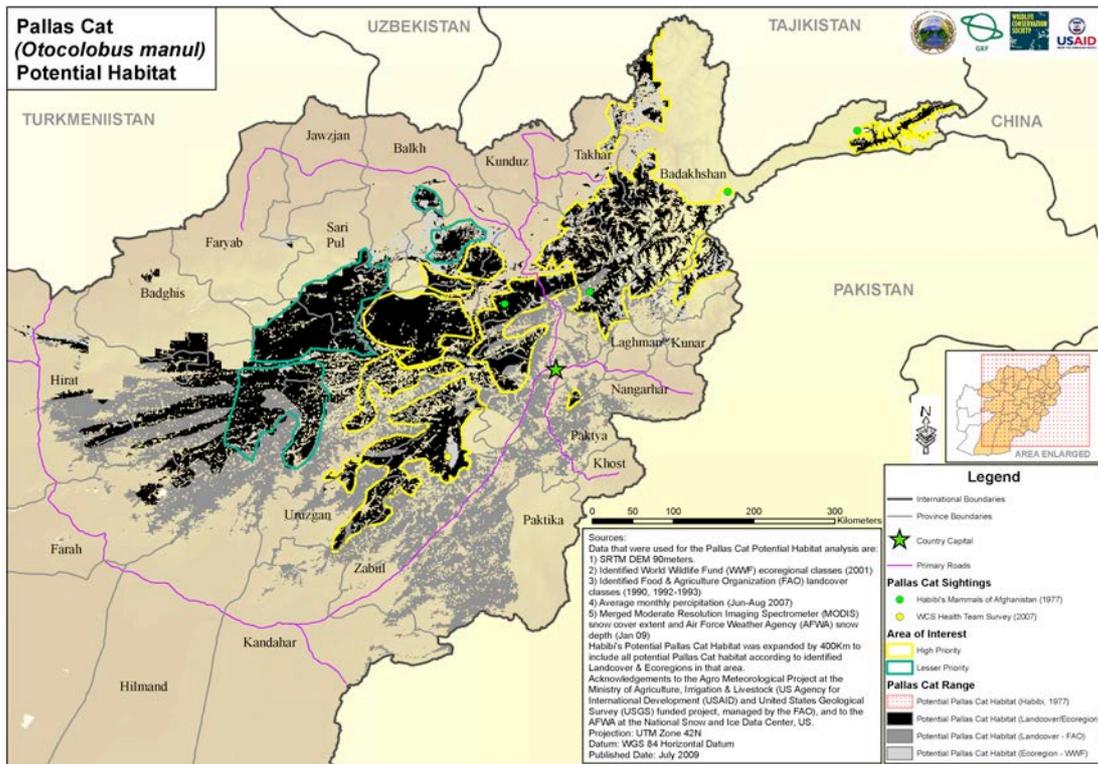
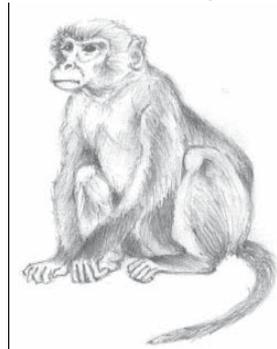


Figure 3: Pallas cat (*Otolobus manul*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Rhesus macaque – *Macaca mulatta*



# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>M. mulatta</i>
Habibi (2003).	Montane forests and cultivations form the main habitat of <i>M. mulatta</i> in Afghanistan. The species often lives close to human habitations and are destructive to crops, raiding grain fields and vegetable patches at dusk. Widespread in forests of eastern Afghanistan, particularly in forests with cedar and oak trees, at altitudes of 1,000 – 3,000m.
IUCN – Timmins et al. (2008).	<p><b>16 major habitat categories listed:</b> temperate forest; subtropical/tropical dry forest; subtropical/tropical moist lowland forest; subtropical/tropical mangrove vegetation above high tide level; subtropical/tropical moist montane forest; dry savanna; moist savanna; temperate shrubland; subtropical/tropical dry shrubland; subtropical/tropical moist shrubland; arable land; pastureland; plantations; rural gardens; urban areas; subtropical/tropical heavily degraded former forest.</p> <p><i>M. mulatta</i> is diurnal and omnivorous, and alternatively arboreal and terrestrial. It resides in a range of habitats, including temperate coniferous, moist and dry deciduous, bamboo, and mixed forests, mangroves, scrub, rainforest, and around human habitations and developments, including cultivated areas, temples, and roadsides.</p> <p>In Pakistan <i>M. mulatta</i> remains in mountainous regions with forest cover and is typically associated with Himalayan moist temperate forest. It is found at elevations up to 4,000 m.</p> <p>Due to hunting in Lao PDR and Viet Nam the species does not occur in commensal situations there, and is restricted to forest areas where it is generally associated with riverine environments over a range of altitudes. In western and northern parts of its range it seems to occur in a wider array of environments.</p> <p>It is highly adaptable to man-made habitat.</p>

## Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>M. mulatta</i>
Nowak (1999).	<i>M. mulatta</i> has adapted to a wide range of habitats, from sea level to elevations of 2,500m; from snow to intense heat and from near-desert situations to dense forests. More than half of <i>M. mulatta</i> in the northern Indian state of Uttar Pradesh actually live in cities and towns where there is ideal habitat.
Cawthorn Lang (2005).	<p>In the most general terms, <i>M. mulatta</i> is found in both tropical and temperate habitats including semidesert, dry deciduous, mixed deciduous and bamboo, and temperate forests as well as in tropical forests and mangrove swamps, usually at elevations from sea level to 2000m, however they have been seen at elevations up to 4,000m in China and northeastern India.</p> <p>In India, <i>M. mulatta</i> are found in flat, cultivated areas, where agricultural fields dominate the landscape and in the plains, foothills and mountainous regions where habitat includes cultivated fields, tropical</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>M. mulatta</i>
	forests and dry, deciduous forests.
Global Invasive Species Database (2007).	<i>M. mulatta</i> occurs in agricultural areas, coastland, natural forests, range/grasslands, riparian zones, ruderal/disturbed, scrub/shrublands, and wetlands. The species is adapted to a variety of habitats from tropical coastal lowlands to snowy mountain valleys 2,500m above sea level, from dense tropical forest, to temperate pine groves, and semi-desert conditions.
The Wildlife of Pakistan (1999e).	<i>M. mulatta</i> mostly inhabits mountainous regions of the moist temperate forest but are also found in dry temperate forest. The characteristic vegetation of the habitat of <i>M. mulatta</i> is: <i>Picea smithiana</i> , <i>Pinus wallichiana</i> , <i>Cedrus deodara</i> , <i>Pinus roxburghii</i> , <i>Pinus gerardiana</i> , <i>Quercus dilatata</i> , <i>Acer caesium</i> , <i>Populus ciliata</i> , <i>Taxus baccata</i> , <i>Abies pindrow</i> , <i>Indigofera gerardiana</i> , <i>Sambucus ebulus</i> , <i>Sobaria tomentosa</i> , <i>Plectranthus rugosus</i> , <i>Berberis ceratophylla</i> , <i>B. Quercus incana</i> , <i>Berberis lycium</i> , <i>Carissa</i> spp, <i>Cotoneaster</i> spp

**WCS Survey Results:** During WCS surveys of the Eastern forest in 2006 and 2007, WCS found solid evidence of *M. mulatta* occurrence in this region, with 28 direct sightings of the species made. These sightings were all between 1,900 and 2,971m within evergreen oak forests, coniferous forests and alpine areas (Karlstetter, 2008).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *M. mulatta* was present in the following provinces/districts:-

- Khost Province (in all districts including Qalandar, Musakhel, Sabary, Jajijadran and Dowamandy)
- Laghman Province (within the mountainous areas)
- Nangarhar Province
- Nuristan Province
- Paktya Province
- Kunar Province

### Information for Rhesus macaque (*Macaca mulatta*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1307	Degenerate forests/high shrubs	1,000 – 4,000m	Summer precipitation – since <i>M. mulatta</i> is dependent on sufficient forage from trees, exclude all areas that received less than 10mm of monthly summer rain on average during June - August 2007.
PA0506	Fruit trees		
IM0502	Irrigated: intensively cultivated (1 crop/year)		
	Irrigated: intensively cultivated (2 crops/year)		
	Irrigated: intermittently cultivated		
	Natural forest (closed cover)		
	Natural forest (open cover)	Extend buffer around	

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

	<p>Rainfed crops (flat lying areas)</p> <p>Rainfed crops (sloping areas)</p> <p>Rangeland</p> <p>Rock outcrop/bare soil</p> <p>Sand covered areas</p>	<p>Habibi's range to the entire country.</p>
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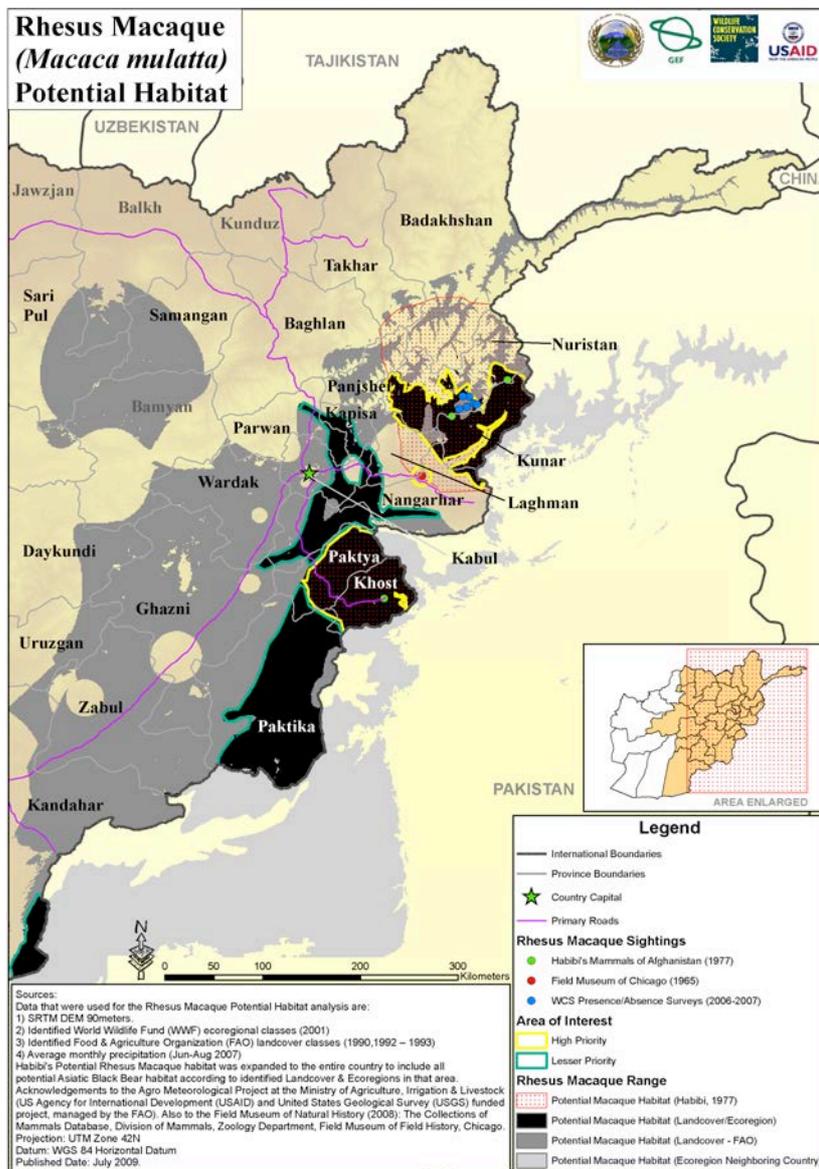
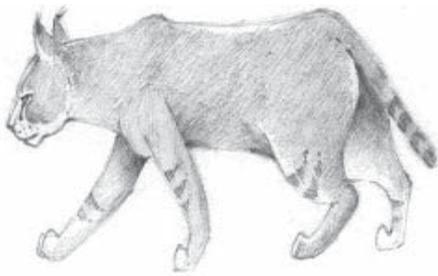


Figure 4: Rhesus macaque (*Macaca mulatta*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Jungle cat – *Felis chaus*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>F. chaus</i>
Habibi (2003).	Semi-deserts, open plains, watercourses, reed beds and cultivations form the main habitats of <i>F. chaus</i> , at elevations of between 400 – 1,000m.
IUCN – Duckworth et al. (2008).	<p><b>14 major habitat categories listed:</b> Temperate forest; subtropical/tropical dry forest; subtropical/tropical swamp forest; dry savanna; temperate shrubland; subtropical/ tropical dry shrubland; temperate grassland; subtropical/tropical dry grassland; permanent rivers/streams/creeks; shrub dominated wetlands; bogs, marshes, swamps, fens, peatlands; freshwater springs and oases; hot desert; temperate desert.</p> <p><i>F. chaus</i>, despite its name, is not strongly associated with the classic rainforest "jungle" habitat, but rather with wetlands - habitats with water and dense vegetative cover. Water and dense ground cover can be found in a variety of habitats, ranging from desert (where it is found near oases or along riverbeds) to grassland, shrubby woodland and dry deciduous forest, as well as cleared areas in moist forest.</p> <p>Areas with extensive deciduous dipterocarp forest and at least scattered surface water are the species predominant known habitat in Indochina. It is probably absent from all closed canopy forests, including rainforest. The species may make use of agricultural areas with a low intensity of human use and which retain patches of scrub.</p> <p><i>F. chaus</i> has adapted well to irrigated cultivation, having been observed in many different types of agricultural and forest plantations throughout their range. In Israel they can be found around pisciculture ponds and irrigation ditches.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>F. chaus</i>
Nowell & Jackson (1996)	<i>F. chaus</i> is not strongly associated with closed forest, but rather with water and dense vegetative cover, especially reed swamps, marsh and littoral and riparian environments. They are able to satisfy these requirements in a variety of habitats, from desert to scrub woodland and dry deciduous forest, as well as cleared areas in moist forest.

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>F. chaus</i>
Parker (1990).	<i>F. chaus</i> is found in a wide variety of habitats, most often in wet grasslands and reed thickets near stagnant or slowly flowing water. Although some populations reside in dry areas, <i>F. chaus</i> is never far from a pool of water.
Nowak (1999).	<i>F. chaus</i> is found in a variety of open and wooded habitats from sea level to elevations of 2,400m but generally is associated with dense vegetative cover and water. It dens in thick vegetation or in the abandoned burrow of a badger, fox or porcupine.  <i>F. chaus</i> adapts well to irrigated agriculture and often is found in the vicinity of human settlements.
IUCN/SSC Cat Specialist Group. (2008c).	<i>F. chaus</i> occurs in sandy, and stony desert country (sometimes with only very sparse shrub cover), along riverbeds or near oases. Also found in shrub and grassland. The species has been recorded at elevations up to 2,400m in the Himalayas.  <i>F. chaus</i> has adapted well to irrigated cultivation, having been observed in many different types of agricultural and forest plantations throughout their range (e.g. sugarcane plantations in tropical Asia).  <i>F. chaus</i> are also often spotted amidst human settlement (and are frequently reported to take chickens).
Baker et al. (2003).	A study of <i>F. chaus</i> in Jordan found that the species was most likely to occur amongst <i>Tamarix</i> , <i>Typha</i> and <i>Phragmites</i> species along the Jordan and Yarmouk rivers.

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *F. chaus* was present in the following provinces/districts:-

- Nangarhar Province (in Hesarak, Sherzad, Phechgram, Haskamena, Achen and Nazyan districts)
- Nuristan Province
- Paktya Province
- Kunar Province

### Information for Jungle cat (*Felis chaus*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Degenerate forests/high shrubs	400 – 2,000m	Slope – <i>F. chaus</i> prefers flat terrain so exclude all land over 30 degrees in slope.
PA1306	Irrigated: intensively cultivated (1 crop/year)		
PA1307	Irrigated: intensively cultivated (2 crops/year)		Hydrogeology – <i>F. chaus</i> prefers habitat in close proximity to water. Therefore exclude all land that is more than 10km from a water source in any direction.
PA1309	Irrigated: intensively cultivated (2 crops/year)		
PA1313	Irrigated: intermittently cultivated		
PA0506	Marshland permanently inundated		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA1004	Marshland seasonal		Extend buffer around Habibi's range to the entire country.
PA0808	Natural forest (open cover)		
PA1005	Pistachio forest		
PA1006	Rainfed crops (flat lying areas)		
PA1012	Rainfed crops (sloping areas)		
PA1322	Rangeland		
PA1326	Rock outcrop/bare soil		
PA1018	Sand covered areas		
IM0502	Sand dunes		
	Water bodies		

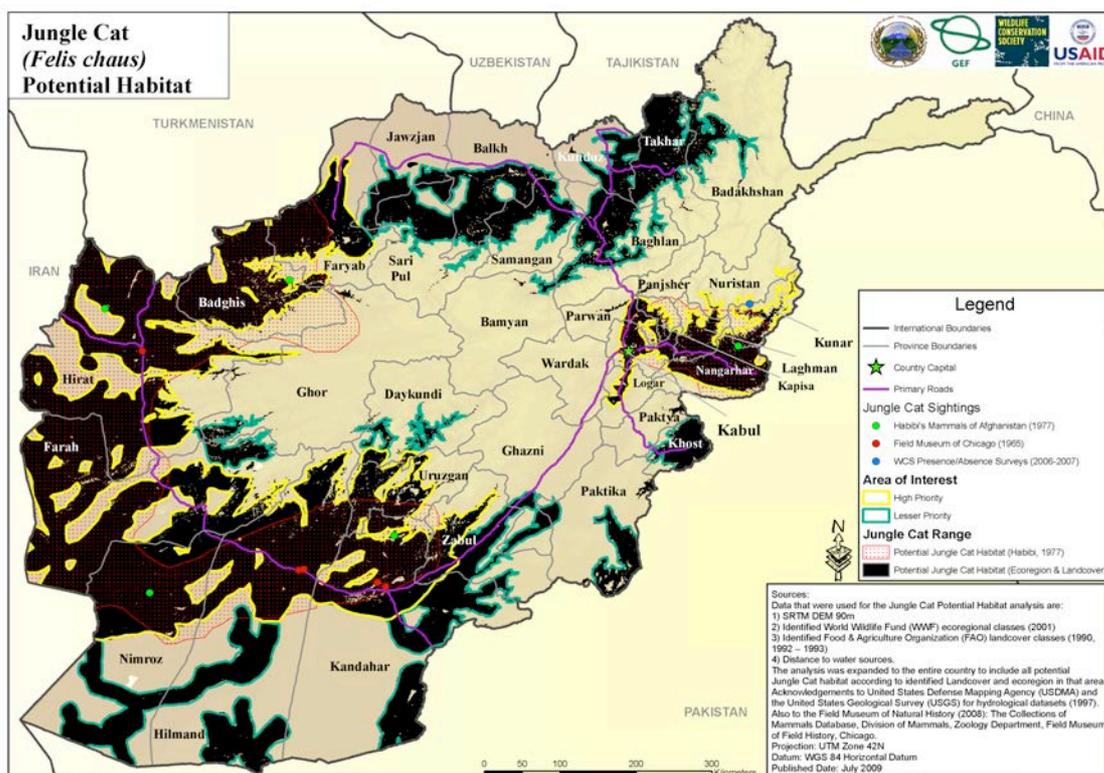


Figure 5: Jungle cat (*Felis chaus*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Leopard cat – *Prionailurus bengalensis*



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### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>P. bengalensis</i>
Habibi (2003).	<i>P. bengalensis</i> are found in scrub, forests and jungles in hilly and mountainous regions between 1,000 – 3,000m.
IUCN – Sanderson et al. (2008).	<p><b>20 major habitat categories listed:</b> boreal forest; subarctic forest; temperate forest; subtropical/tropical dry forest; subtropical/tropical moist lowland forest; subtropical/tropical mangrove vegetation above high tide level; subtropical/tropical swamp; subtropical/tropical moist montane; subantarctic shrubland; boreal shrubland; temperate shrubland; subtropical/tropical dry shrubland; subtropical/tropical dry shrubland; subtropical/tropical moist shrubland; subtropical/tropical high altitude shrubland; tundra grassland; subarctic shrubland; subantarctic shrubland; subtropical/tropical dry grassland; seasonal/intermittent/irregular rivers/streams/ creeks; artificial/terrestrial plantations.</p> <p>The species can range up to 3,000 m in parts of its range, which extends into the Himalayas along river valleys. <i>P. bengalensis</i> is an excellent swimmer, and has successfully colonized offshore islands throughout its range.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>P. bengalensis</i>
IUCN/SSC Cat Specialist Group (2008d).	<p><i>P. bengalensis</i> occurs in a broad spectrum of habitats, from tropical rainforest to temperate broadleaf and, marginally, coniferous forest, as well as shrub forest and successional grasslands. The northern boundaries of its range are limited by snow cover; <i>P. bengalensis</i> avoids areas where snow is more than 10cm deep. It is not found in the cold steppe grasslands, and generally does not occur in arid zones, although there are a few records from relatively dry and treeless areas in Pakistan.</p> <p><i>P. bengalensis</i> usually lives in proximity to a water source and can occupy refuge strips of riverine forest in areas otherwise deforested. They occur commonly in dense secondary growth, including logged</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>P. bengalensis</i>
	<p>areas, and have been found in agricultural and forest (rubber tree, oil palm) plantations, even breeding in hill coffee plantations in southern India. Some have even speculated that secondary forest may be preferred to primary forest.</p> <p><i>P. bengalensis</i> can live close to rural settlements, occasionally raiding poultry, and have recently been reported from the outskirts of Beijing, where they were thought to have disappeared years ago.</p>
<b>Cat Survival Trust (2001).</b>	<i>P. bengalensis</i> are not restricted to primary forests, being found in scrublands, second-growth woodland, semi-deserts, and even agricultural regions, especially near water. They are tolerant of human activity, often being found close to villages
<b>Nowak (1999).</b>	<i>P. bengalensis</i> is found in many kinds of forested habitats at both high and low elevations. It dens in hollow trees or small caves or under overhangs or large roots. It is more adaptable to deforestation and other habitat alteration than most other Asian felids, and is often found near villages.
<b>Rajaratnam et al. (2007).</b>	Scientists noted secondary plantations or plantations could potentially have a higher abundance of rats and mice, the primary prey for <i>P. bengalensis</i> , possibly providing optimal conditions for the species.

**WCS Survey Results:** Interviews conducted by WCS around the Amy Darya alluvial plain during 2007, indicated that the likelihood of *P. bengalensis* occurrence in the Turgai forests of Darqad is medium-low (Ostrowski et al., 2008b). WCS also found solid evidence (camera trap photograph and scat) of this species in Nuristan province. The photograph placed the species at an altitude of 2,511m in evergreen oak forest, whilst the scats were found at 2,060 and 2,650m, also in evergreen oak forest (Karlstetter, 2008).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *P. bengalensis* was present in the following provinces/districts:-

- Khost Province (particularly in Musakhel, Qalandar and Jadran districts)
- Laghman Province (forested areas)
- Jawzjan Province (Darz Ab and Qeshtepa districts)
- Faryab Province
- Nangarhar Province (in Pechgram and Haskamena districts)
- Nuristan Province
- Kunar Province (decreasing in number because of hunting for the fur)

### Information for Leopard cat (*Prionailurus bengalensis*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1307	Degenerate forests/high shrubs	300 – 3,000m	Snow depth - since <i>P. bengalensis</i> avoids areas with deep snow cover, refine by excluding all areas with an average 8-day snow depth of
PA0506	Fruit trees		
PA1005	Irrigated: intensively cultivated (1 crop/year)		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA1012	Irrigated: intensively cultivated (2 crops/year)	<p>more than 50cm during Jan 09.</p> <p>Hydrogeology – <i>P. bengalensis</i> prefers habitat in close proximity to water. Therefore exclude all land that is more than 10km from a water source in any direction.</p> <p>Extend buffer around Habibi's range to the entire country.</p>
PA1018	Irrigated: intermittently cultivated	
	Marshland seasonal	
	Marshland permanently inundated	
	Natural forest (closed cover)	
	Natural forest (open cover)	
	Rainfed crops (flat lying areas)	
	Rainfed crops (sloping areas)	
	Rangeland	
	Rock outcrop/bare soil	
	Settlements	
	Water bodies	

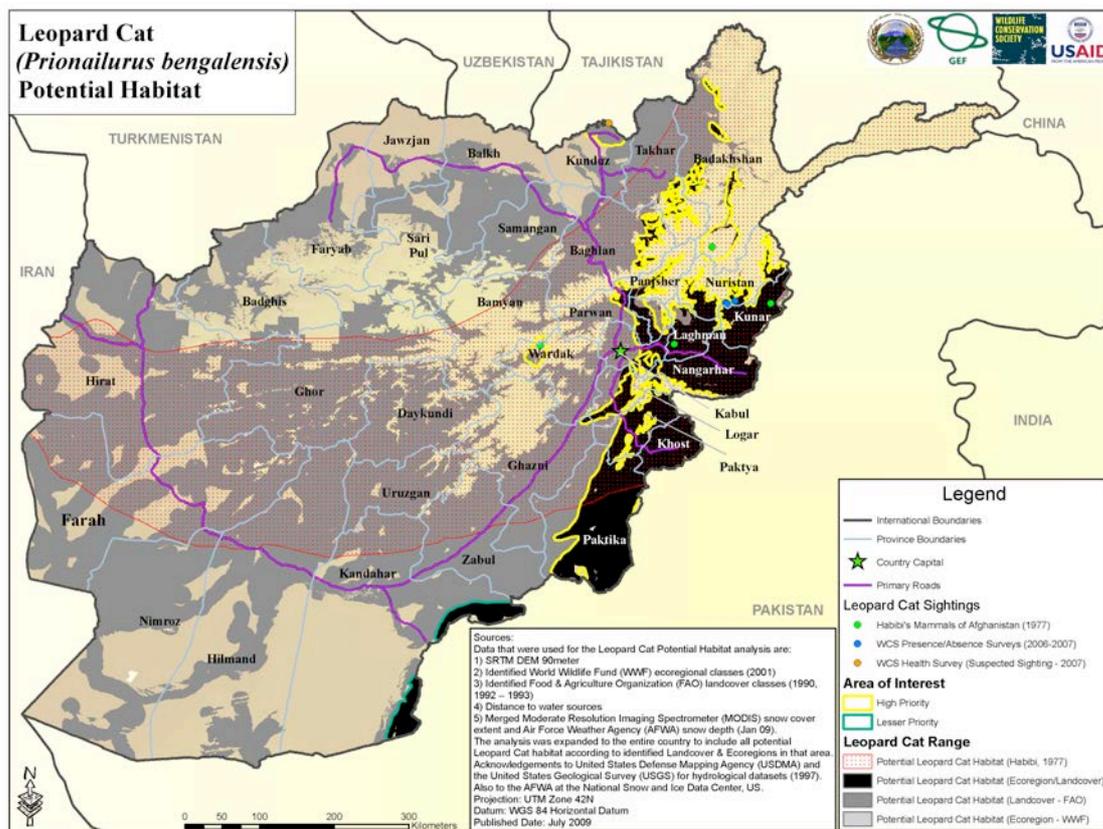
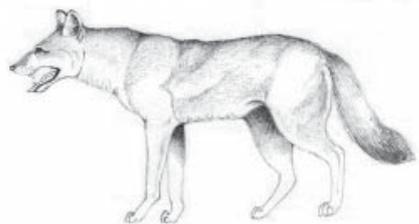


Figure 6: Leopard cat (*Prionailurus bengalensis*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Grey wolf – *Canis lupus*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. lupus</i>
<b>Habibi (2003).</b>	Alpine valleys, forests, steppes, scrub biotypes and settlements form the main habitat for <i>C. lupus</i> in Afghanistan. 1,000 – 4,600m is the preferred elevational range.
<b>IUCN – Mech &amp; Boitani (2008).</b>	<b>16 major habitat categories listed:</b> Boreal forest; subarctic forest; temperate forest; subtropical/tropical dry forest; subarctic shrubland; temperate shrubland; subtropical/tropical dry shrubland; tundra grassland; subarctic grassland; temperate grassland; bogs, marshes, swamps, fens, peatlands; tundra wetlands (including pools and temporary waters from snowmelt); rocky areas; hot desert; temperate desert; artificial/terrestrial pastureland.

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. lupus</i>
<b>Mech &amp; Boitani (2003).</b>	<i>C. lupus</i> lives in all northern habitats where there is suitable food, densities being highest where prey numbers are highest.
<b>Mech (1970).</b>	<i>C. lupus</i> inhabit a wide variety of habitats throughout their range including grasslands, tundra, coniferous and deciduous forests, swamps and deserts.
<b>Nowak (1999).</b>	<i>C. lupus</i> is found in all habitats of the Northern Hemisphere except for tropical forests and arid deserts.
<b>Mech (1974).</b>	<i>C. lupus</i> were formerly distributed throughout Northern Hemisphere in all habitats and topography except deserts and high mountain tops.

**WCS Survey Results:** Evidence of *C. lupus* presence in Afghanistan has been seen many times by WCS research teams, particularly within the Wakhan Corridor (e.g. Waghjir Valley, and the Shirargah, Wuzed, Aba Khan and Ali Su valleys of the proposed Big Pamir Wildlife Reserve) (Schaller, 2004, Habib, 2006, Habib, 2008).

During spring and summer surveys in 2007, WCS teams also found evidence of *C. lupus* close to Dasht-e Nawar. Furthermore, all interviewees that took part in a WCS wildlife presence questionnaire during the same time, believed that *C. lupus* are common in the area of Dasht-e Nawar, particularly in the Safed Koh mountains surrounding the area (Ostrowski et al., 2008a).

Interviews conducted around the Amu Darya alluvial plain in the winter of 2007 suggested that the likelihood of occurrence of *C. lupus* in Imam Sahib is very high, whilst in Aye

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Khanum it is medium-low and, in Darqad, the chances are very low (Ostrowski et al., 2008b).

There are also likely to be healthy populations of *C. lupus* in Nuristan province, with over 25 direct sightings made during the WCS surveys there in 2006 and 2007. These sightings were all between 1,990 and 2,997m, within evergreen oak, coniferous and oak/coniferous mixed forest (Karlstetter, 2008). Furthermore, hunter surveys conducted there during Nuristan revealed that *C. lupus* was the fourth most commonly hunted species within the Eastern forests (Johnson & Wingard, 2008).

**WCS/PoWPA Public Consultations:** In addition, local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *C. lupus* was present in the following provinces/districts:-

- Khost Province
- Laghman Province
- Jawzjan Province
- Samangan Province (noted as causing significant problems there due to its predation on domestic livestock)
- Faryab Province (*C. lupus* is hunted here)
- Sari pul Province
- Balkh Province (in Khulam, Kaldar, Shurtepa, Marmul and Chamtal districts)
- Nangarhar Province
- Nuristan Province
- Paktya Province (*C. lupus* is hunted here because of predation on domestic livestock)
- Kunar Province (in Shegal, Marawar and Chapadara districts)

## Information for Wolf (*Canis lupus*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Degenerate forests/high shrubs	110 – 6,000m	Extend buffer around Habibi's range to the entire country.
PA1306	Fruit trees		
PA1307	Gardens		
PA1309	Irrigated: intensively cultivated (1 crop/year)		
PA1313	Irrigated: intensively cultivated (2 crops/year)		
PA0506	Irrigated: intermittently cultivated		
PA1004	Marshland permanently inundated		
PA0808	Marshland seasonal		
PA1005	Natural forest (closed cover)		
PA1006	Natural forest (open cover)		
PA1012	Permanent snow		

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PA1014	Pistachio forest		
PA1322	Rainfed crops (flat lying areas)		
PA1326	Rainfed crops (sloping areas)		
PA1018	Rangeland		
IM0502	Rock outcrop/bare soil		
	Sand covered areas		
	Settlements		
	Vineyards		
	Water bodies		

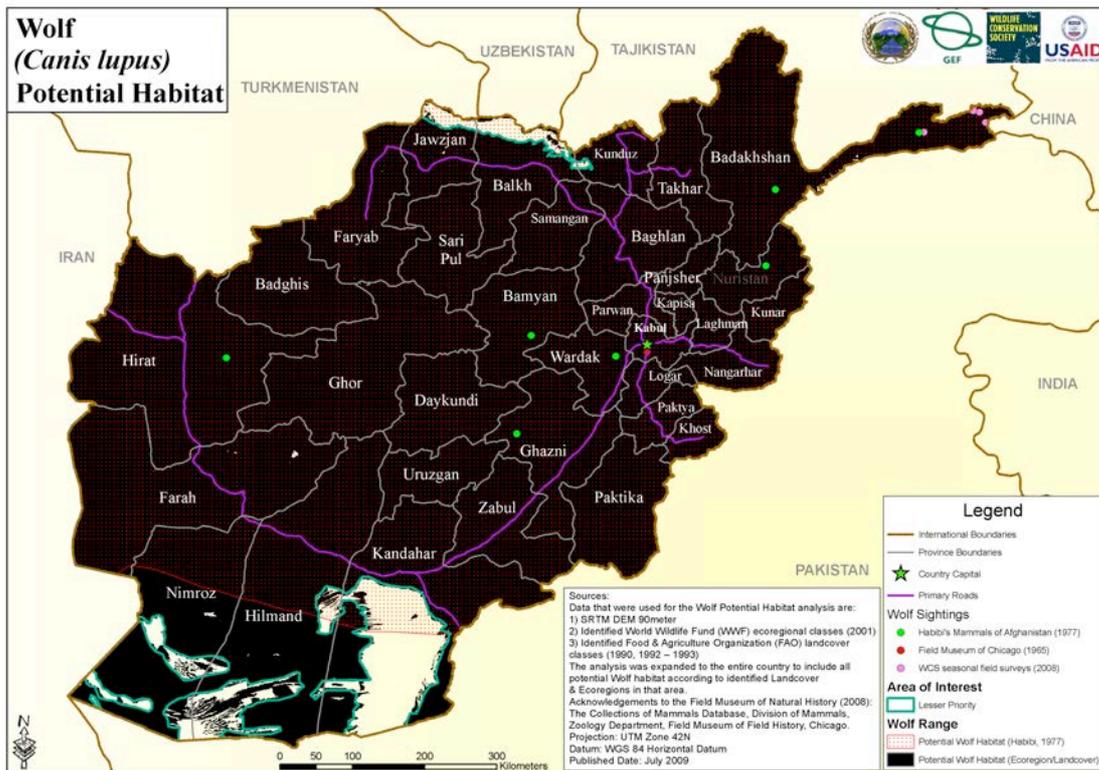


Figure 7: Wolf (*Canis lupus*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Striped hyena – *Hyaena hyaena*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>H. hyaena</i>
Habibi (2003).	Semi-deserts, dry steppes and crags. 500 – 1,500m.
IUCN – Arumugam et al. (2008).	<p><b>9 major habitat categories listed:</b> subarctic forest; subtropical/tropical dry forest; dry savanna; temperate shrubland; mediterranean-type shrubby vegetation shrubland; subarctic grassland; subtropical/tropical dry grassland; subtropical/tropical high altitude grassland; seasonal/intermittent freshwater lakes (over 8 hectares).</p> <p>In most of its range <i>H. hyaena</i> occurs in arid to semi-arid environments. However, it avoids open desert (such as the centre of the Arabian desert), dense thickets and forests, and also avoids high altitudes.</p> <p><i>H. hyaena</i> is sometimes found close to dense human settlements (e.g., Israel and in the suburbs of Algiers). They are unafraid of humans and frequently forage on garbage and carrion.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>H. hyaena</i>
IUCN Hyaena Specialist Group (2008).	<p>In most of its range <i>H. hyaena</i> occurs in open habitat or light thorn bush country. In central Asia it avoids high altitudes and dense thickets and forests. The maximum altitudes recorded are 2,250m in Iran, 2,500m in India and 3,300m in Pakistan.</p> <p>In the Caucasus region, Turkmenistan, Tadjhikistan, and Uzbekistan, prime habitats include savannah and semi-desert regions up to an altitude of 2,100m, mountain areas with a strong relief and valleys and slopes (even with little or no vegetation), with plenty of caves or other resting sites and riverine areas.</p> <p>Other preferred habitats for <i>H. hyaena</i> are thickets of tamarisks, the periphery of sand deserts, and the pistachio (<i>Pistacia vera</i>) savannahs characteristic of the Badhyz area of southeast Turkmenistan.</p> <p>Because of its limited ability to thermoregulate, <i>H. hyaena</i> avoids areas with minimum temperatures of less than -15 to -20°C and more than 80-120 days of frost per year. In Israel it is present even close to dense human settlements.</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>H. hyaena</i>
	In India the species used to be common in open country especially where low hills and ravines were available.
<b>Mills &amp; Hofer (1998).</b>	<i>H. hyaena</i> occurs in grasslands, open woodlands, and bushy regions usually in rugged terrain.
<b>Nowak (1999).</b>	<i>H. hyaena</i> prefers open or rocky country and has an elevational range of up to 3,300m. It avoids true deserts and requires the presence of fresh water within 10km.
<b>Rieger (1981).</b>	Over their entire range, <i>H. hyaena</i> prefers open habitat and sparsely vegetated thorn bush. Desert areas, such as the centers of the Sahara and the Arabian desert are avoided and water must be within 10km.  In many local areas, <i>H. hyaena</i> retreats into rocky ravines and cave labyrinths.
<b>Roberts (1977).</b>	<i>H. hyaena</i> lives in arid, mountainous regions with scrub woodland, denning in rocky hills, ravines, and crevices. In Pakistan it is mainly found in all the major hill ranges of Baluchistan and Sind Kohistan.
<b>Kingdon (1997).</b>	<i>H. hyaena</i> inhabits dry areas, from savanna to true desert, from sea level up to 3,000m.

**WCS Survey Results:** *H. hyaena* seems to be considered common in the mountains of Dasht-e Nawar, with the majority of interviewees during a spring/summer WCS survey claiming the likelihood of *H. hyaena* occurring there as very high (Ostrowksi et al., 2007).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *H. hyaena* was present in the following provinces/districts:-

- Khost Province
- Laghman Province (particularly in the Alingar, Norulam, Qarghae and Dawlatsha areas)
- Nangarhar Province (in Hesarak, Khogyanee and Sherzad districts)
- Nuristan Province
- Kunar Province

### Information for Striped hyena (*Hyaena hyaena*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Degenerate forests/high shrubs	500 – 2,500m	Hydrogeology – <i>H. hyaena</i> is dependent on being close to sources of water. Therefore exclude all land that is more than 10km from a water source in any direction.
PA1306	Pistachio forest		
PA1307	Rainfed crops (flat lying areas)		
PA1309	Rainfed crops (sloping areas)		
PA1313	Rangeland		
PA0506	Rock outcrop/bare soil		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA1004	Sand covered areas		frost or snow cover, refine by excluding all areas with an average 8-day snow depth of more than 80cm during Jan 09.
PA0808	Sand dunes		
PA1005	Settlements		
PA1322	Water bodies		
PA1326			
PA1018			

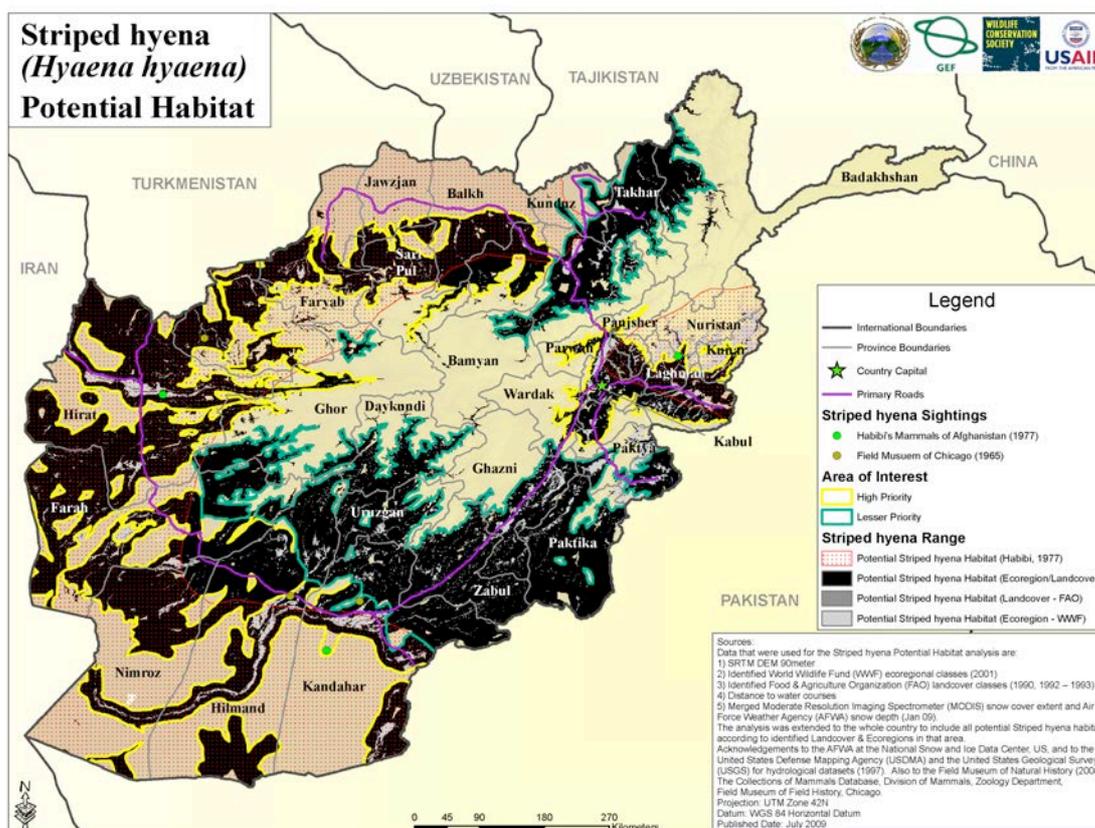


Figure 8: Striped hyena (*Hyaena hyaena*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Common otter – *Lutra lutra*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>L. lutra</i>
<b>Habibi (2003).</b>	Watercourses of the major rivers and streambeds form the basis of <i>L. lutra</i> habitat, at elevations of 500 – 2,000m.
<b>IUCN – Ruiz-Olmo et al. (2008).</b>	<p><b>32 major habitat categories listed:</b> Subtropical/tropical dry forest; subtropical/tropical moist lowland forest; subtropical/tropical mangrove vegetation above high-tide level forests; subtropical/tropical swamp forest; subtropical/tropical moist shrubland; subtropical/tropical seasonally wet/flooded grasslands; wetlands: permanent/seasonal/intermittent/irregular rivers, streams, creeks (includes waterfalls), shrub dominated wetlands, bogs, marshes, swamps, fens, peatlands, permanent/seasonal/intermittent freshwater lakes, permanent/seasonal/intermittent freshwater marshes or pools, freshwater springs and oases, tundra wetlands (including pools and temporary waters from snowmelt), alpine wetlands (including temporary waters from snowmelt), permanent inland deltas, permanent/seasonal/intermittent saline, brackish or alkaline lakes, pools or flats; marine habitats (not relevant to Afghanistan); artificial water storage areas (over 8ha); artificial ponds (below 8ha), irrigated land (includes irrigation channels); seasonally-flooded agricultural land; canals and drainage channels, ditches.</p> <p><i>L. lutra</i> lives in a wide variety of aquatic habitats, including highland and lowland lakes, rivers, streams, marshes, swamp forests and coastal areas. In Europe they are found in the brackish waters from sea level, up to 1,000m in the Alps, and above 3,500m in the Himalayas or 4,120 m in Tibet.</p> <p>In the Indian sub-continent, <i>L. lutra</i> occurs in cold hill and mountain streams. During summer in the Himalayas they may ascend up to 3,660m. These upward movements probably coincide with the upward migration of carp and other fish for spawning. With the advent of winter <i>L. lutra</i> descends to lower altitudes.</p> <p>In most parts of its range, <i>L. lutra</i> occurrence is correlated with bank side vegetation. <i>L. lutra</i> occurrence in different regions may depend upon differing features of the habitat. Most of their activity is concentrated to a narrow strip on either side of the interface between water and land.</p>

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>L. lutra</i>
IUCN Otter Specialist Group (2006).	<i>L. lutra</i> uses a wide variety of aquatic habitats. They are found at sea level and in the Himalayas, and use brackish and salt water as well as fresh water. They will make use of highland and lowland rivers, streams and lakes, swamps, fens, marshes, ricefields, fjords and coastal areas.  In different parts of their range, <i>L. lutra</i> relies on different features of their habitat, but mostly their presence correlates with sufficient food, fresh water and bankside vegetation in which to rest and groom, along with suitable tree roots, earth, rock piles, wood and debris in which to build holts.
The Mammal Society (2006b).	<i>L. lutra</i> is a secretive semi-aquatic species that lives along rivers, lakes and sea coasts and, at times, in marshy areas some distance from open water.
Negi (2002).	<i>L. lutra</i> is found in and around cold hill and mountain lakes, streams and rivers of the western Himalaya. It lives amongst rocks and boulders and in the hollows of trees near water bodies.  They ascend to elevations of over 3,600m along the streams in search of food during the summer.
Kennedy (2003).	<i>L. lutra</i> forages in water and nests on land. They inhabit rivers, lakes, streams, freshwater and peat swamp forests, ricefields, ocean shores, fjords, caves and terrestrial habitats adjacent to waterways.

**WCS Survey Results:** WCS post-winter surveys conducted during 2007 found the first evidence of *L. lutra* in the Wakhan Corridor (Sargez and Goz Kun areas precisely) –the species had not been recorded here previously (Habib, 2008).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *L. lutra* was present in the following provinces/districts:-

- Khost Province
- Laghman Province (in the Alishang and Alingar rivers)
- Jawzjan Province (close to main river)
- Balkh Province (in Amu river, Kaldar and Shurtepa districts)
- Nangarhar Province (in Sorkh-Ab Tangi, Sherzad district)
- Nuristan Province

## Information for Common otter (*Lutra lutra*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Irrigated: intensively cultivated (1 crop/year)	500 – 3,700m	Water sources - Exclude all wetlands that aren't connected to flowing streams or rivers
PA1306	Irrigated: intensively cultivated (2 crops/year)		
PA1309	Irrigated: intermittently		Hydrogeology – <i>L.</i>

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA1313	cultivated		<i>lutra</i> is very dependent on being close to sources of water. Therefore exclude all land that is more than 2km from a river or stream in any direction (not including lakes in this refinement).  Extend buffer around Habibi's range to the entire country.
PA1004	Marshland permanently inundated		
PA0808	Marshland seasonal		
PA1005	Rangeland		
PA1012	Water bodies		
PA1014			
PA1322			
PA1326			
IM0502			

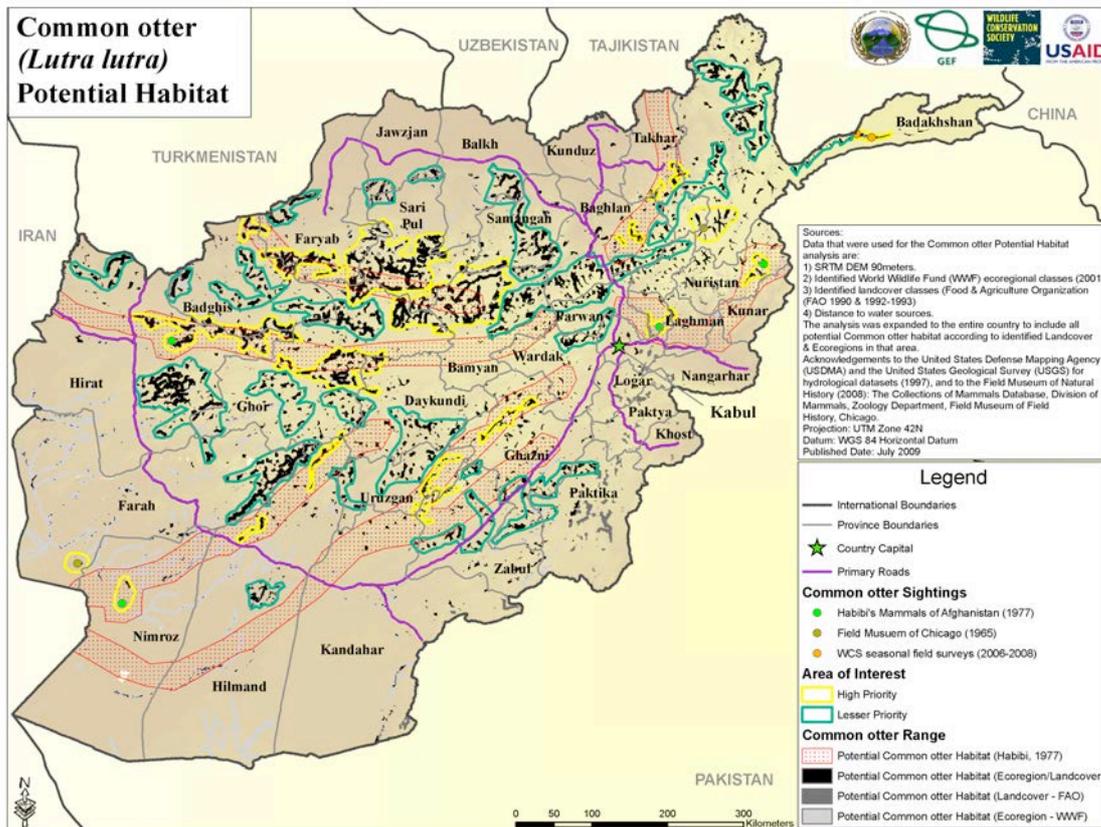


Figure 9: Common otter (*Lutra lutra*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Cape hare – *Lepus capensis*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>L. capensis</i>
Habibi (2003).	Alpine and sub-alpine valleys, semi-deserts, scrub and sandy biotopes. No elevation range is given for this species.
IUCN – Drew et al. (2008).	<p><b>7 major habitat categories listed:</b> subtropical/tropical dry shrubland; Mediterranean-type shrubby vegetation; subtropical/tropical dry grassland; hot desert; temperate desert; arable land; pastureland.</p> <p>The following information applies to <i>L. capensis</i> on the Arabian Peninsula: <i>L. capensis</i> prefers shrubs, rather than grasses, to shelter under in summer. However, whether this is a limiting factor or not is not known. It has been noted that pastureland that has been overgrazed by domestic livestock is favored.</p> <p>In Africa, it is commonly associated with open habitats.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>L. capensis</i>
Kronfeld & Sckolnik. (1996).	<p><i>L. capensis</i> favours open land (meadows, pastures, cultivated fields, sandy moors, marshes), and areas close to hedges, thickets and forests.</p> <p><i>L. capensis</i> occurs in temperate and humid bioclimatic regions, hot and dry, and can be found in barren and extreme arid deserts. Prefers sand dunes, marsh and agricultural land.</p>
World Association of Zoos and Aquariums (WAZA, 2008).	Open habitats like grassland, often around agricultural fields and near woodland and hedgerows are favoured by <i>L. capensis</i> .
Chapman & Flux (1990).	<p><i>L. capensis</i> has been recorded from grasslands, steppe, scrubland, deserts, mountainous terrain and agricultural landscapes from sea level to 3,000m.</p> <p>Practically any open country is suitable habitat for <i>L. capensis</i> from rich savanna grassland on the equator in Africa to cold stony desert in Mongolia's Gobi Desert, where they are most numerous in river valleys but also occur at 2,400m in alpine meadows.</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>L. capensis</i>
	<i>L. capensis</i> also occupies agricultural land and desert in north-central Kazakhstan.
Grzimek et al. (2003).	Being fast-running animals, <i>L. capensis</i> tends to inhabit more open areas, ranging from deserts to grasslands.
Sheikh & Molur (2004).	In Pakistan, <i>L. capensis</i> seems to be more common in arid, semi-arid, gravel/sandy and sandy habitats.

**WCS Survey Results:** The earlier studies of Afghanistan's fauna found *L. capensis* throughout the country, particularly within the alpine Pamir valleys (Habibi, 2003). However, WCS teams had only 5 sightings of this species in total on an intensive survey throughout the proposed Big Pamir Wildlife Reserve during 2006, suggesting population numbers have decreased significantly here (Habib, 2006).

In comparison, all interviewees that took part in a WCS wildlife presence questionnaire during the spring and summer of 2007 believed the likelihood of *L. capensis* occurring in the mountainous areas surrounding Dasht-e Nawar is very high (Ostrowski et al., 2008a). Also interviews conducted around the Amu Darya alluvial plain in the winter of 2007 indicated that the likelihood of occurrence of Cape hare in Imam Sahib and Darqad is 100%, whilst in Aye Khanum it is medium-high. *L. capensis* is believed to occur in the area throughout the year, mostly in the Turgai ecosystem, but also in agricultural lands. For religious reasons, the species is not usually hunted (Ostrowski et al., 2008b).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *L. capensis* was present in the following provinces/districts:-

- Khost Province
- Laghman Province (all desert-type areas)
- Jawzjan Province (along the rivers)
- Samangan Province (in all natural forests)
- Sari Pul Province
- Balkh Province (near to the centre of Balkh where it is apparently hunted)
- Nangarhar Province
- Nuristan Province
- Paktya Province
- Kunar Province

### Information for Cape hare (*Lepus capensis*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1309	Irrigated: intensively cultivated (1 crop/year)	0 – 6,000m	Extend buffer around Habibi's range to the entire country.
PA1313	Irrigated: intensively cultivated (2 crops/year)		
PA1004	Irrigated: intermittently cultivated		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA0808	Marshland permanently inundated		
PA1006	Marshland seasonal		
PA1326	Rainfed crops (flat lying areas)		
	Rainfed crops (sloping areas)		
	Rangeland		
	Sand covered areas		
	Sand dunes		
	Water bodies		

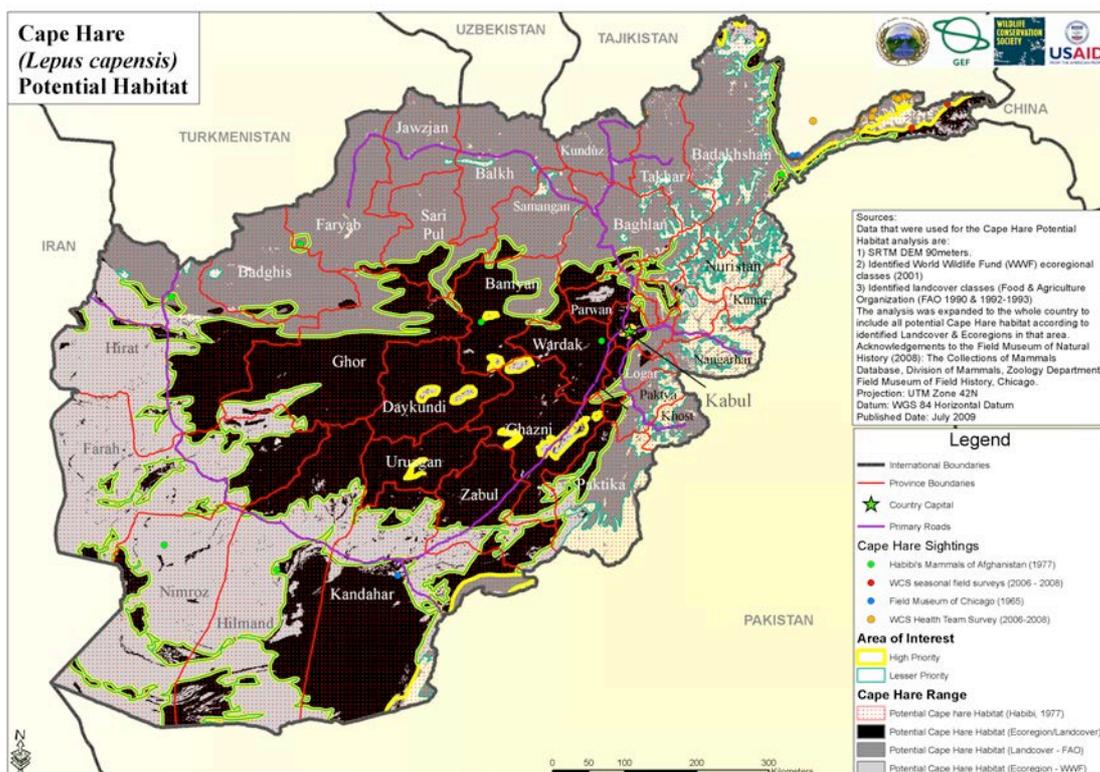


Figure 10: Cape hare *Lepus capensis* potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Asiatic ibex– *Capra sibirica*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. sibirica</i>
Habibi (2003).	Alpine valleys, permafrost zones, cliffs and rocky crags, at elevations of 2,000 – 5,000m.
IUCN – Reading & Shank (2008).	<p><b>4 major habitat categories listed:</b> temperate shrubland; temperate grassland; rocky areas (inland cliffs, mountain peaks); cold desert.</p> <p><i>C. sibirica</i> primarily occupies mountainous regions from 500-6,700m in rocky terrain and open alpine meadows and crags, seeking out lower elevations during the winter. It occupies precipitous habitats in a range of environments from deserts, low mountains and foothills, to high mountain ridges (it tends to remain near steep, escape terrain).</p> <p><i>C. sibirica</i> can also be found in areas with canyons, rocky outcrops, and steep ‘escape’ terrain far from high mountains. The species does not enter forest zones, but on a hot day does prefer shaded areas. The diet consists of alpine grasses and herbs.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. sibirica</i>
Heptner et al. (1988).	Throughout its range. <i>C. sibirica</i> inhabits rocky mountain zones, especially those containing steep slopes. They inhabit mountain ranges from 500m to over 5,000m.
Roberts (1977).	<p><i>C. sibirica</i> feeds on grasses, bushes and mosses in fairly remote regions. It is confined to the relatively arid mountain regions of the inner-Himalayas, living well above the tree line only in the higher more precipitous regions.</p> <p>The species occurs from about 3,600m to over 5,000 in Pakistan.</p>
Fedosenko & Blank (2001).	<p><i>C. sibirica</i> prefers rocky habitats from the lowest mountain zones (semidesert) to the highest areas (alpine zone and rocky tundra covered with lichen). They are attracted to steep slopes of rocks and scree.</p> <p>Although <i>C. sibirica</i> cannot run quickly on plains, they can climb to sharp rocky slopes and cliffs more quickly than their predators. Therefore, they do not stray too far away from crags.</p> <p><i>C. sibirica</i> lives in a complex landscape, which apart from craggy</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>C. sibirica</i>
	<p>mountains, consists of alpine meadows for grazing, streams for watering, and level areas with scree between rocks for resting.</p> <p>In areas with little human disturbance, <i>C. sibirica</i> move a considerable distance away from rocks. They may stay on gently sloping grassy areas for long periods of time or even to descend to wet meadows of mountain rivers for grazing.</p> <p><i>C. sibirica</i> generally prefers firm soil, steppe vegetation, and regions with less snow cover during winter. They generally avoid gentle slopes far from rocks, thick coniferous taiga, tall grass, and damp marshy areas.</p> <p>The species is sympatric with Argali (<i>Ovis ammon</i>) in many places, but the latter avoids rockier habitats, so the 2 species usually do not graze or rest together. <i>C. sibirica</i> may share habitat with Markhor (<i>C. falconeri</i>) in the Hindu Kush of Afghanistan, but where the 2 species coexist only <i>C. sibirica</i> lives in the highest areas; <i>C. falconeri</i> prefers lower ridges.</p>
<b>Nowak (1999).</b>	<p><i>C. sibirica</i> lives at elevations of up to 6,700m, generally at or above the tree line. It almost never enters dense forest.</p> <p>There tends to be a daily descent to feed and a return to the highest, most precipitous crags in the evening.</p>
<b>Shackleton (1997).</b>	<p><i>C. sibirica</i> are probably the most widespread wild ungulate in Afghanistan. They are found throughout the Hindu Kush range, northwest as far as southern Badakhshan, and southwards into the Hazarajat mountains. It is also located in pockets in the Spinghar range and some remnant populations in the Kohe Baba range near Kabul. The species also occurs in the Feroz Koh mountains in the northeast, in the mountains of Badakhshan Province and northern Nuristan, throughout the Pamir mountains, in the glaciated mountains south of the Wakhan River, in the Darwaz section of northern Badakhshan and in the high mountains of Nuristan bordering Badakhshan.</p>
<b>Fox et al. (1992).</b>	<p><i>C. sibirica</i> never roams beyond 350m of escape terrain.</p>

**WCS Survey Results:** According to local informants during a WCS survey in the Pamir mountains during 2004, *C. sibirica* occurs in the precipitous upper slopes of all Pamir mountains, often in the areas that the Marco Polo sheep (*O. a. polii*) do not inhabit. During this same survey, approximately 40 *C. sibirica* individuals were seen by the WCS research team far across the Wakhan River in an alpine meadow, 6 were counted at the head of a small valley in the eastern Little Pamir; and 35 were seen in the Shikargah Valley of the Big Pamir. These sparse observations, together with glimpses of fleeing animals and tracks in a few locations, suggest only modest *C. sibirica* populations in the areas of the Pamirs that were surveyed (Schaller, 2004).

During WCS surveys during 2006, teams noted that the steeper *C. sibirica* habitat did not seem to be much affected by livestock grazing in the Big Pamir. WCS teams counted 162 individuals where they occurred on very steep rocky slopes and cliffs interspersed with more rolling steep habitat (Habib, 2006).

Interviews conducted as part of a WCS wildlife presence study during spring/summer 2007 believed that the likelihood of *C. sibirica* occurring in the area of Dasht-e Nawar is

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

very high, although numbers are known to be decreasing. Interviewees mentioned that *C. sibirica* are still present in Safed Koh, Shar Kalan, Wula, Kuba, Gul Koh and Koh-e Wagh mountains surrounding Dasht-e Nawar (Ostrowski et al., 2008a).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *C. sibirica* was present in the following provinces/districts:-

- Laghman Province (particularly in Dawlatsha district)
- Faryab Province (Pajab district)
- Sari Pul Province
- Nuristan Province
- Paktya Province (in Syed Karam district and Pashtaky Mountain)
- Kunar Province (in Watapora, Ghazi Abad and Shegal districts)

## Information for Asiatic ibex (*Capra sibirica*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Permanent snow	2,000 – 6,000m	Slope – <i>C. sibirica</i> prefers steep terrain so exclude all land under 15 degrees in slope.
PA1306	Rangeland		
PA1307	Rocky outcrop/bare soil		
PA1309			Summer precipitation - since <i>C. sibirica</i> is known to exist in relatively arid regions, refine by excluding all areas that received more than 35mm of average monthly rainfall during Jun – Aug 2007.
PA0506			
PA1004			
PA0808			
PA1005			
PA1006			
PA1012			Extend buffer around Habibi's range to 400km.
PA1014			
PA1322			

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

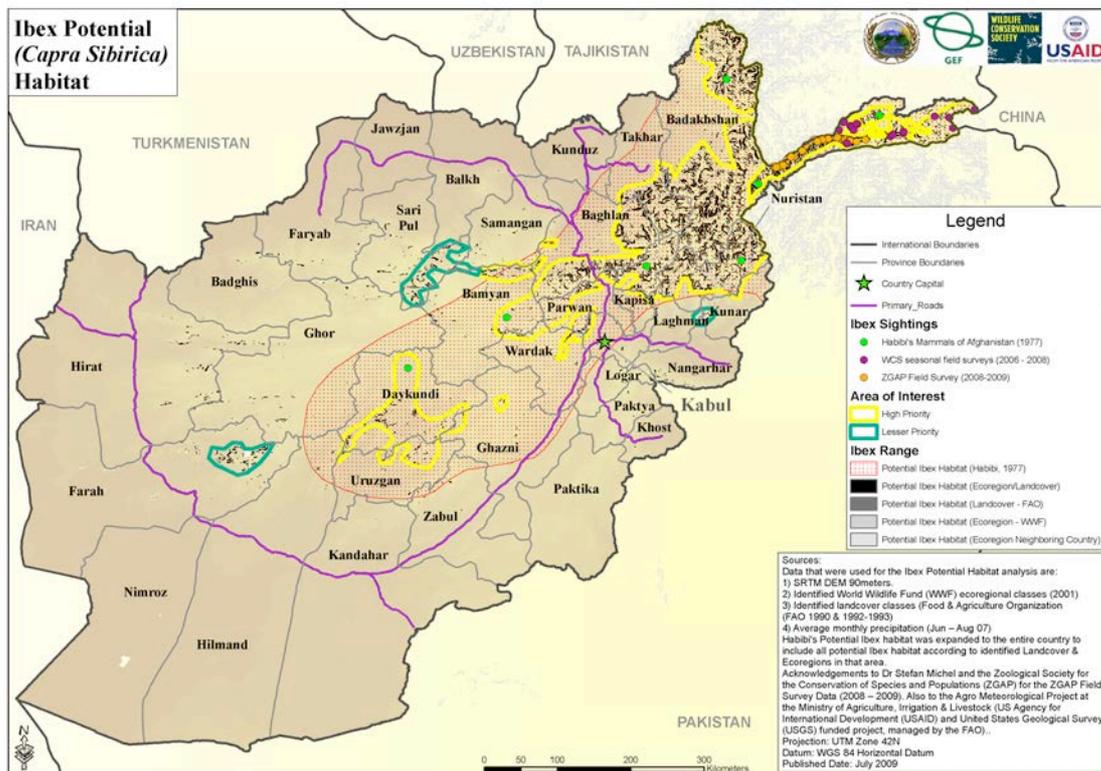


Figure 11: Asiatic ibex (*Capra sibirica*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Wild cat – *Felis silvestris*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>F. silvestris</i>
Habibi (2003).	Steppes, hills, clay valleys and sandy plains, at elevations of 500 – 2,000m.
IUCN - Nowell (2008).	<b>13 major habitat categories listed:</b> temperate forest; subtropical/tropical dry forest; dry savanna; moist savanna; boreal shrubland; temperate shrubland; subtropical/tropical dry shrubland; Mediterranean-type shrubby vegetation; temperate grassland; subtropical/tropical dry grassland; hot desert; temperate desert; cold desert.

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>F. silvestris</i>
	<p><i>F. silvestris</i> is found in a wide variety of habitats, from deserts and scrub grassland to dry and mixed forest. It is absent only from rainforest and coniferous forest. European wildcats are primarily associated with forest and are found in highest numbers in broad-leaved or mixed forests with low densities of humans. They are also found in Mediterranean scrubland, riparian forest, marsh boundaries and along sea coasts. Areas of intensive cultivation are avoided.</p> <p><i>F. silvestris</i> has an elevational range up to 2,000-3,000 m.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>F. silvestris</i>
<b>IUCN/SSC Cat Specialist Group (1996a).</b>	<p><i>F. silvestris</i> are most typically associated with scrub desert. They do not occur in the steppe grasslands of Mongolia and Inner Mongolia, nor in alpine steppe.</p> <p>They range up to 2,000-3,000 m in mountain areas with sufficient dense vegetation. <i>F. silvestris</i> can be found near cultivated areas and human settlement. They usually occur in close proximity to water sources, but are also able to live year-round in waterless desert.</p> <p>Snow depth limits the northern boundaries of their range in winter. In the Caucasus Zone, <i>F. silvestris</i> are found in montane forest, whilst those populations in Asia are found in the low-lying desert and semi-desert areas adjoining the Caspian sea.</p>
<b>International Society for Endangered Cats (2008c).</b>	<p><i>F. silvestris</i> is mainly nocturnal and terrestrial, although they are also accomplished climbers. In Europe, they are predominantly forest cats, although in Scotland they can be found in more open habitats such as rocky outcrops and heathlands.</p> <p><i>F. silvestris</i> in Germany prefer coniferous forests, whereas those of the Caucasus prefer deciduous woodlands. African wildcats can be found in woodlands, wooded grasslands and savannah, while Indian wildcats are adapted to the semi deserts and steppes of the Middle East as far east as northern India.</p>
<b>Nowak (1999).</b>	<i>F. silvestris</i> occupies a variety of forested, open and rocky country.
<b>Nowell &amp; Jackson (1996).</b>	<i>F. silvestris</i> can be found in cultivated areas and, although the species prefers to live near a water source, it can occupy desert ecosystems that contain little water.

**WCS Survey Results:** WCS conducted a wildlife questionnaire in the Dasht-e Nawar region during spring/summer 2007 and found that local residents believe there to be a medium-high likelihood of *F. silvestris* occurring in that area (Ostrowski, et al., 2008a). Similarly, interviews conducted around the Amu Darya alluvial plain in the winter of 2007 indicated the likelihood of occurrence of *F. silvestris* in Imam Sahib is medium-low, in Aye Khanum it is medium-low, and in the Turgai Forest of Darqad it is medium-high (Ostrowski et al., 2008b).

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Wildlife studies conducted in Nuristan during 2007, found solid evidence of *F. silvestris* at 1,204m in evergreen oak forest there, suggesting the species' range extends far east (Karlstetter, 2008).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *F. silvestris* was present in the following provinces/districts:-

- Khost Province
- Laghman Province (particularly Alingar and Qarghae districts)
- Jawzjan Province (Darz Ab district particularly)
- Faryab Province (*F. silvestris* is hunted here)
- Sari pul Province (in Panjab, Kuhistan and Sanmarak areas)
- Nangarhar Province (in Rodat and Koot districts)
- Paktya Province (in Syed Karam and Lamanja)
- Kunar Province

## Information for Wild cat (*Felis silvestris*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Degenerate forest / high shrubs	500 – 3,000m	Snow depth - since <i>F. silvestris</i> avoids areas with deep snow cover, refine by excluding all areas with an average 8-day snow depth of more than 50cm during Jan 09.  Extend buffer around Habibi's range to the entire country.
PA1306	Irrigated: intensively cultivated (1 crop/year)		
PA1307	Irrigated: intensively cultivated (2 crops/year)		
PA1309	Irrigated: intensively cultivated (2 crops/year)		
PA1313	Irrigated: intermittently cultivated		
PA0506	Marshland permanently inundated		
PA1004	Marshland seasonal		
PA0808	Natural forest (closed cover)		
PA1014	Natural forest (open cover)		
PA1322	Rainfed crops (flat lying areas)		
PA1326?	Rainfed crops (sloping areas)		
PA1018	Rangeland		
	Sand-covered areas		
	Settlements		
	Water bodies		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

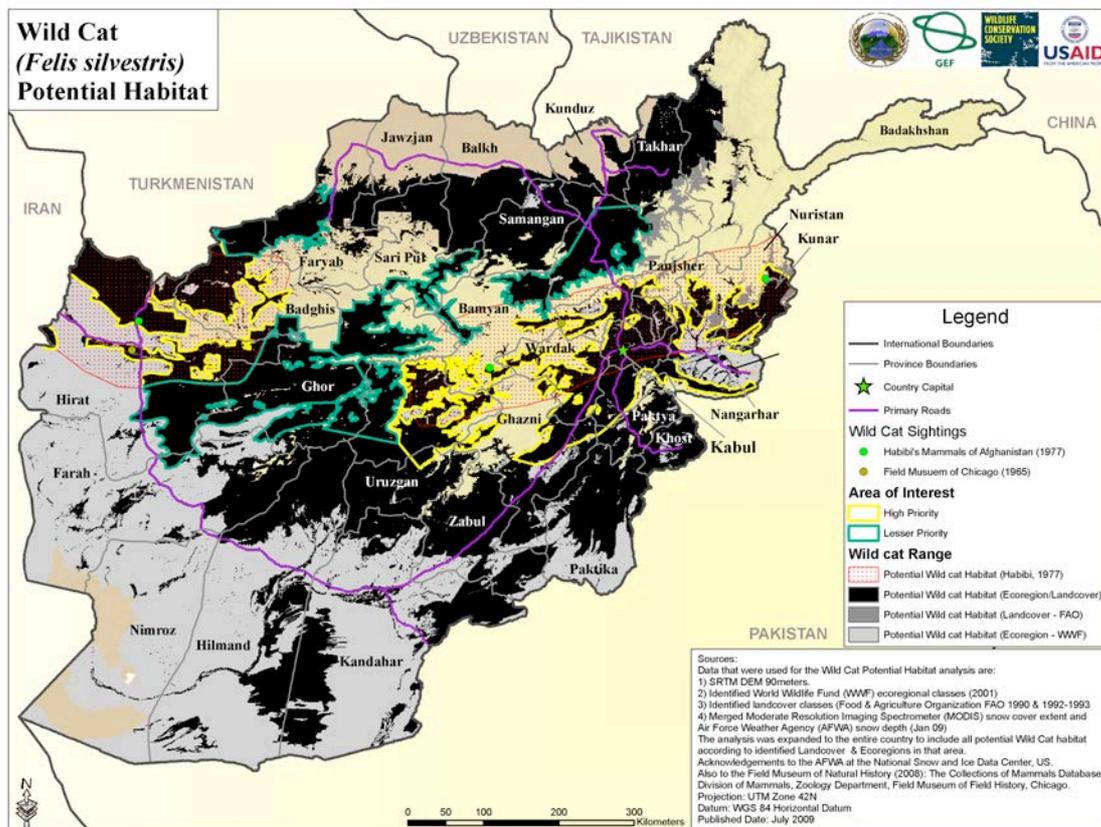
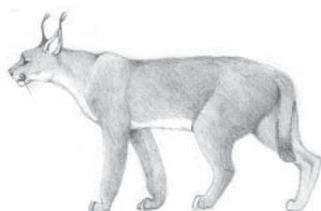


Figure 12: Wild cat (*Felis silvestris*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Caracal – *Caracal caracal*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. caracal</i>
Habibi (2003).	Lives essentially in semi-deserts, hilly steppes and dry mountainous terrain at elevations of 500 – 1,000m.
IUCN – Breitenmoser et al. (2008).	<p><b>7 major habitat categories listed:</b> subtropical/tropical dry forest; dry savanna; subtropical/tropical dry shrubland; temperate grassland; subtropical/tropical dry grassland; hot desert; temperate desert.</p> <p><i>C. caracal</i> occupies a wide variety of habitats from semi-desert to relatively open savanna and scrubland, to moist woodland and thicket or evergreen/montane forest. However it tends to favor drier woodland and</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>C. caracal</i>
	<p>savanna regions with lower rainfall and some vegetative cover. While drier open country is preferred, they are absent from true desert.</p> <p>The species ranges up to 2,500m and 3,300m (exceptionally) in the Ethiopian Highlands.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. caracal</i>
<b>IUCN/SSC Cat Specialist Group (1996b).</b>	In micro-habitat, <i>C. caracal</i> is typically associated with either well-vegetated or rocky areas which provide cover for hunting as well as shelter. It is often found near water points, but is apparently capable of satisfying its moisture requirements from its prey.
<b>Nowell &amp; Jackson (1996).</b>	<i>C. caracal</i> is typically found near water sources between 500 – 1,000m.
<b>International Society for Endangered Cats (2001a).</b>	Essentially an animal of dry regions, <i>C. caracal</i> has a wide habitat tolerance. They are found in woodlands, savannahs and acacia scrub throughout Africa; jungle scrub and deserts in India; and arid, sandy regions and steppes in Asia. During the hot hours of the day, they rest in crevices or abandoned porcupine burrows.
<b>The Wildlife of Pakistan (1999b).</b>	<i>C. caracal</i> is found in dry savanna and woodland areas, scrubland and rugged terrain in mountainous regions, where it is known to live up to 3,000m.
<b>Nowak (1999).</b>	<i>C. caracal</i> is found mainly in dry country – woodland, savannah and scrub – but avoids sandy deserts.
<b>Farhadinia et al. (2007).</b>	<p>During a camera trap survey of <i>C. caracal</i> in Iran, most observations were made among desert mountains and hilly terrains which are considered suitable habitats for rodents and hares. <i>C. caracal</i> has never been seen in flat plains of the area, just a few times along the roads which seems to be transitional individuals switching between hilly habitats.</p> <p>Other research stated that regarding microhabitat preference, <i>C. caracal</i> is typically associated with either well-vegetated or rocky areas which provide cover for hunting as well as shelter. It seems that, based on a limited number of scats and direct observations, rodents play a main role in caracal's diet.</p>
<b>Weishein &amp; Mendelsohn (1990).</b>	Radio-tagged caracals in Israel's Arava Valley showed a preference for savanna habitats near human settlements and farming areas, especially where these areas were associated with streams, fishponds or other water sources.
<b>Sunquist &amp; Sunquist (2002).</b>	<p>Unlike many other cats, <i>C. caracal</i> favors open country, and they can tolerate much drier conditions than other cat species. In Israel, they seem to prefer hilly terrain with acacia and grasses; in Pakistan they inhabit arid subtropical scrub forest and tropical thorn forest. In Turkmenistan, <i>C. caracal</i> lives in black saxul forests (bushy trees that grow in desert conditions), desert foothills and reed thickets associated with large rivers.</p> <p>While <i>C. caracal</i> has been seen in open grasslands at night, they seem to</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>C. caracal</i>
	require some form of cover such as trees, bushes or rocks, and they do not live in true desert. The species often seems to be associated with edge habitats, where forest and grassland meet.

**WCS Survey Results:** Interviewees that took part in a WCS wildlife questionnaire during spring/summer 2007 believed that there is a medium-low chance to *C. caracal* occurring in the area of Dasht-e Nawar. If they are seen, it is most often in the mountains but also on rare occasions in tall grasses of the wetlands hunting water birds (particularly during spring and summer) (Ostrowski, et al., 2008a).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *C. caracal* was present in the following provinces/districts:-

- Nuristan Province

### Information for *C. caracal* Distributional Model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1306	Degenerate forest / high shrubs	500 – 2,000m	Summer precipitation - since <i>C. caracal</i> is known to exist in relatively arid regions, refine by excluding all areas that received more than 5mm of average monthly rainfall during Jun – Aug 2007.  Extend buffer around Habibi's range to the entire country.
PA1307	Natural forest (closed cover)		
PA1309	Natural forest (open cover)		
PA1313	Pistachio forest		
PA1322	Rainfed crops (flat lying areas)		
PA1326	Rainfed crops (sloping areas)		
	Rangeland		
	Rock outcrop / bare soil		
	Sand-covered areas		
	Sand dunes		
	Water bodies		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

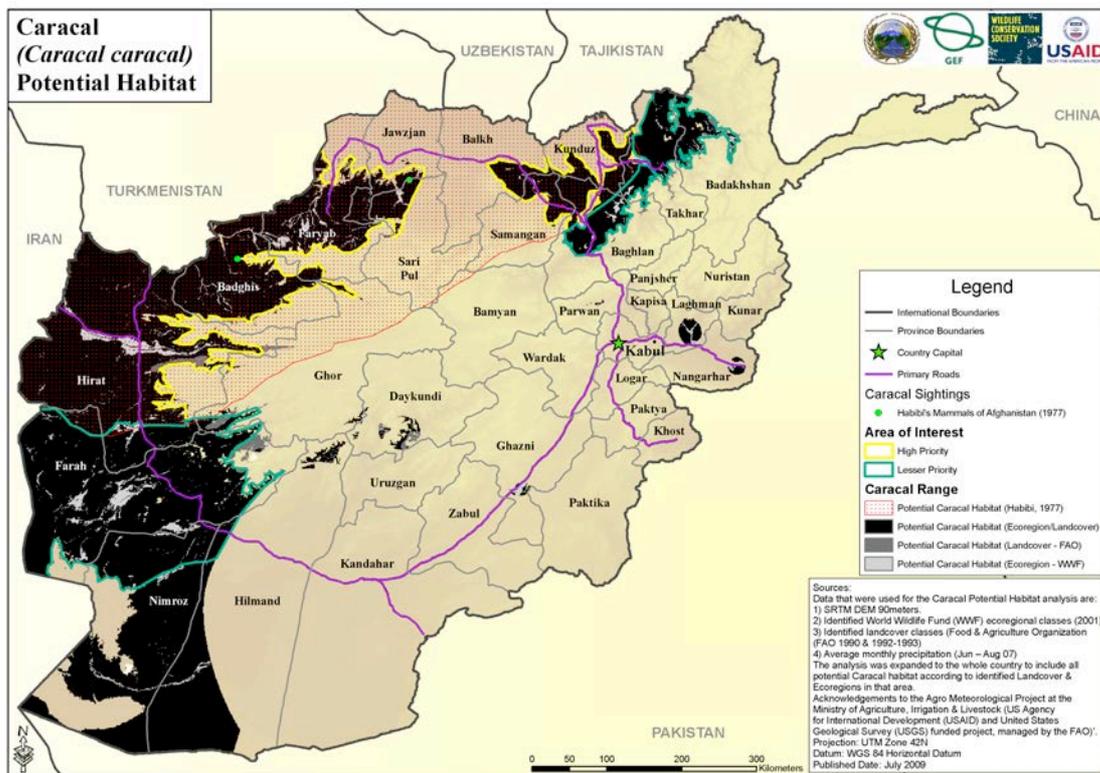
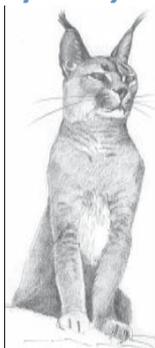


Figure 13: Caracal (*Caracal caracal*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Lynx– *Lynx lynx*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>L. lynx</i>
Habibi (2003).	Adapted to a wide range of habitats such as rugged mountains, alpine meadows and forests, at elevations of 1,500 – 4,500m.
IUCN – Breitenmoser et al. (2008).	<b>11 major habitat categories listed:</b> boreal forest; temperate forest; subtropical/tropical dry forest; boreal shrubland; temperate shrubland; subtropical/tropical dry shrubland; temperate grassland; subtropical/tropical high altitude grassland; rocky areas (inland cliffs, mountain peaks); temperate desert; cold desert.

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>L. lynx</i>
<b>IUCN/SSC Cat Specialist Group (1996c).</b>	<p>Throughout Europe and Siberia, <i>L. lynx</i> are associated primarily with forested areas which have good ungulate populations.</p> <p>In Central Asia <i>L. lynx</i> occurs in more open, thinly wooded areas. The species probably occurs throughout the northern slopes of the Himalayas, and has been reported both from thick scrub woodland and barren, rocky areas above the treeline. On the better-forested southern Himalayan slopes, the only record is a sighting in alpine tundra (4,500m) from the Dhaulagiri region of Nepal.</p> <p><i>L. lynx</i> are found throughout the rocky hills and mountains of the Central Asian desert regions.</p>
<b>International Society for Endangered Cats (2001b).</b>	<p>With one of the widest ranges of all wild cat species, <i>L. lynx</i> prefers deciduous forest or old growth taiga and mixed woodlands, with plenty of undergrowth for cover.</p> <p>They are found throughout the northern steppes of the Himalayas to an elevation of 2,500m in alpine tundra, rocky areas above the tree line, the mountains of the central Asian desert region, and the entire Tibetan plateau.</p>
<b>Roberts (1977).</b>	<p><i>L. lynx</i> is probably found throughout the northern slopes of the Himalayas and has been reported both from thick scrub woodland and barren, rocky areas above the treeline.</p>
<b>World Wildlife Fund (2008).</b>	<p>Temperate broadleaf and mixed forests, boreal forest form the basis of <i>L. lynx</i> habitat.</p>
<b>Nowak (1999).</b>	<p><i>L. lynx</i> is typically associated with forests; it is most common where there is a mixture of spruce and deciduous trees but may sometimes penetrate the forest steppe and steppe zones. In the winter, it follows its prey down to lower elevations.</p>
<b>Sunquist &amp; Sunquist (2002).</b>	<p><i>L. lynx</i> is a forest-dwelling species, and its habitat-use patterns are defined largely by the abundance and distribution of prey, principally several species of small ungulates and arctic hares. Across the northern and central regions of Russia, these cats use a variety of habitats, including taiga, mixed or deciduous boreal forest, and woodlands, but at the southern limits of their range, <i>L. lynx</i> are found in forest-steppe, reaching far into the steppe along large forested streams. Where mountainous terrain occurs within these regions, <i>L. lynx</i> also uses montane and sub-alpine forests up to an elevation of 2,500m.</p> <p>In the Himalaya, <i>L. lynx</i> ascends to the highest alpine slopes, up to 4,500m in summer, preferring areas with reed beds, willow thickets and tamarisk in remote valleys.</p> <p><i>L. lynx</i> are clearly capable of adjusting to a variety of landscapes, even cultivated ones, if they are not persecuted, and adequate food and cover is available. <i>L. lynx</i> can live close to humans or their activities. They spend the daytime hidden in dense cover, sleeping in a tangle of fallen</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>L. lynx</i>
	trees or within a rocky cavern.
<b>Heptner &amp; Sludskii (1992).</b>	<i>L. lynx</i> habitat in the former Soviet Union is characterized by an abundance of prey, especially arctic hares and small ungulates, inaccessible rocks, and snow cover not deeper than 40 to 50cm. Snow greatly influences their habitat use. Despite their adaptations for moving in snow, <i>L. lynx</i> finds loose, deep snow difficult to deal with and cannot survive in areas with snow depths exceeding 100cm.

**WCS Survey Results:** *L. lynx* has very rarely been reported from the Pamirs, however WCS teams in 2007 received confirmed reports of the species from the Hindu Kush Mountains, particularly around the villages of Kret, Sargez and Qila-e Wust (Habib, 2008).

Furthermore, interviews with local communities have revealed some important information about the range of this species. The majority of interviewees that took part in a WCS wildlife presence questionnaire during spring and summer 2007, believed the likelihood of *L. lynx* occurring in the area of Dasht-e Nawar is medium-low (Ostrowski et al., 2008a). Similarly, interviews with local residents in Nuristan Province suggested that *L. lynx* may well still occupy certain areas within the province (Karlstetter, 2008).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *L. lynx* was present in the following provinces/districts:-

- Khost Province
- Laghman Province (within the mountainous areas)
- Nuristan Province
- Kunar Province

### Information for *L. lynx* distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Degenerate forest / high shrubs	1,500 – 4,500m	Snow depth - since <i>L. lynx</i> avoids areas with deep snow cover, refine by excluding all areas with an average 8-day snow depth of more than 60cm during Jan 09.  Extend buffer around Habibi's range to the entire country.
PA1306	Natural forest (closed cover)		
PA1307	Natural forest (open cover)		
PA1309	Permanent snow		
PA1313	Rainfed crops (flat lying areas)		
PA0506	Rainfed crops (sloping areas)		
PA1004	Rangeland		
PA0808	Rocky outcrop / bare soil		
PA1005	Sand-covered areas		
PA1006			

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA1014			
PA1322			
PA1018			
IM0502			

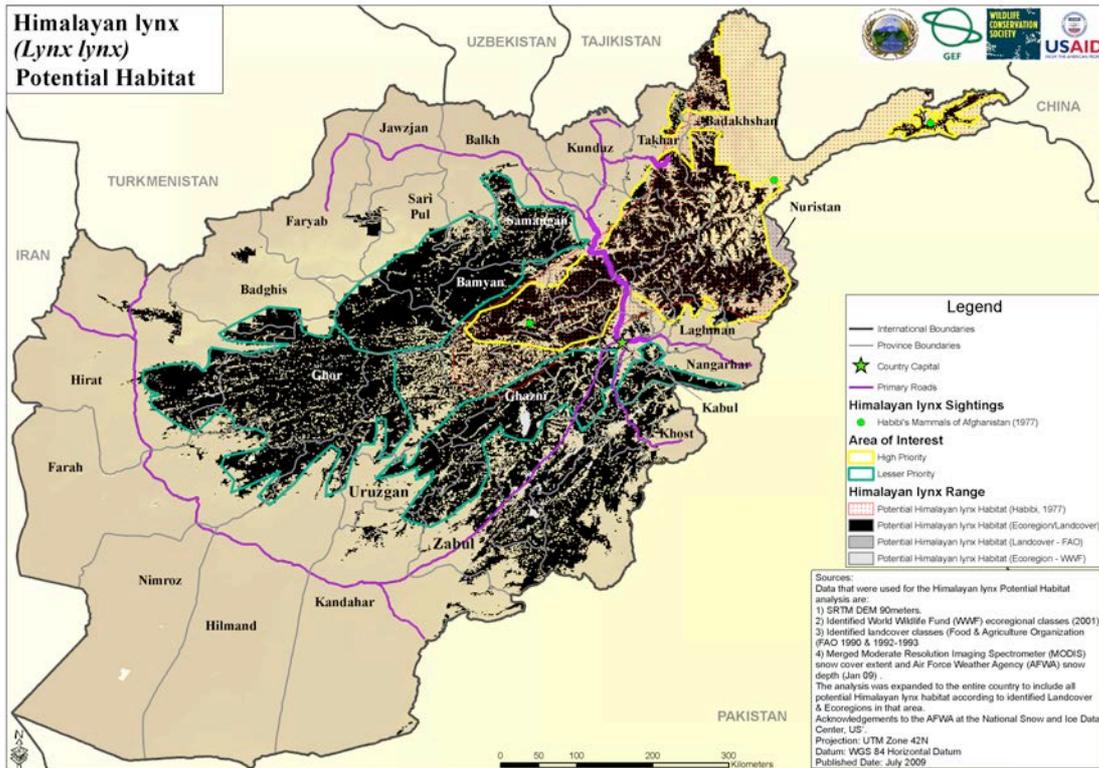
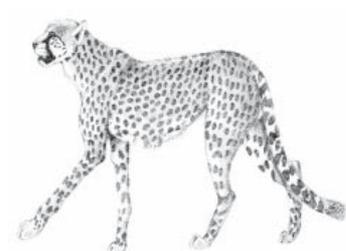


Figure 14: Lynx (*Lynx lynx*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Asiatic cheetah – *Acinonyx jubatus*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>A. jubatus</i>
Habibi (2003).	Inhabits deserts, semi-deserts and open dry areas at altitudes of 500 – 1,000m
IUCN – Jowkar et al. (2008).	<p><b>6 major habitat categories listed:</b> dry savanna; subtropical/tropical dry shrubland; temperate grassland; subtropical/tropical dry grassland; hot desert; temperate desert.</p> <p><i>A. jubatus</i> is primarily found in open grassy habitats, but also make use of dry forest, savanna woodland, semi-desert and scrub, being absent from tropical rainforest. In the central Sahara, <i>A. jubatus</i> occurs in high mountain habitat.</p> <p><i>A. jubatus</i> habitat in Iran consists of desert, much of it with precipitation of fewer than 100 mm per year. The terrain ranges from plains and salt pans to eroded foothills, and rugged desert ranges that rise to an elevation of up to 2,000-3,000 m. The vegetation, if any, consists of a sparse cover of shrubs, most less than one meter tall, of the genera <i>Salsola</i>, <i>Artemisia</i>, <i>Zygophyllum</i>, <i>Astragalus</i>, <i>Aphaxis</i>, and others. Gazelles (<i>Gazella subgutturosa</i> and <i>G. bennetti</i>) are preferred prey, but they have recently become scarce through over-hunting and replacement by livestock. Opportunistic recovery of <i>A. jubatus</i> kills suggests that Urial (<i>Ovis orientalis</i>), Wild goat (<i>Capra aegagrus</i>) and Cape hare (<i>Lepus capensis</i>) are the key prey species today though none are considered optimal.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>A. jubatus</i>
Mallon (2007).	In central and southern Asia, <i>A. jubatus</i> occupies semi-desert, desert plains and foothills from 500-1,000m.
Farhadinia (2007).	The remaining population of <i>A. jubatus</i> in Iran is most likely to be found in desert plain habitat with hilly terrain (suitable for gazelle) and watercourses.
Nowak (1999).	The habitat of <i>A. jubatus</i> varies greatly, from semi-desert through open grassland to thick bush. Activity is mostly diurnal and shelter is sought

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>A. jubatus</i>
	<p>in dense vegetation.</p> <p><i>A. jubatus</i> is much less adaptable than the Leopard (<i>Panthera pardus</i>) to the presence of people. Evidently, the species has disappeared in Asia except in Iran and possibly adjacent parts of Pakistan, Afghanistan and Turkmenistan.</p>
<b>Krausman &amp; Morales (2005).</b>	<p>In India, <i>A. jubatus</i> occurs in dense, forest regions, and in South Africa in open or lightly forested, grassy country.</p> <p>In southwest Africa, <i>A. jubatus</i> occurs on stony ridges in the sandy areas and less frequently in dense bush country or thick, dry forest, montane moorlands, or swamps.</p>
<b>Conservation of Asiatic Cheetah Project (2008).</b>	The primary habitat of <i>A. jubatus</i> in Iran is the desert of Dasht-e Kavir. Currently, this vast arid and dry desert area has become the last refuge for <i>A. jubatus</i> .
<b>Federico &amp; Bracchi (2001).</b>	<i>A. jubatus</i> are not generally associated with forest habitats. Open, grassy savannah plains are preferred (although a mosaic of wood and grassland is also favoured, with the species making extensive use of bush, scrub and open woodlands). The species is well-adapted to living in arid environments.

### Information for Asiatic cheetah (*Acinonyx jubatus*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1313	Natural forest (open cover)	500 – 2,000m	Extend buffer around Habibi's range to 200km.
PA1326	Rangeland		
	Rock outcrop / bare soil		
	Sand-covered areas		
	Sand dunes		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

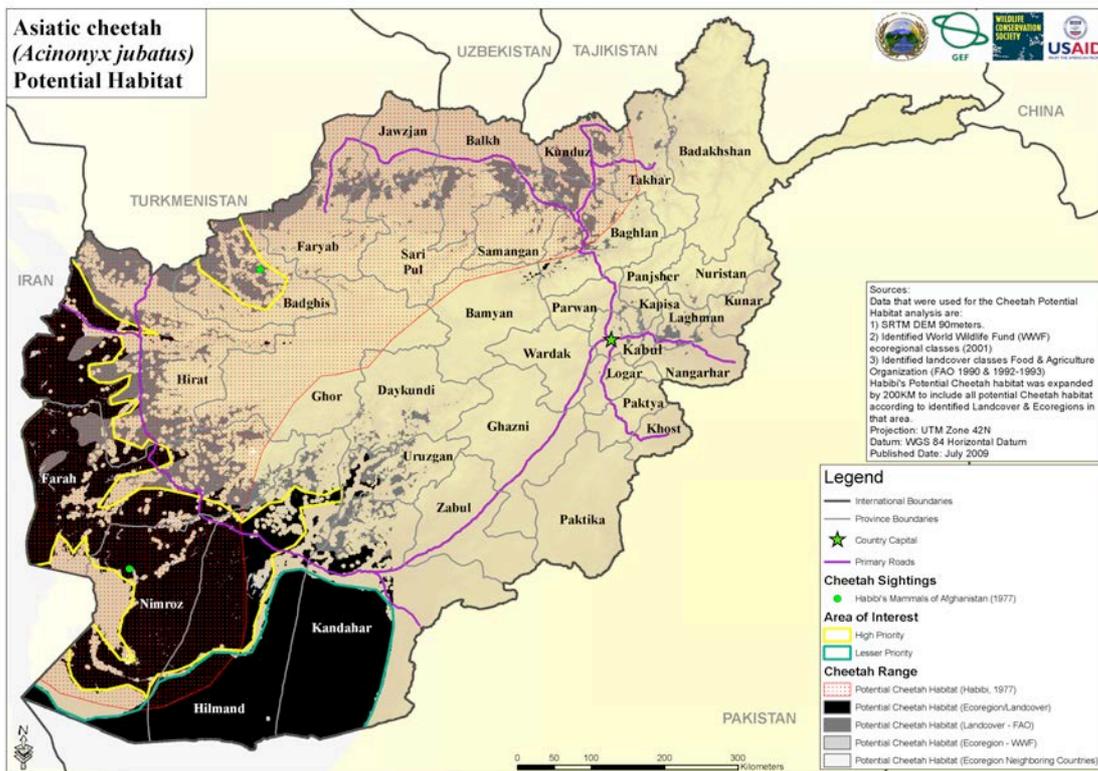


Figure 15: Asiatic cheetah (*Acinonyx jubatus*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Brown bear – *Ursus arctos*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>U. arctos</i>
Habibi (2003).	Alpine and sub-alpine valleys, montane forests at elevations of 2,500 – 5,000m.
IUCN – Boitani et al. (2008).	<b>9 major habitat categories listed:</b> boreal forest; subarctic forest; temperate forest; subarctic shrubland; boreal shrubland; subtropical/tropical dry shrubland; subtropical/tropical moist shrubland; tundra grassland; subtropical/tropical dry grassland.  <i>U. arctos</i> occupies a great variety of habitats from dry Asian steppes to

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>U. arctos</i>
	<p>Arctic shrublands and temperate rain forests. Elevationally they range from sea level to 5,000 m. <i>U. arctos</i> occupies a greater diversity of habitats than any other species of bear and also exploit a large variety of food items.</p> <p>The productivity and density of <i>U. arctos</i> varies enormously, corresponding with the productivity of their habitats. More moderate densities of <i>U. arctos</i> occurs across the interior mountain ranges of North America, Europe, and Asia where they forage on a great variety of grasses, herbs, roots, berries, nuts, as well as animal matter such as insects, mammals, and fish if available. Lower densities are found in dry, desert-like areas, alpine and sub-alpine areas, as well as areas where habitat availability and numbers of <i>U. arctos</i> have been reduced by high human and domestic livestock densities.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>U. arctos</i>
Mertzani et al. (2008).	Habitat preferences for <i>U. arctos</i> appears to be agricultural land and areas near the edge between forests and open landscape formations (grasslands, cultivated fields and fallow land). The species seems to use alpine meadows less than randomly expected.
The Wildlife of Pakistan (1999a).	In Pakistan, the preferred habitat of <i>U. arctos</i> includes mountain forests, open meadows, and rivers in the remote northern regions of the country.
Wildlife SOS (1997).	<i>U. arctos</i> habitat is generally restricted to alpine meadow and sub-alpine scrub zones above the tree-line in the northern mountain regions of India, having Dachigam and Kashmir as its limits.
Servheen et al. (2003).	In the Himalaya, <i>U. arctos</i> inhabits mainly sub-alpine and alpine areas, between 2,600 and 5,000m. They are largely confined to the rolling uplands and alpine meadows above the timberline, ecologically separated from <i>U. thibetanus</i> .
Sathyakumar & Qureshi (2003).	<p>The Asian range of <i>U. arctos</i> extends from Turkey, Iran and Afghanistan, Pakistan, all along the Himalayas of India, Nepal and Bhutan, north and east of Pakistan through the mountains of central Asia, Tibet, northern China and Mongolia to Russia.</p> <p><i>U. arctos</i> occurs in low densities in the subalpine and alpine regions (&gt;3,300m) of the Greater Himalaya and in some parts of trans-Himalaya in India.</p>
Nawaz (2007).	Studies in Pakistan and India suggest preferred <i>U. arctos</i> habitat is blue pine forests ( <i>Pinus wallichina</i> ) in spring and fall, and alpine meadows below the timberline in the summer. Other dominant species within these forests include spruce ( <i>Picea smithiana</i> ), silver fir ( <i>Abies pindrow</i> ), and deodar ( <i>Cedrus deodar</i> ).
Negi (2002).	<i>U. arctos</i> in the Himalayas, inhabits open, rocky areas above the tree line. They descend to lower elevations in winter and retire to the shelter of caves during the spring season.

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

**WCS Survey Results:** During a survey in 2006, WCS teams obtained good records of fresh signs of *U. arctos* from the Proposed Big Pamir Wildlife Reserve, especially from the Ali Su and Aba Khan valleys, and Upper Shikargah valley (Habib, 2006). Signs of *U. arctos* have also been seen by WCS teams in Waghjir Valley (Habib, 2008, and Winnie and Harris, Nov/Dec 2007).

In addition, interviews with local residents in Nuristan suggested that *U. arctos* may still occupy certain areas in the forests within Nuristan (Karlstetter, 2008).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *U. arctos* was present in the following provinces/districts:-

- Laghman Province (particularly Alingar, Qarghaee, Dawlatsha and Alingar district)
- Nangarhar Province (in Khogyani, Sorkhrod and the Black Mountains)
- Nuristan Province
- Kunar Province (in Dengam, Ghazi Abad and Shegal districts)

### Information for Brown bear (*Ursus arctos*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA0808	Degenerate forest / high shrubs	2,500 – 5,500m	Extend buffer around Habibi's range to 200km.
PA1005	Natural forest (closed cover)		
PA1006	Natural forest (open cover)		
PA1012	Permanent snow		
PA1014	Rangeland		
PA1018			
IM0502			

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

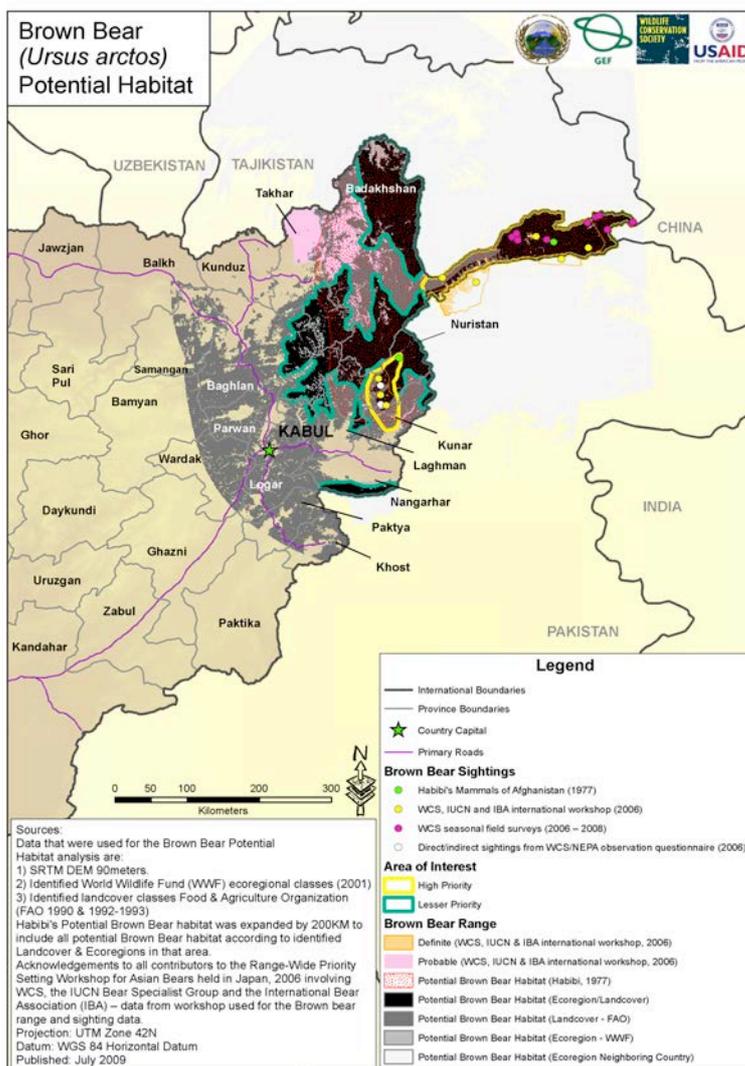


Figure 16: Brown bear (*Ursus arctos*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Corsac fox – *Vulpes corsac*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>V. corsac</i>
Habibi (2003).	Below 1,000m in dry steppes.

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>V. corsac</i>
IUCN – Poyarkov & Ovsyanikov (2008).	<b>3 major habitat categories listed:</b> temperate shrubland; temperate grassland; temperate desert

## Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>V. corsac</i>
<b>Sillero-Zubiri et al. (2004).</b>	<p><i>V. corsac</i> typically inhabits steppes, semi-deserts and deserts, avoiding mountains, forested areas and dense bush. In the western part of the range they occur in low-grass steppe, avoiding dense and tall grass steppes. In the Kaspian Sea region (Russia), the steppes and tarragon-cereal semi-deserts are favoured. It also occurs in fixed-sand habitats.</p> <p>In the Volgo-Ural watershed of northern Eurasia, <i>V. corsac</i> inhabits most usual habitats, but prefers semi-deserts. To the east of the Ural Mountains, the species inhabits steppes and in favourable years occurs even in forested steppes. In Kazakhstan, typical habitats are low grass steppes and semi-deserts, often inhabiting low hills, but avoiding low mountains.</p> <p>In Middle-Asia the species inhabits semi-deserts and ephemeral-deserts, avoiding drifting sands.</p> <p>One limiting factor is snow height in winter, and this species avoids areas where the depth of snow exceeds 150 mm, preferring areas where the snow is either shallower or highly compressed.</p>
<b>Nowak (1999).</b>	<p><i>V. corsac</i> is a typical inhabitant of steppes and semi-desert. It avoids forests, thickets, ploughed fields and settled areas. It may migrate southwards when deep snow and ice make hunting difficult.</p> <p>Because of settlement and plowing of the steppes, <i>V. corsac</i> has disappeared in much of its range.</p>

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *V. corsac* was present in the following provinces/districts:-

- Khost Province
- Laghman Province
- Jawzjan Province (Khajadoko Kham Ab and Qarqeen districts)
- Samangan Province (in natural forests)
- Faryab Province
- Nuristan Province
- Paktya Province

## Information for Corsac fox (*Vulpes corsac*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
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## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA1301	Rangeland	0 – 1,000m	Extend buffer around Habibi's range to entire country.
PA1306	Rocky outcrop/bare soil		
PA1307	Sand-covered areas		
PA1309	Sand dunes		
PA1313			
PA0506			
PA1004			
PA0808			
PA1005			
PA1006			
PA1012			
PA1014			
PA1322			
PA1326			
PA1018			
IM0502			

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

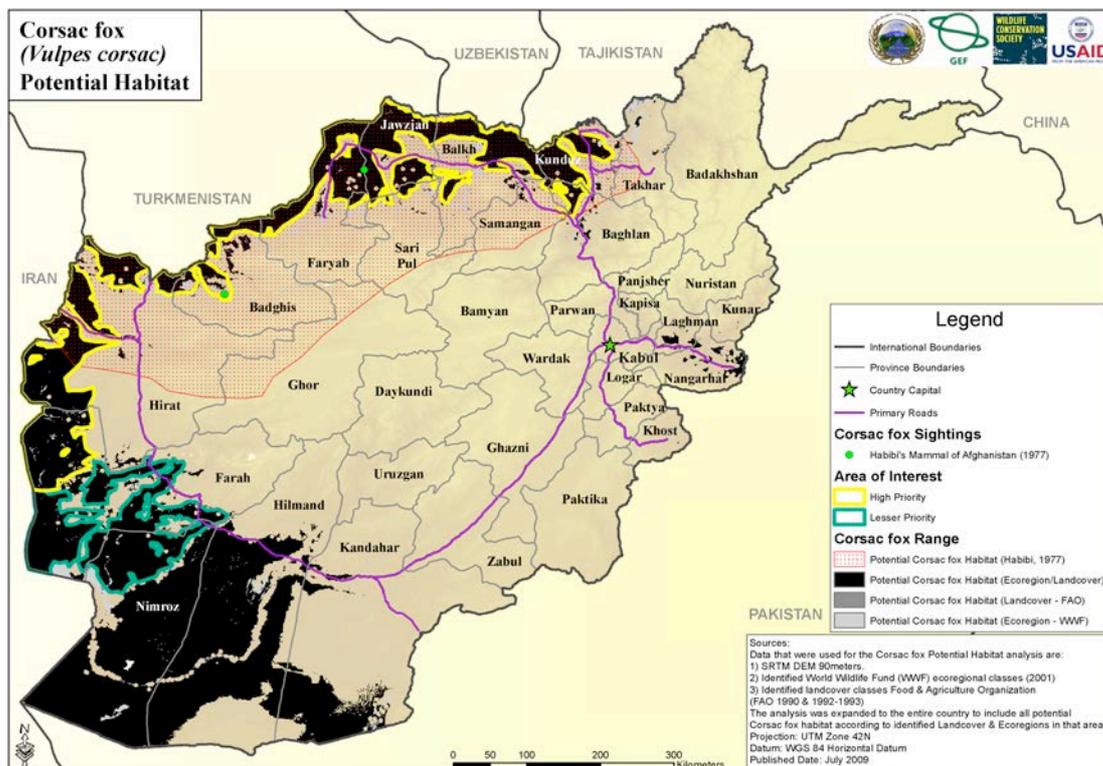


Figure 17: Corsac fox (*Vulpes corsac*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Blanford's fox – *Vulpes cana*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>V. cana</i>
Habibi (2003).	Below 1,000m in semi-deserts and steppes.
IUCN – Geffen et al. (2008).	<p><b>2 major habitat categories listed:</b> rocky areas; hot desert</p> <p>In Israel, <i>V. cana</i> is distributed along the western side of the Rift Valley, and, in the central Negev, specimens were collected in creeks that drain into the Rift Valley. In Israel, <i>V. cana</i> inhabits the driest and hottest regions. The densest population is found in the Judaeen Desert in Israel at</p>

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>V. cana</i>
	elevations of 100–350 m below sea level.  A study in 1992 found that dry creek beds were the most frequently visited habitat in all home ranges in Israel. Dry creek beds provided abundant prey for the foxes and only sparse cover for their terrestrial predators.

## Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>V. cana</i>
<b>Sillero-Zubiri et al. (2004).</b>	<i>V. cana</i> is confined to mountainous regions, below 2,000m, in dry montane biotopes. All the records collected on the Persian Plateau are from foothills and mountains in the vicinity of lower plains and basins. In that region, the habitat of <i>V. cana</i> comprises the slopes of rocky mountains with stony plains and patches of cultivation.  This species appears to avoid higher mountain ranges, as well as lower, warmer valleys. In the Middle East, <i>V. cana</i> is confined to mountainous desert ranges and inhabits steep, rocky slopes, canyons and cliffs.
<b>Nowak (1999).</b>	The habitat of <i>V. cana</i> is mountain steppe.  The species sometimes damages crops, being more frugivorous than other foxes of Pakistan. It can be found in relatively hot, rocky habitats of the Negev and Judean deserts in Israel.
<b>Geffen (1994).</b>	The distribution of <i>V. cana</i> in the Arabian desert is not limited by access to water. In Israel, <i>V. cana</i> inhabits the driest and hottest regions. <i>V. cana</i> in Pakistan are largely frugivorous feeding on Russian olives, melons, and grapes.
<b>ARKive (2008a).</b>	<i>V. cana</i> is usually found in semi-arid mountainous regions to an altitude of 2,000m, where cliffs are the preferred habitat. Originally, <i>V. cana</i> was thought to avoid hot lowlands, but they have since been found near the Dead Sea (the lowest valley in the world) in Israel, an area that reaches extreme summertime temperatures. This species also inhabits cultivated areas.

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *V. cana* was present in the following provinces/districts:-

- Khost Province
- Laghman Province (within desert and forested areas)
- Faryab Province
- Kunar Province

## Information for Blanford's fox (*Vulpes cana*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1307	Fruit trees	0 – 3,000m	Slope – <i>V. cana</i> prefers steep

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

PA1309	Irrigated: intensively cultivated (1 crop/year)		terrain so exclude all land under 20 degrees in slope.
PA1313	Irrigated: intensively cultivated (2 crops/year)		
PA1004	Irrigated: intermittently cultivated		
PA1326	Rainfed crops (sloping areas)		
PA1018	Rock outcrop/bare soil		

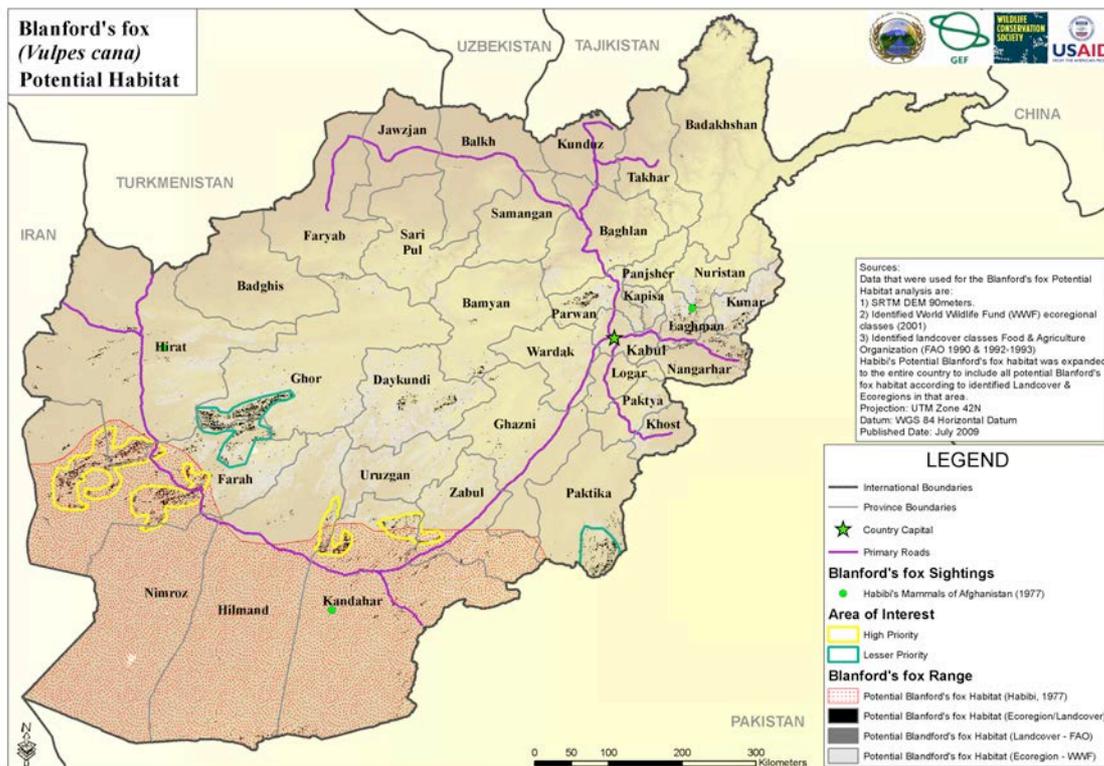


Figure 18: Blanford's fox (*Vulpes cana*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Marbled pole cat – *Vormela peregusna*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>V. peregusna</i>
Habibi (2003).	Semi-deserts, steppes and hilly country at elevations of 500 – 2,500m.
IUCN – Tikhonov et al.	<b>5 major habitat categories listed:</b> boreal shrubland; temperate

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>V. peregusna</i>
(2008a).	grassland; rocky areas; temperate desert; cold desert  <i>V. peregusna</i> inhabits desert, semi-desert and steppe habitats, and is a specialised predator feeding mainly on desert and steppe rodents such as gerbils, ground squirrels and birds. It is the most fossorial of weasel species.

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>V. peregusna</i>
Nowak (1999).	<i>V. peregusna</i> occurs in the steppe and subdesert zones from the Balkans and Palestine to Inner Mongolia and Pakistan. It seems to prefer steppes and foothills.
Gorsuch & Lariviere (2005).	<i>V. peregusna</i> occupies open desert, semi-desert, semi-arid rocky areas in upland valleys and low hill ranges. It is generally not found on higher mountain ranges, although occasionally it can be found up to 2,100m.
Novikov (1962).	In Central Asia, <i>V. peregusna</i> is found in oases, tugai (river-valley bottomland complexes of forest, scrub and meadow), dunes with sparse bush vegetations, clay steppes and salt marshes.  It is also found in irrigated country, melon patches and vegetable fields and has entered buildings to forage for food. In Kazakhstan, <i>V. peregusna</i> is found in shifting dune country. The species also occurs in wormwood ( <i>Artemisia</i> ) deserts, semideserts, and occasionally fescue and needle-grass steppes of the foothills.
Roberts (1977).	<i>V. peregusna</i> occurs in steppe country and arid/subtropical scrub forest.
Krever et al. (1998).	<i>V. peregusna</i> is a species of special interest within the ecosystem of the steppe, semidesert and desert foothills, and the low mountain belt in Kazakhstan. They also occur within areas that encompass foothill deserts, steppe grass communities, and forests which harbour subtropical plants (particularly almond, pomegranate, walnut, wild grapes) and juniper trees.
IUCN/SSC Mustelid and Viverrid Specialist Group (1989)	In Bulgaria, <i>V. peregusna</i> prefers steppe areas, but also orchards, fields and vineyards. The species also shows a preference for dry and open biotopes.

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *V. peregusna* was present in the following provinces/districts:-

- Khost Province (particularly in Sapary, Qalandar and Tany districts)
- Laghman Province (within the mountains)
- Jawzjan Province (Qarqeen and Kham Ob Districts)
- Sari Pul Province
- Nuristan Province
- Kunar Province

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Information for Marbled pole cat (*V. peregusna*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1306	Degenerate forest/high shrubs	500 – 2,500m	Hydrogeology – <i>V. peregusna</i> is dependent on being close to sources of water. Therefore exclude all land that is more than 10km from a water source in any direction.  Extend buffer around Habibi's range to entire country.
PA1307	Irrigated: intensively cultivated (1 crop/year)		
PA1309	Irrigated: intensively cultivated (2 crops/year)		
PA1313	Irrigated: intermittently cultivated		
PA0506	Marshland permanently inundated		
PA1004	Marshland seasonal		
PA0808	Natural forest (closed cover)		
PA1014	Natural forest (open cover)		
PA1322	Rainfed crops (flat-lying areas)		
PA1326	Rainfed crops (sloping areas)		
PA1018	Rangeland		
	Rocky outcrop/bare soil		
	Sand-covered areas		
	Sand dunes		
	Settlements		
	Water bodies		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

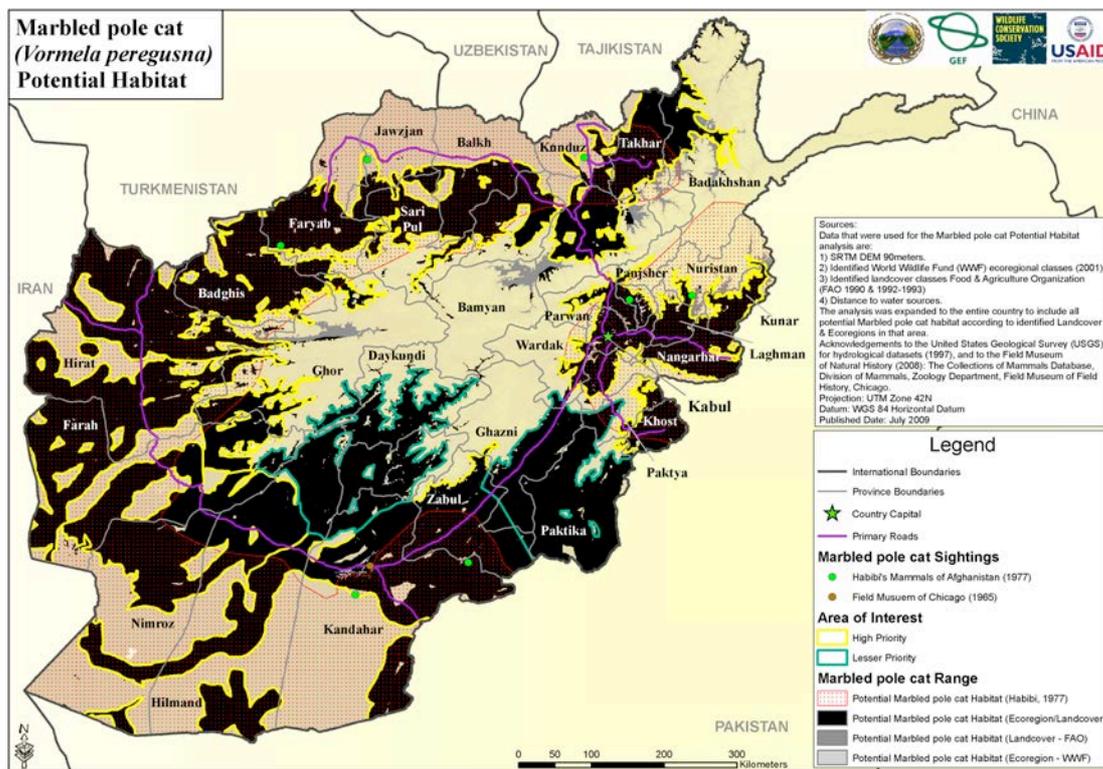


Figure 19: Marbled pole cat (*Vormela peregusna*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Weasel – *Mustela nivalis*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>M. nivalis</i>
Habibi (2003).	Montane biotopes and rock cavities are favored habitats for <i>M. nivalis</i> . Elevation range is 1,500- 3,000m.
IUCN – Tikhonov et al. (2008b).	<p><b>15 major habitat categories listed:</b> boreal forest; subarctic forest; temperate forest; boreal shrubland; temperate shrubland; subarctic grassland; temperate grassland; subtropical/tropical dry grassland; shrub dominated wetlands; rocky areas; marine coastal/supratidal – coastal sand dunes; arable land; pastureland; rural gardens; urban areas.</p> <p><i>M. nivalis</i> occurs from sea level to at least 3,860m. It forms dens in crevices among tree roots, in hollow logs, or in abandoned burrows of</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>M. nivalis</i>
	<p>other species.</p> <p>This species is a specialist diurnal predator of small mammals (especially rodents), although it will also occasionally feed on birds' eggs, lizards, frogs, salamanders, fish, worms, and carrion. Habitat selection is usually determined by local distribution of rodents. Foraging individuals avoid open spaces, where they are most vulnerable to predation by raptors. They prefer dense, rank grassland where microtines (voles and lemmings) are abundant.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>M. nivalis</i>
<b>Nowak (1999).</b>	<i>M. nivalis</i> is much like the Ermine ( <i>M. erminea</i> ) in details of habitat, nest construction and movements. The habitat of <i>M. erminea</i> is very varied, from open tundra to deep forest, but the species seems to prefer areas with vegetative or rocky cover. They make their den in a crevice, among tree roots, in a hollow log or in a burrow taken over from a rodent. It can easily run over snow and, if pursued, it may move under the snow.
<b>King (1983).</b>	<p>The local distribution of <i>M. erminea</i> is broadly related to that of small rodents and lagomorphs. In the Holarctic (habitats throughout the northern continents of the world), <i>M. erminea</i> tends to avoid dense forest and deserts, and settles in successional or forest-edge habitats in scrub, alpine meadows, marshes, riparian woodlands, hedgerows and riverbanks rich in small mammals.</p> <p><i>M. erminea</i> is well adapted to snowy environments and range to above the treeline in alpine areas. Snow presents little obstacle to their distribution, hunting or movements. In addition, snow provides vital insulation against extremes of air temperature.</p>
<b>King (1990).</b>	<i>M. nivalis</i> prefers thick ground cover, so they favour overgrown patches of any habitat from suburban gardens to agricultural land, in scrub and cutover native or exotic forest, or at the margins between these and open country.
<b>Sheffield &amp; King (1994).</b>	<p><i>M. nivalis</i> can survive in a wide variety of habitats, including open forests, farmlands and cultivated fields, grassy fields and meadows, riparian woodlands, hedgerows, alpine meadows and forests, scrub, steppe and semi-deserts, prairies and coastal dunes. They avoid deep, dense forests, sandy deserts, and open spaces which lack food and/or cover. An apparent specialization on readily-available intermediate-sized small rodents may be a major limiting factor limiting the geographic range of <i>M. nivalis</i>.</p> <p><i>M. nivalis</i> lives year-round at high elevations (to 3,660m) on low-altitude mountain ranges. They are well-adapted to tundra and snowy environments and range above the treeline in arctic and alpine areas</p>
<b>IUCN/SSC Invasive Species Specialist Group (2005).</b>	<i>M. nivalis</i> occurs in agricultural areas, planted forests, range/grasslands, riparian zones, rural/disturbed, scrub/shrublands, tundra, and urban areas.
<b>The Mammal Society (2005a).</b>	<i>M. nivalis</i> is less common where their small mammal prey are scarce, such as at higher altitudes and in dense woodland with sparse ground

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>M. nivalis</i>
	cover.
Zub et al. (2008).	At the landscape scale, <i>M. nivalis</i> prefers open habitats (both dry and wet) and avoids forest. In open areas they select habitats with higher prey abundance, except during the low-density phase of the vole cycle, when the distribution of these predators is more uniform. Also in winter, the distribution of weasels at the landscape scale appears proportional to available resources. In summer, within open dry and wet habitats, <i>M. nivalis</i> seems to prefer areas characterized by dense vegetation, and they avoid poor plant cover.
Colak et al. (1999).	The favorable habitat of <i>M. nivalis</i> is the edges of small brooks inside deciduous forests inhabited by small mammals. The species is also found around some villages.

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *M. nivalis* was present in the following provinces/districts:-

- Laghman Province (within desert, graveyard and forested areas)
- Faryab Province
- Sari pul Province
- Nuristan Province
- Kunar Province

### Information for Weasel (*Mustela nivalis*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1306	Degenerate forest/high shrubs	1,500 – 3,700m	Extend buffer around Habibi's range to entire country.
PA1313	Gardens		
PA0808	Irrigated: intensively cultivated (1 crop/year)		
PA1006? (Altai weasel here, <i>M. nivalis</i> not listed on Wildfinder or individual ecoregion descriptions)	Irrigated: intensively cultivated (2 crops/year)		
PA1014	Irrigated: intermittently cultivated		
	Natural forest (closed cover)		
	Natural forest (open cover)		
	Rainfed crops (flat-lying areas)		
	Rainfed crops (sloping areas)		
	Rangeland		
	Permanent snow		
	Sand-covered areas		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

	Settlements		
	Water bodies		

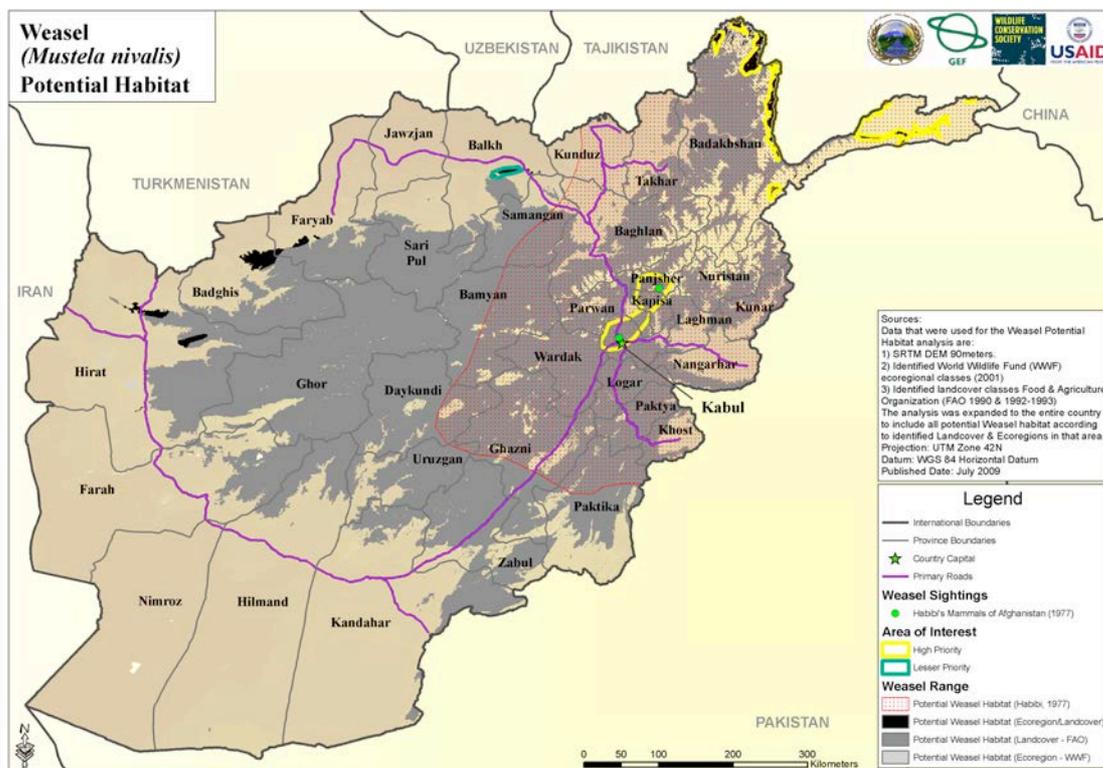


Figure 20: Weasel (*Mustela nivalis*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Urrial – *Ovis orientalis*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>O. orientalis</i>
Habibi (2003).	Alpine and subalpine valleys and steppes are the preferred habitat of <i>O. orientalis</i> in Afghanistan, at elevations between 500 – 4,000m.
IUCN – Valdez (2008).	<b>8 major habitat categories listed:</b> temperate forest; temperate shrubland; subtropical/tropical dry shrubland; Mediterranean-type shrubby vegetation; temperate grassland; subtropical/tropical dry

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>O. orientalis</i>
	<p>grassland; rocky areas; pastureland.</p> <p><i>O. orientalis</i> inhabits moderate to very arid habitats, especially grasslands, but they also occur in agricultural fields and woodland areas. This species is herbivorous, feeding on grasses and shrubs, and also grains.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>O. orientalis</i>
<b>Shackleton (1997).</b>	<p><i>O. orientalis</i> is known to occur throughout the Hindu Kush and the mountains of central Afghanistan, extending from the Zebak mountains in the north to the Seyah Koh range in the southwest. The largest concentration was in Ajar Valley Reserve, from where animals were known to migrate into distant valleys near to Band-i Amir National Park. East of Kabul, the species was found in the Kohe Safi region of Kapisa Province. The species was also reported from the Safed Koh range in Herat and Badghis Province.</p> <p><i>O. orientalis</i> in Afghanistan avoids rugged mountaineous terrain where it might gain some protection and instead competes directly with livestock that are seasonally brought into their habitat.</p>
<b>The Wildlife of Pakistan (1999f).</b>	<p>In Baluchistan and Waziristan, <i>O. orientalis</i> inhabits the gentler slopes of the higher mountain ranges and will occur up to 2,750m. In the Salt range and the Southern North West Frontier Province in Pakistan, they are typically associated with lower elevations, rounded stony hills dotted with wild olive trees. In the extreme northern and inner Himalayan ranges, <i>O. orientalis</i> is associated with barren treeless regions in the lower foothills.</p> <p>They avoid steep precipitous regions in all cases and are usually found in regions with deep erosion gullies which afford them some cover, interspersed with relatively smooth boulder-strewn slopes.</p>
<b>ARKive (2008b).</b>	<p><i>O. orientalis</i> are generally found in mountainous areas with both grasslands and desert, although in Europe the species has also been introduced into forested areas.</p> <p><i>O. orientalis</i> occur up to 3,000m above sea level and they seem to prefer the gentler slopes of the higher mountain ranges with a reasonable amount of cover. They use steep precipitous regions to avoid predators.</p>
<b>Hagen (2003).</b>	<p><i>O. orientalis</i> inhabits steep to undulating grassy terrain, to an elevation of 6,000m.</p> <p>They may also be found in agricultural fields (a potential pest species to farmers, particularly since they are known to eat grains) and they sometimes enter partly wooded areas.</p>

**WCS/PoWPA Public Consultation:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *O. orientalis* was present in the following provinces/districts:-

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

- Laghman Province (particularly in Dawatsha district)
- Nuristan Province
- Kunar Province (in Nri, Dangam, Badel and Watapora districts – although decreasing in number because of hunting)

## Information for Urial (*Ovis orientalis*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1306 PA1307? PA1004 PA0808? PA1006 PA1018?	Degenerate forest / high shrubs  Irrigated: intensively cultivated (1 crop/year)  Irrigated: intensively cultivated (2 crops/year)  Irrigated: intermittently cultivated  Natural forest (open)  Rainfed crops (flat lying areas)  Rainfed crops (sloping areas)  Rangeland  Rocky outcrop/bare soil	500 – 4,000m	Slope – <i>O. orientalis</i> prefers gentle terrain so exclude all land over 40 degrees in slope.  Range data from IUCN.  Extend buffer around Habibi's range to entire country.
<p><b>Please note – the ecoregions where <i>O. orientalis</i> occurs have not yet been mapped by WWF since it's historical range remains unknown. These designated ecoregions have been taken directly from the biodiversity features write-up under each individual ecoregion description. Therefore, they are not as accurate as required for this species map.</b></p>			

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

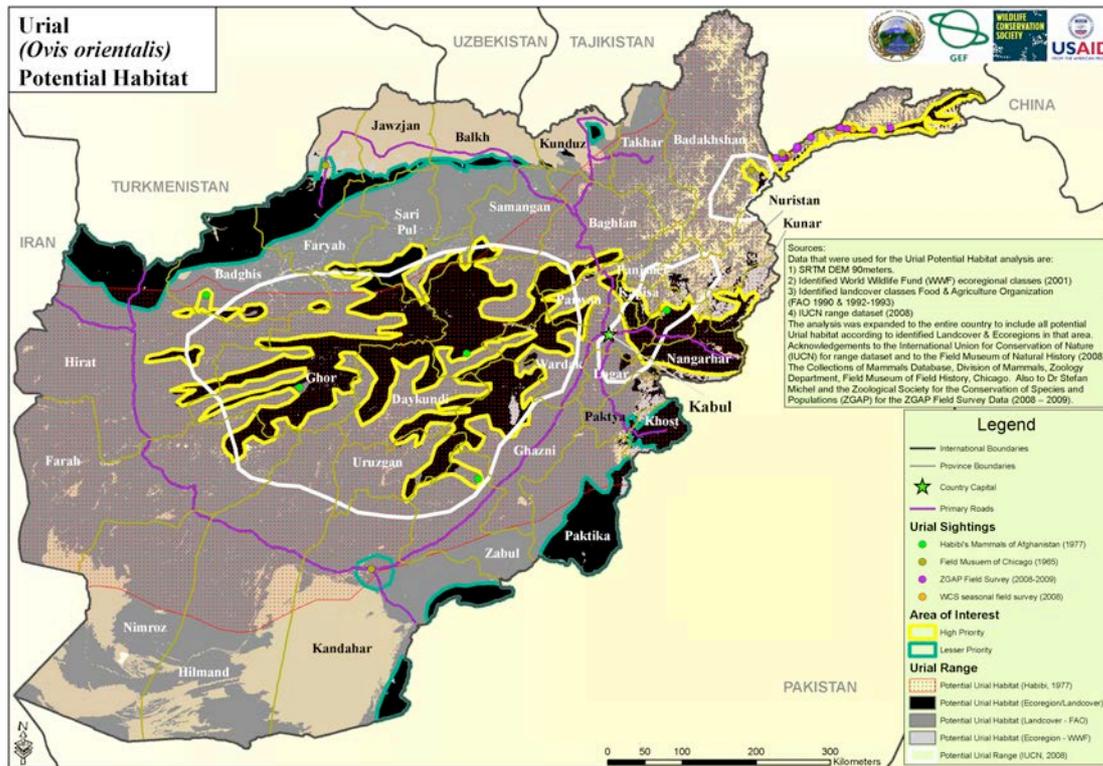


Figure 21: Urial (*Ovis orientalis*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Wild goat – *Capra aegagrus*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. aegagrus</i>
Habibi (2003).	<i>C. aegagrus</i> occur in barren rocky mountains and hills, cliffs and crags at elevations between 2,500 – 3,500m.
IUCN - Weinburg et al. (2008).	<p><b>7 major habitat categories listed:</b> temperate forest; temperate shrubland; subtropical/tropical dry shrubland; Mediterranean-type shrubby vegetation; temperate grassland; rocky areas; hot desert.</p> <p><i>C. aegagrus</i> inhabits mountainous areas, where there is a mixture of rocky outcrops (including scree slopes) and vegetation (shrubby thickets or conifer forests). It tends to be found in relatively arid habitats, though it is a forest species in the Caucasus.</p>

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>C. aegagrus</i>
	<i>C. aegagrus</i> is herbivorous, feeding on grasses, herbaceous plants and shrubs.

## Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. aegagrus</i>
<b>Nowak (1999).</b>	<i>C. aegagrus</i> occupies a variety of habitats on either gentle or very steep slopes, at elevations of up to 4,200m. It can be found in arid country with sparse vegetation, alpine meadows or forests. Food is taken by both grazing and browsing.
<b>Shackleton (1997).</b>	<i>C. aegagrus</i> is probably confined to the Hazarajat and Uruzghan mountains in central Afghanistan, including the arid Feroz Koh and Siyah Koh in the headwaters of the Hari Rud, Farah Rud, Helmand and Arghandab rivers.
<b>Shafique &amp; Barkati (2002).</b>	<p><i>C. aegagrus</i> is distributed in the arid rocky mountainous regions of North Africa, the Middle East, and South-West Asia.</p> <p>In Pakistan, <i>C. aegagrus</i> seems well adjusted to the dry and arid mountain conditions of the Chiltran Park. They generally inhabit the most precipitous slopes of the Hazarganji and Chiltran areas. Here there are rocky cliffs with numerous deep and narrow gullies in which they rest during daylight hours.</p> <p>During the rut and the colder winter months, <i>C. aegagrus</i> generally tends to be found on the lower slopes rather than the higher cliffs and ridge tops.</p>
<b>Yamada et al. (2004).</b>	<i>C. aegagrus</i> are found in most high elevation and relatively extensive arid-zone mountain ranges in Pakistan, occurring at altitudes up to 3,350m. The animals are closely associated with the mountain ranges and they venture to lowland terrain only rarely, usually when they are moving between ranges. Their main requirements seem to be precipitous crags, which are safe from direct disturbance because the terrain is inaccessible to domestic goats and shepherds.

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *C. aegagrus* was present in the following provinces/districts:-

- Khost Province
- Laghman Province (mountainous areas)
- Nuristan Province
- Kunar Province

## Information for Wild goat (*Capra aegagrus*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1306	Degenerate forest / high shrubs	2,500 – 4,000m	Slope – <i>C. aegagrus</i> prefers steep terrain so exclude all land less

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

<p>PA1307? (<i>Capra hircus aegargus</i> listed)</p> <p>PA1004?</p> <p>PA1313</p> <p>PA1018? (<i>Capra hircus aegargus</i> listed)</p> <p><b>Please note – the ecoregions where <i>C. aegargus</i> occurs have not yet been mapped by WWF since it's historical range remains unknown. These designated ecoregions have been taken directly from the biodiversity features write-up under each individual ecoregion description. Therefore, they are not as accurate as required for this species map.</b></p>	<p>Natural forest (closed)</p> <p>Natural forest (open)</p> <p>Rangeland</p> <p>Rocky outcrop/bare soil</p> <p>Sand covered areas</p>		<p>than 30 degrees in slope.</p> <p>Range data from IUCN.</p> <p>Extend buffer around Habibi's range to entire country.</p>
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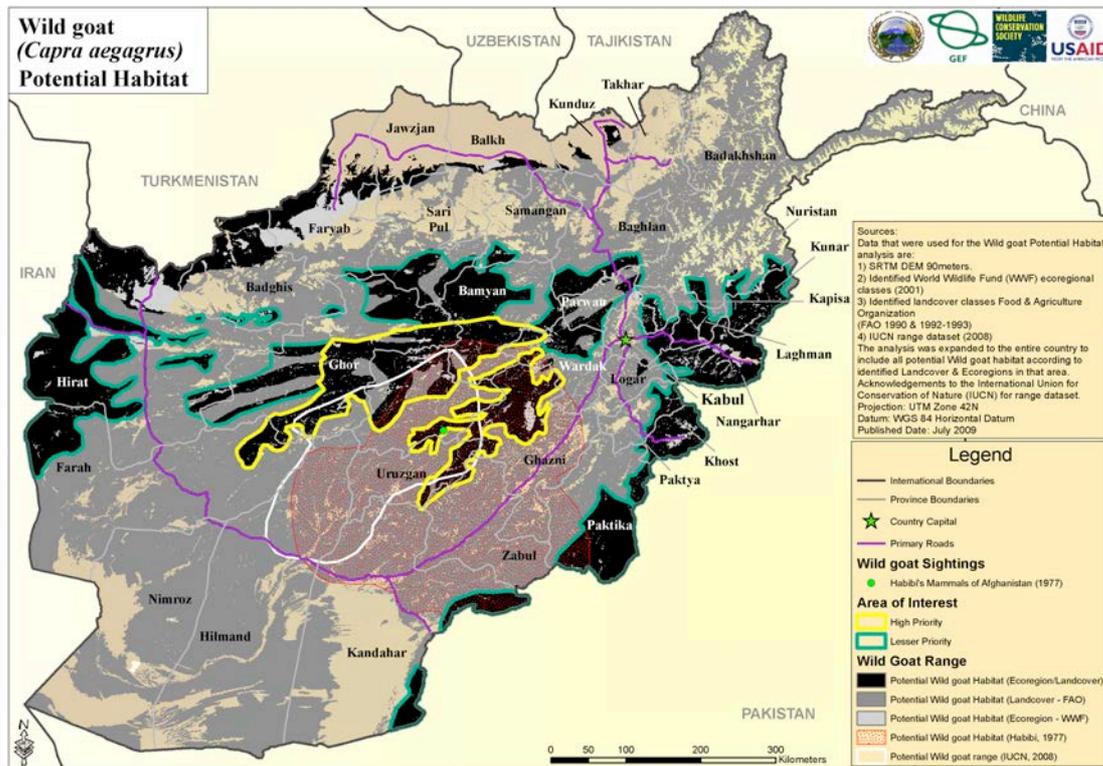


Figure 22: Wild goat (*Capra aegargus*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Bactrian deer – *Cervus elaphus bactrianus*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. e. bactrianus</i>
Habibi (2003).	Broad-leaved forests, reed beds and woodlands, below 1,000m.
IUCN – Lovari et al. (2008).	<p><b>6 major habitat categories listed:</b> boreal forest; temperate forest; temperate shrubland; temperate grassland; rocky areas; pastureland.</p> <p><i>C. elaphus</i> inhabits open deciduous woodland, upland moors and open mountainous areas (sometimes above the treeline), natural grasslands, pastures and meadows. In woodland, its diet consists mainly of shrub and tree shoots, but in other habitats it also consumes grasses, sedges and shrubs.</p> <p>The species is generally found in mountainous regions, where it spends summers in alpine meadows and winters in valleys. On more level terrain, it seeks wooded hillsides in summer and open grasslands in winter. The species also migrates from areas with deep snow.</p> <p>Bushes and trees are critical for protection from predators such as the Wolf (<i>C. lupus</i>), and as an important source of food during the winter in the form of browse.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>C. e. bactrianus</i>
Nowak (1999).	<i>C. elaphus</i> utilizes a wide variety of habitats in both lowlands and mountains. In North America it was originally found in dense coniferous forests, open hardwood forests, chaparral (shrubland or heathland plant communities), and grasslands. The species generally avoids snow cover.
IUCN/SSC Deer Specialist Group (1998).	<p><i>C. e. bactrianus</i> was present along the northern border with the former USSR in the early 1980s. Some 42 animals were present in the Ajar valley in Afghanistan during the same period, following their reintroduction. In the early 1980s, an estimated 900 individuals existed along the Amu Darya river valley in the former-USSR, including along the border with Afghanistan.</p> <p><i>C. e. bactrianus</i> inhabits riverine scrub habitats (tugai) in arid environments and feeds on a variety of grasses, herbs and shrubs.</p>
Convention on Migratory Species Secretariat (2004).	<i>C. e. bactrianus</i> is always strictly connected with riparian forests of river valleys. The species inhabits all types of riparian forests, and even brushes of reeds on salinated lands. Also <i>C. e. bactrianus</i> can use desert

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>C. e. bactrianus</i>
	as marginal habitat (in times of extreme waterfloods).
Senseman (2002).	<i>C. elaphus</i> prefers open woodlands and avoids dense unbroken forests. The species can be found in coniferous swamps, clear cuts, Aspen-hardwood forests (Aspen is a member of the willow tree family), and coniferous-hardwood forests.  The species is found through a wide range of elevations, typically from sea level to 3000 m, although it can also occur at higher elevations too.

**WCS Survey Results:** Interviews conducted by WCS around the Amu Darya alluvial plain in the winter of 2007 indicated that the likelihood of occurrence of *C. e. bactrianus* in Imam Sahib, Aye Khanum and in Darqad is now very low. The species may still occur in the area but in very few numbers and only in the Darqad Turgai forested areas. Aye Khanum which holds relatively little remains of Turgai forest is not expected to be favorable habitat for *C. e. bactrianus*. The species has dramatically suffered from over-hunting and loss of habitat. None of the interviewees had actually seen a specimen of deer in recent years and they all referred to second-hand sightings. In Aye Khanum, a respondent mentioned that an individual was recently seen in the forest of Khoja Bauudin, and one respondent in Darqad admitted seeing recently a specimen but on the Tajikistan side. WCS teams did not see any indices of presence during the survey (i.e. no foot prints, scats, marking of trees or antlers) (Ostrowski et al., 2008b).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *C. e. bactrianus* was present in the following provinces/districts:-

- Balkh Province (in Shurtepa district and Dali and Islam Sufli villages), where it is hunted

### Information for Bactrian deer (*Cervus elaphus bactrianus*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1301	Degenerate forest/high shrubs	0 – 1,000m	Extend buffer around Habibi's range to 200km.
PA1306	Irrigated: intensively cultivated (1 crop/year)		
PA0808	Irrigated: intensively cultivated (2 crops/year)		
PA1005	Irrigated: intermittently cultivated		
PA1006	Marshland permanently inundated		
PA1012	Marshland seasonal		
PA1014	Natural forest (closed cover)		
PA1322?	Natural forest (open cover)		
	Rainfed crops (flat-lying areas)		
	Rainfed crops (sloping areas)		

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

	Rangeland		
	Sand covered areas		
	Waterbodies		

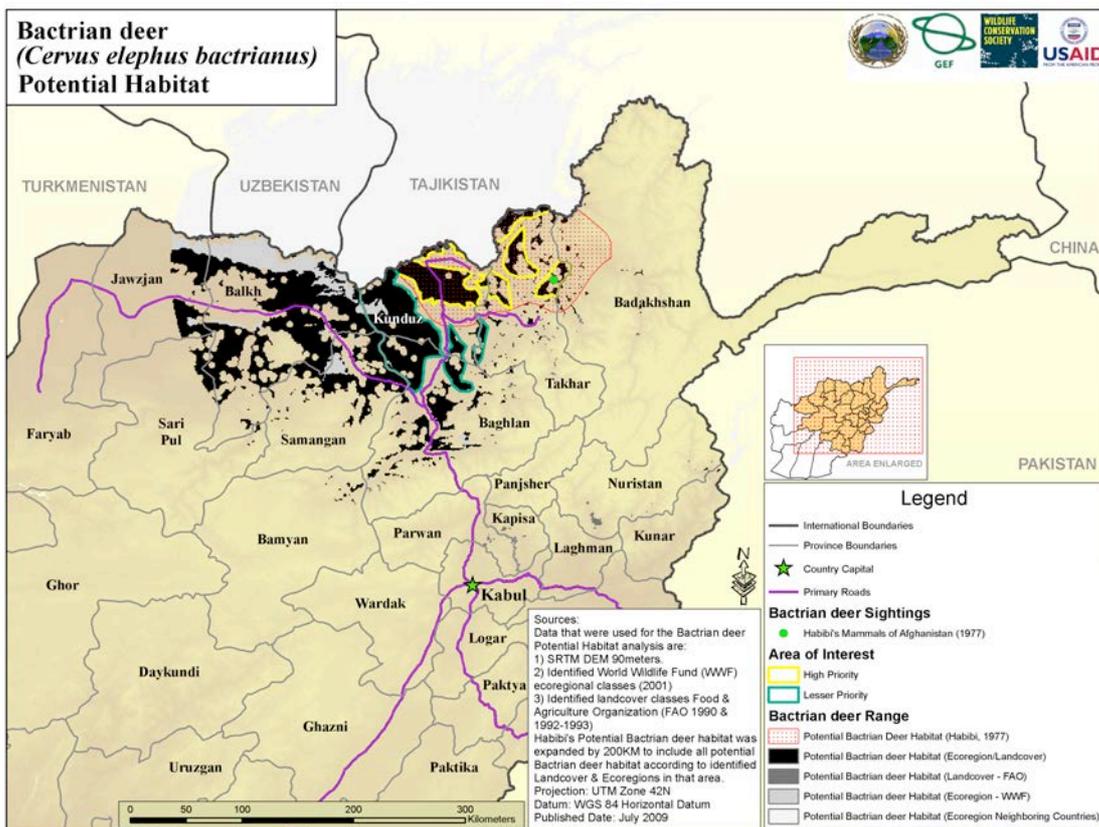
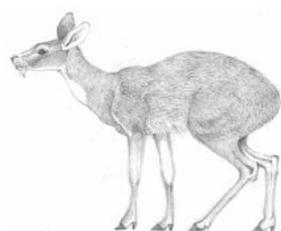


Figure 23: Bactrian deer (*Cervus elaphus bactrianus*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Musk deer – *Moschus cupreus*

N.B. *M. cupreus* was originally described as a subspecies of the Alpine musk deer (*M. chrysogaster*).



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>M. cupreus</i>
Habibi (2003).	<i>M. cupreus</i> inhabits conifer and oak forests between 1,500 – 3,000m.
IUCN – Timmins &	6 major habitat categories listed: Temperate forest;

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>M. cupreus</i>
Duckworth (2008).	<p>subtropical/tropical moist montane forest; temperate shrubland; subtropical/tropical high altitude shrubland; temperate grassland; subtropical/tropical high altitude grassland.</p> <p><i>M. cupreus</i> is found on barren plateaus at high altitudes, where it occupies meadows, fell-fields (sloped alpine or tundra environment), shrublands or fir forests. In western Sichuan, where it overlaps with the distribution of <i>M. berezovskii</i>, <i>M. cupreus</i> inhabits the higher elevations (above 2,000m, usually above 3,000m), compared with the 1,000-2,500m altitudinal range of <i>M. berezovskii</i>.</p> <p>The species feeds mainly on grasses, shrubs, leaves, moss, lichens, shoots, and twigs.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>M. cupreus</i>
Convention on International Trade in Endangered Species (CITES) (2000).	<p><i>M. cupreus</i> are found in dense, shrubby forest undergrowth on steep slopes, and are often associated with rocky outcrops. In the winter, they are attracted to relatively steep slopes covered with coniferous forests.</p> <p>Favorite habitats are sections with rocky outcrops, which provide shelter from predators. In the summer, most of their time is spent in valleys of forest rivers, around streams, and near fields with good grassy vegetation.</p> <p>More than 130 plant species are consumed by <i>M. cupreus</i>. In response to heavy snow, some musk deer have been observed to migrate up to 35km to find food.</p>
UNEP-WCMC (2008).	Forest and brushland at elevations of between 2,600 and 3,600m.
Huffman (2004).	<i>M. chrysogaster</i> lives in alpine forest and scrub at elevations of 2,200 – 4,300m on the eastern and southern edge of Tibet and the southern slopes of the Himalayas.
Nowak (1999).	<p>In the Himalayas, it was found that <i>M. chrysogaster</i> tends to remain in dense cover by day and to use open habitat at night. There is no evidence of any seasonal altitudinal movement in that region, though occasional migrations of 12-35km have been reported for <i>M. chrysogaster</i> in Siberia.</p> <p>Their diet consists of a variety of vegetation, such as grass, moss and tender shoots. In winter, twigs, buds and lichens are taken.</p> <p><i>M. chrysogaster</i> is a shy, timid and generally solitary species.</p>
IUCN/SSC Deer Specialist Group (1998).	<p><i>M. chrysogaster</i> is present in a few parts of Nuristan in Afghanistan (between 1,500m and 3,000m).</p> <p>Species of <i>Moschus</i> inhabit montane forests and subalpine scrub throughout their distribution. A dense undergrowth, typically of rhododendron, bamboo and other shrubs is important, with a marked preference for steep mountain slopes.</p>
Gam (2002).	<i>M. chrysogaster</i> usually lives in forests with moderate to steep slopes.

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>M. cupreus</i>
	The species is found in oak or fir forests and can be found up to the tree line (usually about 4,500m) on mountains. Plants that may be found in its habitat include birch, rhododendron, blue pine, fir, oak, juniper, grass, lichens and shrubs.
Aryal (2005).	<i>M. chrysogaster</i> inhabits steep, forested or shrub-covered slopes, mainly in the sub-alpine zones of mountain regions. Dense undergrowth of rhododendron, bamboo and other shrubs form the typical habitat.
Green (1986).	The characteristic landscape for <i>Moschus</i> species constitutes mountains covered with mixed forest especially places where precipitous cliffs abound.

**WCS Survey Results:** Interviews with local residents during WCS wildlife studies in 2008 suggested that *M. cupreus* may still occupy sites within the forests of Nuristan (Karlstetter, 2008).

**WCS/PoWPA Public Consultations:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *M. cupreus* was present in the following provinces/districts:-

- Laghman Province (Alingar, Alishang, Qarghaee and Dawlatsha areas)
- Nuristan Province
- Kunar Province

### Information for Musk deer (*Moschus cupreus*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA0506 PA1012	Degenerate forest / high shrubs Natural forest (closed) Natural forest (open) Rangeland Rocky outcrop/bare soil Waterbodies	1,500 – 3,600m	Slope – <i>M. cupreus</i> prefers steeper terrain so exclude all land less than 10 degrees in slope.  Extend buffer around Habibi's range to 400km.

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps



Figure 24: *M. cupreus* potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Goitered gazelle – *Gazella subgutturosa*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>G. subgutturosa</i>
Habibi (2003).	Scree-covered semi-deserts, arid plains and treeless areas form the main

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>G. subgutturosa</i>
	habitat of <i>G. subgutturosa</i> , under 1,000m.
IUCN – Mallon (2008).	<p><b>5 major habitat categories listed:</b> subtropical/tropical dry shrubland; temperate grassland; hot desert; temperate desert; cold desert.</p> <p><i>G. subgutturosa</i> inhabits a wide range of semi-desert and desert habitats. It ascends into foothills and penetrates mountain valleys in Central Asia, to altitudes of 2,700 m in Mongolia.</p> <p>They migrate seasonally in search of pasture and water.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>G. subgutturosa</i>
Nowak (1999).	<i>G. subgutturosa</i> is an inhabitant of the dry steppe and subdeserts of Mongolia and adjacent parts of southern Siberia and northern China. <i>G. subgutturosa</i> is found in dry grassland at elevations of up to 5,750m.
Heptner et al. (1988).	A wide variety of desert and semi-arid habitats are occupied by <i>G. subgutturosa</i> . They occur in flat and rolling areas, but prefer foothills with broken grounds, and mountain valley and plateaus, avoiding rocky cliffs, thick woody vegetation, and lands used for agriculture or intensive livestock grazing and areas devoid of gullies and ravines.
The Wildlife of Pakistan (1999c).	<i>G. subgutturosa</i> inhabits the semi-desert and desert steppe in the West of Baluchistan. It survives in the Chagai hills and Nushki hills south west of Quetta. The species is also found at Chaman, near the border with Afghanistan.
Kingswood & Blank (1996).	<p><i>G. subgutturosa</i> lives in nearly all types of desert and semiarid terrain within their range. They occur in flat or rolling areas, along foothills with broken ground and mountain valleys and plateaus. They avoid rocky cliffs, land devoid of gullies and ravines, thick wood vegetation and land used for cultivation of livestock grazing. However, <i>G. subgutturosa</i> does graze at the edge of cultivated land throughout much of their range.</p> <p>The northern distribution of <i>G. subgutturosa</i> is limited by the difficulty of foraging where snow depths reach 10-15cm. In winter, they inhabit windy, snow free areas, finding shelter from wind in deep wadis, gorges of low mountains or thickets.</p> <p>Habitats range from areas having clayey and sandy soils that support grasses, forbs and shrubs, to areas nearly devoid of all vegetation, such as basalt deserts, salt flats and shale slopes.</p> <p>In the southern-Arabian peninsula and parts of Central Asia, <i>G. subgutturosa</i> lives primarily in sand dunes. In agricultural areas, <i>G. subgutturosa</i> eats fruits or shoots of barley, chick peas, cotton, dates, maize, melons, onions, sugar cane, and wheat.</p> <p>For much of the year, <i>G. subgutturosa</i> obtains its water from green plants or snow, but they drink occasionally if surface water is available. In Central Asia, <i>G. subgutturosa</i> historically migrated during autumn and spring between northern steppes having snow cover and deserts in the south.</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>G. subgutturosa</i>
	<i>G. subgutturosa</i> shares its summer pastures with sheep ( <i>Ovis ammon</i> ).
<b>Habibi (2001).</b>	<i>G. subgutturosa</i> were once widespread in the steppes and semideserts of the western and southwestern regions of Afghanistan.

**WCS/PoWPA Public Consultation:** Local community participants at the PoWPA Public Consultations held during May – July 2009, noted that *G. subgutturosa* was present in the following provinces/districts:-

- Jawzjan Province (in Lylee desert and sandy areas between Khaja Dokoh and Kham Ab areas)
- Balkh Province (in Khulam, Kaldar and Seya Ali deserts)
- Nuristan Province
- Kunar Province

### Information for Goitered gazelle (*Gazella subgutturosa*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1306	Irrigated: intermittently cultivated	0 – 1,500m	Summer precipitation - since <i>G. subgutturosa</i> is known to live in a rid zones, refine by excluding all areas that received more than 15mm of average monthly rainfall during Jun – Aug 2007.  Snow depth - since <i>G. subgutturosa</i> avoids areas with deep snow cover, refine by excluding all areas with an average 8-day snow depth of more than 20cm during Jan 09.  Extend buffer around Habibi's range to the entire country.
PA1307	Fruit trees		
PA1309	Rainfed crops (flat lying areas)		
PA1313	Rainfed crops (sloping areas)		
PA0506	Rangeland		
PA1004	Rocky outcrop/bare soil		
PA0808	Sand covered areas		
PA1014	Sand dunes		
PA1322			
PA1326			
PA1018			

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

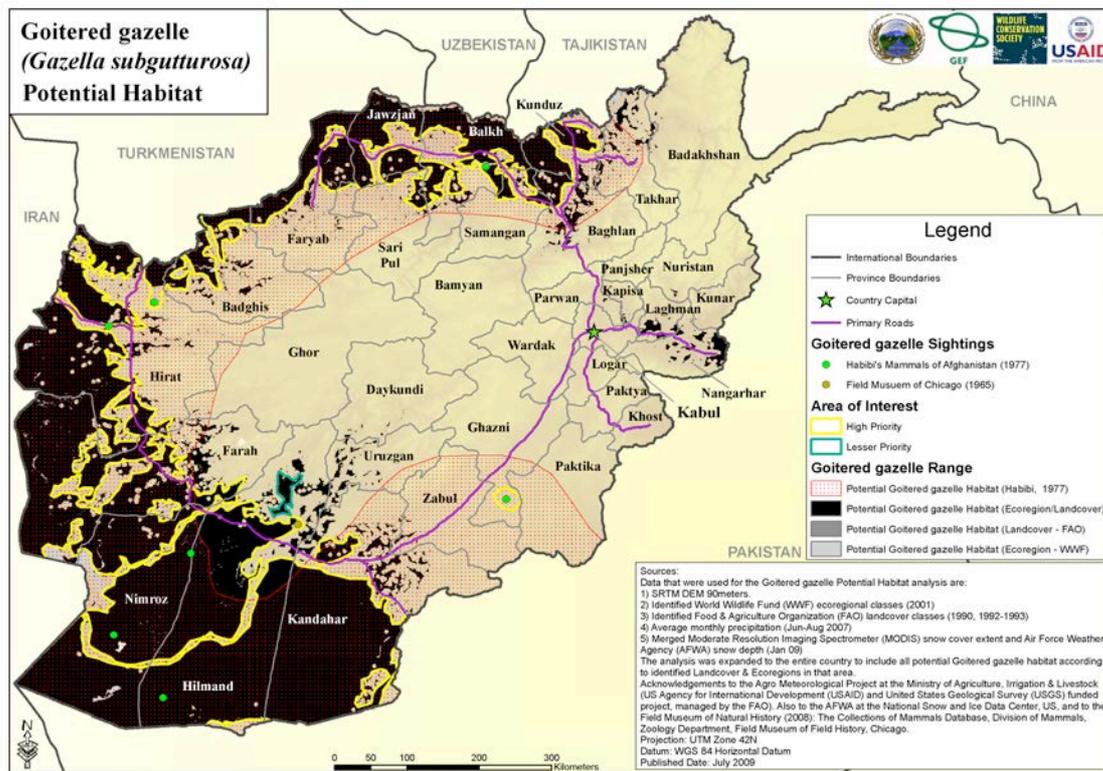
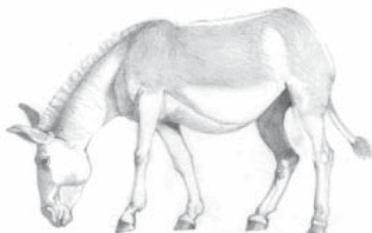


Figure 25: Goitered gazelle (*Gazella subgutturosa*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Asiatic wild ass (Onager) – *Equus hemionus*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>E. hemionus</i>
Habibi (2003).	<i>E. hemionus</i> lives in semi-deserts, arid plains and treeless biotopes, between 500 – 1,500m.
IUCN – Moehlman (2008).	<b>8 major habitat categories listed:</b> temperate shrubland; subtropical/tropical dry shrubland; temperate grassland; subtropical/tropical dry grassland; rocky areas; hot desert; temperate desert; cold desert.  <i>E. hemionus</i> inhabits mountain steppe, steppe, semi-desert and desert

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>E. hemionus</i>
	<p>plains, although they are most usually found in desert steppe. Typically they are grazers and in Mongolia throughout the year they eat <i>Stipa glareosa</i>, <i>Agropyron cristatum</i> and <i>Achnatherum</i> species.</p> <p>They can also be found in rocky or sandy areas associated with <i>Artemisia</i>, <i>Anabasis</i> species, Russian thistle, saxaul (<i>Haloxylon ammodendron</i>) and pea shrubs (<i>Caragana</i> species).</p> <p>Water sources are an important determinant of distribution; in summer months the species occurs within 10-15 km of standing water, and this range increases five-fold in winter when it is not restricted by water availability.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>E. hemionus</i>
Evolutionary Distinct & Globally Endangered and Zoological Society of London (EDGE/ZSL) (2009).	<p><i>E. hemionus</i> occurs in flat semi-desert regions which are hot during the day and cool at night, with little rainfall. Once common in most of the central and southern plains of Iran, they are now found in just two protected areas.</p> <p><i>E. hemionus</i> eats grasses when available, but will also browse on herbs, shrubs and trees. Although they obtain most of their water from food, they are almost always seen within 30 km of a water source. Lactating females in particular need to visit water frequently.</p>
Feh et al. (2001).	<p>A study conducted in Mongolia in 2001 aimed at contributing basic information on fluctuations in numbers, adult sex-ratio, reproductive rate, home range and habitat preferences in Gobi National Park.</p> <p>In this study, despite the extensive areas of shrub desert found in Gobi making up close to 45% of the whole area, <i>E. hemionus</i> were only seen rarely (6%) on these, either in the winter or summer. Over the whole year, <i>E. hemionus</i> grazed or rested often on desert steppe vegetation (40.6%) followed by oases (30.8%) and mountain steppes (22.6%). Oases are used when in the beginning of spring when the foals are born, and then herds move to desert steppes in autumn and early winter.</p> <p><i>E. hemionus</i> are grazers specialised on monocotyledons (one of two major flowering plant groups) such as perennial grasses, <i>Agropyron</i> species, <i>Achnatherum splendens</i> and reeds (<i>Phragmites</i> species) and rushes (<i>Juncus</i> species) - the highest densities of which occur in the oases, followed by mountain and desert steppes.</p> <p>Snow has short-term influence on habitat use. When snow cover is highest (20 – 50cm) the animals grazed on the lower mountains slopes in order to avoid snow drifts. When it partly melted on the warmer desert steppe, they grazed in the plains actively searching for the snow patches to eat from.</p> <p>The existence of large herds of <i>E. hemionus</i> seems to be important for reproductive rate of the population. This asks for specific habitat requirements, namely extensive patches of dense grasses, reeds or</p>

## Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>E. hemionus</i>
	rushes not more than 30km from an undisturbed watering place.
Baskin & Kjell (2003).	<p><i>E. hemionus</i> is known to prefer semi-deserts and deserts of uplands and foothills. During winter, they are found mostly in deserts; during summer mostly in semi-deserts and more seldom in steppes.</p> <p>Snow is an important water source, although snow depth of more than 60-70cm is limiting.</p> <p>In the past, <i>E. hemionus</i> inhabited areas with a temperature range from -50 to +45 degree Celsius.</p>

### Information for Asiatic wild ass (*Equus hemionus*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1306	Rangeland	500 – 1,500m	<p>Hydrogeology – <i>E. hemionus</i> is dependent on being close to sources of water. Therefore exclude all land that is more than 30km from a water source in any direction.</p> <p>Human settlements – since <i>E. hemionus</i> is known to be particularly cautious of humans – no Aols were delineated around sites where there was a certain density of human settlements (the human settlement map was overlaid onto the species map to allow for this refining process).</p> <p>Extend buffer around Habibi's range to the entire country.</p>
PA1307	Sand-covered areas		
PA1313	Sand dunes		
PA1322	Water bodies		
PA1018			

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

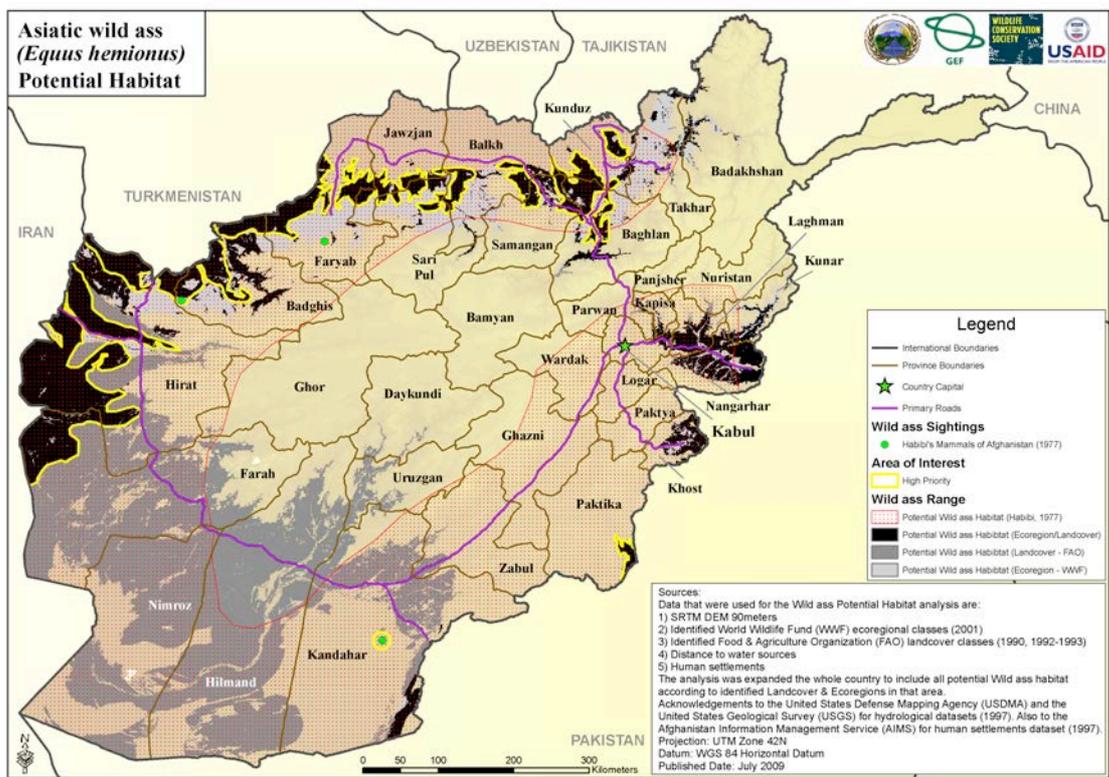


Figure 26: Asiatic wild ass (*Equus hemionus*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Mehely's Horseshoe Bat – *Rhinolophus mehelyi*



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### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>R. mehelyi</i>
Habibi (2003).	No habitat description provided
IUCN – Hutson et al. (2008).	<b>4 major habitat categories listed:</b> subtropical/tropical dry shrubland; Mediterranean-type shrubby vegetation; caves and other subterranean habitats.  <i>R. mehelyi</i> forages in Mediterranean shrubland and woodland, and in dry

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>R. mehelyi</i>
	<p>steppes. Summer roosts are in warm caves, often in karstic (limestone) regions.</p> <p>Winter hibernation sites for <i>R. mehelyi</i> are in colder underground locations (usually large caves with a constant microclimate). The species only roosts in caves and does not tend to use artificial habitats.</p>

## Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>R. mehelyi</i>
<b>Russo et al. (2005).</b>	<p>The least preferred habitats for <i>R. mehelyi</i> are open habitats such as scrubland, grassland and arable land. It forages in a range of different wooded habitats, including broadleaved woodlands like Eucalyptus plantations and those characterized by loose tree cover, such as the 'dehesa' (a Spanish semioak savanna with a tree cover of 20-25% mainly made of <i>Quercus rotundifolia</i> and <i>Q. suber</i>), riparian woodland and olive/almond orchards. However, <i>R. mehelyi</i> seems to keep away from dense woodland where it would have to compete with other, more manoeuvrable bat species.</p> <p>This study was carried out in the altitudinal range 290 – 784m.</p>
<b>Salsamendi et al. (2005).</b>	<p>Higher aspect ratio and wing loading observed in <i>R. mehelyi</i> in a study examining the relationship between habitat use and wing morphology, indicated reduced maneuverability and faster flight speed compared to a con-specific Mediterranean bat species – <i>R. euryale</i>. Consequently, <i>R. euryale</i> seems to be better adapted to forage in cluttered habitats and <i>R. mehelyi</i> tends to fly in more open environments.</p>
<b>DeBlase (1980).</b> <b>Gazaryan – Russian Bat Research Group. (pers. comms)</b>	<p>Most findings of <i>R. mehelyi</i> in all regions in Asia have been underground (e.g. in caves of karst (limestone) or loess (formed of deposits of silt, sand and clay), or underground water channels).</p> <p>All roosts were found in arid and semi-arid landscapes, open or covered by shrub vegetation. Temperature in summer roosts range from 14-20° Celsius. Their winter roosts are always less than 15 °C, but not lower than 7-9 °C.</p>
<b>Spanish Government Ministry of the Environment and Rural Affairs (2007).</b>	<p><i>R. mehelyi</i> is generally found at low altitudes, rarely above 500m, in areas covered with bushes or plentiful forest of oak and cork trees. It is closely linked to warmer areas, staying close to water-courses and areas of cultivation. The species uses caves or mines of medium or large size.</p> <p>In El Pais Valenciano (Spain), the colonies appear to have a marked dependency on warmer refuges, with temperatures higher than 18°C.</p>
<b>Ministry of Environment and Water for Bulgaria (2003).</b>	<p>Most important habitats for European bats, including <i>R. mehelyi</i> are limestone areas, and rocky cliffs and gorges with many crevices. Also, old deciduous forests, mainly beech forests situated at an altitude of 600 – 1,600m.</p>
<b>Hoath (2003).</b>	<p><i>R. mehelyi</i> roosts mainly in caves. They have been recorded from sites close to urban areas but are considered more of a desert species.</p>
<b>Macdonald (1993).</b>	<p><i>R. mehelyi</i> prefers limestone areas with close access to water. It is a cave-dwelling species.</p>

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Information for Mehelyi's horseshoe bat (*Rhinolophus mehelyi*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1313	Degenerate forest/ high shrubs Fruit trees Irrigated: intensively cultivated (1 crop/year) Irrigated: intensively cultivated (2 crops/year) Irrigated: intermittently cultivated Natural forest (open cover) Pistachio forest Rocky outcrops/ bare soil Vineyards Water bodies	0 – 1,600m	Hydrogeology – <i>R. mehelyi</i> is noted as being dependent on sources of water. Therefore exclude all land that is more than 20km from a water source in any direction.  Areas of limestone (USGS data) – since <i>R. mehelyi</i> prefers limestone areas, delineate AoIs according to where suitable landcover and/or ecoregion also overlaps with areas of limestone across Afghanistan.

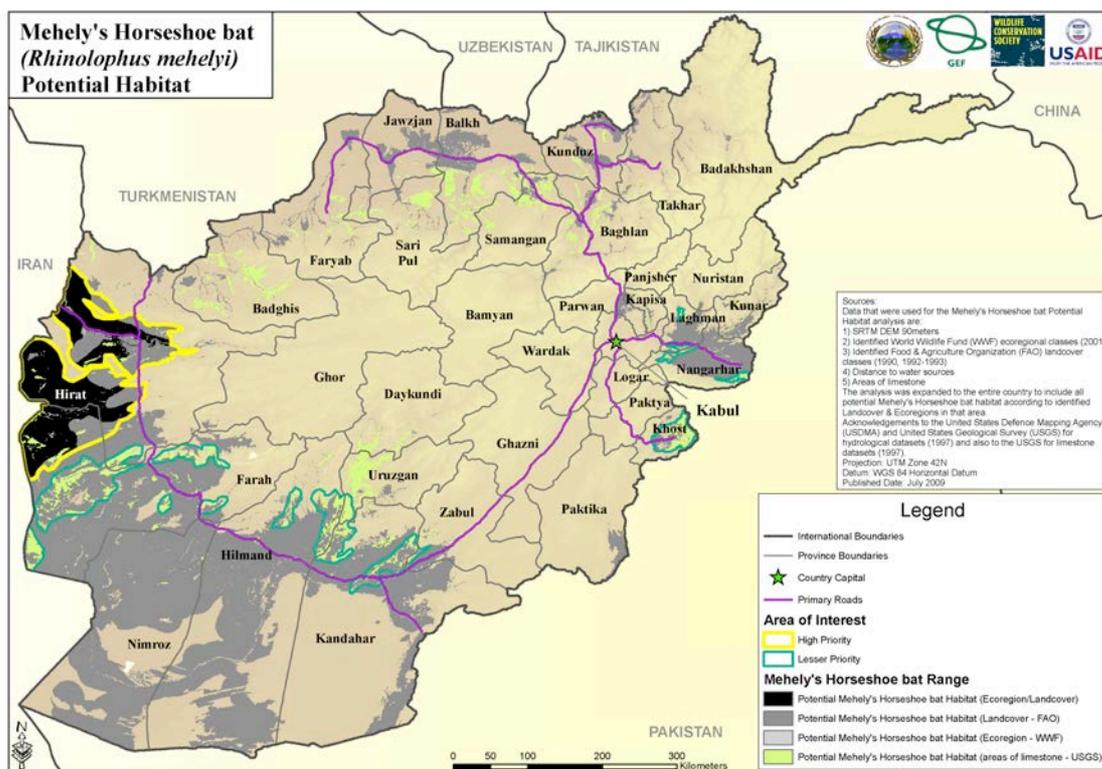


Figure 27: Mehely's horseshoe bat (*Rhinolophus mehelyi*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Kashmir cave bat – *Myotis longipes*



### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>M. longipes</i>
Habibi (2003).	No habitat description or map provided but Habibi does describe <i>M. longipes</i> distribution in Afghanistan as only in Jalalabad and Grot Pialah.
IUCN – Molur & Srinivasulu (2008).	<p><b>1 major habitat categories listed:</b> terrestrial</p> <p><i>M. longipes</i> roosts in large colonies of thousands of individuals in caves, cracks and crevices in old disused buildings, old tunnels and underground canals in primary or secondary forests.</p> <p>It is an early flyer and hunts over water surfaces.</p>

### Secondary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>M. longipes</i>
Bates & Harrison (1997).	<i>M. longipes</i> has a range restricted to Afghanistan and India. Within Afghanistan, it is found in Pilah Cave; Jalalabad. In Jalalabad, a colony of 2000 individuals formed a summer colony in an underground canal beneath the square near the Royal Palace.

### Information for Kashmir cave bat (*Myotis longipes*) distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1307 PA1309 PA0506 PA1005 PA1018	With literature on habitat descriptions for <i>M. longipes</i> being so limited, no landcover categories were assigned.	Not sufficient literature found to designate an elevation range for this species.	<p>Hydrogeology – <i>M. longipes</i> is noted as hunting over waterbodies. Therefore exclude all land that is more than 20km from a water source in any direction.</p> <p>Range data from IUCN.</p> <p>Extend buffer around Habibi's range to the entire country.</p>

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

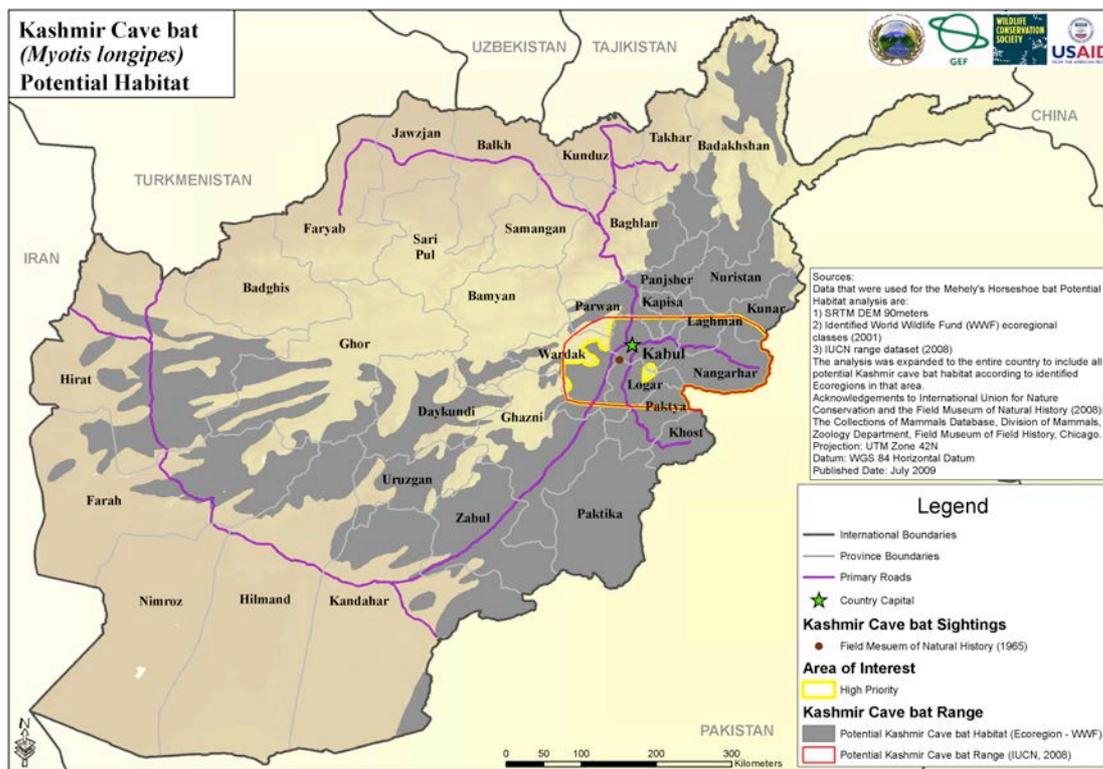


Figure 28: Kashmir cave bat (*Myotis longipes*) potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## *Eremias aria* (Wall lizard species)

### Information for *Eremias aria* distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1307	With literature on habitat descriptions for <i>E. aria</i> being so limited, no landcover categories were assigned. Leviton & Anderton (1970) simply state the range of <i>E. aria</i> as East Afghanistan (the Vale of Jalalabad).	Not sufficient literature found to designate an elevation range for this species.	None (just one sighting record to help designate high priority AoI.)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

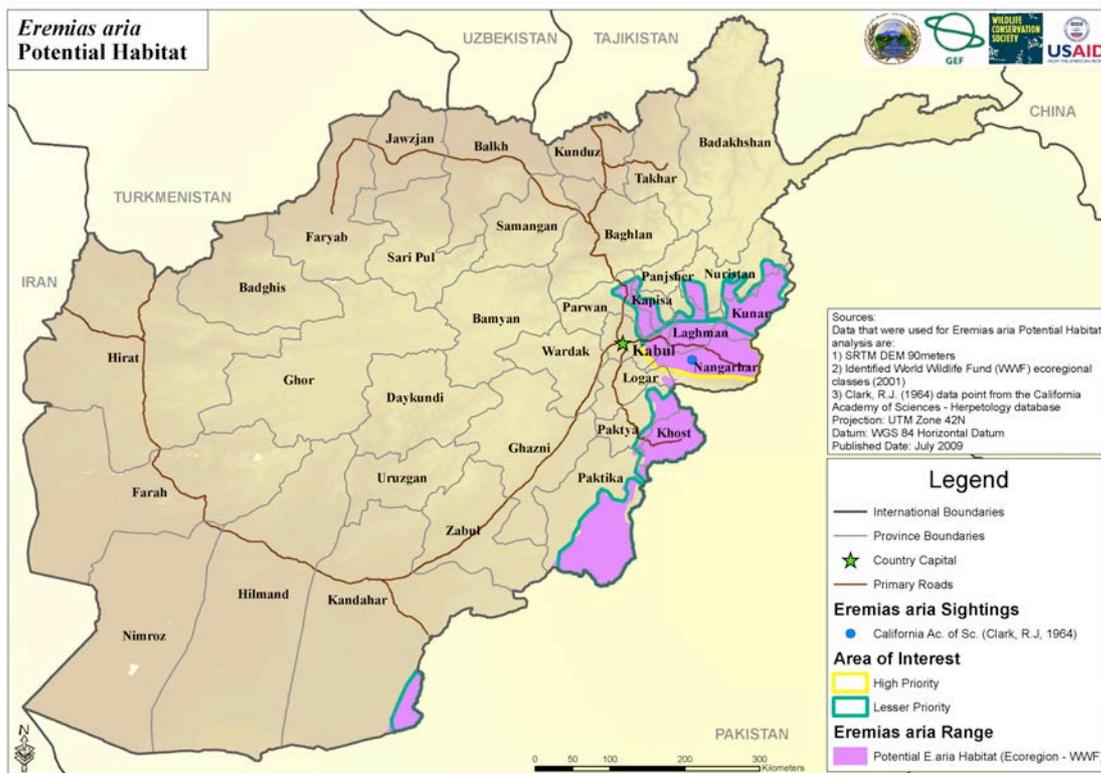


Figure 29: *Eremias aria* potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## *Asiocolotes levitoni* (Glass lizard species)

### Information for *Asiocolotes levitoni* distributional model

Designated ecoregion codes (see Table 3 in report)	Designated landcover types	Elevation	Refining factors (additional to elevation)
PA1309	With literature on habitat descriptions for <i>A. levitoni</i> being so limited, no landcover categories were assigned. Leviton & Anderton (1970) simply state the range of <i>A. levitoni</i> as NE Afghanistan	Not sufficient literature found to designate an elevation range for this species.	None (just two sighting records to help designate high priority AoI.)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

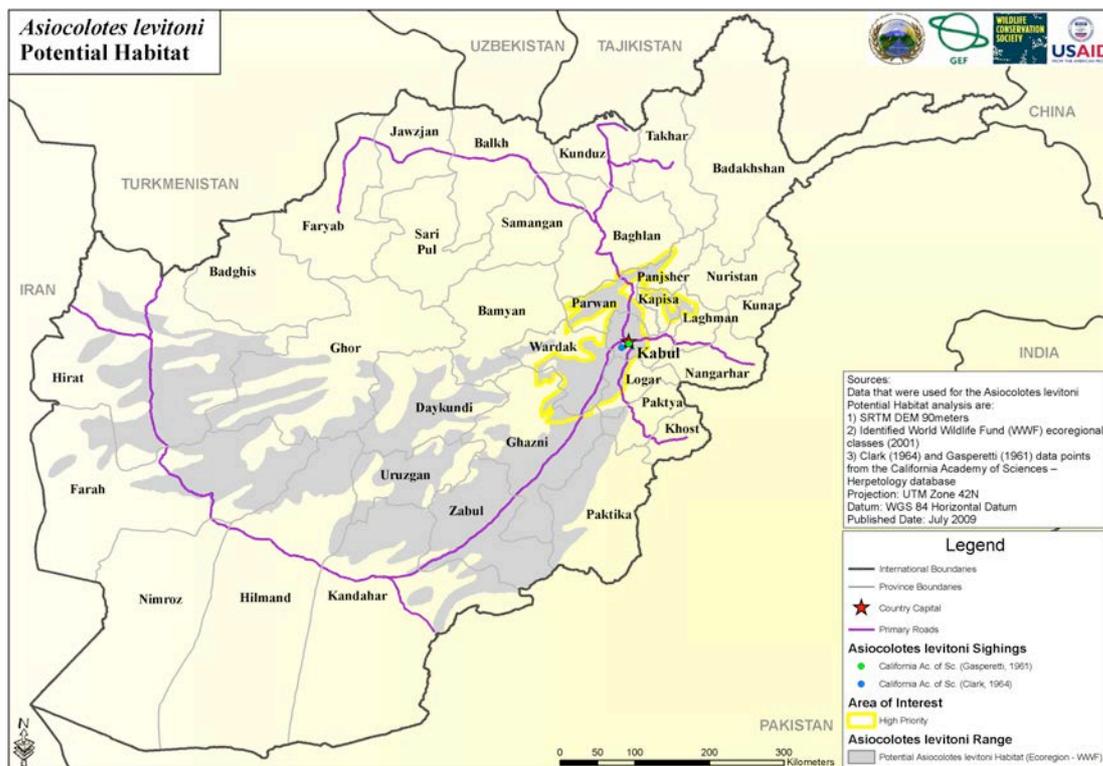


Figure 30: *Asiocolotes levitoni* potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## *Cyrtopodion voraginosum* (Glass lizard species)

### Information for *Cyrtopodion voraginosum* distributional model

Designated ecoregion codes	Designated landcover types	Elevation	Refining factors (additional to elevation)
None available	With literature on habitat descriptions for <i>C. voraginosum</i> being so limited, no landcover categories were assigned. Leviton & Anderton (1970) simply state the range of <i>C. voraginosum</i> as Helmand (Girisk region)	Not sufficient literature found to designate an elevation range for this species.	None (just three sighting records to help designate high priority AoIs.)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

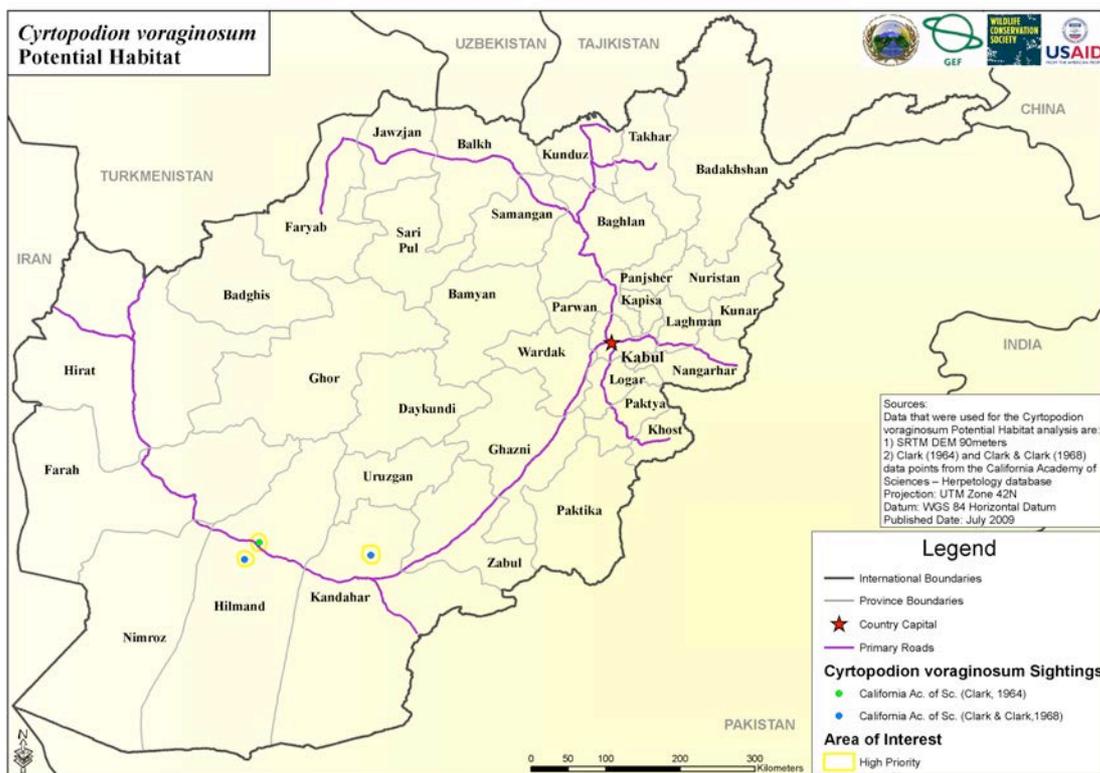
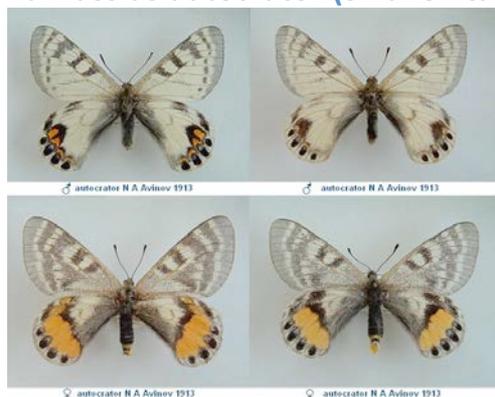


Figure 31: *Cyrtopodion voraginosum* potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## *Parnassius autocrator* (Swallowtail butterfly species)



© Goran Waldeck

### Primary Habitat Descriptions:

Source of Information	Habitat Descriptions for <i>P. autocrator</i>
Collins & Morris (1985).	<p><i>P. autocrator</i> flies at high altitude in the Hindu Kush of Afghanistan, and the Pamir mountains of Tajikistan. It is extremely local in its distribution.</p> <p><i>P. autocrator</i> is a member of the Charltonius species group, whose young stages feed on Fumariaceae plant family. The foodplant of <i>P. autocrator</i> is <i>Corydalis adiantifolia</i> (and possibly <i>C. hindukushensis</i>) – two very local plant species that grow on steep, rocky slopes and cliffs at altitudes around 3,000m</p>

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>P. autocrator</i>
	<p>and above.</p> <p>In north-eastern Afghanistan, <i>P. autocrator</i> is found in the narrow steep-sided valleys where these two foodplants are believed to occur. They fly at altitudes between 2,800 and 4,000m, but are most numerous between 3,200-3,500m.</p> <p>The climate at these altitudes in the Hindu Kush is dry and hot in summer with deep snow in winter. The landscape in summer is bare and dry with thorny, succulent and aromatic shrubs growing on rocky bare earth and scree. This is in great contrast to the meadows in which other alpine butterflies of the same family fly. The former-USSR populations of <i>P. autocrator</i> are said to fly in pastures but the composition and extent of these habitats are unknown.</p> <p>The species is known to be extremely local in north-eastern Afghanistan.</p>
Wyatt & Omoto (1963).	<i>P. autocrator</i> is very local and mainly found where its main foodplant is found – <i>C. adiantifolia</i> . This plant is local to the Hindu Kush and found nowhere else.

## Information for *Parnassius autocrator* distributional model

Designated ecoregion codes	Designated landcover types	Elevation	Refining factors (additional to elevation)
None available	Rangeland  Rocky outcrop/ bare soil	3,000 – 4,000m	<p><b>Slope</b> - since <i>P. autocrator</i> is known to inhabit areas with steep-sided valleys, refine by excluding all areas of less than 30 degrees slope.</p> <p><b>Sightings</b> of one of <i>P. autocrator</i>'s main foodplant – <i>Corydalis hindukushensis</i>.</p> <p>With such a localized range quoted, this analysis was only carried out in the northeastern region of Afghanistan.</p>

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

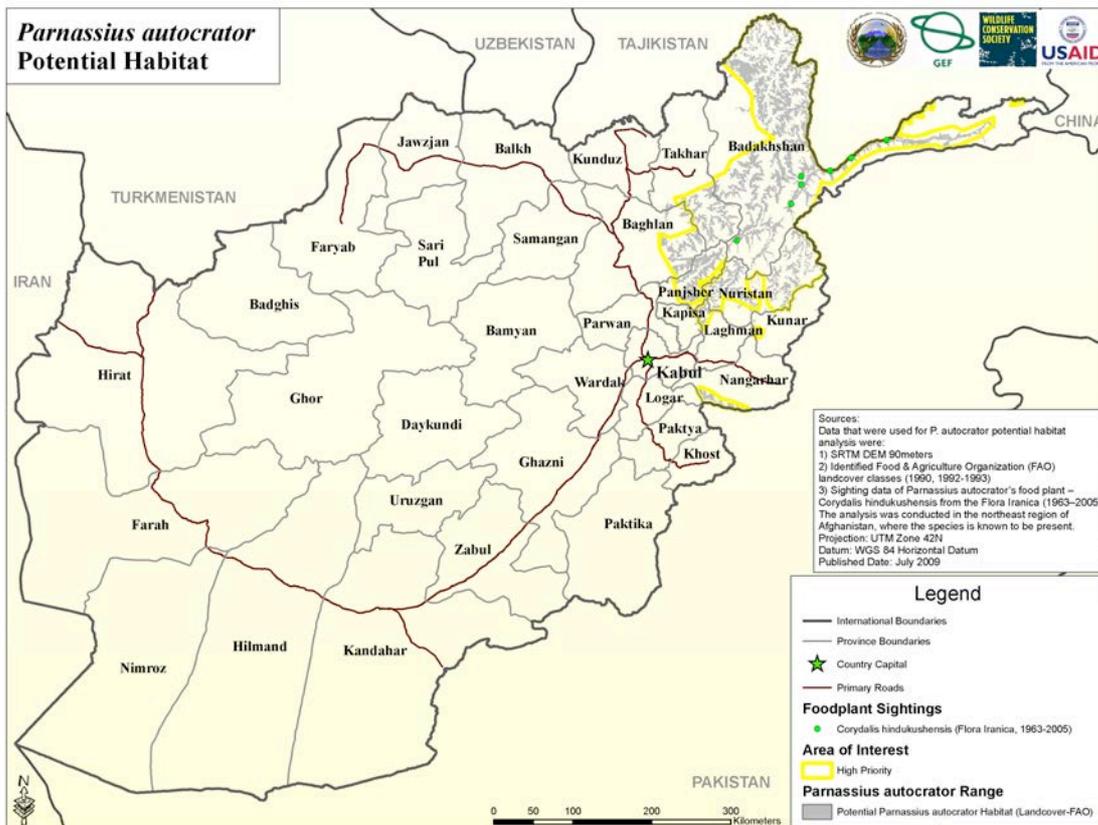


Figure 32: *Parnassius autocrator* potential habitat across Afghanistan, with species areas of interest displayed (WCS, 2009)

## Saker falcon (*Falco cherrug*)



© Tanya Dewey/Animal Diversity Web

*F. cherrug* is classified as endangered by the IUCN Red List and is also listed on Afghanistan's Protected Species List. It is neither habitat or biome-restricted but does face a multitude of threats from habitat loss (primarily due to agricultural intensification), a reduction in prey species, human persecution and off-take for the falconry trade.

### Primary Habitat Descriptions:

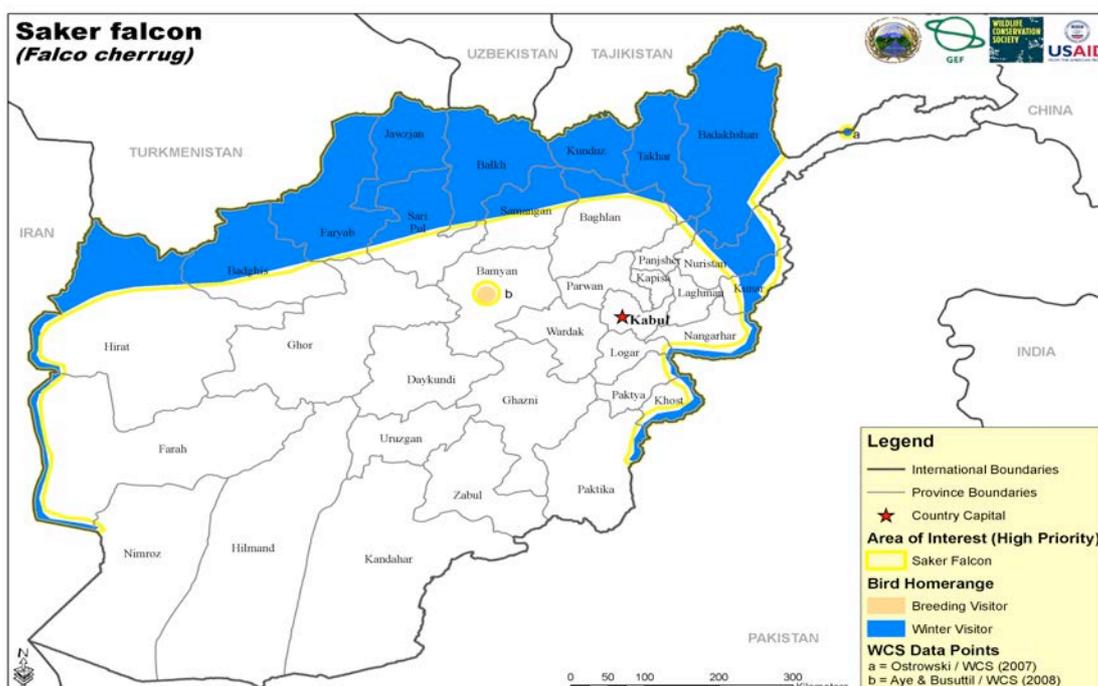
NB. These descriptions were not used for mapping purposes, however provide background to where *F. cherrug* might be found within Afghanistan.

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

Source of Information	Habitat Descriptions for <i>F. cherrug</i>
BirdLife International (2009a).	<i>F. cherrug</i> hunts close to the ground, in open terrain, specializing on rodents that live in open grassy landscapes such as desert edge, semi-desert, steppes and arid montane areas. The species uses copses or cliffs for nest sites, and occasionally even the ground.
Rasmussen & Anderton (2005).	<i>F. cherrug</i> is found in desert, semi-desert, mountains and open areas including wetlands. In its main range, <i>F. cherrug</i> is mainly found in steppe.
Aye (2007).	Immediately next to riverine thickets, dry rocky habitats host a different community of birds including <i>F. cherrug</i> .

## Additional Sources of Data

Source of Data	Description
Aye & Busuttil (2008).	<i>F. cherrug</i> is possibly breeding in Band-i-Amir since one bird was seen by WCS research teams circling above Dewkhana Canyon, Band-i-Amir, in June 2008. As the species is relatively faithful to its breeding sites, it was categorized as a possible breeder. More observations are needed to confirm its status. See (b) on range map below.
Ostrowski (2007).	A possible first-year <i>F. cherrug</i> individual was seen by WCS research teams roosting at a site near to Qila-e Panja along the Wakhan Corridor in November 2007, suggesting this area is used as winter visiting grounds. See (a) on range map below.



**Figure 33: Saker falcon (*Falco cherrug*) potential range/areas of interest in Afghanistan**

(Data from Rasmussen & Anderton, (2005),<sup>i</sup> and 2007/2008 WCS surveys.)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## Siberian Crane (*Grus leucogeranus*)



© BirdLife International

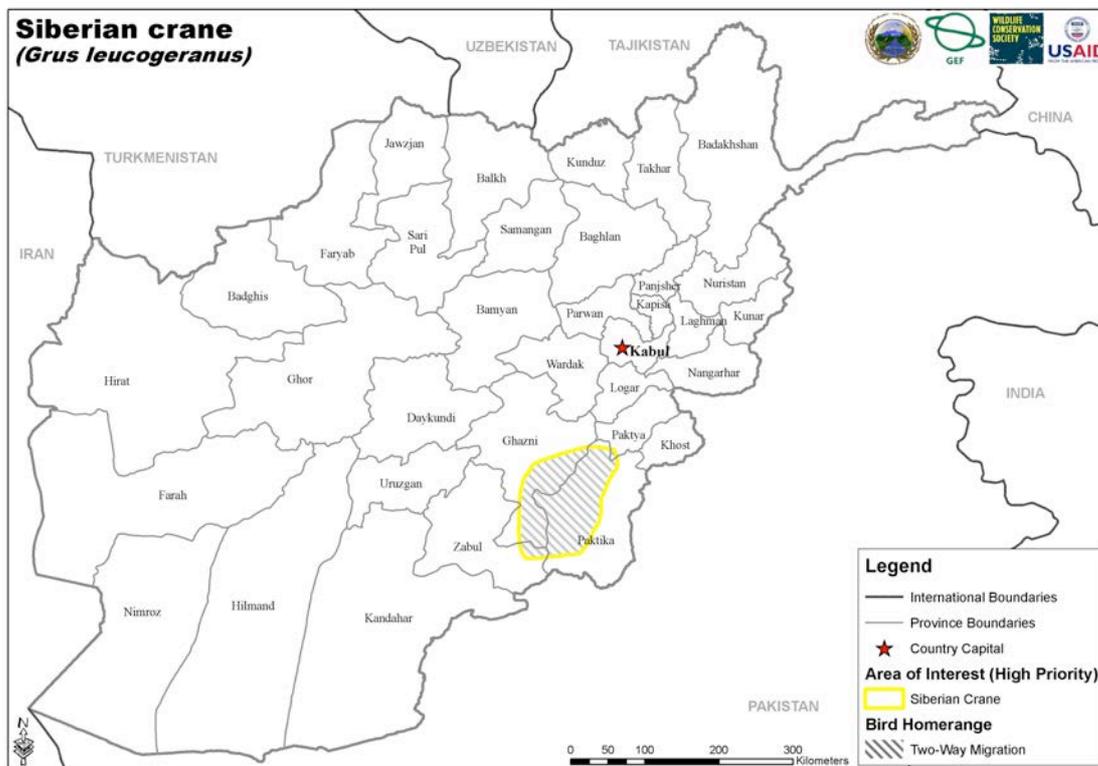
The IUCN lists *G. leucogeranus* as a critically-endangered bird, facing significant threat to its survival given severe habitat destruction to its wintering grounds in China, where a large portion of the population can be found. Wetland loss and degradation is occurring elsewhere in *G. leucogeranus* range areas, through agricultural development, human disturbance and the development of oilfields. The central and western populations are also hunted whilst on passage through for their migration. Furthermore, climate change may be affecting the species' breeding grounds, with melting of the permafrost layer causing expansion of lakes and loss of important islands. *Grus leucogeranus* was placed on Afghanistan's Protected Species List in early 2009.

### Primary Habitat Descriptions:

NB. These descriptions were not used for mapping purposes, however provide background to where *G. leucogeranus* might be found. It is neither considered a habitat-restricted or biome-restricted species, however within Afghanistan, *G. leucogeranus* is known from just one site, used for resting on their two-way migration – Ab-i-Estada.

Source of Information	Habitat Descriptions for <i>G. leucogeranus</i>
<b>BirdLife International (2009b).</b>	<p><i>G. leucogeranus</i> is the most aquatic member of its family, breeding and wintering in wetlands, and showing a general preference for wide expanses of shallow fresh water (up to 30 cm) with good visibility. It favors sites that are infrequently visited by man.</p> <p>Resting areas and stopovers on migration tend to consist of large, isolated wetlands (for example, the shallows and mudflats of seasonal lakes of the Yangtze Basin in China). <i>G. leucogeranus</i> also rests on steppes near water, open jheels and swamps. Those that winter in India and Iran use artificial water impoundments and flooded rice fields.</p> <p>Although it has been suggested that the last few Indian-wintering <i>G. leucogeranus</i> may migrate through the Small Pamir with <i>G. grus</i>, based on local people's reports of the species in western Nuristan, it seems more likely that the species migrates through the mountains of northern Afghanistan via Salang Kotal (given the known pattern of records north of this region).</p>
<b>Rasmussen &amp; Anderton (2005).</b>	On migration, <i>G. leucogeranus</i> uses wetlands away from human settlements and is highly faithful to known wintering sites.

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps



**Figure 34: Siberian crane (*Grus leucogeranus*) potential range/area of interest in Afghanistan**

(Data from Rasmussen & Anderton, (2005))

## Greater flamingo (*Phoenicopterus roseus*)



© Peter Dunn

*P. roseus* is listed by IUCN as least concern, with a relatively large population and range, and an increasing population trend. However, within Afghanistan, this species faces habitat destruction through desiccation of wetlands at its breeding and wintering sites. This is caused both through diversion of inflowing waters from intensified irrigation activities and periods of natural drought. Consequently, breeding within Afghanistan can be severely affected. For these reasons, *P. roseus* was placed on Afghanistan’s Protected Species List in early 2009.

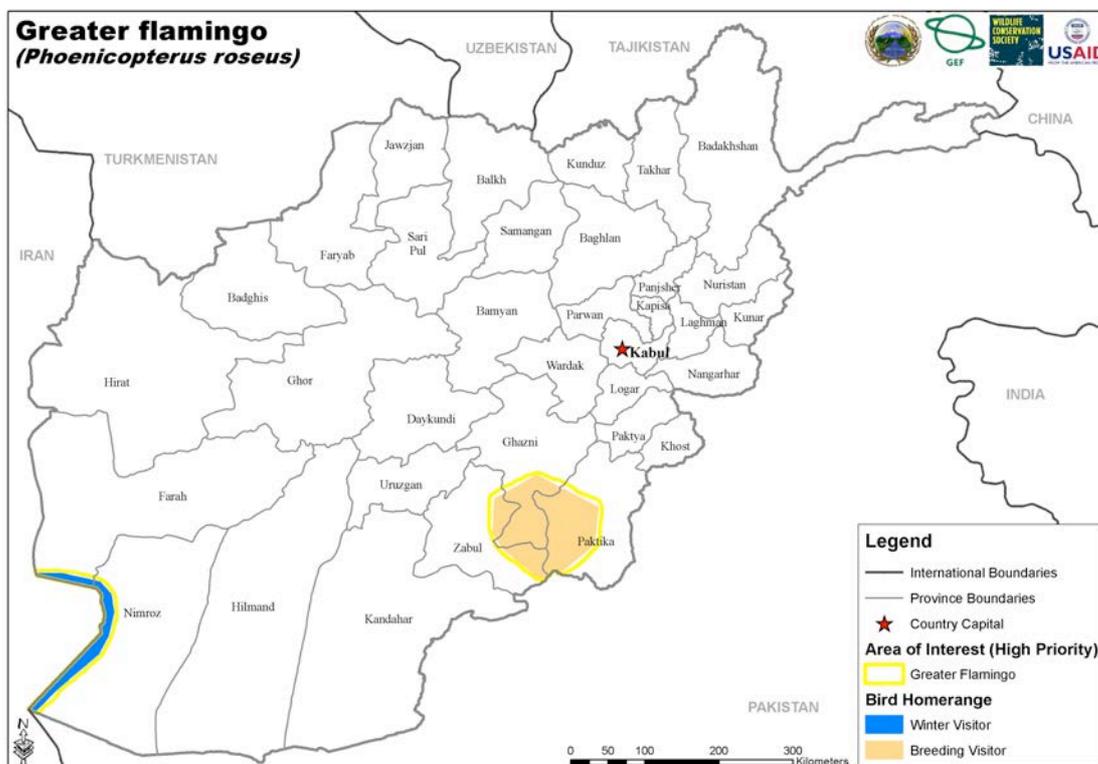
### Primary Habitat Descriptions:

NB. These descriptions were not used for mapping purposes, however provide background to where *P. roseus* might be found in Afghanistan. It is considered to be restricted to certain habitats (estuarine waters and/or inland wetlands – specifically permanent saline, brackish/alkaline lakes)

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

but is not a biome-restricted species according to BirdLife International. Within Afghanistan, *P. roseus* is known to breed in just two sites - Dasht-e-Nawar and Ab-i-Estada (although the Ab-i-Estada colony may not longer exist). Other wetlands in Afghanistan do provide potential habitats for *P. roseus* whilst they migrate across the country (e.g. Hamun-i Puzak).

Source of Information	Habitat Descriptions for <i>P. roseus</i>
BirdLife International (2009c).	<i>P. roseus</i> inhabits shallow (~1 m deep over a large area) eutrophic waterbodies such as saline lagoons, salt pans and large saline or alkaline lakes. It will also frequent sewage treatment pans, inland dams, estuaries and coastal waters, seldom alighting on freshwater but commonly bathing and drinking from freshwater inlets entering alkaline or saline lakes.  <i>P. roseus</i> nests and roosts on sandbanks, mudflats, bare rocky islands or boggy, open shores.
Rasmussen & Anderton (2005).	<i>P. roseus</i> breeds on saline flats; otherwise found in small numbers in large jheels and sheltered shallow coastal waters.
Ostrowski et al. (2008a).	During a summer mission in 2007 to Dasht-i Nawar, WCS teams observed <i>P. roseus</i> breeding for the first time, more than 30 years after the last report. This confirmed the importance of Dasht-i Nawar as important area for the long-term survival of this species within Afghanistan. Little is known about the winter grounds of this population although several authors have hypothesized it could be in Pakistan or in the Seistan marshes in Fars Province, Afghanistan.



**Figure 35: Greater flamingo (*Phoenicopterus roseus*) potential range/area of interest in Afghanistan**

(Data from Rasmussen & Anderton, (2005))

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

## MacQueens Bustard (*Chlamydotis macqueeni*)



© Ray & Gemma Purser

IUCN lists *C. macqueeni* as vulnerable on the basis of rapid population declines due to habitat loss and unsustainable hunting pressure from Middle Eastern falconers, particularly on the species' wintering grounds. These threats and a continually declining population led to *C. macqueeni* being placed on Afghanistan's Protected Species List in early 2009.

### Primary Habitat Descriptions:

NB. These descriptions were not used for mapping purposes, however provide background to where *C. macqueeni* might be found in Afghanistan. This species is considered biome-restricted to Eurasian desert and semi-desert, according to BirdLife International. It is largely resident in Western and Southern Afghanistan, and a migrant through Eastern Afghanistan.

Source of Information	Habitat Descriptions for <i>C. macqueeni</i>
BirdLife International (2009d).	As with the other sub-species of the family, <i>C. macqueeni</i> inhabits sandy and stony semi-desert and is specialized to an existence in arid conditions where trees are absent and both shrub cover and herb layer are sparse. It is not known what habitat preferences exist within the spectrum of arid environments used by the species, but birds are stimulated to breed by grass growth where local rains have fallen, and therefore probably actively select more rather than less vegetated areas.
Rasmussen & Anderton (2005).	Preferred habitat for <i>C. macqueeni</i> includes semi-desert, saltpans, coastal dunes, dry grassland and scrub.

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

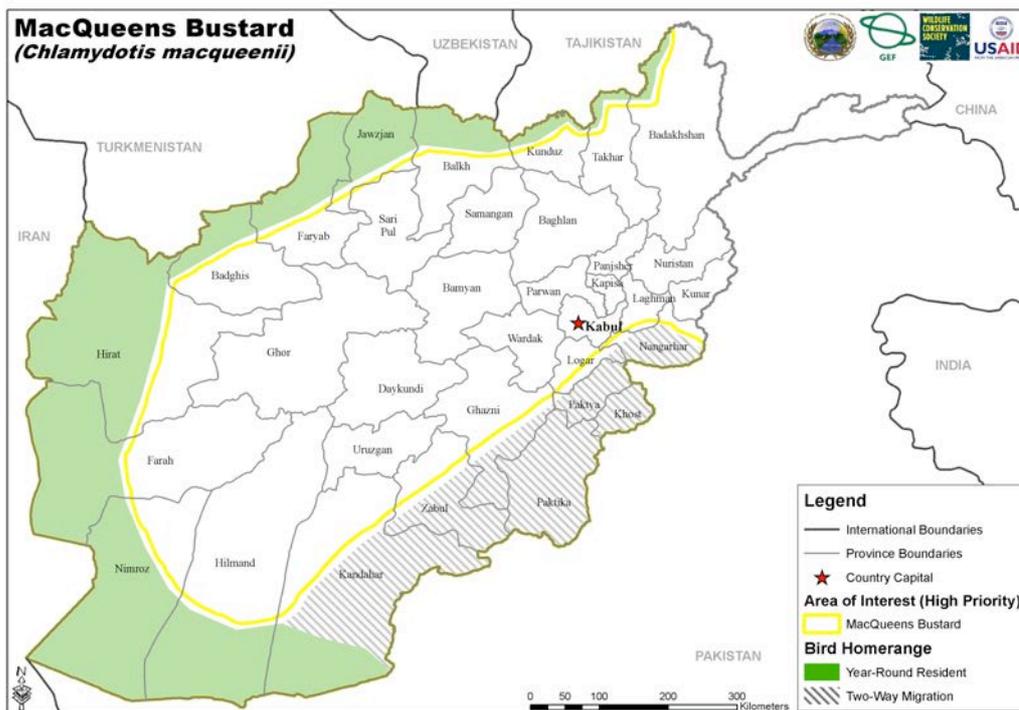


Figure 36: MacQueens bustard (*Chlamydotis macqueenii*) potential range/area of interest in Afghanistan

(Data from Rasmussen and Anderton, (2005))

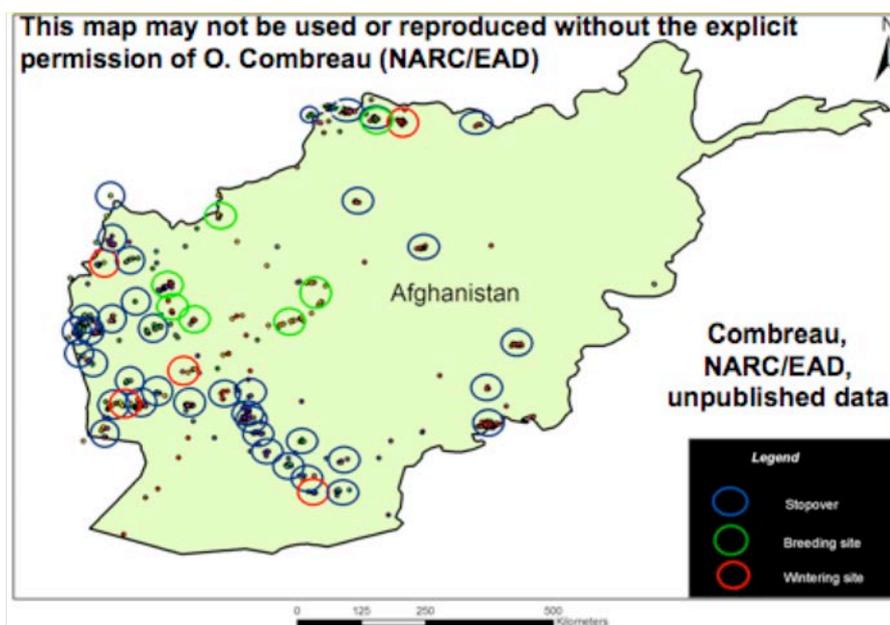


Figure 37: Satellite telemetry data from MacQueen's bustards (*Chlamydotis macqueenii*) tagged in western China, central Kazakhstan, Pakistan, the United Arab Emirates and Oman (Combreau, NARC/EAD, unpublished data).

This map and data may not be used or reproduced without the consent of the principle investigator, Dr Olivier Combreau (National Avian Research Center/Environment Agency – Abu Dhabi).

# Appendix III: Habitat Descriptions and Accompanying Species Potential Range Maps

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