

**PROPOSAL FOR INCLUSION OF SPECIES ON THE APPENDICES OF THE  
CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF  
WILD ANIMALS**

**A. PROPOSAL:** The species argali (*Ovis ammon* Linnaeus, 1758) with all subspecies is proposed to be included in Appendix II of the Convention

**B. PROPONENT:** Republic of Tajikistan and Republic of Kazakhstan

**C. SUPPORTING STATEMENT:**

**1. Taxon**

- 1.1 Classis** : Mammalia  
**1.2 Ordo** : Cetartiodactyla  
**1.3 Familia** : Bovidae  
**1.4 Genus or Species** : *Ovis ammon* (Linnaeus, 1758)  
**1.5 Common name(s)** : English - Argali, Wild Sheep  
 French - Mouflon D'Asie, Mouflon D'Eurasie, Mouflon Vrai  
 Spanish - Muflón Argal

**2. Biological data**

**2.1 Distribution (current and historical)**

Currently nine subspecies of argali are recognized (Wilson and Reeder, 2005 and Fedosenko and Blank, 2005):

- Altai argali (*Ovis ammon ammon*)
- Karaganda argali (*Ovis ammon collium*)
- Gobi argali (*Ovis ammon darwini*)
- Tibetan argali (*Ovis ammon hodgsoni*)
- North China argali (*Ovis ammon jubata*) (=comosa)
- Tian Shan argali, (*Ovis ammon karelini*)
- Karatau argali (*Ovis ammon nigrimontana*)
- Marco Polo argali (*Ovis ammon polii*)
- Severtzov argali, (*Ovis ammon severtzovi*)

Argali live over a vast geographic range, but are separated into more-or-less disjunctive populations, some of which are morphologically identifiable. How much (if any) of the taxon's disjunctive distribution is natural and how much the result of anthropogenic influence remains open to date. Similarly, how (and even whether) various populations should be classified subspecifically remains contentious.

This species is found in north-eastern Afghanistan (Badakhshan), China (Gansu, Inner Mongolia, Qinghai, possibly western Sichuan, Tibet, and Xinjiang), northern India (Ladakh, Sikkim, and Spiti), Kazakhstan (regions South Kazakhstan, Zhambyl, Almaty, Karaganda,

East Kazakhstan and possibly Kyzylorda), Kyrgyzstan, Mongolia, northern Nepal (near the Chinese border), extreme northern Pakistan (Gilgit-Baltistan), Russia (Republics Tuva and Altai), Uzbekistan (regions Jizzakh, Samarkand, Navoiy), and Tajikistan (regions Sughd and Gorno-Badakhshan). There are no recent records of argali occurrence in Bhutan (Tschewang Wangchuck pers. comm., 2008).

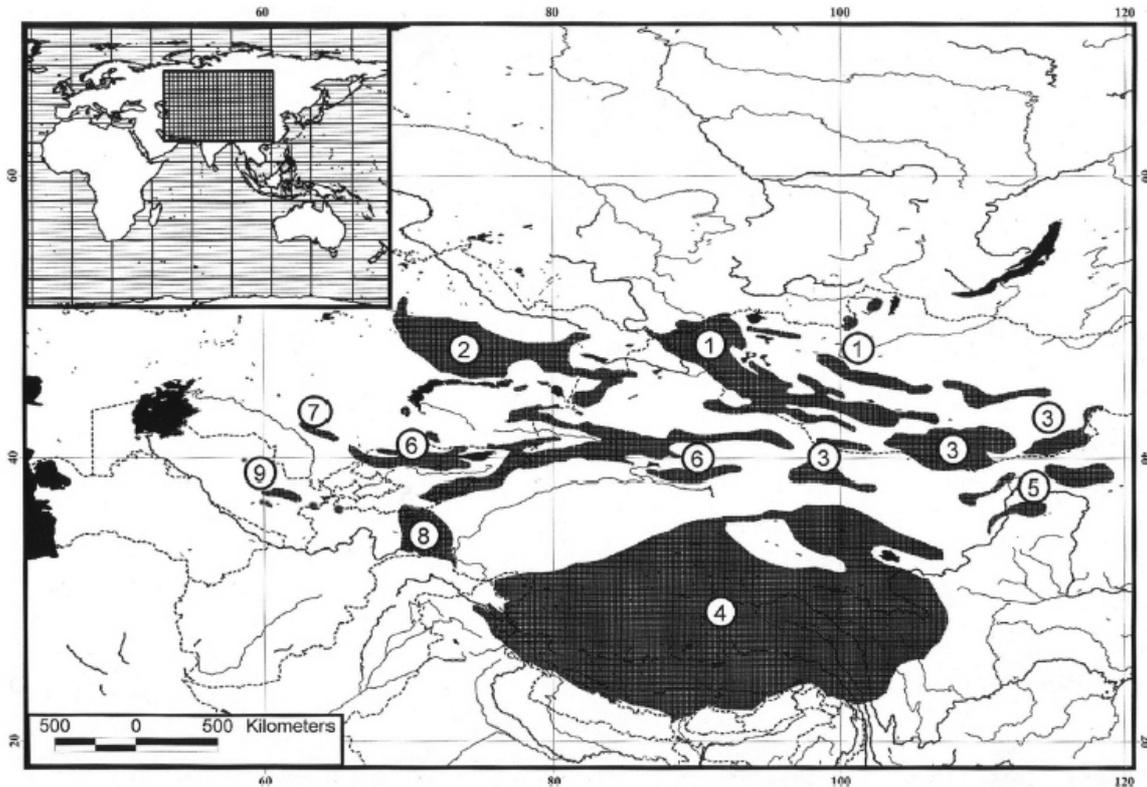


FIG. 3. Geographic distribution of *Ovis ammon* in central Asia and southern Siberia. Type localities of subspecies: 1, *O. a. ammon*; 2, *O. a. collium*; 3, *O. a. darwini*; 4, *O. a. hodgsoni*; 5, *O. a. jubata*; 6, *O. a. karelini*; 7, *O. a. nigrimontana*; 8, *O. a. polii*; 9, *O. a. severtzovi*. Precise boundaries between subspecies are unknown. Adapted from Fedosenko (2000) and Shackleton (1997).

Source: Fedosenko and Blank, 2005, Map slightly revised.

## 2.2 Population (estimates and trends)

### ***Afghanistan***

There is no comprehensive population estimate for argali in Afghanistan. The limited information available suggests a decrease of the population numbers since the early 1970s. However, due to the transboundary character of the population, migrating periodically into neighbouring Tajikistan (Schaller and Kang 2008; Harris et al. 2010), seasonal and inter-annual fluctuation of argali numbers are likely.

Harris et al. (2010) based on capture-recapture modelling from faecal DNA estimated a population size for female argali in the northern slopes of the Wakhan range (Big Pamir) was 172 (95 per cent CI 5 117–23). Because the exploration suggested that males were not a closed population, no attempt was made to estimate male abundance. Exactly opposite the survey area argali are found in Tajikistan (Michel and Muratov, 2010) and thus males are likely crossing the border. Eighty-five individuals (all males) had been encountered by B. Habib in the Wakhjir Valley near the Chinese border in July of 2007 (Harris, R.B. & Reading, R. 2008). During their survey in autumn 2004 (primarily in the Little Pamir), Schaller and Kang (2008) tallied 624 argali. Some of the argali tallied in the Little Pamir may periodically cross into Tajikistan, and thus possibly be counted within surveys there.

In the early 1970s, Petocz *et al.* (1978) accounted for approximately 1,260 argali in the Afghan Pamirs, from which they estimated a total abundance of about 2,500.

### **China**

The information on argali population numbers in China is based on Harris, R.B. & Reading, R. (2008).

Wang *et al.* (1997) put forward estimates of 29,000-36,000 for *O. a. hodgsoni* alone (in Tibet, Qinghai, and southeastern Xinjiang; although Wang (1998) subsequently wrote that such an estimate was probably a “significant overestimate”), with an additional 2,100-2,800 *O. a. darwini* (in Inner Mongolia), 600-700 *O. a. jubata* (in Inner Mongolia), 8,000-11,000 *O. a. karelini* (in the Tian Shan), 2,000-3,000 *O. a. polii* (in the Pamirs), and some additional *O. a. ammon* (in northern Xinjiang near the Mongolia border). This would suggest an estimate during the early 1990s of 41,700-53,500 argali in China. Later, as part of a nationwide attempt to generate numerical estimates for wildlife, Yu estimated the total number of argali in China to be between 23,298 and 31,910 (Yu Yuqun, Northwest Institute of Endangered Species, Xian, personal communication, 2004). Both of these estimates were extrapolations based on density estimates from limited areas, and neither was associated with sufficient explanation to assess their accuracy. Given the tendency for density estimates to be taken from areas known to have the densest concentrations and to use models that are usually biased high (Harris and Burnham 2001) these estimates are more likely to be biased high than low.

On the Tibetan plateau, Schaller (1998) considered that “...the total number of Tibetan argalis (*O. a. hodgsoni*) could be as low as 7,000”. For the Tibetan Autonomous Region, Liu and Yin (1993) estimated 5,000 argali. In Qinghai, Zheng (2003) estimated a total population for Qinghai of 3,588. Earlier, Zheng and Zhu (1990) had estimated a population size of 665 (with a 95% confidence interval of 245) within selected study sites totaling approximately 600 km<sup>2</sup> of the Bu'erhanbuda Shan portion of the Kunlun Shan (based on 18 groups observed).

In Xinjiang, no estimates are available specifically for the Tian Shan (*O.a.karelini*) or Altai Mountains (*O.a. ammon*), although estimates for the former are in the thousands, for the latter in the hundreds. In Taxkorgan County where Xinjiang shares the Pamir range with Tajikistan and Afghanistan, Schaller and Kang (2008) yielded documentation of 851 argali (*O. a. polii*) in the Taxkorgan Nature Reserve and 1,448 argali north of it. In a separate survey during the same year (2005), Gong *et al.* (2007) surveyed selected drainages within Taxkorgan Nature Reserve, tallying 433 argali. Based on the area sampled and assumptions about suitable habitat, they extrapolated an estimate of 1,500-1,700 argali within the Reserve.

No population estimates are available for argali in Inner Mongolia, but most populations appear to be isolated and small (Wang and Schaller 1996, Bu *et al.* 1998, Wang 1998). More recently, Harris *et al.* (2009) based on literature review, interviews with officials and local residents and limited field work investigated the status of argali within Inner Mongolia generally, and more specifically, the status of *O. a. jubata*. They believe that *O. a. jubata* as a subspecies with unique adaptations has become extirpated. Small numbers of argali persist within Inner Mongolia, most likely dependent on the ability of dispersing individuals

from Mongolia to supplement existing groups or colonize new areas. There is no evidence that argali remaining within Inner Mongolia differ in any way from those inhabiting the Gobi ranges of Mongolia (which are generally considered *O. a. darwini*).

Due to the lacking of consistent trend monitoring, population trends in China are largely unknown.

### **India**

Within India, Tibetan argali occur in two widely separated populations in the states of Jammu and Kashmir and Sikkim. The largest known argali population occurs in eastern Ladakh region of Jammu and Kashmir. Our surveys during 2004 to 2007 which covered the entire stretch from Gya Miru to Tso Moriri provided estimates of 45 to 50 animals in the Gya Miru Wildlife Sanctuary, 130 to 150 inside the Tso Kar catchment and 10 to 15 between Tso Moriri and Tso Kar. Summing all recent surveys and reports, the overall population estimate for Ladakh is c. 480 to 620 individuals. In northern Sikkim, argali occur in two subgroups along the border between Sikkim and China (Tibet Autonomous Region), with a total of about 180 to 200 animals (Chanchani 2007, Chanchani et al. in review). Thus, in contrast to the estimate of c. 200 (Fox et al. 1991), the currently known argali population for India is c. 680-820 animals. With intensive survey efforts over time and exploration in new areas have led to discovery of new argali populations in several such areas. These surveys have significantly increased the population estimate of argali in India, indicating that the earlier lower claims were due to absence of surveys in the region rather than actual lower numbers of argali. (Singh, N. J. 2008).

Harris, R.B. & Reading, R. (2008) quote the following information on argali numbers in India: Argali are very rare in Sikkim (Sharma and Lachungpa 2003), and only occasionally move into the Spiti area of Himachal Pradesh from adjacent Ladakh (Pandey 2003). Fox and Johnsingh (1997) estimated that about 200 remained in Ladakh. Namgail (2004) counted 127 in a ~500 km<sup>2</sup> study area in the Gya-Miru Wildlife Sanctuary and adjacent Tsokar Basin in spring 2003. Adding unpublished recent reports of an additional 120-140 argali elsewhere in Ladakh, he concluded that there might be slightly more than 200 argali in the Ladakh.

### **Kazakhstan**

The population size of argali in Kazakhstan based on aerial surveys in spring 2010 is based on recognized subspecies: 180 *O. a. nigrimontana* (before the lambing), approximately 1360 *O.a. karelini*, 12,600 *O. a. collium* and 15 *O. a. ammon*. There is an overall growth of the population numbers of *O. a. collium* and its distribution range is expanding now. (Berber, A. personal comm., 2011) However, in the western parts of the Kazakhstan plateau (Ulytau Mountains) the argali population was extirpated in the 1950s-1960s and will most probably will not recover without external intervention (Berber 2007).

Harris, R.B. & Reading, R. (2008) quote the following information on argali numbers in Kazakhstan: Weinberg *et al.* (1997) estimated 8,000 to 10,000 in the northeastern distribution (*O. a. collium*), i.e., the Karaganda area, with perhaps 250 in the Karatau Mountains (*O. a. nigrimontana*), and an unknown number in the West Tian Shan (*O.a. karelini*). Fedosenko (1999b) quotes R. Baidavletov as assuming a total abundance of 13,500 in the Karaganda area, including 6,500 in Karaganda oblast, 2,100 in Semipalatinsk oblast, 4,300 and the remainder in other oblasts as of the early 1990s. Magomedov et al.

(2003) report tallying 449 individuals within a survey area of 1,544 km<sup>2</sup> in the upper course of the Baralbas River of Karaganda and Semipalatnisk, but declined to extrapolate this figure to areas not surveyed. In the Karatau Mountains, Shakula (2000) believed that the population of *O. a. nigrimontana* could have been as low as 100 animals.

In autumn 2006 and 2007 Berber (2007) and Berber et al. (2008, 2009) conducted surveys in the Tarbagatay, Saur, Manrak and Kalbin Ranges (East-Kazakhstan Region) and in Kazakhstan's highlands (Karaganda, Akmola, Pavlodar and East-Kazakhstan Regions). At a survey area of 399,000 ha 489 argali have been observed and a total number of 2,278 argali was estimated for 1,915,000 ha of argali habitat. At 3,990 km<sup>2</sup> survey area in the Tarbagatay, Saur, Manrak and Kalbin Ranges 489 argali were recorded and the population was estimated as 2,278 animals for 19,150 km<sup>2</sup> distribution area. In Kazakhstan's highlands in spring 2006 an area of 4,401 km<sup>2</sup> was surveyed which yielded 951 argali and in autumn 2006 at a larger area of 6,500 km<sup>2</sup> 907 argali were recorded. Extrapolations for the mountains where surveys were conducted (spring 2006 27,976 km<sup>2</sup>, autumn 39,529 km<sup>2</sup>) provided estimates of 6,705 and 6,820 argali, respectively. Densities varied in spring between 0.2 and 11.6 (average 2.2) and in autumn between 0.23 and 15.2 (average 1.4) argali per 1000 ha. In spring 2007 at 5,115 km<sup>2</sup> 1,159 argali were recorded, in autumn 2007 at 6,272 km<sup>2</sup> 1,556 argali. Extrapolations for the mountains where surveys were conducted (spring and autumn 2007 39,529 km<sup>2</sup>) provided estimates of 8,174 and 8,942 argali, respectively.

The current distribution area of argali in Kazakhstan's highlands is more than 140,000 km<sup>2</sup>. An increase of population numbers is observed, which in the first place is related to the reduction of rural settlements and livestock farms used in summer and winter. At the same time the factors more intensively causing the reduction of argali numbers are still in place: poaching and economic activities (Erzhanov and Kapitanov 1996, Berber 1996, 1999, 2007).

### ***Kyrgyzstan***

Ground surveys in December 2010 in the Issykkul and Naryn Regions tallied approx. 16,800 argali. During a survey in May 2011 less than 100 argali were recorded in Talas, Jalalabad. Osh and Batken regions. Distribution area boundaries between the subspecies *O. a. polii* and *O. a. karelini* in Kyrgyzstan are disputed and the numbers can thus hardly be related to certain subspecies. In May 2011 in Batken Region, close to the border with Tajikistan, ten argali (*O.a.severtzovi*) were seen, thus confirming that a small population of this subspecies exists outside its main distribution area in the Nuratau Mountains of Uzbekistan. (Davletbakov, pers. comm., 2011).

Harris, R.B. & Reading, R. (2008) quote the following information on argali numbers in Kyrgyzstan:

There is little consensus regarding the abundance of argali in Kyrgyzstan. Lushchekina (1994) counted 565 individuals in the western part of the Kokshalatau range in summer 1993. Based on these counts plus older, unpublished counts, she extrapolated an estimate of 6,000 argali in northeastern Kyrgyzstan. Magomedov *et al.* (2003) surveyed 190 km of transects in a similar area during spring 2002, tallying 717 argali. Weinberg *et al.* (1997) reported "no more than 2,000" argali in Tian Shan (which may have included parts of Kazakhstan), and estimates of from 9,900 to 16,000 in the Pamirs and Tian Shan of putative *O.a. polii* subspecies (which included

parts of Tajikistan). Weinberg *et al.* (1997) believed argali in both the Tian Shan and Pamirs were declining. According to Fedosenko (1999b), aerial surveys conducted during winters 1990 and 1991 tallied 5,493 argali, and estimated a total argali population of approximately 8,000 in the early 1990s.

### ***Mongolia***

The most recent nationwide and local data were produced by a survey conducted in autumn 2009. The field teams sampled from a total of 134 argali distribution units within Mongolia, which we estimate occupied approximately 46,603 km<sup>2</sup> of the total 60,237 km<sup>2</sup> of previously mapped as occupied by argali. The directly observed a total of 385 groups of argali, totalling 3,373 individuals. The population estimate of argali is 19,701, with a lower 95 per cent confidence limit of 9,193 and an upper 95 per cent confidence limit of 43,135. However, post survey concerns about sampling in some districts (aimags) and estimates derived previously allowed adjustments that resulted in the best single estimate for argali in Mongolia being 17,903. Estimates for argali on an aimag basis differ from those of the previous nationwide survey (IOB 2001); direct comparisons are difficult because the previous survey report lacked details regarding areas visited, field methods, and analytical methods. Apparent increases or decreases in each aimag may be real, or may have been caused by differences in methods. (Harris et al. 2010).

In November 2009 the August L. Hormay Wildlands Institute (Frisina et al. 2010) conducted a country-wide survey for Mongolian argali on 7 per cent of the estimated range area of 34,873 km<sup>2</sup>. The argali estimate emphasizes the fall range used by wild sheep during the rutting season, the time of year they are most concentrated and readily observed for census purposes. This is why the estimated area of range is smaller than that reported by some authors. The same protocols used in 2002 for a similar survey were repeated in 2009 allowing for the establishment of trend. The November 2009 population estimate of 26,155, based on total of 1,694 argali observed during the survey, is 29.3 per cent higher than 20,226 argali estimated in 2002. (Frisina et al. 2010) As survey sites, observation routes and points in contrast to the randomized sampling approach applied by Harris et al. (2010) were chosen based on convenience (Frisina et al. 2010) the results of these two nationwide surveys are not comparable.

Harris, R.B. & Reading, R. (2008) quote the following information on argali numbers in Mongolia:

No rigorous population estimates exist for Mongolia nation-wide. The Mongolian Academy of Sciences has conducted a few country-wide surveys; however, the methods used do not permit accurate population estimation. Alternatively, they do provide some measure of population trends because similar methods were used. These surveys yielded round number estimates (lacking measures of precision) of 40,000 in 1970, 50,000 in 1975, 60,000 in 1985, and between 13,000-15,000 in 2001 (Dulamtseren 1970, Amgalanbaatar *et al.* 2002b, Zahler *et al.* 2004, Clark *et al.* 2006, Mongolian Academy of Sciences, unpubl. data). Reading *et al.* 1997 suggested that no more than 20,000 argali inhabited Mongolia in 1994. The 2001 Academy of Sciences survey suggested that approximately 10,000 – 12,000 argali inhabited the Gobi Region of Mongolia (roughly corresponding to the range of *O. a. darwini*) and 3,000 – 5,000 argali inhabited the Altai Region (roughly the range of *O. a. ammon* in Mongolia). It is difficult to gauge the accuracy of these figures given the methods and data provided in government reports, but on regional distribution data, it does appear

that argali continue to decline in western and central Mongolia, while populations in eastern Mongolia appear to be expanding. Argali populations in southern Mongolia appear to be relatively stable. Probably no more than a few thousand Altai argali (*O. a. ammon*) persist in Mongolia, while several thousand Gobi argali (the putative *O. a. darwini*) inhabit a growing range in the south and east.

### ***Nepal***

No estimates of the number of argali in Nepal exist; it is likely to be a small number (Shrestha et al 2005 in Harris, R.B. & Reading, R. 2008). Tibetan argali (*O. a. hodgsoni*) have in the past been reported to occur in several sites of northern Nepal and Bhutan where they are apparently absent today (Fox and Manandhar 1994, Schaller 1998 in Singh 2008). The only extant argali population reported in Nepal occurs in the northeast Mustang region, where a population of 77 individuals has been reported from the Damodarkund area (Chetri and Pokharel 2005 in Singh 2008).

### ***Pakistan***

Argalis (*O. a. polii*) using the Khunjerab area of Pakistan may also use the Chinese side; the number of animals occurring in Pakistan remains unknown, but is likely to be small, possibly less than 100 (Hess *et al.* 1997). In 2002 or 2003, Khan and Khan (n.d.) report observing 34 argali. These authors also provide qualitative evidence of a general decline in argali abundance in the area. (Harris, R.B. & Reading, R. 2008).

### ***Russia***

In 2010 surveys of argali (*O. a. ammon*) were conducted in the Altai Republic and in the Tuva Republic. At the Saylyugem Range in Kosh-Agach district in summer 2010 in total 448 argali were counted. The overall population in Altai Republic is estimated with 550 – 600 animals (Baylagasov 2010). In total at the Russian part of the argali range (Tsagan-Shchibetu Range and Mongun-Tayga Massive in Tuva Republic, Chikhachev Range in Tuva and Altai Republics, Saylyugem Range and Ukok Plateau in Altai Republic) during this survey about 700 argali were recorded. The argali population is at least partly transboundary with Mongolia. (WWF 2010).

In the mid-1990s, Weinberg *et al.* (1997) estimated that between 450-700 argali occurred in the Altai Mountains of southern Russia, distributed among numerous subpopulations none of which exceed 50 animals. Paltsyn (2001) reports counts of 80-85 argali within Altai Zapovednik (speculating that 100-110 individuals may have existed), 150-160 in headwaters of rivers of Sailugem Ridge (south of the Zapovednik, near the Mongolian border), and 40-45 individuals along the slopes of Chikhachev's Ridge in the Tuva Republic. (Harris, R.B. & Reading, R. 2008).

### ***Tajikistan***

In the Eastern Pamirs of Tajikistan a survey was conducted on 8,170 km<sup>2</sup> in December 2009. The survey area included the accessible sites known for possible high concentration of argali (*Ovis ammon polii*). In total 23,711 argali in 510 herds were recorded. Maximum herd size was 1,100. Densities varied up to 80 per km<sup>2</sup>; the average density was 2.9 per km<sup>2</sup>. The distribution was very uneven and areas with large aggregations of argali contrasted with vast empty territories despite of suitable habitats. (Michel & Muratov 2010) The last previous population estimate of 10,800 – 12,000 argali was based on records of extrapolation from 5,773 argali recorded at 16,847.5 km<sup>2</sup> survey area in May 2002

(MINISTRY FOR NATURE PROTECTION OF THE REPUBLIC OF TAJIKISTAN, TAJIK NATIONAL PARK 2002).

The distribution range of Kyzylkum argali *O. a. severtzovi* in Uzbekistan includes areas close to the north-western parts of Tajikistan, in particular the Turkestan Range (Kayumov et al. 1998). Oral reports state that fewer than 100 argali may still survive their (Sharufiddinov 2008, pers. comm.; Rahimov 2010, pers. comm.). This corresponds to observations at the Kyrgyz side of the Turkestan Range in May 2011 (Davletbakov 2011, pers. comm.).

Harris, R.B. & Reading, R. (2008) quote the following information on argali numbers in Tajikistan:

Numerous figures have been put forward for the total number of argali in Tajikistan; all suffer from methodological problems of one sort or another. Lushchekina (1994) reported that helicopter surveys conducted in 1991 tallied 9,415 animals, with the estimated total in Tajikistan being 9,900-10,300. Density was highest in the eastern-most section, near the border with China where “engineering” works limited human access. Fedosenko (1999a), based on local information in the Saluistyk River area, believed this estimate to be slightly low, asserting that population size in the early 1990s was 11,500-12,000. Based on poaching records and political events within Tajikistan at the time, Fedosenko (1999a) hypothesized a decline to about 9,500-10,000 during the mid-1990s. Fedosenko (1999a) reported tallying 4,948 argali in southeastern portions of Tajikistan in 1999 where he had tallied only 1,242 in 1995, and concluded that the population in Tajikistan had increased to 13,000-14,000. Magomedov *et al.* (2002, 2003) surveyed 900 km of transects during late February and early March 2002 in southeastern Tajikistan, estimating that they tallied 5,951 individual argali. Extrapolations from these counts (based on poorly documented assumptions) yielded an estimate of 14,500 argali within southern and eastern study areas, and 39,900 for all of Tajikistan (their surveys evidently took place where Lushchekina [1994] and Fedosenko [1999a] had earlier postulated this highest densities in Tajikistan). Schaller and Kang (2008) tallied 1,528 argali in summer 2003 within selected census blocks totaling 1,977 km<sup>2</sup> (and in winter 2005, counted 2,200 animals within their South Alichur block in Murghab). Schaller and Kang (2008) declined to project an estimate for all of Tajikistan, but believed that the 13,000-14,000 estimated by Fedosenko (1999a) was “of the correct order of magnitude”.

### ***Uzbekistan***

Within Nuratau Strictly Protected Area (SPA) of the Nuratau Mountains, about 1,200-1,300 argali survive. Outside of the protected area the Nuratau Mountains supports about 250-300 argali, of which ~150-200 occur in western Nuratau and 100 individuals occur in eastern Nuratau and the Koitash Range. Fewer than 100 argali remain in the Tamdytau and Aktau Ranges. A few individuals may persist in the Malguzar Range near the Zaamin SPA. Therefore, a total of under 1,800 Severtzov’s argali persist in Uzbekistan, of which 90 per cent occur in the Nuratau Range (N. Beshko pers. comm. in Harris, R.B. & Reading, R. 2008).

In 1998 the number of argali at the Nuratau and Koytash Ranges was estimated with 2,500 animals, out of them 1800-1900 inside the Nuratau Strictly Protected Area. Estimates for

other part of the distribution range were Aktau Range 30 argali, western part of Turkestan Range and Malguzar Range 80 – 100 argali, Tamdytau (Central Kyzylkum) 30 argali. (Kayumov et al. 1998) However assessments conducted in 2005/2006 suggest that argali numbers, estimated for the Nuratau Strictly Protected Area, were unreliable and in presented significant over-estimates (NCI 2006).

In the IUCN Red List (ver.2010.4) the species is listed as Near Threatened (NT) without differentiation by subspecies (Harris and Reading, 2008) because this species is believed to be in significant decline (but probably at a rate of less than 30 per cent over three generations, taken at 24 years) due to poaching and competition with livestock, making the species close to qualifying for Vulnerable under criterion A2de.

The IUCN Red List 2004 still separately evaluated each subspecies as follows: Altai argali as Vulnerable (VU—A2cde, C1); Gobi argali as Endangered (EN—C1); Kazakhstan argali (*O. a. collium*) classified as Vulnerable (VU—A2cde, C1); Tibetan argali (*O. a. hodgsonii*) Vulnerable (VU—A2cde); Northern Chinese argali (*O. a. jubata*) Critically Endangered (CR—C2a); Tien Shan argali (*O. a. karelini*) Vulnerable (VU—A2cde, C1+2a); Karatau argali (*O. a. nigrimontana*) Critically Endangered (CR—C2b); Marco Polo argali (*O. a. polii*) Vulnerable (VU—A2cde, C1); and Kyzylkum sheep (*O. a. severtzovi*) Endangered (EN—A2cde, C2b). (Wingard & Zahler 2006).

### 2.3 Habitat (short description and trends)

Argali inhabit mountains, steppe valleys and rocky outcrops (Reading et al., 1997; Schaller 1998; Amgalanbaatar and Reading, 2000; Harris 2007); they also occur in open desert habitats at the south-eastern end of its range (Reading et al., 2003; Tserenbataa et al., 2004; Reading et al., 2005). Argali are sensitive to deep snow, particularly if forage is limited; often migrating from high mountain habitats during winter, but are present all year round at lower elevations in the Gobi desert (Reading et al., 2005). Most argali live on alpine grasslands between 3,000-5,500 m, often descending lower in winter (particularly if snow accumulates to more than a few cm). In some areas, (e.g., Gobi desert of southern Mongolia, Karaganda area of Kazakhstan), they live in lower elevation, semi-arid areas. They generally avoid forested areas (except in Kazakhstan, where they are presumed to occupy forests because of displacement from preferred habitats, Fedosenko and Blank 2005). They prefer to occupy open areas with a gentle slope; females generally occupy steeper (cliff) terrain following lambing. Argali feed on grasses, sedges, and some herbs and lichens, and they regularly drink from open springs and rivers. Where sympatric with blue sheep they are more likely to occur in grass-dominated communities compared to the sedge-dominated communities occupied by blue sheep. (Harris and Reading, 2008).

The biology of argali of Kazakhstan's highlands significantly differs from other argali populations inhabiting the high mountains. (Berber 1999). Passing of large plain areas are common. Vertical migrations do almost not take place in Kazakhstan's highlands. The mountains of Kazakhstan's highlands rarely raise more than 300-400 m above the surrounding plains and thus argali easily can daily move down to their bottoms and move up onto the tops. In Kazakhstan's highlands argali inhabit diverse landscapes, from the high tops of the mountains to hilly plains. During the surveys in 2006-2007 argali were observed at significantly wider areas than only places where they were seen before, even at very small hillocks. During the 1990s and the first decade of the 21st century a recovery of argali in its

former habitats can be observed in the northern and central parts of its distribution range, which has an overall area of more than 140,000 km<sup>2</sup> (Berber 2007).

*O.a.polii* prefer rather flat terrain with high vegetation cover (valley bottoms and foothills of slopes); but in areas with a higher level of disturbance animals stick more to the steeper slopes and higher situated side-valleys (Luethi 2004). The habitats where Marco Polo sheep were observed during the survey in Tajikistan in December 2009 are located at altitudes between 3,800 and 4,650 m a.s.l. The largest agglomerations of Marco Polo sheep have been observed in wide high mountain valleys with alpine meadows and dry steppes on fine earth substrate. At the lower parts of slopes and at watersheds the argalis grazed on semi-shrubs vegetation, mainly teresken *Ceratoides papposa*. (Michel & Muratov 2010).

Harris et al. (2009) state that *O. a. jubata* were originally described from mountain ranges that differ substantially in topography and vegetation types from the isolated Gobi mountain ranges to their north and northwest, and from the higher elevation ranges to their west. Thus they hypothesize that these animals may have had unique adaptations to slightly warmer, more mesic conditions than typify existing argali. It seems possible that argali south and east of their current distribution in Inner Mongolia had different adaptations to their environment than the desert-adapted animals (*O. a. darwini*) we find today. In any case, these animals have vanished.

The Kyzylkum or Severtzov argali *O. a. severtzovii* inhabit or have inhabited a habitat gradient reaching from highly arid low relic mountains in the Kyzylkum desert with scarce vegetation cover, via the semi-arid Nuratau and Koytash Ranges with dry steppe vegetation and open woodlands dominated by almond, honeysuckle and other shrubs to the sub-humid Turkestan Range with more productive sub-alpine herbal vegetation and juniper woodlands. (Kayumov et al. 1998, Sharufiddinov 2008, pers. comm., Davletbakov 2011, pers. comm.) In the Nuratau Range the sheep's range has most likely shifted from gently sloping mountain steppes (= optimal habitat) to areas with a greater portion of steep cliffs as well as rugged mountain ranges (= sub-optimal habitat). The present distribution patterns and population figures are the result of relentless poaching, range fragmentation and a general deterioration of habitat quality caused by increased human population and livestock numbers. (NCI 2006).

In the Karatau Mountains the habitat of *O. a. nigrimontana* consists of rather rugged and rocky mountains with scarce shrubs.

#### 2.4 Migrations (kinds of movement, distance, proportion of the population migrating

Argali migrate seasonally to different extents. Before and during the rut argali males roam about in large areas in search of females. During winter argali migrate to avoid areas with high snow cover while in summer they move to areas with more productive vegetation. Females of some populations of *O. a. polii* - and may be other argali as well - move to certain places for lambing. So far, no targeted research results have been published about the numbers of animals migrating over international boundaries, portion of the concerned populations involved and distances of migration.

Populations of most recognized argali subspecies cross international borders:

In the Altai *O. a. ammon* inhabits the four countries knot between Kazakhstan, Mongolia, the People's Republic of China and the Russian Federation and seasonal movements crossing all state boundaries are likely. Transboundary movements of *O. a. ammon* between Russia and Mongolia are mentioned by Harris et al. (2009) for Uvs Aimag of Mongolia and by WWF (2010) for Altai and Tuva Republics.

A significant part of the population of Marco Polo argali (*O. a. polii*) in numbers of probably several thousand animals seasonally or occasionally migrate between Kyrgyzstan, Tajikistan, PR of China, Afghanistan and Pakistan. Genetic evidence for the movement of argali in the Pamirs between Afghanistan, south-eastern Tajikistan and China is provided by Harris et al. (2010). Migration of *O. a. polii* between Tajikistan and Kyrgyzstan is naturally restricted by the relief of the Trans-Alai Range with the passes Ters Aga (Alтынмазар, Belandkiik valley) and Kyzyl Art being the migration corridors. However, *O. a. polii* are rarely observed at the northern slopes of the Trans-Alai Range in Kyrgyzstan (Murray 2007), suggesting that direct migration between Tajikistan and Kyrgyzstan is limited.

Karaganda argali (*Ovis ammon collium*) migrate on the mountain ranges Tarbagatay and Saur between Kazakhstan and China. (Berber, pers. comm. 2011).

Tien Shan argali (*Ovis ammon karelini*) migrate between Kazakhstan, Kyrgyzstan and China. According to Davletbakov (2011, pers. comm.) significant proportions of the Kyrgyzstan's argali population inhabit the border zones with Kazakhstan and with China. These animals potentially migrate seasonally or irregularly. While the border between Kazakhstan and Kyrgyzstan is open for argali migration, at the border with China a fence hinders migration.

With the exception of the small (and probably isolated) population in the Yabrai Shan, remaining argali *O. a. darwini* in Inner Mongolia (Peoples Republic of China) are distributed very close to the international border, and probably cannot be sustained without occasional interchange from animals in Mongolia. In fact, argali seen in Inner Mongolia may well spend much or even most of their time on the Mongolian side. (Harris et al. 2009).

Most of the population of Severtzov argali (*Ovis ammon severtzovii*) migrates only inside Uzbekistan or is more or less stationary. However, small remaining groups are reported from the Turkestan Range in areas at the borders Uzbekistan/Tajikistan and Kyrgyzstan/Tajikistan. (Sharufiddinov 2008, pers. comm., Rahimov 2010, pers. comm., Davletbakov 2011, pers. comm.) and in the border areas of Uzbekistan/Kazakhstan (Berber 1999, 2007). As these borders are formed by ranges, stretching in East-West direction, it is likely that the animals seasonally inhabit different sites of the borders.

Karatau argali (*Ovis ammon nigrimontana*) occurs only in Kazakhstan and is at the brink of extinction. It does not migrate over state boundaries.

### 3 Threat data

Main threats to Argali sheep come from humans and human activity. These include:

- Over-hunting and poaching

- Competition from domestic livestock, in particular sheep and goats, and hay making
- Disease transmission from domestic sheep
- Habitat loss caused by overgrazing, fuel wood collection, mining

These threats appear to vary little among argali populations.

### 3.1 Direct threat of threat of the population (factors, intensity)

Poaching is the main threat for most argali populations. In the past and for local populations excessive hunting may have had detrimental effects on argali. This is followed by grazing competition and displacement by domestic livestock.

In Afghanistan, poaching, in particular by Kyrgyz herders in the Big and Little Pamirs and in Wakhjir Valley, is generally considered to be a continuing threat to argali, the presidential ban on hunting notwithstanding. The problem has been aggravated as Kyrgyz herders were appointed to guard the border between Tajikistan and Afghanistan and were legally supplied with weaponry and ammunition (Ostrowski 2010, pers. comm.). As reported by the hunting concessions in the SE of Tajikistan Kyrgyz from Afghanistan regularly poach on the transboundary argali population as well as at Tajikistan territory. In contrast the Wakhi, grazing their livestock at the northern slopes of the Wakhan Range (western edge of Big Pamirs), seem to refrain from poaching in a large extent. Grazing pressure is high in the argali habitats in the Big and Little Pamirs in Afghanistan, but low or absent in the Wakhjir. Intense summer grazing and year-round grazing in some valleys limits access to high quality pasture in summer, thus leading to lower fitness, as well as reduces forage and habitat available for argali during winter. (Harris 2007a, Habib 2008).

In China, poaching has been considered to be a substantial threat (Wang et al. 1997, Schaller 1998). In the mid-1990s however, a nationwide effort to confiscate guns from pastoralists substantially reduced the weaponry available for poaching. This, together with continued efforts to publicize the national law prohibiting killing protected species, appears to have reduced poaching during the last decade. At the same time however, efforts to regularize pastoralists generally increased habitat conflicts, because pastoralists typically intensified their use of productive grasslands preferred by argali, thus displacing them (Harris 2007b). In Inner Mongolia, poaching could still occur, either with or without the knowledge of border guards (Harris et al. 2009).

In India despite the ban on hunting, poaching is apparently still a problem in some areas along the border of India and China as both the countries maintain a strong military presence along their Himalayan border regions. Continued instances of hunting by members of the military are still a problem in Sikkim. Overgrazing and competition with livestock has been identified as a major threat to wild ungulate herbivores in the Indian Transhimalaya, with significant increases in livestock populations apparent in both Ladakh and Sikkim in recent decades. Argali have been shown to shift to more marginal areas (steeper, less productive sites) when livestock (sheep and goats) were moved into their habitat. Overgrazing by domestic yaks in Khangchendzonga National Park is also a major threat to argali in Sikkim. Livestock herders are often accompanied by herding dogs, which chase and harass argali and sometimes kill their lambs. (Singh 2008).

As elsewhere, livestock grazing and poaching were considered the principal limiting factors to argali in Kazakhstan by Fedosenko (1999b). Uncontrolled killing by those who carry firearms appeared to be common; local militia and customs officials had come to areas inhabited by argali and killed dozens with gun-machines (A. Subbotin pers. comm., 2008, in Harris and Reading 2008). Berber (1999, 2007) states that during the last decade the factors threatening argali in Kazakhstan did not change significantly. In the first place is poaching but as well predation, especially by wolf, feral and shepherd dogs, and in less extent competition by domestic livestock (sheep and goats) and human economic activities.

Poaching and competition with livestock are also considered threats in Kyrgyzstan (Weinberg et al. 1997). There is general consensus that habitat conditions for argali improved after Kyrgyzstan's independence in 1991, due to the collapse of the state-supported livestock sector and consequent reduction in grazing pressure in the Tian Shan (Farrington 2005). However, since 2000 there have been informal reports that livestock numbers have again risen. Remote pastures are increasingly re-occupied by livestock herders. The reclamation of remote pastures is actively supported by internationally financed projects aimed at development and environmental protection (e.g. GEF, UNDP, World Bank, GIZ), often without consideration of conservation needs and land-use options provided by sustainable use of argali. The herders are usually allowed to carry firearms for protection of herds against wolves which are more than often used by them for poaching argali and ibex (Gries 2010, pers. comm.).

The main threat facing argali in Mongolia is poaching for subsistence and increasingly for their horns, which are being used in traditional Chinese medicine and as mounted trophies (Mallon et al. 1997, Reading et al. 1997, 1998, 1999, 2001, Amgalanbaatar 2002b, Wingard and Zahler 2006). Also important are the impacts from pastoralists who displace argali, whose livestock feed on the same forage as argali, and whose dogs chase and even kill argali (Mallon et al. 1997, Reading et al. 1997, 1998, 2003, 2005, Wingard 2005, Amgalanbaatar et al. 2006). More minor and localized threats include unsustainable trophy hunting (Amgalanbaatar 2002a, Zahler et al. 2004, Wingard and Zahler 2006). Subsistence poaching by miners generally represents a greater threat than actual mining activities, but this may change as the number of mines continues to grow rapidly. These threats remain important due to poor or non-existence law enforcement throughout most of the range of the species in Mongolia. Very little money from trophy hunting currently supports conservation activities in Mongolia (Amgalanbaatar et al. 2002a, Wingard and Zahler 2006).

In Pakistan, in addition to disturbance from livestock (grazing in Khunjerab remains legal; Knudsen 1999, Khan and Khan, n. d.), increased access to the area through the Karakoram Highway is believed to have increased poaching pressure (Hess et al. 1997).

Unlike in Mongolia, domestic livestock herds in the Russian Altai were reported to have declined during the 1990s (Paltsyn 2001), providing a potential opportunity for expansion of the protected area network in the Altai-Sayan area. This statement is strongly opposed by Kashkarov et al. (2008). Total livestock numbers have increased during recent years at a level causing significant habitat destruction and disturbance. Due to occupation of pastures by herders, argali are forced to use sub-optimal habitats, i.e. summer pastures in winter (where forage availability and fleeing from wolves is hindered by snow) and winter pastures in summer (where vegetation due to high grazing pressure is of low productivity). (Kashkarov et al. 2008).

In Tajikistan poaching on argali occurs outside protected areas as well as in the National Park and in Zorkul Strictly Protected Area, in particular where the control by hunting concessions is weak. Some experts and collaborators of hunting concessions estimate that annual off-take by poachers is around 1,000 argali. Argali meat is consumed by the hunters, sold locally and in the regional centre (Michel 2003 – 2011, pers. observ.). The number of domestic livestock and the area of grazed pastures significantly declined after the end of the Soviet Union. By official statements currently livestock numbers are still below those of the Soviet Union. But livestock numbers increase and pastures abandoned during the last decades are again used for grazing. These trends have caused that several areas in past winters grazed by large herds of argali in December 2009 were without sufficient forage and consequently argali were absent from those sites. Forage competition aggravates where herders have cut hay on alpine meadows. Thus the use of pastures and haymaking areas without consideration of the needs for conservation of wild ungulates is the second most important limiting factor for the population numbers and trends of Marco Polo sheep. (Michel and Muratov 2010).

In Uzbekistan, poaching represents the main threat facing Severtzov's argali, which continues to occur even within protected area. The second major threat to Severtzov's argali is a loss of habitat and competition with domestic livestock for forage. (N. Beshko pers. comm.)

### 3.2 Habitat destruction (quality of changes, quantity of loss)

All over the argali range desertification caused by overgrazing is considered the key factor of habitat destruction. It is of utmost importance for argali populations in China, India, Russia, parts of Mongolia, Uzbekistan. In Kazakhstan, Kyrgyzstan and Tajikistan the reduced livestock numbers and contracted grazing areas after independence have allowed a recovery of some argali habitats, but trends of increasing livestock numbers and reclamation of pastures by herders may fast reverse this habitat recovery.

In Tajikistan another factor causing shortage of winter forage and general habitat degradation is the collection of teresken *Ceratoides papposa* for fuel by local people. Around herders' camps, both summer camps as well and more critical around winter camps teresken is dug out by the herders. Further teresken is collected in large quantities as truck loads for the supply in Murghab and in villages. The most affected areas seem to be those where argalis are already absent due to poaching and grazing, but as easy accessible teresken stands are already overused the pressure increases in remoter areas and thus in argali and ibex habitats. (Michel and Muratov 2010) In Uzbekistan's Nuratau Range argali prefer shrubs for resting and hiding, thus fuel wood cutting additionally to overgrazing causes habitat destruction (Michel 1993-2006, pers. observ.)

Habitat loss resulting from rapidly increasing resource extraction (i.e., mining) is a more minor and localized threat in Mongolia (Reading et al. 1998, 1999, 2001, 2005). In Kyrgyzstan gold mining in the Kumtor area has devastated sections of argali habitat. At the other hand local sources report that the large mining area due to effective protection from poaching is still used by argali which even do not react disturbed on the heavy machinery (Davletbakov 2010, pers. comm.). In Tajikistan mining activities are planned in the argali range but the extent of areas affected will likely not reduce available habitat in a significant scale. The intrusion of foreign workers may lead to increase of poaching for meat and horns.

### 3.3 Indirect threat (e.g. reduction of breeding success by pesticide contamination)

In general, argali appear to be extremely intolerant of human disturbance (Fedosenko 1999, Namgail 2004, Maroney 2006, Namgail *et al.* 2007, Harris 2007, Schaller and Kang 2008 in Harris and Reading, 2008). Thus the availability of suitable habitat can be limited due to disturbance (tourists, herders, herders' dogs).

Observations in Tajikistan and Kyrgyzstan, however suggest that tolerance to disturbance is negatively related to poaching pressure. Poaching severely increases disturbance in contrast to trophy hunting, regulated in terms of season, take-off numbers, hunting locations and hunting methods. For this reason the animals flee from people and vehicles at long distances and in the result the presence of any people makes large areas unsuitable as argali habitats and argali are shifting to areas with suboptimal conditions. Reduced fitness and high energy losses caused by fleeing from people makes the argali more vulnerable for predators, diseases and weather and by this mortality increases and reproduction declines (Michel and Muratov 2010). Where poaching is controlled argali are more tolerant to livestock, humans and other disturbance. In hunting concessions in the Tajikistan Pamirs argali can be seen grazing together with free ranging yaks, or few hundred metres from herded other livestock or herders' camps. In Kyrgyzstan argali even graze in the immediate proximity of heavy mining machinery.

Some of the strongest data suggesting interference competition from livestock as a limiting factor for argali comes from Ladakh, India, where Namgail *et al.* (2007) documented a group of argali shifting their habitat preference toward escape terrain and away from preferred foraging areas when livestock were present (Harris and Reading 2008). Singh (2008) showed that argali avoid the areas used by livestock, probably exacerbated by the presence of herding dogs which chase adult argali and prey on lambs.

Tourism development activities in both Ladakh and Sikkim not only destroy habitat, but also disturb wildlife. Although such activities are more prevalent at the margins of argali habitat, there is potential for some effects on argali. (Singh 2008).

Fragmentation into small isolated subpopulations is challenging the survival of argali in the Altai in Russia and Kazakhstan (Kashkarov *et al.* 2008), in the Inner Mongolia of China (Harris *et al.* 2009), and in India (Singh 2008). In the Aktau, Tamdytau, and Malguzar Mountains as well as the Turkestan Range (Uzbekistan and border areas of Kyrgyzstan and Tajikistan) very small, isolated populations of Severtzov are threatened by losses due to poaching and predation, inbreeding and harsh climatic conditions (N. Beshko pers. comm.). Despite small population size the argali in the Afghan Pamirs do not show reduced genetic diversity, due to migration of animals to and from China and Tajikistan (Harris *et al.* 2010).

Argali are reported to have been infected by livestock-introduced diseases such as pasteurellosis, rinderpest, malignant anthrax (Sapozhnikov 1976, R. P. Reading pers. comm.).

### 3.4 Threat connected especially with migrations

The species occurs in many countries with differing management regimes. Thus populations used in a regulated way in one area might be poached at another site causing an unrecorded

mortality not considered in setting of legal quota. *O. a. polii* are heavily poached despite of a hunting ban in Afghanistan while seasonally migrating to Afghanistan and in some areas in Tajikistan, located close to the Tajikistan-Afghanistan border. Currently the Argali is protected in Russia and Kazakhstan while licensed hunting is conducted in Mongolia.

Border fences present a serious barrier for migration of many transboundary argali populations. They cause genetic isolation, split populations into smaller groups more prone to extinction, prevent migration to optimal grazing sites and cause direct mortality when fleeing argali run into them. Border fences hindering migration and exchange of argali between range states exist between countries of the former Soviet Union (Kazakhstan, Kyrgyzstan, Russia and Tajikistan) and China, between Mongolia and China, between India and China, and between Mongolia and Russia.

The argali (*O. a. polii*) from China seem to be more isolated from the argali in south-eastern Tajikistan than the argali in Afghanistan. This relative isolation might be caused by the border fence between Tajikistan and China which over large distances causes an effective barrier for argali migration. Only in area of Akbaytal pass in the 1970s a special corridor for migration of Marco Polo sheep about 4 km wide was left without border fence between Tajikistan and China (Saidov 2007). Tajikistan will concede a total of 1,112 sq km of territory to China from its eastern Gorno-Badakhshan autonomous region (Economist Intelligence Unit 2011). In this context in the region of Rangkul after adjustment of the border between China and Tajikistan a new border fence is reportedly erected, dividing the habitat of approx. two thousand *O. a. polii*, thus fragmenting the population and making important seasonal grazing habitats potentially inaccessible.

Fencing that can further isolate populations and directly cause mortality is an important recent threat to *O. a. hodgsoni* in India and Tibet Autonomous Region of China (Singh 2008).

Between Mongolia and the People's Republic of China (Inner Mongolia) a border fence is hindering migration of *O. a. darwini*. The border fences (there are actually 2, one on each side of the true border line) consists of 12 strands of barbed wire supported by diagonal cross-wires, supported by concrete pillars approximately 1.2 m high. In most places, these fences would likely make passage by an argali very difficult, may obstruct natural movement patterns, and could become especially troublesome if drought or heavy snows on one side of the border temporarily force argali to search elsewhere for food or water. The isolating effects of these fences may be somewhat reduced by the presence of rocky outcrops, which appear to provide places from which argali may leap over. In fact, argali were observed that had just crossed over the border fence. There are evidently some passage-ways built in the Mongolia-Inner Mongolia border fence, which may facilitate occasional movement of argali. Lowering the top few wires of this fence where argali may cross – but where border patrols could otherwise discover illegal human crossing – should be strongly considered. (Harris et al. 2009).

Between the Tuva Republic of the Russian Federation and Mongolia a barbed wire fence hinders seasonal migration of argali and prevents access to appropriate grazing areas (Kashkarov et al. 2008).

Fence systems erected during the last years between Kazakhstan and Kyrgyzstan as well as between Uzbekistan and neighbouring countries so far does not cross argali habitat and has no adverse impact on migration.

### 3.5 National and international utilization

#### ***Afghanistan***

A trophy hunting programme for argali in the Big Pamir operated from ~ 1966-1978, but was discontinued following the Soviet occupation of Afghanistan, and to date, has not been re-established. Under this programme, livestock grazing in high elevation habitats favoured by argali during summer was effectively prohibited, and poaching by local pastoralists reduced. However, domestic livestock grazing was concentrated on argali winter ranges, with the result that the overall effect on argali habitat of the hunting program was unclear (Petocz et al. 1978).

#### ***China***

Trophy hunting based on permits issued by the provincial authorities is conducted in especially assigned international hunting areas. These areas, however not always have clearly delineated boundaries and effective management. (Harris et al. 2009).

#### ***Kazakhstan***

In Kazakhstan during the 1990s limited trophy hunting on *O.a.collium* was conducted based on permits issued by the government. On the other argali subspecies no official hunts were permitted. According to Berber (2008) during eight years (1990-1997) 86 argali rams were shot by foreign hunters, during 1998-2002 another 80 argali. The revenues amounted to about US\$ 2 million which allowed for research work and conservation activities. However, Fedosenko (1999b) also believed that trophy hunting was having deleterious effects on breeding behaviour and resultant productivity of females, and recommended a reduction in the yearly off-take quota. The trophy hunts started in Kazakhstan at the beginning of the 1990s attracted the attention on the populations of rare animals of hunting managers, scientists, state officials and the broad public. This contributed to the regular control of their state. Since 2003 hunts on rare animals are not conducted in Kazakhstan, but discussions on the opportunities of take-off or the imposing of a total ban are currently ongoing. Nature users in the hope for future use options lease hunting grounds in argali habitats and continue their protection. (Berber 2007, Harris and Reading 2008).

#### ***Kyrgyzstan***

In Kyrgyzstan trophy hunting is permitted since the 1990s. About 60-70 permits are issued per annum for foreign hunting tourists, based on recommendations by an interagency commission. Hunting takes place in assigned hunting blocks. Currently (2010) about 90 hunting blocks are assigned, many of them too small for allowing profitable and sustainable argali and ibex management.

#### ***Mongolia***

The Law on Hunting allows hunting on argali only for “special” purposes pursuant to license issued by the Ministry of Nature and Environment. Altai argali may be hunted from July 20th to October 31st. The Gobi argali trophy season extends from July 20th to November 15th. In Mongolia during 1967 – 1989 in the average 74 trophy hunts on argali were permitted per annum (1630 in total). While recommended quotas from Mongolia’s

CITES Scientific Authority (Academy of Sciences) have remained steady since the early 1990s (approximately 60), the number of licenses has steadily increased from fewer than 20 in 1993 to 40 in 2001, to 80 in 2002 (Amgalanbaatar et al. 2002). Notably, the last figure surpasses the Scientific Authority's recommended quota and is in direct contravention of Mongolia's CITES obligations. (Wingard and Zahler 2006).

### ***Tajikistan***

Trophy hunting began in 1987, the same year that local subsistence hunting and commercial hunting for meat were prohibited (Fedosenko 1999b). Quotas for trophy hunts have recently been 40-60/year (Schaller and Kang 2008), up from ~ 20/year in the late 1980s and early 1990s (Fedosenko 1999b). A temporary hunting moratorium was effective autumn 2008 – 2010. It was lifted since autumn 2010 justified by results of a large scale survey (80 permits for the hunting season 2010/2011, which due to late announcement were only partly utilized). According to Saidov (2007) and informal sources in some areas the number of shot animals not always coincides with the number of issued licenses. A part of trophies is said being illegally taken out of country through Kyrgyzstan without any controls and counting.

### ***Uzbekistan***

The Government of Uzbekistan since the early 1990s issues one to five permits per annum for international trophy hunting *O. a. severtzovi*. As no assigned hunting management areas exist, the hunts have been conducted in the immediate vicinity of the Nuratau Strictly Protected Area, in some cases probably even inside the protected area. Some surplus rams from a small breeding enclosure were as well offered to international hunting tourists. (Beshko 1993-2007, pers. comm.).

### ***All other range states***

In the other range states no official utilization is permitted. In none of the range states hunting for other purposes than trophy hunting is allowed.

### ***International trade***

Argali are internationally traded as hunting trophies and in less extent as souvenirs (mounted trophies, single horns, crafts made from horns). Trade for Chinese medicine as well as a part of the trade of hunting trophies and souvenirs occurs illegally. Trade of live animals for zoos and wildlife enclosures is of insignificant scale.

## **4 Protection status and needs**

### **4.1 National protection status**

#### ***Afghanistan***

All hunting in Afghanistan was banned by order of President Hamid Karzai in 2006. There do not, however, appear to be serious efforts to enforce the ban. In 2009 argali were officially-listed as a Protected Species in Afghanistan, strictly prohibiting all hunting and trading of this species within the country. There are currently no protected areas within the distribution of argali in Afghanistan, although plans exist to establish one or more in the Big and Little Pamir areas. Land management regulations or restrictions in any such future protected areas are not yet known. (Harris and Reading 2008).

### **China**

Argali are classified as a Category II “key species” under the Chinese National Wildlife Law of 1988. As such, permits to take argali must be obtained from province-level authorities. In practice, only the trophy hunting programmes have procured permits to take argali under this legislation (Harris 2007).

Argali occur in a number of Chinese nature reserves. In Xinjiang, they occur in at least six nature reserves in Xinjiang (Du and Zhang 2006), including Arjin Shan, Kalamaili, Source of the two Altai Rivers (Altai mountains), West Tian Shan, Hami Shan (Tian Shan range) and Taxkorgan (Pamirs). On the Tibetan Plateau, argali occur in the 247,120 km<sup>2</sup> Qiangtang Reserve in Tibet and the 83,000 km<sup>2</sup> Kekexili Reserve in Qinghai, as well as in scattered populations within the Sanjiangyuan Nature Reserve in Qinghai (Schaller *et al.* 2007). In Gansu, argali occur in Yanchiwan Nature Reserve, and may occur in the Qilian Nature Reserve. Nature reserve designation in China does not necessarily preclude habitat conflicts, as grazing, mining, and other activities often take place.

A number of trophy hunting areas have been established with argali as the focal species. Hunting areas in Xinjiang include Baicheng, Bu'erjin, Fuyun, Hami, Hejing, Qiemo, Tacheng, Tashiku'ergan, and Tulufan counties; in Gansu in Aksai and Subei counties (Subei's consisted of two distinct areas, the Hashiha'er area in the Qilian Mountains and the Mazong Shan area in the Gobi Desert abutting Mongolia). In addition, two hunting areas in Qinghai Province, focusing primarily on blue sheep, have argali populations: Dulan (within separate townships, Balong and Gouli) and Maduo counties. One hunting area in Inner Mongolia (Yabulei) contains argali. Hunting areas in China have generally succeeded in reducing poaching and in generating some local enthusiasm for argali, but have not yet succeeded in treating habitat conflicts (Harris and Pletscher 2002, Harris 2007) (all information from Harris and Reading 2008).

### **India**

Argali are listed as a threatened species by the Government of India and are fully protected under Jammu and Kashmir's Wildlife Act of 1978 (Fox and Johnsingh 1997). Poaching appears to have declined in recent years (Namgail 2004), but has evidently not been accompanied by an increase in argali. Little has been done to address the likely deleterious effects of displacement increasing numbers of livestock on argali in Ladakh. Argali are rare but present in Khangchengzonga National Park in Sikkim (Sharma and Lachungpa 2003). (all information from Harris and Reading 2008)

### **Kazakhstan**

Argali are listed in the Red Book and consequently according to national law they are considered as protected species and can be hunted only based on permits issued by the government. Fedosenko (1999b) considered that some of the hunting concessions in Karaganda oblast protected argali well. Argali occur in several protected areas in the Altai, Tian Shan and in Kazakhstan's Central Highlands. In 2004 a Strictly Protected Area was established in the Karatau Range for conservation of *O. a. nigrimontana*. However, there have been critics that the area chosen was not sufficiently justified and important habitats used by this endangered subspecies were not included (Shakula 2008, pers. comm.).

### ***Kyrgyzstan***

Only recently a research programme for argali was approved by the government of the Kyrgyz Republic on October 11, 2010 (Kyrgyz Republic 2010) over a period of four years, continuing and enhancing the efforts on research and conservation started already in 2004, with the state programme on research, conservation and sustainable use of argali, approved by governmental decree Nr. 235 on April 7, 2004 (Kyrgyz Republic 2004). Argali are listed in the Red Book and according to the law hunting is only possible with special permits from the government. Hunting fees are allocated to the Hunting department for management purposes (30 per cent), to the Republic Nature Protection Fund (15 per cent), to local self-governance bodies (20 per cent) and for management activities of the hunting concessions (35 per cent, based on provision of evidence). Argali occur in several protected areas with the highest populations in Sarychat-Ertash and Naryn Strictly Protected Areas. Some of the hunting concessions obviously manage to keep poaching level low while others are themselves involved in poaching for meat. A new law “On hunting and wildlife management” is under preparation intending to strengthen incentive based approaches and to allow for setting land-use restrictions for protection of key habitats for argali and other animals especially during migration.

### ***Mongolia***

Argali sheep are protected as “Rare” under the 2001 revision (Mongolian Government Act No. 264) of the 2000 Mongolian Law on Animals (Wingard and Odgerel 2002). General hunting of argali has been prohibited since 1953. Altai argali (*O. a. ammon*) were listed as “Rare” in both the 1987 and 1997 Mongolian Red Books, and the species was upgraded to “Endangered” in Mongolia in the most recent nationwide assessment (Clark *et al.* 2006). Although protected from general hunting, trophy hunters can purchase licenses. Approximately 14 per cent of the species’ range in Mongolia occurs within federal protected areas, including Altai Taiwan Bogd National Conservation Park (NCP), Gobi Gurvan Saikhan NCP, Great Gobi Strictly Protected Area (SPA) sections A and B, Ikh Nart NR, Khokh Serkh SPA, Khoredal Saridag SPA, Khustai Nuruu NCP, Myangan Ugalzat Nature Reserve (NR), Sielkhem Uul NCP, Tsagaan Shuvuut SPA, Tsambagarav Uul NCP, and Turgen Uul SPA (Amgalanbaatar *et al.* 2002b). Small populations likely occur in other federal and provincial (aimag) or county (soum) protected areas as well.

Under the Mongolian Hunting Fee Law of 1995, revenue generated from argali trophy hunting is divided among the federal government’s general funds (70 per cent), the local province (20 per cent), and the hunting organization (10 per cent); specifically, US\$ 18,000 for *O. a. ammon* trophies and US\$ 9,000 for *O. a. darwini* trophies is allocated to local and federal governments (Wingard and Odgerel 2002). Ostensibly this money should benefit local people, government agencies, and help implement important conservation actions for argali and the ecosystems they inhabit, but unfortunately, little of this money makes it back to local people or to the conservation of the species (Amgalanbaatar and Reading, 2000, Amgalanbaatar *et al.*, 2002a, Wingard and Zahler 2006). Because local governments generally receive no additional revenue from trophy hunting (the federal government simply reduces payments to local governments that receive trophy hunting permits), many local governments are actively establishing protected areas to prevent future hunting (Amgalanbaatar *et al.* 2002a). Recent reforms to Mongolian trophy hunting practices have led to proposals for community-based wildlife management programmes (Amgalanbaatar *et al.* 2002a). Initial efforts by WWF-Mongolia, the Argali Wildlife Research Center, Denver Zoological Foundation, and local governments stalled; however,

after initiation of a Global Environment Facility Project in the region and no progress has been made in recent years.

WWF and the Ministry of Nature and Environment organised a workshop on 'Conservation of Argali in Mongolia' in 2000 that resulted in an Argali Conservation Management Plan in 2002. However, this plan has not yet been adopted by the government and is not being implemented.

Mongolia's Argali Wildlife Research Centre, Denver Zoological Foundation, and Mongolian Academy of Sciences cooperate on a number of conservation and research projects, including an interdisciplinary research and conservation project in Ikh Nart Nature Reserve, Dornogobi Aimag in cooperation with the Dalanjargal Soum Administration. That work, begun in the late 1990s, has resulted in several publications (e.g., Amgalanbaatar and Reading 2000, 2003, Reading *et al.* 2001, 2003, 2005; Amgalanbaatar *et al.*, 2002a; 2002b, 2006; Tserenbataa *et al.* 2004, Wingard 2005), development of ecotourism to support conservation, a broad conservation education program, and active conservation management of the reserve by the Dalanjargal Soum Administration. (all information from Harris and Reading 2008).

### ***Pakistan***

In Pakistan argali are legally protected and no hunting permits are issued. The only site from which argali are reported is located in the Khunjerab National Park. Working with local people in the Khunjerab area toward mutually agreeable conservation solutions has been a contentious issue for many years.

### ***Russia***

Argali are listed in the Red Data Book of the Russian Federation, and hunting is legally banned; it is unclear how effective this legal protection is. Argali occur in the Altaisky Zapovednik, but most argali in the Russian Federation are outside of protected areas. Both Weinberg *et al.* (1997) and Paltsyn (2001) suggested expanding the area under protected area status in the area. Weinberg *et al.* (1997) suggested that the eastern portion of Saylyugem Ridge near the Mongolian border could be a possible new protected area, as well as in the upper reaches of the Chagan-Burgazy River. Paltsyn (2001) noted that WWF has started a long-term program to promote sustainable development in the Altai-Sayan region, which could have benefits for argali.

### ***Tajikistan***

Argali are protected in Tajikistan under the Law on fauna, which provides for general protection of all species listed in the national Red Book (Abdusalyamov, 1988). According to the law hunting is possible only for scientific purposes but in practice the government annually issues permits based on a quota agreed by an inter-agency commission. Argali occur in Pamir National Park (26,000 km<sup>2</sup>), and the Zorkul Zapovednik (870 km<sup>2</sup>), although neither protected area is fully functional and trophy hunting, poaching as well as livestock grazing occur inside these areas (Saidov 2007, Schaller and Kang 2008).

Tajikistan is so far no member of CITES and until recently Russian CITES authorities have issued necessary export permits to hunters. Since 2010 Tajikistan has issued its own permits and the accession to CITES is in process. Trophy hunts represent a substantial source of revenue that could be used for argali conservation; this appears to be occurring in

some hunting concessions within Tajikistan, but not in others. Protection from excessive poaching and human disturbance appears to be strong in the south-eastern corner of the country; somewhat less so in other portions of argali range. However, poaching, by pastoralists, military, and border guards, is only partly controlled by hunting concessions (Schaller 2003, Michel and Muratov 2010). The hunting concessions have no legal opportunity to restrict livestock grazing and other land-use. Thus they can only in a limited scale protect the argali from forage competition with livestock and habitat degradation.

### *Uzbekistan*

The species is included in the Red Book of Uzbekistan and protected from general hunting, although limited trophy hunting is irregularly permitted by the government and export permits are issued. Severtzov's argali are formally protected with the Nuratau SPA and a few individuals possibly survive in the Zaaminsk SPA. Unfortunately, law enforcement to prevent poaching and livestock grazing are insufficient in the strictly protected areas; and outside of the protected areas poaching and grazing are almost not controlled.

#### 4.2 International protection status

Argali are included on Appendix II of CITES, except the subspecies *O. a. nigrimontana* and *O. a. hodgsonii*, which are included on Appendix I. Among the range states only Tajikistan is not yet a party to CITES.

The United States Endangered Species Act lists argali as endangered, except in Mongolia, Kyrgyzstan, and Tajikistan, where they are listed as threatened. (Threatened classification allows for importation of trophies from legally taken argali in those countries under specifically-authorized permits from the U.S. Fish and Wildlife Service. Permits for importation of trophies are generally not authorized for taxa listed as Endangered). In February 2006, the United State Department Fish and Wildlife Service suspended the issuing of import permits to US hunters taking argali in Kyrgyzstan, pending receipt of additional information on the status of the taxon there (M. Carpenter, USFWS pers. comm., 2006). Issuing permits was partially reinstated in 2007, with ten permits allowed. The import of hunting trophies to the US was restricted on trophies originating from areas south of Naryn River. The intention of this restriction is to avoid take-off of *O. a. karelini*, perceived being rarer than *O. a. polii*. (USFWS 2008) However, the Naryn River can hardly form a natural border between the subspecies, and the argali populations north of this line are not necessarily in no worse shape than south of it.

In the European Union (EU) argali are listed under Annex B of the EC Wildlife Trade Regulations, except for *O. a. hodgsonii* and *O. a. nigrimontana*, which are included in Annex A (EC Reg. No 709/2010 (amending EC Reg. No. 338/97)). Thus for import of argali or its parts to the EU export permit or re-export certificate issued by country of export and import permit issued by the EU Member State of destination are required.

#### 4.3 Additional protection needs

The key issues for the protection of argali are the reduction of poaching and the preservation of year-round sufficient grazing grounds. Formal protection and establishment of protected areas are in many range states not sufficient for the conservation of argali. In most range states significant parts of the argali populations live outside protected areas in

vast and difficult accessible habitats where effective law enforcement is difficult to achieve. Effective anti-poaching units require sufficient training, equipment and good salaries as well as control are needed to prevent corruption. Protected areas are in some countries effective means of protection while in other countries weak control and insufficient financing or inappropriate restrictions limit their effectiveness. It is necessary to enhance conservation management in protected areas where argali are found at high population densities, and to increase the capacity of protected areas personnel and other environmental law enforcement officers. For providing long-term effective conservation of argali protected areas need to ensure protection of habitats against destruction and competing use, in particular livestock grazing.

In addition to protection as a species and establishment of protected areas sustainable management of hunting could offer some alternative for the conservation of certain populations of argali. Although controversial, this practice increases the value of the species to local people, protects habitat and with careful monitoring the revenue obtained can be ploughed back into conservation. So far only trophy hunting is allowed in some range states and this type of hunting can provide the highest revenues per animal taken. This can be the most effective way of sustainable use of argali under the condition that these revenues are allocated in a way that provides incentives to hunting managers for investing in management, support local social economic needs and thus make preservation of argali and their habitats a viable land-use alternative for local people, and supports the overall conservation and monitoring by the state, e.g. in protected areas. Trophy hunting bans or import suspensions can thus potentially have adverse impacts on conservation as incentives are removed and financial means for protection are no longer available, usually without compensation by improved law enforcement.

Direct involvement of local communities and tangible benefits from sustainable use of argali are needed to ensure their compliance with legal requirements, in particular bans on hunting and restrictions on pasture use. A possible way to achieve maximum support would be to initiate community-based approaches to argali conservation where these communities are able to control suitable areas of argali habitat. International trophy hunting has its potential limits and one-sided dependence of conservation on this potentially limited market should be avoided in the long term. Opportunities of sustainable hunting by domestic hunters both for trophies and for local subsistence need to be explored. (Harris 1995).

Quotas for trophy hunting must be established on the basis of sound monitoring. The unit for quota setting should be as local as possible to link the quota directly to local management effectiveness and population size. At the other hand monitoring and quota setting need to take into consideration migration of argali in larger area. For transboundary populations, monitoring and subsequent quota setting need to be coordinated between neighbouring range states.

Habitat protection and ensuring of sufficient forage availability are serious conservation needs for argali. In the context of land-use planning and hunting management planning regulations are needed which ensure that habitats of key importance either for gaining the necessary condition during summer or for grazing in winter are not or only moderately grazed by livestock and no fodder plants are collected for hay or as fuel. These restrictions need to be set and enforced by the respective governments and local administration in the interest of public local, national and global conservation needs.

For the conservation of transboundary populations joint efforts of the range states are required. Most critically migration barriers need to be made passable. Migration must remain possible, allowing the argali to move between seasonal habitats in accordance with the availability of forage and for other biological needs. Maintenance or restoration of migration routes is also essential for exchange of animals between groups and sub-populations for maintaining the genetic diversity necessary for adaptation to changing environmental conditions, as well as for restocking and reoccupation of habitat sections.

## 5. Range States<sup>1</sup>

- Islamic Republic of Afghanistan
- People's Republic of China
- REPUBLIC OF INDIA
- REPUBLIC OF KAZAKHSTAN
- Kyrgyz Republic
- MONGOLIA
- Federal Democratic Republic of Nepal
- ISLAMIC REPUBLIC OF PAKISTAN
- Russian Federation
- REPUBLIC OF TAJIKISTAN
- REPUBLIC OF UZBEKISTAN

## 6. Comments from Range States

## 7. Additional remarks

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<sup>1</sup> CMS Parties in capitals.

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