

The status and prospects for conservation of the Mongolian saiga *Saiga tatarica mongolica*

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Abstract Data are presented on the changes in distribution and abundance of the Mongolian saiga *Saiga tatarica mongolica* in the last few decades, based on an analysis of the literature and the authors' field observations. The subspecies has suffered a considerable decline in its range because of hunting and competition with domesticated stock. In 1997 a survey was made of almost all the known range, which consists of two disjunct areas and covers a total of 2200 sq km. A total of 609 animals was recorded and analysis of the census results suggests that c. 1300 saiga remain in total. The

authors recommend strengthening the nature reserve established in 1993 in the Shargyn Gobi, and creating several sanctuaries outside this area, where Mongolian saiga from the main remaining population could be reintroduced. These measures would enhance prospects for the survival of this endemic subspecies of the semi-deserts of western Mongolia.

Keywords Conservation, hunting, Mongolia, *Saiga tatarica mongolica*, semi-desert, steppe, threats.

Introduction

The Mongolian saiga *Saiga tatarica mongolica* is one of several ungulate species listed in *The Red Data Book of Mongolia* (Shagdarsuren, 1987; *Mongolian Red Book*, 1997). According to a number of prominent scholars of Mongolian fauna, for many years the Mongolian saiga has declined in numbers and range. The main reasons for this decline are illegal hunting and other human pressures on the saiga's habitat (Bannikov, 1954; Dulamtseren & Amgalan, 1995; Shagdarsuren, 1987; *Mongolian Red Book*, 1997). Hunting this antelope has been forbidden since 1953 but enforcement is poor and there are no antipoaching patrols. As early as 1975 this antelope was included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) because of concern about the adverse impact of hunting the animal for its horns, which are valued in traditional Chinese medicine. In 1979, at the 2nd meeting of the Parties to CITES, it was deleted from Appendix I following a proposal from Switzerland. The reasons given were that there was no evidence that *S. t. mongolica* was present in trade. *Saiga tatarica tatarica* was

traded in large numbers, but mostly for meat, and it was not listed in the Appendices at all because the trade was not deemed to be a threat. The proposal also stated that it was impossible to distinguish between the two subspecies when examining the carcasses that were in trade (J. Caldwell, pers. comm.). At the 9th Conference of the Parties to CITES in November 1994 it was proposed that *S. t. mongolica* be included again in Appendix I because of its threatened status. At the same time it was proposed that the common saiga *S. t. tatarica* be included in Appendix II of CITES because of the renewed threat from illegal hunting (IUCN/SSC and TRAFFIC Network, 1994). However, because of the difficulty in distinguishing between the horns of the two subspecies, it was decided to list both subspecies in Appendix II. This allows the international commercial trade between Parties to the Convention to continue to a limited extent under permit and subject to quotas.

Saiga classification

Most of the recent reviews on mammals state that the genus *Saiga* Grey, 1843 is represented by one polytypic species, *Saiga tatarica* Linnaeus, 1766, including two extant subspecies, the nominal form—*S. t. tatarica*—and the Mongolian saiga—*S. t. mongolica* Bannikov, 1951 (Ellerman & Morrison-Scott, 1951; Bannikov, 1954; Sokolov, 1959; Heptner *et al.*, 1961; Corbet, 1978; Sokolov, 1986; Pavlinov & Rossolimo, 1987; Sokolov & Tembotov, 1993). Earlier, Bannikov (1946), as a result of his investigations in Mongolia, expressed doubt about the monotypic status of the genus *Saiga* and described

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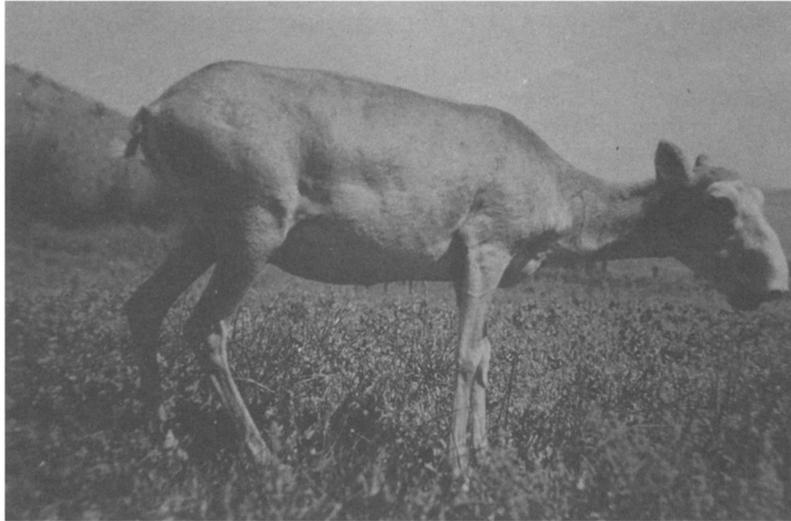


Plate 1 Adult female Mongolian saiga. (*S. Dulamtseren*).

a new species *S. mongolica* sp. nova, based on several saiga specimens from the western part of the country. Later, he (Bannikov, 1951) and other investigators (Sokolov, 1959; Heptner *et al.*, 1961) concluded that the Mongolian saiga should be considered as a subspecies of *S. tatarica*—*S. t. mongolica* (Plate 1).

Saiga tatarica mongolica differs from *S. t. tatarica* in its smaller size, more elevated nasal bones, form of nasal aperture, and larger, rounder eye-sockets. Bannikov (1951) noted the smaller, more slender and less curved horns of *S. t. mongolica* (Fig. 1) as well as differences in nutrition. He also noted that, unlike *S. t. tatarica*, the Mongolian saiga does not undertake regular large-scale migrations and that the lambing period is much later in the year than that of the remaining populations of *S. t. tatarica* in Kazakhstan and Kalmykia.

Historical distribution of saiga in Mongolia

The lack of information has made it difficult to determine the past distribution of the two subspecies of saiga in Mongolia. Reliable fossil material does not exist but saiga bones have been found in two ancient human graves in the dry steppe zone (Dariganga district; Dinesman, 1986). Bronze Age rock carvings depicting saiga, are widespread in Mongolia (Dinesman, 1986; Dinesman *et al.*, 1989; Fig. 2), although it has not been possible to determine the subspecies.

Records of saiga sightings made in the first half of the century (Bannikov, 1954) suggest that the species was extremely abundant in parts of its range. Based on his own observations over many years and information from other sources, Bannikov (1954) compiled a map of saiga distribution in Mongolia (Fig. 2). This

revealed the presence of two forms of saiga: *S. t. tatarica* in Dzhungaria (on both sides of the frontier between Mongolia and China), and *S. t. mongolica* in the Great Lakes basin. The areas of distribution of the two forms are completely separated by the Gobi Altai range.

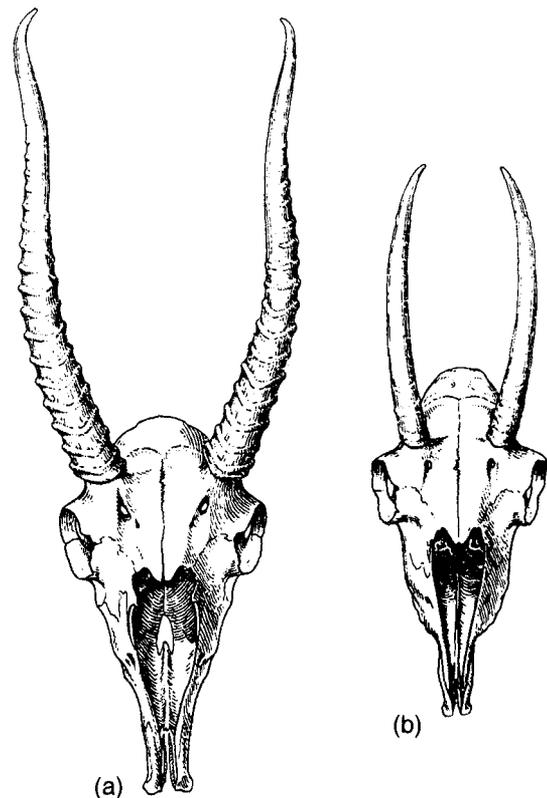


Fig. 1 Skulls of saigas: (a) from Kazakhstan; (b) from Mongolia, Shargyn Gobi (after Bannikov, 1954).

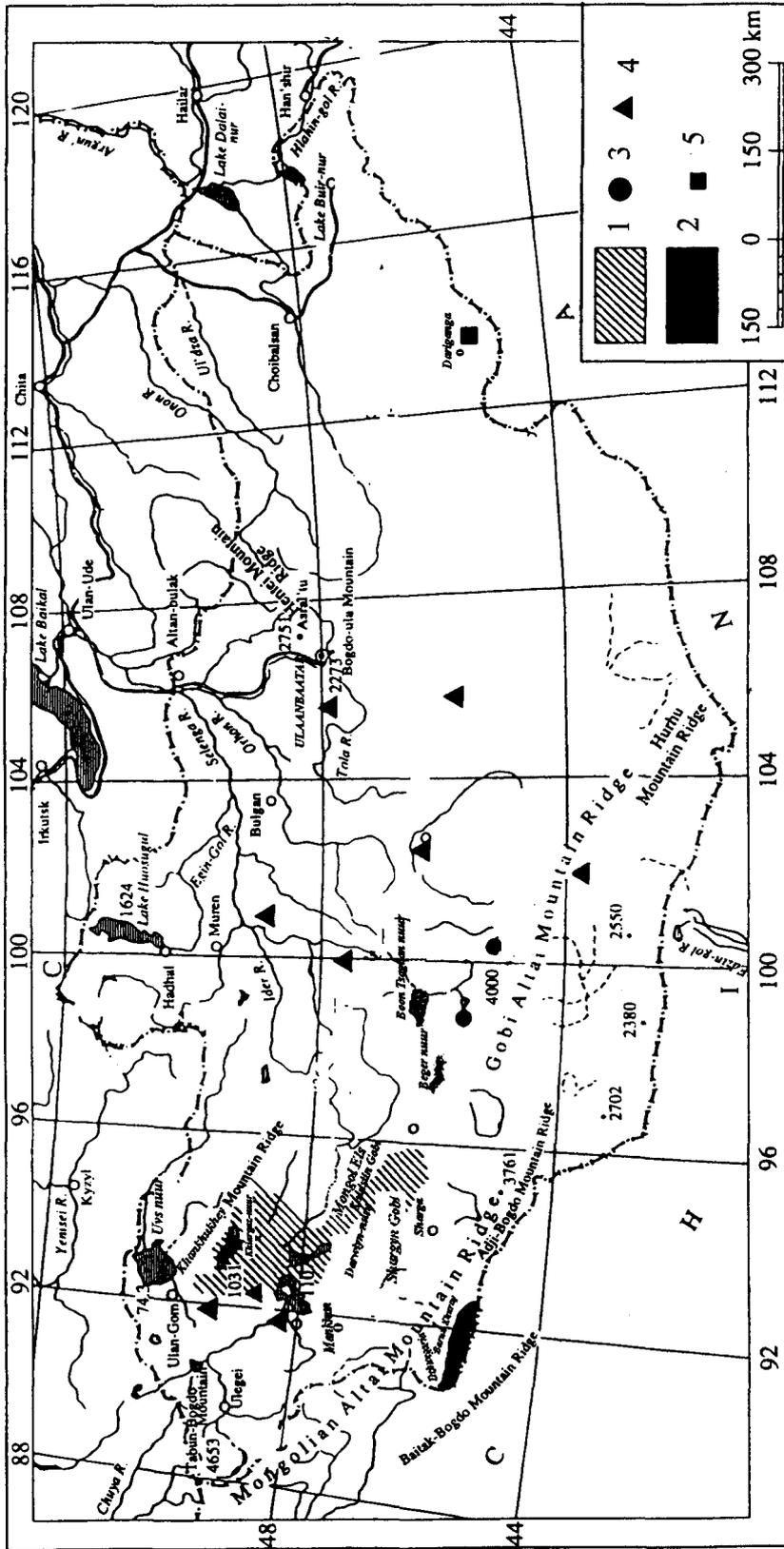


Fig. 2 Current and historical distribution of saiga in Mongolia. 1, range of *Saiga tatarica mongolica*; 2, range of *S. t. tatarica* (after Bannikov, 1954, with changes); 3, sites where saiga findings were reported (Bannikov, 1954); 4, sites of rock paintings depicting saiga (L. G. Dinesman, personal communication); 5, sites where saiga bones were found (after Dinesman, 1986).

Table 1 Data on Mongolian saiga numbers from the literature

Year	Numbers of saiga in the Shargyn Gobi	Numbers of saiga in Mankhan district	References
1977	Several hundreds	?	Mallon, 1985
1977	200	?	Dash <i>et al.</i> , 1977
1978	300	?	Sokolov <i>et al.</i> , 1978 Sokolov & Orlov, 1980 Smirnov, 1983
1981	750	?	Sapozhnikov & Dulamtseren, 1982
1982	900–950	?	Sokolov <i>et al.</i> , 1986
1984	100–150	?	Sokolov, 1986
1988	1700	?	Sokolov <i>et al.</i> , 1992
1992	?	30–40	Mounkhtogtokh, 1993
1993	300	?	Mix, 1994
1994	300	36	Chan <i>et al.</i> , 1995
1995	1300	6	L. Amgalan, pers. comm.

Surveys and observations in the latter half of this century indicate that there has been a substantial decline in the populations of both subspecies and a concurrent reduction in the distribution. Both subspecies are considered to be extinct in China (Jiang & Sung, in press) and recent observations suggest that *S. t. tatarica* may have completely disappeared from Mongolia (Gal & Bold, 1976). Certainly this subspecies seems to have disappeared from Dzhungaria (Mallon, 1985), where it was once widespread and abundant (Eregdendagvaa, 1954; Sokolov *et al.*, 1978; Fig. 2). However, in July 1981, Zhirnov & Ilyinsky (1985) saw 10 saiga during an aerial survey of Dzhungaria. The subspecies of the animals was not established.

By 1974 the distribution of *S. t. mongolica* had been reduced to two limited areas of semi-desert (Shagdarsuren, 1974). By 1994 only two isolated populations of *S. t. mongolica* remained (Chan *et al.*, 1995). The two areas are 200 km apart; one in the Shargyn Gobi covering c. 2000 sq km and one in Mankhan district covering 200 sq km, a total area of 2200 sq km, approximately 30 per cent of the former range (Dulamtseren & Amgalan, 1994, 1995; Fig. 2). It was suggested that the causes of the declines were uncontrolled hunting, recurrent severe winter conditions (*dzhuts*) when a thick ice crust restricts access to forage, and the impact of human activities. Other relevant but very fragmented data on the Mongolian saiga have been reported by Dash *et al.* (1977), Sokolov *et al.* (1978), Sokolov & Orlov (1980), Sapozhnikov & Dulamtseren (1982), Smirnov (1983), Mallon (1985), Sokolov *et al.* (1986), Sokolov *et al.* (1992), Mounkhtogtokh (1993), Mix (1994) and Reed (1995).

Recent surveys for Mongolian saiga

Since 1975 regular motor-vehicle censuses of wild ungu-

lates in Mongolia have been conducted by members of the Soviet–Mongolian (now Russian–Mongolian) Integrated Biological Expedition. The censuses were conducted in many parts of former saiga range but the species was found only in the Shargyn Gobi and adjacent areas, in groups ranging in size from seven individuals (Lushchekina & Dulamtseren, 1997) to several hundred (Dulamtseren & Amgalan, 1995). In November 1995, a 10-day motor-vehicle census of saiga resulted in a preliminary estimate of about 1300 saigas, most in the Shargyn Gobi with only six individuals in Mankhan district (H. Mix, pers. comm.). Table 1 presents data on population numbers of Mongolian saiga from various sources. Given the discrepancies in published data there was a need to clarify the status of the Mongolian saiga so that appropriate conservation measures could be identified and implemented.

Mongolian saiga survey 1997

Methods

As part of a wider survey for ungulates in Mongolia, in August–September 1997 we conducted an off-road motor vehicle survey specifically for saiga in the two known parts of the Mongolian saiga's range (2–20 August). Using topographic maps, parallel transects were selected 2 km apart, covering most of the saiga's known range. Using an auto-compass, we travelled during daylight hours along these transects, 813 km in the Shargyn Gobi and 400 km in Mankhan district—1213 km in total (Fig. 3). We compiled a large-scale map showing locations of the survey routes and the numbers of saiga seen at each observation point. In addition, using binoculars, the ratios of males/females and adult/young animals were determined at each point. According to observed migration patterns and the direction we travelled, it was impossible to count the

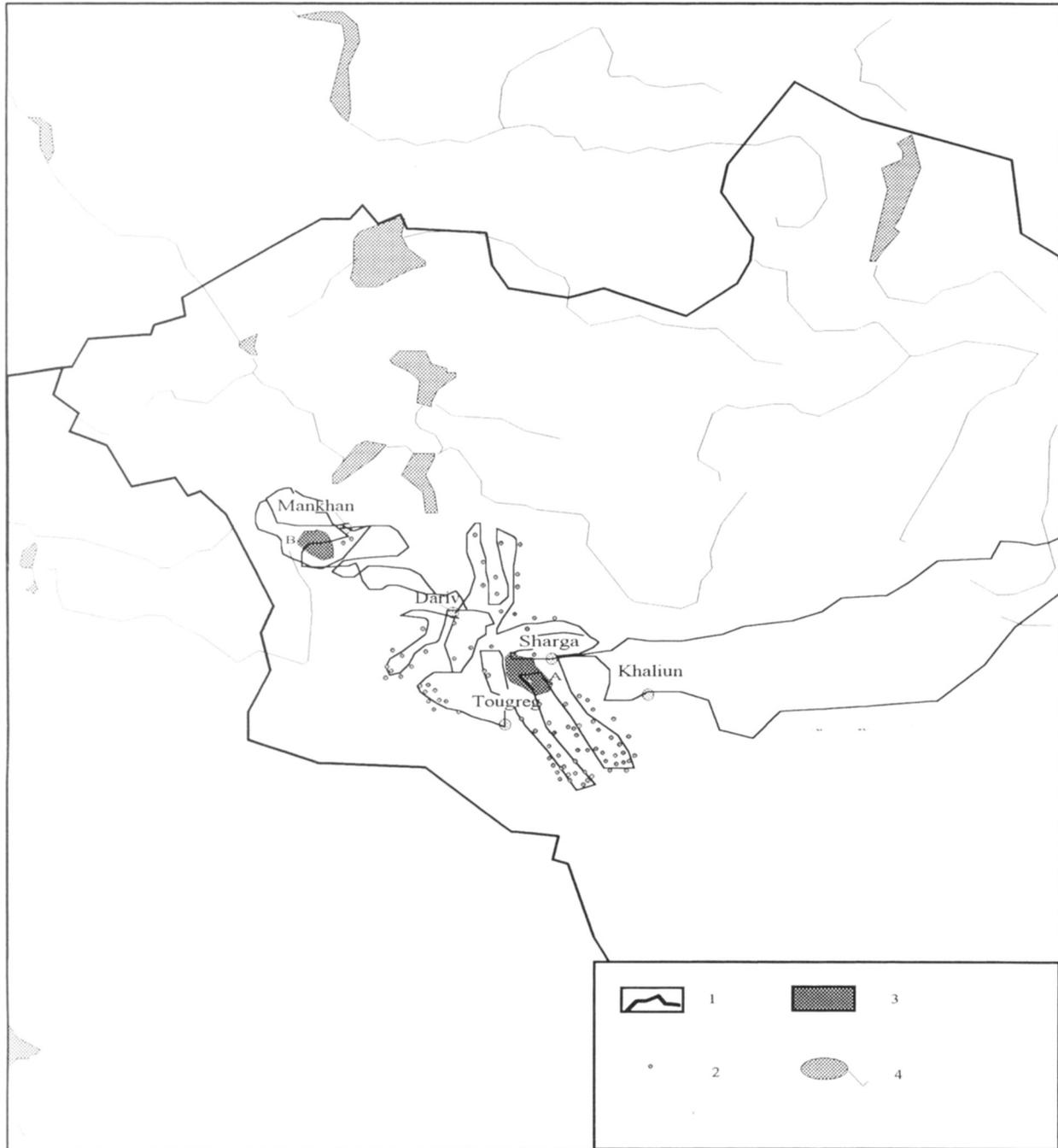


Fig. 3 Current distribution of the saiga in Mongolia: 1, motor vehicle census routes in August 1997; 2, sites where Mongolian saiga were observed in August 1997; 3, location of the Shargyn (A) and Mankhan (B) Nature Reserves; 4, locations of lakes.

main herds of saiga twice. Dispersion of single animals could influence the results of the transect counts, but this would make very little difference to the total results of our survey. In addition to topographic maps, we used the Vegetation Map of Mongolia (scale 1:2500000; Lavrenko, 1979) to help determine the number of saiga in each type of habitat. When we met local people we tried to obtain from them possible data on

past and current distribution of saiga, and the role of different factors in the fluctuation of its numbers.

Results

In total there were 97 sightings of saiga. The maximum number of animals in a herd was 40 and the average number of animals per herd was 6.2. We recorded 607

saiga in the Shargyn Gobi (0.7 animals/sq km) and only two in Mankhan district. We also encountered herds of Mongolian saiga in the Khuisiin Gobi. This would be a new expansion of the range to the north of Shargyn, but may be temporary. Local people also reported seeing saiga near Mongol Els (Khukhmort district, about 150 km from the main part of the Mongolian saiga's range in the Shargyn Gobi). According to these data there is good reason to believe that the current range is much larger than was described earlier (Dulamtsersen, 1970; Dash *et al.*, 1977; Sapozhnikov & Dulamtsersen, 1982; Dulamtsersen & Amgalan, 1995). The calculation of potential saiga range from the topographical maps reveals that it covers c. 5300 sq km. Our transects covered c. 2426 sq km of this area (1213 km long and 2 km wide). Based on the number of saiga we encountered in our survey area (609), we estimate that there could be 1300 saiga in the area covering the known range of the subspecies. However, this estimate does not take into account differences in habitat suitability within the area.

In our survey we only encountered animals on the hill slopes and none was found on flat land. We found the highest concentration of Mongolian saiga in the petrophytous *Stipa-Salsola* and *Salsola-Stipa* semi-deserts or dry steppe on brown soils, stony or gravelly, in the lower altitudinal zone of mountains, mountain valleys and hill massifs of the Mongolian Altai and the Gobi Altai (geobotanical units according to Lavrenko, 1979). According to data from the local administration, livestock numbers in Sharga and Mankhan districts had increased continually since 1993. We observed a golden eagle attacking a 2-month old saiga and later we took the opportunity to collect specimens for laboratory studies. In addition, we collected some samples (hair, dry skin and soft tissues) from this animal for DNA isolation and PCR (polymerase chain reaction—a method for amplifying specific DNA sequences *in vitro*) analysis. A comparison of results of such genetic analyses with data from other populations within the saiga range could help to refine their taxonomic status and level of viability.

Discussion

Mongolian saiga habitat preferences

Mongolian saiga inhabit semi-desert or dry steppe depressions (Bannikov, 1954). According to this author, during the summer saiga preferred grass-salsola (*Salsola passerina*) semi-deserts, where *Stipa gobica* and *Anabasis brevifolia* are codominant. Of somewhat less importance for Mongolian saiga were *Stipa* and *Stipa-Allium* semi-deserts. *Saiga tatarica mongolica* does not

penetrate into the steppe associations further to the north and spreads only reluctantly to true deserts, in particular to shrub deserts. Bannikov (1954) also believed that the Mongolian saiga was a rather stenotopic form with regard not only to vegetation but also to topography. According to Bannikov (1954), it avoids hilly areas and prefers flat lands in large lake depressions, and this preference is associated with its locomotion pattern—an extremely pronounced amble.

Contrary to his observations, during our census we encountered most animals on hill slopes and none on flat lands. In the Shargyn Gobi, the saiga is distributed in three types of biotopes: the area where most saiga occur (small hills, broken by shallow dry river beds); the dispersion area (broken ground with many deep and shallow dry river beds); and the peripheral area (lower parts of mountain slopes and adjacent flats). Dulamtsersen & Amgalan (1995) noted that the Mongolian saiga's most favoured habitats are terraces between mountains, with scarcely broken ground of small stones or sand, occurring from the foothills of the Mongolian Altai to the border of the Shargyn Gobi (at altitudes of 100–2000 m). The main part of the normal dispersion area is composed of semi-desert (or dry steppe) with *Stipa glareosa*, *S. gobica*, *Allium polyrrhizum* and *Anabasis brevifolia* on brown light-loam and sandy-loam soils in the foothills of the Mongolian Altai, as well as semi-desert (or dry steppe) with *Stipa glareosa*, *Anabasis brevifolia* and *Allium polyrrhizum* on brown light-loam and sandy-loam soils on flat land, sometimes with mountain outcrops and hills. The vegetation of the peripheral habitat is represented by associations including *Anabasis brevifolia* on grey-brown soils with scattered shrubs of saxaul *Haloxylon ammodendron*. Saiga avoid these shrubs (Sapozhnikov & Dulamtsersen, 1982), although Bannikov (1954) mentioned that saiga occur in saxaul in periods of heavy snow or high winds.

Changes in abundance and distribution of *Saiga tatarica mongolica*

The literature suggests that the abundance of *S. t. mongolica* is subject to significant fluctuations from one year to the next. It is practically impossible to determine the details of this process and the factors that influence it because of the great variation in estimates and the absence of common, or at least adequately described, techniques for population evaluation that would make standard recalculations feasible. The survey by Sapozhnikov & Dulamtsersen (1982) is an exception; they described in detail the techniques and method used. The exact changes in range size that have taken place since the beginning of the 20th century are also hard to demonstrate—a fact regularly mentioned

in the literature (Bannikov, 1954; Dulamtseren, 1970; Zevegmid & Dawaa, 1973). On the basis of comparison of the results of our survey with the survey carried out by Sapozhnikov & Dulamtseren (1982), it seems that during the last 17 years both numbers of Mongolian saiga and its range have increased. However, our methods and transect lengths were different to those used by Sapozhnikov and Dulamtseren.

Threats

In recent years, during the transition to a market economy in Mongolia, there has been increased illegal hunting to supply the saiga horn trade. This will inevitably lead to a further reduction of saiga distribution and abundance (Chan *et al.*, 1995). One of us (S.D.) described an incident where a Customs officer discovered 84 Mongolian saiga horns in the suitcase of a passenger travelling from Ulaanbaatar to Beijing (reported in a Mongolian newspaper; Ulaanbaatar 16/17, 20 January 1995). This shows the potential great losses that poachers could inflict on saiga populations, but it is very difficult to obtain reliable information on illegal saiga hunting from local people. Another threat to the survival of saiga is competition with domestic animals. According to the local administration, during recent decades, the Shargyn Gobi has always been used as pasture for domestic animals (mostly sheep) but on a moderate scale. Our study found a considerable increase in numbers of livestock in recent years and competition for pasture with domestic animals could affect the survival prospects for the Mongolian saiga, particularly if the desertification of this region continues.

Eregdendagvaa (1954) observed that during summer droughts, Mongolian saiga usually migrated from the Shargyn Gobi north-west across the Khuisiin Gobi to the Great Lakes basin. This appeared to happen also in 1997, when no rain fell between the spring and the completion of our survey (end of August).

Among factors affecting the abundance of the Mongolian saiga, besides unfavourable weather conditions and food shortage, there is significant mortality (higher in males than in females) as a result of illegal hunting. Wolf and fox predation also account for significant losses of both young and adults (Zevvegmid & Dawaa, 1973). Young saiga are also attacked by predatory birds (for example golden eagle *Aquila chrysaetos* and tawny eagle *A. rapax*).

There is sparse information on the epizootics and parasites affecting the Mongolian saiga. We were able to find only one mention of its endoparasites: Sharkhu (1995) found 17 species of helminths, of 11 genera, that parasitize the Mongolian saiga. Most of them are also

known to parasitize *S. t. tatarica* in Kalmykia and Kazakhstan (Bannikov *et al.*, 1961). It is interesting to note that, because of the low numbers of *S. t. tatarica* (< 2000 animals) at the beginning of the 20th century, its specific parasite—a subcutaneous botfly, *Pallasiomyia antilopum* Pallas, 1771, disappeared completely from the territory of the former Soviet Union (Sludsky, 1955; Grunin, 1962). On the other hand, larvae of this species are very common parasites of the Mongolian saiga (Eregdendagvaa, 1954), which was never very abundant. The mass infestation of larvae seriously weakens animals, spoiling their hides and meat. We were unable to count what must have been many dozens of larvae under the skin of the 2-month old saiga killed by the golden eagle. It is possible that the saiga was so weakened by the botfly larvae that it was easy prey. Grunin (1962), describing the biology of *P. antilopum*, mentioned that newborn saiga do not have larvae of this botfly, which does not agree with our observations in the Shargyn Gobi. We believe that high infestations by botfly could be a more serious problem for saiga survival than natural predators.

Conclusion and recommendations

We believe that a number of important questions concerning the Mongolian saiga are still unanswered.

1. What was the original stock for the Mongolian saiga and how much time was necessary for the formation of this subspecies?
2. How widely was the Mongolian saiga distributed in historical times?
3. Why has the Mongolian saiga survived mainly in the Shargyn Gobi and not in other areas that appear to be equally suitable?
4. How has geographical isolation affected the genetic composition and other features of this population?
5. What would be the minimal size of viable subpopulations to ensure the survival of *S. t. mongolica* in case of disaster striking the main population?

The necessity of continuing integrated research in order to find the answers to these questions and to secure a future for this endemic subspecies of Mongolian semi-deserts is clear. A map of the ecosystems of Mongolia (Gunin & Vostokova, 1995) shows that during recent decades the Shargyn Gobi was used for grazing domestic animals on a moderate scale. The pastures have not yet been much modified and, if the area were to be protected, it would be possible to restore them to their original state, thus creating the optimal conditions for the Mongolian saiga.

In view of the pressure from human activities on both surviving populations of saiga in Mongolia, the Shargyn Nature Reserve (286,900 ha) and the Mankhan Nature Reserve (30,000 ha) were established in 1993 (Finch, 1996), including portions of both the semi-desert itself and foothill areas of the Mongolian Altai and the Darwiyn-nuru Ridge. Unfortunately, these nature reserves in reality have no relevant management plans, no indication on the ground that they are reserves, and no funding for the studies of saiga or for protective measures. There are no rangers and no scientific staff. The lack of protective measures could explain the fact that we saw no saiga within the limits of these reserves. The situation regarding the conservation of the Mongolian saiga should be improved as soon as possible if this subspecies is to be saved. In particular, besides strengthening the infrastructure of these reserves and recruiting staff, additional restrictions should be introduced regarding grazing, watering and movements of domestic animals, as well as the use of transport in the area. The control of poaching should also be improved.

Regular and reliable censuses of saiga are essential, as well as the organization of large-scale interviews with local residents, without which the evaluation of changes in the status of the population and the development of protective measures will be impossible. As has been shown in a number of countries, ecological education and awareness of local people have been very useful in wildlife conservation programmes. Special TV and radio programmes, posters and teaching aids should be prepared on the conservation of the Mongolian saiga. The situation of the Mongolian saiga should be of concern not only to Mongolians but to the world in general.

In conclusion, it is necessary to note one more important prerequisite for the conservation of the Mongolian saiga. If the subspecies were to remain only in the Shargyn Gobi, it would be at serious risk from natural disasters (long-term drought, severe winters or epizootic outbreaks). The current situation in Mankhan district, according to our observations, is not favourable for increasing the numbers of Mongolian saiga. In this connection it is obligatory to find suitable sites for reintroduction and establishment of new saiga subpopulations. Some experience was obtained when in 1985–89 Mongolian investigators reintroduced 54 *S. t. mongolica* (ranging in age from 3 to 24 months) from the Shargyn Gobi to the Trans-Altai Gobi (Dulamtsuren & Badamkhand, 1995). The experiment itself was sound but the place for reintroduction was inappropriate because the Trans-Altai Gobi was previously the range of *S. t. tatarica*, not *S. t. mongolica*. The introduced animals have dispersed widely and the final results of their

acclimatization are as yet unpublished. We would like to suggest that a reintroduction is repeated but that other localities are chosen where *S. t. mongolica* once occurred, for example in the Great Lakes basin, where it was abundant some time ago (Eregdendagvaa, 1954). During the reintroduction process it would be necessary to avoid the transfer of pathogens and parasites (including the larvae of *P. antilopum*), and to try to establish a healthy viable population with a normal sex/age ratio. For protection of the Shargyn Gobi population of the Mongolian saiga special preventative measures to control botfly numbers should be prepared and introduced in the near future.

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