

INTERNATIONAL TAKHI GROUP  
NATIONAL UNIVERSITY OF MONGOLIA

DEPARTMENT OF BIOLOGY

**Thesis for Master Degree**

**IMPACTS OF GREY WOLF  
ON WILDLIFE AND DOMESTIC  
ANIMALS IN THE SECTOR “B” OF THE  
GREAT GOBI STRICTLY PROTECTED AREA AND  
COORDINATION OF THE ISSUES**

(SUMMARY OF THE THESIS)

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## Preface

Grey Wolf (*Canis lupis* Linnaeus 1758), a species of carnivores and canidae, is adapted to different ecological conditions; therefore, it lives in a wide range of habitats and geographical distribution in different parts of the world. Wolves and wolf habitats are found throughout Euro-Asia, in all territories from Indostan to 15° N, most territories of North America, and Islands of Socolovets, Caraginsk, Camondorsk Shantarsk and Griland (Socolov 1979). In recent years the species is hunted in large numbers in some European countries, therefore its numbers have been dramatically decreased and even in some places it is threatened with extinction (Viripaev, Vorobiev 1983).

Mongolia is one of the industrializing countries, which is divided into several natural zones of great difference that are well preserved and occupy a relatively large area of land in comparison with other countries.

The wolf is widespread throughout the country from taiga zone to desert zone. Depending on specific features of each natural zone, two types of Grey Wolf that differ by their appearances and body sizes are distributed throughout the country. One of them, a dark gray colored bigger species, is found in forests and mountainous regions and the other, a light gray colored, smaller species, is found in the steppe, and gobi regions to the south. It can be said that appearances and body sizes of a species are different because of climatic conditions

Grey Wolf plays a “cleaning” role in the ecosystem eating the oldest and weakest species among wild species and carrions of any species in their areas. Therefore the wolf helps to (1) prevent wild species from contact with potential infectious diseases and (2) keep the balance of herd structures and numbers among hoofed animals (Bazardorj, Sukhbat 1984).

In comparison to other carnivore species numbers and distribution of the species can be drastically increased within short periods of time and high wolf numbers may adversely impact livestock and game species. Organized hunting of the species might be useful to increase domestic livestock and keep resources of hoofed game animals at certain levels.

One of the protected areas that rank at a top level nation- and worldwide due to their territorial sizes and conservation significance is the Great Gobi Strictly Protected Area (SPA).

During recent years untouched vast areas in the gobi region have been used for grazing of domestic livestock; as a result the ecosystem has been deteriorated and some plant and animal species have been decreased - some of them are even threatened with extinction. Therefore, the conservation of rare species and reintroduction of endangered species in south Altai and Djungarian gobi region are inevitably necessary. Relating to this, comprehensive studies on vegetation cover and pastureland in the region should be carried out.

A project on the reintroduction of Takhi (*Equus przewalskii*) has been successfully implemented under assistance of Germany, Austria and Switzerland in the area since 1992.

Prior to reintroduction of any species, preliminary studies of the ecosystem should be conducted and direct / indirect and positive / negative ecological impacts on the species have to be properly identified.

Between 1990 and 1993 several comprehensive studies on the ecosystem in the Djungarian Gobi, where the ancestor of Takhi once lived, were conducted. However, there is still a lack of information on predators that play an important role in the ecosystem. Grazing and movement of wildlife and livestock along the few available water points in Djungarian Gobi provide favorable conditions for predators such as the wolf.

In order to ensure the protection and reasonable conditions for breeding and habitations of the hoofed animals in the area, comprehensive studies on species habitat requirements and their interrelations within the ecosystem should be carried out. Simultaneously, comprehensive studies on ecological impacts of predators on distributions, habitat use and population dynamics of a reintroduced species, particularly, at the beginning of the reintroduction (when they have no instinct to protect themselves and others in the herds from carnivores like wolves, or when they

are in small numbers) should be emphasized. It is essential to study impacts of predators such as wolf on wildlife and livestock, to develop management plans, to gather more detailed information on the species by discussing with local people and determine human's attitude to the species. Such initiatives / efforts will provide clear outputs for decision making issues.

### **Study Purpose and Objectives**

Roles of carnivores in the Gobi ecosystem are significant. Main objectives of the study are to conduct comprehensive surveys on impacts of Grey wolf on populations of wild species such as Khulan and Black-tailed Gazelle as well as on livestock and properly determine human's knowledge and attitude towards wolves.

To achieve the objectives above the following actions are proposed:

1. Determine distribution, movement areas, numbers and density of wolves in the "B" zone of Great Gobi SPA and identify percentage hunted
2. Find wolf dens in the area and enter their locations in a GIS to produce a distribution map of the species
3. With the help of interviews of residents of the "B" zone of Great Gobi SPA determine human's attitude towards wolves
4. Determine the total numbers of livestock within the area, document their movements, as well as the number of livestock killed by wolves and natural disasters
5. Conduct monitoring on wildlife in target areas and determine species killed and captured by wolves
6. Send proposals for the management of the species in the region

### **Study Findings**

With assistance of International Takhi Group (ITG) we have conducted 359-day baseline field studies in Bij River valley in Bugat soum of Gobi-Altai aimag, where Takhi are being reintroduced. The research facility is called the experimental scientific center for reintroduction of Takhi. At this station I stayed from August 21 to November 15 1999 (75 days), from May 1 to October 15 2000 (165 days), from January 20 to February 5 2001 (14 days), from July 1 to October 15 2001 (105 days) 2001.

#### **A. Information on Grey Wolf**

1. Within our field work we met with all herder families that move around the SPA and we discussed about their ways of herding their livestock, loss and reduction in the numbers of livestock killed by wolf, levels of wolf impacts /effects, numbers and herds of wolf found within their movement areas, overall distributions and hunting of the species, and numbers/herds of other hoofed animals found within the area, and issues management of the species numbers. We used questionnaire for the discussions on the above topics. The questionnaire was developed in cooperation with Dr. PETRA KACZENSKY at an internationally applicable level. The questionnaire consisted of 75 questions in 7 section. On average 45 to 60 minutes were spent for each interview, but the length of time was various depending on the participants. In other words, it depended on their age, gender, educational background, and employment. Within our discussions we felt that some questions could not be asked in their orders listed in the questionnaire. Asking questions in their order might cause wrong and incomplete replies by those surveyed. We realized that it is important to get reliable and true responses and information on the topics during open and long discussions with interviewees.

The interviews were made with a total of 54 people, ages 20 to 78. Of all people interviewed, 85.2 % (46) were males, and 14.8 % (8) were females. 24.4 % of the interviewees were 20 – 28 year old, 50 % age 31–49, and 29.6 % age of 50–78. Results of the questionnaire were analyzed with the program *SPSS 9.0* that is widely used in sociological surveys.

2. We recorded the coordination of locations, where livestock and wildlife species were killed by wolves, on a map of 1:100.000 scale, showing locations, movement, and hunting tracks of the species.
3. In cooperation with experienced hunters and herders we found and recorded wolf dens and took photos of the dens found. Dens found was all put in the map and information on habitat type and size were recorded.
4. We obtained some information on wolf hunting within the area during our discussion with local herders. Wolf hunting takes place year around, and therefore numbers of wolves hunted in previous years are not double counted. Information given by an interviewee were often confirmed by others, therefore, information obtained in this way seems reliable.

### **B. Information on Livestock**

We discussed with local herders about livestock species raised, totals of livestock alive and livestock killed by wolf and natural disasters. Numbers of livestock were obtained on a yearly basis from herders.

### **C. Numbers of ungulates**

During the study we conducted census on wild prey species (such as Khulan, Black-tailed Gazelle, Takhi) once every month (September, October, and November 1999 and July, August and September 2000).

Census was conducted using the same methods for each time, for instance, used the same kind of vehicle “UAZ”-Russian jeep, GPS, binoculars, and the same routes with 4 km width and about 150 km length showed in the Map 4. Census started at 6 a.m. because this period of time was regarded as an active period for the species and more appropriate for observation of the species with binoculars. It is really hot around noon in the Gobi, this makes them sleepy and hard to move around, so they just lie down.

Maps, schemes attached to the report were prepared by using *GIS Arcview 3.2* software and satellite and map of 1:100.000 scale of research area. Geographic coordinates were recorded with a *Garmin 12* hand-held GPS. Additionally, other equipment such as photo cameras were used in the studies.

### **D. Estimation of wolf impacts on existing numbers of Takhi**

Information and data on the numbers of Takhi killed by wolf (including injured foals) were obtained from Takhi researchers.

## Study Result

### 1. Number and Distribution of Grey Wolf

#### 1.1. Distribution and Location of the Species and Hunting areas

The Djungarian gobi lies in the southern part of the Altai mountains and it differs in its territorial size and the location of water bodies from the southern gobi A. In other words, its territory is smaller and water bodies are located closer to each other. Additionally, the area supports some predators such as wolf, red fox, corsak fox, Manul, Snow Leopard, and Lynx that are regularly found. Among these predators the wolf has a significant role in the ecosystem. The species has been studied within the scheme of the management of reintroduction of Takhi in the protected area ecosystem and has become one of the focuses of this study.

The wolf is mostly found in the rocky areas such as Khondlon, Bambagar, Serven, and Shiree Khairkhan and also in areas near water points as well as tussocks, sandy hills and reeds.

In winter, from the end of December to January is mating period for the species. In spring at the end of April, new pups are born. Up to the end of June, female wolves look after their new babies in their dens. Newly born pups are able to walk and play near their dens at the end of May. Distributions and habitats of the species in the area are often changed according to locations and distributions of livestock and wild species in the area. From the end of August, tracks of wolves are observed to increase in the southern and northern parts of Khondlon, Bambagar, and Serven mountains.

According to our observations, Khondlon Mountain is most for wolves because of its rocky conditions. This mountain is horizontally located, stretched from the north to the south, 7-8 km in length, 2-3 km in width, at elevation of 1800-2100 m a.s.l and has several high peaks.

We recorded locations of 11 carcasses eaten by wolf and determined movement patterns of wolves within 50 m area from the location of each carrion. It was proved that wolves came down from Khondlon Mountain, where they are recorded.

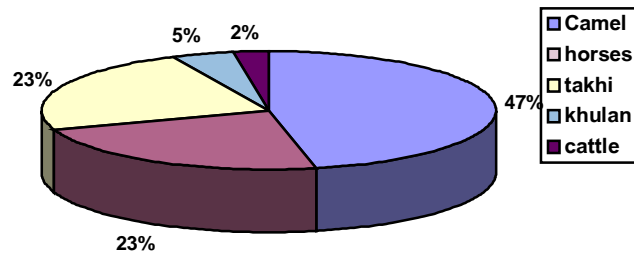
Wolves that inhabit Khondlon, Bambagar, and Serven Mountains usually come down to their southern and northern valleys and eat camels, horses, and Khulans in autumns. Local herder families with their livestock move to Altai Mountain to spend their summer starting from the beginning of June. During this time, the number of wolf tracks decreased in the study area.

However, wolf tracks were regularly recorded in Khonin Us area year round. Although we have never seen any individuals there. This area is inhabited by households of Bij bag with their livestock in winter, and by wild species such as Khulan and gazelle in summer because of less impacts of humans and livestock during the season. Therefore, wolf is regularly found in the area. Wolves are widely distributed in the Altai Mountain range in summer (since June) and autumn because of the livestock presence and the distribution of marmot which is regarded a main part of their prey.

We identified locations of carcasses eaten by wolves in the study area from August to November 1999, and from May to October 2000 and from July to October 2001. According to our records: 47 % of the total carcasses found were of camels, 23 % of horses, 23 % of Takhi, 5% of Khulan, and 2 % of adult cattle (Diagram 1).

Percentages of each species' carrions eaten by wolf

Diagram 1



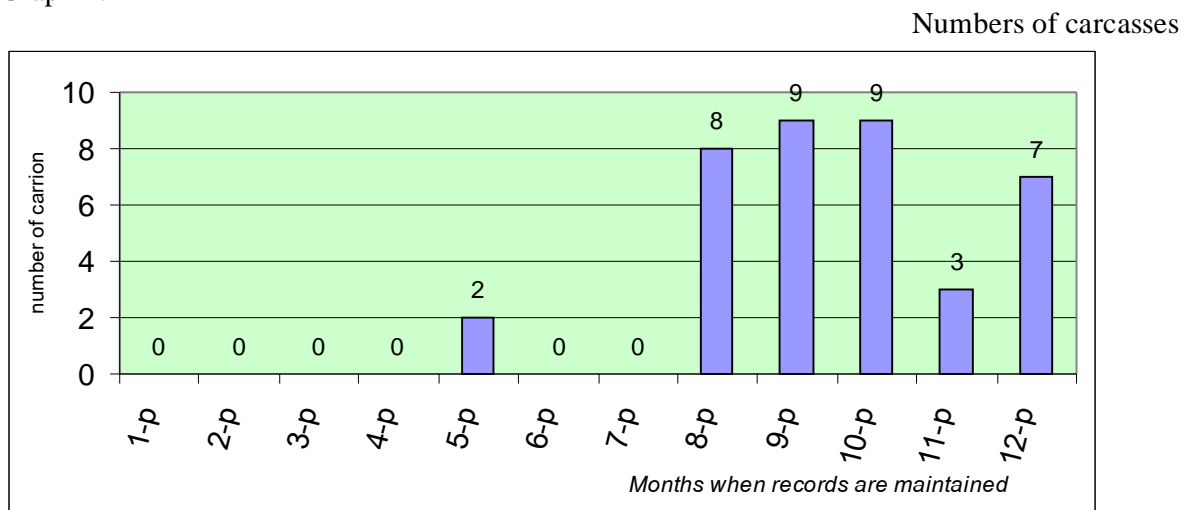
Livestock species eaten by wolf were all adult cattle, and among wild species there were carcasses of Khulan.

No carcasses of small livestock such as sheep, goats and black tailed gazelle eaten by wolves were found and recorded in the area. Body parts of small animals are entirely eaten or if there are some parts left, carnivorous birds eat or take away the remains. Therefore, it is impossible to find and record carcasses of small animals.

Most of carcasses found and recorded (47%) are of camels. In comparison with other species camels are tranquil and sluggish, therefore they are easily caught by wolves. Numbers of camels inhabiting the Bij river valley are relatively low. It is mostly 1-2 year old camels that are eaten by wolves.

80 % of carcasses of horses and Takhi eaten by wolf were foals. This shows that wolf in the area prefer to pray on foals of Takhi and Mongol horses. The following graph shows numbers of carrion found and time/months (Graph 1).

Graph 1.



From the graph above, tracks and impacts of wolves were recorded in the study area starting in August every year. Camels were eaten by wolf in the middle of August. At this period local herders are still in their summer camps, and they start to take their livestock in *Otor* (pasturing of their livestock in good pastures away from their regular pastures) and go hunting for marmots in places far away from their regular living places. Such activities increase human impacts on the area. Therefore, wolves move to the govi region: in the vicinity of Khondlon, Serven, Khonin Us and Gun Tamga. During this period of time, camels go far away from their pastures to remote empty grazing areas in the govi region out of controls of their owners and stay there for several days. Thus, camels are easily affected by wolf. In the middle of October, herders bring their camels from remote pastures and have them in semi-herding manners near their homes in regular pastures. During this time wolves seek to eat other species such as horses and Khulans. In December 2000 there was a lot of snow in the area, therefore herds of Takhi grazed in open land around Khonin Us area. Because of severe climate conditions within this period of time the researchers could not reach the site. Three days later when we finally reached the area, we found that five foals and two female Takhi were eaten by wolf.

We saw an adult wolf at 8:40 a.m. on August 10, 2001 in Serven. The wolf came back to its prey, which it had killed the previous day. We observed another adult wolf (at distance of 1 km) around 9 a.m. on September 27 on the back site of Serven area. The wolf also came to the camel kill and then went back. According to our observation, there was a family of wolves (2–3 members) that mostly eat camels in the valley coming down from Bambagar and Khondlon Mountains. On September 21 the herder Lkhagvasuren observed 13 wolves sleeping in Khoh Undur area, Khondlon Mountain (N 45° 28' 45.0" E 093° 28' 11.0").

## 1.2. Locations of wolf dens in the study area

With the assistance of an experienced local hunter, Lkhachin, we found the locations of several wolf dens in the study areas and recorded them on a map. Pups in dens in Seruun Baraan, Khonin Us, and Mukhar Mogoi areas were taken away by the hunter, while pups in the dens in other areas were moved away by the mother because of hunters. All dens we documented had been used by wolves several years ago.

According to the information given by a hunter, Tsolmon, five pups died (because of no water) in a den in Suul Har area in May 2000. According to the data on hunted wolves, a hunter, Shagdar

hunted a female wolf on the back side of Shiree Khairkhan mountain (near to the dens in Suul Har) in the spring of 2000. It can be said that the female wolf was killed after she whelped. We found a new wolf den in Gunangiin am near Bij bag center in 2001. There was a female wolf with 5 pups in the dens in May. The herder Chuluunbaatar killed 2 pups and routed mother wolf with her 3 pups. We already recorded wolf dens in a previous report. Dens found in 2001 were added to the table 2.

### Locations of wolf dens

Table 2

<b>№</b>	<b>Place name of dens</b>	<b>Positions (GPS)</b>	<b>Using year</b>
1.	Mukhar mogoi	N 45.38. 39. E 093. 55. 40.2	2000
2.	Suul khar	N 45. 11. 48.6 E 093. 45. 31.0	2000
3.	Avdrant	N 45. 31. 55.4 E 093. 24. 25.7	2000
4.	Seruun baraan	N 45. 31. 04.6 E 093. 33. 53.3	1996
5.	Khonin us	N 45. 18. 50.1 E 093. 13. 54.3	1997
6.	Tobkh khuren	N 45. 18. 19.3 E 093. 18. 56.3	1997
7.	Khooloin tolgoi	N 45. 20. 54.1 E 093. 25. 53.9	1995
8.	Gunangiin am	N 45. 34. 51.2 E 093. 47. 01.8	2001

The den recorded in Gunangiin am is at a relatively high place (1850 m a.s.l.) in comparison with other dens recorded before. The den is on the back side of a mountain with straight high cliffs. The areas around the mouths of Gunan, Bogoch, Bij, and Boom Us, that are inhabited by wolves, are inhabited seven herder families with 1397 heads of livestock.

### 1.3 . Surveys on hunted Grey Wolves

From 1999 to October 2001 a total of 42 wolves were hunted in the area. Of these 11 (27 %) were killed in 1999, 24 (58 %) in 2000, and 7 (17 %) in 2001. 45 % of the killed wolves were males, 43 % were females and 12 % were unidentified. 58 % of them were adults, 36.5 % were 2-3 year old individuals and 5.5 % were young pups. These indicators were shown in the following table and diagrams:

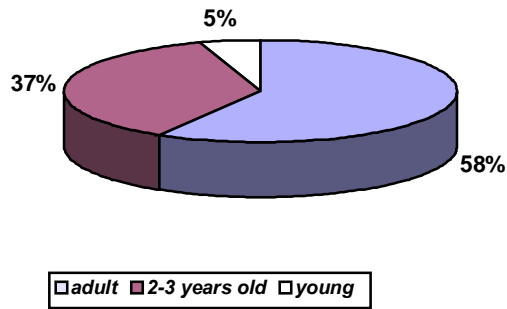
### Age and sex ratio of hunted species (1999– Oct 2001)

Table 4

Years	Age			Sex		Total
	Adult	2-3 year old	Young	Males	Females	
2001	4	1	2	4	3	7
2000	15	9	-	10	12	24
1999	5	5	-	5	3	11
total	<b>24</b>	<b>15</b>	<b>2</b>	<b>19</b>	<b>18</b>	<b>42</b>

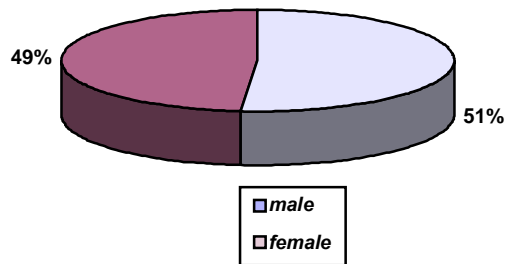
Age structure of hunted wolves

Diagram 2



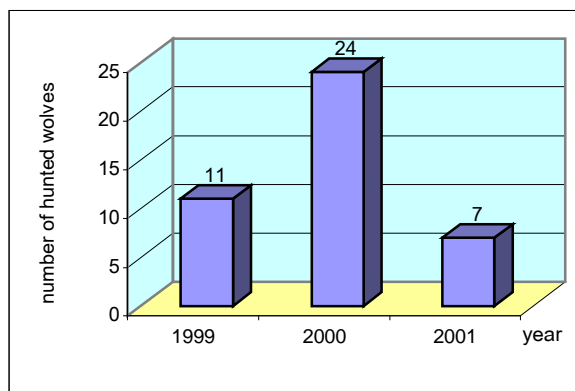
Sex ratios of hunted wolves

Diagram 3



Number of wolves hunted during 1999-2001

Graph 1



During this period the sex ratio of hunted wolves was 1:1. Regarding the age structure: 58 % were adults, 37 % were 2-3 year old individuals, and 5 % were pups.

According to our data a hunter, Naymgerel, injured a wolf in Khondlon Mountain in autumn of 2000 and Byambaa, also a hunter, did wound another wolf in Mukhar Mogoi area by trapping in October 2001.

#### 1.4. Knowledge and understanding of local communities on Grey Wolf

1. There were 54 local people involved in our survey in this field. We surveyed general knowledge and understanding on the species including its positive / negative impacts on local wildlife and livestock through inquiring the following questions:

Table 5

No	Questions	%		
		Correct	Not correct	Do not know
1.	Wolves have two litters of pups per year	79.6	9.3	11.1
2.	Only one female wolf per pack produces young.	81.5	9.3	9.3
3.	Wolves live in all parts of Mongolia	75.9	9.3	14.8
4.	How much does the average wolf weigh	70.3	16.7	13.0
5.	What is the average pack size of wolves	77.8	18.5	3.7
	<b>Average</b>	<b>77%</b>	<b>12.6%</b>	<b>10.38%</b>

77 % those surveyed gave correct answers to the first set of questions and most of inquired people have showed that they had a good levels of knowledge and understanding on the species.

2. Determination of attitudes of local people to the species asking the following questions:

Table6

	Questions	%		
		Positive	Negative	Do not know
1.	How do you feel about the distribution of wolves throughout the territory of the Mongolia?	53.7	29.6	16.7
2.	What do you think of the role of the species in the ecosystem?	81.5	14.8	3.7
3.	Should the wolf be protected?	38.9	29.7	31.5
4.	There is a large wolf population existing in Russia. Therefore it is not necessary to have wolves in Mongolia.	20.4	25.9	53.7
5.	Do you think the Grey Wolf is one a part of natural heritages of Mongolia	87	11.1	1.9
	<b>Average</b>	<b>56.3</b>	<b>22.2</b>	<b>21.5</b>

This set of questions was focused on the knowledge and ecological role of the species. 56.3 % of those surveyed gave positive answers to the questions and they consider that wolf to be an important species that plays a significant roles in the ecosystems. However, 22.2 % disagreed with statements given, and 21.5 % did not have any understanding on the issues.

## 2. Impacts of Grey Wolves on livestock in the vicinity of the Takhi Steppe

The study area contains wildlife grazing areas and water points important either for wildlife or for livestock / human population on seasonal movement throughout the area. In spring and autumn about 60 households move along the water points. Over 40 households and 60 % of the total livestock spend the spring and autumn in areas near Gun tamga, Khairkhan bulag, Tavan ovoonii bulag and Toodgiin Us water points and spend their winters in Takhi Shar Nuruu, mountain range.

According to the information by herders there were total of 18206 heads of livestock: 876 horses, 347 camels, 187 cattle, 6732 goats, and 10064 sheep. The following table shows numbers of livestock inhabit the study area: (statistics of 1999-2001)

Numbers of livestock in the study area

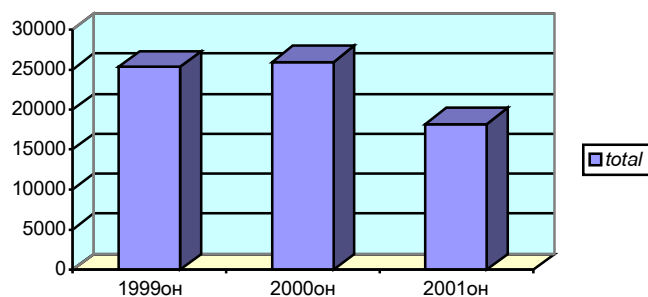
Table 7.

Years	Sheep	Goats	Cattle	Horses	Camel	Total
<b>2001</b>	10064	6732	187	876	347	<b>18206</b>
<b>2000</b>	14583	8991	440	1441	528	<b>25983</b>
<b>1999</b>	14681	8624	368	1280	365	<b>25318</b>

The following graph shows the changes in livestock numbers from 1999-2001:

Livestock numbers in the study area 1999-2001

Graph 5



### 2.2. Loss of livestock and numbers of livestock killed by wolf and amounts of damage to livestock in the area

Table 8

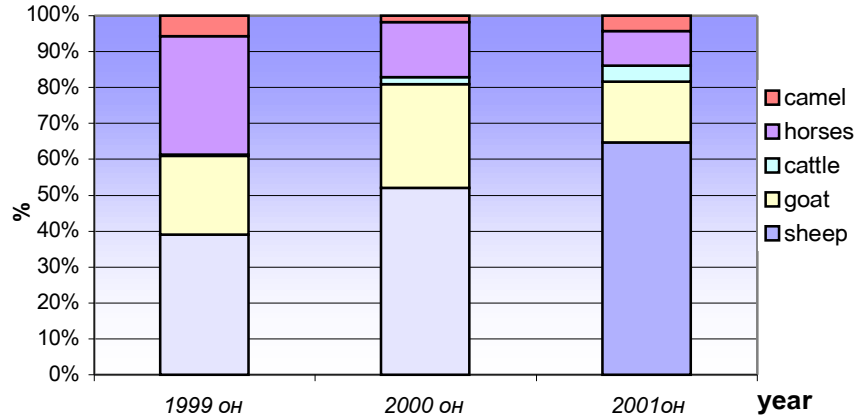
Year	sheep		goat		cattle		horses		camel		Total loses
	n	%	n	%	n	%	n	%	n	%	
<b>2001</b>	162	64.8	42	16.8	11	4.4	24	9.8	11	4.4	250
<b>2000</b>	355	51.9	197	28.8	14	2.04	104	15.2	13	1.9	603
<b>1999</b>	116	39	65	21.8	1	0.3	98	32.9	17	5.7	297

From the table above, numbers of small livestock killed by wolf are higher than numbers of big livestock and their numbers are also higher according to the

ecological and economic evaluation statistics. The graph below shows each indicator:

Numbers of livestock eaten by wolf (percentage)

Graph 6.



According to the surveys on livestock killed by wolf, small livestock, sheep and goats, are killed regularly. Small stock is mostly killed by wolf during nighttime. In addition, Wolf often kills goats and sheep that fall behind their herds. As mentioned above, there are higher numbers of camels killed by wolves from August to the middle of October in comparison to the rest of the year.

The table 9 and graph 7 below show total numbers of livestock species killed by wolf and total amounts of loss of livestock in the area:

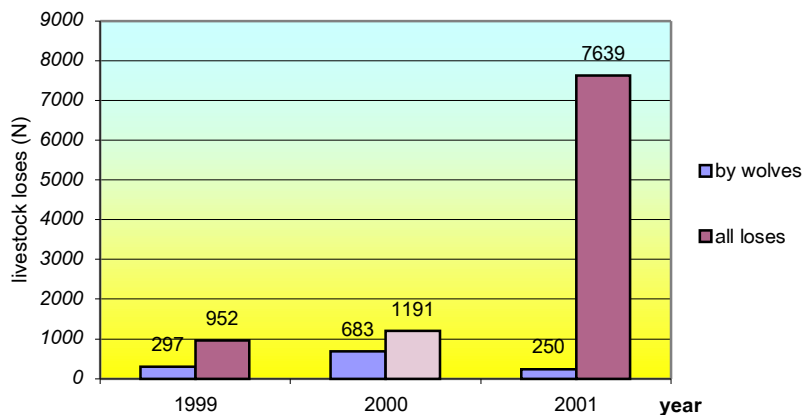
Loss of livestock and numbers of livestock killed by wolf

Table 9

	By wolves	All livestock loses
1999	297	952
2000	683	1191
2001	250	7639
<b>Total</b>	<b>1230</b>	<b>11012</b>

Ratio of numbers of livestock killed by wolf to total loss of livestock

Graph 7



From the graph above there is higher number of total loss of livestock in 2001 in comparison to previous years. However, the number of livestock killed by wolves was much lower in 2001.

### 3. Impacts of Grey Wolf on wildlife species in Takhi Steppe area

#### 3.1. Khulan

The population Khulan regularly migrates on a seasonal basis throughout the area. Herds of Khulan are widely found in areas of Takhi steppe, Gun Tamgiin Us, and Khonin Us in spring, when snow melts, but they are not seen in these areas in winter. The species usually migrate in large sized of herds. We found the average size of the herds was from 50 to 200. Additionally, we found herds with up to 900 individuals in Tavan Tolgoi, Dood Elsen Tolgoi, and Tsagaan Ders areas. According to the questionnaire responses given by herders, majority (96.3 %) thinks that numbers of Khulan increased within the last years.

We also carried out a census of wildlife species every month in 2001 and counted 0.42 Khulan per km<sup>2</sup> in July, 0.51 in August, and 1.24 in September.

#### 3.2. Black-tailed Gazelle

In comparison to the population of Khulan, the population of Black-tailed Gazelle is more stable. However, they also move around on a seasonal basis. Like the Khulan's population they appear in the areas above mentioned in spring, when the snow starts to be melted, but they are not seen in those areas in winter time. Herd structure of the species is different from the Khulan's and mostly herds number 4–7 animals.

According to our census there were 0.54 gazelles per km<sup>2</sup> in July 2001, 0.82 in August, and 1.71 in September.

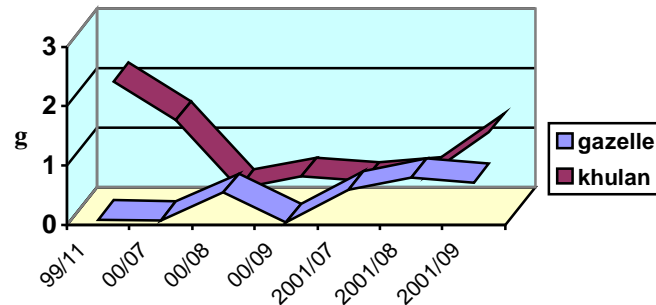
The result of the census conducted during 2001 was compared with the results of the census in previous years in the table 6 and graph 8 that shows numbers of the species per one sq. km area.

Results of census of Ungulates (species/km<sup>2</sup>)

Table 6.

No	Species name	Months of census						
		November 1999	July 2000	August 2000	September 2000	July 2001	August 2001	September 2001
1.	Black tailed gazelle	0.09	0.07	0.55	0.04	0.59	0.8	0.71
2.	khulan	2.1	1.44	0.3	0.5	0.42	0.51	1.24

Graph 8.



The graph shows that the number of Black-tailed Gazelle has decreased, while the number of Khulan has increased. This means that the two species are competitors for grazing areas within their habitats. There are on average 0.9 Khulan per km<sup>2</sup> and 0.4 Black-tailed gazelle per km<sup>2</sup> in the study area. Depending on seasonal climatic conditions and species' movement patterns the number of species fluctuates. In the summer, Khulans form herds of 2-20 individuals, but in the autumn herd sizes are 20-500 individuals, sometimes up to 900 individuals.

Within our study we found relatively fewer numbers of wildlife species killed by wolf. Only 4.6 % of carcasses found and recorded were carcasses of Khulan. However, we believe that wild ungulates (particularly Khulan foals) living in uninhabited areas such as Khonin Us and Toodogiin Us are likely to be killed by wolf, but that there is a low probability that people discover these carcasses. Regarding the Black-tailed gazelle, we did not find any kills at all. We think that carcasses of this species are quickly and completely consumed because of their small sized bodies. Therefore their carcasses are hard to find.

### Ibex

The species are found in the Altai Mountain range, Serven and Khondlon Mountains. However, we have not carried out any census on the species. We saw several herds of ibex (with 5-10 individuals) in Khondlon, Serven, and Ulaan Uul Mountains. We saw 5 ibex with 2 kids in Serven Mountain almost every day from August to October 2001. There is a herd of over ten individuals in the Khondlon Mountain, where wolves are widely distributed. There is much pressure from wolves on the small population of Ibex.

### 3.3 Takhi (*Equus przewalskii*)

Since 1992 a project to reintroduce Takhi has been successfully implemented in the Takhi Steppe and Bij river valley that once were inhabited by the species. Having adapted to severe winter and dry summer climatic conditions, herds of the species are distributed in the areas around Gun tamga, Khonin Us, and Shiiriin Us water points.

In November 2000, there were 25 horses in PAS group around 5 hills, Shar Khar, and Khurgaljin, 8 horses in the BACHLOR group around Khondlongiin Ar, Shar Khotol, and Seruun baraan, and 7 horses YUENCH group around Gashuun, Tamga, and Bij river valleys. In total there were 48 free-ranging and 8 captive (JIGUUR group) in the study area.

In the winter of 2000-2001 it snowed heavily (35-40 cm snow depth) and in the Djungarian gobi and Takhi Steppe winter conditions were very hard. This resulted in a change in the distribution and movements of wild species and livestock in these areas.

Herds of Takhi moved to the mouth of Khonin Us, and proximity of Khurgaljin area until middle of December of the year. Unfortunately, the herds experienced several wolf attacks during this period. This resulted in a loss of 90 % of all foals. From December 1-16 2000 14 Takhi were lost. Of them, 7 were killed by wolf and 4 disappeared. In February 2001 the number of Takhi was reduced to 45. From 1999 to 2001 36 % of the total loss of Takhi was caused by wolves.

## Discussion

Relationship between predator and prey are important to ensure the ecological balance and hence protect the environment. In some cases, the impacts of carnivores, especially of Grey wolves, are underestimated when attempting to protection an ecosystem. Determination of numbers, density and impacts of Grey wolves in the ecosystem is needed for proper decision making concerning management issues that ensure the ecological balances and protect the environment.

According to researchers and scientists the Grey Wolf is abundantly distributed in forest steppe, steppe, taiga regions and in fewer numbers occurs in mountainous areas and is rarely found in the gobi desert areas (Banikov 1954, Dulamtseren 1970). Although the estimates by researchers and scientists are differ, the geographical location, and current conditions of livestock and wild ungulates in the Djungarian gobi have resulted in large densities of wolf in the area.

According to our studies and observations, domestic livestock is the most important preys for Grey Wolves. However, impacts of wolves on wild ungulates has not been very well studied. Incomplete studies make the considerations mentioned above doubtful.

Nevertheless, it can be said that the impact of Grey Wolf on wild ungulate populations in the Djungarian gobi is relatively lower. Because any living organism tries to optimize food intake (without spending extra energy), the wolf tries to eat the livestock that are grazed close to it rather than chasing after wild ungulates.

Within our studies we found that the numbers of ungulates in the area were relatively stable, but population movements (in and out of the 1200 km<sup>2</sup> study area) did occur on a seasonal basis.

According to the information on animal species killed by wolf obtained within the three study years: 297 heads of livestock were lost in 1999, 683 heads in 2000, and 244 heads in 2001. Within the study area 11 % of the total livestock lost were killed by wolves. This is only 1.8 % of the total livestock grazed in the area.

Under the hunting activities conducted in 2000 the number of Grey Wolf in the study area was drastically reduced in 2001.

Interviews with local herders showed that the majority (75%) believed that the number of Grey Wolves in the Great Gobi SPA "B" zone has increased. Hence they disagree "to hunt the species only during hunting season". Additionally, most of them agree to kill wolves by poison or removing pups from dens; herders regard this as necessary to protect their livestock from wolves. From the statements given above, we were able to assess the current number of Grey Wolves inhabiting the Djungarian gobi and Takhin tal and believe they are kept at a reasonable level still allowing them to keep a ecological balances. Therefore, there is no need to further reduce wolf numbers or organize special wolf hunts. The Grey Wolf should be present in certain numbers in the ecosystem of a protected area.

In the study area, camels, particularly young individuals, are more likely killed by wolf. Therefore, more attentions should be paid to their care by local herders. In order to protect their camels from wolf predation, local herders should seek more appropriate methods to care of their

camels. For instance, appoint groups of herder families to herd camels, this might be especially helpful to prevent the loss of foals and young camels.

### **Conclusion**

1. Grey Wolves often moved to the areas where domestic livestock are found. In summer the species are mostly found in the Altai Mountain range and in the autumn they are found in the vicinity of Khondlon, Bambagar, Serven, Khonin Us, Gun Tamga and Shiiriin Us in the gobi area. Totally 42 wolves were hunted from 1999 to October 2001.
2. Eight dens were found and recorded in Khondlon Mountain, Avdarant, Shiree Khairkhan and Suul Hard, and Mukhar Mogoi areas, and one den in Gunangiin am.
3. Surveys and informal discussions on general knowledge / understanding of the wolf and its management were conducted with local people (46 men and 8 women). Over 70 % of those surveyed believed that the Grey Wolf causes serious impacts on wildlife species and domestic livestock, therefore management strategies to reduce wolf numbers are required. However, the species is also regarded as an important parts in the ecosystem. Most herders agreed that the wolf is an important (respectable) species.
4. There are about 60 households inhabiting the valleys of Bij river, Ulaan Bulag, Gun Tamga, Gashuun Bulag, Khairkhan Bulag, Tavan Ovoonii Bulag and Shiiriin Us in spring and autumn. These families own 18206 heads of livestock: 876 horses, 187 cattle, 10064 sheep, 672 goats and 347 camels.

From 1999-2001 there were 8822 heads of livestock lost in the study area. Of these 921 or 10.4% were killed by wolf – this accounts for 1.8 % of the total livestock grazing in the area. These numbers show that the impact of wolves on domestic stock is not so high.

Within our studies, from August to December, we recorded 32 carcasses of livestock and wild ungulates. Of these 47 % were of camels, 23 % of horses, 23 % of Takhi, 5% of Khulans, and 2 % of cattle. In the autumn, camels constitute the main domestic prey for wolves.

5. According to our wildlife census in the study area (1200 km<sup>2</sup>) there are on average 0.4 black-tailed gazelle per km<sup>2</sup> and 0.9 Khulan per km<sup>2</sup> in the study area.

There are 2 wild ungulates (Khulans and gazelle) that inhabit the steppe areas and show seasonal migrations. They seem to be competitors for grazing areas.

It was impossible to estimate the impact of Grey Wolves on wildlife species in the Djungarian gobi.

From 1999 to October 2001 36 % of Takhi loss were caused by wolf.

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