

ON THE ECOLOGY OF THE SNOW LEOPARD IN THE ZAILISKY-ALATAU (NORTHERN TIEN SHAN)

V.A. Zhihjakov

State Sanctuary in Alma-Ata, Alma-Ata, Kazakhstania SSR, USSR

The snow leopard (*Panthera uncia*) is a very rare animal. According to A.A. Sludskij, in 1973 there were not more than 1000 animals in the USSR, but Pokrovskij (1976) held that there were only 300 animals (+/- 150), of which 10-20 lived in Kazakhstan. Since then, it has been stated that in the USSR there are 2000 animals - in Kirgizia 1400 animals and in Tadzhikistan 200. The total number of snow leopards in Kazakhstan is 180-200 animals, while the total number in Tien-Shan and Dzhungarsky Alatau is 400-500 animals. E.P. Koshkarev (1988) stated that the Tien-Shan area harbours 113-157 snow leopards, or 2.35 animals/100 km².

Thus the estimated populations vary greatly even among specialists. Until recently, little was known about the ecology of the snow leopard because it inhabits such inaccessible areas and is exceedingly shy.

This study concerns the snow leopards living in the Sanctuary of Alma Ata and nearby areas. Material collected there during 1969 and 1988 included 105 droppings of this carnivore and also 29 carcasses of its prey from which the author determined the physical condition, age, and sex, and measured the length of the horns. Each winter the number of snow leopards is counted along a route of 500 km. We have studied the hunting habits of snow leopards by following their tracks and have even witnessed 17 attacks on ungulates. In the Sanctuary, which is situated in the centre of Zailiysky Alatau (northern Tien-Shan), there are 2 to 3 litters of snow leopards a year. The home range for a litter is about 24 km², while the population is about 0.1 animals/10 km². Along Turgun there were two litters and a single male. The total number of snow leopards in Zailiysky Alatau is about 20 animals. The average number of snow leopard tracks seen per year on a 10 km route is 0.2-1.2.

Snow leopards prey mainly on ungulates (78.1%), particularly the Siberian ibex (*Capra ibex sibirica*) (Table 1). Rodents also occupy a significant place in the snow leopard's diet (11.9%), which consists mostly of marmots (*Marmota baibacina*), and less often of squirrels (*Sciurus vulgaris exalbidus*) and moles (*Microtus sp.*). Sometimes birds are also caught. In

Table 1.

Snow leopard prey based on studies made in the Alma-Ata Sanctuary derived from 10S droppings.

PREY	AMOUNT	\
Siberian ibex	54	49.6\
Siberian deer	17	15.7\
Other Ung.	13	11.9\
Wild boar	1	0.9%
	Fox 1	0.9%
Marmot	8	7.3%
	Squirrel 3	2.8\
	Mouse 2	1.8\
	Unknown 8	7.3\
	Bird 1	0.9%
	Plants 1	0.9\

TOTAL	109	100\

Table 2.

Amount of wild ungulates in the Alma-Ata Sanctuary

SPECIES	NUMBER/YEAR					AMOUNT/
	1984	1985	1986	1987	1988	
Siberian ibex	680	690	700	700	700	35
Siberian deer	110	110	110	120	120	12
Deer	630	500	470	470	440	26
Wild boar	80	50	50	50	50	3

summer-time snow leopards have been seen eating plants.

Although snow leopards eat carcasses, they prefer fresh meat. In January 1985, a dead roe deer (*Capreolus capreolus*) was found in the Western Talgar gorge. The deep-frozen animal had died of shot wounds and was partly eaten by a snow leopard. On another occasion a snow leopard was seen eating a Siberian ibex which had starved to death. In March 1986 a snow leopard dug up a Siberian ibex buried by man. On rare occasions snow leopards also attack domestic animals. Cases are known in which snow leopards have attacked calves, sheep, foals, dogs and swine. During the very snowy winter of 1968-69, a snow leopard killed a dog in a mountain camp in Talgar.

In Tallasky Alatau (Western Tien-Shan) 9 droppings contained: Siberian ibex (4), argali (*Ovis ammon*) (3), Siberian deer (*Cervus elaphus*) (1), long-tailed marmot (*Marmota caudata*) (3), hare (*Lepus tolai*) (2), rodent (1), bird (2) and plants (1).

The Alma Ata Sanctuary harbours a variety of ungulates (Table 2). The ratio of snow leopards to ungulates is 1: 160. Roe deer were the commonest prey (80.9 %) in the droppings analysed.

In other areas of Tien-Shan 29 carcasses of ungulates have been examined as follows: 18 Siberian ibex (62.1 %), 8 Siberian deer (27.6 %), 2 wild boar (6.2 %), and 1 roe deer (3.4 %).

The snow leopard specializes on Siberian ibex because they occupy the same habitat and the ibex is the most frequent. During the last few years the population of Siberian deer has increased and the snow leopard has started to hunt them as well. These deer are hunted only in winter-time, when the deep snow forces the animals to lower altitudes, where deer and wild boars exist. The prey consists chiefly of adult males. Of 18 ibex killed 17 were males, two of which were young (2 and 4 years old), the rest being from 5 to 11 years old. We have not yet been able to ascertain the true difference in yearly growth of antlers between males killed by snow leopards and those killed by something else. In western Pamir it is also the adult males that are most frequently killed by snow leopards. Even in the Dzhungarsky Alatau the same tendency has been observed (Table 3).

One explanation for a higher frequency of adult males among the snow leopard's prey is that they do not move as quickly as females and young do, and also because they are less alert. The movement of males is restricted by their big, heavy horns.

The snow leopard usually hunts by hiding in the surroundings, - it very rarely sets out in search of its prey.

In February 1984, a snow leopard got into the middle of a herd of Siberian ibex grazing near a steep slope. A 7-year-old male fell on its knees and slid down the slope. The snow leopard had broken its backbone at the loins. The ibex could only use its front legs, the rear end dragging behind. As the animal continued to slide down the slope, the leopard followed right

Table 3.

Ages of the Siberian ibex killed by snow leopards in Zailiysky and Dzhungarsky Alatau (data based on bone radiocarbon dates).

AGE	BONES FOUND			
	Zailiysky Alatau		Dzhungarsky Alatau	
Years	amount	%	amount	%
1	5	3,4	—	—
2	10	6,8	2	2,3
3	4	2,7	—	—
4	11	7,5	3	3,4
5	16	10,9	10	11,5
6	18	12,2	16	18,4
7	12	8,2	14	16,2
8	22	15,0	16	18,4
9	15	10,2	10	11,5
10	14	9,5	8	9,2
11	11	7,5	4	4,6
12	8	5,4	3	3,4
13	1	0,7	1	1,1
TOTAL	147	100	57	100

behind, attacking it a few times. The ibex lost hair on the bushes while sliding down and eventually it was stopped by a stone where the snow leopard killed it by biting its throat. The cat stayed by its prey for 3-4 days and during those days it ate the muscles from the right shoulder and thigh (26x18 cm), backbone and neck, about 30 kg of meat. The prey was opened from the throat to the anus, and some of the guts were thrown out. The snow leopard stayed by its prey, having two resting places about 10 to 15 m away from the carcass. There were no signs of magpies (*Pica pica*) or crows (*Corvus cornix*). Faeces were found in four different places, one of which had been covered with snow.

In December 1969, a snow leopard killed a 7-year-old male ibex in the Western Taigan gorge and fed on its throat and left side. The snow leopard had followed the ibex, which, as in the above mentioned case, had also slithered down a slope and broken its right horn about 25 cm from the root. At the end of January 1981, a snow leopard killed a Siberian ibex 8-year-old male in the Issyk gorge and ate its front leg and part of the hind leg (8 kg).

In February 1982, a male ibex was killed by a snow leopard in Malyj Kliutj (western Talgar). This animal was also pushed down a slope. The snow leopard stayed by the carcass or returned to it until only a little meat was left by the throat.

On 30.12.1985, when ibex were being counted from an aeroplane, at 13.00 hours in Talgar gorge (2,800m), a snow leopard was seen sliding down a slope after its prey. They were stopped by some bushes and the snow leopard killed the ibex. The pilot flew over the place three times but they could not see the animals any longer.

Another ibex hunt was observed on 26.03.1987 in the Talgar gorge area. Early in the morning a 9-year-old male ibex was seen running down a slope with a snow leopard right behind it. The snow leopard jumped and struck the ibex, which fell and got stuck in the snow. The snow leopard did not follow. The ibex got up and jumped down to a narrow shelf. The leopard looked down but could not see the ibex and so it left. A younger snow leopard, however, followed it. The ibex stood hidden for 2 hours, then went down from the slope and started to graze. Suddenly there appeared a third snow leopard, bigger and stronger than the other two – probably a male. The ibex ran and jumped up the slope but fell whereupon the snow leopard caught it and they both started to slide down. The snow leopard killed the ibex by biting its skull. The animal was killed at 10.00 hours but the snow leopard only started to eat it at 14.50. By 16.00 the snow leopard was seen climbing up the mountain. The same leopard was seen in the area three weeks later.

On 10.2.1988, two snow leopards were seen feeding on ibex in the Talgar gorge area. One of them had killed a 4-year-old male and was eating it, the other was eating a female killed in an avalanche. This was in the same area where a snow leopard had killed an ibex a little earlier. Higher up in the mountains a female ibex was standing the whole day, watching the two cats. Afterwards the ibex left the area and did not return until almost a month later.

A smaller and a bigger snow leopard were seen hunting four male ibex in the Issyk gorge (1.3.1988). The hunt was unsuccessful, as the ibex saw the leopards and escaped. Hunting ibex is far from always successful. A snow leopard in the Talgar ravine was seen passing some big rocks when it saw some ibex near these cliffs. It turned and crept nearer. When it was about 30 m from the ibex, it jumped towards the animals with leaps measuring 2.5 - 3 metres. The ibex managed to escape. The new snow (60 cm) which was very soft, made the hunt very difficult for the leopard.

Mostly snow leopards prey on sick and old animals in the ibex population. Of the 47 ibex killed by snow leopards, 4 (8.5%) had one horn broken. In the Sajano-Shushensky Sanctuary wolves kill ibex and of these nearly 5 % had broken horns or bad hooves.

According to Pokrovsky, a snow leopard which has killed an ibex eats 3-4 kg of meat and licks the blood from the wound. In zoos, snow leopards are fed with 2-3 kg meat/day. The yearly amount for a snow leopard is about 3.5 tons. According to my figures, a snow leopard eats 2.5 tons of ibex yearly, which means about 30-35 animals or 4.5-5.2% of their total

number. Thus the snow leopard does not jeopardize the ibex population.

When the numbers of Siberian ibex and Siberian deer (*Cervus elaphus*) started to decrease in the 50's, the snow leopard started to hunt reindeer (*Rangifer tarandus*).

A carcass of a 2-year old male reindeer with broken antlers and with illiured hoof Was found in the river bed of the Talgar ravine in December 1988. The animal had been killed by a snow leopard. The leopard had hidden itself in the woods, attacking the reindeer by jumping on its back and biting it in the throat. When the reindeer Was dead the snow leopard dragged the prey 7 metres to a secure place. There it ate its prey for 4-5 days. All the muscles from the legs Were eaten as well as the left shoulder. The heart and lungs Were also eaten. The snow leopard had eaten about 60-70 kg of meat. Three places Were found where the animal had rested. Droppings were also found in six different places.

Snow leopards are often quite successful when hunting deer. They usually prey on young females, which are easier to kill than adult males. Snow leopards kill a few deer (3-5) annually; that is about 2.5-4.2 % of the total population. Sometimes snow leopards also hunt wild boars. In January 1954, in Talasky Alatau, five snow leopards had taken a wild boar.

Prey is often killed by biting the throat or backbone. Snow leopards usually start to eat from the breast, pulling off the shoulder blade and eating the muscles from it. Sometimes they start to eat the muscles of the hindlegs first. Of the internal organs, the heart and lungs are eaten, while the guts are left. If left in peace, the snow leopard will eat the whole prey and remain near it until it is completely eaten.

The snow leopard has no natural enemies except human beings. In the Ketman mountains a skull of a snow leopard Was found which had been eaten by four wolves. However, the wolf and the snow leopard inhabit different areas. The snow leopard stays high up in the mountain, where the wolf can only come during the summer when the snow has melted. The snow leopard can be dangerous to other carnivores. In Western Tien-Shan two snow leopards killed a young bear.

REFERENCES

- KOSHKAREV, E. P.: Territorial distribution, numbers and habitat of ounce in the North and Inner Tien Shan. *MOIP Bull. Biol. Section* 1980, Vol. 93 (2), 1988
- POKROVSKIJ, V. S.: The snow leopard (irbis), pp. 82-98. in: *Large Predators* (I.B. Shishkin, A.A. Sludskij and S. Pokrovskij, eds.). *Lesnaya Promyshlennost, Moscow* 1976
- SLUDSKIJ, A. A.: The snow leopard or irbis, *Panthera (Uncia) uncia Schreber (1776)*. In: *The distribution and population of wild cats in the U.S.S.R.. Works of the Inst. of Zool., Kazakh Academy of Sciences, Vol. 34: 73-83, 1973*