

# Snow leopard (*Uncia uncia*) as an indicator species and increasing recreation loads in the Almaty Nature Reserve

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**Abstract** — The purpose of this research is to analyze the data on ecology, biology and dynamics of snow leopard population in the Almaty Nature Reserve and to identify if the increasing numbers of ecotourists could contribute to the decrease of *Uncia uncia* population. The results of the study show that increasing recreation loads in the Reserve and adjacent territories elevate the disturbance level to the snow leopard's main prey Siberian Ibex and to the predator itself that could result in a decrease of population of this endangered species or its total extinction.

**Index Terms** — Snow leopard (*Uncia uncia*), Siberian ibex (*Capra sibirica*), Almaty Nature Reserve, Kazakhstan, ecotrail.

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## 1 INTRODUCTION

The research was conducted in the Almaty State Nature Reserve, which is situated in the central part of the Zailiysky Alatau in the basins of Talgar and Issyk rivers. The Zailiysky Alatau range is situated in the most northern part of Tyan Shan mountain range, with the highest point - peak Talgar (4 978 m absolute height).

At present, the only stable populations of snow leopards in Kazakhstan are found in the following two reserves – Almaty Nature Reserve and Aksu Jabagly Nature Reserve. However, increasing recreation loads lead to the elevated disturbance levels on snow leopard and its main prey. This could potentially result in a decrease of the snow leopard population in Almaty Reserve. The *purpose*

of this research is to analyze the data on ecology, biology and dynamics of snow leopard population in the Reserve for the last 30 years and to identify if the increasing numbers of ecotourists could contribute to the decrease of *Uncia uncia* population.

The snow leopard habitat in the Reserve lies in the range of subalpine and alpine zones of 2 500 m and higher (Fig.1). In winter the animal can descend to the forest zone and river valleys following its main prey, the Siberian Ibex (*Capra sibirica*) (Fig.2).



Fig.1. Talgar mountains – snow leopard habitat in the Almaty Nature Reserve. Sredniy Talgar gorge. 2 900-4 000 m absolute heights. (9 514 f- 13 123 f). All photos S. Saparbayev unless stated otherwise.

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Fig.2. Siberian Ibex in the Almaty Nature Reserve. 2 800 m absolute height (9 186 f).

Snow leopard is considered to be an indicator of the state of Asian mountainous ecosystems because it occupies the highest positions in the food chain, requires vast habitat territory, moves on large distances and can only survive in virgin, pristine environment where its prey is abundant [1], [2], [3], [4], [5]. For this reason, a yearly inventory of population of the snow leopard is carried out in the Almaty Reserve. The results are then sent to the Ministry of Agriculture of the Republic of Kazakhstan in order for this data to be analyzed and measures to be taken, if the population has declined.

Ecology and biology of snow leopard in the Zailiysky Alatau was studied by Sludskiy [6], Fedosenko [7], Fedosenko and Zhiryakov [8], Zhiryakov and Janyspayev [9], Janyspayev [10] and others. At present, no research is conducted on snow leopards in Kazakhstan [11], [12]. To date no research has been conducted on the impact of ecotourism on the population of snow leopards in this region.

## 2 MATERIALS AND METHODS

Field survey was conducted from February 2005 to April 2008 in the Almaty Nature Reserve. Signs considered were: counts of tracks, remains of prey, feces and urination, scrapings on rocks and tree trunks. Other methods included inventories of hoofed animals in the study area, reconstruction and extrapolation methods, registering of sign locations with GPS, analysing original scripts

of encounters with the animal, expert knowledge (interviews) and collection of data on the numbers of visitors to the Reserve.

## 3 RESULTS

From the period 1975 to 2000 there were multiple sightings of the leopard's footprints on the snow. Twice the snow leopard's lair was found and in more than 40 cases the animal was directly observed (Fig. 3).



Fig.3 Snow leopard in the Almaty Nature Reserve. Sredniy Talgar gorge. 1650 m absolute heights (5 413 f). February, 1986. Photo A. Janyspayev.

According to our field logbook, the the animal's footprints are frequently found on the territory of the Reserve. However, compared to the period between 1970 and 1990, the number of direct encounters with the animal have decreased. In a 25-year period there were 40 documented encounters with the snow leopard in the Reserve or 1.6 encounters a year on average. From the 2001 to 2008 there were only 6 encounters or 0.8 sightings a year.

In Almaty Nature Reserve the snow leopard uses the same trails as ecotourists. There are six government-approved ecotrails: Leviy Talgar, Pravyi Talgar (includes Monakhov's gorge and Kuvshinki), Sredniy Talgar, Issyk, Pravyi Talgar – Issyk and Lake Isssyk (Fig. 4). The ecocamp that offers regular hikes for its participants is held annually in Pravyi Talgar. In winter time the snow leopard's footprints were found along these ecotrails (Figs.5-7).



Fig. 4. Ecotourists on the Praviy Talgar ecotrail. Altamy Nature Reserve. 1 700 m (5 577 f). July 2007. Photo D. Woodward.



Fig. 5. Snow leopard's footprints found in the Monakhov's gorge. 1 900 m absolute height (6 233 f). November 28 th, 2006.

Snow prints of a female snow leopard with two cubs were found on the 4<sup>th</sup> of December 2007 in Sredniy Talgar gorge. Based on the footprint patterns it appears that the cubs were following in the tracks of the mother, playing with each other, jumping side to side and then returning to the trail. Prints of tail marks were also found (Fig. 6,7)

On the 12<sup>th</sup> of March 2008 in Sredniy Talgar gorge we observed a female Siberian Ibex a broken right horn. On the 27<sup>th</sup> of March 2008 we discovered the remains of that female mountain goat. The evidence pointed to a snow leopard attack. Her age according to the horn rings was 10-12 years (Fig.8).



Fig.6 Snow prints of two snow leopard cubs playing in front of the "Talgar" mountaineering camp. 2 500 m absolute height (8 202 f). December 2007.



Fig.7 Snow prints of a female snow leopard with two cubs. Sredniy Talgar gorge. 2 600 m absolute height (8 530 f). December 4th, 2007.



Fig. 8. Remains of a female Siberian Ibex killed by the snow leopard. Altamy Nature Reserve. Sredniy Talgar gorge. 1 800 m absolute height (5 905 f). March 27th, 2008.

The research results have helped us to determine the main threats to the mountain goats and to the snow leopards in the Reserve. Increased ecotourism activity [Figs.9,10], illegal tourists trespassing from

the adjacent territories (Ile Alatau National park and Almaty tourist center), helicopter rides from the Tabagan Family park, particularly on holidays and on weekends. Ski resort construction as well as noise pollution from the "Sputnik" scout camp have been identified as a serious disturbance factor to the Reserve's fauna. In the summertime the service for monitoring of mudflows conducts regular helicopter transportations of its researchers.



Fig. 9. The snow leopard's main prey in the Almaty Nature Reserve is the Siberian Ibex. The animal is in a state of alert due to the approaching ecotourists. The Skiffs' valley. 2 600 m absolute height (8 530 f). November 2007.



Fig. 10. The Siberian Ibex is leaving the site disturbed by the presence of ecotourists. The Skiffs' valley. 2 600 m absolute height (8 530 f). November 2007.

## CONCLUSION

The results of the research show that the current population of snow leopard is stable and population of the Siberian Ibex is increasing.

This points to the stability of mountain ecosystems in Almaty Nature Reserve at present. However, ecotourism activity in the Reserve and recreation pressing from adjacent to the Reserve areas, such as ski resorts, the "Tabagan" Family park and the Ile Alatau National Park are a threat to the predator and its main prey. Further research into the impact of tourism and recreation on flora and fauna of the Reserve is required. This would allow for a new set of recommendations for protection and maintaining the stable population of *Uncia uncia* in the area.

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