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- Herpetologia
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Nature reserve in Xinjiang: a snow leopard paradise or refuge for how long?¹

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The snow leopard *Uncia uncia* is an endangered species, which is widely but thinly distributed throughout its range in the mountains of Central Asia. China contains as much as 60% of the snow leopard's potential habitat and has the largest population of this species. Xinjiang is the largest province in China, covering an area of 1.66 million km² or about one-sixth of the land area of China. Xinjiang is one of the most important areas for snow leopards with much potential habitat in mountain ranges such as the north and south Tianshan and Kunlun containing almost 30% of the world's snow leopard population. By the end of 2013, total 35 natural reserves have been established in Xinjiang, and 20 of these areas have snow leopards (Ma et al, 2013). In this paper, we report on the status of snow leopards in these protected areas and show that they play an important role in protecting snow leopards and their habitats. Then, we discuss the many problems and challenges faced by these protected areas.

Introduction The snow leopard (*Uncia uncia*) is a member of the subfamily Pantherinae in the family Felidae and on the basis of morphology and behavior it is placed alone in a separate genus. The core habitat of this species is the Himalayan mountain system (Ma et al, 2002). This species has been classified as endangered by the 2002 IUCN Red List (IUCN, 2002), and also listed in the Appendix I in the Convention on the International Trade in Endangered Species (CITES). China also recognized snow leopards as a first class national protected animal in 1989 which received a large amount of attention in China and abroad. According to recent estimates, there are only 4,350 ~ 7,350 snow leopards left in the world, and of all the 12 countries that contain snow leopards, China has the most with approximately 2,500~3,800 individuals. Xinjiang is China's largest province and can be considered the most important area for snow leopards with approximately 1,200~1,700 located in the Kunlun, Pamir, Tien Shan, and Altay mountains (Schaller, 1988; Ma, 2011). Based on historical documents and data, the snow leopard population in the Tien Shan alone has been as large as 700~1,000 individuals, and one can definitively say that the protection of snow leopards in Xinjiang and especially the Tien Shan is important for the conservation of snow leopards.

Nature reserves play a huge role in protecting natural ecosystems and endangered plant and animal species. In order to protect ecosystems and species in Xinjiang, the Autonomous Region government approved and established the first set of nature reserves in 1980. By the end of 2013, 35 nature reserves had been established, and these reserves were at three levels: National Nature Reserves, Province or Autonomous Region Nature Reserves, and Prefecture Nature Reserves (including City and County Nature Reserves). These protected areas have played a positive role in the protection of ecosystems and wildlife species such as snow leopards. In order to clarify the situation of snow leopards in all protected areas as well as the major threats to their survival, we carried out a survey for the 35 nature reserves in Xinjiang to look at the status of snow leopards and challenges faced for effective snow leopard protection.

Methods The field work for investigation of a mysterious animal living in high mountains like the snow leopard is difficult to carry out (McCarthy, 2000). Therefore, several methods for field research are necessary. Our team has investigated the entire Chinese Tianshan between the north and the south ranges since 2003 using a variety of methods such as field observations, line transects, infrared camera-traps, analysis of food resources, questionnaire investigations, satellite coils, and radio-tracking. We carried out major surveys in some areas with limited human disturbance and relatively abundant wild populations, and we were the first to use infrared cameras to investigate snow leopards in the Tomur National Nature Reserve (Ma M, 2005). We also distributed questionnaires for every large protected area, and interviewed local herdsman, miners, hunters, administrators, and explorers. At the same time, we collected relevant data on the protected areas of Xinjiang from the Internet, published literature, market surveys, civil and administrative departmental reports as well as statistical yearbooks, in order to obtain the most accurate data on snow leopard numbers, distribution and status.

Results Thirty-five nature reserves had been established by the end of 2012 in Xinjiang (Table 1). These protected areas have a total area of 22.1 million hectares, accounting for 13.27% and 2.29 % of the land area for Xinjiang and China, respectively. There are 9 national nature reserves (26%), 21 province or autonomous region nature reserves (60%), and 5 prefecture nature reserves (14%).

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Table 1. The general information on the nature reserves in Xinjiang

Category	Type	Number						Area	
		Number of reserves	Percent (%)	National level	Province level	Prefecture level	Snow leopard distribution	×104 Km ²	Percent (%)
Natural ecosystems	Forest	9	25.72	4	4	1	7	2.97	13.45
	Steppe & meadow	2	5.71	-	2	-	2	0.12	0.55
	Desert	3	8.57	1	1	1	-	0.15	0.69
	Inland waters & wetlands	8	22.86	2	4	2	2	1.07	4.86
Wildlife Biology	Wild animals	10	28.57	2	7	1	7	17.66	79.92
	Wild plants	3	8.57	-	3	-	2	0.12	0.53
Total		35	100.0	9	21	5	20	22.10	100.0

We categorized nature reserves into two groups: those that focused on protecting natural ecological systems (N=22, 62.86%) and those that focused on wildlife (N=13, 37.14%). There are 20 nature reserves, which protect the snow leopard and its habitat in Xinjiang, with a total area of 193,876 km² (Table 2, Figure 1).

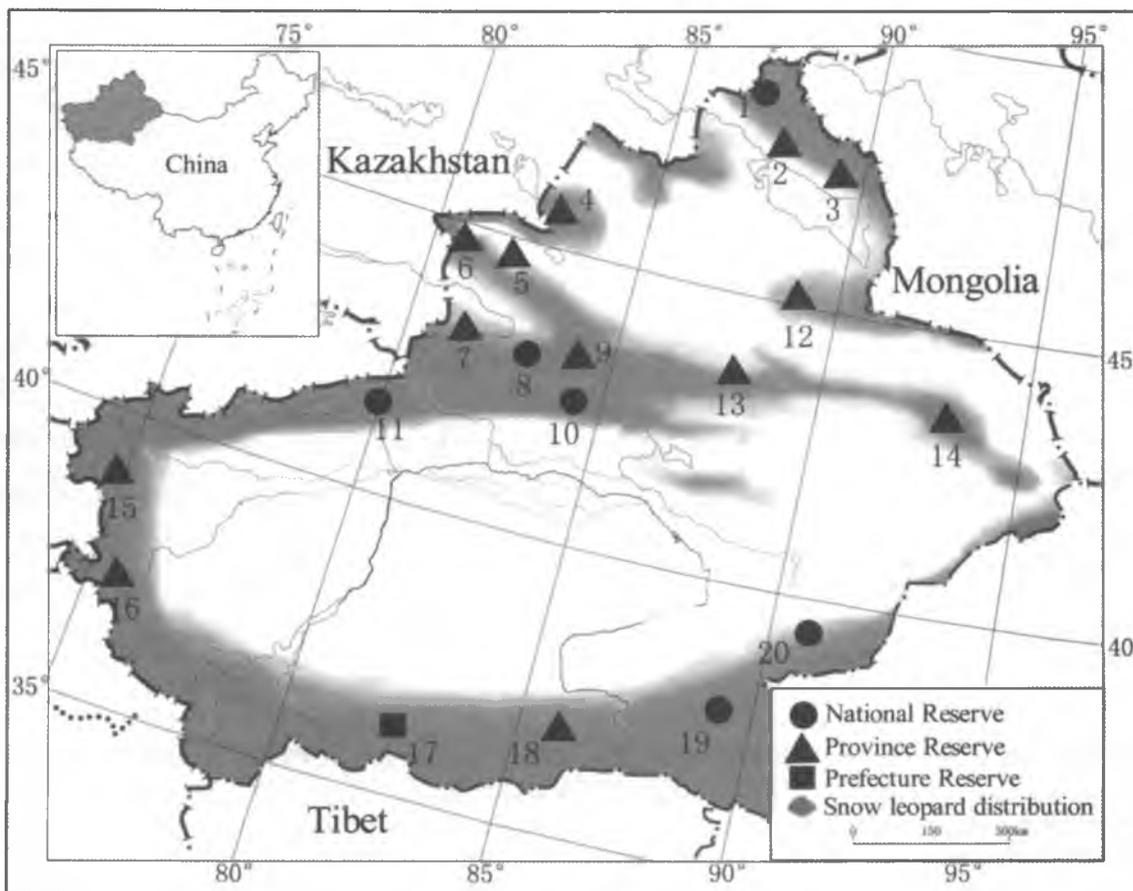


Fig. 1. The location of 20 nature reserves in Xinjiang, with habitats of snow leopard (1. Kanas; 2. Fuhai Jintasi Mt.; 3. Altay Two Rivers Source; 4. Barluk Mt.; 5. Xarxili; 6. Xinjiang *Ranodon sibiricus*; 7. Gongliu Wild Walnut; 8. Western Tianshan; 9. Kunes Mts.; 10. Bayinbuluk; 11. Tomur Feng Mt.; 12. Karamay Mts. (Baytik Mts.); 13. Bogda Feng Mt.; 14. Hami Eastern Tianshan; 15. Pamirs Plateau; 16. Taxkorgan; 17. Western Kunlun; 18. Middle Kunlun; 19. Altun Mts.; 20. Lop Nur)

Table 2. The general situation of the 20 nature reserves in Xinjiang with snow leopards

Name of protected area	District	Classes	Area (km ²)	Altitude (m)	Number of snow leopards	Density (per 100 km ²)	Source of data
1. Kanas	Burqin	NNR	2195.7	1200~4374	35~50	1.594~2.277	Schaller et al, 1998; Ma M, 2006
2. Fuhai Jintasi Mt.	Fuhai	ARNR	567.0	960~3000	10~20	1.764	Ma M, 1993
3. Altay Two Rivers Source	Qinghe, Fuwen	ARNR	6759.0	3100~3500	45~70	0.666~1.036	Gu J H et al, 2004
4. Barluk Mt.	Yumin	ARNR	1150.0	1600~3252	20~40	1.740	
5. Xarxili	Bole	ARNR	314.0	310~3670	10~20		Chen S J et al, 2006
6. Xinjiang <i>Ranodon sibiricus</i>	Wenquan	ARNR	(6.9)	2100~3000	1~3		
7. Gongliu Wild Walnut	Yining	ARNR	(10.2)	900~1800	1~4		
8. Western Tianshan	Gongliu	NNR	312.2	1300~4257	10~15	1.203	
9. Kunes Mts.	Xinyuan	ARNR	653.0	3359~4032	15~25	2.297	
10. Bayin-buluk	Hejing	NNR	1486.9	2500~3000	30~45	2.018	Ma M et al, 1993
11. Tomur Feng Mt.	Wensu	NNR	2376.4	4200~7435	48~72	2.020	Xu F et al, 2011
12. Karamay Mts. (Baytik Mts.)	Fuyun, Qinghe, Qitai, Jimsar	ARNR	15899.6	600~1464 (3318)	20~30	0.126~0.189	Xu F et al, 2006; 2007
13. Bogda Feng Mt.	Fukang	ARNR	469.6	800~5445	10~20	2.130	
14. Hami Eastern Tianshan	Yiwu	ARNR	9900.0	1800~4888	10~20	0.101~0.202	Du N & Zhang P, 2006
15. Pamirs Plateau	Akto	ARNR	1256.0	3300~5500	25~35	1.990~2.787	Ma M et al, 1990
16. Taxkorgan	Tajik	ARNR	15000.0	3200~8611	140~165	0.933~1.100	Schaller et al, 1991
17. Western Kunlun	Minfeng	PNR	1320.0	2000~6000	25~45	1.894	Feng Z J, 1990; Ma M, 2010
18. Middle Kunlun	Qiemo	ARNR	32000.0	2800~6973	60~80	0.188~0.250	Wang B, 1992; Ma M, 2008
19. Altun Mts.	Ruoqiang	NNR	45000.0	3876~6973	40~50	0.089~0.111	Gu J H & Gao X Y, 1991
20. Lop Nur	Bazhou, Hami, Turpan	NNR	67000.0	780~3300	10~15	0.015~0.022	Xia X C, 2007
Total			1.94×10 ⁵		588~837	2.51	

NNR=National Nature Reserve; **ARNR**=Autonomous Region Nature Reserve; **PNR**= Prefecture Nature Reserve

Most snow leopards live in nature reserves, with a total number of 588~837 individuals, accounting for 50-60% of the population living in Xinjiang. The population density of snow leopard in nature reserves is significantly higher (> 2.51/100 km²) than the overall average density of this species in Xinjiang (1.93/100 km²). This fact illustrates that the establishment of protected areas has helped snow leopard survival and reproduction, and this is true in national, autonomous region and prefecture nature reserves (Table 2). This suggests that the rich food resources and powerful protection measures in protected areas have contributed to the protection of snow leopard.

From 2012-2014 there were more than 20~30 stories on the internet as well as in newspapers and magazines about snow leopards appearing in major protected areas such as the Tomur Feng Mt. Nature Reserve,

Lop Nur Nature Reserve, and the Xinjiang *Ranodon sibiricus* Reserve. This was an increase over the previous three years.

Discussion The nature reserves in the mountainous central regions of China are one of the last refuges left for snow leopards. Snow leopards are found in 6 districts across Xinjiang, Tibet, Qinghai, Gansu, Inner Mongolia and Sichuan provinces with a total area of 1,240,000 to 2,400,000 km² of potential habitat for snow leopards. Of this area, 9% -13% has been set aside for protected areas which contain 2,000 to 3,400 snow leopards. These protected areas are closely associated with the mountain ecosystems those provides a good shelter for snow leopards and are essential for their survival and reproduction. Similar to other large wild animal species, the snow leopard population has declined significantly during recent decades, but this species still exists even thrives, especially in the protected nature reserves of remote areas, such as the Kunlun and Tien Shan mountains of Xinjiang. This suggests that the protection status of nature reserve is the best choice for the conservation of snow leopards and other large wild carnivore animals.

Despite the overall positive influence of nature reserves, rapid economic development and forest tenure reform in the western regions of China has created, many problems for the nature reserves and challenges for maintaining viable wild animal populations. Some nature reserves exist only on paper and they were established without changing the protection status of their territories. In fact, local governments can involve these areas in economic development without problems if it is desired. Therefore many nature reserves are eroding, dividing and shrinking under the pressure of the current industrial and agricultural development boom in Xinjiang. For example, due to intensifying of mining activities, the borders of the Karamay Nature Reserve were changed five to six times just during the last few years, forcing the core area to be moved towards the north and leading to fragmentation and degradation of the protected area. In addition, because of industrial waste residues, vegetation has been harmed or destroyed in many protected areas. The investment of the country into ecological conservation over the past 20 years is in danger of being destroyed. In addition, animal survival is sometimes precarious in these so-called protected areas. In some areas, poaching, hunting and selling of snow leopard's parts still goes on unhindered, and in the past 20 years, the price of snow leopard parts has risen ten times at least (MaMing, 2012).

Only 3 of the 20 nature reserves in Xinjiang that contain snow leopards were established especially for snow leopards, and these reserves face additional challenges besides economic development and poaching. For example, in one of these reserves, the Taxkorgan Reserve, there are about 7,750 people with 70,000 domestic animals. The viability of this reserve depends on the willingness of the Kirgiz and Tajik people living there to coexist with wildlife, and management programs must restrict hunting, fuel wood collecting, and livestock grazing.

During the past decades, no new reserves have been added in Xinjiang, and most existing reserves are threatened by losing the area protected and as a result losing the importance of what they protect. Under the shadow of economic development and profit, by our opinion the most important thing is keeping the protected areas in their former undamaged status.

With increasing reports of snow leopards in the media does that mean that the number of snow leopards has also increased? It is more likely that as field methods have improved there is a better chance of encountering snow leopards. Also, with the reduction of suitable habitat for snow leopards they have been forced near humans and this in turn has led to increased conflict between snow leopards and humans such as from leopards preying on livestock. Existing and new reserves must strive to reduce this conflict between snow leopards and humans.

Currently, most of reserves did not have a proper law in practice for protection snow leopards and their habitat from economic development and poaching. On the contrary, they are often become an umbrella for seeking benefits. Sometimes, the law for nature reserve protection is not effective and cannot fulfill the purpose for snow leopard protection. The snow leopard, as many other wild animal species, has greatly decreased in Xinjiang during recent decades. Although numbers are low, the cat persists over a large area, especially in the nature reserves. The future of the snow leopard in Xinjiang will depend ultimately on large well-protected reserves, enforcement of regulations against killing these large cats, and proper management of this carnivore. We hope that nature reserves would become a paradise to snow leopard, but not a hell.

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Резюме

Guohua Xu, Roller MaMing, Paul Buzzard, David Blank. Природные резерваты в Синьзяне: рай для снежного барса или последнее убежище?

С целью выяснения статуса снежного барса в Синьзяне, были проведены исследования в 35 охраняемых территориях этой провинции, созданных к 2012 г. В результате было выяснено, что на территории этих ООПТ живет 588-837 особей, что составляет 50-60% всей популяции барса в Синьзяне. Плотность их на ООПТ выше, чем в среднем по провинции (2.51 против 1.93 на 100 км²). Однако существуют и проблемы, связанные с быстрым экономическим развитием этих областей, что приводит к потере некоторых охраняемых территорий. Кроме того, законодательная база не соответствует целям сохранения крупных кошек. Однако единственным выходом для снежного барса по-прежнему является создание и строгая охрана специально выделенных территорий.



Snow leopard in the Tuomur Feng Mt. Area, May 2014



Snow leopard babies in Hejing County, July 2014

Фото к статье Guohua Xu, Roller MaMing,
Paul Buzzard и David Blank на стр. 144-148.

Snow leopard in Wusu, the Tianshan Mts



Фото к материалу на стр. 236

Китайская команда герпетологов сезона 2013 года по дороге на оз. Сайрам-нур (на заднем плане хребет Кыз-Эмчек, система Борохоро), слева направо: Xianguang Guo, Jinlong Liu, Feng Xu (фото Т.Н. Дуйсебаевой).



Участники экспедиции 2014 года севернее гор Улан-Даба-Ула (система Саура), слева-направо: Jinlong Liu, Марина Чирикова, Татьяна Дуйсебаева, Feng Xu, Dadjiang Li (автосъемка).