Transboundary Protected Areas and Snow Leopard Conservation

Full Text:

Introduction

The snow leopard (Uncia uncia) inhabits some of the most remote and inhospitable terrain in the world - the mountains of Central Asia, notably the Hindu Kush, Karakorum and Himalaya in the south, Pamir and Tien Shan in the west, and the Altai and Transaltai Gobi in the north (Green 1989). As these high mountain ranges form the frontiers between many of the 13 countries that lie within the snow leopard's distribution, transfrontier conservation initiatives, such as the establishment and collaborative management of protected areas across a common border, are crucially important for the future survival of this and other widely ranging species.

The potential for transboundary protected areas to promote peace, conserve biodiversity and maintain cultural values is receiving increasing prominence within the programmes of international conservation agencies such as IUCN (Thorsell 1990; Arends et al. 1995; Cerovsky 1996; Hamilton et al. 1996), UNEP (Westing 1993), Wildlife Conservation Society (Ji and Rabinowitz 1995) and the International Snow Leopard Trust (this and previous symposia). A total of 70 locations where protected areas meet across international borders were originally identified by Thorsell and Harrison (1990), but well over 100 such locations have since been recorded as part of an ongoing review (D. Zbicz pers. comm.).

The purpose of this paper is to assess the importance of transboundary protected areas for conserving the snow leopard, an endangered species (IUCN 1996). Conversely, it provides an opportunity to explore the potential for using this charismatic species as a flagship for promoting cooperation in biodiversity conservation across international borders.

Methods

Previously compiled information on protected areas in which snow leopard is reported to occur (Green 1989, 1993) was updated. This updated list was supplemented with other protected areas lying within potential snow leopard habitat, using the map produced by the National Biological Service, Fort Collins and the International Snow Leopard Trust in November 1995. The total area of potential snow leopard habitat is estimated to be 3,024,728 km2 (Hunter and Jackson, this symposium).

The location of these protected areas known to be inhabited by snow leopard, or located within potential snow leopard habitat, was plotted on a geopolitical map, using the World Conservation Monitoring Centre's (WCMC) Geographic Information System, in order to identify those adjacent to international borders. Those meeting across such borders were identified as transboundary protected areas (TPAs); those lying on only one side of a border were recorded as potential transboundary protected areas.

In the case of TPAs, a preliminary attempt was made to assess the extent to which they are managed on a collaborative basis. This assessment was based on readily available information held at WCMC,

there being insufficient time in which to carry out a questionnaire survey among relevant protected area managers.

Results and Discussion

Protected areas: A total of 109 protected areas, covering 276,123 km2, were identified as known to have snow leopards present or as lying within potential snow leopard habitat (see Table 1 at end of article). This represents 9.1% of total potential snow leopard habitat. However, not all habitat within these protected areas is suitable for snow leopard, a notable example being the vast A Er Jin Shan Nature Reserve which accounts for 16% of the 276,123 km2 under protection. A comprehensive spatial dataset for protected areas is in the process of being compiled by WCMC and the International Snow Leopard Trust in order to estimate and monitor more accurately the extent of potential snow leopard habitat lying with protected areas.

Based on a minimum viable population of 50 breeding individuals for short-term survival of serious inbreeding and its deleterious effects (Soule and Wilcox 1980), protected areas need to be at least 1,000 km2 in high density areas of five snow leopards per 100 km2 (Jackson and Ahlborn 1990). A total of 1,000 individuals is considered necessary for long-term survival of populations (Frankel 1983), which equates to 20,000 km2 of high density snow leopard habitat. Only 35 (32%) of the 109 protected areas exceed 1,000 km2 and three exceed 20,000 km2 (see Table 1). The former account for some 90% of the total extent of protected areas. The latter are A Er Jin Shan and Qomolangma nature reserves in China and the Transaltai Gobi National Park in Mongolia.

Transboundary protected areas: Of the 276,123 km2 of snow leopard protected areas, TPAs comprise 31%, potential TPAs 35% and other protected areas 34% (see Table 1). The geographical distribution and extent of protected areas with respect to political boundaries is summarized in Figure 1. Protected areas, in general, and TPAs, in particular, are most extensive in China, followed in order by Mongolia and Russia.

Currently, there are five TPAs in snow leopard range countries (Figure 2), comprising a total of 13 protected areas (see Table 1). TPAs provide an effective means of increasing the size of protected areas, thereby enhancing the long-term viability of snow leopard populations. Thus, Khubsugul Nuur National Park in Mongolia and Tunkinskiy National Park in Russia comprise a single unit of 20,218 km2, and there are four protected areas in Nepal which abut Qomolangma, China, to form a vast 40,188 km2 complex (see Table 1).

Potential transboundary protected areas: There are a total of 36 protected areas that lie on international borders, with nothing compatible on the neighbouring side (see Table 1). By far the greatest potential for creating new TPAs for snow leopard conservation is in the countries bordering Mongolia. There are also significant opportunities for new TPAs along the borders with Kazakstan, Nepal and Bhutan (see Figure 1). In practice, there may be significant political, socio-economic, cultural and other constraints in establishing new protected areas along borders adjacent to protected areas in neighbouring countries. Such constraints must obviously be weighed up against the benefits of establishing larger protected areas for this fairly widely

ranging species, and possible opportunities to collaborate and even share resources and expertise with neighbouring countries.

Collaborative management: Transboundary protected areas are at an early stage of collaborative management in snow leopard range countries. According to available information, collaboration is underway in only one of the five TPAs, namely the Langtang, Makalu-Barun, Sagarmatha (Nepal)/Qomolongma (China) complex. Here NGOs have played a key role in establishing informal cooperation at the local level under a cooperative agreement (Hamilton et al. 1996)

This state of affairs is to be expected given that protected areas in the mountainous regions of Central Asia are often poorly managed, due to a lack of adequate human and financial resources (Green 1994).

Conclusions

Almost one third of potential snow leopard habitat within protected areas is shared across common international boundaries, highlighting the vital importance of the five existing TPAs in the conservation of this endangered species. There is considerable scope for establishing many more TPAs, as there are many protected areas already existing on one side of an international border. Awareness of such opportunities needs to be raised among policy and decision-makers, and the snow leopard provides an ideal flagship for doing so, given its charismatic nature and symbolism for mountain wilderness.

In view of the importance of TPAs for snow leopard conservation, a priority is to establish and effectively implement transboundary cooperative agreements. Experience from other parts of the world should be drawn upon to promote such cooperation.

BHUTAN
3 Jigme Dorji National Park 1993 428,000
428,000 Green 1994
4 Torsa Strict Nature Reserve 1993 64,400
64,400 presence unconfirmed
5 Sakteng Wildlife Sanctuary 1993 61,000
61,000 presence unconfirmed
6 Kulong Chu Wildlife Sanctuary 1993 118,200
118,200 presence unconfirmed
Subtotal 671,600 0 671,600 0
CHINA
Sichuan
7 Wolong Nature Reserve 1975 200,000
200,000 Green 1994
Xinjiang
8 A Er Jin Shan Nature Reserve 1985 4,512,000
4,512,000 Green 1994
9 Hanas Nature Reserve 1980 250,000
250,000 MFAT 1995
10 Taxkorgan Nature Reserve 1984 1,500,000 1,500,000
No. 68 Green 1994
11 Toumuer Protected Area 100,000
100,000 presence unconfirmed
12 Buergenh Protected Area 5,000 5,000
presence unconfirmed
Xizang (Tibet)
13 Medog Nature Reserve 1985 62,620
62,620 Green 1994
14 Qomolangma Nature Reserve 1989 3,500,000 3,500,000
No. 55,56,57,59 Green 1994
Subtotal 10,129,620 5,000,000 355,000
4,774,620
INDIA
Arunachal Pradesh
15 Namdapha National Park 198,524
198,524 Green 1994
Himachal Pradesh
16 Manali Sanctuary 1954 3,127 3,127
Green 1994
17 Pin Valley National Park 1987 80,736
80,736 Green 1994
18 Rupi Bhabha Sanctuary 1982 85,414
85,414 Green 1994
Jammu-Kashmir
19 Dachigam National Park 1981 14,100
14,100 Green 1994
20 Hemis National Park 1981 410,000
410,000 Green 1994
21 Kanji Sanctuary 1988 25,000
25,000 Green 1994

22 Kishtwar National Park 1981 31,000
31,000 Green 1994
Sikkim
23 Khangchendzonga National Park 1977 84,950
84,950 Green 1994
Uttar Pradesh
24 Govind National Park 1991 47,208
47,208 Green 1994
25 Govind Pashu Vihar Sanctuary 1954 48,104
48,104 Green 1994
26 Kedarnath Sanctuary 1972 97,524
97,524 Green 1994
27 Nanda Devi National Park 1982 63,033
63,033 Green 1994
28 Valley of Flowers National Park 1982 8,950
8,950 Green 1994
Subtotal 1,197,670 0 84,950
1,112,720
KAZAKHSTAN
29 Aksu-Dzhabagly Zapovednik 1926 75,094
75,094 Green 1994
30 Alma-Atinskiy Zapovednik 1931 73,342
73,342 Green 1994
31 Markakol'skiy Zapovednik 1976 75,040
75,040 Koshkarev 1990
32 Verkhnekoksuisky Game Reserve 1981 240,000
240,000 Annenkov 1990
33 Alma-Atinskiy Zakaznik 1978 724,000
724,000 8th ISL Symposium (pers. comm.)
34 Lepsinskiy Zakaznik 1972 258,000
258,000 presence unconfirmed
35 Toktinskiy Zakaznik 1981 187,000
187,000 presence unconfirmed
Subtotal 1,632,476 0 1,632,476 0
KYRGYZSTAN
36 Ala-Archa National Park 1976 19,400
19,400 Green 1994
37 Besh-Aral'skiy Zapovednik 1979 114,000
114,000 Koshkarev 1990
38 Chatkal'skiy Zakaznik 1980 600 600 No. 105
Koshkarev 1990
39 Dzhety-Oguzskiy Zakaznik 1958 31,100
31,100 presence unconfirmed
40 Issyk-Kul'skiy Zapovednik 1948 40,800
40,800 Koshkarev 1990
41 Narynskiy Zapovednik 1983 86,000
86,000 Koshkarev 1990
42 Sary-Chelekskiy Zapovednik 1959 23,868
23,868 Koshkarev 1990
43 Teploklyuchenskiy Zakaznik 1958 32,100
32,100 presence unconfirmed
44 Toguz-Torouskiy Zakaznik 1977 10,000
10,000 presence unconfirmed
45 Kapchagaiskiy Zakaznik 1978 800
800 Annenkov 1990
Subtotal 358,668 600 154,800
203,268

MONGOLIA

46	Dzungarian Gobi (B)	National Park	1976	881,000	881,000	Schaller et al. 1994	
47	Transalti Gobi (A)	National Park	1976	4,419,000	4,419,000	Schaller et al. 1994	
48	Khasagt-Khayrkhan Reserve		1965	33,600	33,600	Schaller et al. 1994	
49	Khokh Serkh Nature Reserve		1977	23,700	23,700	Schaller et al. 1994	
50	Bulgan-gol	Nature Reserve	1965	2,500		2,500	presence unconfirmed
51	Khubsugul Nuur	National Park	1992	838,100	838,100	No. 85	presence unconfirmed
52	Uvs Nuur Watershed	Nature Reserve	1994	771,600	771,600	No. 89	presence unconfirmed
Subtotal		6,969,500	1,609,700		5,336,100		23,700

NEPAL

53	Annapurna	Conservation Area	1992	266,000	266,000	Green 1994	
54	Dhorpatan	Hunting Reserve	1987	132,500	132,500	Green 1994	
55	Langtang	National Park	1976	171,000	171,000	No. 14	Green 1994
56	Makalu-Barun	Conservation Area	1991	83,000	83,000	No. 14	Green 1994
57	Makalu-Barun	National Park	1991	150,000	150,000	No. 14	Green 1994
58	Rara	National Park	1977	10,600	10,600	Dhungel 1994	
59	Sagarmatha	National Park	1976	114,800	114,800	No. 14	Green 1994
60	Shey-Phoksundo	National Park	1984	355,500	355,500	Green 1994	
Subtotal		1,283,400	518,800		621,500		143,100

PAKISTAN

61	Askor Nallah	Game Reserve	1987	12,955	12,955	Green 1994	
62	Astore	Wildlife Sanctuary	1975	41,472	41,472	Green 1994	
63	Baltistan	Wildlife Sanctuary	1975	41,457	41,457	Green 1994	
64	Chassi/Baushdar	Game Reserve	1975	37,053	37,053	Green 1994	
65	Chitral Gol	National Park	1984	7,750	7,750	Green 1994	
66	Danyor Nallah	Game Reserve	1974	44,308	44,308	Green 1994	
67	Kargah	Wildlife Sanctuary	1975	44,308	44,308	Green 1994	
68	Khunjerab	National Park	1975	226,913	226,913	No. 10	Green 1994
69	Kilik/Mintaka	Game Reserve	1975	65,036	65,036	Green 1994	
70	Nar/Ghoro Nallah	Game Reserve	1975	7,255	7,255	Green 1994	

71 Nazbar Nallah Game Reserve 1975 33,425
33,425 Green 1994
72 Pakora Game Reserve 1975 7,515
7,515 Green 1994
73 Sher Qillah Game Reserve 1975 16,842
16,842 Green 1994
74 Agram Bastil Wildlife Sanctuary 29,866
29,866 presence unconfirmed
75 Manshi Wildlife Sanctuary 2,321
2,321 presence unconfirmed
76 Goleen-gol Game Reserve 49,750
49,750 presence unconfirmed
77 Gehrait-gol Game Reserve 4,800
4,800 presence unconfirmed
78 Chinar/Purit-gol Game Reserve 6,446
6,446 presence unconfirmed
79 Drosh-gol Game Reserve 2,060
2,060 presence unconfirmed
80 Tooshi Game Reserve 1,545
1,545 presence unconfirmed
81 Central Karakorum National Park 200,000
200,000 presence unconfirmed
Subtotal 883,077 226,913 306,493
349,671
RUSSIA
82 Altaiskiy Zapovednik 1932 869,500
869,500 Green 1994
83 Azas Zapovednik 1985 337,290
337,290 Koshkarev 1992
84 Sayano-Shushenskiy Zapovednik 1976 390,368
390,368 Smirnov et al. 1990
85 Tunkinskiy National Park 1991 1,183,700 1,183,700
No. 51 Smirnov et al. 1990
86 Katunskiy Zapovednik 1991 150,079
150,079 presence unconfirmed
87 Tchazy Zapovednik 1991 11,825
11,825 presence unconfirmed
88 Maluy Abakan Zapovednik 1993 97,829
97,829 presence unconfirmed
89 Ubsunurskaya Kotlovina Zapovednik 1993 39,600
39,600 No. 52 presence unconfirmed
90 Ininskiy Zakaznik 1973 103,300
103,300 presence unconfirmed
91 Kosh-Agachskiy Zakaznik 1966 241,300
241,300 presence unconfirmed
92 Shavlinskiy Zakaznik 1973 178,000
178,000 presence unconfirmed
93 Khindiktig-Kholskiy Zakaznik 1978 32,000
32,000 presence unconfirmed
Subtotal 3,634,791 1,223,300 150,079
2,261,412
TAJIKISTAN
94 Dashti-Dzhumskiy Zapovednik 1983 19,700
19,700 Kashkarev 1990
95 Iskanderkul'skiy Zakaznik 1970 30,000
30,000 Buzurukov and Muratov 1994

96 Muzkul'skiy Zakaznik 1972 68,000
68,000 Green 1994
97 Pamirskiy Zakaznik 1974 50,100
50,100 Green 1994
98 Ramit Zapovednik 1959 16,100
16,100 Green 1994
99 Sangvorskiy Zakaznik 1972 51,000
51,000 Green 1994
100 Tigrovaya Balka Zapovednik 1938 49,900
49,900 Buzurukov and Muratov 1994
101 Zorkul'skiy Zakaznik 1972 16,000
16,000 Buzurukov and Muratov 1994
102 Sari-Khosorskiy Zakaznik 1959 180,000
180,000 presence unconfirmed
103 Nurekskiy Zakaznik 1984 30,000
30,000 presence unconfirmed
104 Dashti-Dzhumskiy Zakaznik 1972 50,100
50,100 presence unconfirmed
Subtotal 560,900 0 135,700
425,200
UZBEKISTAN
105 Akbulakskiy Zakaznik 1973 12,600 12,600 No.
38 presence unconfirmed
106 Chatkal'skiy Zapovednik 1947 35,686
35,686 Green 1994
107 Gissarskiy Zapovednik 1983 87,500
87,500 Koshkarev 1990
108 Zaaminskiy Zapovednik 1959 15,600
15,600 Koshkarev 1990
109 Uzbekistan National Park 1978 31,503
31,503 Green 1994
Subtotal 182,889 12,600 170,289
0
Grand Total 27,612,529 8,591,913 9,686,925
9,333,691

TABLE 1: List of protected areas within the distribution of the snow leopard. Sources are provided for protected areas in which snow leopard has been confirmed present. Protected areas adjacent to international borders are identified as potential TPAs, and those sharing common borders as TPAs.

COUNTRY National Year Area TPA
Designation created (ha) Area(ha) Borders with
Potential TPA
Area (ha) Other PA

Country National Year Area TPA Potential TPA
Other PA Source
No. Protected Area Designation Created (ha) Area(ha) Borders
Area (ha) Area (ha)

Afghanistan
1 Ajar Valley Wildlife Reserve 1978 40,000
40,000 a

2 Pamir-i-Buzurg	Wildlife Reserve	1978	67,938					
67,938	a							
Subtotal			107,938	0	67,938			
40,000								
Bhutan								
3 Jigme Dorji	National Park	1993	428,000					
428,000	a							
4 Torsa	Strict Nature Reserve		1993	64,400				
64,400	*		5 Sakteng		Wildlife			
Sanctuary	1993	61,000		61,000	*			
6 Kulong Chu	Wildlife Sanctuary		1993	118,200				
118,200	*							
Subtotal			671,600	0	671,600			
0								
China								
Sichuan								
7 Wolong	Nature Reserve	1975	200,000					
200,000	a							
Xinjiang								
8 A Er Jin Shan	Nature Reserve	1985	4,512,000					
4,512,000	a							
9 Hanas	Nature Reserve	1980	250,000					
250,000	b							
10 Taxkorgan	Nature Reserve	1984	1,500,000	1,500,000	No.			
68	a							
11 Toumuer	Protected Area		100,000		100,000			
*								
12 Buergenh	Protected Area		5,000	5,000				
*	Xizang (Tibet)							
13 Medog	Nature Reserve	1985	62,620					
62,620	a							
14 Qomolangma	Nature Reserve	1989	3,500,000	3,500,000	No.			
55,56,57,59	a							
Subtotal				10,129,620	5,000,000			
355,000	4,774,620							
India								
Arunachal Pradesh								
15 Namdapha National Park			198,524					
198,524	a							
Himachal Pradesh								
16 Manali	Sanctuary	1954	3,127					
3,127 a								
17 Pin Valley	National Park	1987	80,736					
80,736	a							
18 Rupi Bhabha	Sanctuary	1982	85,414					
85,414	a							
Jammu-Kashmir								
19 Dachigam National Park		1981	14,100					
14,100	a							
20 Hemis	National Park	1981	410,000					
410,000	a							
21 Kanji	Sanctuary	1988	25,000					
25,000	a							

22 Kishtwar National Park 1981 31,000
31,000 a
Sikkim
23 Khangchendzonga National Park 1977 84,950
84,950 a
Uttar Pradesh
24 Govind National Park 1991 47,208
47,208 a
25 Govind Pashu Vihar Sanctuary 1954 48,104
48,104 a
26 Kedarnath Sanctuary 1972 97,524
97,524 a
27 Nanda Devi National Park 1982 63,033
63,033 a
28 Valley of Flowers National Park 1982 8,950
8,950 a
Subtotal 1,197,670 0 84,950
1,112,720

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Sources found at end of Table 1

Country No.	Protected Area	Designation	Year Created	Area (ha)	TPA Area(ha)	Potential TPA	Other PA Borders	Source
Kazakstan								
29	Aksu-Dzhabagly	Zapovednik	1926	75,094		75,094		a
30	Alma-Atinskiy	Zapovednik	1931	73,342		73,342		a
31	Markakol'skiy	Zapovednik	1976	75,040		75,040		c
32	Verkhnekoksuisky	Game Reserve	1981	240,000				d
33	Alma-Atinskiy	Zakaznik	1978	724,000				e
34	Lepsinskiy	Zakaznik	1972	258,000				*
35	Toktinskiy	Zakaznik	1981	187,000				*
Subtotal				1,632,476	0	1,632,476		
Kyrgyzstan								
36	Ala-Archa	National Park	1976	19,400				a
37	Besh-Aral'skiy	Zapovednik	1979	114,000		114,000		c
38	Chatkal'skiy	Zakaznik	1980	600	600		No. 105	c
39	Dzhety-Oguzskiy	Zakaznik	1958	31,100				*
40	Issyk-Kul'skiy	Zapovednik	1948	40,800		40,800		c
41	Narynskiy	Zapovednik	1983	86,000				c

42	Sary-Chelekskiy	Zapovednik	1959	23,868			
	23,868	c					
43	Teploklyuchenskiy	Zakaznik	1958	32,100			
	32,100	*					
44	Toguz-Torouskiy	Zakaznik		1977	10,000		
	10,000	*					
45	Kapchagaiskiy	Zakaznik		1978	800		
	800	d					
Subtotal				358,668	600	154,800	
	203,268						
Mongolia							
46	Dzungarian Gobi (B)	National Park		1976	881,000		
	881,000	f					
47	Transalti Gobi (A)	National Park		1976	4,419,000		
	4,419,000	f					
48	Khasagt-Khayrkhan	Reserve	1965	33,600			
	33,600	f					
49	Khokh Serkh	Nature Reserve	1977	23,700			
	23,700	f					
50	Bulgan-gol	Nature Reserve	1965	2,500	2,500		
	*						
51	Khubsugul Nuur	National Park	1992	838,100	838,100	No.	
85		*					
52	Uvs Nuur Watershed	Nature Reserve	1994	771,600	771,600	No.	
89		*					
Subtotal				6,969,500	1,609,700		
	5,336,100	23,700					
Nepal							
53	Annapurna	Conservation Area	1992	266,000			
	266,000	a					
54	Dhorpatan	Hunting Reserve	1987	132,500			
	132,500	a					
55	Langtang National Park		1976	171,000	171,000	No. 14	
	a						
56	Makalu-Barun	Conservation Area	1991	83,000	83,000	No.	
14		a					
57	Makalu-Barun	National Park	1991	150,000	150,000	No.	
14		a					
58	Rara	National Park	1977	10,600			
	10,600	g					
59	Sagarmatha	National Park	1976	114,800	114,800	No.	
14		a					
60	Shey-Phoksundo	National Park	1984	355,500			
	355,500	a					
Subtotal				1,283,400	518,800		
	621,500	143,100					

Country No.	National Protected Area	Designation	Year Created	Area (ha)	TPA Area(ha)	Potential TPA Borders	Other PA Area (ha)	Source Area (ha)
Pakistan								
61	Askor Nallah	Game Reserve	1987	12,955			12,955	a
62	Astore	Wildlife Sanctuary	1975	41,472			41,472	a
63	Baltistan	Wildlife Sanctuary	1975	41,457			41,457	a
64	Chassi/Baushdar	Game Reserve	1975	37,053			37,053	a
65	Chitral Gol	National Park	1984	7,750			7,750	a
66	Danyor Nallah	Game Reserve	1974	44,308			44,308	a
67	Kargah	Wildlife Sanctuary	1975	44,308			44,308	a
68	Khunjerab	National Park	1975	226,913	226,913	No.		a
69	Kilik/Mintaka	Game Reserve	1975	65,036			65,036	a
70	Nar/Ghoro Nallah	Game Reserve	1975	7,255			7,255	a
71	Nazbar Nallah	Game Reserve	1975	33,425			33,425	a
72	Pakora	Game Reserve	1975	7,515			7,515	a
73	Sher Qillah	Game Reserve	1975	16,842			16,842	a
74	Agram Bastil	Wildlife Sanctuary		29,866			29,866	*
75	Manshi	Wildlife Sanctuary		2,321			2,321	*
76	Goleen-gol	Game Reserve		49,750			49,750	*
77	Gehrait-gol	Game Reserve		4,800			4,800	*
78	Chinar/Purit-gol	Game Reserve		6,446			6,446	*
79	Drosh-gol	Game Reserve		2,060			2,060	*
80	Tooshi	Game Reserve		1,545			1,545	*
81	Central Karakorum National Park			200,000			200,000	*
Subtotal				883,077	226,913		306,493	349,671

Russia
82 Altaiskiy Zapovednik 1932 869,500
869,500 a
83 Azas Zapovednik 1985 337,290
337,290 h
84 Sayano-Shushenskiy Zapovednik 1976 390,368
390,368 i
85 Tunkinskiy National Park 1991 1,183,700 1,183,700 No.
51 i
86 Katunskiy Zapovednik 1991 150,079 150,079
*
87 Tchazy Zapovednik 1991 11,825
11,825 *
88 Maluy Abakan Zapovednik 1993 97,829
97,829 *
89 Ubsunurskaya Kotlovina Zapovednik 1993 39,600 39,600
No. 52 *
90 Ininskiy Zakaznik 1973 103,300
103,300 *
91 Kosh-Agachskiy Zakaznik 1966 241,300
241,300 *
92 Shavlinskiy Zakaznik 1973 178,000
178,000 *
93 Khindiktig-Kholskiy Zakaznik 1978 32,000
32,000 *
Subtotal 3,634,791 1,223,300
150,079 2,261,412

Tajikistan
94 Dashti-Dzhumskiy Zapovednik 1983 19,700
19,700 c
95 Iskanderkul'skiy Zakaznik 1970 30,000
30,000 j
96 Muzkul'skiy Zakaznik 1972 68,000
68,000 a
97 Pamirskiy Zakaznik 1974 50,100
50,100 a
98 Ramit Zapovednik 1959 16,100
16,100 a
99 Sangvorskiy Zakaznik 1972 51,000
51,000 a
100 Tigrovaya Balka Zapovednik 1938 49,900
49,900 j
101 Zorkul'skiy Zakaznik 1972 16,000
16,000 j
102 Sari-Khosorskiy Zakaznik 1959 180,000
180,000 *
103 Nurekskiy Zakaznik 1984 30,000
30,000 *
104 Dashti-Dzhumskiy Zakaznik 1972 50,100
50,100 *
Subtotal 560,900 0 135,700
425,200

Country National Year Area TPA Potential TPA
Other PA Source

No.	Protected Area	Designation	Created	(ha) Area(ha)	Borders
	Area (ha)	Area (ha)			
Uzbekistan					
105	Akbulakskiy	Zakaznik	1973	12,600 12,600	No.
38		*			
106	Chatkal'skiy	Zapovednik	1947	35,686 35,686	
	a				
107	Gissarskiy	Zapovednik	1983	87,500 87,500	
	c				
108	Zaaminskiy	Zapovednik	1959	15,600 15,600	
	c				
109	Uzbekistan	National Park	1978	31,503	
	31,503	a			
Subtotal				182,889 12,600	
	170,289	0			
Grand Total				27,612,529 8,591,913	
	9,686,925	9,333,691			

Table 1
List of protected areas within the distribution of the snow leopard. Sources are provided for protected areas in which snow leopard has been confirmed present. Protected areas adjacent to international borders are identified as potential TPAs, and those sharing common borders as TPAs.

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Sources

a Green 1994
b MFAT 1995
c Koshkarev 1990
d Annenkov 1990
e ISLT 8th Symp. (pers.comm.)
f Schaller et.al., 1994
g Dhungel 1994
h Koshkarev 1992
i Smimov et.al. 1990
j Buzurukov & Muratov 1994

* presence unconfirmed

Figure 1: Distribution of transboundary, potential transboundary, and other protected areas in snow leopard range countries.

Figure 2: Size of transboundary protected areas in snow leopard range countrie