

The Geographic Distribution of Snow Leopards in The USSR: Maps of Areas of Snow Leopard Habitation in The USSR

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The snow leopard (*Panthera uncia uncia*) or irbis is recognized as an endangered species in the USSR, and is listed as such in the Soviet Red Book. Estimates of the numbers of snow leopards remaining in the USSR vary from as low as 300 to as high as 1000 (Table 1), but there is little doubt that the population of snow leopards has been severely reduced since the beginning of the twentieth century.

The two topics to be discussed here are:

1. Changes in the geographic distribution of snow leopards in Soviet Central Asia and Siberia
2. Reasons for the decline in snow leopard populations of the USSR and prospects for future preservation in the wild

Since the goal of the people at this Symposium is the future survival of the snow leopard, both as a captive and wild species, any information that we can obtain about the snow leopard in its natural habitat may provide us with clues to help ensure the survival of this animal that we hold so dear.

Changes in the geographic distribution

The primary product of this research has been a series of maps presented here, which shows the location of evidence pertaining to snow leopard habitation in the USSR. This data was obtained exclusively through published sources in Russian, and represents the hard work of many Soviet biologists, notably A. A. Sludskij and V. S. Pokrovskij. The evidence lists were compiled from a variety of books and articles over a period of years from 1962 to 1978, but makes use of published reports and personal communications published by Soviet authors, some of whose citations go back to the 1800's.

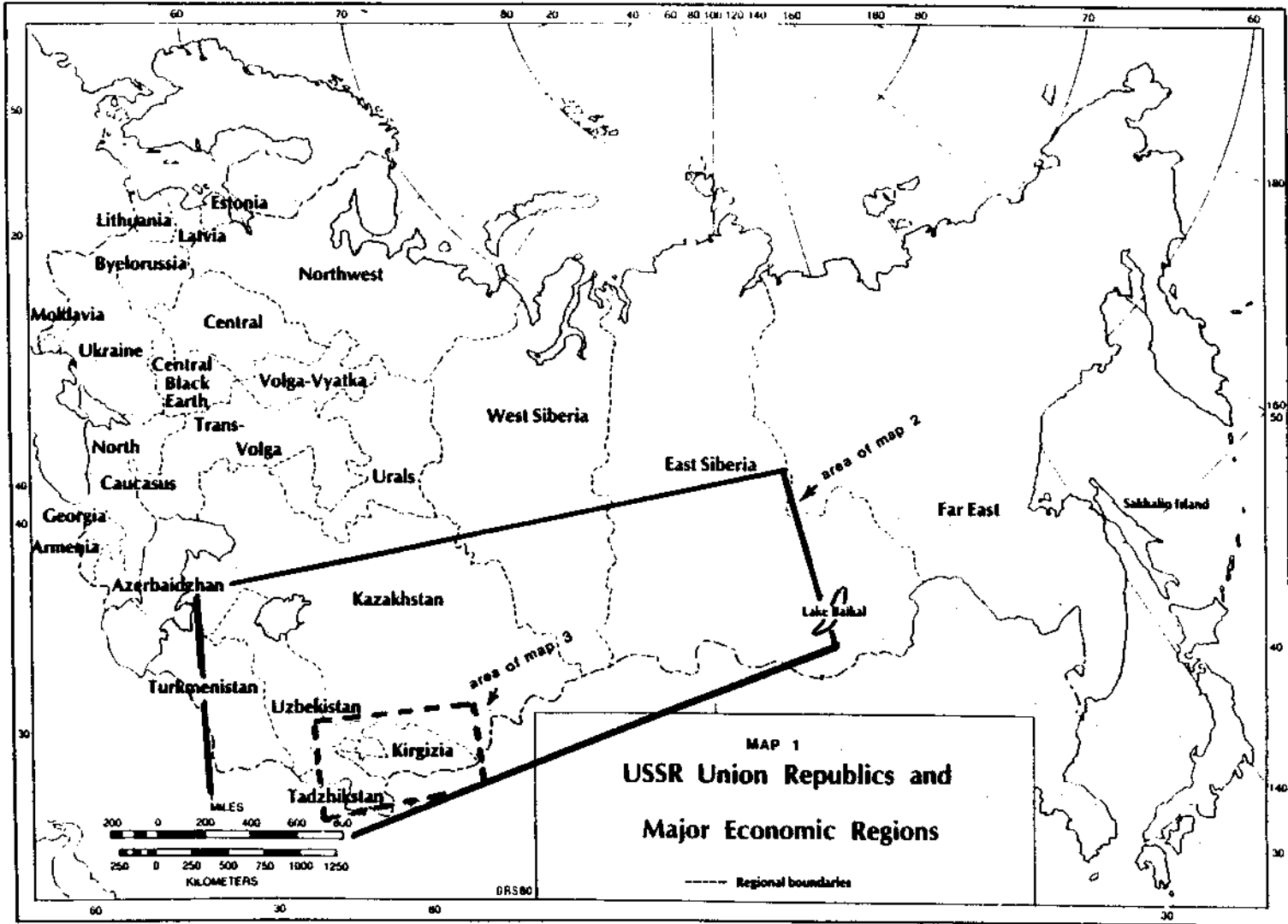
Once lists were drawn up of evidence and locations, the task of placing locations on maps for each union republic began. A variety of atlases and gazeteers were used, but even with detailed topographic sheets in the 1:250000 series from the U.S. Army, some small places eluded discovery, and were therefore listed in map keys as only within a general area. This was not really a problem since the union republic maps were still rather small scale. However, should future research demand larger scale maps more effort could be made to locate these places.

Maps 4 through 9 include detailed keys which provide the following information about the evidence of snow leopard habitation: place, date (year), type of evidence, source (person), and comments. Data not included, but interesting to pursue for future research would include: time of year of evidence, elevation of place, and biotype of place.

"Evidence" includes the following:

1. direct observation
2. observation of snow leopard tracks
3. killing of snow leopard
4. procurement of snow leopard fur
5. find of snow leopard den
6. find of snow leopard litter
7. find of prey remains from snow leopard kill
8. miscellaneous (questionnaire data, or simply the word "noted" by many authors pre 1940)

Some sources have suggested that the snow leopard range once extended as far west as the Caucasus and as far east as Sahalin Island, but these reports are now considered cases of mistaken identity. The Kopet Dag Mountains on the Turkmeniya — Iran border, and the mountains around Lake Baikal are now considered the furthest possible limits of snow leopard distribution in the USSR.



The core snow leopard population today inhabits Kirgizia (Tien Shan system) and Tadzhikistan (Pamirs), although populations extend over six union republics: RSFSR, Turkmeniya, Uzbekistan, Kazakhstan, Kirgizia and Tadzhikistan.

The most striking depletions of snow leopard populations appear to have occurred in Tarbagatay (Kazakhstan — Map 5, No. 1), Saur (Map 5, No. 2), Karatau (Map 5, No. 6), and the East Sayan Mountains (Map 4, RSFSR — Tuvinskaya A.O.) as well as the southern Lake Baikal area (Map 4). Within the major areas of habitation, the snow leopard appears to be retreating into specific, more isolated "pockets" and protected zones. Thus, some population centers occur in the zapovedniki, or reserves, such as the Aksu-Dzhabaglyi (Map 5), Alma-Atinskij (Map 5, No. 4), and Issyk Kulsij (Map 6, No. 12) and Altaiskij (Map 4, Nos. 5, 6, 7).

In examining the pattern of evidence in the union republic maps, it is important to remember that the locations correspond less to density of snow leopard population than with human population. Thus, to have an observation, the snow leopard must be in some contact with a person. In fact, greater population densities may occur in the most remote parts of the Pamirs and Tien Shan where there are fewer pieces of evidence merely because there is less contact with human beings.

The map keys often reveal a sequence of evidence which demonstrates the diminishing number of snow leopards in an area. For example, Dzhungarskij Alatau of Kazakhstan (Map 5, Nos. 3,22) in 1886 witnessed a removal of 142 snow leopard skins from this area alone, and the animal was listed as "common". Up until the 1960's sightings or tracks were found yearly in fair frequency, particularly along the Aksu, Baskan, and Terekty Rivers, but by 1972, even tracks were no longer observed along the Terekty River, and sightings in the area became much less frequent.

The snow leopard range generally follows the subalpine and alpine areas from 600 to 1500 meters above sea level, although they may ascend higher in the summer. There is also a correspondance with preferred prey, mainly goats, arkhari, sheep, and deer, although snow leopards may also take advantage of lesser game such as marmots and ptarmigans. They have attacked domesticated herds at times, and do not appear particularly wary of people. Thus, their downfall. The next topic for discus-

sion is the reduction in numbers of snow leopards.

Population reductions

One can guess at the changes in snow leopard populations in the USSR by examining data from fur trade. The maximum number of snow leopard skins obtained worldwide in one year in the early 1900's was approximately 1000, of which 50 % were usually from the USSR (Russian territory at that time). Between 1907 and 1910 the yearly fur trade averaged 750 to 800 skins. Most in Russian territory were obtained from Kirgizia and Tadzhikistan. In Kirgizia the average yearly catch in the 1920's was 38; 1930's — 46; 1940's — 20; 1950's — 1960's, 6 to 18.

The zoo export trade gives another indication of population levels. In the 1940's — 1950's at the Przewalski Zoobase (Map 6, No. 7) 375 live animals were brought in for export. Though restricted now to ten per year, there are indications that this trade is continuing.

While hunting, trapping, and zooexport may be given the major blame for the decimation of snow leopard populations in the USSR up until the 1950's, socioeconomic factors may now be playing the larger role in the reduction. The protected status of the irbis in the USSR has probably helped stabilize populations in some areas, despite poaching, but socioeconomic trends cannot be so readily controlled by the Soviet government. These factors may be summarized as:

1. increase in domestic herds
2. tourism
3. accessibility to mountain areas
4. increase in human population in Soviet Central Asia

As the USSR agricultural sector comes under increased pressure to produce meat and conserve grain, local cattle, sheep, and goat herds in Central Asia are taking up an increasing share of the pasturage, driving indigenous ungulates onto distant or higher areas. With its usual food source restricted, the snow leopard may poach the domestic herds, and open itself up as a shooting target from local shepherds. The economic outlook for the USSR only suggests that this trend of increasing domestic herd space will continue.

Tourism, both from Soviet citizens, and foreigners, is becoming a growing phenomenon in the mountains of Central Asia as climbers and hikers are encouraged by the USSR Ministry of Culture to visit these areas, particular-

ly in the zapovedniki. The Issyk-Kulskij Reserve (Map 6, No. 12) for example, has experienced a rapid rise in tourism to the point where one Soviet Author has reported that the animal populations have been disturbed. International mountain climbing camps have been established each summer in the Pamirs, sometimes attracting over 1,000 climbers. The Soviet need for hard currency to correct foreign trade imbalances may lead to more Intourist encouragement of foreign visitors to Central Asia.

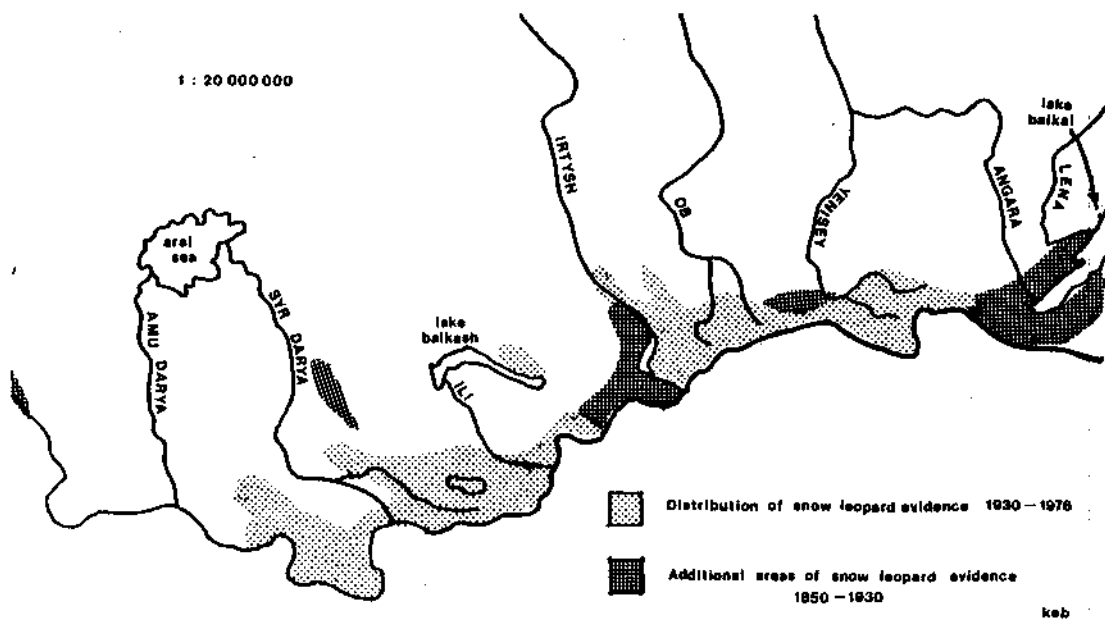
Accessibility provision and industrial development of Central Asia have been progressing, particularly since World War II, with many new roads built such as Highway 37 which goes through the Pamirs. The movement of Soviet troops into Afghanistan as well as the war itself there have apparently had a devastating effect on the wildlife along the Afghanistan-USSR border (see David Alexander: Report from a troubled land. *Int. Wildlife* 10 (6): 44-48).

Finally, human population increase has been phenomenal in all the Central Asian republics, with birthrates outpacing those of the Slavic

population by up to 5 times.

Within the next twenty years, a major population redistribution will be occurring in the USSR, with a shift in the labor resource to Central Asia. Soviet planners will be attempting to redress the imbalance of people and industrial capacity by investing more heavily in Central Asian industry. This fact, combined with schemes to increase irrigation in Central Asia, and the greater numbers of people, is bound to have a negative impact on the snow leopard populations.

The USSR, with its well-established system of zapovedniki, its scientific community, and the conservation ethic of many Soviet people, may have a good opportunity to counterbalance these socioeconomic pressures with a system of management in reserves. We may have to accept the disappearance of the snow leopard wilderness habitat, even in the most remote areas, but we do not have to accept the disappearance from the earth of the species, except as it exists in zoos. Semi-wild, game-farm or ranching methods within the Soviet preserves may hold out the best hope for ensuring a mountain-dwelling snow leopard population.



Map 2: Evidence of snow leopard habitation in the USSR: Geographic distribution 1850-1930; 1930-1975. One should be cautioned that this distribution is not continuous spatially, but varies greatly within individual mountain systems of Central Asia (see Map 3). Also, the distribution is not universally agreed upon by Soviet scientists, and there is some controversy about remnant populations in areas listed as now empty.

Table 1:
Estimates of Snow Leopard Population in USSR, by Union Republic

Union Republic	Pokrovskiy est.	Sludskiy est.
R.S.F.S.R.	70	[160]
Tadzhikistan	30	200
Kazakhstan	40	[90]
Uzbekistan	10	50
Kirgizia	150	500
Turkmeniya	?	?
USSR TOTAL	300 (± 150)	1000

Numbers in brackets [] are computed as residual from total, based on same proportionate comparison of Kazakhstan and RSFSR populations as made by Pokrovskiy.

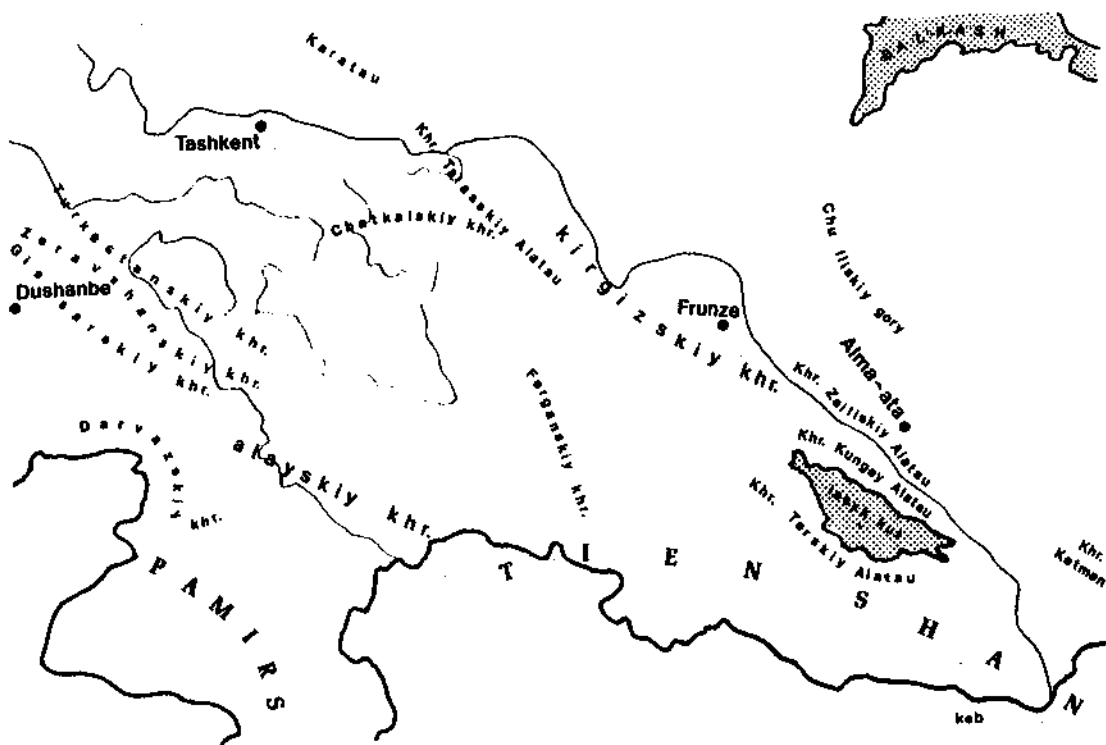
Notes: Pokrovskiy estimate in an earlier (1971) publication was for a total of 500 animals.

Soviet Red Book uses Sludskiy figures for its official estimate

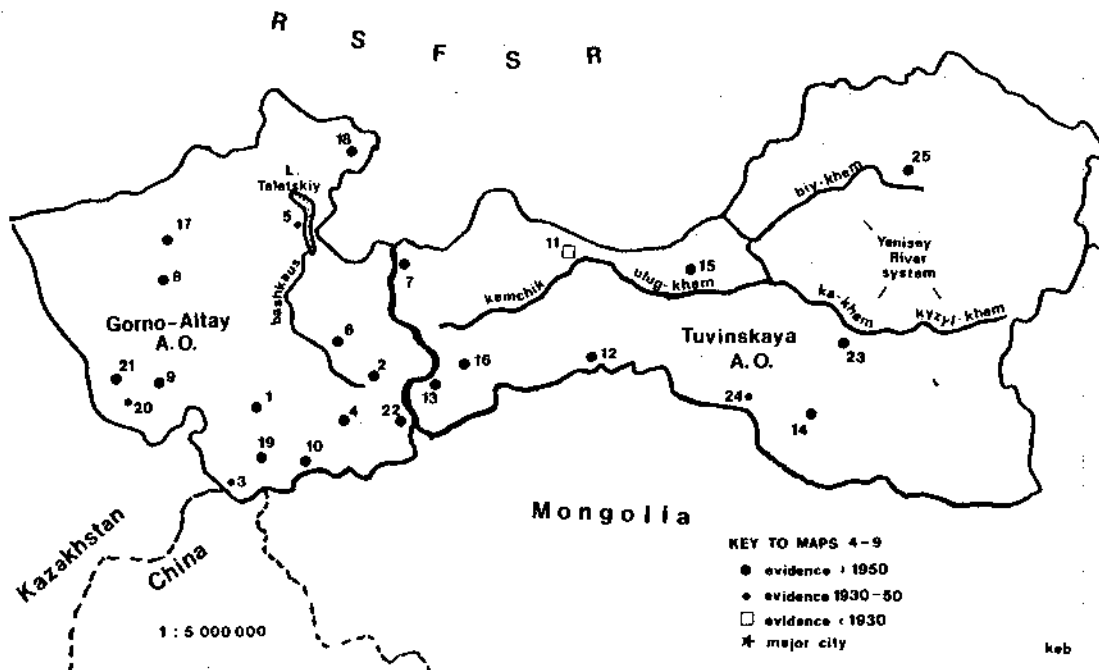
Sources: V.S. Pokrovskiy, "The Snow Leopard (irbis)", Large Predators, 1976.
A.A. Sludskiy, "The Distribution and Population of Wild Cats in the USSR", Trudy instituta zoologii ANKSSR, 1973.

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_____, The Snow Leopard, Moscow, Lesnaya promyshlennost, 1974.
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L.V. Shopin, pp. 143–144.
V.A. Shilov and V.V. Baskalov, pp. 151–153.
A.V. Geits and O.A. Makarov, pp. 115–116.
Yu. A. Grachev and A.K. Fedosenko, pp. 121–123.
A.V. Geits and R.P. Shopin, pp. 116–117.
"The Snow Leopard", Soviet Red Book, 1978, pp. 17–18.
A.A. Sludskiy, "The Distribution and Population of Wild Cats in the USSR", Trudy instituta zoologii ANKSSR, vol. 34, 1973, pp. 74–83: section — The Snow Leopard or Irbis — *Panthera (uncia) uncia Schreber (1776)*.



Map 3: Major Mountain Systems of Soviet Central Asia



Map 4: Evidence of Snow Leopard Habitation in RSFSR (Gorno-Altay A.O. and Tuvinskaya A.O.)

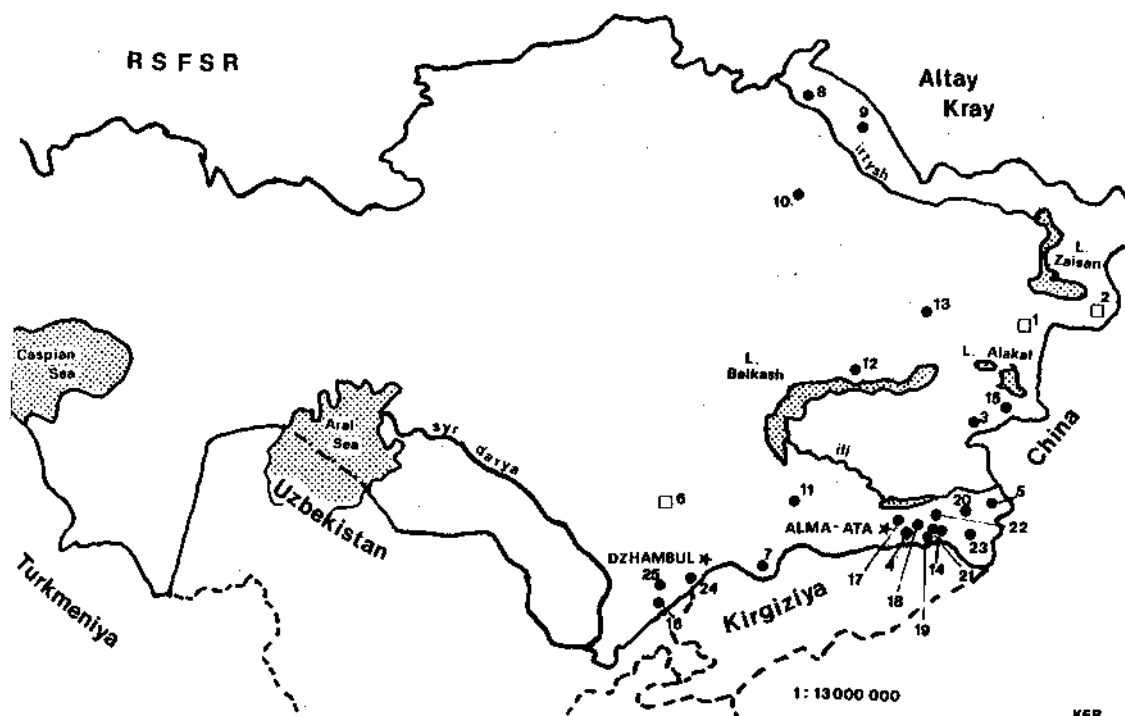
Map 4: Evidence of Snow Leopard Habitation in RSFSR (Gorno-Altay A.O. and Tuvinskaya A.O.)

NUMBER	PLACE(S)	DATE(S)	EVIDENCE	SOURCE/COMMENTS
1	Chuyskiy Mountains	present ¹ 1837– present	noted ² noted	Sludskiy, Sopin Various
2	Bashkaus River	present 1941, 1957	noted tracks	Sopin (goat density high) Shaposhnikov
3	Bukhtarma River	1850's, 1920's 1946	noted pair caught	Sleevin Sludskiy
4	Kosh-Agachevskiy Region	1927 1957 1974	4 caught 1 caught 1 killed attacking flock	Sludskiy <u>Moskovskiy Komsomolets</u> Geits and Makarov
5	Lake Teletskiy Region Altaiskiy Reserve Chulcha River, Toulak Mts.	1933 ? present	observed pair killed miscellan.	Shaposhnikov Shilov and Baskalov Geits and Makarov

6	Chulyshmanskiy Plateau (Altaiskiy Reserve)	present	—	Sopin
	Shaishanskiy Ridges	present	—	Pokrovskiy
7	Shapshalskiy Mts. (Altaiskiy Reserve)	1973	den found	Shilov and Baskalov
8	Ongudaiskiy Region	1961	pair observed	Sludskiy
	Saldzhar Mts.	1968	1 caught	Sludskiy
	Arguta River	present	—	Belizhanin
9	Katunskiy Region	present	—	Sopin
10	Salyugen Mts.	present	—	Sopin
11	Kemchik River (Yenisey)	1850's–1900's noted		Various/cons. rare
12	W. Tannu-Ola Mts.	1936	skin	Skalon
13	Tsagan-Shibetu Mts. (near Lake Kyndyktykul)	1958 1960's 1967	1 caught tracks tracks	Fumin Sarzhinskiy Pokrovskiy
14	Tes-Khemskiy	present	hunters' observ.	Pokrovskiy
15	Ulug-Khemskiy	present	hunters' observ.	Pokrovskiy
16	Bai-Taiginskiy	present	hunters' observ.	Pokrovskiy, Sludskiy
17	Shebalinsky	present	hunters' observ.	Pokrovskiy
18	Abakanskiy Mts.	1976	1 seen	Shilov and Baskalov
19	Tabyn-begdo-ola Mts.	present	observ. by shepherd	Sludskiy
20	Sarymsakta Mts.	1947	tracks	Sludskiy
21	Katon-Karagaiskiy Region	1960's	—	Mislavskiy
22	Lake Kyndyktykul	1961–63 1962	tracks 3 sets tracks, 1 juvenile set	Sarzhinskiy Sludskiy
23	Kaa-Khemskiy River (Yenisey)	1960's	skins	Letov
24	E. Tannu-Ola Mts.	present (?)	—	<u>Mlekopitayushchiye Sovetskogo Soyuz</u>
25	Udinskiy Mts. Biy Khemskiy River	present (?)	—	<u>Mlekopitayushchiye Sovetskogo Soyuz</u>

¹present indicates that snow leopard habitation was accepted by source when material was published

²noted indicates that source listed snow leopard habitation for this area but did not give details about evidence



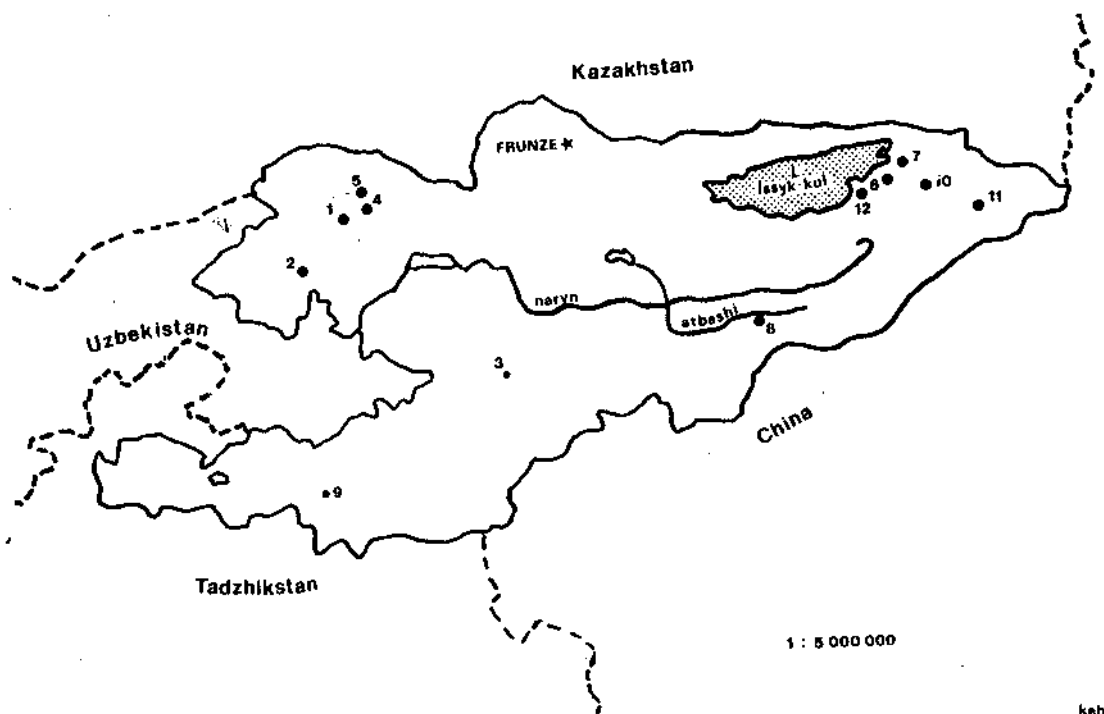
Map 5: Evidence of Snow Leopard Habitation in KAZAKHSTAN

Map 5: Evidence of Snow Leopard Habitation in Kazakhstan

NUMBER	PLACE(S)	DATE(S)	EVIDENCE	SOURCE/COMMENTS
1	Tarbagatay Region	1928	noted	Khakhloviiy <u>Siberian Hunter</u> and <u>Fisherman</u> Sludskiy
	Kenderlyk River	1955	pair caught	
2	Saur Region	1962-64, 71-72 expeditions did not reveal any evidence of snow leopards here, but the absence of irbis in this area is a subject of controversy.		
3	Dzhungarskiy Alatau	present	—	Sludskiy Silantsev
		1886	142 skins	
	Aksu River Baskan River (see 22 also)	1892	106 skins	Silantsev
		1975	tracks	Grachev and Fedosenko
		1968	1 observ.	Grachev and Fedosenko
4	Zailiskiy Alatau (Talgar Peak) Tungen River	1961	tracks	Grachev and Fedosenko
		present	—	Pokrovskiy
	Alma-Atinskiy Reserve	1957-69	racks of female and 2 juven.	Fil and Afanasev
		1930's-50's, present	—	Sludskiy

5	Ketmen Mts.	1960 1962 1956	1 observ. 1 observ. female of a pair captured	Grachev and Fedosenko Grachev and Fedosenko Fil and Afanasev
6	Karatau Mts.	1930's 1860-90	questionnaires observ, killed	Antipin Severtsoviy, Shulpin, Grachev and Fedosenko
7	Khirgizskiy Mts. Big Alma-Atinka River Little Alma-Atinka River	present 1941 1960's 1963	- pair caught observ., tracks tracks	Sludskiy Sludskiy Grachev and Fedosenko Grachev and Fedosenko
8	Kachirskiy Region	1970's	questionnaires	Pokrovskiy (disputed by Sludskiy)
9	Shcherbaktinskiy Region	1970's	questionnaires	Pokrovskiy (disputed by Sludskiy)
10	Bayan-Aulskiy Region	1970's	questionnaires	Pokrovskiy (disputed by Sludskiy)
11	Chu-Iliskiy Mts.	present	—	Sludskiy
12	Lake Balkash (northern shoreline)	1957	1 caught	Shubin
13	Chingiztau Mts.	present	—	Sludskiy
14	Taldy River (Chilik)	1973	tracks	Grachev and Fedosenko
15	Tentek River	1970	1 observ.	Grachev and Fedosenko
16	Ugamskiy Mts. (Sary-Aigyr River) Agam River	1962 1971	litter and den tracks	Grachev and Fedosenko Grachev and Fedosenko
17	Left Talgar River Middle Talgar River Right Talgar River	1964, 72 1975 1973, 74 1973 1957-69	tracks pair seen tracks tracks observ.	Grachev and Fedosenko Grachev and Fedosenko Grachev and Fedosenko Grachev and Fedosenko Fil and Afanasev
18	Issyk River Turgen River	1964 1957-69	1 killed female and cubs	Grachev and Fedosenko Fil and Afanasev
19	Kaskasu River	1957-69	female and cubs	Fil and Afanasev
20	Boguti Region	1964	tracks of 2 individuals	Grachev and Fedosenko
21	Sarytau Mts.	1971	female and 2 juven. killed	Grachev and Fedosenko
22	Terekty River (Dzhungarskiy Alatau)	1958 1959 1959	tracks 1 observ. 3 killed by shepherd	Grachev and Fedosenko Grachev and Fedosenko Grachev and Fedosenko

		1960	1 found dead	Grachev and Fedosenko
		1960	1 found dead	Grachev and Fedosenko
		1962	3 observ. together	Grachev and Fedosenko
23	Karakara River	1971	female and 2 juven. killed	Grachev and Fedosenko
24	Talasskiy Alatau Dzhabaglyy River	1969 19976	2 observ. tracks	Grachev and Fedosenko Grachev and Fedosenko
	Bala-Baldabrek River	1975	1 observ.	Grachev and Fedosenko
	Aksu-Dzhabaglyy Reserve	1920'2— present	—	Various
25	Sairamskiy Region	1958	snow leopards (plural) caught	<u>Pravda</u> 1-19-58

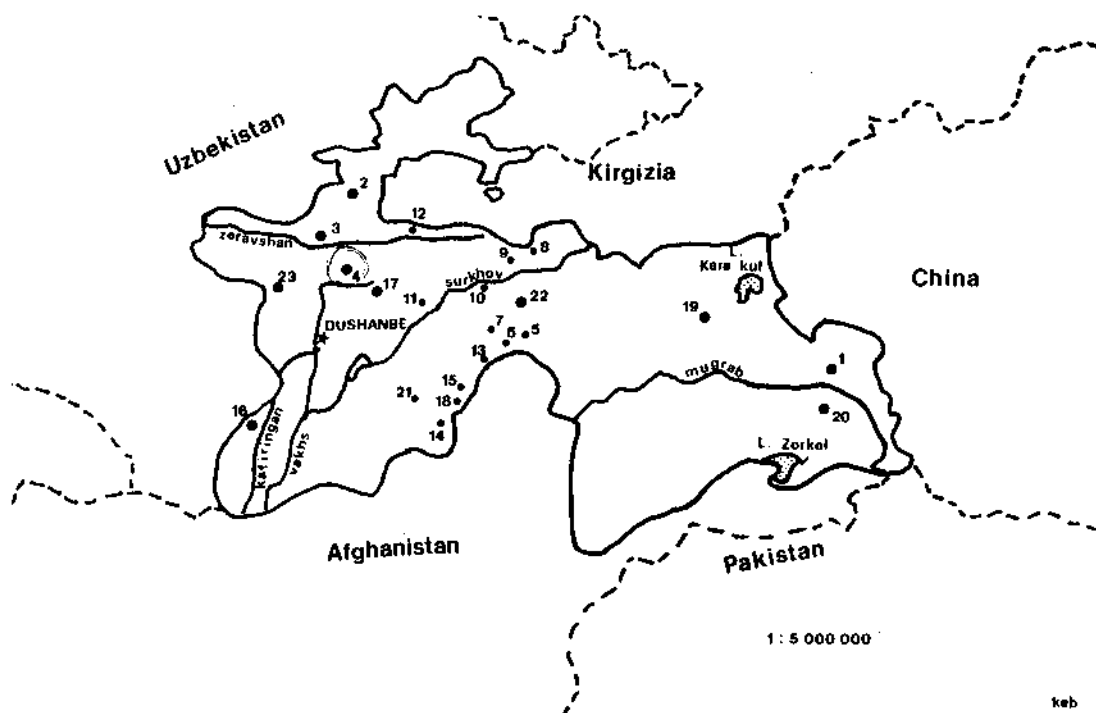


Map 6: Evidence of Snow Leopard Habitation in KIRGIZIA

Map 6: Evidence of Snow Leopard Habitation in Kirgizia

NUMBER	PLACE(S)	DATE(S)	EVIDENCE	SOURCE/COMMENTS
1	Talasskiy Alatau	present	—	Sludskiy
2	Chatkalskiy Reserve	present	—	Pokrovskiy
3	Ferganskiy Mts.	1930's	noted	Kashkarovskiy

4	Sary-chelekiy Reserve	present	—	Pokrovskiy
5	Maidantalskiy Region (Chatkalskiy Reserve) <i>actual in Turk</i>	present	—	Pokrovskiy
6	Dzhety-Oguzskiy Region	present	caught	Pokrovskiy, Sludskiy
7	Przhevalskiy Zoobase	1950's—1960's, 1971, 1972	many brought in live-caught for zoo trade	Sludskiy
8	Central Tien Shan At-Bashinskiy Region Tyupskiy Region	present present	— —	Sludskiy Sludskiy
9	Alaiskiy Mts.	? "rare"	—	Kuznetsov (1948)
10	Terskiy Alatau	1967	1 observ.	Nesterov
11	Inylechek River	present	—	Sludskiy
12	Issyk-Kul'skiy Reserve	present	—	Pokrovskiy



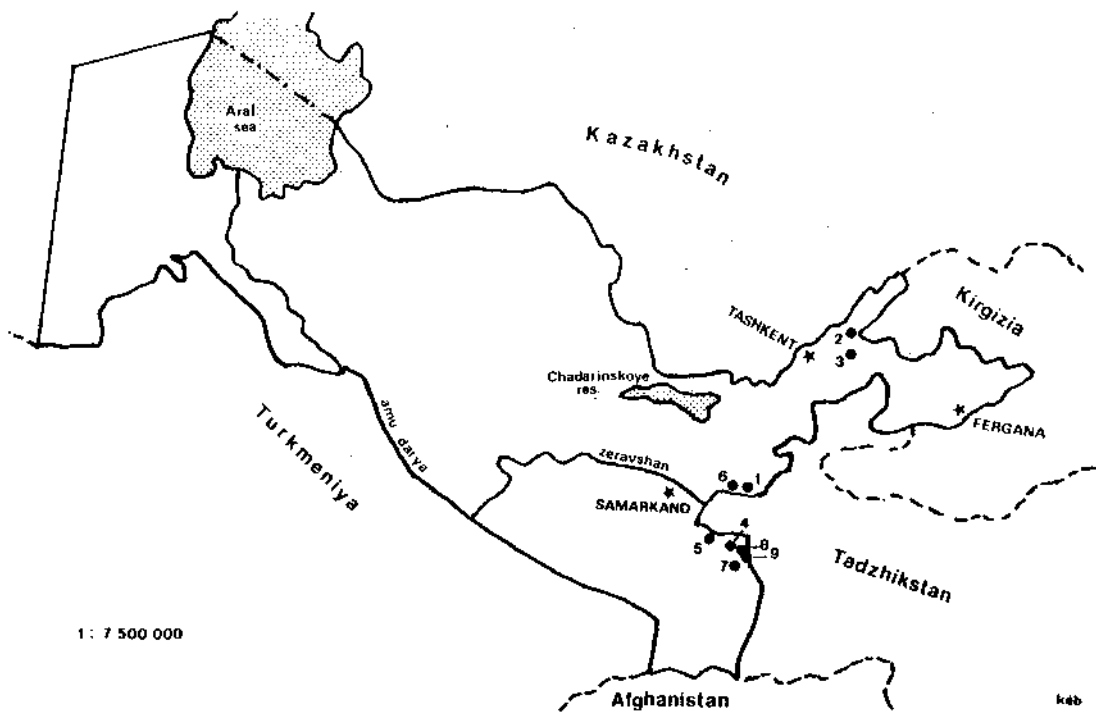
Map 7: Evidence of Snow Leopard Habitation in TADZHIKISTAN

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Map 7: Evidence of Snow Leopard Habitation in Tadzhikistan

NUMBER	PLACE(S)	DATE(S)	EVIDENCE	SOURCE/COMMENTS
1	Murgabskiy Region (Pamirs)	1940's—present	skins cubs found	Sludskiy (sharp decline winter 1968–69)
2	Turkestanskiy Mts.	present	—	Sludskiy
3	Zeravshanskiy Mts.	present	—	Sludskiy
4	Gissarskiy Mts.	present 1947 1947	— tracks pair observed by goat kill	Sludskiy Popov Popov
5	Darvazskiy Mts.	1940's	tracks	Chernyshev
6	Kalai-Khumbskiy Region	1940's	tracks	Chernyshev
7	Tovil-Dorinskiy Region	1940's	tracks	Chernyshev
8	Dzhirgatalskiy Region	1940's	skins, cubs	Chernyshev
9	Tadzhikabadskiy Region	late 1940's	skins	Chernyshev
10	Garmskiy Region	late 1940's	skins	Chernyshev
11	Obi-Garmskiy Region	late 1940's	skins	Chernyshev
12	Matchinskiy Region	late 1940's	skins	Chernyshev
13	Nufvandskiy Region	late 1940's	skins	Chernyshev
14	Kulyabskiy Region	late 1940's	skins	Chernyshev
15	Muminabadskiy Region	late 1940's	skins	Chernyshev
16	Babatag Ridge (Kurgan-Tyubinskiy Forest)	1965	observation	<u>The Krasnoyarskiy Worker</u>
17	Upper Kafiringan River	1976	snow leopards (plural) observ.	Geits and Shopin (may be mistaken iden)
18	Dashtidzhumskiy Region	1940's	skins	Chernyshev
19	N. Pamirs, Mt. Lenin	1975	1 observ.	John Marts, American Expedition
20	Takhtamish-Chinabai-Nabier Village	1944–64	38 trapped by one hunter	Demochkin
21	Kzyl-Mazarskiy Region	1940's	skins	Chernyshev
22	Miyenadu Village	1974	1 killed	Geits and Shopin
23	Lake Iskander-kul	present	—	Chernyshev, Sludskiy

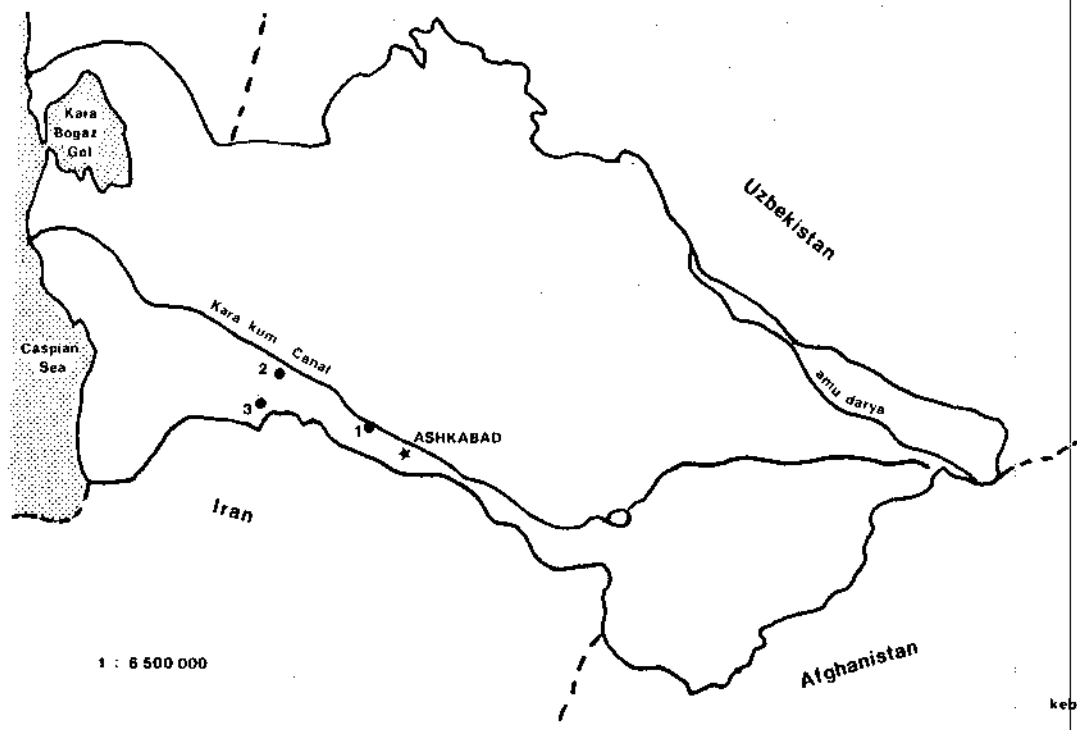
Uzbekistan?



Map 8: Evidence of Snow Leopard Habitation in UZBEKISTAN

Map 8: Evidence of Snow Leopard Habitation in Uzbekistan

NUMBER	PLACE(S)	DATE(S)	EVIDENCE	SOURCE/COMMENTS
1	Turkestan'skiy Mts.	1961-present	observation	Ishunin
2	Chatkatskiy Ridge	1948 1953 1956	1 caught pair observ. 1 killed observation	<u>Komsomolskaya pravda</u> Lustin Korclov
3	Angren Basin	1957	1 caught	Saliev
4	Gissarskiy Mts.	1939-present	noted	Sludskiy, Leviev *
5	Bel-auti Ridge	1939	noted	Leviev
6	Guralashay	1961	noted	Ishunin
7	Tupalanga River	1975	1 killed by shepherd	Geits and Shopin
8	Makhram Ridge	1939	noted	Leviev
9	Kuidi-Tavak Ridge	1939	noted	Leviev



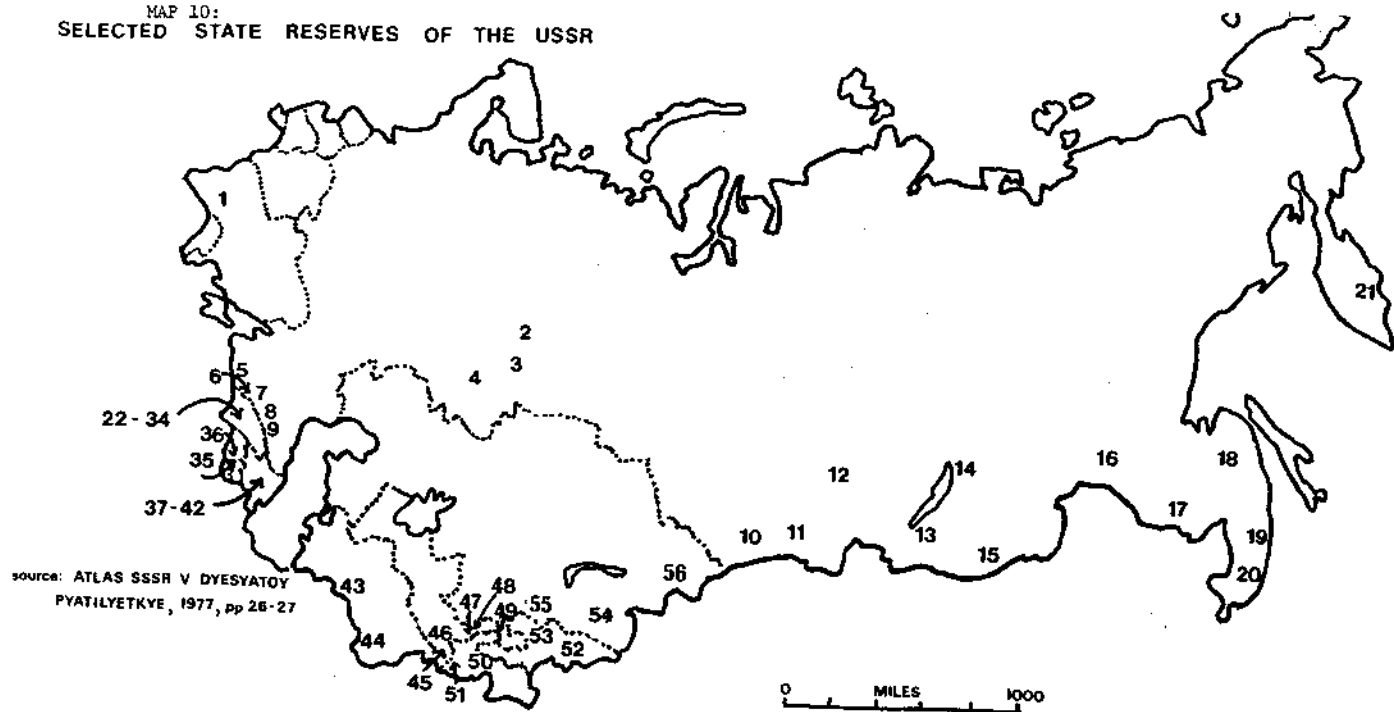
Map 9: Evidence of Snow Leopard Habitation in TURKMENIYA

Map 9: Evidence of Snow Leopard Habitation in Turkmeniya*

NUMBER	PLACE(S)	DATE(S)	EVIDENCE	SOURCE/COMMENTS
1	Geok-Tepinskiy Region	1957	1 caught	Sludskiy
2	Kizyl-Arvatskiy Region	1957	2 caught	Sludskiy
3	Kara-Kalinskiy Region	1948-49, 1958	—	Sludskiy

*all places cited are for Kopet Dag Mountains. In this area, numerous sightings were made from 1882 through the 1930's, but are controversial due to possibility of mistaken identity.

MAP 10:
SELECTED STATE RESERVES OF THE USSR



Map 10: Selected State Reserves of The USSR

- | | | |
|------------------------|-------------------------|-------------------------|
| 1 Karpatskiy | 15 Barguzinskiy | 29 Algetskiy |
| 2 Visimskiy | 16 Zeyskiy | 30 Saguramskiy |
| 3 Il'menskiy | 17 Khinganskiy | 31 Batsara-Babaneurskiy |
| 4 Bashkiirskiy | 18 Komsomol'skiy | 32 Mariamdzhvarskiy |
| 5 Kavkazskiy | 19 Sikhote-Alinskiy | 33 Lagodekhskiy |
| 6 Ritinskiy | 20 Ussuriyskiy | 34 Vashlovanskiy |
| 7 Teberdinskiy | 21 Kronotskiy | 35 Khosrovskiy |
| 8 Kabardino-Balkarskiy | 22 Pytsunda-Myusserskiy | 36 Dilizhansky |
| 9 Severo-Osetinskiy | 23 Gumistinskiy | 37 Gek-Gel'skiy |
| 10 Altayskiy | 24 Kolkhidskiy | 38 Zakatal'skiy |
| 11 Sayano-Shushenskiy | 25 Satapiinskiy | 39 Shirvanskiy |
| 12 "Stolby" | 26 Kintrishskiy | 40 Basutchayskiy |
| 13 Baykal'skiy | 27 Adzhamet'skiy | 41 Girkanskiy |
| 14 Sokhondinskiy | 28 Borzhomskiy | 42 Kyzylgachskiy |
| | | 43 Kopetdagskiy |
| | | 44 Badkhyzskiy |
| | | 45 Aral-Paygambaoskiy |
| | | 46 Mirakinskiy |
| | | 47 Nuratinskiy |
| | | 48 Zaaminskiy |
| | | 49 Chatkal'skiy |
| | | 50 Ramit |
| | | 51 Tigrova-Balka |
| | | 52 Issyk-Kul'skiy |
| | | 53 Sary-Cheleksiye |
| | | 54 Alma-Atinskiy |
| | | 55 Aksu-Dzhabaglinskiy |
| | | 56 Markakol'skiy |

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 *source-names from maps not listed here are from Sludskiy, and are listed in the extensive bibliography in his paper.