



# SNOW LEOPARD CONSERVANCY

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*Promoting community-based stewardship of the endangered snow leopard, its prey and habitat*

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## **Instructions for Conducting a Snow Leopard Sign Transect**

*Snow Leopard Conservancy  
Revised March 2006*

**Repeatable Sign Transects** are conducted under the “*Same place -- Same time -- Same method*” principle which ensures greater consistency between different places, successive years and different observers. Toward this end, we offer the following standardized instructions and data forms.

Schedule your field visit to coincide with the latter part of the snow leopard’s breeding season (February through April or early May), after snow has mostly melted, and before the area is visited by seasonal herders and their livestock (which results in sign being lost before it can be recorded).

Before going into the field, make sure you have the right equipment and survey forms, and that each observer has been suitably briefed and trained. Required items are the survey form, instruction form, pencil and eraser, tape measure and compass. Optional items are a tally counter, altimeter, GPS, camera, topographic map and plastic bags for collecting fresh scats or feces. If you do not have a map or GPS, mark the ending and starting points with a permanent mark (e.g. metal tag, prominent rock cairn) and write a brief description of where you went so you or others can find the same way again.

**Step 1 — Identify the Survey Area:** Select the general area you wish to survey: this could vary in size from 100 – 1,000 square kilometers or more. If possible, mark the boundaries of the survey area on a topographic map (scales of 1:50,000 or 1:100,000 provide suitable detail).

Snow leopards occur through the mountain ranges of Central Asia in China, Bhutan, Nepal, India, Pakistan, Afghanistan, Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, Russia, and Mongolia. Preferred habitat consists of relatively steep and broken mountains, primarily within alpine and sub-alpine zones, vegetated by grass and shrubs and only lightly forested. Often the vegetation is very sparse. In terms of topography, snow leopards strongly prefer steep terrain well broken by cliffs, ridges, gullies, boulders and rocky outcrops. Mountain ridges, cliff edges and well-defined drainages serve as common travel routes and sites for social marking, including the deposition of scrapes, scats and scent. It is important to place transects along these features in order to maximize the probability of encountering the cats sign.

You should try to sample each representative habitat within the survey area in approximate proportion to its abundance. For example, if 30% of the area is very broken and 10% is comprised of gently sloping open terrain, at least 3 out of 10 transects should be located in very broken areas and at least one in open relatively flat areas. However, note that all transects must closely follow known or suspected leopard travel routes in order to maximize the probability of encountering sign (Step 2).

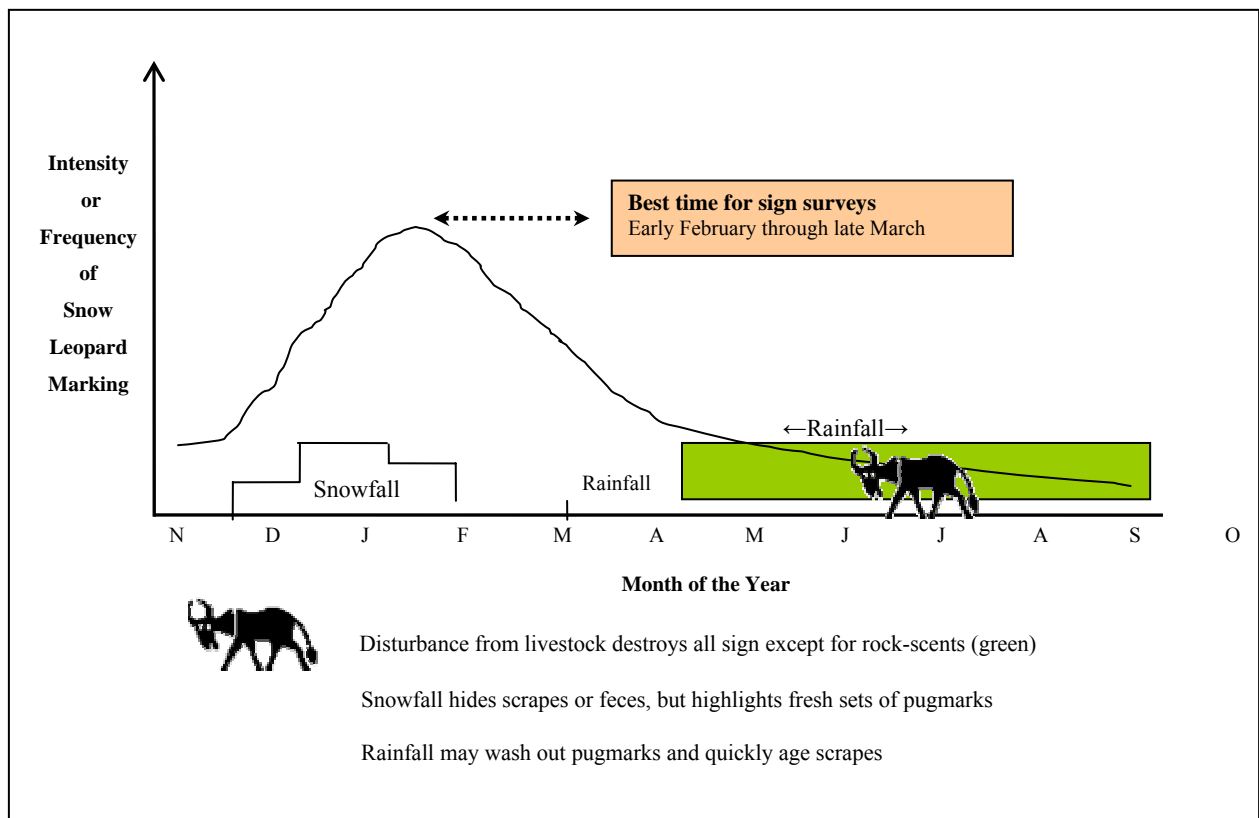
**Step 2 — Determine Where to Place Transects:** Now determine where transects should be placed, how many to run in all, and in what month they should be conducted. First, identify routes where snow leopards are most likely to walk and leave their sign on a fairly regular basis (see definitions page for information on the different kinds of sign cats leave).

If you have a good map, draw a line showing the path you intend to walk along looking for snow leopard sign. Ideally, you should try to identify 5-10 transects to survey in each area of 50-200 square kilometers in size. Select areas where human disturbance is minimal, yet access for the survey is good.

- Summer - Transects should be conducted along high ridgelines and known travel corridors minimally visited by livestock (see next step)
- Winter - Transects can be conducted in valley bottoms nearer settlements since snow leopards move to lower elevations during this time of year.

Ideally, each transect should be contained within the same general type of topography or terrain, e.g. a ridgeline, cliff line, stream bottom (see Definitions page). If the terrain changes, then it is best to start a new transect (or to record that change at the appropriate distance on the form). Transects should not be longer than 1.5 to 2 kilometers in length. It is better to conduct more short transects than a few long or very long ones. We suggest that you try to complete at least 10-40 transects in order to establish the relative abundance of snow leopards present or to compare sign densities from one year to the next.

**Step 3: Decide Best Times to Run Transects:** Sign detection and longevity is influenced by many factors. Figure 1 shows the general relationship between the time of year, amount of marking, snow and rainfall.



Marking activity increases to a peak during mating, which usually peaks in February or March, then declines during the summer months. Sign left by snow leopards during this time of intensified sign deposition is quickly destroyed after herders take their livestock to higher elevations or following rain storms. Sign weathers at different rates, depending upon environmental factors specific to the survey area. Some sign is more long-lived than others: for example, feces and scrapes last significantly longer than pugmarks which tend to be very ephemeral. Devote time to learning how each kind of sign ages in your area. We believe that the more sign present, the greater the number of snow leopards present, and the more often they mark their use areas.

For more information on snow leopard marking patterns, see the documents posted on the websites of Snow Leopard Conservancy ([www.SnowLeopardConservancy.org](http://www.SnowLeopardConservancy.org)) or the Snow Leopard Network ([www.SnowLeopardNetwork](http://www.SnowLeopardNetwork)).

Use the following table format to indicate your survey areas (or blocks), how many transects will be run in each area and when these will be conducted:

Survey Block Location	Number of transects	Month of survey
Area A – (name)	10	March 15-30
Area B	5	April 1-10
Area C (higher elevation site)	3	May 1-5 (snow covered earlier)

**Step 4: Complete Each Transect:** Snow leopard sign surveys are best conducted by a team of 2 or 3 persons: a pacer (the person who tallies distances), an observer to search for sign and a recorder to enter data on the special form. Prepare by determining how many of your steps are equal to a meter in distance, since you will need to keep track of how far you have walked and the approximate distance along the transect at which each item of snow leopard sign is found. It is easiest to take a meter long step, or to use a tally counter to keep track of paces taken, than to take fractions of a meter. Without the later, you have to keep track of the number of paces in your head. And also remember to keep each pace as similar in length as possible, as this will make your distance estimation more accurate. All distances are cumulative, not simple individual distances between adjacent items of sign. All sign within a 5 m distance, and readily visible from each other, is allocated to the same site.

Locate a good starting point for each transect. Fill out the heading information on the first page of the transect survey form (location, date, your name, starting elevation). If you have a GPS, record your position and enter that. Now walk slowly along the transect route, searching up to 5 meters on either side of your travel path for any sign of snow leopard.

Whenever you see sign, record the following information on the survey form, using a single line for each observation:

- Distance along transect in meters from the starting point (i.e., all distances are cumulative);
- Site number (a site is a place with snow leopard sign covering an area no greater than 5 meters in length) – number each site consecutively. Each site may have more than one sign or kind of sign;
- Enter the number of sign present at each site in consecutive rows under the correct column, depending on whether it is a pugmark (track), scrape, feces or scent-mark;
- Estimate the age of each sign item according to the description provided under the page on *Snow Leopard Sign Transect Definitions*. Try to be as consistent as possible when aging each item of sign, placing all age notations under the “age” column;
- It is useful (though not essential) to record sign from other predators like wolf or fox. Write it down on the edge of the form, along with the type of sign seen.

At the ending point, record the elevation, total distance walked and your current GPS position in the

appropriate space on the form.

On page 2 of the form, record background information for each transect. Select the descriptions for type of transect, terrain type, vegetation type (dominant life-form), rangeland use, and human-livestock visitation from the attached *Definitions List* that best describes the prevailing condition along the transect. Recommend whether this would be a good place to survey next year at the same (or another better time).

**Step 5: Prepare & Disseminate Your Report:** On your return to the village, report your findings to the local snow leopard coordinator or SLC representative. Total up the number of sign found under each column. Then calculate the average number of sign per kilometer of transect, using the following formula:

$$\frac{\text{Total number of same sign type}}{\text{Length of transect (in meters)}} \times 1,000$$

Total the number of each sign type by each age class and write these numbers down at the end of the form. The Excel file titled “*SLC Sign Transect Forms*” has imbedded formulae for calculating statistics for individual and multiple sign transects. An Microsoft Excel Urdu language spreadsheet that calculates selected transect statistics is available upon request.

Record what you did and observed in a notebook. How long (hours and minutes) did each transect take you, what wildlife did you see, and would this be a good site for running transects over time to get a better sense of possible trends in snow leopard numbers? Make any other recommendation you think is important to the protection of snow leopards, their prey and habitat, and the community’s welfare. Discuss with the coordinator what additional information should be gathered in order to promote snow leopard and prey species conservation in the area, or to alleviate any conflict with people.

Make sure the page numbers are listed on the upper right-hand corner of each form, so forms from different transects will not be confused with one another.

See the attached page for a description of *Definitions*, and *Codes* that you should use on the form. We prefer standardized definition and codes so that the information collected will be more likely to be consistent among different observers, and from one survey to the next.

Please mail or email a copy of your report to for posting on the Snow Leopard Network (SLN), a partnership of organizations and individuals from government and private sector who work together for the effective conservation of the snow leopard, its prey, and their natural habitat to the benefit of people and biodiversity. You can join this network by registering on SLN’s website: [www://snowleopardnetwork.org/](http://www://snowleopardnetwork.org/)

If you have any questions about this methodology, contact Dr. Rodney Jackson at the Snow Leopard Conservancy ([info@snowleopardconservancy.org](mailto:info@snowleopardconservancy.org)) or visit our website: [www.SnowLeopardConservancy.org](http://www.SnowLeopardConservancy.org). For information about SLIMS (Snow Leopard Information Management System), visit [www.snowleopard.org/slims/](http://www.snowleopard.org/slims/)

We encourage you to conduct sign surveys, so conservationists and managers can have a better understanding of this species current status and distribution across its vast, often inaccessible range.

### Snow Leopard Sign Transect Definitions & Codes

<b>Scrapes</b>	Very old	0	Extensive weathering and disintegration, scrape features poorly defined, often with vegetation growth in the depression and on the pile (age = at least 3 to 6 months).
Distinctive "heart-shaped sign left when leopard scuffs ground with hind feet	Old	1	Moderate weathering, with the scrape showing a rounded form, occasionally with vegetation in depression or on pile; age = several months or more).
	Fresh	2	Slight weathering (Well-defined "sharp" edges, easily recognizable, no new vegetation growing in depression; age = 1 to 4 weeks).
	Very fresh	3	None or very little weathering (Sharp "clean" form, no vegetation in depression or pile, tracks present; age = less than 1 week).
<b>Pugmarks</b>	Old	0	Pugmark is very poorly defined, with an obviously "weathered" appearance; more than 2 weeks old).
Set of tracks in sand, snow or other medium	Fresh	1	Pugmark has sharply defined edges and shape (several days, but less than one week old).
	Very fresh	2	Pugmark is very fresh, showing fine surface details and having a very sharp edge (made less than 24 hours previously).
<b>Feces</b>	Old	0	Scat is mottled and cracked, with a hard, dull surface and dry interior (several weeks to several months of age).
Dropping (can be easily confused with other large carnivores)	Fresh	1	Scat is odoriferous and "fresh-looking", with a glossy, sheen inside (more than 2 days but less than 10 days of age).
	Very fresh	2	Scat is still wet outside and moist inside (no older than 2 days).
<b>Scent-sprayed Rock</b>	None	0	No detectable odor (more than 2-3 months old)
	Slight	1	Odor is just detectable, if nose is held close enough
Overhanging rock face scent-marked by snow leopard	Moderate	2	Odor is readily detectable
	Strong	3	Odor is unmistakable (sprayed within last 10 days)
	Very strong	4	Odor is very strong (can be detected from 25 cm or more away; a day or two old).

**For more information see:** Jackson, R. and Hunter, D.O. 1996. *Snow Leopard Survey and Conservation Handbook*. International Snow Leopard Trust, Seattle, and U.S. Geological Survey, Biological Resources Division, 154 pages + appendices.

Name	Code	Description
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**Transect Type:**

High Ridgeline	HR	Top or crest-line of a mountain massif which usually runs across the landscape with relatively little elevation gain or loss, and which leopards may use to traverse their home areas along its highest points. It should be well defined with saddles and low passes between adjacent valleys, and promontories (point land offering good view of the land below).
Shoulder Ridge	SR	Well defined ridgeline that climbs the shoulder of a mountain, from the valley floor to the nearest peak or high ridgeline, preferably with many large boulders and promontory points along its length.
Knife edge Ridge	KR	Very sharp or narrow ridge (knife-like), usually no more than a few meters wide, and which may occur along either of the ridgelines described above.
Cliff-line	CL	Transect located along the base or top of a cliff & offering good scent-spray and resting sites.
Stream/river bluff	BL	Elevated and well defined, steeply eroding bank above a streambed (does not consist of not solid rock)
Stream/river bottom	SB	Bottom of a seasonal drainage or immediate edge valley floor).
Trail or footpath	FT	Trail <u>infrequently</u> used by humans or livestock but regularly traveled by snow leopard or other wildlife.
Other	OT	Any transect which does not fit in any of the above described categories. Please describe and if possible take a photograph the transect and its dominant topographic features

## Definitions (Page 2)

Transects could also be classified as a **Confluence** or **Non-confluence** site – but only if it is located at or close to where two rivers meet or where a major stream joins another large watercourse. Sign can also be classified according to a **Relic** site (which is regularly and repeatedly marked by snow leopard, as indicated, for example, by scrapes which appear heavily “sculptured” or molded) or a **Non-Relic** site (which appear to be new sites and not remarking or “over-marking” of previously deposited sign). Enter these under the ‘Notes’ section of the form.

### Terrain Type:

Cliff	CLF	Terrain at site is very precipitous (slope more than 50° in steepness).
Broken	BR	Terrain is slightly or moderately broken by cliffs, rocky outcrops, ravines, and gullies.
Very broken	VBR	Terrain heavily or very broken by cliffs, rocky outcrops, ravines, and gullies.
Rolling	ROL	Terrain has a relatively smooth land surface (e.g., rolling hills or alluvial fan).
Flat	FLA	Terrain forms a level surface (e.g., plain or wide valley bottom).
Other	OTH	None of above (Please describe; if possible take a photograph).

### Dominant Vegetation Type:

Barren	BAR	Less than 10% of the ground has vegetation cover.
Grassland	GRA	Dominant vegetation is grassland.
Shrubland	SHR	Dominant vegetation consists of shrubs.
Woodland	WOO	Dominated by open trees and savanna.
Forest	FOR	Tree cover exceeds 30%

### Rangeland–Livestock Use:

No grazing	NON	Area is not used by livestock.
Seasonal grazing	SGR	Area is only grazed seasonally by livestock.
Year-round grazing	YRG	Area is grazed throughout the year (winter and summer).

### Human Disturbance (based on direct observations and interviews of reliable local persons)

High	3	Widespread evidence of poaching & other disturbances to wildlife (e.g., presence of traps, regular reports of hunting, widespread depletion of the prey base, intense competition for forage from livestock).
Moderate	2	Moderate levels of disturbance by people
Low	1	Human disturbance is present, but the impacts of such activities are judged to be minimal
None	0	No livestock use, people rarely visit the area and they do not hunt or otherwise disturb wildlife

**Other Carnivores seen:** Indicate the names of other predators (or their sign) observed when running each transect (i.e., tracks, feces, actual sightings).

**Prey Observations:** List the names of all prey species’ observed (including their sign like tracks, pellets, rest or bedding sites) along the transect.