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Expedition report

Surveying snow leopards and other animals in the mountains of the Altai Republic, central Asia

Expedition dates: **6 July – 29 August 2003**

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Abstract

This study was part of an expedition to the Altai mountains in the Kosh Agach region of the Altai Republic, run by Biosphere Expeditions from 6 July to 29 August 2003. The aim was to conduct the first survey of snow leopard (*Uncia uncia*) in this area, as well as surveying the snow leopard's main prey species; in this case argali (*Ovis amon*) and Siberian ibex (*Capra ibex sibirica*) together with secondary prey species.

Using the Snow Leopard Information Management System (SLIMS) developed by the International Snow Leopard Trust (ISLT), presence/absence surveys (SLIMS form 1) of snow leopard and prey species were conducted throughout the study period across the entire survey area (approximately 200 sq km). Interviews with local, semi-nomadic herders also formed an important part of the research procedure. Scat collected in the field was sent to Brunel University where it is awaiting DNA analysis. The expedition also collected data on local geology and generated mammal, bird and plant inventories.

Surveying a very large study area without snow cover made it difficult to find signs of snow leopard and primary prey species. Despite these constraints, snow leopard sign was found in each of the four two-week slots of the expedition. The field evidence indicated there was at least one resident adult. This, together with evidence from local people, confirmed the importance of the study area as a habitat for snow leopard and as a corridor for snow leopard dispersal. The survey area urgently needs protection but involving the local community is vital if conservation initiatives are to succeed.

Резюме

Данное исследование проводилось в рамках экспедиции в горы Алтая в Кош-Агачском районе Республики Алтай, организованной компанией Biosphere Expeditions в период с 6 июля по 29 августа 2003 года. Целью работы было изучение присутствия снежного барса (Uncia uncia) в данном регионе, а также животных, являющихся основной добычей для снежного барса, среди которых, наряду с другими видами животных, являющимися вторичной добычей для барса, следует отметить аргали (Ovis amon) и сибирского горного козла (Capra ibex sibirica).

С помощью Системы Учета Информации о Снежном Барсе (SLIMS), разработанной Международным Обществом Опеки Снежного Барса (ISLT), исследование присутствия / отсутствия (форма 1 SLIMS) снежного барса и видов, являющихся его добычей, проводилось на протяжении всего периода работы на всей территории, включенной в зону деятельности экспедиции (приблизительно 200 кв. км). В связи с отсутствием достаточного количества исходных данных, низкой плотностью популяции изучаемых видов и единичностью найденных следов, исследования по выяснению относительной плотности вида проведены не были. Однако исследования по выяснению относительной плотности вида были запланированы на 2004 год. Интервью с местным, полукочевым населением, занимающимся скотоводством, также стало важной частью процедуры исследования. Экскременты, собранные в районе исследования, были отправлены в Брунельский университет, где планируется провести анализ ДНК.

Обширность исследуемой территории и отсутствие снежного покрова осложнили поиск следов присутствия снежного барса и основных видов, являющихся его добычей. Несмотря на эти трудности, следы присутствия снежного барса были найдены в каждом из четырех двухнедельных заездов экспедиции. Результаты исследования данного района позволяют говорить о присутствии на этой территории, как минимум, одной взрослой особи. Данное обстоятельство, наряду со свидетельствами местных жителей, доказало важность исследуемого района как ареала снежного барса и как коридора для рассеивания особей снежного барса по другим регионам. Район исследования крайне нуждается в защите, однако, вовлечение в работу местного населения является необходимым условием для того, чтобы инициативы по созданию заповедника могли быть реализованы.

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Matthias Hammer
Biosphere Expeditions

1.1. Background

Biosphere Expeditions runs wildlife conservation research expeditions to all corners of the Earth. Projects are not tours, photographic safaris or excursions, but genuine research expeditions placing ordinary people with no research experience alongside scientists who are at the forefront of conservation work. Expeditions are open to all and there are no special skills (biological or otherwise) required to join. Expedition team members are people from all walks of life and of all ages, looking for an adventure with a conscience and a sense of purpose. More information about Biosphere Expeditions and its research expeditions can be found at www.biosphere-expeditions.org.

This expedition report deals with an expedition to the Altai Republic from 6 July to 29 August 2003. This expedition conducted a survey of snow leopards as well as their prey species like the argali (a mountain sheep with large ram horns and close relative of the Marco Polo sheep) and the Siberian ibex (a relative of the Alpine Steinbock). The expedition also surveyed other animals such as marmots, birds and other small mammals. The area is an important but unprotected corridor of snow leopard movement between Mongolia and Russia and next to nothing is known about these movements. Data collected by this expedition are important for the creation of a protected area, as the current lack of data on these flagship species is delaying any further action.

The Altai Republic sits in the very centre of central Asia between China, Mongolia, Kazakhstan, Russia and the Tuva Republic. The Altai mountains rise from 350 to 4500m and are one of the most beautiful, pristine and remote parts of the world. They were added to the list of natural World Heritage Sites in 1998 as an area of outstanding biodiversity of global importance and providing the habitat for a number of endangered species, including the snow leopard and manul (a small cat predator).

It is, however, also one of the poorest regions of the former Soviet Union whose collapse has increased pressures on exploitation of natural resources and deprived local scientists of precious funds for biodiversity conservation. As a result, the creation of a protected area has been much delayed for lack of data on important flagship species.

Little is known about the status and distribution of the globally endangered snow leopard in the area and its interaction with prey animals like the argali and Siberian ibex, and its reliance on smaller prey like marmots, ground squirrels and game birds. Information gathered by this expedition will provide data that can be used in the formulation of management and protection plans.

1.2. Research Area

The Altai mountains are one of the most beautiful, pristine and remote parts of the world, stretching across the very centre of central Asia between China, Mongolia, Kazakhstan and Russia, and standing at the junction of several natural zones and cultures. Few foreigners get to this corner of the world. Those that do, see a variety of high mountain landscapes and immense spaces of open steppe framed by snow covered peaks. Belukha, the region's highest mountain at 4506 m, rises just west of the research area and other mountain peaks, such as Tapduair (3505 m) and Silugiem (3411 m), overshadow base camp.

The mountains are divided by several river valleys and there is a great variety of landscapes. There are hollows with semi-desert landscapes, alpine peaks, narrow river canyons and broad valleys, highland tundra and deep natural limestone gorges, open steppe, permanent snow and glaciers and tracts of forest, as well as 7000 lakes, wild rivers and waterfalls. Forests of larch, cedar, spruce and pine (but very few deciduous trees) cover more than a half of the mountain territory. Base camp itself is set amidst larch forest at the foot of Tapduair mountain and overlooking an area of open steppe.

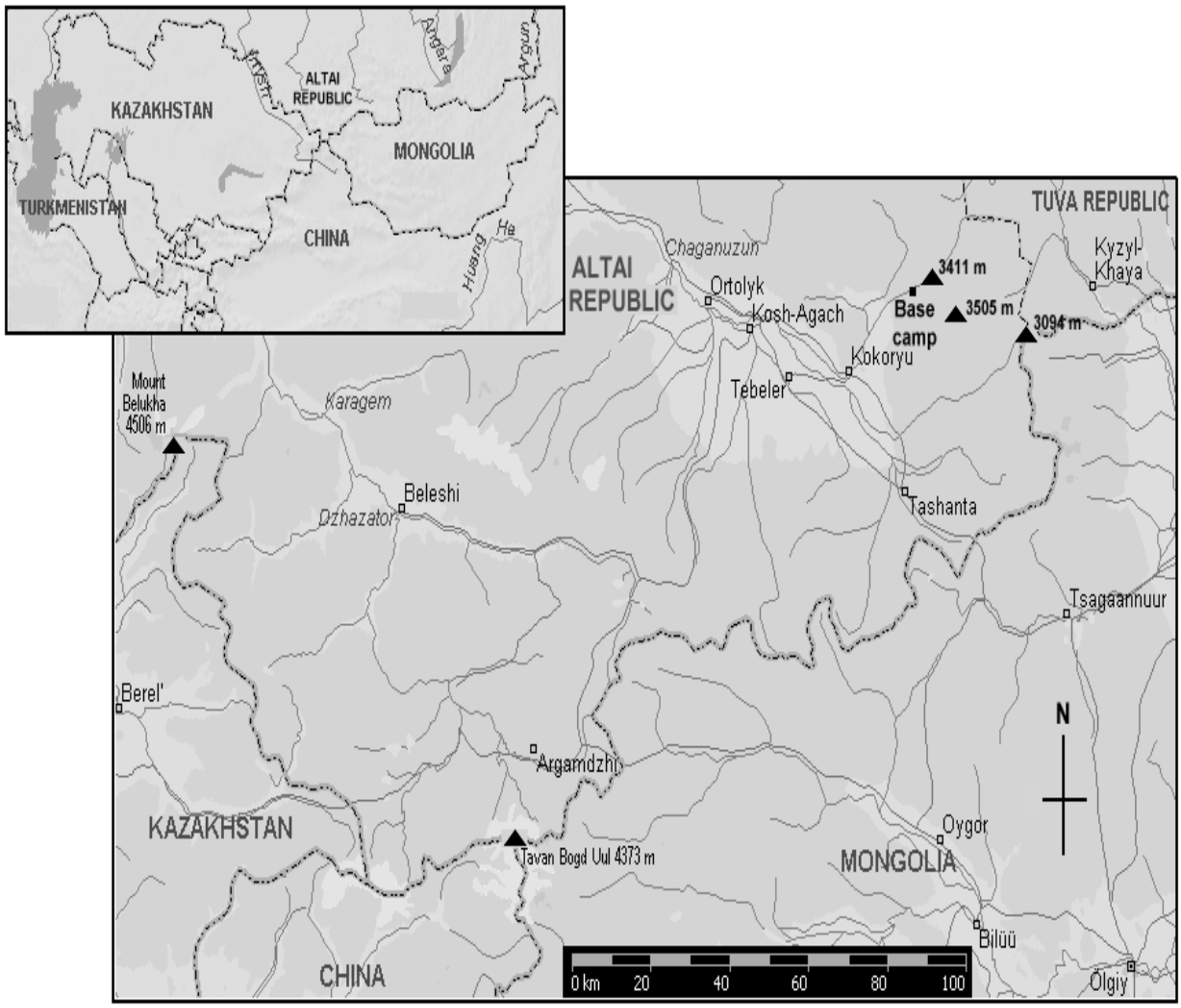

Fig. 1.2a. Map showing the Altai region and base camp.
The research area is within a 30 km radius of base camp.

Many threatened animal and plant species, many of them endemic, are present in the area with a recent count showing at least 73 mammal species, 300 bird species, 44 fish species, 7 reptile species, a large number of invertebrates, and 1270 plant species.

The climate is temperate continental with short, hot summers (during which the expedition will take place) and prolonged, cold winters. January temperatures range from -9°C to -31°C and July temperatures from +11°C to +35°C during the day, dropping to around zero during the night. The weather at base camp was very variable and in extreme cases turned from hot sunshine to a snow shower at temperatures below zero within the space of a few hours.

The Altai Republic is very sparsely populated, with about 200,000 people, 53,000 of whom live in the main city of Gorno Altaisk. About 60% are Russians, 30% are native Altai people, and 5% are Kazakhs. The Altai, a Turkic-speaking people, are mostly village dwellers, but a few are still semi-nomadic, moving with their herds to different pastures, following the seasons and living in yurts in summer. Even today some settled families keep their yurts in their gardens as an extra room or kitchen for summer use. In the remoter areas the horse is still the main means of transport and the yurt the main type of residence.

The history of the Altai is that of a semi-nomadic horseback culture entwined in the power struggles of central Asia between Mongolian and Turkic tribes. In 1756 the Altai became part of the Russian empire and in 1905-1907 they were involved in the Revolution, which ended in the establishment of Soviet power in 1917. During the era of the Soviet Union the Altai people were integrated into the union as an autonomous district (oblast) and most of its semi-nomadic people were collectivised. With the end of the Soviet Union the oblast was transformed into a republic in 1991, adopting the name Altai Republic in 1992. As a semi-independent member of the Russian Federation, the Altai Republic established its current constitution and state symbols, such as its flag and coat of arms, in 1997. Official languages of the Altai Republic are equal Russian and Altaian.

1.3. Dates

The expedition ran over a period of eight weeks divided into four two-week slots, each composed of a team of international research assistants, guides, support personnel and an expedition leader. Expedition slot dates were

6 - 18 July
20 July - 1 August
3 - 15 August
17 - 29 August

1.4. Local Conditions & Support

Expedition base

The expedition team was based in a mountain tent camp of single and double dome, mess and kitchen as well as shower and toilet tents at approximately 2200 m altitude and 60 km from the nearest human habitation. All meals were prepared by the expedition cook and vegetarians were accommodated.

Field communications

There was no mobile or landline telephone connection at base. Instead the expedition used an Iridium Motorola satellite telephone with internet connection. This worked fairly well and e-mail contact was available intermittently. Courtesy of Motorola and their local Novosibirsk dealer, Neman, a radio mast and a GM950 base station were installed at base, and four Motorola GP320 hand-held and three GM340 mobile radios, all courtesy of Motorola, were used for communication. These worked extremely well and, when within range, the expedition research teams could communicate with each other reliably and easily at the press of a button.

Transport & vehicles

Team members made their own way to the Novosibirsk assembly point. From there onwards and back to the assembly point all transport and vehicles were provided for the expedition team, for expedition support and emergency evacuations. Courtesy of Land Rover, and their local dealer Avtoland of Novosibirsk, the expedition had the use of three Defender 110 Station Wagons.

Team members wishing to drive the Land Rovers had to be older than 21, have a full clean driving licence and a new style EU or equivalent credit card sized driving licence document. Offroad driving and safety training was part of the expedition.

Medical support & insurance

The expedition leader was a trained first aider, and the expedition carried a comprehensive medical kit. Further medical support was provided by a district hospital in the town of Kosh Agach (60 km from the camp). All team members were required to be in possession of adequate travel insurance covering emergency medical evacuation and repatriation. Emergency evacuation procedures were in place. There were no major medical incidents. There were several mild cases of diarrhoea during the expedition.

1.5. Expedition Scientist & Expedition Leader

Tessa McGregor, the expedition leader, took on the double role of expedition leader and expedition scientist. Tessa was born in Paris and educated in England. She read biology at King's College, London and specialised in animal behaviour and ecology. Her life-long passion for wildlife and wild places motivated her personal and professional life. Tessa has worked in remote places as a wildlife biologist, environmentalist and in the media - TV, radio and journalism (including BBC Natural History Unit, Radio 4, World Service and Discovery). She is an expert on tigers. She loves sharing her passion for the natural world with others and has organised many field trips and wildlife projects. Tessa joined Biosphere Expeditions in 2003 and currently lives in Scotland. Her other interests include horse riding, diving and photography.

1.6. Logistics Co-ordinators and Helpers

Sergey Kurgin of Sibalp, Novosibirsk, oversaw the setting up of base camp, recruited the Russian team and helped with registration in Gorno Altaisk.

The Asla Travel Group of Huntingdon, UK, provided important advice and logistical support in organising transport, transfers, visas, etc.

1.7. Expedition Team

The expedition team was recruited by Biosphere Expeditions and consisted of a mixture of all ages, nationalities and backgrounds.

6 July - 18 July

Ray Boalch (UK), Sam Elson (UK), Thorsten Hottenrott (Germany), Lyndsay & Roger Jones (UK), Nigel Lamb (UK), Andrew Marchant (UK), Marion & Tony Mead (UK), Martyn Roberts (UK), Stefan Strüning (Germany), Karin Thiele (Germany).

20 July - 1 August

Martin Baumgarten (Germany), Hilary Brown (UK), Nigel Brown (UK), Frances Davidson (UK), Ruth Eales (UK), Rosalynde Grum (UK), Marion & Tony Mead (UK), Evelin & Rick Royston (Germany & USA), Karin Thiele (Germany).

3 August - 15 August

Toril Andresen (Norway), Gesine Berndt (Switzerland), Ruth Eales (UK), Frances Davidson (UK), Andrew Kenzitt (UK), Uwe Kürsten (Germany), Martina Laier (Germany), Gregor Meyer (Switzerland), Christine Newell (UK), Annette Payne (UK), Peter Pilbeam (UK), Anthony Witton (UK).

17 August - 29 August

Colin Ball (UK), Ruth Eales (UK), Eva Davey (UK), Chloé Harwood (UK), Catherine Howard (UK), Rob Huxtable (UK), Katharine Kinney (UK), Vladimir Smirnov (Russia), Grant Stapleton (Australia), Lynda Warrington (UK), Steve Watson (UK), Carolyn White (UK).

Throughout the expedition

Professor Yuri Malkov of Gorno Altaisk University, author of numerous Russian publications (including the Altai Red Data Book), was present for the first two slots (6 July to 1 August). His illustrated (unpublished) guide to the mammals of the Altai and their distribution proved particularly helpful as did his presence when meeting herders.

Olga Telinkova from Moscow and Anastasia Sevastyanova from Novosibirsk (translators). Andrei (driver and also unofficial archaeological advisor and fund of knowledge about the region). Oleg Gigarev (mountain guide). Oleg Shiryaev (camp helper and mountain guide). Nadya Yanova (cook).

1.8. Expedition Budget

Each team member paid towards expedition costs a contribution of £1100 per two week slot. The contribution covered accommodation and meals, supervision and induction, a permit to access and work in the area, all maps and special non-personal equipment, all transport from and to the team assembly point. It did not cover excess luggage charges, travel insurance, personal expenses like telephone bills, souvenirs, etc., as well as visa and other travel expenses to and from the assembly point (e.g. international flights). Details on how these contributions were spent are given below.

Income	£	
Expedition contributions	49,916	
Expenditure		% of which spent directly on project
Base camp and food includes all meals, base camp equipment	5,350	100
Transport includes fuel, vehicle maintenance	1,426	100
Equipment and hardware includes research materials, research gear	3,340	approx. 80
Biosphere Expeditions staff includes salaries, travel and expenses to Novosibirsk	6,962	100
Local staff includes salaries, travel and expenses, Biosphere Expedition tips, gifts	6,974	100
Administration includes bribes, registration fees, sundries, etc	2,296	100
Logistics & co-ordination Payment to Sibalp	4,667	100
Team recruitment Altai as estimated % of PR costs for Biosphere Expeditions	3,950	100
Income – Expenditure (unadjusted)	14,887	
Income – Expenditure (adjusted to % spent on project)	15,568	
Total percentage spent directly on project	69%	

1.9. Acknowledgements

This study was conducted by Biosphere Expeditions which runs wildlife conservation expeditions all over the globe. Without our expedition team members, who are listed above and who provided an expedition contribution and gave up their spare time to work as research assistants, none of this research would have been possible. The support team and staff, also mentioned above, were central to making it all work on the ground. Thank you to all of you and the ones we have not managed to mention by name (you know who you are) for making it all come true. Biosphere Expeditions would also like to thank Land Rover, Motorola, Silva, Field & Trek, Globetrotter Ausrüstung and Gerald Arnhold for their sponsorship.

1.10. Further Information & Enquiries

More background information on Biosphere Expeditions in general and on this expedition in particular including pictures, diary excerpts and a copy of this report can be found on the Biosphere Expeditions website www.biosphere-expeditions.org.

Enquires should be addressed to Biosphere Expeditions at the address given below.

2. Snow Leopard & Prey Survey

Tessa McGregor
Biosphere Expeditions

2.1. Introduction

The estimated population of snow leopards (*Uncia uncia*) in the wild today is between 3000 and 7000 animals (unpublished manuscripts and Sunquist & Sunquist 2002). This is the same estimate as for tigers, but whilst tigers have received a lot of publicity and there is wide public awareness of their precarious status, the same cannot be said for the snow leopard. They are still one of the least known big cats. Hardly a surprising fact when one considers their elusive nature and the remote and difficult habitats they occupy in the mountainous regions of central Asia. Their geographical range spans twelve countries, many of which are politically unstable and all of which have sensitive borders. The snow leopard is classified as an endangered species (Category I) by the IUCN and is disappearing from many parts of its formerly vast range.

After China, which it borders, Russia has the second largest potential snow leopard habitat and together with Mongolia and other post-Soviet republics, it accounts for much of snow leopard habitat.

The amount of suitable snow leopard habitat in Russia totals about 131,000 sq km (Koshkarev 1994), with snow leopards being reported from the Altai and Sayan ranges bordering Mongolia. Smirnov et al. (1990) estimates about 80 snow leopards reside in southern Siberia, including those animals that wander into Mongolian territory. Sopin (1977), cited in Fox (1989), estimates 0.75 to 1.5 snow leopards per 100 sq km in parts of the Altai mountains giving a total population of about 40 (Jackson & Hunter 1996).

Rodney Jackson's four year study (Jackson 1996) of radio-collared snow leopards in Nepal provided most of what is known about the species today, but while Nepal contains prime snow leopard habitat and has the highest percentage of protected area (26.7%) after Bhutan (57.4%), it also only accounts for a small proportion of snow leopard range (0.9%). It took another 10 years for a comparable study to be undertaken in a different habitat (Schaller et al. 1994). This study employed radio-collared animals (VHF & satellite transmitter radio-collars) and took place in the Mongolian part of the Altai mountains, to the north of the Great Gobi National Park. Although a stronghold of snow leopards in Mongolia, prey densities were found to be relatively low and probably representative of much of the snow leopard's range in central Asia (McCarthy et al. 2005). Results from this study have also revealed much larger snow leopard home ranges than previously recorded.

However, studies involving radio-collared snow leopards are difficult, time-consuming and expensive. Conducting surveys using the Snow Leopard Information Management System (SLIMS), on the other hand, is a more practical way of assessing snow leopard status and distribution in much of the snow leopard's range. Following this protocol ensures standard procedures are used and enables data gathered across any part of the snow leopard's range to make a valuable contribution to the International Snow Leopard Trust's (ISLT) database and so help further knowledge and conservation efforts. The expedition therefore followed SLIMS methodology.

2.2. Research Area & Timing of Survey

The area surveyed by Biosphere Expeditions was chosen for several reasons including: (1) the area was as yet unsurveyed for snow leopard; (2) map study suggested that the area may be an important corridor for snow leopard dispersal to and from Mongolia; (3) the habitat is biodiverse, supporting a range of prey species and other carnivores; (4) the area lacks proper protection and is threatened by a proposed road to Tuva and a proposed gas pipeline.

The study site totalled approximately 200 sq km and was delineated by geographical features (rivers and mountain ranges). The site was divided into two survey blocks. As per SLIMS suggestions, the survey routes followed river valleys and landform edges wherever possible. While survey routes are marked on the map (scale 1:200,000) they are only an indication of the area covered. Research was focused on the core area as it included the most important habitat for snow leopard and prey, and suffered from the lowest levels of human disturbance. The survey sites were accessed by Land Rover Defender (or on foot if near base camp). All surveys were conducted on foot. Elevations ranged from 2000 m to 3600 m. Base camp was situated in a valley, at the entrance to the core area, below the mountain of Silugiem. It afforded the necessary shelter and fresh water source needed by the expedition.

Snow leopard surveys are best undertaken when weather permits travel within the proposed survey area, when animals are most actively marking and when sign is most long-lived. These conditions rarely coincide, so trade-offs have to be made between logistical factors and biological ones. In this study, logistics and team recruitment by and large determined the survey period. On the one hand, summer is a difficult time to find snow leopard sign: marking activity is low, human disturbance is high and livestock grazing can soon obliterate sign. Suitability of tracking substrate is also poor (tracking is much easier in snow). Weather conditions also tend to be unpredictable and contribute to sign erosion and eradication. Rain erodes sign rapidly. On the other hand, however, recruiting an expedition for a summer expedition is much more realistic, logistics are not nearly as prohibitive as in winter and, most importantly for this study, human presence can be a valuable source of information, especially in the absence of other baseline data. Summer is also the optimum time for accumulation of sign and availability of "relic" sign (i.e. old sign that is not washed away or otherwise destroyed or removed).

2.3. Methodology

2.3.1. Snow leopard presence-absence survey

Presence-absence surveys of snow leopard and prey (SLIMS Form 1) were conducted throughout the survey area. Designed for ease of use, presence-absence surveys are a scientifically valid approach to determine the general status of snow leopards in broad geographical areas. The surveys rely on the presence of snow leopard sign at strategic search locations. Data analyses use survey block summaries to draw conclusions on: (1) the presence-absence of snow leopards and prey species; (2) major threats; (3) management recommendations.

These are qualitative methods that lead to personal judgements supported by physical evidence documented in the survey forms. Unlike relative abundance surveys, there is no statistical basis for the conclusions. When snow leopard sign is absent, the analyst must rely on all other information on the data forms to reach a judgement. Prey species, habitat and local interview data may point to the presence of snow leopards, even though no sign was found during the survey.

The analyst uses the survey data to support qualitative judgements on snow leopards, prey species, threats and management recommendations for the survey area. The survey forms are the critical analytical unit and are stored for future reference. Over time, as survey conclusions are mapped out, trends will emerge. It is estimated that it will take at least three years for these trends to become clear for the Biosphere Expeditions Altai survey area.

Snow leopard presence can be detected by sign, i.e. pugmarks (tracks), scrapes, faeces (scat), urination and rock scent spray. These signs tend to be left in relatively predictable places. For example, scrapes tend to be left at the base of cliffs, beside large boulders, on knolls and promontories, at bends in trails, or along other well-defined landform edges (Schaller 1977; Koshkarev 1984; Mallon 1988; Schaller et al. 1987; Jackson & Ahlborn 1988; Fox 1989). These factors are important when deciding where to survey.

2.3.2. Prey base survey

Surveying prey base is another, essential component of the present SLIMS presence/absence survey. Argali and ibex are the main prey species. Their range closely parallels that of snow leopard. Siberian red deer (*Cervus elaphus maral*), roe deer (*Capreolus capreolus*) and wild boar (*Sus scrofa*) are also taken by snow leopard in Russia (Jackson & Hunter 1996).

Prey species were surveyed by recording sign and by observation. Prey sign included tracks, faeces, hair/wool, and carcasses/bones. Prey species were divided into ‘primary’ (ibex and argali) and ‘secondary’ (maral, musk deer, marmot, pika, hare and game birds). The same search sites were used for snow leopard and for prey.

2.3.3. Interviews with semi-nomadic local herders

Interviews with local people played an important part in the research. Interviews were conducted at regular intervals throughout the survey period and over the whole survey area. The quality of information obtained varied with interviewees. Economic status and length of herding tradition within the family were particularly important factors. It was often not possible to conduct formal interviews and some families were questioned regularly throughout the expedition.

2.3.4. Additional surveys

Evidence of other carnivores sharing snow leopard habitat was also recorded as part of the SLIMS survey. These were wolf, fox, lynx and manul.

Additional non-invasive methods planned for this study were camera trapping and faecal analysis.

2.4. Results

2.4.1. Snow leopard presence-absence survey

Snow leopard sign searched for during this study included: pugmarks (tracks), scrapes, faeces (scat), urination and rock scent spray.

Table 2.4a. Summary of snow leopard sign found during the expedition.

	PUG = pugmarks	SC = scrape	FE = faeces	UR = scent mark	RC = claw rake	OBS = observation
10/07/03	1	0	0	0	0	0
14/07/03	0	0	1*	0	0	0
23/07/03	1	1?	0	0	0	0
28/07/03	2	0	0	0	0	0
11/08/03	2	0	0	0	0	0
13/08/03	0	0	1*	0	0	0
21/08/03	0	1?	0	0	0	1

Comments: PUG = pugmarks (the number in the table above refers to the number of different tracks found and not the number of individual pugmarks). SC = scrape (? = both non relic and not fresh/defined enough for definite ID). FE = faeces (* = awaiting results of DNA analysis for positive ID).

Tracks (pugmarks): These are more easily found in sandy rather than gravelly places, but sandy areas were only present at lower elevations, away from preferred snow leopard terrain. One set of tracks was found in gravel. Most of the area surveyed was unsuitable for tracking (scree, boulders, vegetation, etc), but the wet weather and higher than average snowfall made finding tracks “easier” than had been anticipated.

Scrapes: These can be found in sandy sites (short-lived) and gravel (more long-lived). Unfortunately suitable substrates were not present in most of the survey area favoured by snow leopard, where the majority of substrate was vegetation and broken terrain. Potentially suitable substrate was subject to livestock grazing. High rainfall and frequent snowfall throughout much of the survey period also reduced the possibility of finding scrapes.

Faeces: Faeces can be long-lived in areas with little rainfall and minimal insect activity - the survey area was subject to high rainfall and intense insect activity. Grasshoppers were found at all but the highest elevations and were voracious consumers of faecal, plant and other matter. Faeces can be deposited solitarily (67%) or with other scats of varying ages (Jackson & Hunter 1996). Faeces are most often found in association with scrapes - two scats were found over the whole survey period. Both had been deposited by themselves and were not associated with a scrape. One sample was old and one sample was fresh.

Scat samples collected in the field were stored in sample tubes and preserved in ethanol. They were brought back to the UK (no CITES permits are needed for importing faecal samples) and sent to Brunel University for DNA analysis. This is being done by Dr Annette Payne. She is heading a five year programme to analyse snow leopard faeces sent in by researchers from all over snow leopard range countries. This work has the potential to identify individual snow leopards by using DNA extracted from their faeces. This also means genetic relationships between populations can be investigated. National Environment Research Council (NERC) funding for the project was in the approval stages when Dr Payne was surveying as part of this study (3rd slot). The NERC grant was approved in 2004. DNA analysis is very time consuming and snow leopard scat samples have been sent in from many other countries, so it will be some time before the results of scat analysis are available.

Urination: Urine can be deposited on scrape piles and is commonly deposited along regular paths or trails. No signs of urination were found during the survey period. Lack of trails and difficulty in finding scrapes were a contributing factor.

Scent spray: Snow leopards spray-mark the faces of upright or overhanging boulders and the base of cliffs. Some sites are periodically revisited and re-sprayed (mainly along trails). The majority of spray sites will have one or more scrapes within a distance of a few meters. No scent-sprays were found during the survey period. Lack of trails and suitable upright or overhanging boulders were a contributing factor.

Claw rakes: These are occasionally left on a rock face, log or upright tree trunk. No claw rakes were found during the survey period.

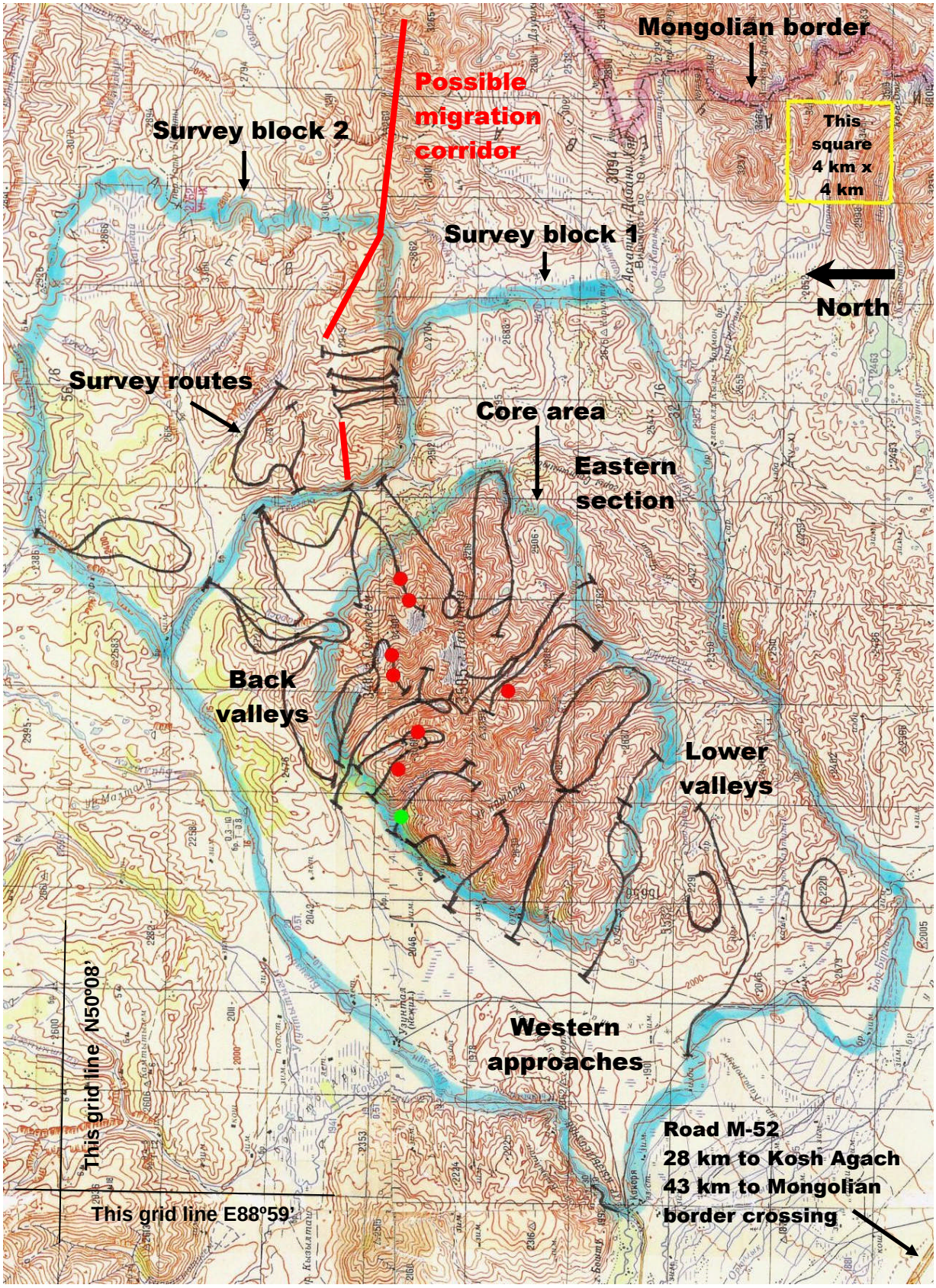

Fig. 2.4.1a. Topographic map of survey area with survey blocks and routes. Approximate locations of snow leopard sign marked by red dots. Base camp location marked by green dot. Sign of primary prey (ibex and argali) found only in core area and survey block around possible corridor. Sign of secondary prey found throughout survey blocks 1 and 2 (but sign of deer and game birds only found in core area).

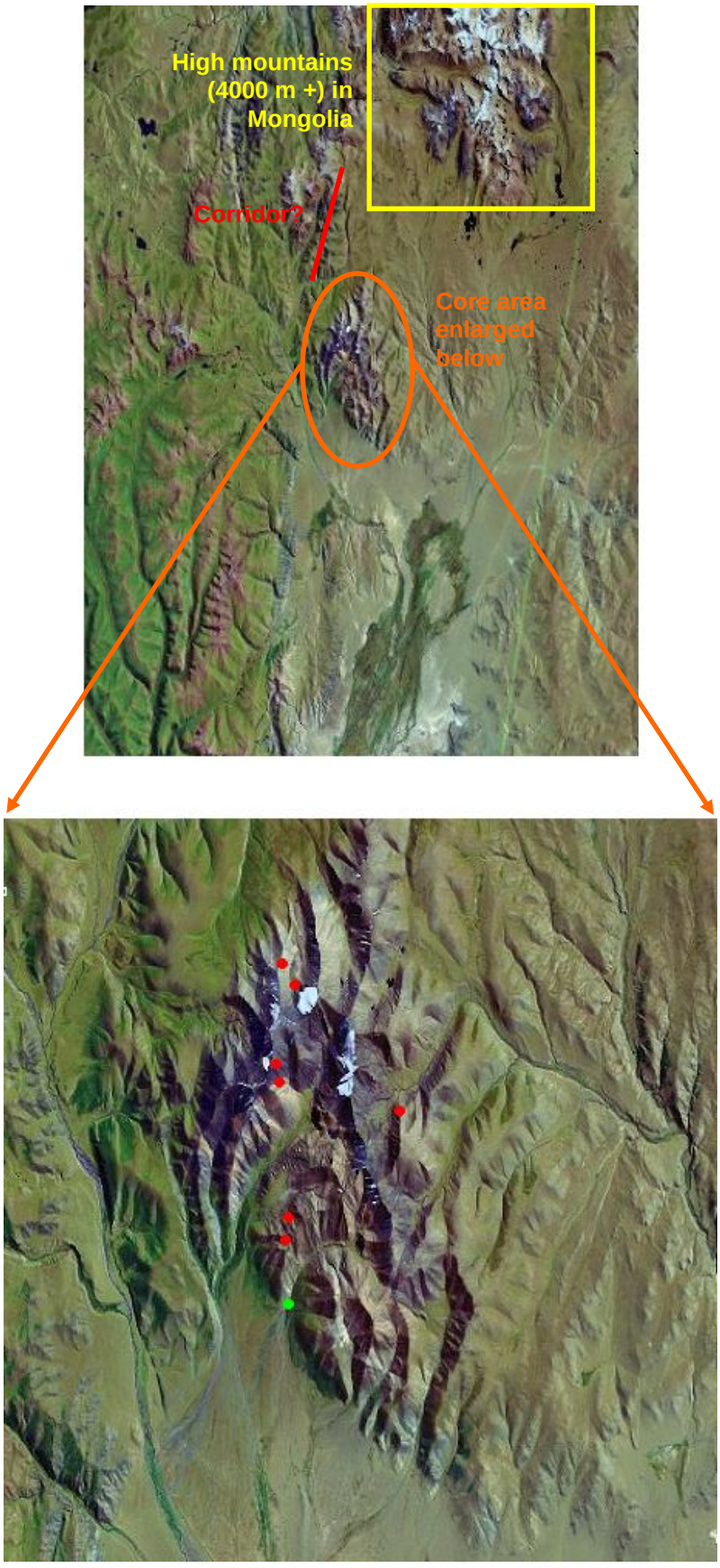

Fig. 2.4.1b. Satellite images of survey area. Approximate locations of snow leopard sign marked by red dots. Base camp location marked by green dot. Notice how well the topographic map on the previous page and these satellite images match, even down to the shape of the glaciers.

Table 2.4.3b. Details of snow leopard sign found during the expedition.

Type of sign (with SLIMS code)	Date	Survey Route	GPS coordinates	Altitude	Comments
OBS = observation	21/08/03	1Y	N49°57.770' E89°19.050'	3305 m	1 adult seen resting in broken terrain below ridgeline at distance of approx 50 m at 14:00. Animal retracted lips & bared teeth at observer & moved off immediately. Sighting lasted only few seconds.
PUG = pugmark (= track)	10/07/03	1B	N49°59.821' E89°13.334'	N/R but ≥ 2600 m	Pugmarks ≥ 6 days, found in crystalline snow. Track ≤ 5 m.
	23/07/03	1K	N49°59.594' E89°20.888'	2864 m	Track approx. 70 m on fine gravel plateau - followed landform edge closely before crossing open ground (20 m) to grassy plateau used by argali.
	28/07/03	1T	N49°55.971' E89°13.330'	2923 m	Both set of tracks ≥ 6 days & found on snow patches. Although tracks hard to measure, one set slightly smaller (possible indication of mother and cub?).
	28/07/03	1T	N49°56.231' E89°13.989'	2965 m	Track ≥ 10 days
	11/08/03	1J +	N50°00.650' E89°17.965'	3330 m	Track ≤ 5 days
	11/08/03	1J+	N50°00.274' E89°17.987'	3373 m	Both sets of pugmarks found in snow made by adult and had been made less than 12 days apart – either made by same individual (likely) or 2 different animals (less likely).
SC = scrape	23/07/03	1K	N49°59.578' E89°21.050'	2795 m	Non relic scrape found in lee of large boulder approx 1.5 m wide & 1.8 m high with flat face angling back at approx 60° to the horizontal, the upper edge overhanging. Possible scrape, but very old.
	21/08/03	1Xa	N49°56.322' E89°19.817'	2565 m	Possible old, non relic scrape in gravelly sand.
FE = faeces	14/07/03	1J	N50°01.492' E89°18.770'	2786 m	Large cat scat, quite fresh – awaiting results of DNA analysis for positive ID.
	13/08/03	Ridge 'manul rock'	N/R	≥2580 m	Large cat scat, old – awaiting results of DNA for positive ID.

2.4.2. Prey base survey

Sign of prey species were more abundant and widespread. Prey species used a much greater variety of terrain (e.g. valleys and hill slopes). Periods of observation were conducted from hilltops and ridges, using binoculars, but most observations of primary prey were made from lower elevations and were fortuitous. Observations/encounters with primary prey species were far fewer than had been anticipated. Herd sizes were also smaller than expected. Ibex were only seen in very small groups. The largest herd size observed was 13. Argali were also seen in small groups although a herd of 22 animals was observed on two occasions. Evidence from surveys and interviews indicates that the number of animals using the survey area is low. Estimates for ibex population in survey area are ≤ 20 and for argali ≤ 40.

2.4.3. Interviews with semi-nomadic local herders

Surprisingly, every person questioned initially said snow leopards were more common now than they had ever been, but when questions were rephrased, different answers were given and there was a direct correlation between snow leopard sightings, snow leopard predation of domestic livestock and age of herder. Frequency of sightings and predation incidents decreased markedly with every generation. 70% of herders in the 50+ age group knew of sightings of, or predation of stock by, snow leopard. The figure dropped to 20% in the 30 - 40 year age group and to below 5% in the 25 and under age group. Where good relationships were achieved with herding families (this happened in the majority of cases), they became much more open and admitted that snow leopards were very rare now and that prey species (mainly ibex and argali) were also declining fast.

All the herders in the survey area complained of the difficulty of making a living in post-Soviet Russia. The collapse of the collective farming system has adversely affected herders' livelihoods and changed the livestock composition. 'Sarliks' (local yaks) had been important livestock animals in the collective farms. These animals were traditionally grazed at higher altitudes than other livestock in winter and summer and snow leopard sightings had largely occurred while grazing sarliks; but there were only ten of these animals left in our survey area. Cattle were still kept as important sources of milk for dairy produce, but herds were smaller. Sheep and goats made up the majority livestock biomass and were grazed in large herds (300 – 1000 animals).

Horse numbers had also decreased and there was an absence of breeding stock. Horses were used for herding and transport, mainly the former as transport is increasingly mechanized.

Table 2.4.3a. Percentage of herder population with direct or indirect (family member or neighbour) experience of snow leopard activity in the region.

Herder age group (years)	Snow leopard sign (adult)	Snow leopard sign (cub)	Snow leopard predation
50+	70%	20%	30%
30 - 40	15%	5%	5%
20 - 30	3%	1%	0%
10 - 20	1%	0%	0%
0 - 10	0%	0%	0%

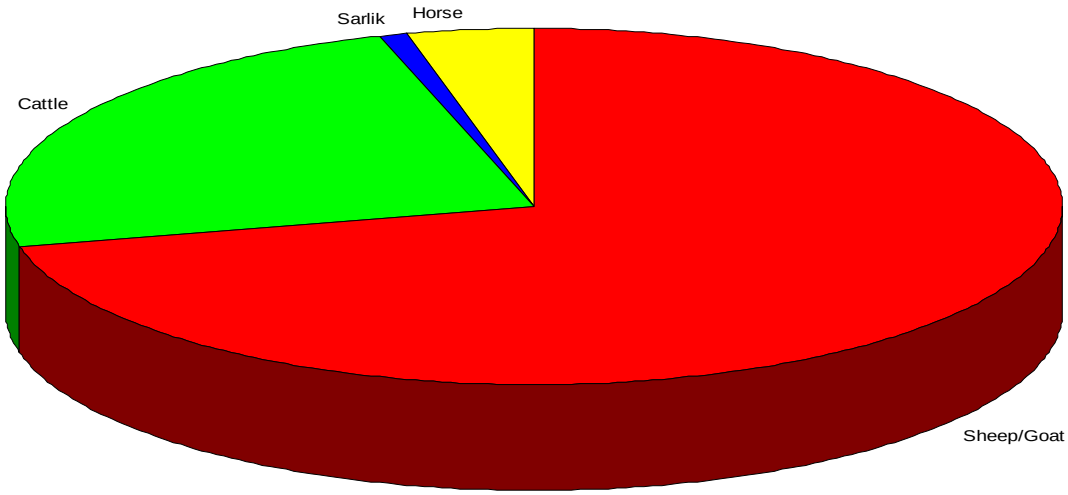

Fig. 2.4.3a. Composition of domestic livestock in survey area

2.4.4. Additional surveys

Evidence of other carnivores sharing snow leopard habitat was also recorded. These were wolf, fox, lynx and manul. Wolf, fox and manul sign were found at high elevations. Sign of lynx was only found at lower elevations (in forest and in narrow valleys).

Very fresh sign of bear was found in two separate locations, two days apart, during the last slot - one at low elevation (fresh track on dry, sandy section of riverbed) and one at higher elevation (fresh faeces in valley behind Tapduiar mountain). This was interesting, as we had been told that bear had been present in the survey area in the past, but there had been no sign for the last four years.

From the data gathered, it appears that snow leopard ranges do not regularly overlap with lynx in summer, but that areas favoured by snow leopard are shared with fox and manul (80%) and to a lesser extent with wolf (50%). Wolf was the only predator currently preying on domestic livestock.

Table 2.4.4a. Summary of snow leopard, prey and other carnivore sign for each expedition slot.

	1st slot 06/07/03 to 18/07/03	2nd slot 20/0703 to 01/08/03	3rd slot 03/08/03 to 15/08/03	4th slot 17/08/03 to 29/08/03
No of surveys completed	14	11	17	11
No of surveys with snow leopard sign	02	02	02	01
No of surveys with primary prey sign*	05	06	09	07
No of surveys with secondary prey sign**	14	11	17	10
No of surveys with other carnivore sign***	08	03	05	05

Comments: * ibex and argali, ** other prey listed on SLIMS form 1: snow leopard presence-absence: prey species, *** wolf, lynx, manul, fox (bear also included although an omnivore).

Video camera trapping equipment was carried by the expedition, but trapping was not attempted, as no suitable location was found to set up the video camera trap. A possible location was identified on the very last survey day (!) (survey route 1I) and will be tested in 2004. However, the chances of remote video capture of snow leopard are slim until a trail or “relic” scrape is found.

2.5. Discussion & Conclusions

On an expedition such as this, covering a large area of remote, rough and broken terrain, it is difficult to find signs of snow leopard and primary prey species, especially during the summer absence of prolonged, continuous snow cover. Ungulates and carnivores favour higher ground and are more dispersed during this season and snow leopard sign is harder to find. Despite these constraints the expedition was very successful and snow leopard sign was found in each slot and there was even a sighting! The field evidence indicates that snow leopard is present in the area surveyed. This, together with evidence from local people, confirmed the importance of the study area as a habitat for snow leopard and as a corridor for snow leopard dispersal between Russia and Mongolia.

Sign of snow leopard was found in the core area of survey block 1 in each slot. Age of sign varied from fresh to old. This implies a resident animal and/or or more than one snow leopard in the research area. The lack of trails and unsuitable substrate diminished the possibility of finding scrapes and scent marks and these are the most reliable and long-lived indicators of snow leopard activity. However, the fact that other sign was found in each slot and that there was also a sighting shows that snow leopards were present.

Sign of prey species was found in each slot throughout the survey area. Observations were made, and sign found of, primary prey species in the core area (survey block 1) and in the corridor area (survey block 2). Observation/sign of secondary prey species was found throughout the survey area (blocks 1 & 2). While there is still an adequate and varied prey base to sustain a healthy snow leopard population, ibex and argali were only found in small numbers. Unless action is taken soon, the primary prey population is likely to become further reduced.

Many older herders (as well as other people interviewed) had seen snow leopards (adults and cubs) and/or signs of their activity within survey blocks 1 and 2 and in the surrounding area. Sightings were most frequent adjacent to, or in, the core area. Sightings have decreased significantly since 1998, even after taking into account the change in winter herding practices. Snow leopard predation of domestic livestock had occurred in the past, but there were no records of any incidents after 1993. The evidence from interviews suggests the study area once held a healthy, breeding snow leopard population, which is now in steep decline, along with the prey species on which it depends. The main cause is increased poaching of snow leopard and prey species coupled with seriously diminished facilities to combat these problems. The situation is exacerbated by economic and social problems caused by the political destabilisation of post-Soviet Russia.

The survey area is rich in flora and fauna. It is an important area for birds, notably for raptors and breeding Demoiselle cranes. The habitat is varied and capable of sustaining a healthy prey base for snow leopard, but there is a worrying decline in prey species (namely argali, ibex, maral and musk deer) due to poaching.

Overgrazing by livestock and erosion caused by vehicles is also a problem. Improved anti-poaching control together with a temporary ban on hunting could have an immediate impact on halting the decline of prey species and, by inference, snow

leopards. The survey area urgently needs proper protection. Involving the local community and helping them to benefit as well as wildlife is vital for any conservation initiative to succeed.

In summary:

(1) Results from SLIMS data sheets confirmed the presence of at least one resident snow leopard within the survey area;

(2) The major threat facing the snow leopard and prey population within the study area is poaching. Secondary threats come from habitat degradation caused by increased grazing pressure and proposed development (a through road to Tuva and a gas pipeline). If development goes ahead it will exacerbate the poaching problem and cause further damage to an already fragile ecosystem.

Management recommendations include:

(1) An immediate temporary ban on hunting any of the larger prey species. Ibex and deer numbers are not high enough locally to support hunting pressure and it is almost impossible to regulate what is shot once a licence is issued;

(2) Improving the economic situation of local people in return for participation in wildlife monitoring and help with anti-poaching. This might be possible using the combination of ecotourism and marketing products made by herders. This aspect needs further investigation and consultation with herders;

(3) Further research in the study area especially corridor area (survey block 2) and lower valleys (survey block 1). Plus at least one winter survey (this would be of shorter duration).

Outlook & future expedition work:

Further research is needed for at least two more years to monitor snow leopard and prey population trends in the survey area. Presence-absence surveys will be repeated in 2004 and 2005 and relative-abundance surveys will also be undertaken in the most suitable habitat areas. Finding a trail and/or relic scrape(s) is a high priority. If either of these are found, remote camera-trapping will be included as a survey tool. Collecting scat for DNA analysis will continue to play an important part in the research. Liaising with local people will continue to play a key part in the research. Continued dialogue with herders is very important, not only to find out what has happened in between expedition periods but to involve them more fully in the research and explore possibilities of benefiting the local community. After 2005 the project should expand and a new and additional survey area in the Altai should be targeted for research.

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Appendix 1
Data from Altai SLIMS forms 1. For more details on abbreviations, etc, see Jackson & Hunter (1996).

Date	Survey route	Distance km	Time h	Dominiating landscape type	Livestock	Human disturbance
10/07/2003	1A	5	10	SROL+NVAL	SIG	Yes (med)
10/07/2003	1B	4	9.5	SROL+BTER	0	No
10/07/2003	1C	5	8	SROL	SIG	Yes (med)
11/07/2003	1D	5.5	9	NVAL+GROL+GORG	SIG	Yes (med)
11/07/2003	1E	5	6	NVAL	SIG	Yes (high)
12/07/2003	1F	3	4.5	NVAL	SIG+OBS	Yes
12/07/2003	1G & H	2 x 3	2 + 2	PLA+GROL	SIG+OBS	Yes (high)
14/07/2003	1I	8	8.5	NVAL	SIG	No
14/07/2003	1J	10	7	NVAL	SIG+OBS	No
14/07/2003	1K	12	6.5	SROL+BTER	SIG	No
15/07/2003	1L	n/r	5.5	SROL	SIG	Yes (low)
16/07/2003	1M	6	4	GROL	SIG	No
16/07/2007	1N	7	6	GROL+SROL+BTER	SIG	No
23/07/2003	1K	8	n/r	GROL+BTER	N/R	N/R
23/07/2003	1K	8	8	SROL+BTER+NVAL	SIG	No
24/07/2003	lower forest	2	2	GROL+OTH	SIG	Yes (med)
24/07/2003	med forest	2	5	SROL+BTER+GORG	SIG	Yes (low)
24/07/2003	high forest	5	2.5	SROL+BTER	SIG	No
26/07/2003	1P+1Q	2 x 5	5	GROL+SROL	SIG	Yes
26/07/2003	1Q	6	5	GROL+SROL+BTER	SIG	Yes
26/07/2003	1S	4	4.5	GROL+SROL	SIG+OBS	Yes
28/07/2003	1T (lower)	2	n/r	NVAL+GROL	SIG+OBS	Yes
28/07/2003	1T (upper)	4	6.5	SROL+BTER	SIG	No
05/08/2003	"manul rock"	1.5	4.5	SROL+BTER+NVAL	0	No
06/08/2003	2A	6	4.5	GROL+SROL	SIG+OBS	Yes
06/08/2003	2B	6	5.5	SROL+BTER	SIG	Yes
07/08/2003	2C	8	4.5	GROL+SROL+BTER	SIG+OBS	Yes
07/08/2003	2D	7	4	SROL	SIG	Yes
07/08/2003	2E	8	5	GROL+SROL	SIG	Yes
08/08/2003	1U lower	6	3	GROL+ rock outcrops	SIG+OBS	Yes
08/08/2003	1U higher	7	4	SROL+BTER	SIG+OBS	Yes
08/08/2003	1I	4	3	GROL+Forest	SIG	Yes
09/08/2003	1V	n/r	4.5	GROL+SROL+PLA	SIG	Yes (low)
09/08/2003	1W	7	4	SROL+BTER+GROL	SIG	Yes (low)
10/08/2003	1C (lower)	n/r	6.5	SROL	0	No
11/08/2003	1J+1I	14	8	BTER+NVAL+GORG	SIG+OBS	No
11/08/2003	1Ja	10	6.5	SROL+NVAL	SIG	Yes (med)
12/08/2003	1F	6	3	NVAL+SROL+GORG	SIG	Yes (med)
13/08/2003	BC (lower)	2	3	SROL+ Forest	SIG	Yes (low)
13/08/2003	BC (ridges)	3	3	SROL+BTER+NVAL	0	No
20/08/2003	1K	8	6	GROL+SROL+BTER+NVAL	SIG	No
21/08/2003	1Xa	n/r	4	NVAL	SIG	Yes (low)
21/08/2003	1Xb	n/r	5.5	SROL+NVAL	SIG	Yes (low)
21/08/2003	1Y	n/r	3	SROL+BTER	SIG	Yes (low)
22/08/2003	2C	n/r	n/r	GROL+BTER	SIG	Yes (high)
22/08/2003	2C	n/r	4.5	NVAL+GROL	SIG	Yes (high)
22/08/2003	2D	6	4	NVAL+SROL	SIG	Yes (med)
23/08/2003	1R	5	3.5	WVAL+PLA (river bed)	SIG	Yes (high)
25/08/2003	1J+1F	8	8	SROL+BTER+GORG	SIG	No
26/08/2003	1Z	10	9	NVAL+SROL+BTER	SIG	No
26/08/2003	1I	7	7	SROL+BTER+NVAL	SIG	No

…continued

Date	Snow leopard	Ibex	Argali	Red deer	Musk deer*	Wild boar	Marmot	Pika	Hare	Game bird	Lynx	Manul	Wolf	Bear
10/07/2003	0	0	0	0	SIG	0	OBS	0	SIG	OBS	0	0	0	0
10/07/2003	PUG	0	0	0	0	0	SIG	SIG	0	OBS	0	PUG	0	0
10/07/2003	0	0	0	SIG	0	0	0	0	SIG	SIG	0	0	0	0
11/07/2003	0	0	0	0	0	0	0	SIG	0	0	0	0	SIG	0
11/07/2003	0	SIG	0	SIG	0	0	SIG+OBS	0	SIG	0	0	0	SIG? (FE)	0
12/07/2003	0	SIG+OBS(2)	0	0	0	0	0	SIG	SIG	0	0	0	0	0
12/07/2003	0	0	0	0	0	0	SIG	0	SIG+OBS	0	0	0	0	0
14/07/2003	0	SIG	0	SIG	0	0	0	SIG+OBS	0	0	0	SIG	0	0
14/07/2003	SIG? FE	0	0	0	0	0	0	0	SIG	OBS	0	SIG? (FE)	0	0
14/07/2003	0	SIG	SIG	0	0	0	0	SIG	SIG	0	0	SIG? (FE)	0	0
15/07/2003	0	0	0	0	0	0	SIG	0	SIG	OBS	0	0	0	0
16/07/2003	0	0	0	0	0	0	SIG	0	0	0	0	SIG? (SC)	0	0
16/07/2007	0	SIG	0	0	0	0	SIG+OBS	SIG	SIG	OBS	SIG? PUG	0	0	0
23/07/2003	0	SIG?	SIG	0	0	0	SIG	SIG	SIG	0	0	0	0	0
23/07/2003	PUG & SC	0	SIG	0	0	0	SIG	SIG	SIG	OBS	0	SIG (PUG)	0	0
24/07/2003	0	0	0	SIG	0	0	SIG	SIG	SIG	0	0	0	0	0
24/07/2003	0	SIG	SIG	0	SIG	0	SOG	0	SIG	OBS	0	0	0	0
24/07/2003	0	SIG	SIG	SIG	0	0	SIG	SIG	SIG	0	SIG? FE	SIG (PUG)	0	0
26/07/2003	0	0	0	0	0	0	SIG+OBS	0	0	OBS	0	0	0	0
26/07/2003	0	0	SIG	0	0	0	SIG	SIG	SIG	OBS	0	SIG (PUG)	0	0
26/07/2003	0	0	0	0	0	0	SIG+OBS	0	OBS	0	0	0	0	0
28/07/2003	0	0	0	0	SIG	0	SIG+OBS	SIG	SIG	0	0	0	SIG (FE)	0
28/07/2003	PUG	SIG	SIG?	0	SIG?	0	SIG	SIG	0	SIG	0	0	0	0
05/08/2003	0	SIG	SIG	0	0	0	SIG	OBS	SIG	0	0	0	SIG	0
06/08/2003	0	0	OBS(4)	0	0	0	SIG	0	0	0	0	0	0	0
06/08/2003	0	SIG	SIG	0	0	0	SIG	SIG	0	0	0	SIG (PUG)	0	0
07/08/2003	0	0	0	0	0	0	SIG	SIG	0	SIG+OBS	0	0	0	0
07/08/2003	0	0	0	0	0	0	SIG+OBS	0	0	SIG	0	0	0	0
07/08/2003	0	0	0	0	0	0	SIG+OBS	SIG+OBS	OBS	0	0	0	0	0
08/08/2003	0	0	0	0	0	0	SIG	0	0	0	0	0	0	0
08/08/2003	0	SIG	SIG	0	0	0	0	0	SIG	OBS	0	0	0	0
08/08/2003	0	0	0	0	0	0	SIG	0	0	0	0	0	0	0
09/08/2003	0	SIG	SIG	0	0	0	SIG	0	SIG	OBS	0	0	0	0
09/08/2003	0	SIG	SIG	0	0	0	0	0	0	0	0	SIG	0	0

… continued

Date	Snow leopard	Ibex	Argali	Red deer	Musk deer*	Wild boar	Marmot	Pika	Hare	Game bird	Lynx	Manul	Wolf	Bear
10/08/2003	0	0	0	SIG	0	0	SIG	OBS	SIG	SIG	0	SIG	0	0
11/08/2003	PUG	0	SIG+OBS(22)	0	0	0	SIG	SIG	0	SIG	SIG? PUG	SIG (PUG)	0	SIG?
11/08/2003	0	SIG	SIG	0	0	0	SIG+OBS	SIG	SIG+OBS	SIG	0	0	0	0
12/08/2003	0	0	0	0	0	0	SIG	0	SIG	SIG	0	0	0	0
13/08/2003	0	0	0	SIG	SIG	0	0	0	SIG	SIG	0	SIG (PUG)	SIG? (FE)	0
13/08/2003	SIG? FE	SIG+OBS(8)	0	0	0	0	0	SIG+OBS	0	0	0	0	0	0
20/08/2003	0	SIG	0	0	0	0	0	0	SIG	0	PUG+SC	0	0	0
21/08/2003	0	0	0	0	0	0	SIG	0	SIG	0	PUG+SC	0	0	0
21/08/2003	0	SIG	SIG+OBS(2)	0	0	0	SIG	SIG	0	0	0	0	0	SIG (FE)
21/08/2003	OBS	OBS (20?)	0	0	0	0	SIG	0	OBS	OBS	0	0	0	0
22/08/2003	0	0	0	0	0	0	SIG	0	SIG	0	0	SIG?(PUG)	SIG (FE)	0
22/08/2003	0	0	SIG	0	0	0	SIG	0	SIG	0	0	0	0	0
22/08/2003	0	SIG	SIG	0	0	0	SIG	0	SIG	OBS	0	0	0	0
23/08/2003	0	0	0	0	0	0	0	0	SIG+OBS	0	PUG	0	SIG (FE)	SIG (PUG)
25/08/2003	0	SIG	SIG	0	0	0	0	0	0	SIG	0	0	0	0
26/08/2003	0	SIG+OBS(13)	SIG+OBS(22+14)	0	0	0	0	0	0	0	0	0	0	0
26/08/2003	0	0	SIG	0	0	0	SIG+OBS	SIG+OBS	SIG	SIG	0	0	0	0

* = could also have been of roe deer, which is present in the study area, but absent on the SLIMS form.

Appendix 2

Transcripts of interviews with herders & Head of local Wildlife and Hunting Department.

Aruna Mahiva

Date: 27/07/03

Location of interview: Summer Camp situated at the entrance to the 'back valleys'

GPS coordinates: N50º02.791 / E89°12.637

Altitude: 2008m

The Summer Camp is occupied from the beginning of June to the end of August. Aruna Mahiva is 21 years old. There are nine members in her family, living in the summer camp, although during this interview, she was alone. Her parents had gone to see the Autumn Camp, located 13 km away in the steppe. This is where the family moves to from mid August to end of September to make hay. Winter camp is further away (22 km) and occupied from October to May. Much of the family go to live in villages in the Kosh Agach region for this period so that the children can attend school.

Livestock: 500 goats/sheep, 30 beef cows, 10 milk cows and 5 horses

Threats to livestock: Wolves.

Snow leopard information: Aruna has never seen a snow leopard, but her elder brother had a sighting 10 years ago. He saw 4 individuals in winter, a mother with well-grown cubs. Aruna is not aware of any snow leopard poaching.

Other carnivores/omnivores

Wolves: These are seen in small groups in summer and in winter they can be seen in packs. They are the main predators of livestock, especially sheep and goats. Aruna's family scare them away when they see them. Professional hunters kill wolves and they are also poisoned.

Manul: Occasionally seen

Main prey species

Ibex and argali: Present. Seen in groups of 20 or fewer and only seen at higher altitudes (i.e. slopes above the steppe). Most frequent sightings are in spring. Aruna says she knows it is forbidden to hunt them, but poaching does occur near Kosh Agach.

Marmots: There are many marmots and these are trapped mainly for their fur (the herders use marmot fur to make hats to wear in winter) but also for their meat. Marmots, fish, wild mushrooms, herbs and berries are important additions to the herders' diets.

Other prey species: Ground squirrel and hare. Both are trapped for their fur and meat

Other factors

Wood extraction: Very little. Government/local authority controls it. Herders are allocated wood to build autumn/winter camps and for fuel, but the main fuel used is dried dung (collected from the livestock).

Forest fires: Medium risk

Other risks to snow leopard/prey populations: Increased grazing pressure in summer due to domestic livestock plus human disturbance. Poisoned bait in winter months. Poaching.

Spiritual/cultural significance of snow leopard: Not aware of any.

Religious belief/ethnicity: Ancestral traditions / Altai.

Amado Kurdiab

Date: 27/07/03

Location of Interview: Back valleys near maral farm.

GPS coordinates: N50°03.247' / E89°14.474'

Altitude: 2061m

This camp is used for most of the year and the dwelling is built of wood, but is technically a winter camp (October to May). The summer camp is several kilometres away on the other side of the (Balugi) river. Amado is a young man living with his parents and two younger sisters. His parents were away preparing hay in the steppe and were absent during the interview.

Livestock: 40 maral, 40 sheep/goats, 20 cows and 2 horses

Threats to livestock: Wolves.

Snow leopard information: Amado says he would like to see a snow leopard. His grandparents used to talk about seeing them, but none of his family has ever seen one. He does not think there are any in this area and says there is no poaching (but he looks slightly nervous when he says this).

Other carnivores/omnivores

Wolves: Always present, in small groups (1 to 3 individuals) but very shy. They are poisoned and professional hunters shoot them.

Manul: seen quite often.

Main prey species

Ibex/argali: No sightings.

Marmots: Common. They are trapped and used for their meat and fur.

Other prey species: Ground squirrel and hare. Both are trapped for their fur and meat.

Other factors

Wood extraction: None. His family rent this patch and the government provides timber needed to build and maintain the winter quarters. The main fuel used for cooking and heating is dried livestock dung.

Forest fires: High risk.

Other risks to snow leopard/prey populations Increased grazing pressure and human disturbance in summer. Fencing associated with Maral farming. Poisoned bait in winter months. Poaching.

Spiritual/cultural significance of snow leopard: Not aware of any.

Religious belief/ethnicity: None/Altai

Abai Baitokov

Date: 27/07/03

Location of interview: Summer Camp situated in the back valleys.

The Summer Camp is used from the beginning of June to the end of August. Winter Camp is about 60km away (towards Kosh Agach) in the steppe at lower altitude. Abai is a Kazak. He is 33 years old, married with one son and shares this summer camp with his parents and three brothers and their families.

Livestock: 1000 sheep/goats, 290 cows, 10 sarliks and 40 horses. The livestock is divided into 10 herds.

Threats to livestock: wolves (and snow leopards in the past but not now).

Snow leopard information: Abai saw a snow leopard 3 years ago (2000) while out herding. The sighting was in summer and he was able to observe the snow leopard for some time through binoculars before it moved off. He was very excited to see it. Children from a neighbouring yurt also saw a snow leopard at that time. There have been no sightings since then. Sightings were more common in his parents and grandparent's time, when snow leopards preyed on livestock, especially in winter. The only snow leopard attack on livestock he witnessed happened in 1993, in summer when a tethered horse was attacked and wounded. The snow leopard was driven off. Abai is not aware of any snow leopard poaching, but he says they occasionally die from poisoning. He thinks that this is because they sometimes eat the poisoned bait put out for wolves.

Other carnivores/omnivores

Wolves: Common. They go around in small groups (1 to 4 individuals). Abai does not shoot them as firearms are prohibited, but the domestic dogs chase them away. Professional hunters shoot the wolves and poisoned bait is put out for them in autumn and winter.

Manul: Frequent sightings in the autumn

Main prey species

Ibex and argali: Seen throughout the year in small groups (5 – 20 individuals). They are very shy. Abai has seen them this summer through binoculars. He thinks poaching is a problem, mainly in spring and autumn.

Marmot: Present and locally abundant. They are trapped for meat and fur.

Other prey species: Ground squirrel (very abundant) and hare, also trapped for meat and fur.

Other factors

Wood extraction: None. Wood allocated by government and dried dung mainly used as fuel.

Forest fires: Low risk as not many trees.

Other risks to snow leopard/prey populations: Grazing pressure and human disturbance in the summer months. Poisoned bait in winter months. Poaching.

Spiritual/cultural significance of snow leopard: Not sure but likes seeing them.

Religious belief/ethnicity: Muslim and ancestral traditions / Kasakh.

Arthur Yalbakov

Date: 29/07/04

Location of interview: Lower valleys

GPS coordinates: N49°54.435' / E89°14.339'

Altitude: 2352m

The Summer Camp is occupied from June to August. Arthur Yalbakov is in his 30s and lives with his family (wife and 4 children ranging from 3 months to 8 years old).

Livestock: 40 sheep/goats, 10 cows and 2 horses

Threats to livestock: Wolves

Snow leopard information: Has never seen a snow leopard, but he says he knows they are still in the area as they occasionally die from poisoning in winter and there are new skins in the villages.

Other carnivores/omnivores

Wolves: Common. They go around in small groups (1 to 4 individuals). Arthur does not shoot them, but has friends who do. Professional hunters shoot the wolves and poisoned bait is put out for them in autumn and winter.

Manul: Frequent sightings in the autumn.

Main prey species

Ibex and argali: Seen throughout the year in small groups (5 – 20 individuals). They are very shy. Arthur has not seen any this year. He says he sees them in the winter.

Marmot: Present and locally abundant. They are trapped for meat and fur.

Other prey species: Ground squirrel (very abundant) and hare, also trapped for meat and fur.

Other factors

Wood extraction: None. Wood allocated by government and dried dung mainly used as fuel.

Forest fires: Low risk as not many trees.

Other risks to snow leopard/prey populations: Grazing pressure and human disturbance in the summer months. Poisoned bait in winter months. Poaching.

Spiritual/cultural significance of snow leopard: Not sure.

Religious belief/ethnicity: Muslim / Kazakh.

Samunov Maltlei

Date: 29/07/03

Location of Interview: Lower valleys.

GPS Coordinates: N49°54.001' / E89°17.267'

Altitude: 2284 m.

Samunov is 44. He lives with 5 other family members (wife and children) this is the 3rd summer he has had a Summer Camp in the survey area. He moves to winter quarters near Kosh Agach from September to May.

Livestock: 600 sheep/goats, 70 cattle and 3 horses.

Threats to livestock: Wolves (particularly near his winter station).

Snow leopard information: He has heard about them, but has never seen one himself although he heard them on 3 separate occasions in winter in the Silugiem range in the region of our base camp about 6 years ago (1997). His parents and grandparents used to see snow leopards and snow leopards occasionally attacked stock in the past (mainly sarliks and horses). Samunov thinks there are many fewer snow leopards now.

Other carnivores/omnivores

Wolf: Individuals frequently seen at all times of year in steppe and forest. The wolf population was very high 2 years ago (2001) but hunters reduced numbers significantly.

Manul: Present in the survey area

Main prey species

Ibex and argali: other herders see them but he has not seen them this summer. They are easier to see in winter when they come down lower. Group size varies from 5 – 15 animals.

Red deer: Saw last year (2002) near his winter station – very unusual.

Other factors

Wood extraction: None. Wood allocated by government and dried dung mainly used as fuel.

Forest fires: Low risk as not many trees.

Other risks to snow leopard/prey populations: Grazing pressure and human disturbance in the summer months. Poisoned bait in winter months. Poaching.

Spiritual/cultural significance of snow leopard: Doesn't know but he would love to see one and wants his children to see one. Thinks it brings good luck.

Religious belief/ethnic origin: Ancestral traditions / Altai.

Alexander Kourgunov

Date: 29/07/03

Location of Interview: Lower valleys.

GPS coordinates: N49°53.605' / E89°18.077'

Altitude: 2254 m.

Alexander is in his 40s and lives with his family (wife and children). This is his 3rd summer and he has chosen to put up a Summer Camp (yurt and stock enclosures) in this area.

Livestock: 200 sheep/goats, 30 cattle and 2 horses.

Threats to livestock: Wolves – present at all times of year.

Snow Leopard information: Saw 2 snow leopards through binoculars while out herding 4 years ago (1999). He watched them for approx 10 minutes, they did not see him. The sighting occurred in the southern approaches to Tapduair mountain, past the winter station. When they became aware of him they moved off. Has not seen any sign of them since then.

Other carnivores/omnivores

Wolf: Individuals or small groups (2 – 3) seen at all times of year.

Manul: present at all times but easier to see in winter.

Main prey species

Ibex and argali: Only sees them in winter when they come down from the mountains. Seen in groups of up to 15 animals.

Other factors

Wood extraction: None. Wood allocated by government and dried dung mainly used as fuel.

Forest fires: Low risk as not many trees.

Other risks to snow leopard/prey populations: Grazing pressure and human disturbance in the summer months. Poisoned bait in winter months. Poaching.

Spiritual/cultural significance of snow leopard: None.

Religious belief/ethnicity: None / Altai.

Compe Petrovich

Date: 12/08/03

Location of interview: Autumn camp in the steppe (western approaches).

Altitude: 2200 m.

The Autumn Camp is occupied from August to October. It is used for haymaking (August) followed by grazing. Compe Petrovich is about 63 years old. He has been a herder for 43 years. He lives on the steppe all year round, moving from summer, to autumn to winter camp. The former camps are temporary – yurts erected for the season and dismantled afterwards. The winter station is a permanent wooden settlement made up of basic hut and low buildings for livestock. This is where his hay is stored.

Livestock: 400 sheep/goats, 20 cattle and 2 horses

Threats to livestock: Wolves, occasionally lynx and snow leopards in the past.

Snow leopard information: Compe Petrovich has seen snow leopard in the study area many times. Sightings although never frequent were more common in the past and usually occurred in winter. His most recent sighting occurred in 1998 in our survey area in summer – an adult with 2 small cubs was seen between 14:00 and 15:00 on high ground (above 3000m). The sighting was very short. He then saw an adult in the same area that autumn. Again the sighting was brief and the animal more than 400 m away. He has not seen snow leopard since then.

Other carnivores/omnivores

Wolves: Common. They go around in small groups (1 to 4 individuals). Seen at all times of year.

Lynx: Occasional sighting but none in the last 2 years.

Manul: Frequent sightings in the autumn when they come down to lower ground.

Main prey species

Ibex and argali: Seen throughout the year in small groups (5 – 20 individuals). Easier to see in winter when they come down to the lower slopes and edge of the steppe. Compe Petrovich has noticed a sharp decline in population of both these species, especially in the last 5 years. He used to see herds of 40+ animals.

Maral: Very few. Heavily poached.

Marmot: Although still locally abundant and an important source of fur and meat for herders, Compe Petrovich has noticed a steep decline in numbers. He thinks too many are hunted and that there is no regulation

Other factors

Wood extraction: None. Wood allocated by government and dried dung mainly used as fuel.

Forest fires: Low risk

Other risks to snow leopard/prey populations: Grazing pressure and human disturbance in the summer months. Poisoned bait in winter months. Poaching and corruption – serious problem.

Spiritual/cultural significance of snow leopard: Not sure but feels it is a very important animal.

Religious belief/ethnicity: None (but ancestral traditions important) / Altai.

In addition to above interviews with herders the following interview was conducted with **Ivan Michaelovitch Mandeshkanov (IMM)**, Head of Wildlife and Hunting Department (founded in 1998), Ministry of Agriculture, Kosh Agach Region.

Date: 23/08/03

Location of interview: Kosh Agach.

Q) What criteria are used to determine hunting quotas?

A) Hunting licences are issued only if the wildlife population is deemed large enough. The quota for each species is set each year.

Q) How is the quota decided?

A) An annual survey is conducted between 25 January – 25 March.

Q) How do you carry out the survey?

A) We survey several different locations between January and March. Surveying entails walking a 10 km stretch on foot on a clear day (no snow or rain) and clearing the ground (using a type of broom). The same area is walked the next day and all wildlife tracks noted. The survey encompasses all wildlife, including birds.

Q) Which species are protected and why?

A) Argali and snow leopard because they are very rare.

Q) What species are hunting licences issued for?

A) Marmot, maral, ibex, bear and wolf

Marmot – the hunting season is from 5 – 30 August. The indigenous population is given priority when applying for licences.

Maral – licences are issued to hunt 3% of the population. The season is the first 10 days in September.

Ibex – the season is the same as for maral. Again, a limited number of licences is issued

Musk deer – the hunting season is 15 November to 15 January. A limited number of licences is issued and is proportional to the musk deer population.

Bear – The hunting season is spring and autumn. (IMM told me that bears in this area are very rare and difficult to hunt so very few people apply for a licence).

Wolf – there is no hunting season and no licence is needed to kill a wolf. They are classed as vermin and can be shot all year round. (When I asked IMM about regulation concerning putting down poison he told me this was illegal).

Q) Who applies for hunting licences?

A) Local people don't hunt much, except for marmots although they do like to hunt ibex for the meat. It is mainly trophy hunters who apply for licences to shoot ibex, maral and bear.

Q) Your department is in charge of wildlife protection. Is poaching a problem?

A) Yes, and it's getting worse

Q) Do you have an anti-poaching strategy?

A) Yes, our staff goes out daily, on horseback or by car to look for poachers, but we have few horses and no fuel to run the car so it is difficult.

Q) What happens if you catch poachers?

A) If poachers are caught, then we charge them. The file goes to the police and a fine is levied, but apprehending the poachers is dangerous. They are armed.

Q) Do you have any worries about the wildlife of this area?

A) Yes, since the collapse of the Soviet Union peoples' living standards locally have dropped dramatically and so poaching has got much worse, but it is hard to prosecute someone from the village who is poor or hungry. It causes bad feelings. The other big worry is rich people killing wildlife from helicopters for fun and poaching gangs also fly in and out, so it's impossible for us to catch them.

Q) So is the wildlife declining here?

A) Yes, everything except wolves

Q) What evidence do you have of snow leopard using this area?

A) Snow leopard tracks were found in 2001 and 2002 about 300 m up from the valley (at approx 2400m) and I saw a snow leopard last January (2003), near the border guard post, south of your base camp. I only saw it after spotting an ibex standing still, then I realised there was a snow leopard below, blocking its path. The snow leopard disappeared when it saw me.

Appendix 3
Inventory of mammals seen during the expedition.

English name	Latin name	Sign found
Snow leopard	*Uncia uncia*	OBS + SIG
Lynx	*Felis lynx*	SIG
Manul	*Felis manul*	SIG
Wolf	*Canis lupus*	SIG
Red fox	*Vulpes vulpes*	OBS + SIG
Brown bear	*Ursus arctos*	SIG
Ibex	*Capra siberica*	OBS + SIG
Argali	*Ovis amon*	OBS + SIG
Red deer	*Cervus elaphus maral*	OBS + SIG
Musk deer	*Moschus moschiferus*	SIG
Roe deer	*Capreolus capreolus*	SIG
Steppe marmot	*Marmota boboc*	OBS + SIG
Altai marmot	*Marmota baibacina*	OBS + SIG
Ground squirrel	*Citellus undulatus*	OBS + SIG
Mountian hare	*Lepus timidus*	OBS + SIG
Tolai hare	*Lepus tolai*	OBS + SIG
Alpine pika	*Ochotona alpina*	OBS + SIG
Daurian pika	*Ochotona daurica*	OBS + SIG
Siberian chipmunk	*Tamias sibiricus*	OBS + SIG
Red squirrel (northern variety)	*Sciurus vulgaris*	OBS + SIG
Large-eared or Altai vole	*Alticola macrotis*	OBS + SIG
Flat-headed vole	*Alticola Alticola strelzovi*	OBS + SIG?
Common vole	*Microtus arvalis*	OBS + SIG?
Narrow-skulled vole	*Microtus gregalis*	OBS + SIG?
Root vole	*Microtus oeconomus*	SIG?
Mongolian vole	*Microtus mongolicus*	SIG?
Red-backed vole	*Clethrionomys rutilus*	OBS + SIG?
Grey red-backed vole	*Clethrionomys rufocanus*	SIG?
Wood mouse	*Apodemus sylvaticus*	OBS + SIG
Korean field mouse	*Apodemus peninsulae*	?
Tundra shrew	*Sorex tundrensis*	OBS + SIG?
Laxmann's shrew	*Sorex caecutiens*	SIG?
Common shrew	*Sorex araneus*	OBS + SIG?
Flat-skulled shrew	*Sorex vir*	SIG?
Otter	*Lutra lutra*	SIG

…continued

English name	Latin name	Sign found
Wolverine	*Gulo gulo*	SIG
Sable	*Martes zibellina*	SIG?
Mountain weasel	*Mustella altaica*	OBS + SIG
Everman's or Steppe polecat	*Mustella evermanni*	OBS + SIG
Stoat	*Mustella erminea*	OBS + SIG

Appendix 4
Inventory of birds seen during the expedition.

English name	Latin name	Habitat	Status
Great cormorant	*Phalacrocorax carbo*	Near large lakes and rivers	Common in places
Ruddy shelduck	*Tadorna ferruginea*	Lakes and rivers of steppe and water in mountains	Common
Black-eared kite	*Milvus lineatus*	Variety of habitats	Very common
White-tailed sea eagle	*Haliaeetus albicilla*	Variety of habitats, near water	Rare as a whole
Euroasian sparrowhawk	*Accipiter nisus*	Forest edges, river valleys	Uncommon in east
Common buzzard	*Buteo buteo*	Forest and forest-steppe	Numerous
Upland buzzard	*Buteo hemilasius*	Mountain steppe, forest steppe, mountains inc. Altai	Uncommon
Long-legged buzzard	*Buteo rufinus*	Hilly plains	Common
Golden eagle	*Aquila chrysaetos*	Mountains and forests	Rare, more com. in mount.
Imperial eagle	*Aquila heliaca*	Forest, forest steppe	Common in places
Tawny eagle	*Aquila rapax*	Steppe and desert	Quite common
Greater spotted eagle	*Aquila clanga*	Forest and forest-steppe	Common
Lammergeier	*Gypaetus barbatus*	High cliff areas (Altai)	Rare
Cinereous (black) vulture	*Aegypius monachus*	Mountains	Not numerous
Eurasian griffon	*Gyps fulvus*	In/near mountains	Fairly common
Saker falcon	*Falco cherrug*	Forest-steppe, steppe	Rare, common in places
Common kestrel	*Falco tinnunculus*	Variety of habitats	Common
Lesser kestrel	*Falco naumanni*	Variety	Common
Willow grouse	*Lagopus lagopus*	Forest-steppe and mountains	Common
(Rock) ptarmigan	*Lagopus mutus*	Mountainous tundra	Not numerous
Chukar partridge	*Alectoris chukar*	Rocky mountainous slopes	Common
Grey partridge	*Perdix perdix*	Open spaces	Common
Altai snowcock	*Tetraogallus altaicus*	Alpine and subalpine mountains	Scarce

…continued

English name	Latin name	Habitat	Status
Demoiselle crane	*Anthropoides virgo*	Steppe and semi-steppe	Common in places
Houbara bustard	*Chlamydotis undulata*	Sandy, clay deserts	Rare
Corn crake	*Crex crex*	Variety	Common
Dotterel	*Charandrius morinellus*	Dry, hilly, rocky tundra	Common
Redshank	*Tringa totanus*	Variety, grassy swamps	Common
Common sandpiper	*Actitus hypoleucos*	Variety	Common
Solitary snipe	*Gallinago solitaria*	Alpine regions	Rare
Mew (or Common) gull	*Larus canus*	Variety	Common
Black headed gull	*Larus ridibundus*	Variety	Common
Common tern	*Sterna Hirundo*	Variety	Common
Rock pigeon	*Columba livia*	Mountain, steppe	Common
Eurasian cuckoo	*Cuculus canorus*	Forest and thickets	Common
Northern swift	*Apus apus*	Open spaces	Common
Hoopoe	*Upupa epops*	Thinly wooded open spaces	Common
Northern skylark	*Alauda arvensis*	Open country	Common
Barn swallow	*Hirundo rustica*	Settled areas	Common
Sand martin	*Riparia riparia*	River valleys	Common
Richard's pipit	*Anthus richardi*	Open steppe, meadow	Common
Tree pipit	*Anthus trivialis*	Edges of forests	Often numerous
Citrine wagtail	*Motacilla citreola*	Damp meadows and grassy swamps	
Grey wagtail	*Motacilla cinerea*	Banks of mountain reservoirs	Common
White (or Pied) wagtail	*Motacilla alba*	Wetlands	Common
Dipper	*Cinclus cinclus*	Fast flowing streams in mountains	Common
Mistle thrush	*Turdus viscivorus*	Forests in flatlands and hills	Common
Dark throated thrush	*Turdus ruficollis*	Woods and thickets in plains and hills	Common (winters Altai)

…continued

English name	Latin name	Habitat	Status
(White-backed) rock thrush	*Monticola saxatilis*	Hilly steppe, dry rocky mountain slopes.	Common
Northern wheatear	*Oenanthe oenanthe*	Open dry hills	Singly or pairs
Isabelline wheatear	*Oenanthe isabellina*	Dry open areas in plains and hills	Common
Stonechat	*Saxicola torquata*	Dry steppe, damp meadows	Common
Eurasian redstart	*Phenicurus phoenicurus*	Thin woods	Common
Güldenstadt's redstart	*Phoenicurus erythrogaster*	Upper treeline of mountains near permanent snows	Common
Greenish warbler	*Phylloscopus trochiloides*	Woods and overgrown thickets	Common
Yellow -browed warbler	*Phylloscopus inornatus*	Coniferous and mixed taiga	Common
Raddes warbler	*Herbivocula schwarzi*	Forests	Common
Hume’s leaf warbler	*Phylloscopus humei*	Rocky mountainous slopes with sparse vegetation	Uncommon
Willow tit	*Parus montanus*	Coniferous/mixed	Common
Marsh tit	*Parus palustris*	Deciduous plantations	Common
Yellowhammer	*Emberiza citronella*	Forest steppe	Common
Twite	*Acanthis flavirostris*	Rocky steppe, meadows	Common
Long-tailed rosefinch	*Uragus sibiricus*	Forest floodlands, thickets along mountain slopes	Fairly common
Scarlet rosefinch	*Carpodacus erythrinus*	Thickets, forest edges, mountains	Common
Pallas's rosefinch	*Carpodacus roseus*	Taiga forests, mountain taiga	Not numerous
Rose-coloured starling	*Sturnus roseus*	Dry open spaces with precipices, cliffs	Common
Jackdaw	*Coloeus monedula*	Settled areas	Common
Red-billed chough	*Pyrrhocorax pyrrhocorax*	Open mountain areas, meadow steppe	Common
Alpine chough	*Pyrrhocorax graculus*	Upper mountain regions, cliffs, rockslides	Common
(Black-billed) magpie	*Pica pica*	Variety	Common

Appendix 5
Plants identified and/or collected by expedition team member Christine Newell.

Family	Genus	Species	Authority (Location of type specimen)	Common name	Source	Collection notes
Apiaceae	*Bupleurum*	*multinerve*	D.C. (Geneva)	Hare's-ears	1 (16)	5/8 #1, 12/8 #4 Base camp 2200m
	Pachypleurum?	*alpinum?*	Ldb. (Leningrad)		1 (17)	5/8 #6 Base camp 2200m
	Phlojodicarpus?	*villosus?*	Turcz. (Leningrad)		1 (16)	6/8 B High, damp steppe
	Seseli	*strictum*	Ldb. (Leningrad)	Moon carrot	1 (16)	13/8 #2 Hillside near base camp
Asteraceae	**Achillea*	*millefolium?*	L.	Yarrow		5/8 Base camp 2200m
	Artemisia	*altaiensis*	Krasch. (LE)	Mugwort	1 (26)	5/8 #4 Base camp 2200m
	Artemisia	*pontica?*	L. (LINN)	Mugwort	1 (26)	5/8 Steppe near base camp 2200m
	Aster	*serpentimontanus?*	Tamamsch. (LE)	Aster	1 (25)	5/8 # 5 Base camp 2200m
	**Cirsium*	*acaule*	(L.) Scop.	Dwarf thistle	2	6/8 Steppe
	Erigeron	*krylovii?*	Serg. (LE, TK)	Fleabane	1 (25)	5/8 #10 Base camp 2200m
	Heteropappus	*altaicus*	(Willd.) Novopokr. (B?)		1 (25)	8/8 #2
	Leontopodium	*ochroleucum*	Beauv. (LE) var. *campestre*	Edelweiss	1 (25)	6/8 #11 Steppe adjacent to river
	Pyrethrum	*pulchrum*	Ledeb.(LE)	Daisy	2	9/8 #7 mountain ridge 2985m
	Saussurea	*ambigua*	Kryl. ex Serg. (LE)		1 (27)	5/8 #12 Base camp 2200m
	Saussurea	*frolovii*	(Ldb.) (LE)		1 (27)	6/8 #6 Hillside
	Saussurea	*salicifolia*	(L.) DC. (LE)		1 (27)	5/8 #22 Base camp 2200m
	Saussurea	*sumneviczii?*	Serg. (LE)		1 (27)	7/8 #2 Hillside
	**Tragopogon*	species?		Goat's beard		5/8 Base camp 2200m
Berberidaceae	*Berberis*	*sibirica*	Pall. (Leningrad)	Barberry	1 (7)	7/8 #3 Hillside
Betulaceae	*Betula*	*rotundifolia*	Spach. (Paris)	Dwarf birch	2	6/8 Hillside
Boraginaceae	*Myosotis*	*asiatica*	Schischk. (Tomsk)	Forget-me-not	1 (19)	9/8 #3 Lake side 2758 m
Campanulaceae	**Campanula*	species?		Harebell		5/8 Base camp 2200m

…continued

Family	Genus	Species	Authority (Location of type specimen)	Common name	Source	Collection notes
Caryophyllaceae	*Cerastium*	*lithospermifolium*	Fisch. (Leningrad))	Mouse-ear	2	9/8 #4 Lakeside 2758m
	Dianthus	*superbus*	L. (London)	Fringed pink	1 (6)	5/8 #17 Streamside behind base camp 2200m
	Dianthus	*versicolor*	Fisch. (Russia)	Pink	1 (6)	5/8 #9 Base camp 2200m
	Gastrolychnis	*tristis*	(Bunge)Czer		2	12/8 #1 Damp streambank
	Gypsophila	*patrinii*	Ser. (Geneva)	Baby's breath	1 (6)	5/8 #20 Rocky stream bank, base camp 2200m
	Silene	*repens*	Patr. (Paris)	Campion	1 (6)	5/8 #12 Base camp 2200m
	Silene	*graminifolia*	Otth. (Geneva)	Campion	1 (6)	5/8 #19 Base camp 2200m
	Stellaria	*dichotoma*	L. (London)	Stitchwort	1 (6)	8/8 #1 Steppe 2206m
Chenopodiaceae	*Chenopodium*	*prostratum?*	Bge. Ex Herder (Leningrad)	Goosefoot	1 (6)	6/8 Steppe
Crassulaceae	*Orostachys*	*spinosa*	L. (London)		1 (9)	12/8 #5 steppe and hillsides, common
Cupressaceae	*Juniperus*	*pseudosabina*	Fisch. et Mey. (?)	Juniper	1(1)	7/8 #10 dry, stony east side of hill ca. 2432m
Empetraceae	*Empetrum*	*nigrum*	L.	crowberry	2	7/8 Damp hillside
Ephedraceae	*Ephedra*	*monosperma*	C.A.M. Mono. (Lena)	Joint pine	1 (1)	7/8 #9 top of hill, dry stony east side ca. 2432m
Ericaceae	*Vaccinium*	*vitis idaea*	Koch (London)	Cowberry	1 (18)	10/8 #2 Damp woods behind base camp 2300m
	Arctous	*alpina*	(L.) Niedenzu (London)	Arctic bearberry	1 (18)	7/8 #11 Damp hillside
Fabaceae	*Astragalus*	*austrosibiricus?*	B. Schischk. (Leningrad)	Milk-vetch	1 (12)	11/8 #3 Woods along steep stream valley
	Hedysarum	*neglectum*	Ldb. (Leningrad)		1 (13)	5/8 #3 Base camp 2200m
	Oxytropis	*alpestris?*	B. Schischk. (Leningrad)		1 (13)	6/8 #5 Dry hillside
	Trifolium	*eximium*	Steph. ex. D.C. (Leningrad)	Clover	1 (13)	7/8 #13 Dry hilltop
	**Vicia*	*cracca*	(L.)	Tufted vetch		5/8 Base camp 2200m

…continued

Family	Genus	Species	Authority (Location of type specimen)	Common name	Source	Collection notes
Gentianaceae	*Gentiana*	*plebeja?*	Cham. et Schlecht.(Berlin?)	Gentian	1 (18)	10/8 #10 Damp woods behind camp 2200m
	Gentiana	*algida*	Pall. (Leningrad)	Gentian	1 (18)	6/8 #8 Hillside
	Gentiana	*azurea*	Bge. (Leningrad)	Gentian	1 (18)	6/8 #10 Hillside
	Gentiana	*barbata*	Froel	Gentian	1 (18)	10/8 #9 Streamside behind base camp 2200m
	Gentiana	*decumbens*	L. (London)	Gentian	2	5/8 #2 Base camp 2200m
	Gentiana	*nutans*	Bge. (Leningrad)	Gentian	1 (18)	9/8 #1 Damp hillside 2901m
	Lomatogonium	*carinthiacum*	(Wulfen.) A. Br. (?)		1 (18)	12/8 #2 Damp hillside
	Swertia	*obtusa*	Ldb. (Leningrad)		1 (18)	13/8 #3, 7/8 #1 River valley and damp woodland
Geraniaceae	*Geranium*	*pratense*	(L.)	Meadow crane's bill	2	5/8 #15 Base camp 2200m
Lamiaceae	*Dracocephalum*	*origanoides*	Steph. ex. Willd (Berlin)		1 (20)	7/8 #6 Dry hillside
	Dracocephalum	*peregrinum*	L. (London)		1 (20)	7/8 #4, 13/8 #1 Hillsides
	Lagopsis	*marrubiastrum*	(Steph.) Ik.-Gal.		2	6/8 #7 Shale slope
	Leonurus	*sibiricus?*	L. (Amman cit.)	Motherwort	1 (20,21)	11/8 #2 Dry hillside
	Thymus	*serpillum*	L.	Thyme	2	6/8 #13 Steppe along river side
	Ziziphora	*clinopodioides*	Lam. (Paris)		1 (20,21)	7/8 #7 Dry hillside
Liliaceae	**Allium*	*altaicum*	Pall. (?)	Onion	2	Disturbed soil around marmot, squirrel colonies
	Allium	*clathratum*?	Ldb. (LE)	Onion	1 (4)	5/8 #7 Base camp 2200m
	Allium	*tenuissimum*?	L. (?)	Onion	1 (4)	5/8 #8 Base camp 2200m
Limonaceae	*Goniolimon*	*speciosum*	(L.) Boiss. (London)	var. *multicaule*?	1 (18)	8/8 #4 Rolling steppe 2280m
Onagraceae	**Chamerion*	*angustifolium*	(L.) Holub	rosebay willowherb	1 (15)	5/8 Base camp 2200m
	Chamerion	*latifolium*	L. (London)		1 (15)	5/8 #16 Rocky streamside, base camp 2200m
Papaveraceae	*Papaver*	*nudicaule*	L. (London)	Poppy	2	5/8 #11 Base camp 2200m

…continued

Family	Genus	Species	Authority (Location of type specimen)	Common name	Source	Collection notes
Parnassiaceae	*Parnassia*	*palustris*	L. (London)	Grass of Parnassus	1 (9)	6/8 #1 River valley, steppe
Poaceae	*Eriophorum*	*humile*	Turcz	Cotton grass	1 (3)	10/8 #3 Pool on damp hillside behind b. camp
Polemoniaceae	*Polemonium*	*coeruleum*	L. (London)	Jacob's ladder	1 (19)	5/8 #19 Woods behind base camp 2200m
Polygonaceae	*Polygonum*	*bistorta ?*	L. (London)	*nitens*?	1 (5)	6/8 #3 Hillside
	Polygonum	*viviparum*	L. (London)	Knotgrass	1 (5)	5/8 #21, 6/8 #4 Hillside
	**Rheum*	*altaicum*	A. Los. (Leningrad)	Wild rhubarb	1 (5)	13/8 Hillside near base camp in disturbed soil
Portulacaceae	*Claytonia*	*joanneana*	Roem. et Schult. (London)	Purslane	1 (6)	6/8 #2
Pyrolaceae	*Pyrola*	*incarnata*	Fisch.ex D.C.	wintergreen	1 (18)	10/8 #1 Damp wooded hillside behind b. camp
Ranunculaceae	*Aconitum*	*barbatum*	Pers. (London)	Wolf's-bane	1(7)	5/8 #13,15 Base camp 2200m
	**Aconitum*	species?		Monkshood		
	**Pulsatilla*	species?		Pasque flower		Hillsides, common
	Ranunculus	*gmelini?*	D.C. (Leningrad)	Buttercup	1 (7)	9/8 #6 Small waterhole on slopes ca. 2758m
	Thalictrum	*foetidum*	L. (London)	Meadow-rue	1 (7)	5/8 Base camp 2200m
Rosaceae	**Alchemilla*	*species?*	L.	Lady's mantle		Hillsides, steppe
	Comarum	*salesovianum*	(Steph.) Aschers. et Grebn.	Cinquefoil	2	5/8 #14 Rocky streamside, base camp 2200m
	Dryas	*oxyodonta*	Juz.	Mountain avens	1 (10)	6/8 #9 Hillsides, common
	**Pentaphylloides*	*fruticosa*	(L.) O. Schwartz	Cinquefoil	2	5/8 Base camp 2200m
	Potentilla	*sericea*	L. (London)	Cinquefoil	1 (10)	11/8 #1 Rocky hillside
Rubiaceae	*Galium*	*verum*	L.	Ladies bedstraw	2	6/8 Base camp 2200m
Salicaceae	*Salix*	*nummularia*	Anderss. (?)	Prostrate willow	1 (5)	9/8 #8 Damp hillside ca.2758m
	**Salix*	*reticulata*	L. (London)	Net-leaved willow		10/8 Damp woods behind base camp

…continued

Family	Genus	Species	Authority (Location of type specimen)	Common name	Source	Collection notes
Saxifragaceae	*Saxifraga*	*hirculus*	L. (London)	Saxifrage	1 (9)	12/8 #3, 9/8 #2 2901m
	Saxifraga	*punctata*	L. (London)	Saxifrage	1 (9)	7/8 #8 Damp hillside stream bank
	Saxifraga	*sibirica*	L. (Leningrad)	Saxifrage	1 (9)	10/8 #6 Rocky streambed behind base camp
Scrophulariaceae	**Euphrasia*	species?		Eyebright		5/8 Base camp 2200m
	Lagotis	*integrifolia*	(Willd.) Schischk. (BHU)		1 (22)	9/8 #5 Lakeside 2758 m
	Pedicularis	*tristis?*	L. (LINN)	Lousewort	1 (22)	10/8 #11, 5/8 #18 Damp woods above camp
	Pedicularis	species?		Lousewort	1 (22)	6/8 A
	Veronica	*sessiliflora*	Bge. ex Ldb. (Leningrad)	Speedwell	1 (22)	6/8 C

Sources

1. Flora of the USSR - Initiated by VL Komarov. Israel Program for Scientific Translations, Jerusalem 1967
2. Plant Species - Oleg Kosterin (http://pisum.bionet.nsc.ru/kosterin/planta.htm)
3. Common name of genera: Stace, C. New Flora of the British Isles. 2nd. Edition 1997
4. LE: Botanical Institute of the Academy of Sciences of the USSR

* Species seen but not collected

Appendix 6
Geology of the base camp area (by expedition team member Ros Grum).

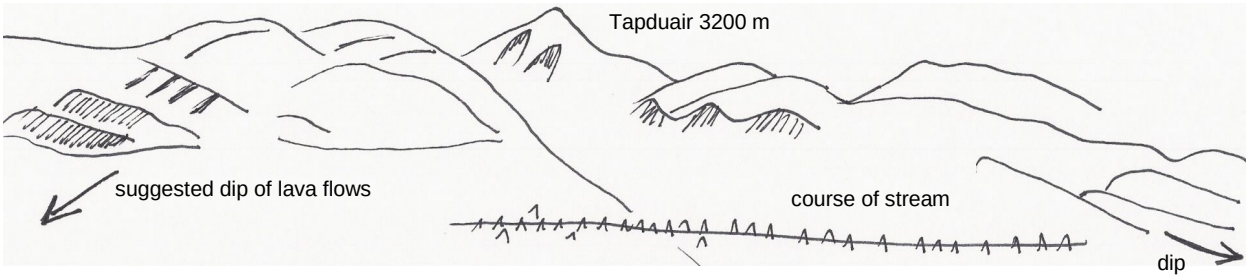

Fig. 6a. View from hill above base camp to west (290º).

Local geology

Harder rocks forming chunky, blocky sharp scree and angular outcrops on hillsides are lava flows. These vary in composition. Those weathering to pale colours are acid (rhyolitic silica rich). Those weathering orange/brown are intermediate (andisites) or possibly basalts. A thin section would be needed for accurate identification.

Softer rocks in between forming smoother shapes are a mixture – some are old volcanic ash possibly water-deposited as bedding can be seen (break into slatey fragments). Others are old sedimentary rocks subjected to low grade regional metamorphism that are now forming slates and quarzites. Cross bedding structures indicate these were deposited in water. In appearance these rocks are rather similar to the Borrowdale volcanic series in the English Lake District.

At the end of the last Ice Age the rivers were flowing into the basin. Their base level was higher and this could have been because the basin was occupied by ice or a lake or the mountains may have risen later. Since the melting of the ice, the base level has fallen causing all the rivers to cut down into the base sediments leaving the former valley floor and flood plain levels as terraces above the current river channels.

Cutting into is alluvial fan, the river has left parts of the original sunken level as benches or terraces. These form the flat land that the base camp tents are pitched on and the terraces behind with the ground squirrel colonies (see Fig. 6b).

Geological structure

In the vicinity of base camp, rocks are steeply dipping. Different rock types form the variety of colours seen in the valleys close to base camp, especially to the north east.

South of base camp on the drive to the yurt interview sites, a gentle syncline is present.

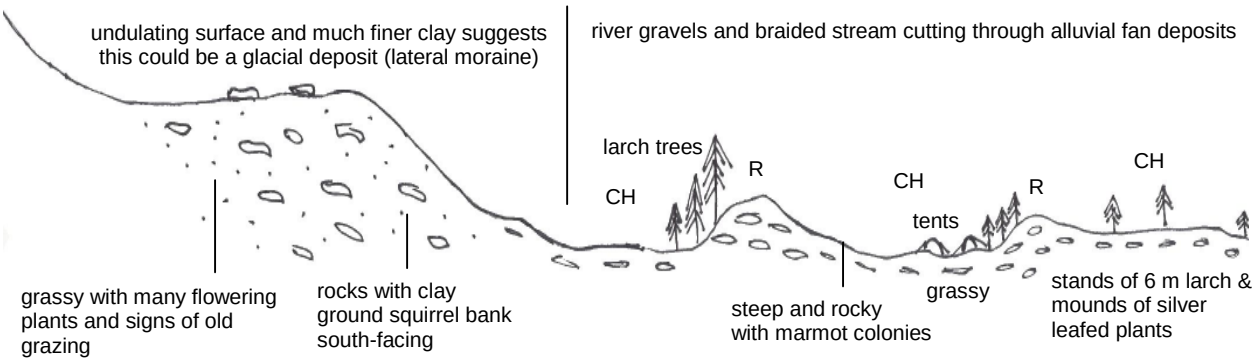

Fig. 6b. Section of north east bank of base camp river valley.

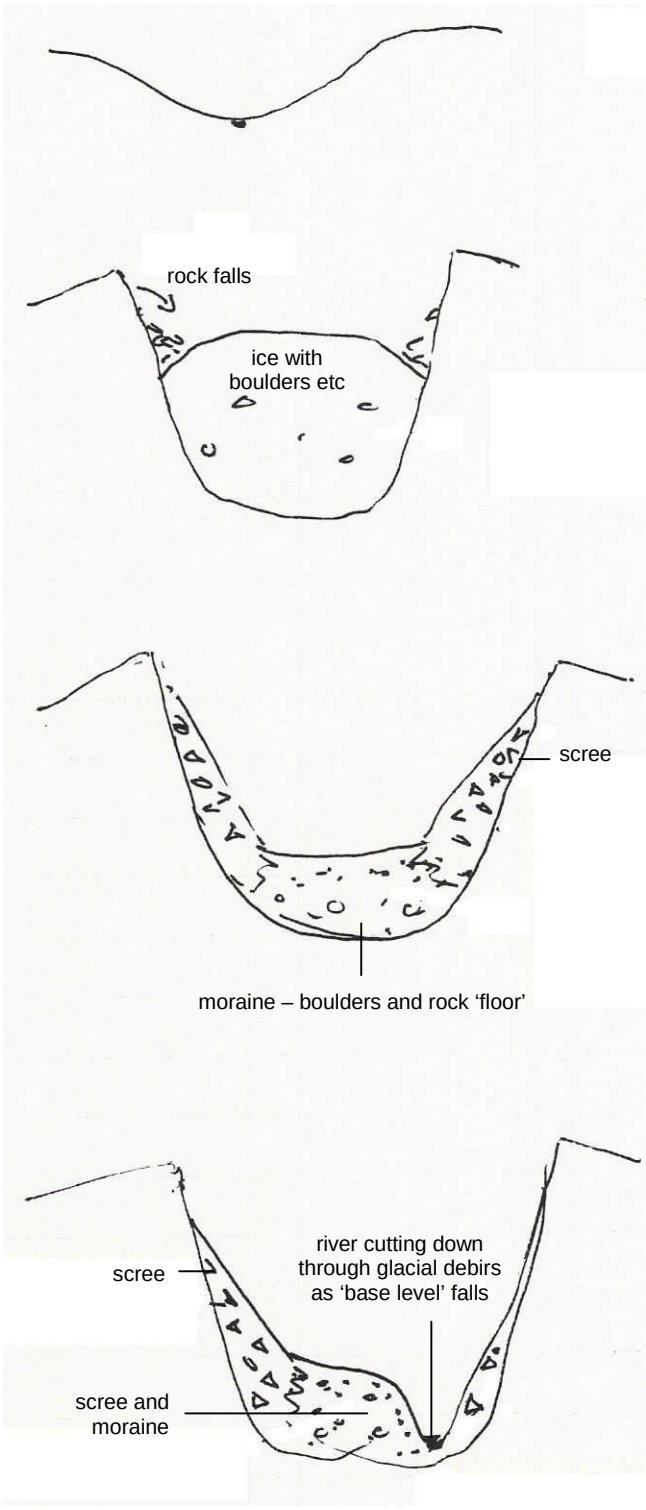

Fig. 6c. Interpretation and evolution of land forms in upper valley behind base camp in cross section.

Appendix 7
Expedition diary by Tessa McGregor.

8 July

Just getting to base camp is quite an expedition. We departed from Novosibirsk (great city!) in high spirits on Sunday morning. Matthias leading the convoy with Sam and Martyn (old Namibia hands) bravely volunteering to drive the first shift. It's a long drive – first through vast swathes of agricultural lands, often tilled by hand and villages made up of traditional wooden houses adorned with intricate carvings surrounded by lush vegetable plots. It was hot (sweltering!). Matthias had talked everyone through the local traffic rules – just as well as the driving proved, um interesting – some spectacular overtaking by Matthias (3 vehicles abreast with oncoming traffic and clouds of dust) and a couple of other drivers also gave us "interesting" moments. Lunch in a roadside café afforded us our first big mammal sighting (bear). Unfortunately it was hanging on the wall. Lunch was good and the drive continued, and continued…..and continued, through Siberian landscapes of silver birch, poplar, swathes of unimproved grassland, rich with flowers and finally in the afternoon, the Altai Republic border. The driving was done in shifts. We travelled on along the Katun river – very popular for white-water rafting and local tourism. The density of livestock increased (cattle wandering on and off road, horses, sheep, pigs and the first camels). We eventually reached the 'Sibalp' hut at Anoz in the evening (after crossing a narrow wooden bridge spanning the Katun River). Everyone very relieved to get out of the cars and enjoy the scenery. The hut is cosy warm and inviting – the cook wonderful and the view onto the Katun River great. Best of all a Russian sauna – I've never been in one so hot.

Our interpreters, Olga and Nastya are beautiful, charming and speak great English. Matthias has just told me this is far too long ("well get the**** on with it" to be more accurate) – just to let you know we have all made it to base camp intact. The location is stunning – have seen many birds of prey, ground squirrels – no snow leopards yet but brilliant off-road driving course on the steppe given by Matthias today. He was almost human. People have remarked that sophisticated is not how they would describe base camp. Matthias's answer is that the point of reference is Russia and that by Russian standards it's very sophisticated. The showers are character building (******* freezing) and it's very cold at night (but then Matthias says I'm a wimp).

Bring warm clothes and a 4 season sleeping bag. Forget the soap – we have! The Russian staff are wonderful and the food very good. Professor Yuri Malkov a real character. Next email will be dry and strictly confined to data, gear etc. (very efficient like Dr Hammer himself).

9 July

Research methodology and gear explained today and demonstrated on walk through steep forested slope behind camp (dominant vegetation of larch and pine with some willow, much creeping birch, juniper and bilberry). Plenty of animal faeces (deer, hare, fox and small mammals). Also signs of livestock (horse and sheep) – dung and skeletons. Flowers abundant and very beautiful. After thunderstorm and heavy rain, afternoon spent on the step doing map-reading skills. Base camp has a ground squirrel colony just by. Tomorrow the first sites will be surveyed.

10 July

Early start. 3 different groups. 2 surveying ridges and one surveying river valley for signs of snow leopard and prey. 2 quite tough and one medium route. Plenty of evidence of prey species found (hare, marmot, game birds, deer) but no evidence of main prey species (argali & ibex). Terrain steep and broken. River level had risen significantly with yesterday's rain. All groups out all day. Fantastic start as one group found evidence of snow leopard at the snowline (tracks) – no more than one week old. Can hardly believe it. Everyone ecstatic – made filling the data forms a real pleasure. We have a really good group – all working very well. Finding sign of snow leopard in this terrain is hard, but we know it's possible. The weather is very variable –cold nights and mornings and a mixture of overcast, hot sun and daily thunderstorms. Base camp is shaping up. The radio mast is up with the Biosphere flag flying.

11 July

Three groups again today – 2 surveying snow leopard and one to the steppe and poplar groves to look at butterflies and birds. A pair of Demoiselle cranes with 2 young seen this morning on steppe 3 miles from base camp. Butterflies abundant but the poplar grove due to be surveyed too difficult to get to by vehicle (marsh and boggy ground). One of the snow leopard survey groups found intact ibex skull and horns (male category 6). We are building up a collection of animal faeces to help in identification. Marmots and picas have been observed. Bird list increasing. Working here is a challenge, but it's worth it.

12 July

Snow leopard surveying again…and the weather just as changeable. Thunder storms and rain alternate with strong sun. Dramatic skies and ever changing cloud patterns. The snow leopard surveying continues. Exploring new areas. Matthias led a group today in the back valleys and found evidence of ibex. The two other groups surveyed lower ridges in rolling steppe. A lot of livestock and yurts. We saw a flock of rosy starlings. We are all getting very fit (there is no choice!).

13 July

Breakfast at 9am today and morning off. Very welcome and it was even sunny. Everyone took the opportunity to shower and wash clothes in the river. Also shook the grasshoppers out of tents. They love eating socks and just about everything else. The afternoon was spent going to the back valleys where there are lots of nomads with their herds, as well as ancient burial mounds and dramatic scenery. Despite the rain the drive was stunning. Everyone ready to tackle another arduous day surveying tomorrow. More rain.

14 July

It rained heavily in the night again…. How I hate wet flysheets first thing in the morning. The rain lifted and three groups went out again. My group went up a valley and then observed from the ridges. The rivers are fast flowing with all the rain and it is difficult to find places to cross without getting wet boots. The day was arduous – following the river along scree banks – climbing up to the ridges across steep scree slopes. Lots of evidence of domestic stock using the valley in the past and fresh signs of deer, pika and suslik. Found cat track – possibly manul. Back at base camp a big fire was going and the most amazing sunset. The whole steppe and surrounding mountains glowed. It was dry and we had all had a great day. I have never looked at so many scats (expedition members are very diligent!) – many of them belonging to mustelids so you can imagine the smell. A good and productive day.

15 July

Dry flysheet this morning! Makes a big difference to getting up. Three groups did different things today. One surveyed a marmot colony, another went to survey a new valley and I took the last group to interview nomads. Karin (one of the expedition members staying on for the next slot) was immediately deemed suitable wife material by one of our hosts for one of his four unmarried sons, but she won't commit until she has seen them. Thorsten (another expedition member) was mistaken for Tolstoy. I just asked questions about snow leopards and got to ride one of the horses. The off-road driving was quite a challenge! It is beautiful again as I write. We have just had supper. Our cook, Nadia, does a great job.

16 July

A beautiful, cold, clear morning. The groups went out surveying promising plateau areas and a difficult ridge. Matthias and I were busy sorting out last bits and pieces before he leaves (this weekend). The sun was hot and I got to shower and do my washing (lovely feeling). The first group was back at 4pm. The area looks good but needs longer periods of observation. Nothing was seen today. The second group were back after 19.00, having had an arduous climb (the scrub made walking difficult up the valley). No signs of snow leopard or main prey species today, but plenty of evidence of smaller prey (marmot, hare etc) and evidence of otter. Our last evening together at base camp. Nadia, our cook, made cakes to celebrate the successful completion of the first slot.

17 July

Another bright morning - group photos were taken before departure at 09.00. Karin, Tony and Marion stayed at base camp as they are also doing the next slot. The rest of us drove to Kosh Agach – I hated leaving base camp, the steppe and the mountains. The drive to Anoz went well. We stopped in the same restaurant at about 14.00 for lunch. It was very busy this time – many Russian tourists. We looked at the rock art (sadly being eroded away by weather and people treading all over it) before driving on. We reached Anoz at 19.00. There were queues for the sauna this time. Many thanks to Martyn for producing a bottle of Vodka. The toast was "to snow leopards".

18 July

We left Anoz at 6.30 and the drive back to Novosibirsk was wet and long. Arrived at Hotel Central 5pm. I was very impressed by the expedition members' driving skills, especially for the last part of the journey and negotiating Novosibirsk rush hour traffic. This first team has worked very hard and I am very grateful for all their efforts. The information we have gathered so far is very useful and I look forward to building on to it with subsequent expedition members.

19 July

Day spent in Novosibirsk getting Land Rovers checked, shopping and meeting the new team. Torrential rain.

20 July

Matthias flew back to the UK today. Olga and I were back in Hotel at 06.30. We packed the Land Rovers at 07.00 and the first briefing took place at 08.00. All expedition members very prompt. Left Novosibirsk 08.45 and covered a lot of ground. The weather turned gloriously hot. Stopped at the same place for lunch and for a photo stop at the Altai Republic border. The Katun river looked particularly beautiful we were in Anoz by 19.00. Everyone enjoyed the evening there and Vica, the cook had prepared a lovely meal.

21 July

We left Anoz at 07.00. Another ravishing day. Stopped for photos at the car bridge and then made it to Silver Springs at 10.00. The stalls were just opening – selling the usual wooden artefacts, medicinal herbs, shamanistic trinkets, maps, tapes, books, beads and so much else. Sadly there were also brown bear claws for sale. Having planned to stay only 15 minutes we ended up having to spend over two and a half hours because problems with two expeditions members passports meant a return journey had to be made to Gorno Altaisk. Please, please make sure that you have filled in your immigration form on the plane or at Moscow airport (these are handed out on some flights but not on others) as it is crucial to have this bit of paper. The other serious problem is for anyone on a business visa (i.e. a visa for more than 28 days). Sibalp's letter of invitation does not work for these and it is necessary to have all the paperwork sorted out by your visa agency and the Moscow office. One of our expedition members had to go back to Anoz and wait for the right paperwork to be faxed. She joins us tomorrow. We only left Silver Springs just before 13.00 and had a pretty tough drive with few stops, in order to get to base camp before midnight. Despite the pressure it was the most stunning drive. Driving through the Altai – with dramatic geographical and geological changes was breathtaking. We made it to Kosh Agach at 21.00 and to Base Camp by 23.00. It was cold – the sky bright with stars – the camp fire going. Lovely to see Karin, Tony and Marion again as well as Nadia our cook and young Oleg.

22 July

A bitterly cold, bright morning. We have run out of water as our river has disappeared after the 5 hot days with no rain. We have to use the Land Rovers to get it from the next water body (about 10 minutes drive from base camp). The day was spent going through the risk assessment, explaining gear, research aims and doing the off-road driving course. We are lucky in having very experienced drivers, so it did not take very long. We saw the cranes on the steppe and the usual birds of prey. In the evening everyone relaxed and played card games and chess in the mess tent. There is a good team spirit already. The rain has returned with a vengeance – so hopefully our river will also return.

23 July

We went out in two Land Rovers to re-survey a route located in the back valleys which had looked very interesting. It poured with rain for most of the day and was cold. However it was definitely worth it. There is a small lake which is not marked on the map and two further dried lake areas above, before getting into the high mountains and snow line. We split into two groups and the area was very thoroughly surveyed. The lake edge was full of tracks (argali – various age groups) plus traces of mustelids. The rocks heaving with ground squirrels and a very healthy marmot population. We also saw 2 snowcock (male and female). I climbed to the highest dried lake area and was rewarded with snow leopard track, following the edge of the scree before crossing the open area and disappearing up the steep grass and scree slope. The cold and rain were immediately forgotten and I felt really elated. When I rejoined the other group they had found manul tracks – going down towards the lake. The habitat is perfect for argali and we found plenty of fresh evidence (tracks and faeces) – but sadly no sighting yet. The rain came on again as we made our way down, back to the Land Rovers. The walking was testing (very in parts) but everyone did really well. We all made the return 2 hour journey soaked and tired. Filling in the data sheets was really positive with evidence of snow leopard and a good prey base. Everyone really tired.

24 July

It has been raining heavily in the night and our river has returned. We waited until the worst of the rain was over – during which time I took everyone through our now extensive collection of faeces (wildlife not ours!). It stopped at about 09.00 and we went off to survey adjacent forest areas and ridges. One group surveyed the lower edge, just in from the steppe, my group surveyed the upper end of the tree line (hellish walking on very steep slopes and patches of loose scree – also tick infested area) and the third group surveyed the ridge running parallel the steppe. A few people stayed back as they did not feel well. We were all quite tired after yesterday. Surveying the area was interesting. Rick and I found more fresh signs of deer than anywhere else to date and an abundance of mountain hare droppings and lynx faeces. Watching steppe eagles and black kites at close range was one of the highlights of

the day, as well as hearing and seeing choughs. Annoyingly I have hurt my knee and Rick lost his binoculars so we called it a day and got back to Base Camp at 15.00 – the others were enjoying the sun and the opportunity to shower. I stuck my leg in the river which acted as an excellent ice pack and after arnica and a shower; I'm ready to walk up another mountain.Yuri Malkov returned at 17.00 from a walk up behind base camp having seen a manul, hunting ground squirrels. Just off to do data sheets. It's raining again.

25 July

It rained for most of the night and it's raining hard this morning as I write. It is very cold and there is fresh snow on the mountain behind base camp. The conditions are too cold and slippery to do a full day's surveying, so a small, intrepid group will set out after lunch to survey lower slopes. Fresh snow will be good for tracks, but it is too risky to survey ridges until the weather is dryer. Everyone is playing card games and chess. I am trying to sort out problems with the satellite phone (could be weather influenced) so that you can get the diary and I can pick up emails. At least we have a small stove to dry clothes now – but no spare tent! I am sorting that out today.The grasshopper population has dramatically decreased, although they still munch their way through anything left out in sunny weather and the rodents have suddenly decided to move in. They shred shoe laces, boot insoles, anything left outside the tents. One even tried to move in with Tony and Marion, but it was quickly expelled (in the middle of the night – Marion had to stand outside her tent while Tony dealt with it). Yuri Malkov continues to entertain us with his fund of dramatic stories. He also sings Russian folk songs and plays his guitar (late into the night if he has some vodka). Bring plenty (and I mean plenty) of warm clothes, thermals. Good waterproofs, hats, gloves and plenty of spare socks essential.

26 July

Sergey arrived with Ruth and Nastya at 1am. I was delighted to see them both. It was bitterly cold – we had tea and bits to eat in the mess tent. Got back into my sleeping bag after 2.30am so getting up this morning was hard! But this morning was stunning – much more fresh snow on the mountains (and closer to base camp). We went to survey the area that was out of bounds to group 1 (where Yuri and Oleg refused to go any further). It was spectacularly beautiful. The mountains marking the Mongolian border are covered in snow. Getting up to the snowline for our survey was hard going, but everyone had a great day.Yuri Malkov goes everywhere with his huge butterfly net, swiping erratically now and then and collecting every edible mushroom he finds. He saw 3 ibex and found two rare species of butterfly. Tracks of cat were found by Oleg in the fresh snow – possibly snow leopard? I was on a different ridge so did not get to see them. Rain and sleet started once we were at base camp but there have been sunny intervals – during which I took a shower (it was necessary!) I'm still recovering from the experience, but as Matthias kept saying, where else can you get such a view from the shower. Nearly forgot – saw a lammergeier this morning with a bone in its talons – wonderful sight.

27 July

Temperature dropped to below zero last night – thawing out this morning was hard! Late breakfast as it is Sunday and the official rest day. The day was magnificent – sun, snow capped mountains, the vast stretches of steppe. Expedition members walked from base camp and enjoyed the chance to take pictures. I went back to the yurts in the back valleys with Olga, Yuri, Oleg and Martin – did some more interviewing and got to ride a different horse. Useful day. Everyone very happy and card games (Rick and Evelyn brought a game called Uno) in the mess tent in the evening are riotous. Just wanted to let the first slot know that it is at least twice as cold now. The water is frozen in the morning. We are heating buckets of water on the fire to keep the shower at the same temperature as during that first fortnight. Young Oleg is doing a great job as guide and Nadia is continuing to do us proud. Everyone loves her cooking. We also have fresh fruit this slot, which makes a big difference. Watermelons are in season and we enjoyed one today. Back to surveying tomorrow. Hope it keeps dry. Tony and Marion saw 5 red deer (maral) from observation point not far form camp.

28 July

Another survey day – a valley running parallel to base camp. One group surveyed the lower reaches and the second group went up to the snowline. Very exciting as tracks of snow leopard were found with smaller tracks (quite possibly last year's cub). I went to see a new area (Silugiem range) north of base camp with Yuri and Oleg. They fished (you should have seen the size of the one that got away!) and I surveyed. Very bad weather came in in the afternoon and we all spent the night in the Land Rover (an experience I will never forget!). It snowed heavily in the night and was very cold. It confirms my feelings that it is too risky to plan overnight stays away from base camp in order to do dawn/dusk observation.

29 July

Deep snow made the landscape unrecognisable and the drive back to base camp was tough (the rivers in the back valleys have risen and were only just passable this morning) but we were there by 09.00. No snow on the steppe near base camp, but plenty on the valleys and peaks just behind. It is cold and wet (rain and sleet). The mess tent leaks badly, but with the stove it is at least warmer. We went out in two Land Rovers at 10.30 to do more interviews. They proved interesting. It seems there are fewer snow leopards than there used to be, but manuls are frequently seen, especially in winter. We had very close views of steppe eagles, vultures and of course, black kites. We finished interviews around 15.00 and the snow suddenly came down again – in a very short time we were in a blizzard and the vehicles were skidding and losing traction. Visibility was down to fewer than 10 metres. The weather is so changeable it makes planning surveys (especially in areas further from base camp difficult). Oleg managed to get the Land Rovers back on another track and we all got back to base camp safely. Everyone needed a vodka! – Yuri played the guitar and sang after supper and many expedition members sang too. A very jolly evening.

30 July

More rain and sleet. Had to cancel surveying as the conditions too slippery and cold. We did very thorough vehicle checks in the morning and everyone filled in their post-expedition questionnaires. Hillary has been helping Yuri chop and split wood. Some people have braved the weather and are walking around base camp – I'm about to go up to the snowline to look for tracks. Everyone packing up for the return journey tomorrow. This has been a really good group and they have worked well in very testing conditions. We continue to gather valuable data. I just hope the weather improves soon.

31 July

It really is sod's law - today is beautiful, cold and crisp - the snowline low - in short a perfect survey day; but we have to leave. It is so frustrating. The drive to Anoz was stunning. Everyone drove very well and we made it in good time. We stopped and saw some (neolithic?) carved stones - or hysterical stoned women as Rick put it + burial mounds on the way. Frances and Ruth have come back to Anoz between slots. The weather so much warmer past Kosh Agach. Felt positively tropical in Anoz (especially after a session in the 'Banya'). Yuri on top form sang for us until late – helped by generous shots of vodka provided by Volodia – (who works for Sergey).

1 August

A beautiful morning. We left Anoz just after 07.00 and took an 'interesting' shortcut to Gorno Altaisk – off road, through fields – and dropped Yuri back at his flat. I will miss him very much. Then the drive to Novosibirsk provided exciting driving, as always. I have now earned my Russian passport (those of you who saw me drive first slot would not recognise me behind the wheel now!). I even enjoy it. Tony also earned Russian driver status (we heard Marion over the radio asking him "have you gone dizzy?"). We made such good time that we drove past our usual lunch stop and stopped instead at a roadside stalls that did the most delicious 'shashliks', salads etc. Great meal – eaten outside in baking sun. We can't believe the heat. I thought I would never feel warm again. Banter over the radio was very funny. Rick has the sexiest voice in the universe and the combination of Rick, Nigel, Hilary and our car made for a lot of laughter. Got to Novosibirsk by 17.00. Oleg, Nigel, Hilary and I took the Land Rovers in to Autoland to get them checked and I asked about snow chains. I was told snow chains are not available in Russia – and that I did not need them – all I need is a Russian man! And they were not joking. I was speechless. Got back to hotel just in time to put some clean clothes on and we all went to a really nice Mexican restaurant. A very jolly evening (except that I found out that I may have a hard head for vodka – but Tequila floors me…..never again).

2 August

Day spent collecting Land Rovers, shopping, sorting things out etc. Olga and I very tired. Pissing with rain in Novosibirsk today. Met new group at 20.00 and went to the Russian restaurant.

3 August

Drive to Anoz. I am beginning to know this road very well. Overcast day then rain. The grass has been cut and the road sides are dotted with hayricks and people selling mushrooms and berries collected from the forest. Stopped at the usual place for lunch. Arrived at Anoz 19.30. A lovely welcome from Vica who looked after us wonderfully, as usual. Lovely to see Ruth and Frances again (they look tanned and squeaky clean) and they are both looking forward to being at base camp again, as I am.

4 August

Sergey arrived at 01.30. Olga and I went with him and Oleg to do passport registration in Gorno Altaisk. Mercifully no problems this time. Stopped to buy a large sheet of plastic to cover the mess tent with and then met the others at Silver Springs. We then stopped at Sibalp's childrens camp as he wanted them to see the Biosphere Land Rovers and I was supposed to give a speech, but the children were all out. We parted with Sergey and carried on the journey. The weather improved. We stopped for lunch at 15.00. The Tuvan restaurant offered us 'vodka' made from fermented mare's milk – an acquired taste I am told. We made it from Kosh Agach to base camp in record time (Ruth, myself and Uwe driving). The snow has melted and the snowline is back where it was in the first slot. Arrived at 20.00. It was dry and sunny. People had time to unpack and then we ate (young Oleg had made a really good soup). We can contact base camp from Kosh Agach over the radio which is really impressive. Everybody this slot has brought really warm clothes and seems very well prepared. The sky was fabulous – so many stars. I saw 3 shooting stars before retiring to my tent = 3 wishes (shall I wish for 3 sets of snow chains or 3 Russian men?.....I think the former). Goodnight.

5 August

Bright, sunny morning. I can hardly believe it. The day spent going through risk assessment, gear, data collecting, field methodology, off-road driving course and vehicle inspection. Packed it all in and people walked around camp in the late afternoon/early evening. After supper, Annette Payne gave us a talk about her work on snow leopard DNA, which was really interesting. We sat around the fire. Andre and Nadia cooked shashliks on the fire and we had some wine. It was a really good first day. Christine (a plant scientist) has already been hard at work identifying flowers.

6 August

It rained in the night. Morning overcast, but mild. Today we went to the back valleys and started surveying the 'corridor' zone (that links our survey area to the Mongolian border). The habitat looks perfect for argali and Ibex, but the area is intensively grazed. Found signs of domestic stock up to 2900 m. Found one set of manul tracks at the same height (in the snow) but they were quite old. Gesine, one of our expedition members observed 4 argali (probably a group of males). It was a distant sighting, but she could distinguish the pale rump and underparts. It was a beautiful day. Sunny, but the wind was so bitter I was crying into my binoculars while sitting observing. Saw big flock of choughs, upland buzzard, saker falcon, steppe eagle, the ubiquitous black-eared kites and many LBJs (= little brown jobs). Great day. Everyone enjoyed the surveying. Ruth, Frances, Oleg and Nastya went on to find a route into our next survey area and were successful. On the way back we found an argali skull (young male) in the river bed. Also passed huge flock of domestic sheep and goats (which gave me the opportunity to observe them closely and note their horns) and then a boy on a white horse with cattle. He stopped to talk to Oleg – so I borrowed his horse and did some cattle herding. I wanted to swap one of the Land Rovers for the horse, but knew I was toast if I did. So don't worry Matthias. All 3 Land Rovers are back in base camp.

7 August

Back to corridor area to do more surveying. The expedition members are all very keen. It rained in the night (again!) and this morning, but the weather lifted during the day. Ruth and I stayed in camp today as she was not feeling very well and my knee was painful after I slipped yesterday. I took the opportunity to catch up on admin and have a shower. The expedition members came back at 17.00 and we went through data sheets and 'field samples' before supper. After supper Andrei, Olga and I went to find one of Andrei's friends from the first back valley yurt to arrange to interview him. He was not there, but driving through the steppe in the evening light was unforgettable. The herders are making hay in the steppe at the moment. The grass is not tall and the piles of hay low. It seems so little to feed the huge herds of livestock.

8 August

Raining again. Left to survey more of the area south of us (with views out to the Mongolian border). 2 groups surveyed the lower slopes and I went up to the snow line. It was bitter – sleet and some snow came down, but it was wonderful to be up there. Saw grouse, fleeting view of Altai snowcock and lots of game bird and hare tracks. We all went back in the afternoon. I left again at 3 for the back valleys to sort out some more interviews, accompanied by Olga, Oleg, Nastya and Nadia. We met Askir again (remember Karen?) and met more of his sons. I have been invited to join them to spend a full day on horseback, working with them on Sunday. An offer I can't refuse. Tomorrow we are doing a big survey at the bottom end of back valleys (about a 3 hour drive from base camp). I should think everyone will be glad to have the day off after that! All going well. My only complaint is that the mice are going too far. They have eaten my laces, Olga's laces, and my trousers and have made a hole in our tent. It's war!

9 August

Early start – cold bright day. Perfect for surveying. We drove through the back valleys and up the riverbed and then drove on, and on and on…..breathtaking landscapes and huge areas free from livestock and people. The off-road driving was challenging to put it mildly, but we got to our survey area eventually, after 4 hours driving. (Admittedly we stopped for photos). Had wonderful close views of a pair of golden eagles and steppe eagle. The survey area was craggy and steep with snow on the ridge and the valley below had an interesting lake. One group surveyed the lake area and the other group surveyed the ridge line. The views out onto the Mongolian border were spectacular. Oleg, Nastya and I went to find an alternative route home and succeeded. We can now reach this survey area by an easier (and shorter) route. Had a really good view of a cinereous vulture on the way home (very exciting). The light was so beautiful on the steppe as we drove back. Everyone is working hard and doing excellent fieldwork. I am very lucky to be surrounded by such enthusiastic and knowledgeable expedition members. Samples brought back from the field continue to keep me occupied! The area we surveyed was rich in game birds and there were ducks (ruddy shelduck) on the lake. The bird list is growing and a copy will be sent to all expedition members at the end.

10 August

I left camp at 6.30 with Oleg, Olga and Ruth. We drove to the back valleys and stopped at Abai's yurt (just by Ascir's and other family yurts).I was in the saddle by 8.30 and went off up into the mountains with Abai, his son and his nephew. We went up very steep slopes and followed the livestock (sheep, goats and cattle) up the valley and into the mountains. I was able to see how they grazed and the amount of droppings they leave behind them. We covered a lot of ground, stopping frequently to wait while the stock grazed. The cattle stayed lower down and we continued to climb. The riding was quite tough in parts, but I had a very good horse. Saw a solitary snipe (well named). The views onto Salugiem were superb and I got the chance to see a lot of good habitat. Conversation was lively despite the fact that I speak no Russian. We drew pictures on stones using sharp stone fragments. Some of the results were very artistic. We headed back at about 14.00, driving the stock back down to the yurts. My "horse cred" is good and I can ride out with them whenever I like (I wish!). We were back at 15.00 and joined the others. Olga and Ruth had spent the morning learning to make butter and cheese. Abai's wife, Gulinara had prepared a delicious meal for us (bread, butter, fresh cheese, and a meat dish). We then took our delightful hosts with us to visit sacred springs (a 20 minute drive). We drank the water and wet our hair as the water is said to be healing. The area was festooned with prayer ribbons. Back at the yurt we had a last cup of tea and I tried yet another horse – very fast gallop across the valley – exhilarating! Left to be back at base camp by 20.00. Joined everyone in the mess tent. They had also had a very good day. Andrei had taken a group out on the steppe to bird watch and they had seen 25 cranes and had close views. Oleg sang around the camp fire until late while I battled with the satellite phone and caught up with lots of paperwork. The river has disappeared again.

11 August

Rain in the night and early morning, but it stopped by 6.00. A big survey day. We re-surved Silugyem and covered a lot more ground. Early start and we were surveying by 9.00. One group surveyed the valley and surrounding ridges. The valley is very lush - good habitat for a variety of mammals, including bear. So many varieties of berry are ripe now and the flowers continue to fascinate us. I went up with the second group to survey the high, ridge area. We found tracks of argali and followed them along the streambed going up the valley. The terrain got steeper and soon we were into bare scree. It was a tough walk up (the first group will remember) and the temperature dropped dramatically as we ascended. I found snow leopard tracks at 3330 m, in the snow. They were about 2 weeks old. We then found more snow leopard track at a higher altitude. These were much fresher (a few days old) – so one individual is using either the area regularly, or there have been 2 adult snow leopards in this areas in the past fortnight. You can imagine how happy I was. We also found sign of argali and large game bird. Being on the top of Silugyem, and walking the ground a snow leopard is using is something that will live for me forever. I keep talking about the views, but they were beyond description. The snow was 25 cm deep in places. I could look down onto the lake where Oleg found traces of argali during the first slot. We then came down a very steep scree slope – running down it is something else I will never forget! And eventually came down along the sides and bed of a steep river. Close to the bottom, where it joins the "lost valley" we saw argali. They were on a scree slope opposite us. There were 22 individuals (mixed age and sex). We watched them through binoculars. They were about 300 m away. They walked up and over the ridge. My happiness was complete. To have found new snow leopard tracks and seen the main prey species on the same day….I was on a cloud. The rain came down and we were soaked by the time we reached the Land Rovers at 17.00. As we arrived close to base camp we met Sergey. He had come to see us. The red truck was in base camp for the night. After supper, Pasha (from Anoz) sang and played the guitar and Sergey, Oleg, Olga and I talked late into the night – and yes, there was vodka.

12 August

Up early and it was bitterly cold. I had a shower and it was snowing. The cold was beyond description. One group went off to re-survey a valley. The others recuperated after yesterday's efforts (we walked about 18 km). Olga and I spent the morning with Sergey (no vodka, strictly business). He left at 13.00 and I took a group to do interviews and see haymaking in the steppe. Could only do one interview as everyone is too busy haymaking, but it was the most interesting interview to date. The man I interviewed has been a herder in this area for 43 years. He confirmed my suspicions that poaching has decimated the wildlife, especially since the collapse of the Soviet Union and the collective farming system. He also thinks that there are fewer snow leopards than there used to be. It was not possible to do more interviews as everyone is busy haymaking. Most of the yurts we visited earlier on are no longer tenanted. Nearly all the herders have moved to the steppe for haymaking and have moved stock to the autumn grazings. Andrei then took us to see burial mounds and stone circles. Saw 3 demoiselle cranes at the first burial mound. They were so elegant – dancing in the wind before flying off – such a beautiful sighting. It was bitterly cold. The other group had done a good survey and found very fresh faeces – probably lynx and one huge pile (human, bear?). Annette is going to analyse the samples when she gets back. Christine is pressing so many flowers and doing a plant list. She has also drawn sketches of the various mammal faeces collected. The group is also doing an excellent bird list. Progress is good. Uno continues to be a big hit in the evenings. It is now being played in Russian! And I still have not played it. Tomorrow…

13 August

Bitterly cold night. Got up at 5.30. Base camp under snow. Had to change my survey plan. Sent 2 groups out to survey near base camp as did not want to take the Land Rovers out. One group surveying the tree line other side of camp, the other up on the slopes behind base camp. The shower frozen (not for the first time and I'm sure it won't be the last). Buckets of water are warming on the fire as I write and the snow is melting – thank goodness, as we leave tomorrow. This afternoon I take expedition members onto the steppe to do a last bit of bird watching and to visit the Altai cemetery nearby. Nadia is singing as she prepares a late lunch. Young Oleg has just spoken on the radio – they have found tracks and seen ibex!!! (the ibex were resting on the slope behind base camp). Also found very fresh manul tracks. I am happy. Look forward to the data sheets later on….

It is later on – have spent afternoon on the steppe bird watching with some expedition members. Went to area we have not visited before and as usual, ended up looking for the road. Oleg stopped to ask at a yurt and we were all invited to be photographed and have tea. It was the grandmother's birthday - she was adorable and very voluble! Toril and Gesine got to cuddle the cats. Crossed a dry, wide riverbed, thick with willow and other shrubs. Oleg said it was a very good place for wolves. Now he tells me! We will survey it next slot. I have played my first game of Uno (we play it in Russian) and the full moon tonight is so beautiful. Must get some sleep before the next lot of driving.

14 August

Bitterly cold morning (minus 6 degrees in equipment tent). 7am breakfast – broke the ice off the water pail again. Left base camp at 08.00, leaving Ruth, Oleg and Nadia behind (lucky things). The drive started well, but the risk assessment sadly is all too correct – we had an accident about 200km from Kosh Agach. The minivan crashed, trying to avoid an oncoming truck, which was driving at manic speed, in the middle of the road and the road was narrow. Luckily, no one was hurt (Olga and Nastya were travelling with Andrei at the time). The expedition members were wonderful. Warning triangles and first aid kits were out in no time. Everyone was calm and helpful. We towed the minibus for about 40 km and left it in a secure yard behind a small roadside hotel. Continued our journey and made the Tuvan restaurant by 14.00. And were all in Anoz by 19.45 – having stopped to buy much needed beers first (andI didn't even get to drink mine as Oleg mysteriously lost it). Sergey was there and we discussed the consequences of no minivan or alternative transport late into the night.

15 August

Early start – away by 07.00. Made good time and stopped for coffee and food in the morning and then about 150 km from Novosibirsk for lunch (the roadside café that does such good shashliks and has flushing loos). It was very hot – strange to feel heat again. Haymaking all along the route. The leaves are turning already. Fruit trees laden with apples and plums. Sunflowers high. The harvest abundant. Got to Hotel Central by 17.00, so expedition members avoided the worst part of Novosibirsk rush hour. Olga, Oleg and I had that dubious pleasure as we went out again on expedition business. Met up with everyone for supper at the Russian restaurant, followed by dancing at the open-air place below the hotel. Thank you all. You have all worked so hard. We had a really good evening and were very touched by your generosity.

16 August

Another hot day in Novosibirsk (lovely!). Olga and I managed to go the museum and to the art gallery. Roedrich's paintings are exquisite. Met the new group in the day and again in the evening. They have all got to know each other already and there is a great team spirit. I really look forward to working with them. I'm still having problems with the satellite phone. It's driving me crazy.

17 August

All expedition members very prompt. Have managed to pack everybody and everything into the Land Rovers (quite a feat), including the journalist, called Nikolai, from Automobily (glossy Russian car magazine). We left Novosibirsk just after 08.00 – beautiful morning. Made good time until 40km from the Altai border when Land Rover 2 had to stop as it was overheating. We got out to check the problem and I saw there was a hole in the radiator, made by a stone. I could have wept with frustration as I need every single vehicle to get to base camp. The expedition members were brilliant, good humoured and resourceful. The bonnet was removed – I chewed gum on an industrial scale while the bonnet was strapped to the roof and then plugged the hole. Oleg and Nikolai told me I was wasting my time – but the repair held until the Gorno Altai border where we took our group photo. Managed to buy fluid to temporarily fix the leak and carried on the journey. Made it to Anoz before 20.00. Simply beautiful evening and Vica excelled once again with borsch, smitana and other delights. I just love her. She brought me a huge female stag beetle just after supper "because it was just passing by" she said. The banya was very popular – most expedition members in at the same time….in their swimming costumes, as Carolyn says she doesn't do naked and frankly, when else are they going to get to wear them. Managed to get hold of Land Rover people who said we can drive no.2 to base camp and back no problem. I'm very relieved, as with the minibus out of use there is nothing else available. Anoz so soothing. The night warm and loud with the sound of crickets and the Katun river.

18 August

Left Anoz at 07.00 and waited at Silver Springs for Olga and Oleg to meet us after processing the permissions. This time all went without a hitch. I could hardly believe it. Very sadly, no more wild berry blinis available – had to make do with condensed milk roll with my coffee. The drive to base camp takes my breath away every time. This time was no exception. We stopped at the Tuvan restaurant for lunch at 14.30. Plov was the thing to be eating (isn't it always?). On to Kosh Agach for the last re-fuelling and onto the steppe. No traces of snow – tracks very dusty – ravishing evening. As always, so happy to be back, but this time I felt a deep melancholy at the thought that this is the last journey in to base camp. I don't want to leave. We passed lorries laden with hay and the steppe bearing the patterns of the scythe marks where the hay has been cut. Big herds of sheep and goats in the steppe now. Welcome from young Oleg, Nadia and Ruth – all looking tanned and lovely. The camp fire going. The slopes behind camp have turned red in the 5 days I have been away and the river has disappeared (again!). Lovely supper in the mess tent. Wonderful, positive and funny group of expedition members who all get on really well. Katya (alias Catherine) and Colin are worthy competition winners and have already proved themselves as great expedition members during the burst radiator incident, as has Grant…..and everyone else! We all have 'a really good crack' around the fire, helped along by the vodka. Young Oleg saw ibex behind base camp again in our absence. The sky full of stars. It is mild for base camp. Feels very strange.

19 August

Up very early. The mice really trying to take over the kitchen, the mess tent….everywhere. The first day followed the usual pattern of risk assessment, going through research, gear, etc. and off-road driving. Quite a few expedition members are really feeling the altitude. Oleg senior livened up the proceedings by chasing mice and voles around camp with a tea towel and actually catching one, which he proudly brought in to show us – wrapped in his woolly hat. We identified it as *Alticola macrotis* (yes, I know it's a vole, not a mouse). Carolyn stroked it and put it in a container to admire it – then dropped it and it ran off – probably heading straight back to the kitchen. Nikolai took some photos of the off road driving. Oleg cooked us a shashliks by the fire (one each – very good) and then asked me for some flares "to shoot mouse" and no, he was not just winding me up, he was serious. "Niet" is a word I find I am using more and more frequently!

20 August

Got up early – beautiful morning, and mild. I got so engrossed talking with Grant that I forgot to do the agreed wake up call (blasts of Biosphere whistle followed by Land Rover Alarm – and some people still manage to sleep through it!). Still ready to leave before 09.00 – drove through the back valleys to re-survey the very promising lake area (where we found tracks of argali/ibex and snow leopard in the second slot). The slopes are so vivid with all the low vegetation turning red and the green of the larch trees. There are lots of birds of prey (eagles, buzzards, falcons – saw pair of golden eagle mobbed by choughs). Arrived survey site – hills red and ridge snow covered – stunning. Sent group out with young Oleg. I stayed with other Oleg and Nikolai for the Land Rover photos, to make sure the Land Rover returned in one piece. Reminded them of the Dr Hammer's "no testosterone" rule. I was not popular, but the Land Rover survived the ordeal unscathed and Nikolai seemed very happy with his pictures. Went back to join

the survey group. Everyone very positive. Another ravishing drive back to base camp. The yurts are all being dismantled and we pass trucks laden with the all the paraphernalia of summer camp – children sitting on the dismantled yurts. It is sad to see the herders we have got to know leaving and it reminds me I will also be leaving soon. Base camp is in shadow before 19.00 now and the trees are turning colour.

21 August

Another beautiful morning – frost on the ground. We surveyed the ridges and valley behind Tapduair. On the way to the survey site we saw a marmot very close to the track, lying very still. I thought it was dead, as the marmots here are very wary and never stay out in the open when people or vehicles pass. I was just about to get out and check it, when Oleg leapt out of the car and pounced – he just missed it. The marmot got the fright of its life and ran down the slope. It had been asleep. I was torn between feeling furious and laughing - the comic side won. Who needs Crocodile Dundee when you can have Marmot Zigarev? The expedition members all found the incident very funny. You can imagine how much stick I got about dead marmots. Quite what Oleg would have done with the marmot if he had caught it I still don't know – the word shashlik comes to mind – and the thought that he would need a much bigger hat…Once at the survey site we split into 3 groups. I went with young Oleg to survey the higher valley and scree edges, a second group to survey the rest of the valley and Marmot Zigarev, Ruth and Nastya to survey the ridge. The day was very productive – we had a great sighting of an artic fox and I had a distant sighting of 2 argali (adult and young), plus plenty of sign and interesting faeces, which I collected for Annette to analyse. Everyone worked hard and the habitat is perfect for snow leopard and prey. While driving back to base camp, Nastya dropped a bombshell. "Tessa, Oleg says he saw a snow leopard, but we don't know if he is joking". I looked at Oleg, and not for the first time wondered what on earth goes through his mind sometimes. I asked him about the sighting and he confirmed it. I wanted to shake him. The lucky bastard!!! He was not even excited (he reminded me that he has seen snow leopards before). Back at base camp I was able to cross-examine him closely about the sighting and I believe it was genuine. He had gone on ahead, alone (as he often does!) and had come to the "pass", between the end of the survey ridge and Tapduair range. He looked down onto a steep, craggy ravine and a rocky ledge with boulders and saw a snow leopard, about 40 m away. It was resting and had not heard or smelt him. It was startled when it saw him (and so was he). It retracted its lips/snarled, before running down out of sight. The sighting only lasted a few seconds, Oleg said he was afraid. He showed me where he had seen it on the map and told me he also saw a herd or 20 ibex on the same slope – a distant sighting. He could not make out any detail, as he did not have binoculars. Everyone congratulated him, but he was subdued. It was good filling in the data sheets. We have achieved so much.

22 August

Frost on the ground – up very early (as usual) and that daily contemplative moment when I marvel at the beauty of this place while brushing my teeth. I have got much tougher. I am used to the cold and red hands devoid of feeling after washing. It doesn't matter. All that matters is being here and getting to know this area, its people and wildlife and making this project a success. We surveyed more of the corridor area today. The long drive through the back valleys and up the river beds always impressive. Saw the cormorant by the river again and many birds of prey. The mountain slopes red, the sky blue, white clouds cast shadows on the sunlit valleys. No more yurts – only dark patches of earth remain to mark where they and the livestock enclosures stood. Again we split up into 3 groups and survey 2 ridges and a valley. The day was magnificent. Silugiem and Tapduair - snow covered. Visibility towards the mountains on the Mongolian border very good – spectacular cloudscapes above. The Land Rovers are covering so much ground – much of it very testing for both vehicles and drivers – but we all love it and the vehicles, if not pristine, are in remarkable condition. I am so impressed by what they (and the drivers!) can do. My survey group made it up to the snowline, where we found artic fox faeces. Also had wonderful sighting of 3 grouse on the way down (so close that we almost trod on one of them). Grant saw an imperial eagle. The other group found an argali skull (big male) but did not bring it back to camp as the horns were full of putrid liquid (which Rob got all over his trousers and socks – the smell!!!!). We all caught the sun today. I drank in every detail as we drove back through these remote valleys. I am elated by what we have achieved, but time is going by so fast and I don't want to stop. The expedition members all on great form. There is so much banter and laughter. Everyone is working hard and playing hard. Nearer base camp the intense colours of the rocks, the golden steppe the last fragile flowers…. Sergey has arrived and set up a camp near the winter station for 3 Germans who want to ascend Tapduair. I went over with Olga and Oleg to see him. Sergey as warm and hospitable as ever and we ended up staying for supper and had very interesting discussions about this whole area. I did my vehicle check before drinking any vodka (hope you are all impressed) with the Sibalp boys looking on with interest. Olga and Oleg not at all impressed as I was dusty and covered in dry grass. They both brushed me down before allowing me to go in to the tent to have supper. I kept trying to contact base camp to find out how the rest of the group was getting on with the data sheets – but no answer. Gave up about 22.00 and got into the serious business of vodka and conversation (Sergey knows so much about the Altai and this area. He also cares very much about its future and the wildlife – very encouraging). We had a great evening. Olga very animated and so beautiful. Oleg and I make a brilliant combination I drink and earn the respect of the Russians and he doesn't drink and can look all macho driving home. We got back to base camp at 01.00 and I understood why none of the expedition members were answering the radio. They were all singing around the fire and drinking more vodka than me! We joined them and the party carried on late into the night. The sky full of stars and a meteor shower.

23 August

Woke up with a start at 07.00 (disgracefully late) – but was still the first one up. Went and had a very cold shower as meeting Sergey this morning to go through the accounts (arghh!!). Expedition members made it to breakfast looking worse for wear – a lot of black tea and coffee consumed this morning. Good thing I planned a very flat survey for today (river bed that looks good for signs of wolf). They all left at 10.00. Sergey arrived shortly afterwards and we had tough negotiations. Tricky moments but all ended well. I understood when he said to Olga that I was tougher than I look. We then went to Kosh Agach with Olga, Oleg and Nikolai - who was hoping to find some method of transport back to Gorno A/Novosibirsk. Kosh Agach hot and dusty. Transport facilities out limited…Nikolai asked me to drive him to Gorno A, but as I said earlier, "niet" is a word I use a great deal more than I used to. Sergey and Oleg managed to find him a lift and we said goodbye at the fuel station. I was sorry to see him leave. He has been lovely to us all and very helpful in camp – chopping wood and singing/playing the guitar with Oleg. He even helped me with the Land Rover (vehicle checks) – something Oleg has yet to do. Spent the afternoon doing interview with the head of the hunting licensing board, thanks to Sergey and Oleg. Very interesting (all the interviews will be included in the report so won't go into detail here). Back to base camp late afternoon. River bed survey very exciting as not only did expedition members find evidence of wolf and fox – they also found fresh bear tracks. So exciting!!!. I love them all. Sergey came to us for supper and then more discussions with vodka until the early hours. I have forgotten what it is to sleep and if this carries on much longer you will be able to tap neat vodka from my veins.

24 August

Sunday - so day off. Spent morning catching up on admin.Grant, Colin and others go off in the Land Rovers to collect firewood and water. Other expedition members rest and enjoy pottering around camp. I leave with Oleg, Olga and Ruth to go and find the family of herders we have become good friends with (the ones I rode out with). It is Gulinara's birthday and we are invited. Just as we leave, the Land Rovers come back squeaky clean – my wonderful expedition members have washed the cars in the river inside and out and got stacks of firewood. I just love them. We go off in search of Abai and Gulinara. Finding their winter quarters proves almost impossible and takes us 4 hours – we pass bleak areas of overgrazed steppe towards Kosh Agach. The sky is leaden and it rains – but we make it to the wooden winter quarters just after 16.00. The grass is lush, the sun comes out and our welcome warm. The rest of the afternoon is spent with the extended family – eating and drinking and celebrating. Many photos (Olga and I give Gulinara a camera for her birthday). A very happy occasion. Abai's horse is tethered not far away and I have my last ride – short and fast. Hate to leave. We stop at Kosh Agach on the way back to get expedition members requests (vodka, fags and chocolate). Much rain in the night.

25 August

Despite the rain in the night and cold morning I decide to re-survey Silugyem as there is fresh snow lying so good for assessing snow leopard movement. We all set off and go up the valley. Marmot alarm calls as we arrive. Lots of fresh argali tracks all the way up. Then the ascent up the scree and the final push for the snowline. Everyone is elated to make it to the top. No fresh tracks but the sun comes out and we take group and other photographs in the snow. Take a different route down, following the ridge – very dramatic. Find more very fresh argali tracks on the descent, including very small prints. I think the snow leopard is around Tapduair at the moment and that the ibex have moved there as well. Tomorrow's survey will tell. Supper in the mess tent very jolly. The range of conversations with this group is astounding. I don't think any subject has been left uncovered. Sergey comes round after supper and I spend another evening talking with him and Olga late (and I mean very late) into the night, which means more vodka. Can someone please remind me – what does sleep feel like ?

26 August

Beautiful morning. The cold showers are a punishing but necessary start to the morning. Young Oleg up early as well and making sure camp is running smoothly. Send one group to survey Tapduair (young Oleg, Ruth, Colin and Steve). I take the other group off with Oleg Z to survey the glacial lake above the lost valley. My group splits in the valley as not everyone up to the full survey. I go on with Oleg, Nastya, Grant, Rob and Carloyn. Oleg finds a perfect potential lying up site for snow Leopard. We ascend a steep boulder slope surrounded by towering scree slopes…and another…Make it to the lake by 13.00. Seeing the blue-green lake, sitting in a bowl between the forbidding mountain ridges is extraordinary – like stepping into another world. The silence (no wind) is only pierced by the alarm calls of pika and suslik. It is a magical place and has great potential as an observation site (sign of argali found all the way up the boulder slope). Rob gets close enough to a pika to get a good photo. I survey the area around the lake and find a place where argali have been lying up very recently – it still smells of them. At 14.00 we see tiny figures on top of Tapduair. We wave and make radio contact. They have seen ibex and argali. Head back down to join the others in the valley and the walk back to the Land Rovers so beautiful. Red slopes, willows turning gold, green larches, their soft needles underfoot, the river shimmering in the late afternoon – exquisite light – the last berries. Too many impressions to write here, except, again, the wrench of seeing this place for the last time (for this year anyway). Nadia has prepared a lovely supper (as always). Radio contact with the Tapduiar group who make it back into camp at 21.00 – on a high. No snow leopard tracks but 2 sightings of large herd of argali (about 40 animals) and one

sighting of Ibex (about 11 animals). We end the day around the fire and Oleg sings for us beautifully. Sergey and the Sibalp boys are living at base camp with us as we prepare to pack up base camp. The two trucks are parked with the Land Rovers.

27 August

The day spent packing up camp. So much do. Hot sun. The Biosphere flag lowered and the mast taken down. Food packed. Equipment stored. It takes all day. Take a brief moment off to do group photo in the late afternoon. Some of the expedition members go off to wash the last Land Rover and Rob takes photos of Katya and Grant for me. Supper in the mess tent more subdued. Nadia has found time to make us cakes and they prove very popular. Kitchen tent dismantled in the dark and the packing of camp continues until after dark. I feel very sad to be leaving, but so proud of what we have all achieved. So many stars.

28 August

06.00 breakfast and departure just after 07.00. Leave young Oleg, Sergey, and the Siblap boys to pack up the tents and load everything. I travel with all the Russians and Ruth. We are packed and take it in turns to squash up in the back. The most beautiful rainbow on the steppe as we leave. I take it as a sign of hope. Tears in the vehicle as we leave the steppe. The drive goes well. We make it to Anoz by 17.30. Vica's warm greeting cheers me up. Oleg and I go on to Gorno – to say goodbye to Yuri and return his book. Funny seeing him in his flat – all clean – very dapper in jeans and a black t-shirt. Get back to Anoz at midnight. Sergey looking very sad. Sit up and talk until the early hours then I go into the Banya. I no longer care about sleeping.

29 August

Another 06.00 breakfast and the drive back to Novosibirsk. Hot sun, usual coffee and shashlik stops. Much traffic. Get to Hotel Central by 17.30. Everyone checks in and for once, Olga and I don't have to rush out to do things before supper. All meet up at 20.00 and go a Chinese restaurant. All the Russian team with us which is lovely. Really good food and really loud music – plenty of cold Russian beer. Thank you all – Biosphere for running the expedition – my much-loved Russian team and all you wonderful expedition members who have done so much. I am so proud and happy of what we have achieved and look forward to building on it in the future. I have fallen in love with the steppe and the mountains. Leaving has been very painful. I can't imagine life away from base camp; but the work does not stop here…there is the report to write, Russian to learn…I end with a toast "to next year".