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EXPEDITION REPORT

Expedition dates: 28 June – 7 August 2010
Report published: April 2011

Mountain ghosts: snow leopards and other animals in the mountains of the Altai Republic, Central Asia.

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Mountain ghosts: snow leopards and other animals in the mountains of the Altai Republic, Central Asia.

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Authors:
Volodymyr Tytar
I.I Schmalhausen Institute of Zoology
of the National Academy of Sciences of Ukraine

Matthias Hammer (editor)
Biosphere Expeditions

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 28 June to 7 August 2010. The aim was to continue a survey of snow leopard *(Uncia uncia)* in this area, as well as surveying the snow leopard's primary prey species, argali *(Ovis ammon)* and Siberian ibex *(Capra 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. In 2010 surveys were extended to areas away from the Talduair massif site to valleys and surrounding ridges of the Karaghem mountain pass. Interviews with local, semi-nomadic herders also formed an important part of the research procedure. The expedition also collected data for extended mammal, bird and plant inventories. No signs of snow leopard presence were recorded this year and there was no indication that the areas had been visited and used since the 2009 expedition. The developing relationship between the predator and prey species seems to be very fragile, so perhaps the decline in the prey species (particularly argali) may have driven the snow leopard out of the area. In addition, human disturbance is considered to be a severe and growing threat and may be responsible for the declining mammal diversity in general. Yet the study area still retains its importance 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 and raising public awareness is vital if conservation initiatives are to succeed. Work on establishing four additional nature parks in the Republic of Tuva and the Sailugem Nature Reserve in the Republic of Altai, which will protect the biggest Russian population of the snow leopard, is in progress.

Резюме

Данное исследование проводилось в рамках экспедиции в Кош-Агачском районе Республики Алтай РФ, организованная природоохранным агентством «Biosphere Expeditions» в период с 28 июня по 7 августа 2010 г. Целью работы было изучение наличия снежного барса в данном регионе, а также учет животных, являющихся основной его добычей, среди которых, наряду с другими видами животных, следует отметить аргали и сибирского горного козла. Параллельно проводили инвентаризацию птиц, млекопитающих и высших растений. С помощью Системы Учета Информации о Снежном Барсе (SLIMS), разработанной Международным Обществом Опеки Снежного Барса (ISLT), исследование наличия (форма 1 SLIMS) снежного барса и его видов-жертв, проводилось на протяжении всего периода работы на всей территории, включенной в зону деятельности экспедиции. В этом году исследовали также окрестности Карагемского перевала. Интервью местных скотоводов также стало важной частью исследования, что фиксировалось в разработанной для этой цели анкете. В 2010 г. не обнаружены никаких следов зверя. Отмеченные колебания численности поголовья главных потенциальных жертв не способствуют появлению тут снежного барса, но можно предположить, что главенствующее негативное влияние на зверя оказывают антропогенные факторы. Они же, в целом, привели к падению разнообразия местной фауны млекопитающих. Вместе с тем имеется положительный потенциал для присутствия здесь снежного барса, чему способствует рельеф, растительность, слабая посещаемость высокогорий скотоводами, пребывание потенциальных жертв (прежде всего, аргали, но его численность стремительно падает, и горного козла). Район исследования крайне нуждается в защите, однако, вовлечение в работу местного населения (в т.ч. проведение разъяснительной кампании) является необходимым условием для того, чтобы инициативы по созданию биосферного заповедника или национального парка могли быть реализованы.

Contents

Please note: Each expedition report is written as a stand-alone document that can be read without having to refer back to previous reports. As such, much of this section, which remains valid and relevant, is a repetition from previous reports, copied here to provide the reader with an uninterrupted flow of argument and rationale.

1. Expedition Review

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 28 June – 7 August 2010. This expedition conducted a survey of snow leopards as well as their prey species such as 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 and snow leopard numbers. Data collected by this expedition will be crucial in the fight for wild snow leopard survival.

The Altai Republic sits in the very centre of central Asia between China, Mongolia, Kazakhstan, Russia and the Tuva Republic. In it, the Altai mountains rise from 350 to 4500 m 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 they provide 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.

Little is known about the status and distribution of the globally endangered snow leopard in the area and its interaction with prey animals such as the argali and Altai ibex, and its reliance on smaller prey such as marmots, ground squirrels and game birds. Biosphere Expeditions will provide vital data on these issues, which can then be used in the formulation of management and protection plans.

1.2. Research Area

Flag and location of the Altai and study site.

An overview of Biosphere Expeditions' research sites, assembly points, base camp and office locations is at Google Maps.

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 stunning 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.

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 steppes, 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 overlooking the Jyelo river with flower meadows, mountains, cliffs and glaciers all around.

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 Altai Republic is very sparsely populated, with just 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 more remote 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. More information on the Altai is at www.altai-republic.com.

1.3. Dates

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

28 June - 10 July | 12 - 24 July | 26 July - 7 August 2010.

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. Base camp for groups 1 & 2 was at the foot of the Talduair massif, base camp for group 3 was at Kara Gyem. All meals were prepared by the expedition cook.

Field communications

There was no mobile or landline telephone connection at base. Instead the expedition used an Inmarsat BGAN satellite system with internet connection. Courtesy of Motorola hand-held radio were used for communication. These worked well when within range.

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 Russia, and their local dealers MAKS Motors of Novosibirsk, the expedition had the use of two Defenders. There was also an assortment of other Russian vehicles.

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. Off-road 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 small district hospital in the town of Kosh Agach (60 km from the camp) and a large hospital in Gorno Altaisk (500 km from camp). There was also a helicopter rescue service. 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 and there were no major medical incidences throughout the expedition.

1.5. Expedition Scientist

Volodymyr Tytar was born in 1951 and his Master's Degree in Biology is from Kiev State University. At that time he first experienced the Altai mountains and wrote a paper on the ecology of the brown bear in the Altai. He then pursued a career as an invertebrate zoologist before shifting towards large mammals and management planning for nature conservation. He has worked with Biosphere Expeditions on wolves, vipers and jerboas on the Ukraine Black Sea coast and has been involved in surveying and conservation measures all his professional life.

1.6. Expedition Leader

Andrew Stronach was born in Scotland, studied Engineering and then flew aircraft for the Royal Air Force before working in wildlife. Surveys of wild plants, birds and marine mammals led him into anti-wildlife crime work that has become his passion and taken him all over Britain and Cyprus. He has taken part in expeditions to Belize, Honduras and Sulawesi, surveying coral reefs and rainforest. Due to a rare allergy to offices, Andrew is almost always found outdoors, whether it is working in the highlands of Scotland, trekking in some remote national park on one of his many foreign travels or dangling from a rope on a rock face.

1.7. Expedition Team

The expedition team was recruited by Biosphere Expeditions and consisted of a mixture of all ages, nationalities and backgrounds. They were (with country of residence):

28 June - 10 July

Simone Draeger (Germany), Uwe Draeger (Germany), Madeleine Reichlin (Switzerland), Claire Shapiro (UK), Anja Struß (Germany), Kathy Gill (UK).

12 - 24 July

Sharareh Aref (Germany), Nancy Crenshaw-Miller (USA), Birgit Gollmann (Austria), Eva Jensen (Austria), Paul Miller (USA), Sibylle Noras (Australia), Peter Pilbeam (UK), Joanne Rappaport (Canada), Madeleine Reichlin (Switzerland), Vivian Siderfin (UK).

26 July - 7 August

Brian Clarke (Australia), Josef Feigl (Germany), Ritva Honkanen (Finland), Martina König (Austria), Keith Millar (UK), Peter Pilbeam (UK), Susanne Praglowski (Austria), Lorin Praglowski (Austria), Ulrike Sigl (Germany), Stephen Swan (UK).

Throughout the expedition

Masha was our great translator for groups 1 & 3, whilst sparkly Alexandra translated during group 2. Oleg was our very competent and experienced mountain guide. Nina Taranova was our fantastic cook and Russian mother who looked after us very well. Emil was our camp helper, making sure we had hot showers every night – great job Emil!

1.8. Expedition Budget

Each team member paid towards expedition costs a contribution of £1640 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	42,223
Expenditure	
Base camp and food includes all meals, base camp equipment	4,024
Transport includes fuel, vehicle maintenance	4,835
Equipment and hardware includes research materials, research gear	866
Staff includes salaries, travel and expenses, Biosphere Expedition tips, gifts, travel and expenses for local and international staff	8,491
Administration includes bribes, registration fees, sundries, etc	483
Logistics & co-ordination Payment to Sibalp	5,041
Team recruitment Altai as estimated % of PR costs for Biosphere Expeditions	6,844
Income – Expenditure	11,639
Total percentage spent directly on project	72%

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 the Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, WWF Russia, the snow leopard Conservancy, the Siberian Environmental Centre, the Foundation of Sustainable Altai, the Altai Project, the Altai national government, as well as local authorities, communities, museums & schools. Land Rover, Swarovski Optik and Motorola also support this expedition. The support of all these is gratefully acknowledged.

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.

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2. Snow Leopard & Prey Survey

Volodymyr Tytar
I.I Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine

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: also see www.snowleopardnetwork.org). 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 can not 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.

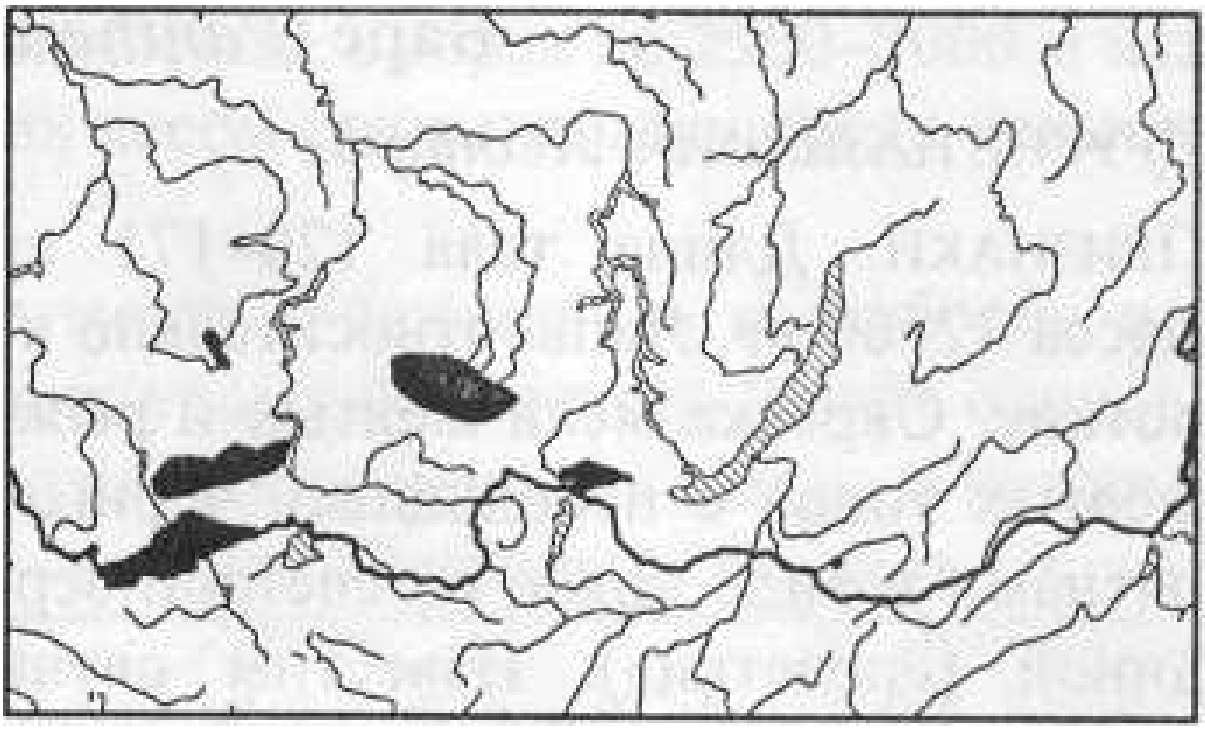

Figure 2.1a. Distribution of the snow leopard in Russia (from Павлинов И.Я. и др., 2002)

The amount of suitable snow leopard habitat in Russia totals about 131,000 square km (Koshkarev 1994) with snow leopards being reported from the Altai and Sayan ranges bordering Mongolia. Smirnov et al. (1990) estimate 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 (VHP & 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 follows SLIMS methodology.

2.2. Research Area & Timing of Survey

The area surveyed by Biosphere Expeditions is chosen for several reasons including: (1) the area before was poorly surveyed for snow leopard; previous expeditions to the area since 2003 suggest the fragility of the area for sustaining a viable snow leopard population and its temporary status as a snow leopard habitat, however more evidence is needed before coming to a final conclusion; (2) a map study suggests that the area may be an important corridor for snow leopard dispersal to and from Mongolia; (3) the habitat is diverse in biological terms, supporting a range of prey species and other carnivores; (4) the area lacks proper protection and is threatened by a proposed road to the Tyva Republic and a growing economic interest to its mineral resources (http://www.sibecocenter.ru/article.htm?articleID=26). However, there is a potential here for establishing a protected area that could favour wildlife and benefit local residents.

Two main clusters of study sites are distinguishable. One study site (Talduair area) totals approximately 200 square km (in a square roughly between 50.10°N, 89.20°E and 49.85°N, 89.48°E) and is delineated by geographical features – rivers, in particular Buguzun and Bar-Burghazy, and a number of mountain ranges. The other site focuses on an area of the Northern and Southern Chuya mountain ranges centered around the Karaghem mountain pass (49.97°N, 87.77°E) (See fig.2.2.a).

Figure 2.2a. Distribution of survey sites in 2010 (map composed in *Google Earth*); yellow pins – survey areas, blue pins – Gorno-Altaisk and Kosh-Agach.

The initial base camp (49.99^{o}N, 89.23^{o}E) was situated in a valley, at the entrance to the core area, below the mountain of Kunduyak (3399 m) in the Talduair massif. It afforded the necessary shelter and fresh water source from Kunduyak stream needed by the expedition.

In 2010, as in the year before, surveys were extended to areas outside of the Talduair site to the one indicated above and for convenience the base camp for the third group was relocated to a spot in the valley of the Dzhelo stream (49.96^{o}N, 87.83^{o}E), some 7 km from the Karaghem mountain pass. One of the reasons for selecting this area was the digital modeling exercise (see below), which indicated the place as favorable (in terms of bioclimatic parameters) for the snow leopard.

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).

As per SLIMS suggestions, the survey routes followed river valleys and landform edges wherever possible. Research was focused on areas considered 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 (or on foot if near one of the base camps). All surveys were conducted on foot.

2.3. Methods

2.3.1. Snow leopard presence-absence survey

Presence-absence surveys of snow leopard and prey (SLIMS Form 1, see appendix 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 judgments 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 judgment. 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 judgments 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.

Snow leopard presence can be detected by sign, i.e. pugmarks (tracks) (PUG), scrapes (SC), faeces (scat) (FE), urination (UR) and rock scent spray (RC). 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, marmot, pika, hare and game birds). The same search sites were used for snow leopard and for prey.

2.3.3. Interviews

The social and economic crises of the 1990s in Russia (and now the current GFC) strongly influenced the intensity and character of how the environment is used, which had a dual effect on the snow leopard. On one hand, due to a decreased number of livestock and related pressure on natural pastures, population numbers of major prey species, Siberian ibex and argali, have grown. On the other hand, due to the fact that the living standards of the locals have declined, its pressure on biological resources has also increased. People who have lost their jobs have intensified their use of hunting grounds, including the introduction of poaching techniques highly dangerous for the snow leopard.

Grazing livestock in the highlands is part of traditional land use that directly affects the snow leopard, and herders, many of whom are hunters too, form the part of the human population that is present in the snow leopard habitats and encounters the animals most often. The expedition found it instructive to interview these people to find out about their attitudes to and sightings of snow leopards and other wildlife. These interviews were conducted in Russian and translated to the team members as they happened. Their job was to make sure that all topics in a formalised questionnaire (see appendix 2) were covered and all questions were asked as far as possible. Datasheets were discussed in the evening with scientific staff as part of the filling in datasheet activity.

2.3.4. Additional surveys

Evidence of other carnivores sharing snow leopard habitat was also recorded as part of the SLIMS survey.

In the end an attempt is made to build a predictive model of the distribution of the snow leopard in the Altai based on ecological niche modeling and using Biosphere Expedition records together with published data summarized in the Red Data Book of the Republic of the Altai. *DIVA-GIS* software (http://www.diva-gis.org) was applied to process georeferenced primary occurrence data for the species, in combination with digital maps representing environmental parameters (namely, altitude and 19 bioclimatic parameters). The simplest *BIOCLIM* model (Nix, 1986) was chosen, which itself involves tallying species' occurrences in categories for each environmental dimension, trimming the extreme 5% of the distribution along each ecological dimension, and taking the niche as the conjunction of the trimmed ranges to produce a decision rule.

2.4. Results

2.4.1. Snow leopard presence/absence survey

From 30 June and up to 5 August 28 snow leopard presence-absence surveys were carried out. The search effort took from 3.3 to 10.5 hours, an average of 6.67±0.4 hours. Elevations ranged from 1949 m (in the Bar-Burghazy floodplain) to 3351 m (the summit of Sailughem mountain) (average 2578±40 m). The dominant landscape surveyed in the areas consisted of narrow valleys (NVAL), broken terrain (BTER), and steeply (SROL) and wide valleys (GROL) met, respectively, in 41, 39, 5 and 5% of the cases; other landforms included grass plateau, ridges, rock falls, glacial lake areas, and woodland consisting of Siberian larch and sporadic Siberian pine stands.

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

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. Most of the area surveyed was unsuitable for tracking (scree, boulders, vegetation, etc), so any conclusions are fairly dubious.

Special attention was drawn to snow patches left behind from wintertime. However, no pugmarks were recorded.

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. Rainfall and occasional snowfall throughout much of the survey period also reduced the possibility of finding scrapes.

No scrapes possibly belonging to the snow leopard were encountered.

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, for instance, were found at all but the highest elevations and were voracious consumers of faecal, plant and other matter. Faeces can be deposited solitarily or with other scats of varying ages (Jackson & Hunter 1996). Faeces are most often found in association with scrapes.

No sign of faeces were recorded.

Urination: Urine can be deposited on scrape piles and is commonly deposited along regular paths or trails.

No definite 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-spray was found during a survey conducted this year.

Claw rakes: These are occasionally left on a rock face, log or upright tree trunk.

No claw rakes were found during the survey period.

Direct observation: There were no direct observations of a snow leopard this year.

2.4.2. Threats to snow leopard presence

In the course of the presence-absence survey an account was taken of human-induced factors considered to be threatening to snow leopard presence in the area. Grazing activities turn out to be common and widespread and were recorded in 17 out of the 28 accomplished snow leopard presence-absence surveys (60.7%) and are in most cases are confined to foothills and valley floor. More grazing occurs obviously in the Dzhelo area (just down on the eastern side of the Karaghem mountain pass), where several herders' summer stations are in place and dogs are kept in plenty. However, here, as elsewhere, most of human impact occurs at lower altitudes (extending downstream from the Dzhelo river and occupying areas in the adjoining Taldura valley).

In general, the grazing pressure in the area continues to remain fairly stable and considerably reduced, compared to communist times. Many areas suitable for grazing (as, for instance, along the Tekelyu river or down on the western side of the Karaghem mountain pass) have been abandoned by herders, which are no longer subsidised by the government. Today these areas are considered to be 'empty', not meaning, of course, that in the near future they can once again be used by herders (or, for example, as hunting grounds or enclosures for keeping maral).

Occasional horse droppings and car tracks found in higher places indicate sporadic human presence all over the area. Other signs of human presence and disturbance included bullet cases, hides, campfires and various items of rubbish left behind by visitors. Fresh collection of firewood was recorded as well.

Quad bikes were recorded in areas of the Karaghem glade and the Taldura valley. This surely is a bad sign, has nothing in common with the local traditional land use and may become an additional factor of disturbance for wildlife.

Short-term disturbance is created by harvesters coming in for pine cones, mushrooms, wild onions, moss used for insulation, etc.

2.4.3. Prey base survey

Signs of prey species in both presence/absence and relative abundance surveys were fairly abundant and widespread as far as they were usually met in a much greater variety of terrain.

In 2010 argali were recorded in 7 surveys out of 28 (25%, meaning significantly fewer than in the year before – 38.2%). Signs of argali (faeces, hoof prints, skulls; no direct observations) were recorded between altitudes of 2436 and 3022 m.

Siberian ibex were recorded in 23 surveys out of 28 (82.1%, the percentage being approximately the same as in the year before – 76.5%). These included records of faeces, hoof prints, 'beds', skulls, tufts of hair; in 15 surveys direct observations of the animals were made. Siberian ibex were seen between altitudes of 2350 and 3351 m.

In pooled samples elevations for both argali and ibex records overlap and vary around 2789±50 m (the same, in fact, as in 2009 – approximately 2800 m). Signs indicating the altitudes at which the animals are met highlight the area as a potential habitat for the snow leopard.

Evidence from surveys and interviews indicates that the numbers of animals using the survey area are perhaps relatively low and are subjected to fluctuations from year to year (see, for instance, the 2008 expedition report, http://www.biosphere-expeditions.org/images/stories/pdfs/reports/report-altai08.pdf). It is quite difficult to give any statistical interpretation of these estimates (solely based on the number of records originating, especially in recent years, from various differing areas). However, the general decline of argali seems to be progressing, whereas the Siberian ibex is yet a fairly common (even abundant) species.

Fig. 2.4.3.a presents the records of the potential prey species. Only one fifth (about 20%) are records of the 'primary' prey species, argali and Siberian ibex (in the previous year they comprised around a third). Game birds (Altai snowcock, grouse, etc.), pika, mountain hare and the grey or Altai marmot together make up above 60% of the records. Fewer records are made of roe deer, wild boar and the Arctic ground squirrel, elk (placed in the category 'other') was recorded in the vicinity of the Karaghem glade.

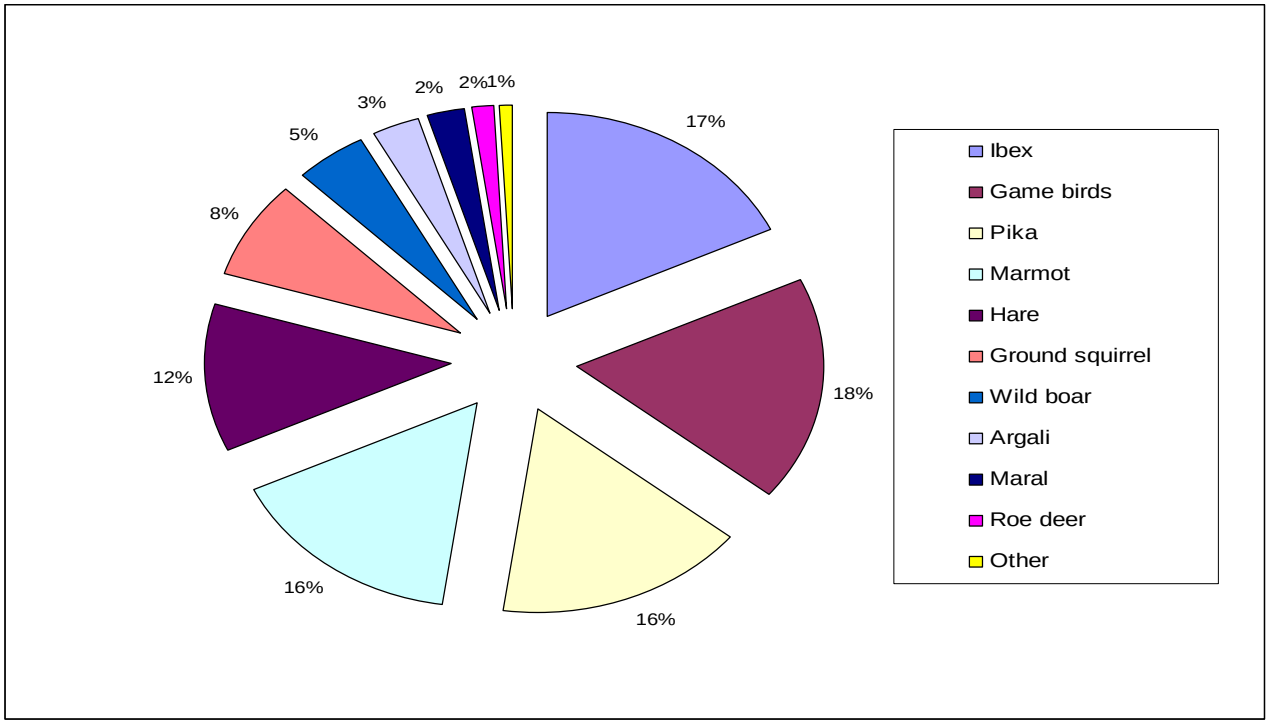

Figure 2.4.3a. Records of potential prey species.

2.4.4. Interviews

Only two interviews were conducted. One was of a couple (herder and his wife) and the other was of a herder met on his own. All of them were aged around 60 and are residents of Kosh-Agach District. As seasonal herders they keep livestock: sheep (numbering up to 1000), goats (up to 300), and fewer heads of cows and horses.

The overall feeling towards the snow leopard was 'indifferent' and none of them had ever seen the species in the wild or could say anything on 'how many snow leopards do you think live in the region'. On the other hand, the interviewees were well aware that the snow leopard is protected in Russia.

Responses to questions related to the impact of the snow leopard on wildlife, particularly 'primary' and 'secondary' prey species, attacks on humans and domestic livestock depredation, etc. were all neutral.

On the question concerning the attraction of more tourists to the region because of snow leopards, the couple was indifferent, whereas the other herder was positive and considered it 'a good thing'. In general, people in the area are not opposed to tourists from outside, provided they are respectful of the environment, but the couple was skeptical on the behaviour of non-resident hunters.

Unfortunately, richer people from outside displaying a growing aggressive attitude towards the use of the natural resources of the area, attempting to privatise at any cost areas for their selfish economic needs and hardly respecting traditions such as for instance, hunting rules established by consensus between the local residents and kept in force for many, perhaps hundreds of years. For instance, the winter of 2009 has seen a very worrying example of this as allegations of poaching by a hunting expedition aboard a Mi-171 helicopter has received wide coverage even in the government-friendly media outlets (see http://www.themoscowtimes.com/article/1010/42/376853.htm).

A remedy to this intrusion could be the establishment here of a protected area, preferably a national park or a biosphere reserve. However, people to whom we spoke do not think the whole area should be protected and do not seem to realise the threat that encroaching civilization could bring to the area. So far the herders and people in the steppe have managed to prevent privatisation of the land and are trying their best to resist the 'invasion' from outside.

2.4.5. Additional surveys

Evidence of other carnivores sharing snow leopard habitat was also recorded. These were wolf and red fox. Wolf sign was found at various elevations (up to 3000 m) in 16.7% (about twice as much as in the year before – 8.8%).

Wolf, apart from perhaps brown bear as well, is the only predator currently preying on domestic livestock in the area. Unfortunately, eradication measures for the wolf include poisoning and the use of traps, a potential hazard for the snow leopard as well.

No video or stills camera trapping was carried by the expedition in 2010. Previously possible locations were identified and tested, but without success. Indeed, the chances of remote video capture (particularly if only one camera is in use) of snow leopard are slim until a trail or 'relic' scrape is found. Recent experiences in the lower reaches of the Argut river involving the use of 18 cameras have shown the futility of the effort (see http://eco.rian.ru/nature/20101021/287965311.html?id=). Perhaps, even more cameras would be needed to reach a positive result given the presence of the target species in reasonable numbers.

2.5. 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.

The first expedition in 2003 indicated that snow leopard was 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. The repeated surveys of the expeditions have also shown that the habitat in the Talduair massif is sufficiently varied and capable of sustaining a healthy prey base for the snow leopard. In 2003 sign of snow leopard was found in the core area of the Talduair massif implying a resident animal and/or or more than one snow leopard in the research area. However, in the following years no other sign was found, besides fairly old (perhaps a few months) scat samples presumably belonging to the species, showing that snow leopards may have left the area or were visiting it on an occasional basis.

Fresh signs of snow leopard presence recorded in 2009 were an indication that the core area once again had been visited and used. The developing relationship between the predator and prey species seems to be very fragile, so any decline (perhaps even slight) in the prey species may drive the snow leopard out of the core area. Indeed, poaching and disturbance may be the main factors for driving animals out of the site.

Interviewed people have not seen snow leopards (adults and cubs) and/or signs of their activity within the areas. Sightings have decreased significantly since 1998. Snow leopard predation of domestic livestock occurred in the past, but there are 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. We hypothesize that the main cause for this may be increased disturbance of snow leopard and poaching of ungulates (particularly argali, of which there are fewer records this year) exacerbated by seriously diminished facilities to combat these problems.

The corridor area located to the north beyond the Buguzun-Karagai-Tekelu boundary seems to be of vital importance for animals recolonizing the Talduair massif. The relationship between these two areas resembles 'continent' and 'island' relationships in biogeography (MacArthur & Wilson 1967), a notion arising from the digital modeling exercise (Fig. 2.5a). Indeed, mountain ranges located north of the Talduair Massif together with the Kurayskiy range form an extensive cluster of 'excellent' habitat area (coloured in red) interconnected with similar areas in the Chuya ranges favoring snow leopard presence to which the expedition has moved in 2010 (green triangle on the map).

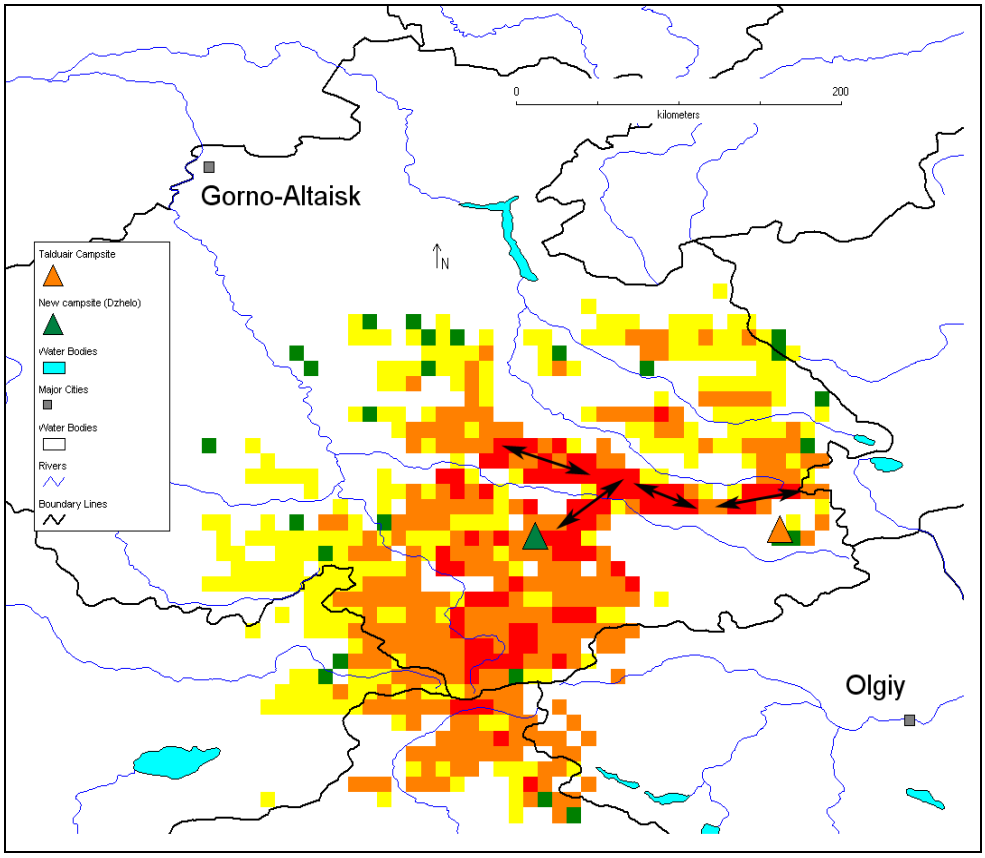

Figure 2.5a. Digital distribution model of the snow leopard in the Republic of Altai (and some adjacent areas); areas within the red-coloured cells present the most favourable ('excellent') combination of ecological conditions required by the species (composed in *DIVA-GIS*).

On the other hand, predicted 'excellent' habitat area from the standpoint of bioclimatic variables alone may not by favourable for the snow leopard due to human impact, a factor not assessed in the model due to the lack of corresponding digital data. The significance of this factor can be evaluated only by conducting the appropriate ground surveys. The absence of snow leopard sign in areas studied this year and pointed out by the model to be 'excellent' habitat can be considered as strong evidence of ongoing human disturbance. Declining argali numbers, fewer records of carnivore species, including the manul, and a comprehensive drop of mammal diversity (see Chapter 4. 'Mammal Survey') may all be consequences of this impact.

Overgrazing by livestock and erosion caused by vehicles is also a problem, particularly at lower altitudes. However, as a priority 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.

All the surveyed areas, including the Talduair massif, urgently need proper protection. Involving the local community and helping them to benefit as well as wildlife is vital for any conservation initiative to succeed. Fig. 2.5b depicts Biosphere Expeditions locations and survey efforts in the context of the developing network of protected areas in the Republic of Altai. Unfortunately, most of these plans are yet on paper and NGOs such as the Siberian Environmental Center (http://www.sibecocenter.ru/), the Gebler Ecological Society, etc. are involved in a bitter struggle to implement them. Recent efforts have been focused upon the establishment of the Sailughem National Park, an area equally interesting to Biosphere Expeditions. Initial plans were to have the park in two locations (see 3.18 in Fig. 2.5b), including a cluster "Argut" (in patch 3.13 of the map). Together the alleged area of the national park would be of about 117 thousand hectares. Up to now the Russian Government has adopted a resolution (№ 241-р, 27.02.2010) on declaring the protected area, but matters seem to have gone no further. As yet there is no national park on the ground, not meaning, of course, that we should throw up our hands.

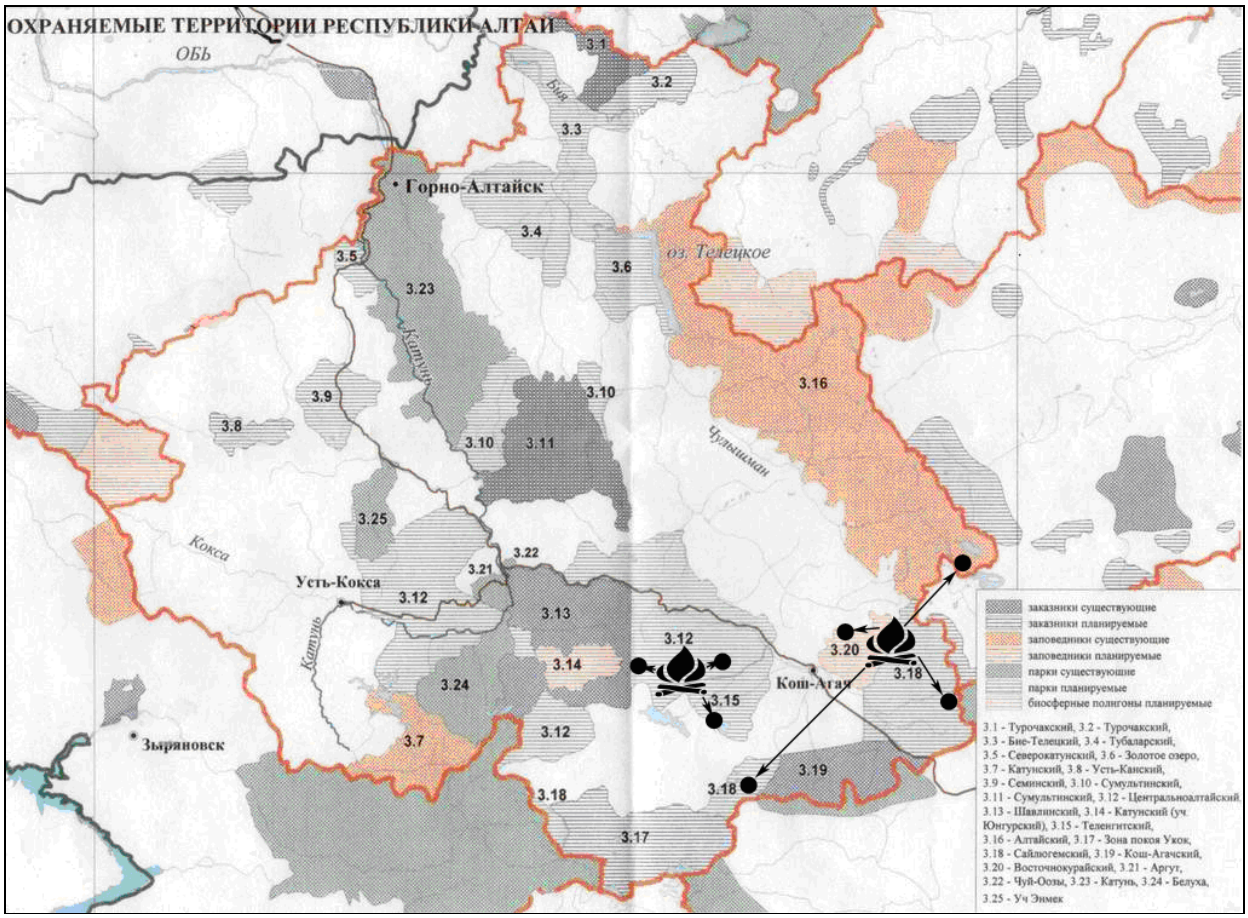

Fig.2.5b. Biosphere Expeditions base and major field camp locations mapped in relation to the present and planned network of protected areas in the Republic of Altai (source map http://www.al-tai.ru/tourist/gorny/ecolog/zapoved/): 3.16 – the Altai Nature Reserve, 3.17 – Ukok Quiet Zone; 3.19 – Kosh-Agach Wildlife Sanctuary; planned protected areas – 3.12 (Central Altai National Park, 3.15 – Telengit National Park, 3.18 – Sailughem National Park, 3.20 – Eastern Kurai Nature (or Biosphere) Reserve.

In summary:

- Results from SLIMS data sheets confirm the fragility of surveyed areas for sustaining a viable snow leopard population.

- The major threats facing the snow leopard and prey population within the study areas seem to be disturbance, habitat degradation caused by grazing pressure, human interference and proposed development, land privatisation. Development may exacerbate the existing problems and cause further damage to an already fragile ecosystem that, as shown in this report, is plunging into a crisis.

2.6. Summary & Management Recommendations

Management recommendations are in line with the Strategy for Conservation of the snow leopard in the Russian Federation (2002) and include the following:

- III.1* *Safeguarding the range structure* – conduct further research in the study areas.

- III.3. *Measures for conservation of major prey species and control over potential competitors* – an immediate temporary ban on hunting any of the larger prey species. Ibex and Argali numbers are not high enough locally (the latter seem to be drastically decreasing) to support hunting pressure and it is almost impossible to regulate what is shot once a license is issued.

- III.5. *Solutions to the conflict between snow leopards and local herders* – improve the economic situation of local people in return for participation in wildlife monitoring and help with anti-poaching. In fact, interviews have shown that locals in their majority are not opposed to the snow leopard, so it might be reasonable for this purpose using the combination of ecotourism and marketing products made by herders.

- V. *Raising public awareness of snow leopard conservation* – further investigation and consultation with herders are needed, so they would reach an understanding of the snow leopard as a 'flagship' species not only for nature conservationists, but a species benefiting them as well. More attention has to be drawn to realizing the threat that encroaching civilization is bringing to the area and to the understanding of protected areas concept as a tool for withstanding against privatization of land by non-residents and maintaining sustainable nature resource use in the traditional fashion.

* As numbered in the Strategy for Conservation of the snow leopard in the Russian Federation of Anon (2002).

2.7. Outlook & Future Expedition Work

Further research is needed to monitor snow leopard and prey population trends in the survey area. Presence-absence surveys will be repeated in the following years in the most suitable habitat areas as pointed out in the digital modeling and an account will be taken of the human impact. For this purpose the expedition base camp will operate from the place nearby the Karaghem mountain pass (Dzhelo). Finding a trail and/or relic scrape(s) is still a high priority. If either of these can be found, remote camera-trapping will be included as a survey tool. Collecting scat for DNA analysis must continue to play an important part in the research; for this purpose a search should be continued for an appropriate grant for processing the scat samples in a laboratory. 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.

2.8. Заключение

С 30 июня по 5 августа 2010 г. проведено обследование на наличие снежного барса в районе горного массива Талдуаир, Северо- и Южно-Чуйского хребтов (преимущественно в районе Карагемского перевала) и оценка подходящих для вида местообитаний. Вели поиск отпечатков лап, поскребов, экскрементов, мочи и мочевых меток. Исследования прошлых лет года дали основания считать, что в районе обитает по крайней мере одна особь. Находка лишь одного образца экскремента в 2004 году дало повод предположить, что вид покинул район горного массива Талдуаир или только временно ее посещает. Сделанные в 2005 г. находки отпечатков лап и мочевых меток указывают на возвращение в район снежного барса, что может быть связано с некоторым увеличением численности его потенциальных жертв, в первую очередь горного козла, но отсутствие подобных следов в 2006 г. (все находки были сделаны в другом районе – на СЗ от основного района исследований) позволяет предположить, что возрастающее негативное влияние оказывает беспокойство со стороны людей. В 2007 г. найдены лишь старые следы и экскременты, а предположительное снижение поголовья главных потенциальных жертв не способствует появлению тут снежного барса. В 2008 г. вообще не обнаружено каких-либо следов пребывания снежного барса, но в 2009 г. вновь обнаружены (на снежнике) отпечатки лап зверя. В этом году соответствующих следов и обнаружений не было.

Предполагается, что снежный барс потенциально может проникать на территорию горного массива Талдуаир с массивов, расположенных севернее линии, образуемой реками Бугузун-Карагай-Текелю, и входящими с состав своебразного миграционного коридора. Подобное предположение покрепляется полевыми наблюдениями и компьютерным моделированием экологической ниши снежного барса, выполненным с помощью ГИС-технологии. Отдельные признаки пребывания барса были отмечены в районе Карагемского перевала в 2009 г. В 2010 г. сюда будет перенесен базовый лагерь экспедиции, но и здесь поиски зверя дали отрицательный результат.

Оценка подходящих для вида местообитаний, расположенных на высотах в среднем 2800 м н.у.м., показала, что имеется определенный потенциал для присутствия снежного барса, чему способствует рельеф, слабая посещаемость мест скотоводами (хотя в расположенных ниже угодьях выпасание домашних животных является обычной практикой), признаки пребывания потенциальных жертв (прежде всего, сибирського горного козла и аргали, относительная численность последнего, однако, стремительно падает).

Вместе с тем, имеются признаки незаконной охоты на основных потенциальных жертв снежного барса, и снижение их численности может привести к полному исчезновению вида на рассматриваемой территории. Вместе с тем, хотя относительная численность аргали снижается, относительная численность козла за этот период испытывала как падения, так и подъемы, но это, по-видимому, никак не отразилось на количесто регистраций хищника. Тем не менее необходимо ввести запрет и/ или строгий контроль на отстрел диких копытных и придание району Талдуаир, в частности, природоохранного статуса. Кроме того, улучшение благосостояния местного населения и экологическое просвещение могут стать составными элементами комплексной природоохранной программы, целью которой станет сохранение такого флагманского для всей экосистемы вида как снежного барса.

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Please note: Each expedition report is written as a stand-alone document that can be read without having to refer back to previous reports. As such, much of this section, which remains valid and relevant, is a repetition from previous reports, copied here to provide the reader with an uninterrupted flow of argument and rationale.

3. Bird Survey

Volodymyr Tytar
I.I Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine

3.1. Introduction

It is often asserted that birds are convenient indicators of biodiversity, at least at larger scales and that they are useful for monitoring environmental change (as discussed by Furness & Greenwood 1993). One reason is that birds have long been popular with naturalists, amateur and professional, and consequently their systematics and distributions are better known than any other comparable group of animals.

A measure of the species diversity is a meaningful complementary result from a wildlife count survey. It allows managers to document the ecosystem health with reference to similar ecogeographical areas and to evaluate the biological potential of an area managed with objectives of natural resources exploitation. Under a monitoring scheme, regular information on community composition and species assemblage, combined together with a special focus on target species (harvested or flagship species, such as, for instance, the snow leopard), provides greater sensitivity to evaluate ecosystem responses to development of anthropogenic activities or to changes in management strategies (Kremen, Merenlender & Murphy 1994). Comprehensive ecological monitoring is therefore a crucial source of information to integrate both conservation and management objectives.

3.2. Methods

The abundance of birds and the diversity of their communities are difficult things to measure. The acquisition of quantitative data presents many problems, yet such data are becoming more necessary, for example in allocating categories of threat to the rarer species (Mace & Stuart 1994, Sisk et al. 1994, Bennun & Njoroge 1996).

For the purpose of measuring and comparing bird diversity, there are two broad groups of methods: those which generate a species list, perhaps with an approximation of abundance, and those which generate a species list with a quantifiable measure of abundance (for details see Bibby et al. 1992) [Russian version published in 2000]. For birds, abundance is enormously difficult to measure with any precision. A key problem is the difference between observed and real abundance. Various methods can yield data on distributions as well as abundance, but they differ considerably in the amount and types of data they produce in relation to the effort put into them. All quantitative methods are relatively time-consuming and cost-effectiveness is thus important. Using a combined measure of abundance and diversity is a widespread practice in bird surveys.

Typically, a survey consists of set of counts. The mean score for each species is regarded as an index of its abundance. Bibby et al. (2000) proposed a simple approach, in which abundance is indexed by the simple proportion of the counts in a survey in which a species is encountered. It is obvious that the commoner the species, the more likely it is to be recorded with higher frequency. For example, out of the total of 627 records of species being encountered during the surveys and recognized beyond dispute, 29 (or 4.6%) belong to the black-eared kite, one of the most common birds in the study area. On the contrary, rare species recorded only once account only for about 0.16%. The same can be assessed by using the number of surveys in which a particular species was encountered.

In general, the time horizon of the expedition survey and available logistics constrained our choice to presence-absence methodologies and those which could yield useable data in one day's sampling per transect.

The census methods we employed consisted of different transect counts (car day and foot counts). The overwhelming majority of censuses were based on direct sightings. Animals detected were identified either by the naked eye or with binoculars. For the analysis car day counts and foot counts are pooled.

Sampling units (i.e. transects) were spread over the whole study area and covered all habitat types. This network did allow for a relatively fair proportional coverage of habitat units, so we consider it to provide a representative sample of the area for a reliable estimate of bird diversity. The time to complete one transect took between 4 and 10 hours and varied around an average of 7.2 hours. The number of routes was used in our analysis as a measure of the sampling effort (as far as more than one route could be accomplished in one day, say by two separate teams). A total of 31 survey routes were accomplished between the 29 June and 5 August.

Records were entered into a datasheet after each survey in the evening of the same day.

Data analysis

The simplest and least controversial estimate of diversity is the number of species (S, species richness) in a defined area, such as a particular habitat (Magurran 1988). The total species richness of a site can only be approximated by exhaustive data collection. Even then, ‘new’ species can be added after thousands of hours in the field. However, species richness can be extrapolated in various ways from the numbers actually recorded.

Diversity was estimated by the Shannon index (entropy, *H'*), which takes into account the number of individuals (or its analogue) as well as number of taxa:

$$H' = - \sum n_i/n \ ln \ (n_i/n),$$

where n is the total number of individuals and n_i is number of individuals of taxon i. This index varies from 0 for communities with only a single taxon to high values for communities with many taxa, each with few individuals. The variance of *H'* (*Var H'*) can be used as a measure of statistical error, however the significance of differences in diversity between samples was preferably determined by using the Shannon diversity *t*-test (Hammer et al. 2008).

Of course, it is only big differences in species richness, which are likely to be useful as indicators of conservation value. However, when considering conservation priorities, species richness should, wherever possible, be combined with other measures, such as the presence of rare or restricted range species (see, for example, Usher 1986). For the local avifauna, abundance categories have been asserted using a five-point logarithmic scale (Песенко, 1982).

3.3. Results

The methods used resulted in a presence-absence data set consisting of 684 records. A total of 108 species (subspecies) were recorded (belonging to 13 orders and 35 families) (appendix 3). In 57 cases (8.3%), species were not identified (most of these were pipits, *Anthus* (17 cases), redstarts, *Phoenicurus* (8 cases), or occasional raptors, etc., or there are doubts on how reliable the identification was, particularly if only feathers were found, or birds were seen at a considerable distance). One questionable record concerned the Griffon vulture.

The following analyses of bird diversity were made:

3.3.1. Species richness & diversity.

The overall diversity of the avifauna (assessed by the Shannon index, *H'*) comprised 4.189. The Shannon diversity *t*-test has detected no differences in the diversity between samples collected in consecutive years (4.173 in 2009) (t=0.11, p>0.05).

A qualitative analysis of species diversity done by taxonomic unit (bird order and family) shows that just above a half of the species (58 out of 108, or 53.7%) are represented, as one could expect, by passerines (table 3.3a). In terms of species numbers, passerines are followed (as in previous years) by raptors (families *Accipitridae* and *Falconidae*) and waders (predominantly *Charadriidae*), composing respectively 14.8% and 8.3% of the local bird fauna. In 2010 ducks (*Anatidae*) as well comprised a noticeable portion of the avifauna (8.3%) due to frequent visits to wetlands in the area.

In general the distribution of species amongst the major bird orders remains stable as evidenced by the Chi-square statistical tests (p well above the 0.05 threshold) (see table 3.3b).

Table 3.3a. Summary of species in each taxonomic unit (bird order and family).

Order	No. of species	Family	No. of species
Passeriformes	58	Turdidae	10
		Corvidae	9
		Motacillidae	9
		Fringillidae	5
		Sylviidae	5
		Laniidae	4
		Hirundinidae	3
		Passeridae	3
		Prunellidae	2
		Alaudidae	2
		Paridae	1
		Cinclidae	1
		Emberizidae	1
		Muscicapidae	1
		Sittidae	1
		Sturnidae	1
Falconiformes	16	Accipitridae	13
		Falconidae	3
Charadriiformes	9	Charadriidae	5
		Laridae	2
		Scolopacidae	1
		Sternidae	1
Anseriformes	9	Anatidae	9
Galliformes	4	Phasianidae	2
		Tetraonidae	2
Ciconiiformes	2	Ardeidae	1
		Ciconiidae	1
Gruiformes	2	Gruidae	1
		Rallidae	1
Podicipitiformes	2	Podicipitidae	2
Pteroclidiformes	2	Pteroclidae	2
Columbiformes	1	Columbidae	1
Coraciiformes	1	Upupidae	1
Cuculiformes	1	Cuculidae	1
Gaviformes	1	Gaviidae	1
Total: orders 13		**Total: families 35**	**Total: species (subspecies) 108**

Table 3.3b. Distribution of species amongst the major bird orders for survey years 2009-2010.

Orders	2009	2010
Passeriformes	61	58
Falconiformes	18	16
Charadriiformes	15	9
Other (pooled)	22	25
Chi-square$_{2009/2010}$ = 1.601 *d.f.* = 3, *p* = 0.66		

Local and regional rarity

Different methods have been proposed for defining abundance classes. Following Песенко (1982), we use the logarithmic approach in which the upper boundary for each abundance class is defined as: $N^{a/k}$, (a=1, 2, ..., k), so the upper boundary for the rarest category in a series of five abundance classes (k =5) will be set at $31^{0.2}$ = 1.99, or approximately 2. In such a way the uniques (species that occur in only one sample) and duplicates (species known from two samples) fall into one abundance class, and in our case they comprise together 47.2% of all the recorded species. Boundaries for the remaining four abundance classes (2 to 5) are presented in Table 3.3c.

Table **3.3c.** Summary of abundances of recorded bird species (2009-2010)

Abundance classes					
1 (rare)		2 (few)	3 (moderate)	4 (common)	5 (abundant)
Data 2010					
1-2 records		3-4 records	5-8 records	9-16 records	17-31 records
uniques: 30 (27.8%) duplicates:21 (19.4%)	Total: 51 (47.2%)	17 (15.7%)	12 (11.1%)	18 (16.7%)	10 (9.3%)
Data 2009					
1-2 records		3-5 records	6-10 records	11-20 records	21-43 records
uniques: 43 (37.1%) duplicates:10 (8.6%)	Total: 53 (45.7%)	21 (18.1%)	17 (14.7%)	18 (15.5%)	7 (6.0%)
Chi-square$_{2009/2010}$ = 1.57, d.f. = 4; p = 0.81					

Amongst the most frequently encountered birds (‘abundant’ category) are the black-eared kite, Isabelline wheatear, Northern wheatear, steppe eagle *(III), ted-billed chough, white (pied) wagtail, carrion crow, Eurasian skylark, horned skylark, sand martin.

Next in abundance (‘common’) are the Altai snowcock*(III), hoopoe, rock ptarmigan, common sandpiper, greenish warbler, twite, rufous-tailed rock thrush, cinereous vulture*(I), common cuckoo, Demoiselle crane*(III), black-billed magpie, bommon stonechat, rufous-backed redstart, bluethroat, common kestrel, little ringed plover, ruddy shelduck, willow grouse.

Moderate records have been made of the common redshank, dark-throated thrush, grey wagtail, citrine wagtail, Guldenstadt's redstart, barn swallow, common tern, plain mountain finch=Hodgson's mountain finch, yellow-billed chough, Brant's mountain finch *(III), tufted duck, upland buzzard*(III).

Fewer records were made of the Black redstart, brown shrike, Daurian jackdaw, Eurasian jackdaw, long-legged buzzard, rufous-tailed shrike, spotted nutcracker, white (pied) wagtail (personata), Altai accentor, booted eagle*(I), Eurasian dotterel, hill pigeon, merlin, raven, Slavonian grebe, water pipit, willow tit.

Seven species marked with an asterisk are listed in the Red Data Book of the Altai Republic (I-IV stand for their assigned nature conservation status[1]). In 2009 there were 10 such species.

Amongst the rarest species 12 are listed in the Red Data Book of the Altai Republic: golden eagle*II, spotted eagle*II, imperial eagle*II, black stork*II, saker falcon*III, solitary snipe*II, black-throated diver*II, bearded vulture*I, great grey shrike*II, black-tailed godwit*III, white-winged scoter*III, Pallas's sand grouse*II.

Together 19 species out of 67 (or about a third) listed in the Red Data Book of the Altai Republic have been spotted by the expedition team during the survey. In 2009 there were 23 such species.

The Chi-square tests shows that variations in the figures concerning the distribution of bird species between the abundance classes observed between the consecutive survey years (table 3.3c) are statistically insignificant (*p* above the critical value of 0.05).

In general, the entire period of observation (since 2003) has revealed 215 bird species in the SE Altai and a total of 42 are listed in the Red Data Book of the Altai Republic (i.e., 62.7%).

Arbitrarily the core of the avifauna may be considered to consist of species recorded repeatedly each year or have been missing from the annual lists only once.

First and foremost these are the Altai snowcock*(III), black-billed magpie, black-eared kite, cinereous vulture*(I), citrine wagtail, common cuckoo, common kestrel, common redshank, common sandpiper, common stonechat, common tern, Demoiselle crane*(III), dipper, Eurasian skylark, golden eagle*II, grey wagtail, Guldenstadt's redstart, hoopoe, imperial eagle*II, Isabelline wheatear, long-legged buzzard, Northern wheatear, red-billed chough, rock ptarmigan, ruddy shelduck, rufous-tailed rock thrush, saker falcon*III, sand martin, white (pied) wagtail, yellow-billed chough.

[1] I – globally threatened, II – declining species, III – rare, IV – species at the edge of its home range and/or poorly known.

Secondarily, the species are the Eurasian sparrowhawk, Richard's pipit, steppe eagle*(III), tawny eagle, upland buzzard*(III), little ringed plover, black stork*ii, carrion crow, Eurasian jackdaw, horned skylark, solitary snipe*II, bearded vulture*I, willow grouse, black-tailed godwit*III, willow tit, greenish warbler, lapwing.

In total this 'core group' consists of 47 species of which about a quarter are declared protected under the Red Data Book of the Altai Republic. This data confirms the richness of birdlife in the area and the relevancy of distinguishing important bird areas (IBAs[2]) in the SE Altai, in particular AT-002 and AT-008 covered in part by Biosphere Expedition surveys (see the map below). These areas may play a vital role in preserving threatened species mentioned in the IUCN Red List, for instance, such as the bearded vulture (http://www.iucnredlist.org/apps/redlist/details/144346/0) and deserve further investigations that may be conducted hand in hand with local nature conservationists.

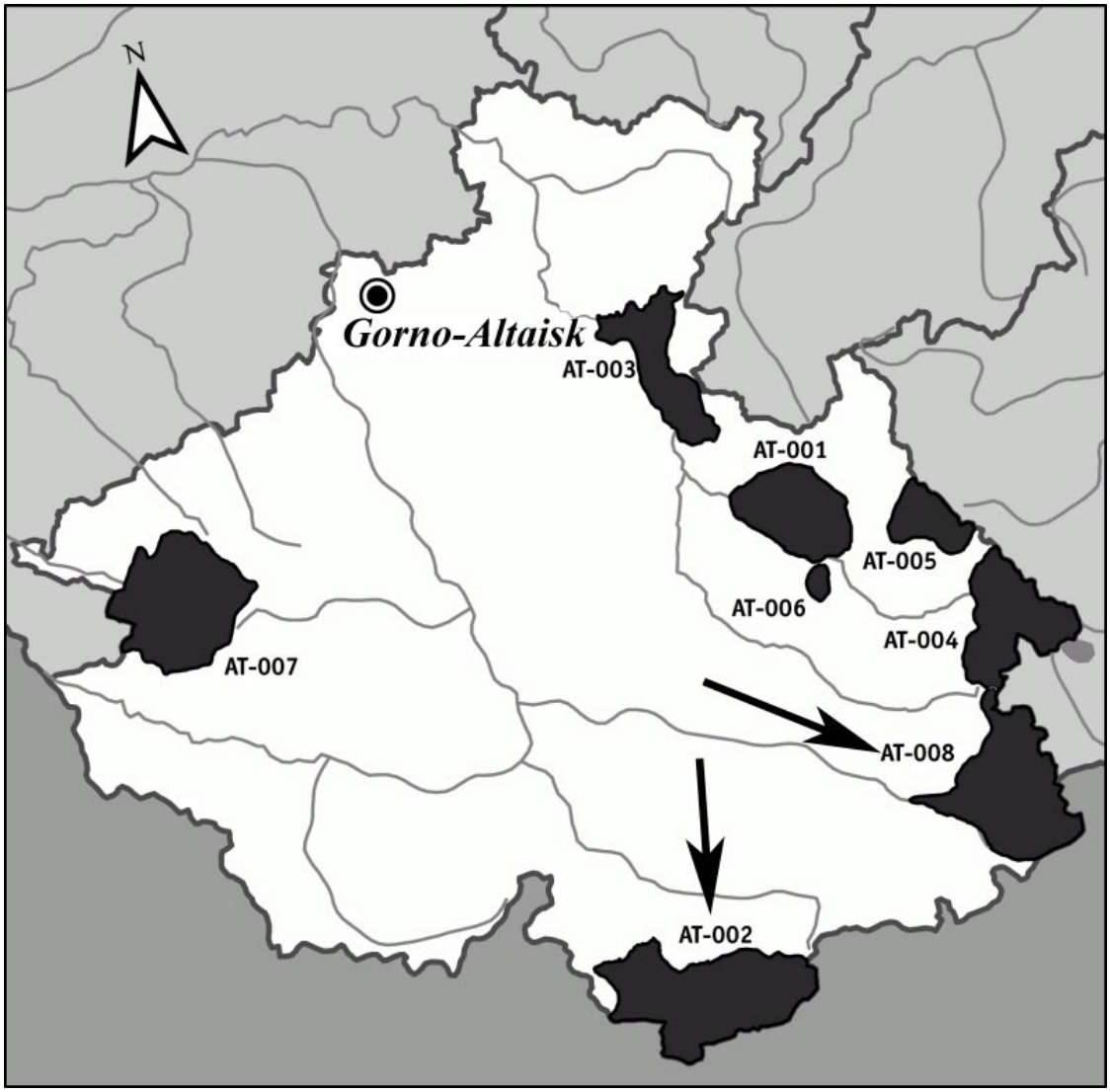

Fig. 3.3a Important bird areas (IBAs) in the Altai Republic (source: http://gis-lab.info/projects/iba-ws-rus.html)

[2] An Important Bird Area (IBA) is an area recognized as being globally important habitat for the conservation of bird populations. Currently there are about 10,000 IBAs worldwide. The program was developed and sites are identified by BirdLife International. These sites are small enough to be entirely conserved and differ in their character, habitat or ornithological importance from the surrounding habitat (see also Ключевые…2006).

The long-term trend of the diversity of the avifauna in the study area (estimated by the Shannon index) has shown (by polynomial smoothing) a general increase (Fig. 3.3b) though fluctuations do occur. Most noticeable increases (and statistically significant) took place in 2005 and 2008, compared to the previous years (t=2.29, p=0.020 and t=2.63, p=0.008, respectively), and at the moment a slight decline is being observed (from H'= 4.337 in 2008 to 4.189 in 2010; t=2.76, p=0.006). But the general pattern of the behaviour of the index which accounts both for the number of individuals (in our case these are records) as well as number of taxa is growth. The reasons behind this trend may be various and could include an array of factors ranging from the survey research design (notably moving out to previously unexplored areas) to impacts of climate change.

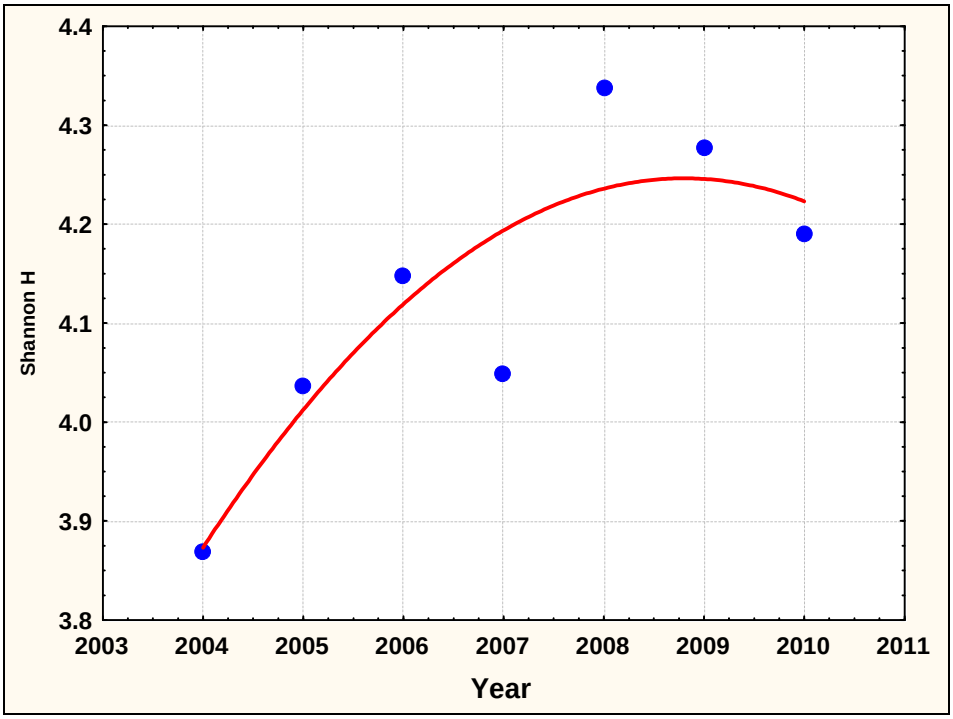

Fig. 3.3b. Long-term trend of the diversity of the avifauna in the study area (estimated by the Shannon index)

3.4. Conclusions / Заключение

1. A repeated bird species inventory in the Talduair area and areas around the Karaghem mountain pass of the Altai Republic undertaken by Biosphere Expeditions between the 29 June and 5 August 2010, involving a total sampling effort of 31 survey routes (684 records), yielded 108 species belonging to 13 orders and 35 families; in 57 cases species were not identified or there were doubts on their identification.

1. В районе горного массива Талдуаир и вокруг Карагемского перевала в Республике Алтай РФ с 29 июня по 5 августа 2010 г. проводили очередную инвентаризацию фауны птиц и учет их численности. Работа велась силами трех команд волонтеров, участников экспедиции. Общее количество маршрутов, потраченных на наблюдения, составило 31 (сумма наблюдений составила 684). В итоге обнаружено 108 видов птиц (принадлежащих к 13 отрядам и 35 семействам); в 57 случаях нужны дополнительные данные для надежного определения птиц.

2. An analysis of species diversity done by taxonomic unit (bird order and family) shows that the majority of species belong to passerine families. As in previous years, carnivores continue to make up a high-ranking diet guild, indicating a rich source of secondary production in the area capable of maintaining an array of raptor species and specialised scavengers.

2. Анализ таксономического разнообразия птиц показывает, что большинство видов принадлежит к Воробьиным. Хищные птицы продолжают составлять существенную по численности видов группу, что указывает на достаточные ресурсы вторичной продукции, способные содержать многих хищников и падальщиков.

3. 51 (or 47.2%) of the recorded species can be considered rare; 12 of them are listed in the Red Data Book of the Altai Republic.

3. 51 (или 47.2%) зарегистрированных здесь видов птиц можно считать редкими; 12 из них занесены в Красную книгу Республики Алтай.

4. 57 species belong to other abundance categories, ranging from “few” to “abundant”; 7 of them are listed in the Red Data Book of the Altai Republic. A pleasing fact may be considered the presence (even amongst birds the abundance of which has been categorized as “abundant” or “common”) of such flagship species as the Steppe eagle, or the Demoiselle crane.

4. 57 вида принадлежат к другим категориям встречаемости (от «мало» до «очень много»); 7 из них числятся в Красной книге Республики Алтай. Радует тот факт, что среди них (даже принадлежащих к категориям «много» и «обычные») встречаются такие «знаковые» для природоохраны виды как степной орел и красавка.

5. The core of the avifauna in the study region consists of 47 species of which about a quarter are declared protected under the Red Data Book of the Altai

5. Ядро орнитофауны региона состоит из 47 видов, четверть из которых числится в Красной книге Республики Алтай. Данные экспедиции

Republic. BE data confirms the richness of birdlife in the area and the relevancy of distinguishing important bird areas in the SE Altai, especially in terms of preserving, for instance, the Bearded vulture.

подтверждают правильность выделения ключевых орнитологических территорий ЮВ Алтая и их важную роль в сохранении, например, бородача.

6. Comparisons between inventories of 2009/2010 seem to confirm no significant environmental change in the study area and the validity of the approaches we have chosen for biodiversity assessment based on bird species richness, especially in terms of replicability.

6. Сравнение результатов учетов 2009/2010 гг. указывает на относительную стабильность окружающей среды в исследованном районе, а также обоснованность методов, используемых для оценки биоразнообразия, особенно в аспекте получения стабильных повторных результатов.

7. The long-term trend (2004-2010) of the diversity of the avifauna in the study area has shown a general increase. The reasons behind this trend may be various and could include an array of factors ranging from the survey research design to impacts of climate change.

8. Многолетний (2004-2010 гг.) тренд разнообразия орнитофауны в регионе показывает его общий рост. Причины этого могут быть разными: от выбора участков для проведения наблюдений до влияния климатических изменений.

3.5. References

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Please note: Each expedition report is written as a stand-alone document that can be read without having to refer back to previous reports. As such, much of this section, which remains valid and relevant, is a repetition from previous reports, copied here to provide the reader with an uninterrupted flow of argument and rationale.

4. Mammal Survey

Volodymyr Tytar
I.I Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine

4.1. Introduction

Mammal species have long been far less popular than birds with naturalists, amateur and professional, and consequently their taxonomy and distributions are poorer known.

The basic objectives and methods used for the mammal inventory are much the same as for the bird inventory. Methods we employed consisted of different transect counts (car day and foot counts). The censuses were based on both direct sightings (encounters) and signs (tracks, faeces, bones, etc.). Animals detected were identified either by the naked eye or using binoculars; signs were associated with particular species using relevant field guides (Bang & Dahlstrøm 2001, Долейш 1987, Руковский 1984, etc.). For the analysis, car day counts and foot counts were pooled. The sampling effort totaled 24 routes (accomplished between 30 June and 5 August). Records were entered into a datasheet after each survey in the evening of the same day.

4.2. Results

The methods used resulted in a presence-absence dataset (appendix 4). A total of 21 species were recorded (belonging to 5 orders and 11 families). In some cases (particularly *Muroidea gen. sp.* – 16 cases) it was impossible to identify the animals to the exact species.

The overall diversity of the mammal fauna (assessed by the Shannon index, *H'*) comprised 2.572 (2.865 in 2009). The Shannon diversity *t*-test detected differences in diversity between inventories performed in 2009 and 2010 ($t_{2009/2010}$=3.21, p<0.05), meaning an alteration in the quantitative structure of the mammal fauna in the area. Reasons for this are yet unclear. On the other hand the qualitative similarity between these inventories, assessed by the Dice measure (Hammer et al. 2008), is fairly high and reaches around two thirds (66.7%) of the species' composition.

This year there has been a significant drop in the previously fairly large proportion of Carnivora (39.2% in 2009 and 23.8% in 2010) (Table 4.2a) what may be an indication of the decreasing complexity of the local community structure and diversity of food webs (reflected perhaps, by the way, by the decreased Shannon index).

Table 4.2a. Summary of mammal species in each taxonomic unit

Order	No. of species	Family	No. of species
Carnivora	5	Mustelidae	2
		Canidae	2
		Ursidae	1
Artiodactyla	5	Cervidae	3
		Bovidae	2
		Suidae	1
Rodentia	6	Sciuridae	3
		Cricetidae	3
Lagomorpha	3	Leporidae	1
		Ochotonidae	2
Insectivora	1	Talpidae	1
Total: 5		Total: 11	Total: 21

Local and regional rarity

We follow Песенко (1982) in distinguishing the abundance classes using the logarithmic approach in which the upper boundary for each abundance class is defined as: $N^{a/k}$, (a=1, 2, ..., k), so the upper boundary for the rarest category in a series of five abundance classes (k =5) will be set at $24^{0.2,}$ which is 1.89 or approximately 2. In such a way the uniques (species that occur in only one sample) and duplicates (species known from two samples) fall into one abundance class, and in our case they comprise together 38.1% of all the recorded species. Boundaries for the remaining four abundance classes (2 to 5) are presented in Table 4.2b. In general, the distribution of mammal species between the abundance classes observed between the consecutive survey years is fairly similar (p well above 0.05).

Amongst the most abundant mammal species are the Arctic ground squirrel, Siberian ibex, red fox, Arctic or mountain hare, grey or Altai marmot, Northern pika.

Next in abundance (common) is the Daurian pika.

Moderate records were made of the wild boar.

Fewer records were made of the maral deer, roe deer, wolf, Argali sheep*I, Siberian chipmunk.

Only one species marked above with an asterisk is listed in the Red Data Book of the Altai Republic (I stands for its assigned nature conservation status).

Table 4.2b. Summary of abundances of recorded mammal species

Abundance classes					
1 (rare)		2 (few)	3 (moderate)	4 (common)	5 (abundant)
Data 2010					
1-2 records		3-4 records	5-7 records	8-13 records	14-24 records
uniques: 7 (33.3%) duplicates: 1 (4.8 %)	Total: 8 (38.1%)	5 (23.8%)	1 (4.8%)	1 (4.8%)	6 (28.6%)
Data 2009					
1-2 records		3-4 records	5-8 records	9-16 records	17-31 records
uniques: 9 (32.1%) duplicates: 2 (7.1%)	Total: 11 (39.2%)	4 (14.3%)	4 (14.3%)	5 (17.9%)	4 (14.3%)
Chi-square$_{2009/2010}$ =0.09, d.f. = 2*; p = 0.95					

*as far as some of the scores in the abundance classes are less than 5 neighbouring 2 and 3, 4 and 5 classes have been pooled into two; consequently the degrees of freedom (*d.f.*) is reduced to 2 (i.e., number of classes minus 1)

Eight of the mammal species recorded in 2010 are considered to be met rarely. Identified species in this category are the brown bear, Chinese striped hamster (recorded by BE for the first time[3]), elk, large-eared or Altai vole, mountain or Altai weasel, Northern red-backed vole, Siberian or Altai mole, stoat. Unfortunately, there have been no records of the endangered felid species, the manul.

Only one mammal species (namely, Argali sheep) out of 19 listed in the Red Data Book of the Altai Republic was recorded by the expedition team during the survey.

In general, the entire period of observation (since 2003) has yielded 43 mammal species in the SE Altai and a total of 5 are listed in the Red Data Book of the Altai Republic (i.e., 26.3%).

Arbitrarily the core of the mammal fauna may be considered to consist of species recorded repeatedly each year or have been missing from the annual lists only once.

First and foremost these are the Arctic ground squirrel, Arctic or mountain hare, Argali sheep*I, grey or Altai marmot, large-eared or Altai vole, maral deer, Northern pika, red fox, Siberian chipmunk, Siberian ibex, wild boar, wolf.

[3] The Chinese Striped Hamster, also known as the striped dwarf hamster, is a species of hamster. It is distributed across Northern Asia, from southern Siberia through Mongolia and northeastern China to northern North Korea. The species is included to the IUCN Red List of Threatened Species http://www.iucnredlist.org/apps/redlist/details/5524/0.

Secondarily, the species are the Corsac or steppe fox, Daurian pika, manul*II, Northern red squirrel, roe deer, stoat, Tolai hare.

In total this 'core group' consists of 19 species of which two are declared protected under the Red Data Book of the Altai Republic. In terms of snow leopard habitat quality the 'core group' engulfs a broad prey base consisting of both 'primary' and 'secondary' prey species, and persisting records of these species support the potential for snow leopard presence in the area.

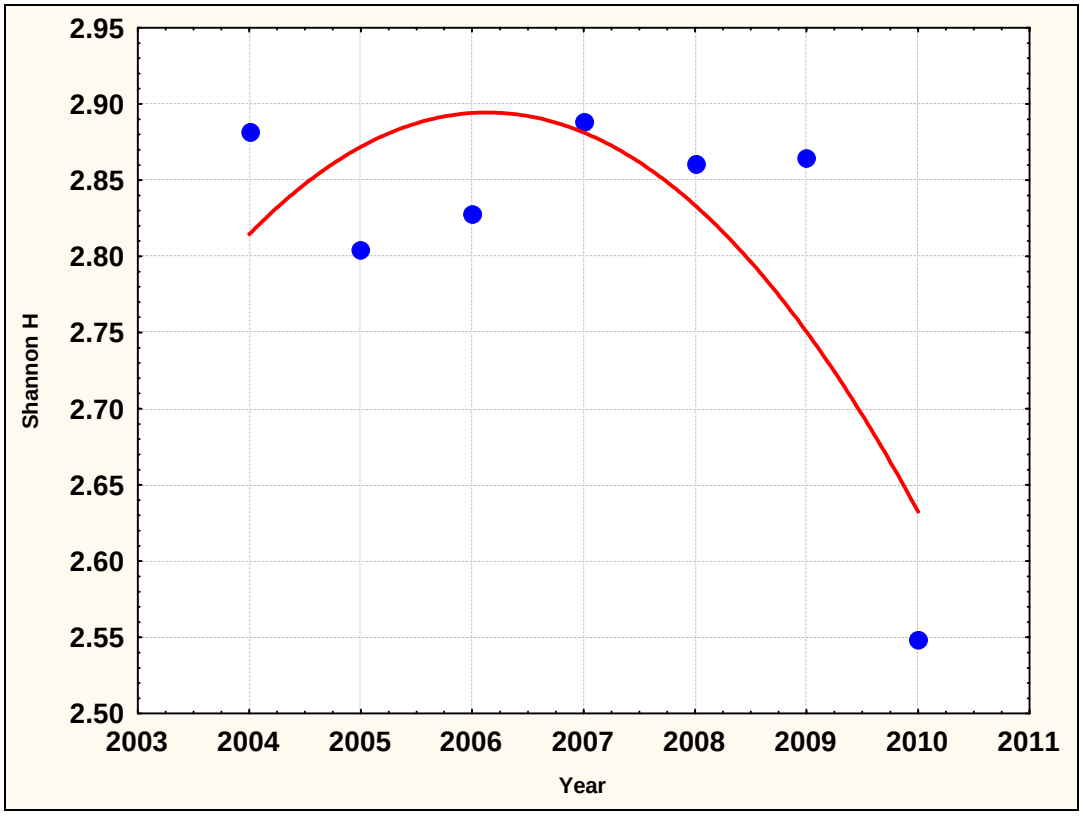

Fig. 4.2a. Long-term trend of the diversity of the mammal fauna in the study area (estimated by the Shannon index)

The long-term trend of the diversity of the mammal fauna in the study area (estimated by the Shannon index) has shown (by polynomial smoothing) a sudden drop in the last (2010) year (Fig. 4.2a). Fluctuations between 2004 and 2009 did occur, however they were not statistically significant (all *p* well above the 0.05 threshold for the *t*-criterion). As mentioned above, reasons for this are yet unclear.

Interestingly, birds have shown an overall opposite trend and the responsible reasons behind it, as already been suggested in the previous chapter, could include an array of factors ranging from the survey research design (notably moving out to previously unexplored areas) to impacts of climate change.

On the contrary, modifications of the survey research design seem to have had no effect upon the quantitative character of mammal fauna diversity in the study area. Most likely human-induced factors are responsible for this recent decline, which first and foremost (as would be expected by ecological theory) has affected the top of the trophic pyramid occupied by carnivores.

4.3. Conclusions/ Заключение

1. A total of 21 species of mammals were recorded (belonging to 5 orders and 11 families).

1. Отмечено наличие в исследованном районе 21 вида млекопитающих (принадлежащих к 5 отрядам, 11 семействам).

2. A previously fairly large proportion of Carnivora species (39.2% in 2009) has decreased to 23.8% and this may be an indication of the decreasing complexity of the local community structure and food web diversity.

2. Снизилась прежняя относительно большая доля видов отряда Хищные (39.2% в 2009 г.) до 23.8%, что может быть показателем упрощения структуры местной экосистемы и снижения разнообразия пищевых цепей.

3. Uniques and duplicates comprise together a noticeable portion of the fauna (38.1%).

3. Виды, которые наблюдались один или два раза, составляют 38.1% фауны.

4. Persisting records of mammal prey species of the snow leopard support the potential for predator's presence in the area

4. Потенциальные жертвы снежного барса обычны в исследованном районе и отмечаются ежегодно, что создает определенные трофические условия для хищника.

5. The manul since 2004 has shifted down to the "fewer" abundance category, but in 2009 had appeared in the category of rare species and the population seems to be in a steady decline. In 2010 there were no signs of the felid.

5. Положение манула, вызывает тревогу. Этот вид до 2009 г. продолжал редко встречаться. В 2010 г. его следов не обнаружено.

6. Only one mammal species out of 19 listed in the Red Data Book of the Altai Republic was recorded.

6. В 2009 г. отмечено наличие только одного из 19 видов млекопитающих, внесенных в Красную книгу республики Алтай.

7. The long-term trend of the diversity of the mammal fauna in the study area has shown a sudden drop in the last (2010) year. Most likely human-induced factors are responsible for this recent decline, which first and foremost has affected the top of the trophic pyramid occupied by carnivores.

7. Многолетний (2004-2010 гг.) тренд разнообразия фауны млекопитающих в регионе показывает его резкое падение в последний год. Этому могло способствовать влияние человека, которое задело в первую очередь верхние уровни трофической пирадимы, занятой хищниками.

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Appendix 1: SLIMS form 1.

BIOSPHERE EXPEDITIONS

Datasheet: **Altai**

SLIMS form 1: snow leopard presence/absence survey: snow leopard

Observer names		Date		Survey Block Number	

Summary of snow leopard sign observed in this survey block

Column 1 Search site number	Column 2 Type and amount of sign	Column 3 Search effort (km^2 and time)	Column 4 Dominant landscape
This is the number of the search SITE within the survey BLOCK. You should be given this number before you set out. If not, ask. Fill in one sheet for each search site.	A simple list for each discrete sign. Take GPS reading for each sign and note approximate age (new or old) into your notebook. On completing the search, total the number of each type of sign and enter below. If no sign is found enter 0 below. Sign types: PUG = pugmark (track). SC = scrape. FE = scat or feces. UR = urination. RC = rock scent spray. Age of sign: OLD = old or very old sign (> 1 month). FRE = fresh or very fresh sign (1 day to 1 month).	Note the approximate size of the area searched and the time it took to do this. Remember to note down your search start and end time!	Note the dominant landscape at each search site. PLA = plain. GROL = gently rolling (low hills and valleys without distinct ridgelines). SROL = steeply rolling (steep or very steep slopes of more than 30 m). BTER = broken terrain (land surface broken by irregular slopes, cliffs, rocky outcrops, gullies). WVAL = wide valley (wide, level floor more than 1 km wide). NVAL = narrow valley (steep sides with floor less than 1 km wide). GORG = gorge (extremely steep-sided and deep valley with cliffs and bluffs along its edges). OTH = other (describe).
	PUG		
	SC		
	FE		
	UR		
	RC		

Threats to snow leopard

Comments

SLIMS form 1: snow leopard presence/absence survey: prey species

Information on prey species is obtained in two ways: Interviews with locals and noting all species observed or their sign. Because animals may be disturbed while searching for snow leopard sign, a separate morning or afternoon should be devoted to searching for prey animals. If at all possible the same groups should search for snow leopard sign *within the same search site* and then for prey species and use this one form to record results for both searches. From prominent ridges or hill tops, but well-hidden from view, scope the area with binoculars. When using the same search site, be aware that prey species use less rugged terrain such as a wide valley or gently rolling hill slopes.

Observer names		Date		Survey Block Number	

Summary of prey species and their sign observed in this survey block

Column 1 Prey species	Column 2 Type and amount of sign	Column 3 Relative abundance	Column 4 Threats
Ibex, Argali, Red deer, Musk deer, Wild boar, Marmot, Pika, Hare, Rabbits, Game birds (including Altai snowcock).	Kind of evidence and amount. Kinds of evidence are INT = interview (describe). OBS = observation by researchers (describe numbers, behaviour etc). SIG = sign (describe what kind of sign and deductions made from sign).	Record, for example, the number of herds seen at the search site or the number of days a particular species or sign was seen. Also note your observations and opinion on whether the prey species populations are low, average or high and give reasons.	Is there evidence of poaching? If so, how widespread is it, who is involved and where are products sold? Also record information on livestock that may be competing with prey species. If possible, interview locals to learn how much predation there is on prey species and livestock (but exercise caution when asking questions and interpreting responses).

Comments

Appendix 2: Interview datasheet.

DATASHEET: RECORDING INTERVIEWS

ALTAI

You will be visiting local people to find out about their attitudes to and sightings of snow leopards and other wildlife. These interviews will be conducted in Russian and translated to you as they happen. It is your job to make sure that all topics on this sheet are covered and all questions asked as far as possible.

However, interviews will be conducted in a very informal, "chatty" way as formal interviews with datasheets tend to result in inaccurate information. This is because as soon as an interviewee sees a formal datasheet and is asked questions in a very rigid way, he or she is likely to become tense and will attempt to second-guess what answers the interviewer would like to hear, rather than give his or her true opinion. This effect can be avoided by having a very informal chat which nevertheless covers all the topics.

Guidelines

1. Be relaxed, friendly, chatty.
2. Take pictures only after asking for permission and then only a few.
3. Keep the datasheet out of sight as much as possible.
4. You can glance at the datasheet or record the questions in your notebook beforehand to make sure they are all covered. If necessary, prompt the interviewer to make sure this is done.
5. Immediately after the interview and out of sight of the interviewee, discuss the datasheet and record the answers, using your judgment.
6. Discuss the datasheet in the evening with scientific staff as part of the filling in datasheet activity and make changes as necessary.

INTERVIEW CONDUCTED BY: **DATE OF INTERVIEW:**

PERSONAL INFORMATION ABOUT THE INTERVIEWEE

Sex:

Age:

Place of residence (name of community):

Place of birth (region):

Occupation:

If you are a livestock owner/raiser, what kind of animals do you have?

Sheep Goats Cows Horses Other

INFORMATION ABOUT SNOW LEOPARDS AND OTHER WILDLIFE

Which of the following statements best describes your feeling towards snow leopards?

Strongly dislike Dislike Indifferent
Like Strongly like

The presence of snow leopards for you is

A good thing
A bad thing
You are indifferent

Have you ever seen a snow leopard?

No
Yes, when _____ and where _____

How many snow leopards do you think live in the region?

_____ number

Are snow leopards protected in Russia?

Yes
No
Don't know

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
snow leopards have a considerable impact on large game (argali, ibex, etc.)	1	2	3	4	5
snow leopards have a considerable impact on small game (marmots, susliks, etc.)	1	2	3	4	5
snow leopards reduce populations of argali and ibex to unacceptable levels.	1	2	3	4	5
snow leopard attacks on humans are more frequent in regions where snow leopards live in close proximity to humans.	1	2	3	4	5
In regions where snow leopards live in close proximity to livestock, they feed primarily on domestic animals.	1	2	3	4	5
We already have enough snow leopards in the region.	1	2	3	4	5

If snow leopards attracted more tourists to the region, this would be

A good thing
A bad thing
You are indifferent

Comments (record any other useful/interesting information here)

Appendix 3: Bird species recorded by Biosphere Expeditions in the Altai (2010). Names and classification following Cramp, S and Simmons, K E L (eds.) (2004), BWPi: Birds of the Western Palearctic interactive (DVD-ROM). BirdGuides Ltd, Sheffield.

English name	Scientific name	Русское название	Nature conservation status in the Red Data Book of the Altai Republic. Природоохранный статус в Красной книге Республики Алтай
Alpine accentor	Prunella collaris	альпийская завирушка	
Altai accentor	Prunella himalayana	гималайская завирушка	
Altai snowcock	Tetraogallus altaicus	алтайский улар	III
Barn swallow	Hirundo rustica	деревенская ласточка	
Bearded vulture	Gypaetus barbatus	бородач	I
Black bellied sand grouse	Pterocles orientalis	чернобрюхий рябок	
Black redstart	Phoenicurus ochruros	горихвостка-чернушка	
Black stork	Ciconia nigra	черный аист	II
Black-billed magpie	Pica pica	сорока	
Black-eared kite	Milvus lineatus	черный коршун	
Black-headed gull	Larus ridibundus	озерная чайка	
Black-tailed godwit	Limosa limosa	большой веретенник	III
Black-throated diver	Gavia arctica	чернозобая гагара	II
Bluethroat	Luscinia svecica	варакушка	
Blyth's pipit	Anthus godlewskii	конёк Годлевского	
Booted eagle	Aquila pennata	орел-карлик	I
Brant's mountain finch	Leucostichte brandti	жемчужный вьюрок	III
Brown shrike	Lanius cristatus	сибирский жулан	
Buff-bellied pipit	Anthus rubescens	американский конёк	
Carrion crow	Corvus corone	черная ворона	
Chiffchaff	Phylloscopus collybita	пеночка-теньковка	
Cinereous vulture	Aegypius monachus	черный гриф	IV
Citrine wagtail	Motacilla citreola	желтоголовая трясогузка	
Common cuckoo	Cuculus canorus	кукушка	
Common kestrel	Falco tinnunculus	обыкновення пустельга	
Common redshank	Tringa totanus	травник	
Common sandpiper	Actitis hypoleucos	перевозчик	
Common starling	Sturnus vulgaris	обыкновенный скворец	
Common stonechat	Saxicola torquata	черноголовый чекан	
Common teal	Anas crecca	чирок-свистунок	
Common tern	Sterna hirundo	обыкновенная крачка	
Coot	Fulica atra	лысуха	
Dark-throated thrush	Turdus ruficollis	темнозобый дрозд	
Daurian jackdaw	Corvus dauuricus	даурская галка	
Demoiselle crane	Anthropoides virgo	красавка	III
Dipper	Cinclus cinclus	оляпка	
Dusky warbler	Phylloscopus fuscatus	бурая пеночка	
Eurasian dotterel	Charadrius morinellus	хрустан	
Eurasian goosander	Mergus merganser	большой крохаль	
Eurasian jackdaw	Corvus monedula	обыкновенная галка	
Eurasian nuthatch	Sitta europaea	обыкновенный поползень	
Eurasian skylark	Alauda arvensis	полевой жаворонок	
Eurasian sparrowhawk	Accipiter nisus	перепелятник	
Golden eagle	Aquila chrysaetos	беркут	II
Great crested grebe	Podiceps cristatus	большая поганка	
Great grey shrike	Lanius excubitor	серый сорокопут	II
Great rosefinch	Carpodacus rubicilla	большая чечевица	
Greenish warbler	Phylloscopus trochiloides	зеленая пеночка	
Grey heron	Ardea cinerea	серая цапля	

Grey partridge	Perdix perdix	серая куропатка	
Grey wagtail	Motacilla cinerea	горная трясогузка	
Guldenstadt's redstart	Phoenicurus erythrogaster	краснобрюхая горихвостка	
Herring gull	Larus argentatus	серебристая чайка	
Hill pigeon	Columba rupestris	скальный голубь	
Hoopoe	Upupa epops	удод	
Horned skylark	Eremophila alpestris	рогатый жаворонок	
House martin	Delichon urbicum	городская ласточка	
House sparrow	Passer domesticus	домовый воробей	
Hume's warbler	Phylloscopus humei	тусклая зарничка	
Imperial eagle	Aquila heliaca	могильник	II
Isabelline wheatear	Oenanthe isabellina	каменка-плясунья	
Lapwing	Vanellus vanellus	чибис	
Little ringed plover	Charadrius dubius	малый зуек	
Long-legged buzzard	Buteo rufinus	курганник	
Mallard	Anas platyrhynchos	кряква	
Merlin	Falco columbarius	дербник	
Northern shoveller	Anas clypeata	широконоска	
Northern wheatear	Oenanthe oenanthe	обыкновенная каменка	
Pallas's reed bunting	Emberiza pallasi	полярная овсянка	
Pallas's sand grouse	Syrrhaptes paradoxus	саджа	II
Pine grosbeak	Pinicola enucleator	обыкновенный щур	
Plain mountain finch=Hodgson's mountain finch	Leucosticte nemoricola	гималайский вьюрок	
Pochard	Aythya ferina	красноголовый нырок	
Raven	Corvus corax	обыкновенный ворон	
Red crested pochard	Netta rufina	красноносый нырок	
Red-backed shrike	Lanius collurio	обыкновенный жулан	
Red-billed chough	Pyrrhocorax pyrrhocorax	клушица	
Richard's pipit	Anthus richardi	степной конек	
Rock ptarmigan	Lagopus mutus	тундряная куропатка	
Rock sparrow	Petronia petronia	каменный воробей	
Rook	Corvus frugilegus	грач	
Ruddy shelduck	Tadorna ferruginea	огарь	
Rufous-backed redstart	Phoenicurus erythronotus	красноспинная горихвостка	
Rufous-tailed rock thrush	Monticola saxatilis	пестрый каменный дрозд	
Rufous-tailed shrike	Lanius isabellinus	буланый сорокопут	
Saker falcon	Falco cherrug	балобан	III
Sand martin	Riparia riparia	береговушка	
Siberian chiffchaff	Phylloscopus collybita tristis	пеночка-теньковка	
Slavonian grebe	Podiceps auritus	красношейная поганка	
Solitary snipe	Gallinago solitaria	горный дупель	II
Spotted eagle	Aquila clanga	большой подорлик	II
Spotted flycatcher	Muscicapa striata	серая мухоловка	
Spotted nutcracker	Nucifraga caryocatactes	кедровка	
Steppe eagle	Aquila nipalensis	восточный степной орел	III
Tawny eagle	Aquila rapax	степной орел	
Tawny pipit	Anthus campestris	полевой конек	
Tufted duck	Aythya fuligula	хохлатая чернеть	
Twite	Acanthis flavirostris	горная чечетка	
Upland buzzard	Buteo hemilasius	мохноногий курганник	III
Water pipit	Anthus spinoletta	горный конек	
White (pied) wagtail	Motacilla alba	белая трясогузка	
White (pied) wagtail_personata	Motacilla personata	маскированная трясогузка	
White-capped water redstart	Chaimarrornis leucocephalus	белошапочная горихвостка	
White-winged scoter	Melanitta deglandi	горбоносый турпан	III
White-winged snowfinch	Montifringilla nivalis	снежный вьюрок	
Willow grouse	Lagopus lagopus	белая куропатка	
Willow tit	Parus montanus	буроголовая гаичка	
Yellow-billed chough	Pyrrhocorax graculus	альпийская галка	

Appendix 4: Mammal species recorded by Biosphere Expeditions in the Altai (2010).

English name	Scientific name	Русское название	Nature conservation status in the Red Data Book of the Altai Republic. Природоохранный статус в Красной книге Республики Алтай
Arctic ground squirrell	Citellus undulatus	длиннохвостый суслик	
Arctic or Mountain hare	Lepus timidus	заяц-беляк	
Argali sheep	Ovis ammon	горный баран, аргали	I
Brown bear	Ursus arctos	бурый медведь	
Chinese striped hamster	Cricetulus barabensis	даурский хомячок	
Daurian pika	Ochotona daurica	даурская пищуха	
Elk	Alces alces	лось	
Grey or Altai marmot	Marmota baibacina	серый, или алтайский, сурок	
Large-eared or Altai vole	Alticola macrotus	большеухая горная полевка	
Maral deer	Cervus elaphus	марал	
Mountain or Altai weasel	Mustela altaica	солонгой	
Northern pika	Ochotona alpina	алтайская пищуха	
Northern red-backed vole	Clethrionomys rutilus	красная полевка	
Red fox	Vulpes vulpes	обыкновенная лисица	
Roe-deer	Capreolus capreolus	косуля	
Siberian chipmunk	Eutamias sibiricus	бурундук	
Siberian ibex	Capra sibirica	сибирский горный козел	
Siberian or Altai mole	Talpa altaica	сибирский крот	
Stoat	Mustela erminea	горностай	
Wild boar	Sus scrofa	дикий кабан	
Wolf	Canis lupus	волк	

Appendix 5: Expedition leader diary by Andy Stronach & Kathy Gill.

22 June

Dear Altai expeditioners

This is the first diary entry for the 2010 Biosphere expedition to the golden mountains of Altai in search of snow leopard.

This is just a quick note from Andy & I to let you know that we in the midst of preparing for this year's Altai expedition and about to head off to Novosibirsk where we look forward to seeing you.

We will be e-mailing more once we have taken possession of the Land Rovers, made sure the Russian mobile is still working, re-stocked supplies, etc. and things are all set up for your arrival.

For now, just a quick word about the 2009 expedition report and the 2010 base camp location. Our scientist Volodya has only just managed to finish his draft report and we have not had time to make this into a full-blown Biosphere Expeditions report. Please could you all berate Volodya once you meet him and tell him to hand in his report a lot earlier next time :) For now and so that you have the latest information, please find attached the draft reports for you to study and learn by heart before you arrive ;)

Finally, about the base camp. Those of you who have been to the Altai before, know our tried and tested camp location. This year we were hoping to change location to open up more survey areas, but it's been a very harsh winter, even by Siberian standards, and several roads and bridges have not survived. Our scouts also tell us that there's also still a lot of water in the rivers. All this means that we will be in our normal, tried-and-tested (and also very beautiful) location for slot 1. We will also use slot 1 to scout out other locations and then move base in between slots. Or we may not - it all depends on what the situation is like when we get there. A good example of expedition life - and the 'stay flexible' moto...

I hope your preparations are going well and you all have your paperwork in place! We look forward to seeing you at the Hotel Sibir in due course.

Kathy Gill
Strategy Director
Biosphere Expeditions

23 June

Kathy Gill and myself meet at Heathrow airport in London and jet off to Moscow, the aircraft groaning under the weight of our bags full of equipment for the expedition. It's taken a long time to prepare; in Russia, unexpected events are the norm (which is all part of the fun), but hopefully we have most eventualities covered so that we can spend our time in the mountains. It would be great if everyone who is coming on the expedition could make sure they have everything on the kit list so we can just get stuck into the fieldwork.

Since I was last there, Moscow's Sheremetyevo airport seems to have been completely re-built and it is thankfully, far more user friendly and less time consuming. Unlike previous times I have been at Sheremetyevo I did not need to change terminals between my international and domestic flights; I don't know if this always applies, but check before you go rushing off to a domestic terminal.

23 June

We had an overnight flight to Novosibirsk and the early morning, as we descended was stunningly beautiful. Thee was a very thin layer of mist at ground level stretched out like silk with woods and small groups of birch trees bathing their heads in the warm morning glow, magical.

We checked into Hotel Sibir and then commenced on a day filled with getting our two brand new Land Rovers (which we will need to take great care with), getting the paperwork sorted out, buying snow chains, etc. etc.

In the evening we interviewed some students, the best of which will be joining us on the expedition on studentships. They will assist us in our work, gain experience and let others know about snow leopards, nature conservation and the work we do. This should be a great opportunity for a bit of cultural exchange too.

24 June

More shopping for medical supplies (please make sure you all have a good personal medical kit with you), batteries, duct tape, more tape (every good expedition needs lots of tape!), etc. etc.

I have a mobile phone for expedition use, the phone number is +7 983 308 0124, please note that this is a different number from previous years. This number should only be called in cases of emergency and please be aware that due to the expedition working in remote areas, it is probable that you will not get me and a reply will normally take a considerable time.

I look forward to meeting everyone on slot one; I will be in the reception area of Hotel Sibir at 1930 on Sunday evening where I will brief everyone on the journey to base camp. After, if you like, we can go all for a meal at a local restaurant. It will be great to meet you all at last and set off for the Golden Mountains, can't wait!

26 June

Spent the day shopping in Novosibirsk and taking one of our Land Rovers to the garage. The Land Rover lost power occasionally and cut out twice, hopefully it was just dirty fuel that should eventually flush out, however, the mechanics had it all hooked up to computers to give it a thorough check before we head off.

27 June

Happy birthday to Novosibirsk, happy birthday to Novosibirsk…

Kathy headed off with Oleg to Gorno Altisk so she can meet with university personnel tomorrow. Volodia, our expedition scientist, arrived from Kiev this morning, soon after, he, Masha, Mila and I went to meet Alexander of the Siberian Environmental Centre. We discussed the work he and we were doing, how we could help each other, other NGO's working in the area; all very interesting and useful. Afterwards, we went for a walk in the botanic gardens where I was savaged by mosquitos and a few fairly large trees had been savaged and felled by beavers; impressive.

In the evening I met all of team 1, sorted out paperwork and then we all went out for a meal together which was a great opportunity to start to get to know everyone.

Got back to the hotel afterwards just in time to get a great view of the city's birthday celebration fireworks, spectacular!

28 June

Happy birthday to me, happy birthday to me….

With everyone packed and ready to go, we were first into the dining room for breakfast when the doors opened. After a breakfast big enough to last us the entire expedition, we set off in our Land Rover and mini bus. I drove the first section through the sometimes crazy drivers of Novosibirsk, till we reached the quieter countryside where Uwe and later Simone took over; I was delighted to see they were both competent and careful drivers. Lunch was at the honey market where we had piroshkis – very traditional Russian 'pies' filled with either potatoes, cabbage, liver or eggs and onions, all delicious. Dessert was bliny (pancakes) filled with either strawberries or cherries; wow, they were good :) Soon after, we crossed into the Altai Republic and then into Gorno Altaisk where we met Kathy and Oleg. Here, we registered with the authorities, eventually….. and then continued to Mikhailovo where our driving for the day stopped and my birthday fun started. At dinner, Volodia produced some chocolate liquors which we shared and Madeline gave me a mountain of Toblerone chocolate which she had carried all the way from Switzerland, but even better, we danced Tango – didn't think that was going to happen in Altai! We rounded off a great day with a banya (sauna) and off to bed in the quiet of the countryside

29 June

Mikhailovo to base camp.

Headed off after breakfast, Uwe and Simone driving to get more practice with the Land Rovers before we start doing off-road driving. Driving up the Seminsky pass, the roadside verges were spectacular, filled with flowers. Though not fully out, there were butterballs, aquilegia, roses, bluebells, spirea, sauceria, ranunculus, rumex and with apologies to Christine for forgetting what she taught me, many others. When there is a wet spring in Altai, the wildflowers can later be absolutely spectacular, totally carpeting the land in great swathes of blues, yellows, oranges and purples; I think it may have been a wet spring :) We had great luck in seeing a golden eagle land right at the side of the road, only about 20m from the vehicles where it was eating a ground squirrel or souslik, amazing to be able to see it so close. We crossed the

Chiki Taman pass, the second and final for the day, thereby crossing a sub bio-geographical zone boundary; the change was dramatic in the space of only a few kilometres: before the pass, lush and green whilst after, drier, rockier, browner. Before the pass the people were almost exclusively of European appearance, whilst after, Mongolian. Now, we are heading to Kosh Agach, the last town before we arrive at base camp, hopefully I'll be able to post this diary entry from there ;)

30 June

Well, as you see, the Kosh Agach internet facility is as reliable as ever….. After arriving at base camp last night and being fed lovely soup by Nina, we all went to bed and slept like logs, despite the sub-zero temperatures. Because of the long and exhausting drive of the past two days, we had a late breakfast before getting stuck into the training day. First, Volodia took Claire, Anja and Madeline for a walk in the forest, looking for sign of animals, whilst Simone and Uwe learnt some off road driving with me. We practiced driving up and down steep and loose slopes, marshalling and crossing rivers and boulder fields. It was fantastic at the end of the training to watch Simone marshalling Uwe across boulders, round a sharp corner and finally up a steep loose slope close to the limits – very competent and impressive; we are in safe hands :)

We started the afternoon, with the health and safety briefing, then navigation (map, compass, GPS) and finally, Volodia completed the training day with a session on the science; what we plan to do, how we do it, why we do it and who uses what we produce.

1 July

Volodia went with Kathy, Simone, Uwe, Anja, Alexi, Anton and Oleg to a valley near the winter station to carry out the first survey of the expedition. The weather could have been a little better (it was pouring with rain and cold for most of the time they were out!) but the persevered with the survey and were rewarded with a fantastic display of wild flowers which are particularly good in this valley and particularly good in general this year. Meanwhile, Claire, Madeline, Masha and Anton went with me to survey the lakes in the steppe for birds, this went very well. As well as having much better weather than Volodia, there were lots of great birds such as black tailed-godwit, slavonian grebe, white-winged scoter, citrine wagtail, demoiselle crane, teal, red-crested pochard, ruddy shelduck and black crane to name but a few.

Andy

2 July - Yurt interview

We woke to another very wet day so decided against heading up a mountain and instead set off to do some interviews at yurts. Yurt interviews are an integral part of the expedition survey methodology, where we interview locals to find out their views towards Snow Leopards and other animals and whether they have seen any. We set off up the Buguzon river valley; with Simone and Uwe at the wheels, we crossed the river with ease even though it was higher than normal and the river bed had been drastically altered with the spring melt water spates. A little further on, where it was very wide, the river bed was almost full of ice well over a metre thick. Abi and Gulinara are good friends of the expedition and I was disappointed to see their yurt spot by the river at the end of a very beautiful valley was unoccupied. Other yurt locations were similarly empty; I thought it and Volodia said that perhaps we would not find any yurts at all in the valley…. We passed many memories on the way; a pool on the river where we frequently saw locals fishing for the wonderful silvery grayling that fill the clean mountain rivers and a small standing stone carved with the face of a man from some unknown past.

All was not lost however and just past the petroglyph we spotted a yurt, the only trouble was how to get to it – it was at the other side of the river. After due consideration of water depth, size of rocks on the river bed, necessity of crossing and a whole host of other things we decided on plan B :-) Plan B materialised a couple of kilometres up the valley where there were two yurts; Claire, Simone, Volodia and I crossed a small river and went to one yurt whilst everyone else went to the other. We were greeted with great hospitality, which is wonderfully normal here. We were invited into the yurt and were given bowls of tea and lovely 'olive' bread onto which we spread a slice of cream – the thickest and tastiest cream ever :-) Volodia, being the only Russian speaker in our group wove all the questions we had for our interview into the conversation which was delightful.

Unfortunately, there was no-one at home at the other yurt, so after lunch, we all headed off, up a nearby valley to survey it. There was very little in the way of sign of animals, but the wild flowers were spectacular and we found a few big mushrooms which we brought back for Nina to work her culinary magic on.

On the way back, we stopped at Campii Petrovich's yurt and arranged to have dinner there on our last day. Campii was in the mood for a bit of bartering and offered us a bucket full of lovely, freshly caught grayling fish (which his kids were battering each other with) in exchange for 20l of petrol; unfortunately we didn't have any petrol - tenderized grayling could have been good!

3 July - Koshalu and Kosh Agach steppe lakes

On the steppe, around Kosh Agach, there are many small lakes, on which we have noticed birds as we whizz past en-route to base camp, but we have never surveyed them; this was the day. Claire, Madeline, Masha and I set off, binoculars and bird guides in hand. Just after passing Kokoria, on a telegraph pole, I noticed a small falcon, which turned out to be a Merlin, which got Claire all excited as she had not seen one before. Throughout the day, we covered the steppe from Kokoria to Kosh Agach and a little beyond, stopping at most of the myriad small lakes on the way. White-winged scoters are a rare duck with a pretty lumpy head; we have only seen these birds once before, but by the end of the day, we had seen around 20 dotted around the lakes, singly or in small groups.

Meanwhile, Volodia had taken the rest of the group up Koshalu Mountain which is by base camp. This is one of my favourite mountains in the area and the views from the top, over the steppe are spectacular. Fortunately, the weather was good and everyone had a great day, Volodia managing to spot a couple of Ibex too.

4 July - Base Camp to Tapduair

Snow Leopards range over very large areas, so we need to do the same to survey them and the habitats that they may choose to live in. There are a couple of survey routes we can walk from camp, others start after a drive of perhaps an hour, but areas that are much further away require us to stay away overnight; Tapduair is one of these.

After breakfast, we packed the Land Rovers with the team, tents, a large pile of food and most importantly, Nina our magician/cook. We headed off round the mountain massif from our north-west side, to the eastern side with its amazing views of glacier and snow clad mountains of the Chichova range that mark the border with Mongolia. Just before reaching our overnight camp site, we stopped on a small hill top and had lunch in the sun, enjoying the panoramic views from Tapduair with its corniced peak and turquoise glacial lake filled valleys behind us, across the undulating green and gold valley in front of us, to beckoning Chichova and its tempting peaks and unknown treasures of wildlife.

On arrival at our camp, first order of business was to set up Ninas kitchen tent, however, the poles were missing….. Fortunately, poles from one of the other tents fitted some of the pockets, ever useful duct tape came into it's own and with the Land Rovers providing protection from the wind, we were in business.

In the afternoon, we surveyed a lake very close to camp. We found tracks of Argali nearby, around 6 animals, both adults and young; this was the first record of this endangered red data book species for the expedition this year, a great find. On the lake, there were a couple of families of Ruddy shelduck, along with their young; around 25 lovely little fluffy blobs paddling around in the middle of the lake, no more than a week or so old. A passing black-eared kite had a differing view of the chicks; around 25 lovely little fluffy snacks paddling around in the middle of the lake, with no more than a week's experience of escape and evasion. However, despite many passes where the kite tried to snatch a chick from the water, all that it got was a splash in the face as the chicks disappeared beneath; a gripping drama.

After dinner, we went to the top of a hill by camp to watch the sun go down over Mongolia. The views were spectacular, but even better, we found a dotterel and its chick on the hilltop which allowed us to approach very close. This wading bird was beautifully marked and had a fantastic burnt umber coloured breast; lying on the ground, I got some great photos of this wonderful bird with the Mongolian mountains in the background :)

5 July - Tapduair mountain

After an early breakfast, we split into three teams to survey the ridges and valleys of Tapduair's eastern side. Anton and Alexi went with Volodia up one ridge and found a group of about 12 Siberian Ibex. Claire, Madeline and Kathy headed up a valley with 3 beautiful turquoise glacial lakes and saw another group of about 9 Siberian Ibex. Simone, Uwe, Anja, Masha, Oleg and I went up the north east ridge. At the top of the ridge, I wondered if the Ibex in the valley below might be frightened up towards us by Madeline, Claire and Kathy, so I got us into a position where we could get a good close view of them if they came across the ridge at the saddle we were at. It almost worked, but unfortunately, Claire told us they crossed at the next saddle up the ridge from where we were, ho hum, next time maybe! We scoured Tapduair's cliffs for animals with our binoculars, but found nothing, so moved a little and searched the great valley to the north. Anja spotted some odd looking rocks which were in fact more Ibex, a big group of about 25. We watched the Ibex for around an hour as they moved from their resting depressions which we could see with the naked eye from about 2km away; light coloured patches against darker ground. Some Ibex moved from their resting slope to a stream to drink, others to a grassy area to feed, it was wonderful to be able to watch them undetected from our cliff top location and see them behaving naturally.

6 July - Bailukien Lakes and Chornie Mountain

Back at base camp and after one of Nina's enormous breakfasts, we waddled into the vehicles and set off to the north. With Simone and Uwe driving, we made good and safe progress, crossing the wide and fairly deep Bugozon river and then heading up Bailukiem valley. Anja, along with Alexi and Oleg were to climb Mount Chornie – black mountain to scour it's slopes for signs of Snow Leopard or other animals, so they continued up the valley towards the mountain as we paused at one of the many lakes to check it for birds; some nice birds, but nothing exceptional. A couple of lakes further on however, we found a black-throated diver which is a red data book endangered species for Altai, so this was a great find. Further along the valley, the 'road' (!) got steadily worse and progress steadily slower, but there were fantastic flower fields along the way so no-one complained. Suddenly Uwe shouted 'Shrike', we all looked and got a brief glimpse of grey, black and white bird disappearing into the dwarf birch that covered the roadside slope; but the glimpse was enough to identify the bird which, this was lucky because even after spending some time searching, we never saw it again – a new species record for the expedition :)

At the valley's watershed, we stopped for lunch and then split into two teams. Along with Volodia, Anja, Claire, Madeline and Anton surveyed a valley, whilst Simone, Uwe, Kathy and I headed up a ridge. We had only gone 50m when we spotted lots of mole hills, unusual animals to find in this area that is so harsh in the winter. The next surprise was a couple of lizards, one of which I managed to catch and Simone managed to photograph. These were viviparous lizards, giving birth to live young as the climate here is too cold for reptiles that lay eggs. Next was a little gully that was full of sign from ptarmigan along with some of their pristine white feathers. Our ridge was steep and followed the edge of a cliff. On reaching the top, the views were 360 degree panoramic, giving us a huge area of good animal habitat to check with our binoculars, we spent lots of time checking, but surprisingly, found nothing, perhaps the two rifle cartridges we found on the way up had something to do with that.

7 July - Glacial lake valley Survey

Volodia took most of the team up a valley nearby base camp; first the valley is filled with Siberian Larch, then this changes to shorter vegetation and finally to little vegetation and lots of rock. The team split high up the valley with most heading up to a hanging valley and it's glacial lake where a Lammergeyer Vulture and it's nest were seen on the cliffs above. Meanwhile, Volodia and Madeline continued up the valley where they disappointingly found a hunters hide built from stones. This position gave commanding views of the head of the valley…

Meanwhile, Kathy and myself headed off to the Taldura river valley, almost 100 miles from base camp, to check the access to what will hopefully be our base camp for slot 3. One route which would have given a shorter access route was impassible; at one point, to get to a bridge over a river, there was a huge river in the way! Another access route had a bridge that had been destroyed by the excesses of the Russian winter, however another route looks good with just one small river crossing which should be fine. This new camp is actually by the Jyelo river, a short distance from the Taldura river valley at the edge of a Siberian Larch forest and is every bit as beautiful at our current base camp. The habitat is very different though with big alpine mountains and valleys, much large forests, but no steppe.

8 July - Day off!

We all drove across the steppe to Kokoria to meet the history teacher for a day visiting archaeological sites, which are everywhere and to learn a bit about the people of Altai. We started at Kokoria's little museum which was very interesting, complete with a replica yurt, a bit prettified, but quite similar to the yurts we have visited. We were told about the animals, plants, rivers and mountains, all of which have spirits, like the Maral deer that is the spirit of the sun and how all Altaians respect all in the wild. We talked about threats to the wild and I in my naivety asked if there was anything we could do to help protect the wilds of Altai; Altai would look after itself I was told. White water rafters die, helicopter borne hunters who shoot animals from the air crash and die. There were artifacts from many different peoples, the Huns, the Sythians and many more.

We then drove for 15 min to two stone circles. A big circular pile of stones in the centre was a representation of the world and surrounding that and about 200m in diameter, the universe was represented by a circle of stones. The history teacher said that some tourists did not follow the rules; I asked what the rules were –'be quiet, that is all'.

Another 20 min drive and we were at a big stone stella, covered in petroglyphs; there was some writing that looked like runes, it said 'you are responsible for my death.' Another big stella about 3m high was of uncertain meaning, possibly an indicator of ownership of the land by someone, or possibly a border marker, one thing was certain, because of the square of stones around the stella, it was Turkic. Having returned the history teacher to Kokoria, we had lunch at a small hill where there were many ptroglyphs such as Maral, Ibex, men with bow and arrow and my favourite, three men in a boat. On the hill top, there was a big slab of rock that was covered with many, many petroglyphs, mostly maral deer with fantastical antlers; an absolute masterpiece.

Back at camp, a shower and a change into posh clothes before heading off to Campii Petrovich's yurt for dinner. On the menu was stewed mutton, the Altaian national dish which went down very well with everyone, except the vegetarians :) This was not a problem though as Nina had cooked something special for them and we just took it with us :)

Later, back at camp, there was some fine Russian champagne, a little vodka and many tall tales; a fantastic last day indeed.

9 July - Slot 1 Team leave Base Camp and head for Novosibirsk

Having breakfasted and packed, we all got into the minibus which had miraculously managed to drive all the way across the rough steppe tracks to base camp and then we set off. I drove with Kathy in a Land Rover to Kosh Agach where we said our last farewells.

Slot 1 started off with very wet weather, but all was sunny in the end. Lots of survey work was completed and some great finds were made. Thanks very much to all team members for your hard work and dedication in the occasionally hard conditions. Same time next year? ;-)

10 July

Spent all day writing this diary…….

13 July - Slot two team arrive at base camp

After the second day of long driving, all slot 2 team members arrive at base.

14 July - Training day.

Had a good day filled with training; health and safety, off-road driving, map, compass and GPS navigation, science and survey methodology.

15 July - First Survey Day

After breakfast we all took a short drive to a valley a few kilometers from base. This valley is one of my favourites for wild flowers and with the wet spring this year, the flowers were spectacular; big swathes of blues in one little bowl, stream gullies full of orange trollius and whole mountainsides covered in yellow. Sharereh, Bergit, Alexandra, Yulia and I left the valley and headed up a hill that was bigger than it looked (!), but that gave us fantastic views to the Chichova mountains of Mongolia.

16 July - 'Little' Sailugem, Koshalu and Kunduyak river valley surveys

After a big breakfast, we split into 3 groups. With me, Sharerah, Bergit and Alexandra headed for Sailugem, a big horseshoe ridge that takes you up high, 3415 m to be precise. We started in larch forest and then onto the ridge that was our route for the rest of the day; though it was steep in places and always hard work, it was mostly straightforward with only one section of easy scrambling. At one of our many rest stops, err, I mean stops to look for animals, we spotted two Siberian ibex about 400 m from us, relaxing in the sun, apparently oblivious to our presence (we were all dressed in subdued tones of greens and browns) or unconcerned; probably the former.

Having struggled up to the summit :) we enjoyed the views of a wonderful turquoise glacial lake far below. Tapduair's hanging glaciers opposite us were stained red with the growth of algae and all around the rocks were covered with lichens of orange and yellow.

On the way down, looking across the wide and steep valley, we saw that the two Siberian ibex we had seen about 5 hours earlier were still reclining in the same spot; maybe I'll try Siberian ibex in my next life ;)

Meanwhile, on Koshalu mountain, along with Volodia were Eva, Nancy, Paul and Peter who saw one Siberian ibex and a rock ptarmigan with its chicks; along with the stunning views over the steppe, a wonderful experience.

The rest of the team went with Oleg up the valley behind base camp, rough ground and very hard going……

17 July - Move to temporary camp

After breakfast, we packed our world into the Land Rovers and headed off. With Joanne driving, we made it across rivers and rough ground to Kolya's yurt where we gave him a few photos I had taken of his family during slot 1. Kolya gave us bread and cream, tea and cheese, wonderful hospitality that Viv, Madeline and especially Joanna were bowled over by :)

Everyone else headed for another yurt to interview the owners where Nina wanted to kidnap a young lamb; not really sure if that was a cute and fluffy inspired thing or whether she had plans to cook it for dinner :) Meanwhile, Peter started diversifying Biosphere's business, branching out into vehicle recovery by towing a small truck a short distance to the owner's yurt. The steel reinforcing bar that the truck owner had been using fell off, but the tow rope from our emergency box worked just fine. All was going well, then fear could be seen in Volodias eyes as he shouted speed up, we're being followed! ;)

18 July - Big mountain survey

From our temporary camp on the Tekelu river under the cliffs of 'Big' Sailugem, we split into two teams; with Volodia, Joanna and Sybille headed for the 'Argali' hills to the east where we have in the past seen these red data book endangered species, whilst everyone else went with me up 'Big' Sailugem. As with 'Little' Sailugem which we climbed a few days ago, which is a slightly lower summit, this was a ridge walk with amazing views and only occasional minor scrambling difficulties on the way. Approaching the bottom of the ridge, we saw a family group of rock ptarmigan with 4 or 5 chicks, beautiful. As soon as we were on the ridge, we found many fresh tracks of Ibex; I estimated well over 20. Soon after, we found resting depressions of ibex, these depressions were about 80 cm by 50 cm where the animals had cleared away big uncomfortable rocks, leaving comfortable gravel to sleep on; we counted over 20. We found ibex poo; again only a few days old and everywhere tracks, sometimes a day or two old, sometimes perhaps a week old.

At just over 3200 m on the ridge, someone somewhere flicked a switch and the beautiful weather was gone. Dark clouds filled the sky, rain started and quickly became very heavy and the wind whipped up lashing us with sheets of rain. In the not too far distance there was thunder; time to leave the ridge. We easily descended a big scree slope that would have been a nightmare to ascend; around half way down, Viv shouted ibex; we all looked and no-one saw a thing. Had Viv been at her bottle of whisky again, perhaps the altitude/effort was messing with her brain, but she continued to claim the sighting. Eventually, after much scanning with binoculars, we spotted the lone male ibex about 300 m downhill from us, I will never know how Viv spotted that with the naked eye, incredible!

Having descended into the valley, the weather eased a bit, we still had some spare time, so I decided to go to the head of the valley, just felt like the thing to do. Sharereh, Peter and Eva headed back to camp, but everyone else came with me. As we approached the head of the valley, I said to Alexandra that I smelt ibex, Alexandra laughed; less than 100 m ahead there was a massive group of Siberian ibex – 29 of them! We all ditched our rucksacks and crawled on our bellies to get a good view of them, watching them for about 20 min before they got wind of us/spotted up and disappeared off up a slope and away into our memories; my best ibex experience ever ;)

With our Motorola radios, I called camp and arranged for one of our vehicles to come and pick us up at the end of the valley; the sun came out created a fantastic vivid rainbow, at the end of which was our taxi :) Back at camp, everyone was soaked, exhausted and very, very happy.

19 July - Small mountain survey and return to base camp

Today, we surveyed the lower valleys around Sailugem; eagle-eyed Viv again spotting Siberian ibex, this time a group of 19, disappearing over the horizon. Nancy found some stoats, racing around in their ever energetic manner. Meanwhile, Joanne, Sybelle, Sharereh, Madeline and I drove round the mountain massif, scanning the cliffs as we went and stopping for lunch with panoramic views of the Chichova mountain range, just over the border into Mongolia; that was a long lunch ;)

20 July - Steppe lakes

Today we surveyed the lakes in the middle of the steppe for birds. Afterwards, we visited Marat, a local horseman/herdsman at his isle (log version of a yurt) nearby. Unfortunately, he was not in, but his wife was. Paul and Nancy, cattle ranchers from Kansas, showed her some photos of their animals and she was enthralled, scrutinizing every photo in detail and comparing with her own animals. The route back to camp took in the village of Kokoria where full use was made of the ice-cream selling facilities and we were lucky enough to see a wedding there too.

21 July - The day of the fox

Kamtitigem, a very steep-sided valley was our survey location today. Alexandra, Yulia, Paul, Birgit, Eva and I headed up the most gentle slope we could find to access the plateau above; perhaps gentle is not the best word, however, Paul now has some great stories and photos for his slideshows for his friends back home in Kansas :) On top, Alexandra disturbed a fox that shot off like a missile, however, we did later see probably the same one again. There are some 'rock forts' as Paul described them on top of the plateau, and perched on one of these, Birgit spotted two adult male Siberian ibex, complete with big black beards; these too disappeared off at top speed, not to be seen again, however.

Everyone else had walked up the valley to a group of three beautiful waterfalls surrounded by cliffs, amazing. On the drive back across the steppe to base, we saw lots of Demosielle cranes dancing on their long legs and flapping their broad wings; in the dramatic evening light, a spectacular sight. Back at camp, there was a nice inter-species relationship developing when a vole approached a marmot, touched lips and then ran off to its hole – playing hard to get!

22 July - Day off

Volodia took the team on a tour of the archaeological sites in the local area to see standing stones, stone circles, kurgan (tombs) and petroglyphs.

23 July - Slot 2 Team depart Base Camp

After breakfast, the team pack and Peter, Sasha and I drive them to Kosh Agach where we part :-(The end of a great slot!
Back at base camp, Peter, Emil, Sasha, Oleg, Nina and I pack base camp into two Land Rovers and one UAZ – it's amazing how much you can get into these vehicles if you try, and then drive 120 km to our new base camp location on the Jeylo river just off the Taldura river valley.

24 July - Setting up new base camp

Woke to a deep blue sky amongst our wonderful old larches; the weather was perfect for setting up our new base camp. Having decided on the layout, we spent the day erecting tents, digging toilets, etc., etc. However, our first task was a bit of river engineering; about 30 min with a few spades and we filled the dry stream by camp with lovely fresh water. It's amazing what you end up doing on expeditions :)

27 July - Slot 3 team arrives

Met slot 3 team members at Ortalik where we transferred from bus to our two Land Rovers and two local UAZ vehicles. After an interesting river crossing and towing one of the UAZs up a hill, we made it to base camp.

28 July - Training day

Woke to a rather dull day, but that soon changed - to a blizzard, well, sort of :) We spent the morning in our big mess tent, doing health and safety, survey methodology, science and navigation. In the afternoon we went for a walk in the woods by base camp, looking for sign of animals (tracks, scats, scrapes, etc.) and came back to camp laden with all sorts of mushrooms for Nina to cook. Not really sure what species the mushrooms are, but according to a Russian saying, all Russian mushrooms are edible; at least once :)

29 July - First survey day

Took the two Land Rovers to Kara Gyem pass, 6 km from base camp. The sky was unusually clear, crystal clear, so that we had amazing views of the Chichova mountains in Mongolia to the east, as well as all the way to the dramatic shark tooth 4500 m peak of Belucha, Altai's highest on the border with Kazhakstan.

We climbed to 3200 m and amazing views of glaciers. We were very lucky to see a Lammergeier vulture and no fewer than eight cinereous vultures – red data book endangered species. Eagle-eyed Keith spotted Siberian ibex on a ridge across the valley, a total of eight of these animals, which are one of the main prey species of snow leopard. Dotterel are wading birds that breed high on mountains and are only occasionally seen in low numbers, by the end of the day. We saw over 30! Probably some sort of dotterel conference was Volodia's conclusion. Just before we started our descent down a ridge towards base camp, we found some wolf scat, a fantastic find of these severely persecuted, wonderful animals.

30 July - Kara Gyem pass north

We drove the 6km from base camp to Kara Gyem pass with stunning views of glaciers under deep blue skies. Peter spotted a group of three Siberian ibex, whilst far below a group of six people packed their bright red tent, which was on top of a glacier, then started to ascend a vertical scree slope, heading for an even more vertical cliff of loose rock. Rather them, than me!

Brian, at 77 years old, did an amazing job throughout the day, making it up to over 3000 m. I hope I am that fit if I make it to that age :-)

31 July - Drive to Kara Gyem

Today I split the team into two. Half of the team stayed with Volodia at base camp to survey the local mountains and valleys. With me, Uli, Ritva, Keith, Stephen Loren and Emile headed for Kara Gyem in the company of Yana and Jenya, long standing friends of the expedition and owners of a heavily modified Land Rover with winches and enormous wheels everywhere.

Having crossed the Kara Gyem pass, we descended into a very deep and narrow valley with towering cliffs of orange and rust to the north and larch-covered slopes to the south. The 'road' such as it was, was frequently completely removed by the river and we had to make a total of 10 crossings on the way, Uli did a fantastic job of driving us safely.

We reached Kara Gyem meadow for lunch and everyone was speechless; completely full of yellow flowers. To either side of the valley were very steep rocky slopes with larch trees and at the head of the valley, enormous glaciers flowed down from precipitous peaks.

1 August - 20 km assault course

After breakfast, we set out to survey the Kara Gyem valley, all the way to the source of its river. Past the flower filled meadow, we walked through dwarf birch, then larch forest and after 4km reached the point where two rivers met; we branched right and followed the river north. Having walked only a very short distance, Uli found unusual tracks: feet with toes. But these were huge feet, far too big to be human and therefore, obviously yetti. We were trying to work out how to record yetti as there wasn't a box on the mammal tick list, when someone suggested they were in fact bear tracks – fantastic!

The previous valley was used by walkers to some extent, but this valley we were in now was not used by walkers and there were no human trails, only animal trails which appeared then disappeared. In the not very dwarf birch, going was tough but we were rewarded with successive flower filled meadows as we climbed, filled with yellows, blues, purples and swirls of Solomon's Seal flowers with their huge leaves.

All along the valley, there were massive amounts of sign of big animals; brown bear, elk, maral deer and ibex, more than I've ever seen before. Incredible! It was not a coincidence that the valley was probably the most remote and inaccessible spot I've ever been to as well……

The head of the valley was amazing; massive hanging glaciers dropping down 1,000 feet to the valley and waterfalls plunging down to fill the river that raged by us through a narrow, deep canyon. That too was spectacular.

On the way back the rain came on and we got soaked; however, I radioed back to Emile at camp and when we arrived, as well as dinner, he had a sauna ready for us; what service. We all warmed ourselves and dried our clothes and after some discussion, decided that the essentials for a sauna were – binoculars, passport and socks…..

2 August - Kara Gyem to base camp

We woke to low cloud over the mountains, so I decided to head back to Base Camp whilst we still could – with rain, the river would rise and make crossings impossible. We made record time on the way back and on crossing the Kara Gyem pass, it was snowing behind us but Base Camp below us was in sun – 'Sun in the shire' as Stephen said. It felt good to be home again ;-)

Happy birthday!

3 August - Restaurant at the end of the universe (Kuskunor valley)

Drove to the Kuskunor valley in our two Land Rovers. Crossing the pass to the valley, we had fantastic panoramic views of the glaciers up the Taldura river valley and all around; breathtaking.

In Kuskunor, we split into two teams. Martina, Ritva, Keith, Joseph, Loren and Oleg walked back the 7 km to base camp over the mountains whilst the rest of us continued the drive to the head of Kuskunor. At the head of the valley, there was a deep ravine, which was a very definite stop for our driving and here there was a herder's hut. We were invited in and given bowls of lovely soup; customary and wonderful hospitality. After (second!) lunch we made a short exploration of the surroundings, seeing one ibex. This is an area we will have to return to and spend some time surveying in detail as it looks great for snow leopard and their prey.

On the way back, one Land Rover stopped; dirty fuel. We managed to drain it and get going again, but again it stopped and the fuel filter was totally clogged. We had to tow it through rivers, across bogs and very rough ground, breaking three tow ropes about 15 times. One river crossing had algae-covered rocks, which prevented us towing, so we winched the Land Rover across. Bit late for dinner...

4 August - Day off and petroglyphs

Everyone has been working hard during the expedition, so we're having a day off today. We went to a local site where there are lots of petroglyphs on top of a small hill in the Taldura river valley. Dating from a few thousand years ago, there were petroglyphs of many of the large animals of the area, such as ibex, argali, snow leopard and wolf as well as humans hunting them. Fantastic petroglyphs, blue skies and great views; the perfect day off. But some of the team just couldn't rest and we recorded mammals and birds on the way and at the site and on the way, including white-winged snow finch, which was a new record this year.

5 August - Last survey day

I had the joy of completing an inventory of the expedition kit as well as other exciting work, whilst the rest of the team abandoned me and headed off up into the mountains for the last time. Uli had her ibex spotting eyes on and found a big group of 15 as they crossed the horizon and into our memories.

After shower time, we went to a local isle (wooden version of a yurt) for dinner, the Altai national dish, stewed mutton. The pieces of meat were massive, hanging over both sides of the plates. We also had Kazak bread with cream and dvorak, a kind of delicious cottage cheese.

Back at camp, we spent our final night chatting around the fire and tangoing under the Milky Way...

6/7 August - Base camp to Novosibirsk

After breakfast, packed and drove the two hours to Beltir where we met our mini-bus which we took to Novosibirsk, along with our two Land Rovers. Spent the night at Michelovo before continuing to Novosibirsk, stopping at the honey market to re-fuel on piroshkis and bleny ;) Very sad that the expedition is coming to an end as I have finally succeeded in training the team; at one point I had no less than four ice-creams given to me ;)

And so ends the 2010 Biosphere expedition to The Golden mountains of Altai. For slot three, we moved base camp to a new location, the first move in the eight years the expedition has been running; this move went well and we have started to survey the surrounding areas. As well as areas grazed by sheep, goats and yaks, we found lots of very healthy habitat full of snow leopard snacks (large mammals!) and we have identified other promising areas for surveying next year.

Thanks to all team members for making this expedition possible and for all the hard work completed. I had a fantastic time, lots of adventures, saw lots of wonderful wildlife and beautiful scenery and meting you all was lovely; same time next year?

Andy