Cat Project of the Month – May 2006

The IUCN/SSC Cat Specialist Group's website (www.catsg.org) presents each month a different cat conservation project. Members of the Cat Specialist Group are encouraged to submit a short description of interesting projects

For application use this ***standardised form*** *(an editable word document)*

The Foraging Ecology and Conservation of Pallas Cat in Central Mongolia

Pallas cat hiding under a rock (Photo J. McGregor)

The steppes of Mongolia are one of the few places in the world containing healthy populations of Pallas cat. This project is a joint venture between Mongolian and foreign researchers set up to address our poor understanding of the ecology and conservation issues of Pallas cat by intensive field based research.

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Steve is currently a PhD Student at the University of Bristol and Mongolian Academy of Sciences, conducting and coordinating full-time field research on Pallas cat in Central Mongolia. He has previously worked on African lions in Botswana. Steve has been a member of the Cat Specialist Group since 2005.

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Steve Ross (Photo J. McGregor)

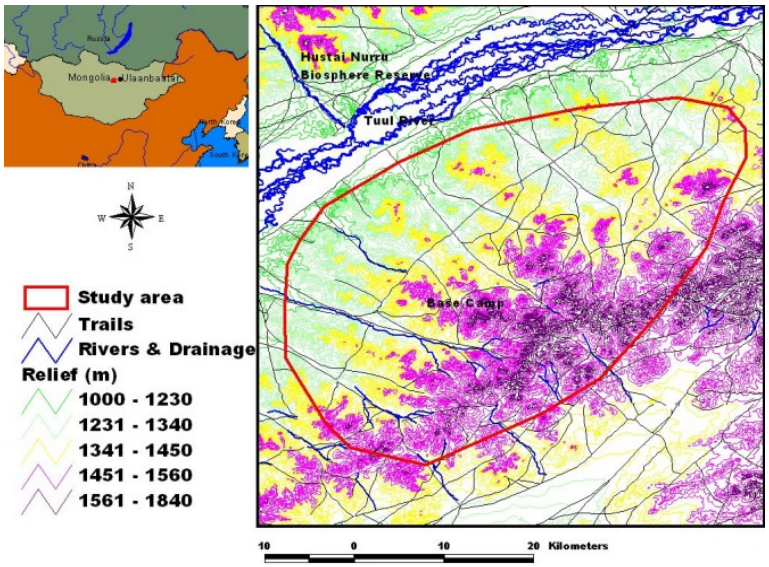
Pallas cat (*Otocolobus manul*) is a small, unknown cat species endemic to Central Asia. Listed as Near Threatened by the IUCN, the species is thought to be at risk from habitat fragmentation, a declining prey base due to rodent control programs and hunting for furs and traditional medicines. Moreover, it is distributed within the temperate grasslands biome, the least protected of all biomes in the world and increasingly under pressure from economic development and population growth. No scientific study of the species in the wild exists, giving us little basis on which to assess the main conservation issues of Pallas cat and insufficient data to plan and develop a conservation strategy. This project aims to provide rigorous data on Pallas cat spatial and resource utilisation, aspects of ecology which are of prime importance for adequate conservation management and for habitat suitability analyses (Palomares *et. al,* 2001). The analyses will be conducted at several spatial scales in order to identify the consequences of habitat patchiness on spatial patterns. Temporal environmental variation will be dealt with by conducting the analyses seasonally. The overall aim is to identify the space and resource requirements of the species at scales suitable to facilitate its future conservation management: critical habitat resources to landscape requirements. Space use and resource utilisation will then be modelled and related to the species current vulnerability in the wild, considering the habitat alteration occurring throughout its range.

Objectives

- To find the seasonal and annual spatial requirements of Pallas cats.
- To determine habitat utilisation behaviour at the scales of landscape, home range and movement path.
- To relate prey distribution, sympatric predators, humans and season to the spatial patterns of Pallas cats.

To model data on resource and space use and critical habitat to improve our understanding of how the species ecology influences its vulnerability under present and future hypothetical conditions.

Showing typical steppe, ravine and valley habitats during summer with a traditional Mongolian ger site in centre (Photo R. Kamnitzer).



The map on the left shows the study areas position within Mongolia and the study area is shown on the right.

Study area

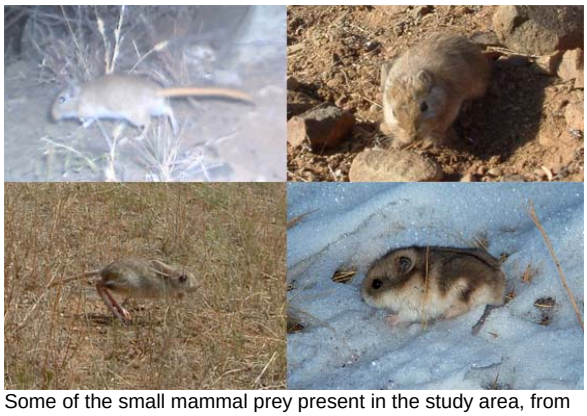
The study area is approximately 650 km2 and located within the buffer zone of Hustai Nurru Biosphere Reserve. The habitat is typical hilly, grassland steppe within a mosaic of valleys, ravines and rocky hill slopes. The local climate is markedly continental, with severe winters and large diurnal and annual variations in temperature. The mean January temperature is -25°C (down to -40°C); mean July temperature is 20°C (up to 36°C). The average annual rainfall is 270 mm, most of which falls in the summer. Human density in the area is 20 people/100 km2 during the winter. Density decreases to almost zero during the summer when herdsmen move to the river valley. The availability of water, grazing and shelter largely determines the local nomadic people's movements. Other mammal species found in the area include corsac and red fox, wolves, Siberian polecat, Eurasian badger, Siberian jerboa, jirds, Daurian pika, mountain and Brandt's voles, Russian dwarf hamster, marmots, tolai hares, Eurasian hedgehog and Mongolian gazelles, among others.

Methods

The spatial data will be captured at three scales: the home range, core utilization areas and microhabitat and foraging movement paths. VHF radio-tracking of collared cats is the current means of data collection; these will be replaced by GPS collars (Televilt, Tellus mini) in the near future to provide microhabitat and movement data. Temporal variation is being measured using 4-seasons.

Radio-tracking in winter with the southern side of the study area in the background. Fixes are taken consistently every 3-4 days to determine seasonal home range, home range shifts and habitat utilisation. Telemetry also facilitates the investigation of sheltering holes and the collection of faecal samples outside of shelters (Photo S. Ross).

In order to understand the spatial behaviour of Pallas cat it is also important to have a good understanding of the ecological setting to which they are responding. As a carnivore, the most important variable influencing habitat selection is likely to be prey density (Fuller, 2001). Pallas cat is also one of several sympatric carnivore species inhabiting the study area, the presence of other carnivores may also be influential (Simberloff & Dayan, 1991). We use survey techniques to find how resources and other sympatric carnivores are distributed in space and time. The prey survey method involves fifteen, 500m long, randomly placed line transects conducted during the middle of each season and marked in order to sample the same area each season. We have found transect lines describe the patchiness and variability of prey populations better than grid methods. Pika sign surveys are also conducted along the lines and grasshopper surveys during the summer months. We plan to calculate correction factors to estimate absolute prey densities in the second year of study.



Some of the small mammal prey present in the study area, from top left clockwise, jirds (*Meriones unguiculatus*), mountain voles (*Alticola royalii*), Siberian jerboa (*Allactaga sibirica*) and Russian dwarf hamster (*Phodopus sungorus)*. Daurian pika (*Ochotona daurica*), ground squirrels (*Spermophilus dauricus*) and Brandt's voles (*Microtus brandtii*) are also preyed upon by Pallas cats in our area (Photos S. Ross).

Spotlight surveys are used to measure the density of sympatric carnivores and nocturnal prey species (jerboa and tolai hairs) using Distance methodology (Buckland, *et al.* 2001). Eight 7 km track transects are conducted each weekly session. Lines have been selected to cover all the habitats in roughly the proportion they are available giving seasonal densities and the relative importance of different habitats to the surveyed species. Local nomadic peoples are also an important ecological variable as they are ubiquitous throughout the Central Asian steppe ecosystem and within the majority of Pallas cats range. The movements, hunting practises and herd sizes of nomadic herdsmen inhabiting the study area are being mapped to find if any spatial relationships between people and the cats exist. All the data is compiled within a GIS. In addition, the diet of Pallas cats is being determined by scat analyses, to allow us to relate habitat selection to prey acquisition. The characteristics and preferences of Pallas cat den and sheltering sites are also being investigated as a potential critical resource. With the above sampling strategy we hope to gain some solid data describing Pallas cats' ecological strategy and how this relates to present and future threats within its habitat.

We work closely with the local nomadic peoples who are enthusiastic to find out more about the many animals species inhabiting the area. They contribute by reporting Pallas cat sightings and by interview of their hunting and herding practises. One local person Mr. J. Gantulga and a Mongolian student, G Naranbataar are employed as field assistants and are currently learning GIS and wildlife survey techniques. The support and expertise of Mr. B Munkhtsog of the international Snow leopard Trust provides an important link to Mongolian Government and Academics. Munkhtsog was also responsible for setting up the study area and the first radio-collaring of Pallas cats.

Field team and project associates. Sperm was collected from the pictured cat by Dr. Bill Swanson (far left). The sperm will be used by artificial insemination to boost genetic diversity in the zoo population without the need for more captures from the wild. The cat was also tested for disease by Dr. M. Brown (2nd from left; Photo J. McGregor).

Male Pallas cat in winter. Pallas cats are not fast runners and the grassland steppe provides few places to hide. When in the open, Pallas cats often crouch down and remain motionless to avoid detection. Even a short covering of grass allows them to remain concealed. However in the dead of winter, with no cover, this strategy can backfire! (Photo S. Ross)

Preliminary Results

Nine Pallas cats are currently radio-collared in the study area; most captures were made only recently this winter. The first six months of work concentrated on developing methodology for capture, telemetry, prey and predator surveys and finding out which aspects of the species habits we are able to sample. Gaining seasonal data to meet sample size requirements and the project objectives has followed. The following observations are of low sample size and very preliminary but are being presented as such.

Dispersal behaviour was recorded for one male and female Pallas cat, both were one year olds. The female also raised a litter during summer 05, which seemed to stabilise her movements, before again showing large dispersal type movements in Autumn 2005. The dispersing male crossed a large river and moved 45 km to the north, remained there for two months and then progressively moved another 50 km to the east before coming back and establishing a home range only 10 km from where he was first captured. Dispersal defines the scale at which individuals perceive landscape structure and whether landscapes are connected (With, 1994). The large distances travelled by the male indicate the potential of population connectivity. Seasonal home-range data was collected for one adult male, he displayed behaviour typical of territory maintenance, using a core area and making occasional movements to areas defining the home range borders. During the mating season (Feb-Mar), he visited all parts of his range. The male that had dispersed the summer before used a much smaller area than the adult male during the mating season; perhaps because he had a less defined and established home range. Mating was indicated by radio-collared male and females being located together. This established that males mated with more than one female (n = 3 males). Males remained with or near to the females from 2-4 days, perhaps guarding the female while she was receptive (Clutton-Brock, 1989). Home range data on the two adult (stable) collared cats showed the male home range to be 2-7 times larger than that of the female. The data so far indicate the male mating strategy to be polygyny with territory maintenance (Clutton-Brock, 1989).

Table 1: Showing seasonal home range data collected so far, measured using fixed kernels (LSCV) and 100% MCPs, all samples use > 20 points, and the fixed kernels are considered a good representation actual space use. The comments include behaviours and age related influences on space use.

	Fixed kernels with LSCV (km2)					
	95%	**70%**	**50%**	**100% MCP**	**Fixes**	**Comments**
Male 1 Sum 05	61.8	24.9	16.2	33.6	25	Adult Male > 2 yrs old with established home range.
Male 1 Aut 05	37.7	9.8	5.2	74.3	23	
Male 1 Win 06	86.2	30.9	11.7	56.8	23	Breeding season, visited all parts of home range bred with at least 2-females.
Fem 1 Aut 05	15.5	5.1	3.1	11.8	21	Adult Fem > 2 yrs old with established home range.
Fem 1 Win 06	11.3	3.5	1.8	5.1	20	
Male 2 Sum 05		dispersed			10	Immature 1 year old, now an adult.
Male 2 Aut 05	157.8	49.3	31.5	224.7	22	Establishing home range.
Male 2 Win 06	36.5	14.5	6.1	30.2	22	Established home range, bred with at least 2-females.
Fem 2 Sum 05	35.2	17.2	7.9	25.2	25	Immature female, first litter at 1-year, summer 05.
Fem 2 Aut 05	224.7	41.9	25.6	243.5	23	Showed dispersal behaviour after breeding, believed to have been hunted at end of Autumn.
Fem 3 Win 06	23.5	7	4.3	22.0	20	Adult female > 2 years collared at start of winter 2006.
Fem 4 Win 06	18.4	8.4	3.5	9.1	20	10 month old female collared at start of winter.

Data on sheltering behaviour and characteristics have been collected from five cats. Sheltering sites have either been burrows made by marmots (*Marmota sibirica*) or fissures or holes in rocks or cliffs. The shelters are likely to function as protection from extreme cold and predation. The data show a shifting den system; shelters have been repeatedly used when the cat is using the surrounding part of its home range. This was also true of a female who was raising a litter; she changed dens twice, moving her litter a distance of 5 km each time. In summer 50% (n = 9) of shelters were under rocks and in winter 85 % (n = 19) of shelters were in marmot burrows and all were south facing. The sample indicates the importance of marmots in providing Pallas cats with suitable sheltering habitat. Marmots are intensely hunted in many parts of Central Asia for food and skins, their decline may affect the behaviour and potentially survival of many other species.

A Pallas cat sheltering hole, dug and previously inhabited by marmots (Photo S. Ross)

Pallas cat mortality records include two reliable accounts of cats being killed and consumed by steppe eagles (*Aquila nipalensis*). Recently one of the radio-collared Pallas cats was predated; spoor, teeth marks on the collar and a faecal sample containing Pallas cat fur suggested it was killed by a red fox. In addition to natural predation we have had five reports of Pallas cats being killed by domestic dogs kept by the nomadic herdsmen in the area. We will conduct a survey of all herdsmen this summer, including questions on hunting and domestic dog predation.

These initial observations are to be built upon to increase sample sizes. The capture, radio-tracking and habitat characterisation work is ongoing and we hope to switch to GPS collars as soon as they become available. GPS collars will increase the resolution and frequency of data and help us to answer new ecological questions requiring the fine scale data.

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Project information

Duration:	2005-2008 (this phase)
Location (see map):	Central Mongolia
Sponsor(s):	The Leverhulme Trust, Royal Zoological Society of Scotland, The Royal Geographic Society, Cincinnati Zoo and Botanical Gardens. Other funding sources are needed for the continuation of the project.
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Project website:	not yet