Pallas' Cat ecology and Conservation in the Semi-desert Steppes of Mongolia

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The Pallas' cat *Otocolobus manul* is a unique, arid-adapted cat that ranges across the steppes of Central Asia. Known to occur from Tibet in the south to Siberia in the north, the Pallas' cat inhabits a wide variety of grassland, semi-desert, and desert habitats (Heptner & Naumov 1992). Despite its range, little is known of the ecology or behaviour of the species and few details exist on its population and conservation status. The paucity of information on the species poses considerable challenges to wildlife managers and conservationists in Asia.

In 2005, we began a research project to understand basic information on the ecology and conservation of Pallas' cats in the semi-desert steppes of Mongolia – a region where the status of the species remains largely unknown. Our goals are to quantify the fundamental ecology of the species, identify major threats to its survival, and develop conservation actions for populations in arid regions of Mongolia. Our study site is in the Ikh Nartiin Chuluu Nature Reserve, which is located in the Dalanjargal Soum (county) of the Dornogobi Aimag (province) in central Mongolia (N45.723º E108.645º). The reserve lies along the eastern edge of the Gobi Desert at the confluence of grassland and semi-desert ecosystems and includes a variety of steppe habitats. The reserve harbours Pallas' cats and several other carnivores including marbled polecats *Vormela peregusna*, corsac foxes *Vulpes corsac*, red foxes *Vulpes vulpes*, Eurasian badgers *Meles meles*, wolves *Canis lupus*, and lynx Eurasian *Lynx lynx*. Our investigations of Pallas' cats are part of a larger study that examines the ecology of these and other steppe carnivores.

To date, we have captured and deployed radio transmitters on 4 Pallas' cats, 1 male and 3 females. Our results at this point, however, remain quite preliminary. We captured cats using large wire-mesh box traps and opportunistically by hand – Pallas' cats are docile and rarely flee far when approached. We fitted each cat with a ~35g VHF radio collar that comprised approximately 1% of body weight. Using locations obtained through radio telemetry, we estimated home range size for 3 cats from January 2005 to June 2005. Preliminary home ranges for these animals were 15.2 and 5.8 km^2 for females and 12.5 km^2 for the male (calculated as 90% fixed kernels – LSCV; ranges based on >35 nightly locations per animal). We captured the fourth cat in May, but require additional locations to generate a range. Although our sample size is small, in the coming months we hope to capture additional cats to evaluate habitat use and activity patterns through sequential tracking.

Weekly observations indicate that Pallas' cats are primarily nocturnal, resting in shallow rock crevices and dens during the day. They typically rest in steep, rocky, semi-desert areas and hunt in open grasslands where the density and diversity of small mammals are highest. We have collected some cat faeces from our study site that will be analyzed in 2006. However, droppings are often difficult to find as the cats bury them. A preliminary analysis of faeces suggests that Pallas' cats feed mainly on gerbils *Meriones* spp. and jerboas *Dipus sagitta* and *Allactaga* spp. Pallas' cats also prey on argali sheep *Ovis ammon* lambs at our site during spring months (Reading *et al*. 2005).

The Pallas' cat is listed as *Near Threatened* by the IUCN and under Appendix II in CITES (IUCN - World Conservation Union 2004; UNEP-WCMC 2004). Both listings are in response to a perceived decline of the species throughout its range. The extent of the decline remains unknown and requires quantification to better understand the current plight facing this cat. Several factors threaten the survival of Pallas' cats and other steppe carnivores including loss of habitat, hunting, and illegal trade (Pratt *et al*. 2004; Reading *et al*. 1998; United Nations Environment Programme 2001; World Bank Group 2001).

In Mongolia, Pallas' cats are threatened mainly by over-hunting and poaching. Despite their near threatened status, Pallas' cats are legally hunted in Mongolia. The national law governing wildlife stipulates that Pallas' cats may be hunted for 'household purposes', provided that hunters obtain permits from local (soum) governments (Wingard & Odgerel 2001). The permit system, however, is largely ineffective and unrealistic as herders in rural areas rarely have the resources to travel to soum centres to obtain permits. The law is also ambiguously worded. Permits are valid for up to 5 days, but details on the number of cats that may be harvested per permit are not provided. Similarly, the law does not indicate the number of permits that may be obtained by each household per year or include an adequate reporting process. Such ambiguities allow wide interpretation that could lead to over-exploitation of the species. In any case, law enforcement throughout most of Mongolia is weak at best.

In the Ikh Nartiin Chuluu Nature Reserve, Pallas' cats are actively hunted. Although all forms of hunting are illegal in the reserve, poaching of cats inside the reserve occurs – indeed, an illegal hunter killed one radio collared cat within reserve boundaries in 2005. To gather information on attitudes toward hunting and factors that lead to poaching, we conducted interviews with herders living in the reserve and surrounding areas. Our preliminary results found that Pallas' cats are hunted mainly for furs that are sold to Chinese traders. Furs sell from US$10 to $15 to traders and are often manufactured into hats and coats for Russian and Chinese markets. Pallas' cats are also sought for the live trade. In our study area, international traders pay up to US$100 for live cats that are illegally exported to China. Herders also use Pallas' cat body parts locally for medicinal purposes. For example, herders often use the fat of Pal-

las' cats to sooth and relieve frostbite. The impacts of hunting for household and commercial purposes on Pallas' cat populations remains unknown.

Disease may also pose a risk to Pallas' cats in our study area. Studies in central Mongolia indicate that toxoplasmosis occurs in free-ranging Pallas' cats and may contribute to declines (Brown *et al*. 2002). Disease exposure among Pallas' cats in the drier Ikh Nartiin Chuluu Nature Reserve is not known. However, feral cats range across much of the reserve and have been observed during spotlight surveys and captured in traps. Feral cats may act as vectors for a variety of diseases such as toxoplasmosis.

Pallas' cat conservation in the semi-desert steppes of Mongolia requires several actions. Among the most important include:

1. Improving law enforcement efforts, especially in protected areas, to control trade and limit poaching. In most of Mongolia, including many protected areas, rangers and nature officers from local administrative centres are tasked with law enforcement. Yet, they generally lack the equipment, training, and funding to adequately enforce wildlife laws. The Mongolian government and international organizations desperately need to fund, train, and recruit more wildlife rangers to strengthen enforcement efforts.
2. Revamping the hunting permit system. In rural Mongolia, the permit system is ineffective and not enforced. A more realistic system that is acceptable to local people must be developed and implemented to regulate hunting of the species.
3. Establishing monitoring programs for Pallas cats' and other carnivores. Information on population trends is important for evaluating the status of the species, assessing the impact of threats, and calculating harvest rates. In addition, the monitoring program should strive to assess harvest rates for all fur bearers such as corsac foxes, red foxes, and badgers. Currently, no such monitoring program exists.

Scientific research is also needed to understand and better manage Pallas' cats, not only in Mongolia, but across Central Asia. More information, for example, is needed on the spatial and habitat requirements of Pallas' cats across much of their range from the steppes of Mongolia and China to Siberia. Behavioural research is also needed to understand the basic social organization of the species.

Pallas' cat in the Ikh Nartiin Chuluu Nature Reserve, Dornogobi, Mongolia. Pallas' cats often use rock crevices for shelter and protection from predators during the day (Photo: R. P. Reading).

For more information on our project and Pallas' cats in the Ikh Nartiin Chuluu Nature Reserve, please visit our website at: http://www.wildcru.org/links/mongolia/mongolia.htm.

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References

Brown M., Lappin M. R., Brown J. L., Munkhtsog B. M. and Swanson W. F. 2002. Exploring the ecologic basis for extreme susceptibility of Pallas' cats to fatal toxoplasmosis: Comparisons of wild and captive populations. Proceedings of the American Association of Zoo Veterinarians:12-15.

Heptner V. G. and Naumov N. P. (eds). 1992. Mammals of the Soviet Union. E.J. Brill, New York.

IUCN - World Conservation Union. 2004. The 2004 IUCN Red List of Threatened Species. IUCN World Conservation Union, Gland, Switzerland.

Pratt D. G., Macmillan D. C. and Gordon I. J. 2004. Local community attitudes to wildlife utilisation in the changing economic and social context of Mongolia. Biodiversity and Conservation 13, 591-613.

Reading R. P., Amgalanbaatar S., Wingard G. J., Kenny D. and DeNicola A. 2005. Ecology of Argali in Ikh Nartiin Chuluu, Dornogobi Aymag. Erforsch. Biol. Ress. Mongolei (Halle/Saale) 9, 77-89.

Reading R. P., Mix H., Lhagvasuren B. and Tseveenmyadag N. 1998. The commercial harvest of wildlife in Dornod Aimag, Mongolia. Journal of Wildlife Management 62, 59-71.

United Nations Environment Programme-WCMC. 2004. Checklist of CITES Species. Convention on International Trade of Endangered Species.

United Nations Environment Programme. 2001. Mongolia: State of the Environment 2002, Ulaanbaatar, Mongolia.

Wingard J. R. and Odgerel P. 2001. Compendium of environmental law and practice in Mongolia. GTZ, Ulaanbaatar, Mongolia.

World Bank Group. 2001. Mongolia Environment Monitor, Ulaanbaatar, Mongolia.

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