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Pallas's cat Status Review & Conservation Strategy

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Original contributions and short notes about wild cats are welcome

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Cover Photo: Camera trap picture of manul in the Kotbas Hills, Kazakhstan, 20. July 2016
(Photo A. Barashkova, I Smelansky, Sibecocenter)

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Prologue: Why care about *Otocolobus manul*?

The Pallas's cat or manul *Otocolobus manul* is a small felid of the leopard cat lineage inhabiting the Asian steppes from the Himalayas to the southern rim of the boreal forest. In spite of its vast distribution range, the Pallas's cat has received little attention from the scientific and conservation community, and hence information is scarce and often only available for small fractions of its range. The Pallas's cat is listed as Near Threatened in the IUCN Red List of Threatened Species, but robust information on the status and trend of the population are lacking from most of its distribution range. The gaps in knowledge of the species restrict the development of effective conservation actions and the establishment of targeted conservation plans. Thus, the Pallas's Cat International Conservation Alliance PICA and the IUCN SSC Cat Specialist Group Cat SG have joined up with the Pallas's cat Working Group PCWG and experts from all Pallas's cat range countries to produce this comprehensive Status Review summarising available information on *Otocolobus manul*, but also identifying important gaps of knowledge, priority research topics, and conservation priorities, and consequently the first Conservation Strategy. This Status Review and the developed Conservation Strategy will assist a more rigorous planning for the species' conservation according to IUCN standards.

The Pallas's cat, also known as the manul, is endemic to the Asian montane grassland and shrub steppe, and is found from north-eastern China across Central Asia to the Iranian Caucasus, from the Himalayas to the southern rim of the boreal forest (Ross et al. 2016; Fig. 1, 2). The Pallas's cat is believed to have lived in this area and habitat for around 5.9 million years since the Pliocene when it diverged from a leopard cat ancestor (O'Brien & Johnson 2007, Li et al. 2016). The Pallas's cat has a large distribution area ranging 5,800 km W–E and 2,700 km N–S, but it occurs at very low densities (2–6 individuals/100 km²; Ross et al. 2016). Its estimated area of occupancy is 2,269,000 km² but includes many regions where the presence of the species was never confirmed (Ross et al. 2016; Fig. 2). In spite of its extensive distribution range, the Pallas's cat is a habitat (Ross et al. 2010a, 2016, Ross 2009) and prey specialist (Heptner & Sludskii 1992, Ross et al. 2010b; Chapter 2). The species is vulnerable to both predation from and competition with other carnivores (Ross et al. 2012, 2016). As a hunter of rodents and lagomorphs (Guggisberg 1975, Heptner & Sludskii 1992, Sunquist & Sunquist 2002, Ross 2009, Ross et al. 2010b), the Pallas's cat rely on species with fluctuating populations, which are in turn vulnerable to changes in land use and likely also to climate change.

Perhaps due to the species low density, despite its vast range across 16 range countries, the Pallas's cat is almost unknown to people living outside of range countries and is rarely seen within range countries. The species has also received little attention from the scientific and conservation community. Range-wide data on the Pallas's cat is lacking, and information on its ecology, behaviour, distribution and population status is scarce (Brown & Munkhtsog no date, Murdoch et al. 2006, Aghili et al. 2008, Jutzeler et al. 2010, Barashkova & Smelanski 2011, Farhadinia et al. 2016, Ross et al. 2010b, 2016). Studying the Pallas's cat is particularly challenging due to the remoteness of its

habitat and there is thus very limited information on the species (e.g. Munkhtsog et al. 2004, Murdoch et al. 2006, Ross 2009, Ross et al. 2010a, b, 2012, Barashkova & Smelanski 2011, Pavlova et al. 2015, Farhadinia et al. 2016, Barashkova et al. 2017). Consequently ecological data is only available from some parts of its large geographical range. Most information on the distribution was, and still is, based on opportunistic records (e.g. Fox & Dorji 2007, Aghili et al. 2008, Chanchani 2008, Thinley 2013, Hameed et al. 2014, Joolaei et al. 2014, Shrestha et al. 2014, Webb et al. 2016, Mahar et al. 2017, Otaghvar et al. 2017).

According to Sunquist & Sunquist (2002), “much of the information on the status of the manul comes from records of the animal's pelt in the fur trade” (Chapter 6). In the past, the Pallas's cat was heavily harvested due to its valuable pelt (Nowell & Jackson 1996). In the 1970s, harvest figures started to decline, which has been attributed to a decline in the global population (Nowell & Jackson 1996). However, the Pallas's cat was also listed under CITES Appendix II in 1977 and was granted legal protection in an increasing number of range countries and the known offtake thus diminished. Hunting of Pallas's cats is still permitted in Mongolia (Murdoch et al. 2006) and where Pallas's cats are still traded on local markets (Wingard & Zahler 2006). The fat, oil, meat and organs of the species are or have been used for medicinal purposes in Mongolia and Russia (Murdoch et al. 2006, Wingard & Zahler 2006, Ross et al. 2016; Chapter 6 & 8). Pallas's cats are also poached and their furs illegally exported to China (Murdoch et al. 2006). In 2005, it was estimated that 2,000 Pallas's cats were



Fig. 1. *Felis (Otocolobus) manul*. Sketch by A. N. Komarov, from Heptner & Sludskii (1992).

killed per year in Mongolia (Wingard & Zahler 2006). Compared to the remarkable hunting pressure half a century ago (Chapter 6), the current offtake is small. However, there is no data available demonstrating neither a positive effect of the harvest reduction on the population development, nor is it known how much of the formerly legal and recorded hunting has been replaced by illegal hunting and hence is not reported.

History of the IUCN Red List assessment of the Pallas's cat

In 1994, the Pallas's cat was regarded as "*Insufficiently known*" (nowadays Data Deficient) in the IUCN Red List of Threatened Species (Groombridge 1994, Nowell & Jackson 1996). The species was considered vulnerable to rare. It was reported to be uncommon in most parts of its range, to have disappeared from most of the Caspian region and to have been eradicated from eastern China due to hunting (Groombridge 1994). The Pallas's cat was believed to be most abundant in the cold grasslands of Mongolia and Inner Mongolia (Nowell & Jackson 1996).

In 1996, the Pallas's cat was assessed as "*Lower Risk*" (now Least Concern) in the IUCN Red List based on its estimated wide range of 5,000,000 km² across Central Asia. However, still very little information about the species existed (Baillie & Groombridge 1996).

In 2002, 2008 and 2016, the Pallas's cat was assessed as Near Threatened in the IUCN Red List and its population trend as decreasing due to habitat and prey base degradation (Cat Specialist Group 2002, Ross et al. 2008, 2016). In 2002, the total effective population size of the Pallas's cat was estimated at less than 50,000 mature individuals. The Pallas's cat was considered to occur throughout the Tibetan plateau and to be widely distributed throughout the grassland steppes of Mongolia, but to be less abundant and threatened in the southwest of its range such as the Caspian region and Baluchistan province, Pakistan (Cat Specialist Group 2002). The Pallas's cat was described to mainly inhabit the Central Asian steppe regions of Mongolia, China and the Tibetan Plateau (Ross et al. 2008). Mongolia was thought to be the stronghold of the species, based on an estimated density of 7.5 ± 2 individuals/100 km² in the steppe grasslands of central Mongolia (Ross et al. 2008). Populations in the southwest of its

range were, as in 1994 and 2002, described as declining and sparse, and populations in Armenia, Azerbaijan, Russia's Krasnoyarsk region and Turkmenistan were assessed to be threatened (Ross et al. 2008).

In 2016, the classification as Near Threatened was justified by population fragmentations and a suspected population decline of 10–15% over the last three generations (11 years), based on habitat loss and reduced habitat quality, growing threats, low detection rates and the Pallas's cat's susceptibility to disturbance (Ross et al. 2016). The Pallas's cat was considered to have a wide but fragmented distribution across the grasslands and montane steppes of Central Asia and to occur at low densities of 2–6 animals/100 km² (Ross et al. 2016). The low density was assumed to be the result of predation and the fact that Pallas's cats are habitat specialists requiring habitats with good cover from predators and sufficient prey availability (Ross et al. 2016). Due to its special habitat requirements, the Pallas's cat is vulnerable to several threats and vast areas are needed to conserve viable populations (Ross et al. 2016). In the 2016 Red List assessment, the main threats (as in previous assessments) were identified to be habitat loss and fragmentation due to increasing human and livestock populations, agriculture, infrastructure development and mining, prey base depletion due to poisoning and overhunting (rodent control programmes mainly in China and Mongolia), and killing by herding dogs (Cat Specialist Group 2002, Ross et al. 2016, 2008; Chapter 8). Illegal hunting and accidental killing in snares and traps were a further continuous threat to the Pallas's cat (Ross et al. 2016).

In the 2002, 2008 and 2016 Red List assessments, the authors discussed whether the Pallas's cat might even qualify for Vulnerable in the near future if negative trends persisted and if better information on its status and distribution range were available (Cat Specialist Group 2002, Ross et al. 2008, 2016). Ross et al. (2016) stated that the Pallas's cat may qualify as Vulnerable under criterion C1 (small population size) if the global population that was then estimated at 15,315 mature individuals would decline below 10,000. However, range-wide data was lacking and thus no reliable information was available to estimate the global population size and status of the species (Ross et al. 2016). Therefore it could be that the Pallas's

cat may also qualify for Least Concern if better information on its population size and trend becomes available, as the assumed population size of 15,000 mature individuals is indeed the threshold between Least Concern and Near Threatened. Considering the uncertainty in the Red List assessment, we agree with Ross et al. (2016) that understanding occurrence and abundance of the Pallas's cat is fundamental for the conservation of the species and that there is thus an urgent need for more surveys to understand abundance, distribution, population dynamics, and habitat needs of the Pallas's cat (Chapter 9).

Challenges to Pallas's cat conservation

One big challenge to the conservation of the Pallas's cat is the lack of consistent information across its range, which restricts the development of effective conservation actions and the establishment of targeted conservation plans (Murdoch et al. 2006, Ross et al. 2016; Chapter 8). Indeed, records of the species' presence after 1996 are available only from about 30% of the assumed distribution range, and the distribution of the point data and the distribution range do not really match (Fig. 2). The species' distribution, the degree of range fragmentation (the segregation into isolated populations), abundance and population trends are not known for most regions and the factors affecting variation in these parameters are not understood. Thus, the population size decline in the IUCN Red List assessment from 2016 is based on crude estimations and extrapolations (Ross et al. 2016). Although a majority of local experts assume a decrease in distribution and abundance (Chapters 3–5), there is no long-term robust population study that can confirm this, and no field study that would explain the ecological processes behind the assumed decline. In addition, the few field-studies conducted are likely not representative for the entire range and all habitat types; there is an urgent need for more field studies (Chapter 8). Even the historic distribution of the Pallas's cat is uncertain (Fig. 2a). The historic distribution (<1996) range of the Pallas's cat presented in Nowell & Jackson (1996) and the distribution records collected in the Global Mammal Assessment Database GMA of the Cat SG until 1996 show discrepancies in regard to the historical distribution of the species. There are also divergences between the extant

and possibly extant distribution range of the species defined in the IUCN Red List of 2016 and more recently collected presence records (Fig. 2 and following Chapters). Thus, there is a need to clarify the current and his-toric distribution of the Pallas's cat in order to understand changes in the range and to help identify conservation priority areas. Given the large distribution of the Pallas's cat, we can assume that the population dynamics of the species may differ

between regions. Also some threats are certainly effective throughout the species' range, it is unlikely that local populations all face the same challenges (Chapter 8). Consequently, understanding the ecology and population dynamics of and threats to the Pallas's cat will require field studies in different parts of its distribution range and consistent surveys in reference areas representing all major habitat types of the species (Chapter 8).

The Conservation Strategy (Chapter 10) provides guidance for additional surveys and improved monitoring, and for further research, but also for conservation measures to mitigate threats as they were identified. Long-term successful conservation of the Pallas's cat will depend on range-wide co-operation and exchange of information. The contributors to this Special Issue and participants at the strategic planning meeting (Appendix I) have joined in the intention

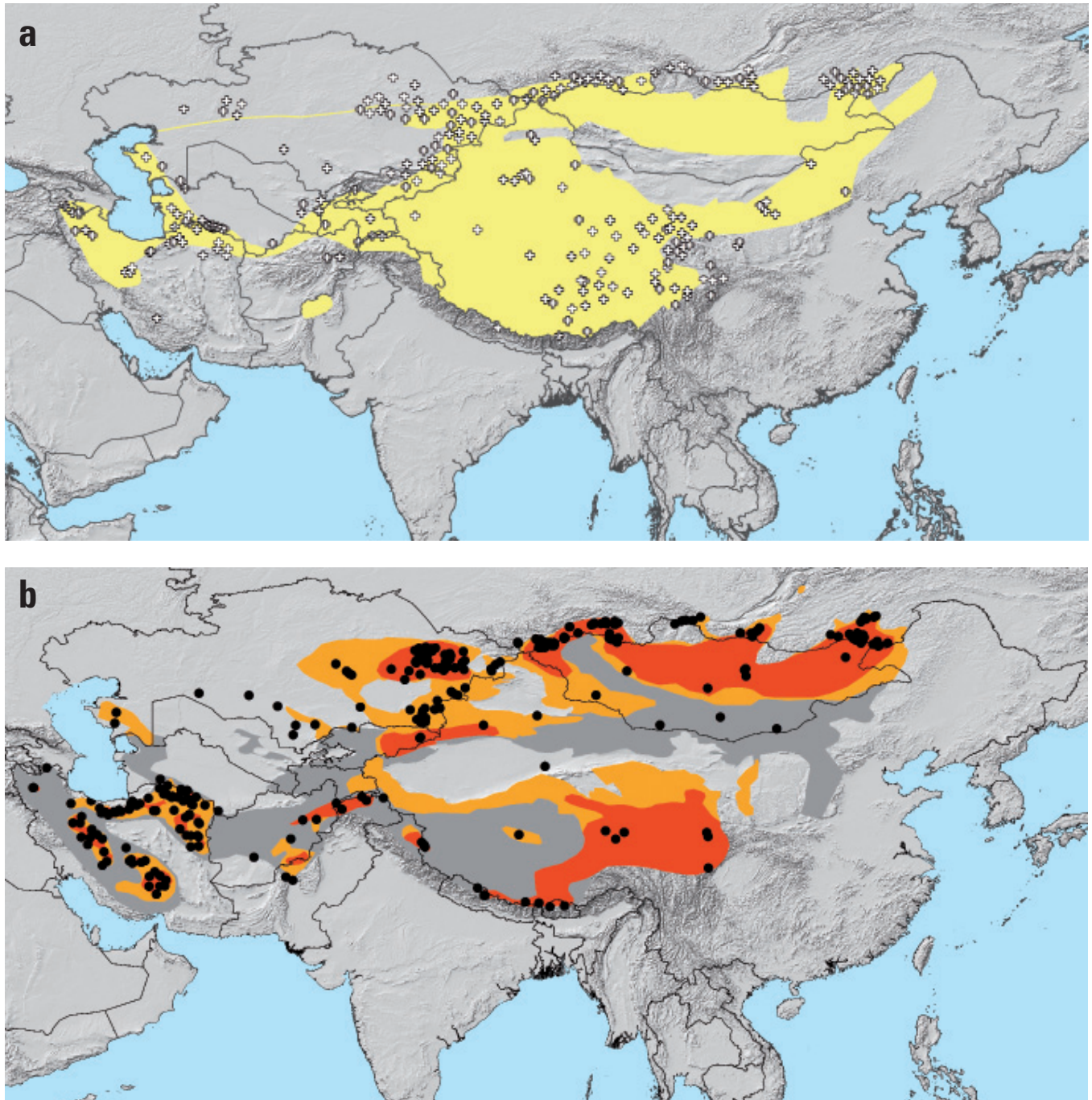


Fig. 2. Historic (a) and recent (b) Pallas's cat distribution. The differences between the assumed range and the point distribution references taken from the literature indicate the need for further surveys. Map a: Yellow = historic Pallas's cat distribution according to Nowell & Jackson (1996). White crosses = Pallas's cat records before 1996 compiled for the Global Mammal Assessment (IUCN SSC Cat Specialist Group). Map b: IUCN Red List distribution range: Red = extant, orange = possibly extant, grey = presence uncertain, black points = Pallas's cat records from the GMA after 1996.

to do so. The Status Review and the Conservation Strategy will also be used to reach out to the national wildlife conservation authorities of the Pallas's cat range countries. The Pallas's cat is an indicator species for the cold mountainous steppe habitats, and monitoring its populations across the range would allow tracking the conservation not only of *Otocolobus manul*, but also of its characteristic living space in Asia.

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