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Eurasian lynx in China - present status and conservation challenges

Lynx lynx

Fig. 1. Typically coloured lynx from Saihanwula nature reserve in Inner Mongolia..

The Eurasian lynx *Lynx lynx* attracts little attention from scientists despite the availability of funds due to the nation's economic expansion over the past few years. Only two research papers in Chinese were produced, addressing the distribution and food habits of the lynx in northeast provinces and in Xinjiang Autonomous Region (Abdukadir et al. 1998, Tian et al. 2002). With the recent implementation of the national policy for wildlife conservation and nature reserve construction, more and more land is coming under government protection. The habitat of most wild animals is recovering from unplanned mining, deforestation, and agricultural plantation. The local fauna shows hints of population recovery; however for most species, we still know little about their ecological status. The distribution and population status of Eurasian lynx in China drawn mainly from scientific field surveys in nature reserves are reviewed, and some conservation problems and planning of protection mechanisms are discussed.

Subspecies taxonomy

The taxonomic classification of the lynx has not been fully resolved. While some scientists recognize two subspecies of Eurasian lynx, *L. l. isabellinus* from Tibet and *L. l. kamensis* from the west of Sichuan Province (Field Survey Team for Tibetan Plateau of Chinese Academy 1986, Gao 1987, Wang 2003a), others consider three subspecies, *L. l. isabellinus* (including *L.l. kamensis* and *L.l. tibetanus*), *L. l. stroganovi*, and *L. l. wardi*. *L.l. wardi* is sometimes also included into *L.l. isabellinus* (Smith & Xie 2008). Liang (1986) considered them all synonyms and recognized only one subspecies *L. l. isabellinus*. Over most of its distribution this cat is light grey brown with a layer of silver white, and the patches are pale brown or indistinct (Fig. 1, 2). This form is locally referred to as sheep lynx. Individuals from Xinjiang Autonomous Region and Tibet are deep brown with distinct patches; these cats are locally called horse lynx. However, the two colour phases may co-exist in the same area.

Distribution

The Eurasian lynx is widely distributed from the northeast to the northwest (Fig. 3), and has been reported in the northern part of Yunnan Province of Baimaxueshan Nature Reserve (98.57"–99.21" E, 27.47"–28.36" N), according to local fauna and nature reserve reports (Wang 2003a, Wang 2003b). Specific distribution sites were confirmed by local field surveys when nature reserves were established (Wang 2003b). In northern China the Eurasian lynx is distributed only in the mountainous areas surrounding Daxinganling Mountain. The southern distribution of the Northeast is near the Mulanweichang Nature Reserve at longitude 116.51"–117.45" and latitude 41.47"–42.06". Distribution areas include the forests in Heilongjiang and Jilin provinces and the northern part of Inner Mongolia in northeast China. It is believed that no lynx have inhabited Liaoning Province since the 1990s (Jin & Qiu 2004) while in the 1980s lynx had been seen at Huanren County in this province (Xiao 1988). In the northwest the lynx is seen almost everywhere in Ningxia, Gansu, and Qinghai provinces as well as western Inner Mongolia, Xinjiang and Xizang (Tibet) Autonomous Region. Lynx are not reported in southern China, indicating that the Eurasian lynx is a palaearctic species adapted to cold weather regions.

Population dynamics

China conducted a national census of its wild animals in the late 1990s. The lynx population was estimated at around 27,000 animals with Ningxia Autonomous Region as a new distribution province (State Forestry Administration 2009). Additionally, two field surveys were conducted to determine the population trend. One survey covered the area of northeast Heilongjiang and Jilin provinces and the Hulunbeier League in northeastern Inner Mongolia (Tian et al. 2002). The survey was con-

ducted using transects from 1992 to 1997 and a population of 2023±299 lynx over an area of 200,000 km² was estimated. Within this large area the density was 2.4 animals/100 km² on the east slope of the Daxinganling Mountain with an estimated population of 1341, whereas it was 1.8/100 km² on the west slope of Daxinganling Mountain. In other places the population estimates were as follows: 286 at Xiaoxinganling Mountain, 228 around Wandashan Mountain, 168 at the sallow mountain area of the Songhuajiang Forestry Administration, and 232 on the southern portion of Changbaishan Mountain. These population assessments were based on tracks; it was assumed that one track represented one individual. However, the authors did not mention how far apart the transect lines were, and did not indicate whether the footprints were from juvenile or mature individuals. So this number may be an overestimate. The fur harvest was around 70 pieces a year from 1971 to 1975 in Heilongjiang Province (Ma 1986).

The other field survey was in Xinjiang Autonomous Region, where 1532 lynx were estimated in an area of 305,000 km² by using the density data of one lynx per 199 km² in Europe (Abdukadir et al. 1998). The authors also indicated that the suitable habitat for the lynx shrank by 50% since the 1950s. From 1955 to 1970 there were 237 pelts (around 16 per year) collected by the local fur buying company; the number dropped to 5–10 skins per year from 1970 to 1994 for unknown reasons. At Saihanwula Nature Reserve in northeastern Inner Mongolia where I conducted a NSFC project, we found the lynx population is recovering steadily, based on footprints in the snow. In 2006 we identified 4 lynx over an area of 800 km². In 2008 we identified between 4 and 14 lynx. We collected winter scats from different areas and gained kidney, liver, and muscle samples from a poached adult male for DNA analysis to determine the genetic background of this individual lynx.

Lynx lynx Fact Sheet

Names:
猞猁 [she li]
Eurasian lynx

Head and body length:
80-130 cm
Tail length:
11-25 cm
Weight:
18-38 kg

Global Population:
>50,000 (IUCN 2010)
Chinese Population:
27,000 (SFA 2009)

Distribution in China:
everywhere but SE China

IUCN Red List:
Least Concern (2010)
CITES:
Appendix II

China Red List:
EN A1cd
China Key List:
Class II

Photo A. Abdutalip

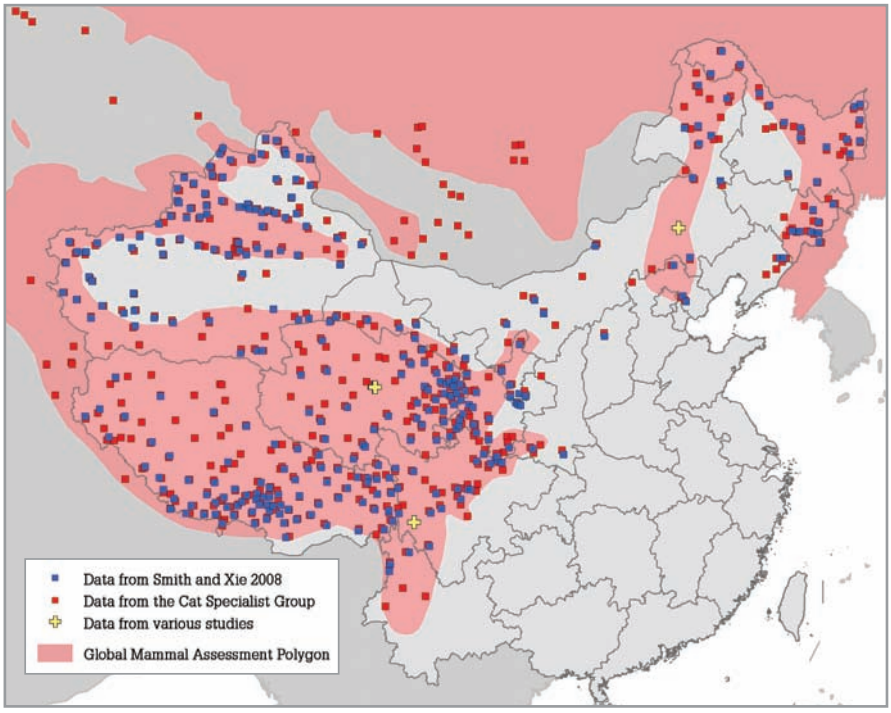
Reproduction

In our field survey we also found footprints of a female lynx and her young at Saihanwula Nature Reserve in January 2009 (unpublished data). Adult individuals spray urine around grass bases in January and February. According to interviews with reserve workers, they found 2 cubs in a litter in late May 1987, whose body length was around 40 cm and weight about 2 kg. The cubs had already opened their eyes and demonstrated attacking behaviour. The cubs were sent to the Beijing Zoo one month later. Other reports indicated that cubs were born in May and June (Gao 1987).

Fig. 2. Photograph of a lynx in Sichuan from February 2009 (Photo Que Pinjia).

Prey

The biological data on wild lynx were obtained with the help of hunters, herdsmen, and field observation (Gao 1987). However, a systematic study is needed on this widely distributed felid species. Based on scat analysis, the lynx preys on 22 species in Xinjiang and the main diet included roe deer, hare, and blue sheep. In Tibet the prey consisted of 37% steppe hare, 16% steppe pika, 21% birds, 9% Tibetan antelope, 7% Tibetan gazelle, 4% blue sheep, and 3% Tibetan fox in 21 scats (Liu 1999). The author Liu Wulin from the Tibetan Forestry Administration also indicated that lynx were much less numerous in areas co-occupied by grey wolf. Our scat study in Saihanwula Nature Reserve found the following prey distribution in 26 scats: 81% hare, 31% rodents, 27% birds, and 11% red and roe deer. We also found two cases of raccoon dog hair in lynx faeces; it is unknown whether this prey was hunted or scavenged. The hunting routes of lynx usually follow roe deer to their night beddings; in winter they traverse frozen streams. The lynx can leap over 2.3 m in dense shrub habitat (Fig. 4).



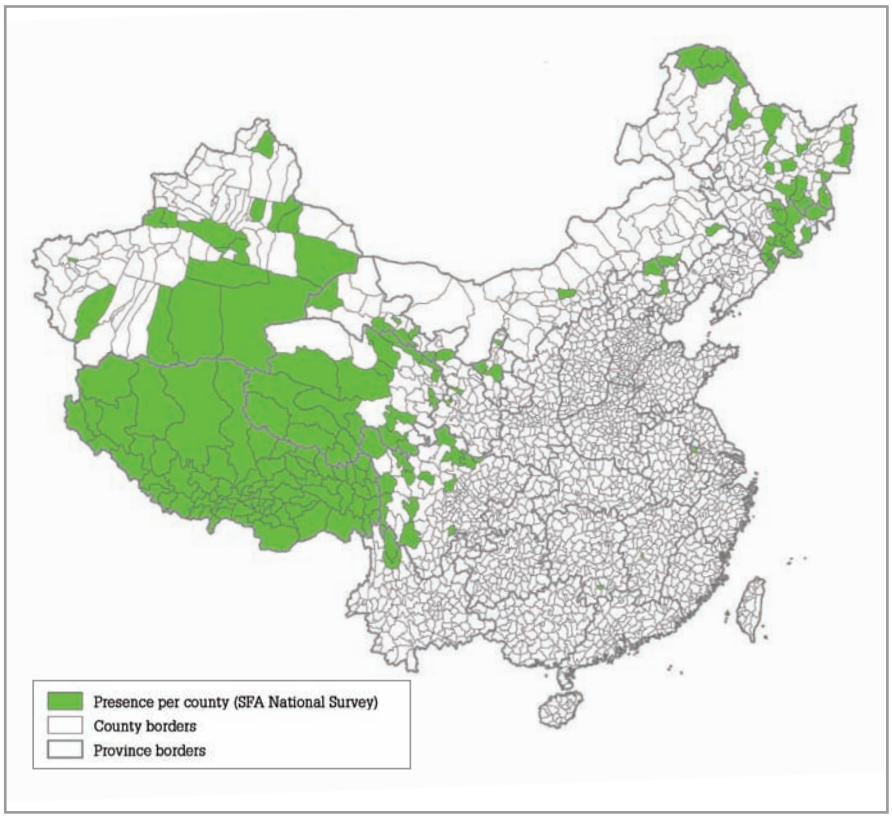


Fig. 3. Distribution of the Eurasian lynx in China.

In captivity

Studies on partial gene sequence analysis revealed that the lynx is phylogenetically distinct from other cat species present in China (Zheng et al. 2005). But the result of this preliminary study was different from other reports (Johnson et al. 2006). The regulatory region of the growth hormone gene was sequenced from a lynx body from Ji'nan Zoo in Shandong Province (Ma & Liu 2001). Studies were also conducted on zoo individuals for disease diagnosis and treatment (Qiu & Xiang 1982, Tian et al. 1992, Zhang et al. 1992, Li & Tang 2006, Zhao et al. 2007). One report described the morphology of the stomach and intestines of a female from Zhenzhou Zoo in Henan Province (Cheng et al. 1998). A paper addressed artificial rearing methods including feeding formula, reproduction management, and disease prevention for guidance on lynx farming from the Institute of Special Agricultural Products of the Chinese Academy of Agricultural Sciences (Wei & Zhou 1996).

Threats and conservation

Two decades ago factors threatening the lynx included shooting, snaring, poisoning, and removing cubs from dens. Since the Wildlife Protection Law was enacted in 1988, hunting activities have been banned. Strict limits on personal firearm possession from 2000 and associated punishments reduced field hunting sharply. From 2003 to 2008, 31 lynx pelts, 27 small-bore rifles and 19 home-made Tibetan powder guns were confiscated in Qiangtang Nature Reserve in Tibet.

Poaching is presently the main threat to lynx. Poachers do not intend to snare lynx particularly, but are seeking species of high economic value such as red deer, roe deer, goral, antelope and gazelle. Snares are left in the open and present a year-round danger to all wild animals. Some of the nature reserves conduct snare removal efforts. At Hunchun nature reserve in Jilin province, volunteers collected 308 snares and traps in 6 days during December 2005; during another 4-day search in January 2008 they

Fig. 4. The leaping traces of lynx in January, Saihanwula Nature Reserve.

Fig. 5. Snares cleared at Saihanwula Nature Reserve, central eastern Inner Mongolia.

located and confiscated 511 snares and 3 clips. At Saihanwula Nature Reserve we conducted trap removal efforts during the winters of 2007 and 2008; over 300 snares were collected (Fig. 5). Higher penalties were imposed on 11 poachers; those snaring for hares were fined 2000 Yuan, and for deer 5000 Yuan; this is about half a year's income for local farmers. These penalties curbed poaching behaviour effectively; the footprints of lynx appeared steadily in the core protected areas during 2008. But poaching is still the primary problem for nature reserve managers.

Although the national Law of Wildlife Protection was enacted in 1988 and the provincial governments also issued management regulations, law enforcement is always complicated by Guanxi [the personalized network of relationships and connections]. The situation is more difficult in minority communities such as in western Sichuan, Tibet, and Xinjiang, where local minorities consider clothes or garment decorations from wild animal pelts to be symbols of cultural tradition and higher social dignity.

Although more and more land is being set aside in nature reserves, the lynx populations within the reserves are being impacted by the fragmentation of habitat due to expansion of human activities in rural areas. Populations are becoming isolated from one another. How inbreeding will influence genetic diversity in the long term is an open question.

The Eurasian lynx is listed as a national second class key protected species under strict protection of the Law of Wildlife Protection in China. Lynx habitat has been enlarged thanks to the implementation of the project of Wildlife Conservation and Nature Reserve Construction. The number of national grade nature reserves has expanded from 243 in 2005 to 303 in 2008. As of 2008 there are over 2500 different classified reserves in the mainland; additionally, the quality of staff, facilities, and checking stations are much improved. Some of the nature reserves have implemented monitoring programs addressing predator-prey relationships and food supply, which have helped ungulate recovery (Sun 2005). These monitoring programs revealed that takin, giant panda and mainland serow increased more than 3% at Changqing nature reserve (Yuan et al. 2003), and the provisioned feeding accelerated the blue sheep population's recovery to a state that will destroy the habitat vegetation at Helanshan reserve (Liu & Wang 2006).

Conclusion

Eurasian lynx is a widely distributed medium-sized felid in China. We know of the cat's biological attributes from hunters and trophies taken during hunts for pelts and traditional medicine during the 1960s. A few reports were published on disease diagnosis, feed processing and captive breeding based on zoo animals. Populations inside protected reserves are recovering thanks to law enforcement addressing poaching and the increase in reserve numbers. Detailed studies on protected populations are needed to assess species status, including the segregation of subspecies and their possible distribution in China. Genetic diversity should be included in monitoring programs to detect impacts of habitat fragmentation on genetic health.

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