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The status of the tiger in China

Panthera tigris

The tiger *Panthera tigris* is the world's largest species of Felidae, although there is size variation across its range. There are only 3,000 to 5,000 tigers left in the wild, reduced from probably over 100,000 a century ago, due to habitat loss and fragmentation, prey base depletion, and human persecution (Dinerstein et al. 2007, IUCN 2010). The tiger's geographic range has declined by about 41% from its occurrence estimated a decade ago and now occupies only 7% of the historic range (Dinerstein et al. 1997, Dinerstein et al. 2006, Sanderson et al. 2006). The population is fragmented into 76 Tiger Conservation Landscapes – places and habitats that have the best chance of supporting viable tiger populations into the future – but no subpopulation has more than 250 mature breeding individuals (Dinerstein et al. 2006, Sanderson et al. 2006). Tigers are currently found in 13 Asian range states: Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Russia, Thailand, and Vietnam (Nowell & Jackson, 1996). They may still persist in North Korea, although there has been no recent confirmed evidence (IUCN 2010).

Evolution and taxonomy

The earliest tiger fossils, found in northern China and Java (in Indonesia), date back to around 2 million years ago (Hemmer 1987). Yet

all living tigers are traced back to a common ancestor as recent as 72,000–108,000 years ago, as reflected by their relatively low genetic diversity (Kitchener 1999, Wentzel et al. 1999, Luo et al. 2004). This is a consequence of recent demographic reductions, probably related to the earth's largest known volcanic explosion during the Quaternary – the Toba volcano super eruption in Sumatra. The extant tigers are divided into six subspecies: Amur tiger *P. t. altaica* (Fig. 1); Indo-Chinese tiger *P. t. corbetti*; Malayan tiger *P. t. jacksoni*; Sumatran tiger *P. t. sumatrae*; Bengal tiger *P. t. tigris*; and South China tiger *P. t. amoyensis* (Mazak 1981, Luo et al. 2004). Three subspecies previously recognized on the basis of morphology are extinct: Bali tiger *P. t. balica* (Schwarz 1912), Javan tiger *P. t. sondaica* (Temminck 1844), and Caspian tiger *P. t. virgata* (Illiger 1815). Conservation of tigers in China is unique and important to tiger conservation in the world, as four of the six remaining tiger subspecies occur in the wild in China.

Ecology and behaviour

The most important factors for tiger survival are dense vegetation cover, abundant large ungulate prey, and access to water (Sunquist et al. 1999). Tigers thrive in a variety of habitats, including tropical evergreen and moist deciduous forests of Southeast Asia,

tall grassland and deciduous forests in South Asia, mangrove forest in Sundarbans, and the mixed Korean pine/deciduous and temperate deciduous forests in the Russian Far East (Nowell & Jackson 1996, Seidensticker et al. 1999, Sunquist & Sunquist 2002). They less commonly inhabit pure coniferous forests, swamps, meadows, or alpine areas, but tracks have been found in the snow at 3,000 m in the Himalayas (Prater 1971). Tigers tend to avoid open landscapes and are almost never found in agricultural lands (Smith 1993). These habitat preferences reflect the habitat preferences of their prey, and are therefore useful in predicting suitable tiger habitat in China.

The home range of a tiger correlates with prey density, varying from as small as 20 km² for a female tiger in the Indian subcontinent where primary productivity is high, to 450 km² in northeast Asia (Smith 1993, Miquelle et al. 2006). Because tigresses are territorial, each female requires a non-overlapping range. This fact is of critical importance in determining area requirements for a population. For instance, in northeast China, in order to maintain a population of 20 breeding female tigers, approximately 8,000 km² of well-connected habitat is necessary. No reserve in northeast China covers such a large area, and thus planning for tiger recovery zones beyond the current protected areas is essential.

Male tigers have the capacity to disperse very long distances, with a record of up to 1,000 km away from source populations (Heptner & Sludskii 1992). Males make long-distance movements in search of potential mates, and will rarely settle in one location unless a female is found. The available evidence suggests that female tigers seldom disperse more than 30–40 km from their natal home range, and often inherit a portion of their mother's home range (Smith 1993, Sunquist & Sunquist 2002). Many sightings of tiger in northeast China near the border with the Russian Far East are most likely such dispersing males, and not evidence for a stable reproducing population (D. Miquelle, pers. comm.).

Female tigers normally start reproducing at between 3 and 4 years of age and males do not generally start until they are about 5 years old when they establish a territory of their own (Smith & McDougal 1991). Mating takes place at any time of year, but most frequently from late November to early April. Female tigers give birth to 2–4 cubs after a gestation of 100–104 days. The female rears the cubs alone, and they become independent at 18–28 months old. Females usually breed



Fig. 1. A camera trap picture was taken of a tiger at the Xishuangbanna Nature Reserve in Yunnan, China on May 13, 2007 (Photo L. Feng & A. Zhang).

every 2–2.5 years (Mazak 1981). Although they live longer in zoos (26 years recorded), the oldest wild tiger on record was a female tiger of 17 years in Nepal (McDougal 1991).

Prey

Tigers have a wide prey spectrum, ranging from frogs to elephant calves, but throughout their range the dominant prey are large ungulate species. Tigers' preferred prey in northeast Asia are red deer, wild boar, roe deer, and sika deer (Miquelle et al. 1996, Miquelle et al. 2006). In the South Asia region, sambar, chital, barking deer, spotted deer, red deer, hog deer, gaur, and wild pigs comprise the principal diet (Karanth & Nichols 2002). Indochinese tigers prey mainly on sambar, wild pigs, serow, and large bovids such as banteng and gaur. Adult tigers must kill the equivalent of one large ungulate per week, or about 50 large prey animals per year (Karanth et al. 2004). For females nursing cubs, the rate must be higher. If large prey species are not available, a female cannot make a sufficient number of kills to rear cubs successfully, as small prey species do not provide sufficient biomass to sustain both herself and her cubs. Thus, although tigers can survive for a short while on an assortment of smaller prey, in the long term these species form an insignificant part of the tiger's diet (Sunquist & Sunquist 2002). Assuming that a tiger removes 10–20% of the prey population per year, a single tiger requires a prey base of no fewer than 250–500 individuals within its home range in order to survive (Miquelle et al. 1996). This fact is of particular importance when considering tiger habitat recovery in China, where large ungulate populations are also in decline in many regions.

Distribution and population dynamics

Tigers in China have been reduced to a few, scattered populations (see Fig. 2) with a total number fewer than 50, all with a highly precarious future. This dramatic drop in numbers is primarily due to habitat loss, depletion of their prey base, and human persecution (Wang 1998, Smith & Xie 2008).

South China tiger

The original distribution of the South China tiger *P. t. amoyensis* was from Fujian to Zhejiang province to western Sichuan (about 100°E), from the Xijiang River Basin (about 23°N) to Shanxi, Gansu and Shaanxi Province (about 35°N). It is believed there were more than 4,000 South China tigers in the country

Panthera tigris Fact Sheet

Names:

虎 [hu], 老虎 [lao hu]
tiger

Head and body length:

215-275 cm (females)
220-330 cm (males)

Weight:

75-167 kg (females)
100-306 kg (males)

Distribution in China:

formerly widely in NE, SE, C, and S China

IUCN Red List:

Endangered A2bcd+4bcd;
C1+2a(i) (2010)

CITES:

Appendix I

China Red List:

CR d

China Key List:

Class I

Global Population:

3,000-5,000 in the wild
(IUCN 2010)

Chinese Populations:

37-50 individuals, of which
- Amur tiger *P. t. altaica*
(northeastern China): 18-22
- Bengal tiger *P. t. tigris*
(Motuo county, Tibet): 8-12
- Indochinese tiger *P. t. corbetti* (southern Yunnan province): 11-16
- South China tiger *P. t. amoyensis* (southern China): no definite evidence
- Caspian tiger *P. t. virgata* (Xinjiang): extinct (IUCN 2010)



Photo A. Silva

in 1949, and over 3,000 were killed during the 1950s and 1960s when they were declared pests and officially hunted down, until protection status was given in 1977 (Lu & Sheng 1986a, Ma et al. 1997, Smith & Xie 2008). The scattered surviving population is then thought to have declined to the brink of extinction with only occasional reports from the provinces of Zhejiang, Hubei, Guangdong, and Guizhou (State Forestry Administration 2009). Extensive surveys over the last 10 years have failed to find direct evidence of their existence (Tilson et al. 2004). The Government of China's State Forestry Administration announced at the 2007 International Tiger Symposium in Kathmandu, Nepal, that there is no definite evidence of the continued existence of the South China tiger in the wild (also see State Forestry Administration 2009).

Amur tiger

The Amur tiger *P. t. altaica* historically occurred across most forested ecosystems of northeast China. The habitat has been

decreasing for over a century since the Qing dynasty's ban on the exploitation of forests was lifted in 1870, and under Japanese occupation the forest was decimated until 1950 (Ma 1983). The tiger was widely distributed in the Daxing'anling, Xiaoxing'anling, Laoyeling, Zhangguangcailing, Wandashan, and Changbaishan mountains, but became extinct in the 1960s in the Daxinganling Mountains, in the 1970s in the Xiaoxinganling Mountains, and at the end of the 1980s in the Changbaishan Mountains (Ma et al. 1997), mainly due to hunting and primeval forest loss. In 1979, Chinese specialists estimated that there were about 150 tigers, but in 1988 it was said that the number had fallen to about 35 (Ma et al. 1997). There are now about 12–16 Amur tigers in northeast China, including 7–9 in Jilin, and 5–7 in Heilongjiang (State Forestry Administration 2009). Reports of tigers in the Laoyeling, Zhangguangcailing, and Wandashan Mountains are not uncommon, but there is no evidence indicating reproduction in any of these landscapes. The absence of persistent,

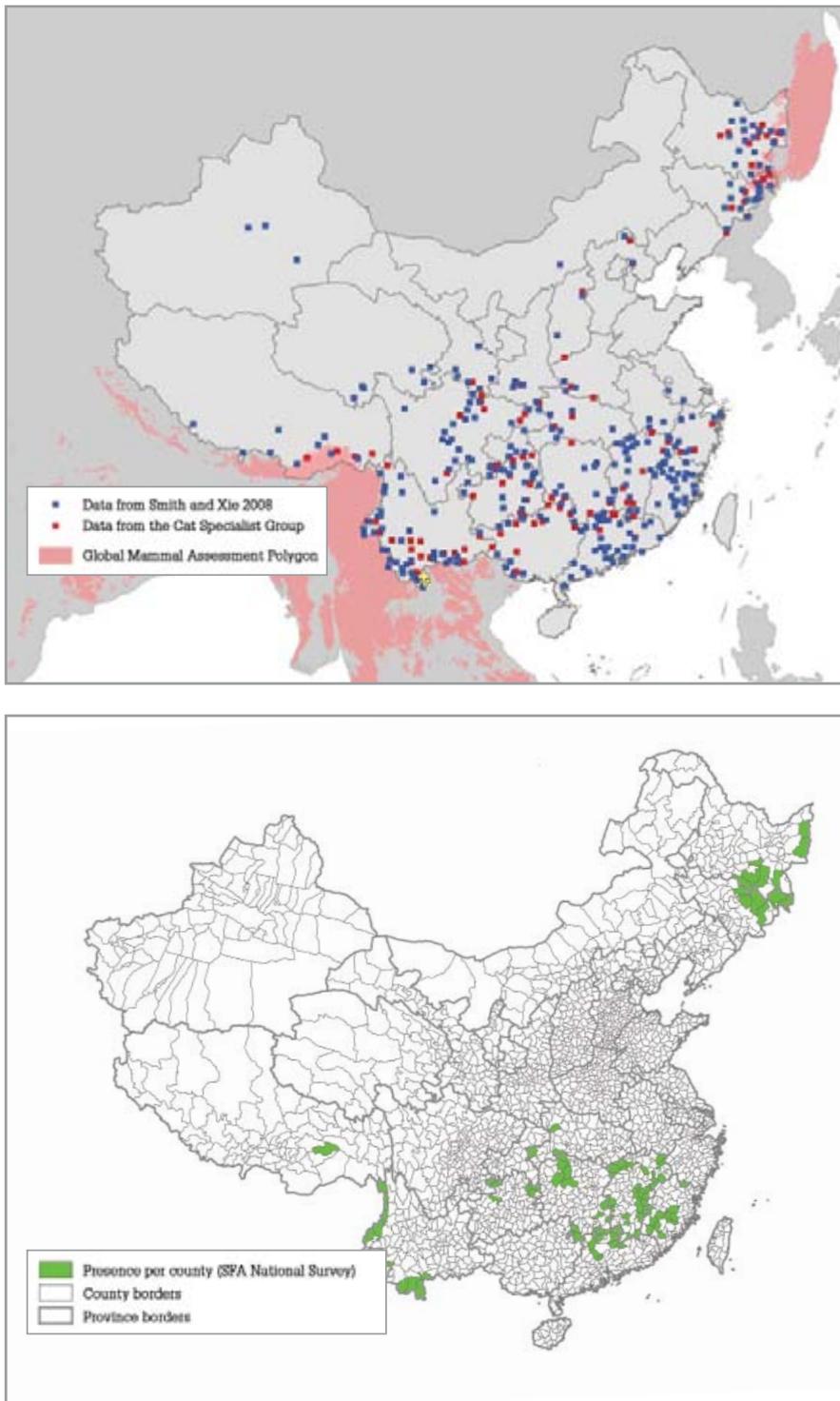


Fig. 2. Distribution of the tiger in China.

repeated observations of tigers in any given location suggests that there may be no resident animal in China, and all recorded observations (Li et al. 2008) may represent transient or dispersing animals from Russia where now over 400 tigers live, compared with the 20–30 in the 1940s (Miquelle et al. 2006). Since large tracts of forests and potentially suitable habitat for Amur tigers still exist throughout eastern Jilin and Heilongjiang provinces, re-colonization of previously

occupied tiger habitat in northeast China is still possible, if appropriate conservation steps across the landscape are taken.

Indochinese tiger

The Pleistocene centre of modern tiger radiation was probably in the Indochina/southern China region, which is now the range of the Indochinese tiger *P. t. corbetti* (Luo et al. 2004). The few remaining tigers in southern Yunnan on the borders to Lao PDR, Vietnam and Myan-

mar belong to this subspecies. Tigers had occurred much more frequently before the 1990s but reports from the Chinese government in the mid 1990s estimated the number of tigers in Yunnan to be 30–40 (He 1994), and in 2009, 14–20 (State Forestry Administration 2009). These tigers probably exist in Xishuangbanna (11–16 individuals) and Simao (3–4 individuals) regions, which are both adjacent to the country's borders and indicate cross-boundary individuals rather than resident tigers within China. A photo of a wild Indochinese tiger was taken in Xishuangbanna National Nature Reserve adjacent to Laos in 2007 (Feng et al. 2008; see Fig. 1). However, unlike the Amur tiger in northeast China, there is no single large source tiger population in Laos, Vietnam or Myanmar immediately bordering Yunnan. Transboundary collaboration from all the neighboring Indochinese countries will be required to maintain the survival of wild tigers in Yunnan and to facilitate the recovery of wild tigers and their habitats on all sides of the borders.

Bengal tiger

The Bengal tiger *P. t. tigris* was once distributed throughout the broadleaf forests of southern and southeastern Tibet, and western Yunnan, below an elevation of 2,500 m. Today, there is probably only one remnant population in Medog (Motuo) County, Tibet. Widespread illegal and uncontrolled hunting has greatly reduced the numbers of wild pig, takin, red goral, and muntjacs, which are the tiger's prey species (Qiu & Bleisch 1996). Losses of livestock to tigers in this region are high. One persistent livestock killer tiger was officially shot in 1996. In 1999, the Gedang Xiang (administrative unit) in Medog lost 7.8% of its cattle and 1.9% of its horses to tiger predation. Tigers in the northern hills of Arunachal, India, have become extremely scarce, which in effect isolates the small Medog population of tigers. The total number of tigers in Medog is estimated at 8–12, including 5–7 in Gedang, and they possibly represent the last resident tiger population in China (State Forestry Administration 2009).

In captivity

It is estimated that over 15,000 tigers live in captivity worldwide, three to five times more than their wild relatives (IUCN 2010, Nyhus et al. 2010). Only about 1,000 of them are managed through coordinated breeding programs among zoos that aim to preserve genetic variability that is representative of geographic

and subspecies clustering found in the wild (Luo et al. 2008). There are 64 South China tigers registered in studbooks as of 2007, all at Chinese zoos, but they are derived from six wild-caught founders with uncertain genetic ancestry and are extremely inbred (Yin 2007). There are no coordinated breeding programs for other subspecies of tigers by the Chinese Association of Zoological Gardens. The vast majority of captive tigers worldwide are not part of these managed breeding programs, most residing in roadside zoos, breeding farms, makeshift breeding facilities, circuses, and as pets (Nowell & Xu 2007, Williamson & Henry 2008). There are over 4,000 tigers living in breeding facilities in China (Xinhuanet 2006, Guo 2007, Morell 2007).

Main threats

Tigers in China have been reduced to a few small, scattered populations, all with a dire future. Habitat loss and poaching for trade are the principal causes of a significant decline in tiger range and numbers (Dinerstein et al. 2007). Depletion of tiger prey base is the main threat to tigers in areas of otherwise suitable habitats (Karanth & Stith 1999). Maintenance and expansion of the present habitat are crucial to the tiger's future, together with recovery of prey populations and protection from illegal killing.

Tigers were shot or poisoned for livestock protection and for gain. Large numbers of tigers were killed in the 20th century in China when they were officially considered pests, and bounties were paid for their destruction. About 3,000 South China tigers were killed within 30 years until 1977 when official protected status was given (Lu & Sheng 1986a). But demand from the black market and the status of its near extinction in China continue to drive illegal poaching of tigers. Tigers have traditionally been hunted for skins, trophies, decoration, and for the use of their bones and other body parts in traditional medicines (Gratwicke et al. 2008). In recent years tiger poaching appears to have occurred or increased in several range states, apparently to smuggle skins, bones, and body parts to China (Nowell & Xu 2007).

Widespread illegal and uncontrolled hunting has greatly reduced the numbers of the tiger's primary prey. Subsistence hunting of ungulate prey by local people is now a powerful force driving the tiger's decline over large parts of its range. Also, some of the methods used for catching deer, such as snaring, can inadvertently catch and sometimes kill tigers. Studies

from tropical Asia show that it is unlikely tigers that can reproduce successfully at prey densities below 2–5 ungulates per km² (U. Karanth, pers. comm.). In northeast Asia, Amur tigers expand their home ranges to allow for the seasonal movements of a lower density ungulate prey base. They are naturally vulnerable to sharp declines in ungulate populations during severe winters (D. Miquelle, pers. comm.). In many tiger ranges, low abundance of tigers in suitable habitats usually correlates with a reduced number of large ungulate species in the region (Rabinowitz 1993).

Large tracts of contiguous habitat are essential to assure the long-term survival of wild tigers. Tigers live in 40% less habitat than they were thought to inhabit a decade ago and currently occupy only 7% of their historic range (Dinerstein et al. 2007). Severe habitat loss has occurred during the past century with the growth and spread of human populations, settlement and activities. Not only have large blocks of tiger habitat been converted to human use, but wilderness has been fragmented, creating many isolated tiger populations that are subject to genetic deterioration, disease, demographic collapse, and environmental catastrophes.

Protection measures

The tiger is not only an ecological umbrella species, but also has an outstanding cultural significance in China. As in most of the other tiger range countries, habitat loss, overhunting, poaching, and prey depletion are the primary causes for reduction of wild tigers in China. Efforts to conserve tigers in the wild include identifying potential habitats and ecological corridors that are crucial to the survival of free-ranging tigers, developing and implementing regular monitoring systems, conducting status surveys in priority areas to monitor tiger population trends, restoring their prey base particularly the large ungulate prey species, and maintaining or even expanding the existing reserves and sanctuaries.

In the 1970s the Chinese government reversed previous regulations declaring the tiger as a pest, and fully banned the killing of wild tigers (Ma et al. 1997). In 1988, the top legislative body in China passed and began implementing since 1989 the P. R. China Law for Wildlife Conservation that lists all the subspecies of tigers in the first category of protected animals (CITES Management Authority of China 2007). The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), of which China

has been a member since 1981, prohibited international tiger trade in 1987. In 1993, the State Council of China issued the Notification on Banning the Trade in Tiger Bone and Rhino Horn, which forbade import, export, and domestic trade in tiger parts and derivatives (CITES Management Authority of China 2007). Since then, tiger bone has been removed from the list of ingredients in official Chinese pharmacopoeias. This is a commendable contribution to the conservation of wild tigers worldwide. In 2006 the Regulation for Import and Export of Endangered Species of Wildlife was enacted in China to implement CITES. To fully stop poaching and illegal trade in tiger products, it requires cooperative effort in all range countries to increase the effectiveness of implementation of conservation laws and regulations.

Large carnivores such as tigers are highly vulnerable to extinction in small and isolated reserves. Large, continuous tracts of land with sufficient prey base are the key to the long-term survival of viable tiger populations in the wild. There is a need to approach tiger conservation at a much larger scale than before. All the remaining tigers in China are near the country's borders in the northeast or southwest; thus landscape-level conservation of wilderness habitat and the recovery of large wild ungulate populations as the prey base for the tiger will be required. Close collaboration between Russia and China, and between Indo-Chinese countries and China, will be critical to ensure that natural ecological corridors exist between the countries, allowing exchange of tigers and other native wildlife. Creation of international protected areas, as well as adjacent lands in the neighboring countries will protect critical habitat and provide linkages for transboundary tiger populations.

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