

PHILIP RIORDAN<sup>1</sup> and SHI KUN<sup>2</sup>

# The snow leopard in China

## *Panthera uncia*

The snow leopard *Panthera uncia* occurs within 12 countries across Central Asia. The secretive nature of this rare species, and the inaccessibility and harshness of the areas in which it exists have precluded accurate population assessments across their entire range. It is estimated that China contains approximately 60% of the potential habitat available to snow leopards (McCarthy & Chapron 2003). The importance of China for snow leopard conservation is an echo of the scale of the country itself. The vast size and diversity of China, together with unparalleled social and economic change, present a myriad of complexities and challenges for conservation. As an amplified clarion for the world, the complex and changing interface between people and wildlife in China demands our attention.

China is the central country of the snow leopard's global distribution. Its known range in China is over a million km<sup>2</sup>, and this area borders to all of the other eleven snow leopard range states. The significance for

the conservation of snow leopards that they primarily inhabit areas with often sensitive political boundaries is not to be underestimated. The constraints this places on developing range-wide conservation strategies and the necessity of securing high-level political dialogue make our task all the harder. Beijing Forestry University and the Wildlife Conservation Research Unit at Oxford University, together with the State Forestry Administration of China (SFA) are working to develop both national and regional action plans for the conservation of snow leopards in China, with input from experts within the Snow Leopard Network, Panthera and the Snow Leopard Trust.

### Background

Based on morphology, the snow leopard has previously been placed within its own genus *Uncia* of the Pantherinae subfamily of the Felidae (McCarthy & Chapron 2003). However, more recent molecular phylogenies (Christiansen 2008, Wei et al. 2009) have

placed the species within the *Panthera* genus: *Panthera uncia*.

Snow leopards typically occur within an elevation range of 3,000–4,500 m above sea level, although they have been recorded both above 5,500 m and below 1,000 m. They are small by "big cat" standards, weighing between 27 and 54 kg, with males tending to be larger than females. Snow leopards are adapted to rugged high altitude areas (Fig. 1), with wide feet for walking in snow and providing traction on loose surfaces, further assisted by fur on the undersides. They have small rounded ears which further minimise heat loss. Their body length is between 74 and 130 cm and their long flexible tails are the same length again, which assists with balance in rocky terrain, and the tail can be wrapped around the animal to provide additional warmth when lying still. They have long fur ranging from dark cream to smoky grey in colour, providing camouflage with darker rosettes on the body and spots on the head. The pattern of rosettes and spots is unique to each individual, thus enabling the use of camera trap methods for individual based surveys (Jackson et al. 2006, Karanth et al. 2006). The footprints of snow leopards may also provide means of individual identification (Riordan 1998).

Snow leopards are predominantly solitary, although territorial behaviour is poorly understood and adjacent ranges can overlap substantially, particularly between males and females. Home range area appears to vary greatly, probably with prey density, up to 400 km<sup>2</sup>, though recent satellite-based telemetry suggests that snow leopards' range areas may be an order of magnitude greater than this (McCarthy et al. 2005). Snow leopards mark usage areas in their ranges with scrapes, urine and faeces, often at dominant features and along travel routes. Intensification in marking behaviour coincides with breeding between late January and March. One to five cubs are born after a gestation period of 93–110 days.

Snow leopards are opportunistic predators, employing short-range hunting techniques, relying on camouflage and stealth, more suitable to the rugged mountain habitats than longer-range hunting methods. They are capable of taking large prey, up to three times their own body weight, but also show dietary plasticity, as would be expected in the harsh environments in which they exist, and will often take much smaller prey such as marmots and galliform birds. Livestock



**Fig. 1.** Snow leopard photographed in Sichuan in the Qionglai mountains in Wolong National Nature Reserve, January 2009 (Photo Li Sheng, W. McShea & Wang Dajun).

depredation occurs throughout their range, probably depending on the availability of wild prey. The relative rates of livestock depredation attributable to snow leopard remains uncertain, with sympatric carnivores such as lynx *Lynx lynx* and wolf *Canis lupus* also taking livestock but also at unknown rates. Where compensation schemes have been established for livestock depredation by snow leopards specifically, predation by sympatric carnivores may be misreported since these incidents will not be compensated, with livestock loss being wrongly attributed to snow leopards at an unknown rate. Furthermore, predation rates quantified from faecal analysis may be misleading in the absence of genetic verification, given the apparent rate of species misidentification of collected scats (Janecka et al. 2008).

#### Status and distribution

Synonyms and local names used in China are Ai Ye Bao, Cao Bao, He Ye Bao, Xue Bao.

China contains over 60% of the potential habitat available to snow leopards (see Fig. 2) and the estimated population of between 2,000 and 2,500 individuals accounts for between one-third and up to one-half of the total global population in the wild (McCarthy & Chapron 2003). Snow leopards have been reported to occupy approximately 1.1 million km<sup>2</sup> of China's fragile mountain environments (Fox 1994). Using snow leopard habitat suitability ranges from the Snow Leopard Survival Strategy (McCarthy & Chapron 2003) we estimate the area of suitable habitat for snow leopards in China to be 2.1 million km<sup>2</sup>, which is consistent with the estimated 60% of snow leopard habitat being in China. Snow leopards occur principally in the western provinces of the country: Gansu, Qinghai, Sichuan (see Fig. 1), Tibet and Xinjiang. The status of potential populations in Inner Mongolia, Ningxia, Shanxi and Yunnan are uncertain at this time. The extent of the snow leopard range in China coincides with over 10,000 km of national border adjoining 11 neighbouring snow leopard range states. Many areas of international conjunction occur at key sites for range connectivity, such as the Himalayan region (Tibet – Bhutan; Nepal; India); Karakorum and Pamirs (Xinjiang – India; Pakistan; Afghanistan; Tajikistan); and Tian Shan (Xinjiang – Tajikistan; Kyrgyzstan; Kazakhstan).

As in other part of their range, the secretive nature of snow leopards, and the inaccessibility and harshness of the areas in which they exist have hampered accurate population as-

## Panthera uncia

### Fact Sheet

#### Names:

雪豹 [xue bao]  
ounce, snow leopard

#### Head and body length:

74-130 cm

#### Tail length:

80-105 cm

#### Weight:

27-54 kg

#### Global Population:

4,080-6,590 (IUCN 2010)

#### Chinese Population:

2,000-2,500 (Smith & Xie 2008)

#### Distribution in China:

1,100,000 km<sup>2</sup>, W China

#### IUCN Red List:

Endangered C1 (2010)

#### CITES:

Appendix I

#### China Red List:

CR A1cd

#### China Key List:

Class I



Photo A. Silva

sessments across China. Work is continuing to improve the regional and national assessments of snow leopard populations.

Little additional information on snow leopard populations in China has been published since the surveys of George Schaller and his team in the 1980s. At that time, snow leopard populations were assessed in the provinces of Qinghai, with an estimated 650 individuals in a range of 65,000 km<sup>2</sup>, and Gansu (Schaller et al. 1988a). Estimates were also produced for areas of Xinjiang, where approximately 750 individuals were estimated to exist within 170,000 km<sup>2</sup> of suitable habitat (Schaller et al. 1988b). In Tibet, the distribution area of the snow leopard is potentially at least twice that of Qinghai (Yang & Feng 1998) and snow leopards were found to exist sporadically across the province (Schaller 1998). From these estimates and from assessment of available habitat the population size of the snow leopard in China is estimated to be 2,000–2,500. Estimating total population size in China and elsewhere is difficult, since densities appear to vary greatly, for example one animal per 100 km<sup>2</sup> in Qinghai compared with one animal per 250 km<sup>2</sup> in Xinjiang.

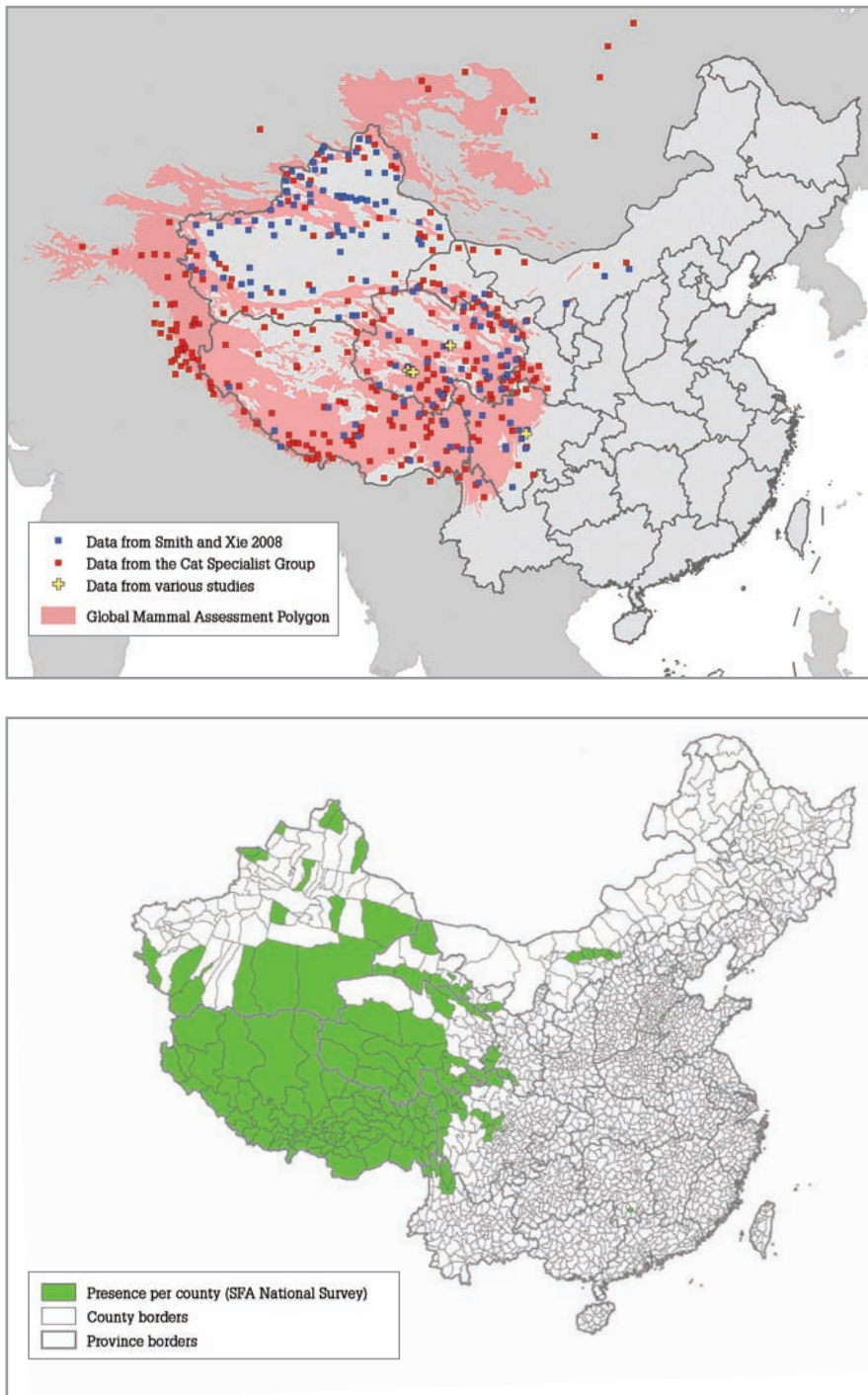
In China, the amount of suitable snow leopard habitat within protected areas is 28%, higher than the overall figure of 6% calculated for the entire range by Hunter

& Jackson (1995). Of 203 reports of snow leopard occurrence in China stored on the Snow Leopard Network database, only 53 (26.1%) coincided with protected areas, significantly different from other countries where, out of a total of 1,292 snow leopard records, 606 (46.9%) occurred within protected areas (Fisher's Exact Test:  $p < 0.001$ ). The largest protected areas within the snow leopard range in China are Qiangtang Nature Reserve in Tibet and the adjoining Sanjiangyuan Nature Reserve in Qinghai, with a combined area of approximately 600,000 km<sup>2</sup>. Aierjinshan Nature Reserve in Xinjiang and Kekexili Nature Reserve in Qinghai also abut these reserves, forming a protected area complex of 740,000 km<sup>2</sup>. Of this total area, 375,300 km<sup>2</sup> (50%) is designated as suitable snow leopard habitat, with the majority of this (258,300 km<sup>2</sup>) in Qinghai. Areas of suitable habitat within protected areas are not contiguous and it is unclear how much the interstitial unsuitable habitats are impermeable to snow leopards, presenting significant obstacles to dispersal.

#### Main threats

The main threat to snow leopards is perceived to be retaliatory killing by local human communities following livestock depredation. However, livestock herding communities





**Fig. 2.** Distribution of the snow leopard in China.

in Qinghai did not view snow leopards as a major threat to their livestock (Xu et al. 2008), indicating that the severity of this threat may vary substantially across snow leopard range in China. The relative importance of this and other related threats, such as direct poaching, habitat degradation and reduced natural prey abundance is not well understood. Intuitively, one would expect snow leopard populations to be negatively correlated with intensity of human activities. Recent surveys in the Shaksam region of Xinjiang, revealed little evidence of snow leopard activity, despite

low human population density, an absence of livestock farming and a relatively high abundance of prey (Riordan et al. in prep.). Precious few life-history data exist for snow leopard, and so unpicking the relative impacts on the survival and reproduction of this elusive cat across its range remains a matter of some speculation. Information exists at local scales; however recent telemetric work confirms suspicions that snow leopard populations function at large geographical scales and the impacts reported in any one area may not generalise linearly across the entire range.

Attention is often drawn to reports of illegal supply and sale of snow leopard body parts, particularly skins for ornamental use and bones for traditional Chinese medicine (TCM). This is a wider issue across Asia (Baker et al. 2006), contrasting traditional beliefs and values with encroaching modern Western influences. Increasing affluence among middle sectors of society, in combination with traditional beliefs, may have stimulated markets for snow leopard and other big cat body parts. China has a significant role to play in bringing an end to this trade with the support of the international community.

In general there is a lack of convergence between conservation and human development aims, not just within China but across the entire snow leopard range. Within mountain areas in Asia descriptions of places often include the terms "harsh", "inhospitable", "barren" and "unproductive", and people are often characterised as "incapable stewards" of the natural environment, as lacking sufficient intelligence and as being unable to overcome environmental constraints and survive in their own habitat (MacDonald 1998). Greater appreciation of the needs and desires of local indigenous peoples may serve to aid and harmonise conservation and development aims. Improving the accessibility of local resources for local people may be the most significant, yet often unrecognised, factor of conflicts that weaken conservation and development programmes (Cohn 1988). All stakeholders will agree on the need to see sustainable developments. However, politicised or naïve ambiguities in the definitions of key concepts around sustainability, for example between social and ecosystem sustainability (Shearman 1990) can be argued to have increased the disparity between development and conservation goals. Finding and defining common goals thus becomes essential for both conservation and human wellbeing.

### Current and future protection

There are two principal laws providing protection for snow leopards in China: the Wildlife Animal Protection Law (WAPL) of the People's Republic of China (1989) and the Enforcement Regulations for the Protection of Terrestrial Wildlife of the People's Republic of China (1992). The species is listed as a Class I protected animal under the WAPL, which means that hunting of snow leopards and trade (sale and purchase) in their products both constitute a criminal offence. Permits may be granted allowing particular listed pur-

poses, such as scientific research, domestication, breeding, or exhibition (WAPL Article 22).

The Criminal Law of the People's Republic of China, last amended in 1997, provides severe penalties for unlawful taking, killing, transporting, purchase or selling of State-protected animal species, such as the snow leopard. Depending on the severity of the crime this can result in a prison sentence of more than 10 years, a fine and the confiscation of property (H. Xu, in Theile 2003). Provinces may also adopt their own wildlife protection regulations, which may be more, but not less, stringent than the national legislation.

China's extensive national borders and major international ports at Shanghai and Guangzhou create great challenges for China's wildlife law enforcement agencies. Attempts have recently been made to develop a volunteer network to assist the China authorities, and the Chinese government has pledged further funds to fight wildlife trade as part of policy. In recent years hunting has been made illegal in several provinces across the administrative jurisdictional boundaries: Jilin (since 1996), Guangdong (2001–2003), and Liaoning (2003–2013). Other provinces, including those with snow leopard populations, have stopped hunting in wildlife conservation hot spots or during breeding seasons. Further efforts to work with international partners have been made; with China hosting key CITES regional workshops in recent years (TRAFFIC International 2006).

Key recommendations made in the Snow Leopard Survival Strategy (SLSS; McCarthy & Chapron 2003) focused on interrelated human activities. These covered such topics as grazing management, income generation, reducing poaching and trade in snow leopard parts, reducing livestock depredation by snow leopards, animal husbandry, conservation education and awareness. Significant progress has been made on some of these approaches in other countries, for example: Mongolia and Kyrgyzstan, where alternative income has been generated from handicrafts; India developed community-based ecotourism, livestock insurance schemes and corral improvements in Ladakh and Spiti; Pakistan has today community-based compensation and insurance schemes and livestock husbandry programs. Adopting examples of best practice and creating workable solutions in China is of critical importance.

Within the SLSS, snow leopard range states were also encouraged to develop their own



**Fig. 3.** Snow leopard photographed in Sichuan in the Qionglai mountains in Wolong National Nature Reserve, March 2009 (Photo Li Sheng, W. McShea & Wang Dajun).

national and regional survival strategies for snow leopards. In collaboration with the Chinese national and provincial authorities, work is continuing to develop regional and national strategies for China.

Furthermore, we encourage action to tackle the key threats to snow leopards in China, by developing fully collaborative projects, engaging policy makers, human communities in areas of concern and international partners; the aims are:

- to carry out fundamental research into the behaviour and ecology of snow leopards in China, comparing the impacts of differing human interaction across their range;
- fully and openly to investigate the magnitude and impacts of illegal trade in snow leopard body parts; this should include a detailed and dispassionate study of the use of big cat body parts in TCM and the substitutability of alternatives;
- to evaluate wide-ranging climate change impacts in mountain ecosystems, in terms of agricultural practice, wildlife populations and conservation of top predators; and

- to develop and support capacity in local communities to monitor snow leopard populations and their prey, and to provide mechanisms for managing livestock incidents objectively and fairly.

<sup>1</sup> Wildlife Conservation Research Unit, Department of Zoology, University of Oxford, Tubney House, Abingdon Road, Tubney, Oxfordshire, OX13 5QL, UK  
<philip.riordan@zoo.ox.ac.uk>

<sup>2</sup> Wildlife Institute, Beijing Forestry University, 35 Tsinghua-east Road, Haidian, Beijing 100088, China  
<kunshi11@yahoo.com.cn>