TRAFFIC REPORT

AN OUNCE OF PREVENTION:

Snow Leopard Crime Revisited

Kristin Nowell, Juan Li, Mikhail Paltsyn and Rishi Kumar Sharma

OCTOBER 2016

TRAFFIC
the wildlife trade monitoring network

WWF

USAID
FROM THE AMERICAN PEOPLE

TRAFFIC **REPORT**

Financial support for TRAFFIC's research and the publication of this report was provided by the WWF Conservation and Adaptation in Asia's High Mountain Landscapes and Communities Project, funded by the United States Agency for International Development (USAID).

Suggested citation: Nowell, K., Li, J., Paltsyn, M. and Sharma, R.K. (2016). *An Ounce of Prevention: Snow Leopard Crime Revisited*. TRAFFIC, Cambridge, UK.

ISBN: 978-1-85850-409-4

Front cover: A Snow Leopard looks out over its mountain territory in Mongolia's Altai mountains. Credit: Munkhtogtokh Ochirjav, WWF Mongolia (camera trap photo).

Design: Pham Thi Ngoc Tram
ngoctram89@gmail.com

"*An ounce of prevention is worth a pound of cure*" Benjamin Franklin (1736), in reference to fire fighting.

Ounce is the original common name of the Snow Leopard, bestowed in the first published scientific description of the species (G.L. Buffon, 1761), and echoed in its Latin name *Panthera uncia* (Schreber, 1775).

AN OUNCE OF PREVENTION: Snow Leopard Crime Revisited

Kristin Nowell, Juan Li, Mikhail Paltsyn and Rishi Kumar Sharma

© Munkhtogtokh Ochirjav, WWF Mongolia (camera trap photo)

A Snow Leopard looks out over its mountain territory in Mongolia's Altai mountains.

TRAFFIC
the wildlife trade monitoring network

WWF

USAID
FROM THE AMERICAN PEOPLE

A Snow Leopard with a steel jaw trap clamped to its left front foot climbing up past a remote video camera in Mongolia. The fate of this animal is unknown, but other remote cameras have captured images of living Snow Leopards with parts of their limbs missing as the result of trap injuries, or with wire snares still wound around the neck or foot. Photo credit: Munkhtogtokh Ochirjav, WWF Mongolia, 2013.

TABLE OF CONTENTS


© S. Michel

ACKNOWLEDGEMENTS

Aishwarya Maheshwari and Shekhar Kumar Niraj researched and wrote preliminary analyses for this TRAFFIC synthesis report, with additional inputs from Stephanie von Meibom.

The following people for are thanked for contributions and for sharing their information, experiences and photographs:

Fakhar-i Abbas, Saeed Abbas, Ablimit Abdukadir, Justine Shanti Alexander, Aziz Ali, Tolkunbek Asykulov, Aratov Bakhtiyor, Debbie Banks, Risbek Zhaparkulovich Baydavletov, Saloni Bhatia, Yash Veer Bhatnagar, Chimeddorj Buyanaa, Paul Buzzard, Elena Bykova, Pankaj Chandan, James Compton, Munkhnast Dalannast, Charlotte Davies, Marten van Dijl, Phub Dorji, Amina Dzhzalilova, Wendy Elliott, Alexander Esipov, Yufang Gao, Abhishek Ghoshal, Nicola Jing Guan, Tatiana Ivanitskaya, Rodney Jackson, A.J.T. Johnsingh, Kalil Karimov, Alexander Karnaukhov, Rakhee Karumbaya, Babar Khan, Javed Khan, Shafiqullah Khan, Gopal Khanal, Vladimir Khudyakov, Alexander Kuksin, Aleksey Kuzhlekov, David Lawson, Phurba Lhendup, Roller Ma Ming, Aishwarya Maheshwari, Tom McCarthy, Kamal Medhi, Stefan Michel, Zalmai Moheb, Sybille Noras, Munkhtogtokh Ochirjav, Saroj Panthi, Olga Pereladova, Hanaa Pfueller, Rashid Raza, Christiane Roettger, Tatjana Rosen, Vinciane Sacre, Alamanov Azat Salamatovich, Bikram Shrestha, Karma Sonam, Samundra Subba, Kulbbhushansingh Suryawanshi, Jaffar Ud Din, Stephanie von Meibom, Byron Weckworth, Bo Wen, Lingyun Xiao, Yu Xiao, Belinda Wright, Tessa McGregor and Peter Zahler.

Contributions were also received from the following organizations: Environmental Investigation Agency; staff of the National Environmental Protection Agency, Afghanistan; NABU (Nature And Biodiversity Conservation Union); the Snow Leopard Network; TRAFFIC; Wildlife Protection Society of India; and WWF.

This report benefited from reviews by Steven Broad, James Compton, John Farrington, Tatjana Rosen and Ling Xu.

James Compton, John Farrington and Tom Preisser were very supportive throughout the research and writing process. The research and writing of this report was funded by the WWF Conservation and Adaptation in Asia's High Mountain Landscapes and Communities Project which itself is funded by the United States Agency for International Development (USAID).

ACRONYMS

CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
GSLEP	Global Snow Leopard and Ecosystem Program
HWC	Human-Wildlife Conflict
IUCN	International Union for Conservation of Nature
NGO	Non-Governmental Organization
NSLEP	National Snow Leopard and Ecosystem Program
SAWEN	South Asia Wildlife Enforcement Network
SLAWEN	Snow Leopard and Wildlife Enforcement Network
SLC	Snow Leopard Conservancy
SLF	Snow Leopard Fund
SLN	Snow Leopard Network
SLT	Snow Leopard Trust
SLSS	Snow Leopard Survival Strategy
TAR	Tibet Autonomous Region, China
UNEP-WCMC	United Nations Environment Programme-World Conservation Monitoring Centre
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Snow Leopard poaching and trafficking – referred to herein as Snow Leopard crime – is revisited 13 years after TRAFFIC's first report on the subject, *Fading Footprints: The Killing and Trade of Snow Leopards* (Theile, 2003). This report builds on a preliminary analysis published in May 2016 (Maheshwari and von Meibom, 2016). It addresses a major information gap concerning the linkage between retaliatory killing for livestock depredation and poaching for trade, and the scale at which both are taking place. The focus is on 12 Snow Leopard range countries: Afghanistan, Bhutan, China, India, Kazakhstan, the Kyrgyz Republic, Mongolia, Nepal, Pakistan, Russia, Tajikistan and Uzbekistan. There is little evidence of illegal trade in Snow Leopards outside these countries.

Two sets of data were developed in the research for this report. The first is a Snow Leopard crime database containing records of seizures (legal actions taken by government authorities) and observations (reports of Snow Leopard killing, capture or trade, including market surveys). The database contains records dating back to 1989 (which are discussed in Annex 1), but the analysis focuses on the period since the release of *Fading Footprints,* the first TRAFFIC report: 2003-June 2016. Seizures are a function of law enforcement effort, effectiveness and publicization, as well as the magnitude of illegal trade, and so observations are an important component of the analysis, particularly for countries where few seizures are made or reported. However, detailed observations are not regularly published, and may be are biased toward countries where there is more effort, so a simple multiple choice survey was designed for Snow Leopard experts. Completed by 42 of them in 2016, and covering all 12 range countries, the survey asked experts for their total number of known cases, case outcomes, and reasons for killing Snow Leopards.

Based on the average number of cases known to experts over the average of nine years spent working in their geographic areas of knowledge, 221-450 Snow Leopards were estimated to have been poached annually since 2008. With the average rate of poaching detection estimated by experts at less than 38%, these numbers could be substantially higher. Of these, 55% are killed in retaliation for livestock depredation, 21% killed for trade and 18% taken by non-targeted methods such as snares. Although retaliatory killing is estimated to account for roughly half of Snow Leopard poaching (55%), experts estimate that there is a 50-50 chance (48%) that a poaching attempt will take place after a depredation incident. On average, experts estimate that 60% of retaliatory and non-targeted poaching incidents result in an attempt to sell; accounting for differences in this estimate between countries, a total of 108-219 Snow Leopards potentially enter into illegal trade. Over 90% of annual Snow Leopard poaching is estimated to occur in five range countries: China (103-236), Mongolia (34-53), Pakistan (23-53), India (21-45) and Tajikistan (20-25).

Given the uncertainties about population numbers, as well as the low rate of poaching detection, it is difficult to assess the impact of this offtake on the viability of the species. Snow Leopard range is used as a proxy for Snow Leopard population numbers; most national Snow Leopard population estimates are derived from extrapolating study site densities across likely range. Although China had by far the highest number of seizures and observations (309 Snow Leopards from 2003-2016) and the highest annual poaching estimate, its share of Snow Leopard crime was not disproportionate to its large share (at least 60%) of Snow Leopard range. Countries flagged for having disproportionate shares of crime levels relative to share of range included Afghanistan and Russia (seizures and observations), and Nepal and Pakistan (annual poaching estimates). China and Russia were most frequently identified as destinations for animals poached in other countries.

The expert survey indicates that the scale of Snow Leopard crime is more serious than apparent from the annual average number of Snow Leopard seized (18) or observed (34) from 2003-2016. This could be in part due to the challenges of law enforcement in the Snow Leopard's remote montane habitat. Indeed, the survey found that an average of 23% of known cases were investigated by authorities, and only 14% prosecuted.

The minimum number of Snow Leopards in the seizures and observations database fell by 43% from the first half of the analysis period (2003-2009) compared to the second (2010-June 2016) (from 451 to 259). However, the decline was in the number of Snow Leopards observed in trade and in market surveys, which fell by 80% (from 280 to 54), with the largest decline taking place in China. There were more market surveys in the first half of the analysis period (13) than the second (5), but they

were repeated in the same places (Kabul, Afghanistan and cities in western China), and far fewer skins were seen (for example, 60 skins in the Chinese city of Linxia in 2007, compared to one in 2011). The numbers of Snow Leopards in other observations were roughly equivalent for the two periods (108 in the first and 100 in the second), but the numbers in trade observations fell by 46% (from 52 to 28). Otherwise, the number of Snow Leopards seized rose by 16% (from 115 to 133), and the number of individual seizure cases rose by 77% (from 44 to 78). The number of poached Snow Leopards seized doubled (from 31 to 60), and the observed number of poached Snow Leopards also increased by 14% (from 56 to 64). The number of Snow Leopards in trade seizures was the same in both periods (55), and the number smuggled roughly equivalent (29 seized in the first period, and 24 seized and observed in the second).

There are three possible interpretations of this situation of rising numbers of Snow Leopards poached (as measured by seizures and observations), steady numbers in smuggling and trade seizures, and steeply declining numbers in trade observations and market surveys. It could be that the limitations of available data and the authors' inability to collect all of it has resulted in an incorrect picture. It is apparent that illegal trade has become more clandestine and difficult to detect in most countries, so that secondly, it could be increasing, as indicated by the apparent rise in poaching numbers. However, the number of Snow Leopards seized in large cases (more than 3 Snow Leopards per case), indicative of organized trafficking activity, declined from 60 in the 2003-2009 to 23 in 2010-2016. This points to a third possibility: that trade (and perhaps demand) is declining, possibly due to increased enforcement, but local people continue to opportunistically sell Snow Leopards they poached primarily to protect livestock.

With skins being the main Snow Leopard product type in trade (78%), the primary motive for buyers appears to be for display, with some observations of skins hanging on walls in homes and restaurants, as well as stuffed taxidermy specimens. Priced in the thousands of US dollars, skins have been described as a "symbol of wealth and power." However, there probably exists very little in the way of a definable consumer segment deliberately seeking out such items. They are most likely purchased opportunistically – "impulse buys" – and most consumers probably only buy one in their lifetime. Once in a home, the illegal possession has very low probability of detection, and moreover law enforcement authorities may be reluctant to investigate in such situations. The purchase itself also has a low probability of detection, as indicated by the sharp decline in observed numbers of Snow Leopard skins being offered for sale. While growing personal wealth in Asia has been highlighted as a primary driver of illegal wildlife trade, poverty is also recognized as a driver, and the Snow Leopard trade may be more driven by rural people in Snow Leopard habitat attempting to make money and make up for livestock losses to predators than by wealthy people placing orders for luxury household decorations. Unlike the demand-driven Tiger trade (Annex 2), to which it otherwise bears many similarities, the market for Snow Leopards may be more a function of supply, and actions should focus on the communities living near Snow Leopards to reduce incentives to poach and sell. This notion is reflected in the aphorism behind the title of this report: an ounce of prevention equals a pound of cure. Preventing livestock losses, offsetting the costs of losses and improving community support for Snow Leopard conservation are the most important approaches to tackling the problem of Snow Leopard trafficking.

Recommendations focus on addressing the leading cause of Snow Leopard poaching (retaliatory killing/Human-Wildlife Conflict) as well as measures to stem illegal trade, and are primarily targeted at the 12 Snow Leopard range countries. They are aligned with existing recommendations and planned actions, including CITES recommendations, draft Decisions and consultant's reports around implementation of Resolution Conf. 12.5 (CITES 2015, 2016; Nowell and Pervushina, 2014); the Global Snow Leopard and Ecosystem Protection Program (GSLEP, 2013, 2015, n.d.); the SLN's Snow Leopard Survival Strategy (SLN, 2014); and WWF's Snow Leopard Species Action Plan (WWF, 2015 and Sharma, 2016). There was also an informal discussion about recommendations to address poaching and illegal trade at the Second China Snow Leopard Forum, held in Urumqi, Xinjiang province 24-26 August 2016 (B. Weckworth, Panthera, *pers. comm.*).

Recommendations are grouped according to four primary actors in Snow Leopard conservation: 1) governments of Snow Leopard range countries; 2) communities living in Snow Leopard range; 3) conservation organizations and Snow Leopard experts; and 4) donor governments and agencies.

1. Recommendations to governments of Snow Leopard range countries

1.1. Support efforts to mitigate retaliatory killing of Snow Leopards

The results of this report show that retaliatory killing/Human Wildlife Conflict is the leading cause of Snow Leopard poaching, which feeds into illegal trade. It is important for governments to support and expand the approaches developed by the Snow Leopard conservation community to address this issue. Mishra *et al.* (2016) propose a three-pronged strategy: 1) reduce livestock losses (e.g., through the construction of predator-proof corrals [Mohammed *et al.*, 2016; Paltsyn *et al.*, 2016] and promotion of improved herding practices [Nawaz *et al.*, 2016a]); 2) offset livestock losses (e.g., through community livestock insurance [Kunkel *et al.,* 2016] and government compensation programs [e.g., Chen *et al.,* 2016], and 3) improve the social carrying capacity for Snow Leopards (e.g., through education [Hillard *et al.,* 2016] as well supporting conservation-linked initiatives to strengthen local livelihoods [Agvaantseren *et al.,* 2016; Namgail *et al.,* 2016]). Governments should also create trained HWC rapid response teams, and protect the Snow Leopard's wild ungulate prey base (Lovari and Mishra, 2016), through both enhanced anti-poaching as well as trophy hunting linked to community benefits (Nawaz *et al.,* 2016b; Reading and Amgalanbaatar, 2016; Michel and Rosen, 2016).

1.2. Address legislative shortcomings

A full analysis of range country legislation was beyond the scope of this report, but national and provincial laws, as the basis for enforcement, should clearly assign administrative responsibility for illegal taking, storage, transportation, collection, ownership, acquisition, and the sale or consignment of Snow Leopards and their products, parts, or derivatives (as has recently been accomplished in Russia). Legislation in Pakistan's Gilgit-Baltistan province should be amended to remove the exemption allowing the killing or capture of Snow Leopards in defense of human life and property. Mongolia should amend its legislation as envisioned in its National Snow Leopard and Ecosystem Program (NSLEP). Other range country governments are encouraged to adopt China's "Zero Tolerance" approach to online advertising for protected species products, working closely with major e-commerce trading site companies and nongovernmental organizations. China's ban on auctions (without permission) of pre-Convention/pre-national trade ban items derived from protected species (SFA, 2012) is also recommended as a best enforcement practice. Kazakhstan and Russia need to ensure that their legal protections for Snow Leopards are harmonized under the Eurasian Customs Union to ensure that illegal trade cannot be facilitated by open borders.

1.3. Capacity building for law enforcement agencies

This report identifies the following countries as priorities for increasing law enforcement capacity against illegal Snow Leopard trade (based on seizures, observations and poaching estimates): Afghanistan, China, India, Mongolia, Nepal, Pakistan, Russia and Tajikistan. Afghanistan is particularly important as there is a clear need to increase capacity across multiple agencies. The Wildlife Conservation Society has developed a mobile app to aid Customs identification (WCS, 2015) and a set of training modules for relevant government agencies in Afghanistan (P. Zahler *in litt.,* 2016); these now need to be implemented and should be funded as a matter of priority. In all range countries there is the need for greater information sharing between provincial and national agencies responsible for enforcing wildlife laws and other branches of government, including Customs, police, and the judiciary. Multi-agency teams should be incentivized for performance and anti-corruption, and be provided with the latest technical tools (SMART, Zero Poaching). Mobile response teams can respond quickly to remote enforcement needs identified by informants.

1.4. Increase transboundary law enforcement cooperation

Most seizures have taken place in China, showing that not only is that country most likely the major area of illegal trade, but that it is also being addressed seriously through enforcement (although this could be improved through much greater adoption of community-based anti-poaching programs). China shares borders with every other Snow Leopard range country and has been identified as a primary destination for poached Snow Leopards, China should increase its cooperation with neighboring governments to share intelligence and coordinate enforcement efforts.

Illegal trade in Snow Leopards, outside China, is largely international, with poached Snow

Leopards being moved across borders. More support should be given to the newly created Central Asian Snow Leopard and Wildlife Enforcement Network (SLAWEN) (GSLEP, 2015), as well as the operationalization of the South Asia Wildlife Enforcement Network (SAWEN), to focus the attention of all range countries on illegal Snow Leopard trade, and increase the professional capacity of participating governments to conduct intelligence-led anti-poaching and trade seizures (Beale and Botezatu, 2016). Regular trans-boundary meetings between environment enforcement, Customs and border officials are essential.

2. Recommendations for communities in Snow Leopard range

2.1. Threat assessments

Village interviews and key informant surveys are part of the GSLEP Snow Leopard Landscape management process (GSLEP n.d.), and it is recommended that collection of information on Snow Leopard poaching and illegal trade be part of the threats assessment for these (and other) areas. Interviews could be conducted by trained leaders of the involved communities, as has been the successful practice of WWF in Russia and western Mongolia from 2000-2013 (M. Paltsyn, *pers. comm.,* 2016). Interviews can be conducted anonymously and, as circumstances dictate, in the local language.

2.2. Community-based conservation management

Given the difficulty of protecting Snow Leopards in remote montane habitat, government authorities should devolve management responsibility to reliable local organizations and institutions whenever possible. Community benefits from wildlife conservation are key to increasing conservation benefits to Snow Leopards. Community-based conservation programs are probably the single most important approach to reducing retaliatory killing, poaching and trafficking, and should be considered a high priority for funding support across Snow Leopard range. The primary needs are for funding, training and equipment. Such organizations need to be carefully designed to foster self-reliance and sustainability, to provide or generate economic incentives to protect Snow Leopards, and deter an understandable reluctance to self-police. One option is the practice of "soft enforcement," (Wingard and Zahler, 2006), with alternative remedial actions for transgressions (such as the signing of no-hunting and informant contracts in exchange for benefits, or the fining of a livestock animal instead of financial penalties), as well as the option to summon government authorities when outsiders are involved or the transgression is serious or repeated. The rapid and regular removal of snares is just one example of the benefits of this approach, and could be incentivized with "snare swaps" where snares can be exchanged for useful household items (WWF Mongolia in Sharma, 2016) or for camera traps (as in Russia: M. Palytsyn *pers. comm.,* 2016). Community organizations can take two main forms:

Community governance organizations: Community-based conservation organizations are being developed to various degrees in almost all Snow Leopard range countries, and many include ranger patrols and intelligence collection on poaching and illegal trade (Zahler and Paley, 2016). Traditional hunters can be some of the most effective members of anti-poaching teams operated by these organizations in cooperation with government authorities. Employment as rangers allows traditional hunters to use their considerable skills in a way that is directly connected with conservation, and their integrity can be verified through Snow Leopard population monitoring. While such programs have been started in many range countries (including Afghanistan, India, the Kyrgyz Republic, Mongolia, Nepal, Russia, Pakistan and Tajikistan), they often struggle for funding support and need to be expanded in scale.

Religious institutions: Shen *et al.* (2012), Li *et al.* (2014) and Liu *et al.* (2016) discuss the important role Buddhist monasteries play in wildlife conservation in general and for Snow Leopards in particular (about 80% of Snow Leopard range coincides with areas where Buddhism is practiced). With appropriate training and recognition, monasteries could not only deter poaching and trade through traditional practices, but play a more active role in law enforcement by alerting authorities to the presence of outsiders and leading soft enforcement remedial actions. This is particularly recommended for the Tibetan Plateau, where pilot programs have been started (Liu *et al.,* 2016), and there is little expert presence (Figure 2) but numerous monasteries.

This option has been less explored in other areas of Snow Leopard range, but traditional indigenous religious elements have been incorporated into community management organizations in northern

Pakistan (Mock, 2016), conservation messages have been delivered in religious sermons (WWF Pakistan in Sharma, 2016) and the Snow Leopard Conservancy has developed an alliance of Central Asian Snow Leopard cultural practitioners (Colorado and Ryskulova, 2016).

3. Recommendations to conservation organizations and Snow Leopard experts

3.1.Snow Leopard crime database

TRAFFIC should partner with SLN to continue to build on the database created for this report. Many experts have the opportunity to observe or collect reports on the poaching and trade of Snow Leopards, but the academic publishing process is not an ideal way to capture this information. A suitable platform should be created for experts to easily input their observations from the field. This could be designed in the form of a simple mobile app (using a common platform such as Viber, WeChat and the like), which would allow rapid uploading of Snow Leopard poaching reports and spatial information. This would aid both monitoring and analysis, as well as serve as an important means of rapid communication with law enforcement authorities, preferably through a trained database focal point to liaise through the GSLEP Secretariat.

3.2. DNA and photographic databases

A DNA database for key species is being explored on a regional level for Southeast Asia, and India's national photographic Tiger database has already identified the origin of several Tigers seized in Nepal (Govt. of India, 2016). Snow Leopard experts and their community and government partners frequently collect Snow Leopard scat for DNA analysis and camera trap photos. This information is usually kept in separate research groups for publication in the academic and conservation literature. The Snow Leopard Network should explore creation of a centralized database repository for genetic and photographic information as an aid to law enforcement in seizure cases.

3.3. Market monitoring

Seizures and observations indicate that Snow Leopards are sometimes seized or sold with other high mountain wildlife products in medicinal and fur markets. Markets dealing in such products should be monitored regularly for potential illegal trade in Snow Leopards. Priorities are markets in cities and large towns in Afghanistan, China and Pakistan. In addition, more systematic online surveys should be undertaken in all range countries as social media and web advertisements are becoming the primary advertising mechanism for illegal wildlife trade. Documentation of illegal trade should be provided to relevant government authorities as soon as practicable.

3.4. Expert study of demand for Snow Leopards

More information is needed to better understand why consumers are motivated to illegally purchase Snow Leopard products, and how they find them. This may be most effectively approached through government cooperation, allowing interviews of people who have been arrested buying or selling Snow Leopard products.

4. International donors

International donors should prioritize funding for Snow Leopard conservation in range countries, and in particular assist in implementation of the GSLEP. Given the importance of China as the largest Snow Leopard range country (and center of illegal trade), the country should take a more active role in the future of GSLEP. As noted by the CITES Standing Committee (CITES, 2015), range country governments require financial and technical assistance to build additional capacity and resources to effectively implement CITES Resolution Conf. 12.5 (Rev. CoP16).

1. INTRODUCTION

The Snow Leopard *Panthera uncia* is uniquely adapted in many ways to life at high altitudes and extreme cold. Its lush fur (longest and densest of all the *Panthera* cats) is colored pale to smoke grey with large black rosettes and spots (Kitchener *et al.*, 2016). It looms large in traditional religion, mythology and symbolism in the mountain cultures of Central, East and South Asia, and its beauty has led its fur to be prized for adornment and household display for thousands of years in the region. The first recorded global trade records date to 1907, with 500-1,000 skins per year traded up until 1920. In the 1960s American ladies were enticed with advertising such as: "Untamed…the Snow Leopard, provocatively dangerous. A mankiller. Born free in the wild whiteness of the high Himalayas only to be snared as part of the captivating new fur collection...styled and shaped in a one-of-a-kindness to bring out the animal instinct in you" (Nowell and Jackson 1996).

Concern over the international spotted cat fur trade was a genesis for the establishment of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1975, and at that time, and ever since, the Snow Leopard has been listed on Appendix I, prohibiting commercial international trade. International legal trade now consists exclusively of live captive-bred animals for the zoo trade (UNEP-WCMC CITES Trade Database). Hunting and trade has also been prohibited domestically in all 12 Asian range countries for decades (chapters in McCarthy and Mallon, 2016), and all range countries are Party to CITES so that international commercial trade of Snow Leopard is banned consistently.

© Richard Avedon/Harper's Bazaar – print courtesy Devodotcom

A vintage fashion photo featuring a Snow Leopard fur coat from 1962

However, illegal trade has been widely described as a leading threat to the Snow Leopard for over a decade. Five major global conservation strategies all include elements of combatting poaching and illegal trade (Snow Leopard crime): the Snow Leopard Survival Strategy of the expert SLN (SLN, 2003 and 2014), the Snow Leopard Range wide Assessment and Conservation Planning workshop (held by WCS in Beijing, China in 2008) and the Global Snow Leopard and Ecosystem Program (GSLEP, 2013) (Sanderson *et al.*, 2016), as well as the WWF Snow Leopard Species Action Plan (WWF, 2015). The GSLEP, endorsed by all range country governments at the first Global Snow Leopard Conservation Forum in Bishkek, Kyrgyz Republic in October 2013, is a document which synthesizes 12 National Snow Leopard Ecosystem Programs (NSLEPs). As part of that exercise, each government ranked threats to Snow Leopards in their country. Threat rankings for direct killing or removal of Snow Leopards are shown in Table 1. Poaching for trade in furs and bones received high threat scores, along with killing in retribution for livestock depredation. This report aims to describe and quantify illegal trade (building on the 2003-2012 trade records analyzed by Maheshwari and von Meibom [2016]), delineate the drivers, and recommend solutions.

Direct Killing and Removal of Snow Leopards	Afghanistan	Bhutan	China	India	Mongolia	Nepal	Pakistan	Russia	Kyrgyz Republic	Kazakhstan	Tajikistan	Uzbekistan	Mean value
In retribution for livestock depredation	**13**	6	10	8	**11**	**12**	**14**	8	6	**12**	8	8	9.7
Poaching for trade in hides or bones	9	6	8	6	6	9	**12**	10	**15**	11	11	9	9.3
Zoo and museum collection of live animals	0	0	0	0	0	6	0	0	2	3	3	5	1.1
Traditional hunting of Snow Leopards	0	3	3	0	4	3	0	0	0	6	1	9	2.4
Secondary poisoning and trapping of Snow Leopards	3	7	6	6	7	9	6	**14**	9	10	4	0	6.7

Table 1. Ranking by range country governments of threats related to the direct killing and removal of Snow Leopards *Source: GSLEP (2013), as modifed by SLN (2014). Higher numbers indicate severity of perceived threat: High (red, 11-15); Medium (orange, 6-10); Low (yellow, 1-5); Not a threat (white, 0).*

The subject of this report, however, is not restricted only to illegal trade in Snow Leopards, but also looks at the problem of poaching, for several reasons. Previous trade analyses include poaching cases as well, for Snow Leopards (the first TRAFFIC report, *Fading Footprints: The Killing and Trade in Snow Leopards* [Theile, 2003] and the paper authored by one of the authors of this report Poaching and Trade of Snow Leopards in China 2000-2013 [Li and Lu, 2014]). This has also been the case for Tigers (Pervushina and Stoner, 2012; TRAFFIC, 2016). Poaching and trade are obviously closely linked — unless derived from a captive animal, any Snow Leopard skin for sale in a market represents acts of both illegal trade and poaching, although potentially committed by different actors.

More so than for any other big cat, people and their livestock range widely across Snow Leopard habitat; there are very few areas, legally protected or otherwise, in Snow Leopard range that are entirely free of livestock herds and herders. The most common prey species are large mountain ungulates but, based on scat analysis, the Snow Leopard's diet has been shown to consist of about 15-30% livestock, ranging from zero where unavailable up to 70% (reviewed in Mallon *et al.,* 2016). Snow Leopards prefer wild prey, but turn to livestock when their natural prey is depleted by over-hunting and competition for pasture with livestock, an increasingly common condition across much of Snow Leopard range (SLN, 2014). Livestock depredation rates attributable to Snow Leopards average 1-3% of people's holdings (Jackson, 2015) (and up to 12% [reviewed in Mishra *et al,* 2016], with considerable variation even within limited areas: Chen *et al,* 2016). Catastrophic episodes of surplus killing, where tens of animals penned in a corral may be killed but not eaten, increase antipathy towards the predator. In the expert literature, it is commonly stated that livestock depredation may "often" or "frequently" lead to attempts at retaliatory killing, a rational choice for the owner (as pointed out by Rosen *et al.* [2012]), despite potentially severe legal penalties.

© Aishwarya Maheshwari/TRAFFIC

Taxidermy-prepared Snow Leopard skin offered for sale in Kabul, Afghanistan, 2013

Retaliation not only alleviates the threat of future attacks, but when successful results in an opportunity to make up for the financial loss by selling the captured or killed Snow Leopard. Figure 1 illustrates the potential role retaliatory killing may play in the black market for Snow Leopards; the market may be supplied by a poacher seeking to derive income, or by a herder seeking to prevent or make up for livestock depredation. Figure 1 also delineates the positions of poaching, smuggling and trade in the market supply chain. Mallon and McCarthy (2016), in their review of future prospects for Snow Leopard survival, lament that "…there is a lot of speculation over existing and emerging threats, but little quantified evidence to show the severity of their actual impact on Snow Leopards…For example, retaliatory killing is frequently cited as a major issue, but no figures for the number of Snow Leopards thus killed are available to present a balanced judgement". To address this information gap, experts were surveyed to quantify the level of retaliatory killing and its role in illegal trade.

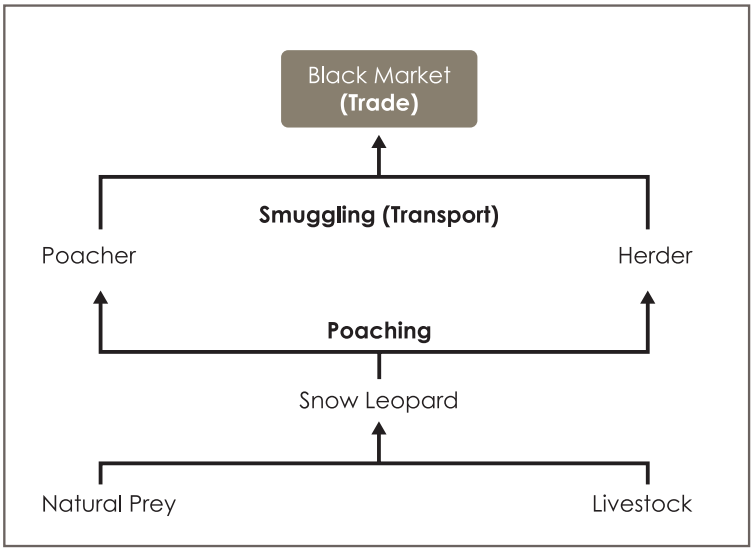

Figure 1. Conceptual diagram of the supply chain for the black market in Snow Leopards
There may be multiple actors involved in the smuggling and trade components of the supply chain

© Marten van Dijl

A female Snow Leopard with a full stomach, photographed in western Mongolia after feeding from a domestic sheep she killed. Its owner did not retaliate.

© Jura Bahriev/Panthera

This Snow Leopard was killed with a shovel, cornered after killing several goats and sheep in a livestock corral in a village in Tajikistan in 2013. When the man who killed it attempted to sell the skin and bones, word reached local authorities and he faced a fine of US$32,000. The NGO Panthera intervened, the specimen was donated to the Tajikistan government, and the fine was waived in exchange for his promise to never kill another predator (BBC, 2016).

Experts disagree on Snow Leopard population estimates[1] (Panthera, 2016; SLT, 2016; WCS, 2016; WWF, 2016), which consist of extrapolated densities from study sites to large areas where presence of the species has not been confirmed recently (Figure 1). Only 1/3 of the range shown in Figure 1 was classified as definitively having Snow Leopards in 2008. Much of the unconfirmed range is in China, on the Tibetan plateau, where suitable habitat exists, but relatively little research has been done to confirm Snow Leopard presence (Riordan and Shi, 2016). Several methods, including expert knowledge and habitat suitability models, have been used to estimate Snow Leopard range, and compilations of range size per country vary considerably (e.g., GSLEP, 2013; SLN, 2014; Farrington and Li, 2016; McCarthy *et al.,* 2016). Table 2 presents the country range estimates used in this report, mostly taken from country chapters in a new scientific book on Snow Leopards (McCarthy and Mallon, 2016). Expert opinion is unanimous on one aspect of Snow Leopard status: that the species is threatened and declining, although the importance of poaching relative to other threats (including loss of wild prey and degradation of habitat) is unknown. This report provides the first quantitative estimates of the scale of the poaching threat.

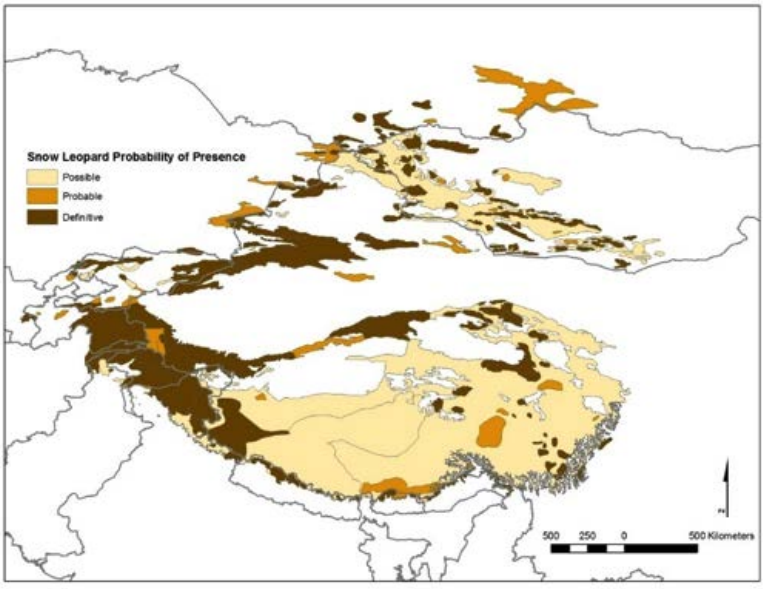

Figure 2. Definitive, probable and possible Snow Leopard range mapped by experts in 2008 (McCarthy *et al.*, 2016)
Map credits: Panthera, WCS, SLT, SLN

Country	Known and likely Snow Leopard range (km²)
Afghanistan [f]	14,662
Bhutan [j]	9,000
China [d]	1,026,708
India [a]	100,146
Kazakhstan [d]	37,468
Kyrgyz Republic [b]	89,000
Mongolia [e]	225,001
Nepal [e]	29,134
Pakistan [g]	80,000
Russia [h]	20,000
Tajikistan [i]	85,700
Uzbekistan [c]	10,000
Totals	1,726,819

Table 2. Recent expert estimates of Snow Leopard range by country
Size of Snow Leopard range was taken from the following sources to use the most current figures for areas where experts consider Snow Leopards present:
a) Bhatnagar et al., (2016),
b) Davelebetov et al., (2016);
c) Esipov et al., (2016),
d) Farrington and Li (2016),
e) McCarthy et al., (2016),
f) Moheb and Paley (2016);
g) Nawaz and Hameed (2015);
h) Paltsyn et al., (2016);
i) Saidov et al., (2016);
j) Wangchuk and Tharchen (2016).

[1] The Snow Leopard was assessed as Endangered for the IUCN Red List of Threatened Species in 2008 (Jackson *et al.*, 2008), and is currently being re-assessed for publication in 2017.

2. METHODS

This report is based on two sets of data: a Snow Leopard crime database of seizures and observations, and a 2016 survey of Snow Leopard experts. It focuses on the period 2003-June 2016, and Annex 1 compares the results to those obtained by the first TRAFFIC report on Snow Leopards (Theile, 2003).

2.1. Snow Leopard crime database

Figure 2 outlines the process of building the Snow Leopard crime database. Records of seizures[2] and observations were obtained from searches of Internet news and conservation literature, and also (carefully excluding duplicates) from seizure datasets kept by NGOs (Environmental Investigation Agency and the Wildlife Protection Society of India) and the online UNEP-WCMC CITES Trade Database (searching only for confiscations/seizures, source code "I"). Observations from experts were also obtained in a case questionnaire survey issued to experts in 2013 and again in 2016 (available from: www.traffic.org/storage/snow-leopard-annex4-questionnaire.pdf); some of these results were included in an analysis by Maheshwari and von Meibom (2016). Government authorities differ in their ability to make and report seizures. For example, relatively low numbers of seizures in a country may indicate lack of law enforcement success or lack of significant crime, which is why it is important to also include observations. Although seizure records are obtained as the result of law enforcement action, and observations are not, it should be noted that at least some of the observations may have led to subsequent government action.

The format of the database is based on Li and Lu (2014: Supplemental Information), which collected 43 publicly reported law enforcement seizures in China. Each record was converted into minimum number of Snow Leopards (e.g., two skins are considered two Snow Leopards, whereas one skin and one set of bones is considered to represent a single animal). Records were categorized as poaching, smuggling or trade (when sufficient detail was available), depending on the point of apprehension or observation (Figure 1). Records were categorized as poaching unless the point of detection occurred in the act of transport (smuggling) or an attempt to buy or sell (trade). For analysis, records were grouped into two seven-year periods: 2003-2009 and 2010-June 2016. These two periods are compared in Annex 1 to two previous periods (1989-1995 and 1996-2002) to look at long-term trends in Snow Leopard crime. Country totals of the different types of record from the database are contained in four tables in Annex 3.

There are three types of observations in the database: individual cases (which have a specific date and location), multi-year cases (when observations were summed by the source over multiple years), and market surveys (deliberate attempts by observers to search for illegal trade in Snow Leopards). Individual and multi-year observations were characterized for reliability on a 3 point scale of most to least reliable: most (one point) for direct observations by the observer (e.g., 3 pelts observed and photographed in northwest Nepal by Acharya [2014]); 2 points for reports deemed by the collector to be from a reliable source (e.g., "In the household interviews we conducted in the 44 villages overlapping with Snow Leopard habitats of the Sanjiangyuan Region, we recorded a minimum of 25 Snow Leopards killed by local herders or outsiders since 2000" [Li and Lu, 2014]; and 3 points (least reliable) for estimates ("at least 1-2 Snow Leopards perish every year in snares set out for musk deer by local residents in the middle Barlyk River basin (Tsagan-Shibetu Ridge)" [Paltsyn *et al.,* 2012]). For estimates where no specific year range was given (e.g., "every year," "in recent years,"), a two-year period was used to avoid overestimates.

[2] The term "seizure" is used although a number of cases did not actually involve confiscation.

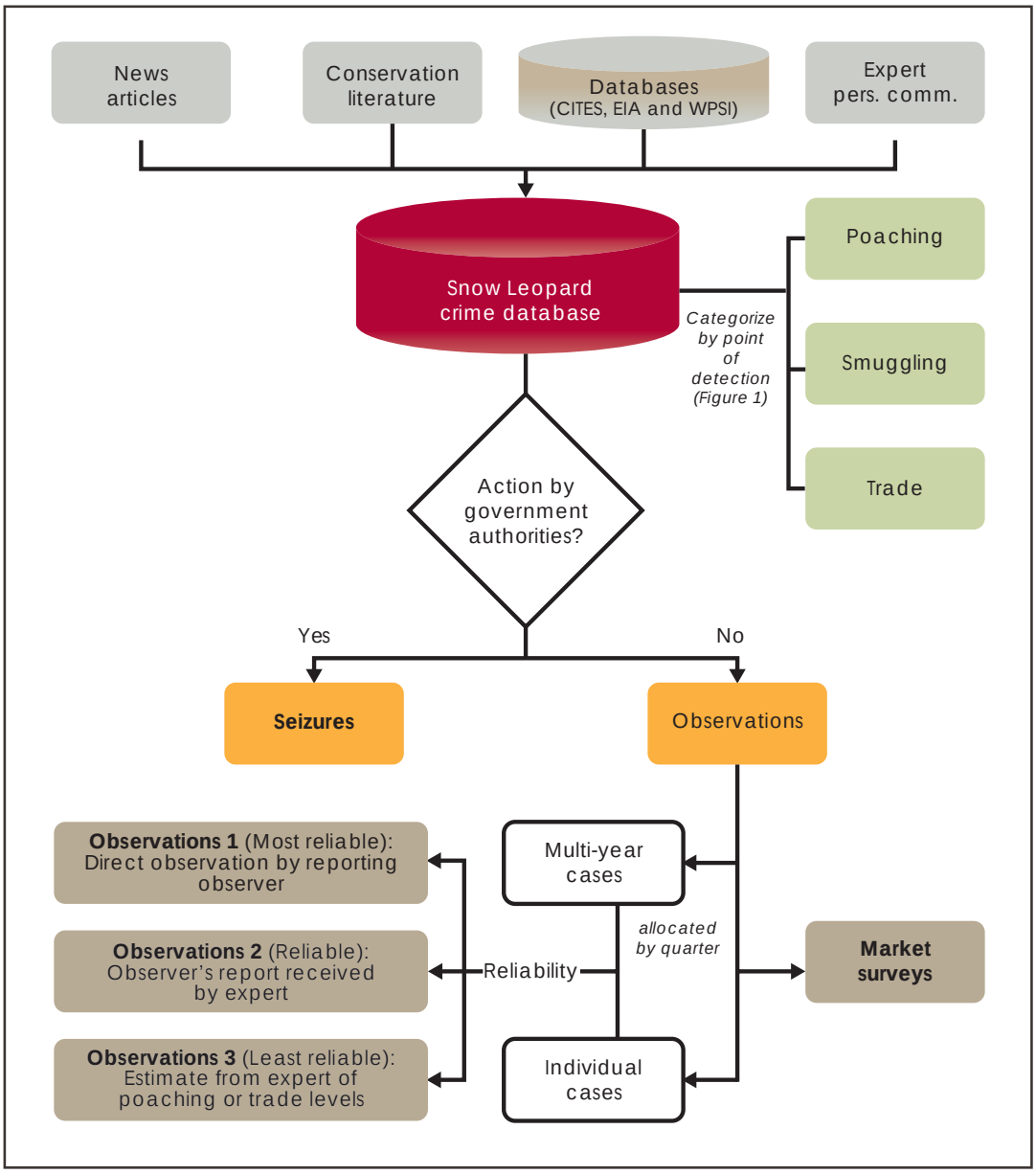

Figure 3. Workflow process chart for obtaining and categorizing records in the Snow Leopard crime database

2.2. Questionnaire survey of Snow Leopard experts

An expert survey was designed and posted online (surveymonkey.com) in June 2016, with invitations to participate sent to the SLN membership, the WWF Snow Leopard mailing list, as well as personal contacts of the authors. Olga Pereladova translated the questionnaire into Russian. The survey collected information on Snow Leopard poaching and trade in a quantitative form by asking experts about the cases known to them in the areas where they work, including motives and outcomes. The questionnaire offered multiple-choice range responses (e.g., 0, 1-5, 6-10, etc.; <10%, <25%, <50%, etc.), because experts do not always keep detailed records, or find it difficult to compile individual cases from their records.

Areas of knowledge were described by the experts in the survey, and clarified by individual follow up when the size was not clear (e.g., if it included areas other than protected areas). Maximum size

per area was capped at 20,000 km^2 , based on Li *et al.,* (2013): in order to obtain a representative sample of villages across the 360,000 km^2 Sanjiangyuan area of China, they conducted household interviews in 5% of 1,511 15 x 15 km^2 grids (=18,000 km^2). In the authors' judgement, it would be difficult for an expert, even one who had ranged widely across a region for many years, to be familiar with communities across an area larger than 20,000 km^2.

To estimate the number of Snow Leopards poached annually, each expert's range of known poaching cases was divided by the number of years worked in the area, which was then divided by the area's size to obtain an annual case rate per 1,000 km^2. Expert case rates were then averaged by country and multiplied by Snow Leopard range (from Table 2) to obtain minimum and maximum national annual poaching estimates; each case is considered to represent one adult animal.

Some questions in the 2016 survey were similar to those asked in a TRAFFIC survey conducted at the Snow Leopard Survival Summit, held in Seattle, Washington in 2002. Not all results from the survey were included in the first TRAFFIC Snow Leopard report (Theile, 2003). The 2002 survey responses were provided by S. von Meibom (*in litt.,* 2016); they are re-analyzed and compared to the 2016 survey results in Annex 1.

2.3 Ratio of Snow Leopard crime share to Snow Leopard range share

Snow Leopard range is used as a proxy for Snow Leopard population numbers, which are highly uncertain; most national Snow Leopard population estimates are derived from extrapolating study site densities across likely range, so that a large range is generally considered to hold or have the potential for a large population. To help gauge the impact on national populations, each range country's share of total Snow Leopard crime is divided by its share of total Snow Leopard range (from Table 2). For poaching estimates, the midpoint of each country's minimum and maximum estimates was used. For example, if Country A has 50% of detected Snow Leopard crime (as measured by seizures and observations, or by the poaching estimate midpoint), and holds 50% of Snow Leopard range, the resulting ratio of one (50/50) indicates that the level of crime is not disproportionate, although it is certainly not acceptable and not necessarily sustainable. Country B, with 20% of detected Snow Leopard crime and 5% of Snow Leopard range, has a ratio of four (20/5), substantially higher than one, showing that it appears disproportionately affected, and crime may pose a more severe threat to Snow Leopards than for Country A.

2.4 Limitations

The Snow Leopard crime database contains records of detected crime. Some countries have more enforcement and observation effort and success than others, and better reporting of it, so that the authors had greater ability to collect data from some countries (especially China, India, Mongolia, Pakistan, Russia and Tajikistan) than from others. This could lead to an erroneous impression that high detections are equivalent to high crime levels, and vice versa. This could be reflected in the country's ratio of Snow Leopard crime share to Snow Leopard range share, if the total amount of Snow Leopard crime is not captured due to poor detection in some countries. Due to the uneven availability of detail in the source material, it was not always possible to classify conclusively records as poaching, smuggling or trade, and this could affect the author's ability to determine trends in the three categories of Snow Leopard crime. For the same reason, trade records could not be analyzed comprehensively to determine the motivations and methods of sellers and buyers. Inclusion of poaching estimates of low reliability may bias results, especially for the period 1989-2002, where they make up 60% of observations.

Occasional observations of Snow Leopard crime are not regularly published. To make up for this, a multiple-choice format expert survey was employed, but this method lacks specificity and detail is lost. The survey asked experts for the number of all cases known to them, but this number may be subject to errors of recall, or exaggeration. This method also precludes an analysis of trend, yielding only an annual average minimum and maximum. Experts may have reported cases which took place before they began working in their area, which could lead to an overestimate of case rate. On the other hand, they may have had poor knowledge of cases, leading to an underestimate of case rate. The case rate per 1,000 km^2 is sensitive to the size of the expert's area of knowledge; by capping areas at 20,000 km^2, poaching levels may be overestimated. Extrapolation of case rates to range beyond the expert's geographic area of knowledge is subject to the same uncertainty as population estimates, and the resulting poaching estimates may be too high or too low.

3.RESULTS

Results are presented for the crime database and the expert surveys in separate sections.

In addition, Annex 1 presents data from 1989-2002 to compare to more recent levels of Snow Leopard crime (2003-2016), as well as a 2002 expert survey that asked similar questions to the one conducted in 2016. Annex 2 compares Snow Leopard crime to the related (and better known) illegal trade in Tigers. Annex 3 contains country summaries of seizures and observation data. The questionnaire surveys used in this study can be viewed at: www.traffic.org/storage/snow-leopard-annex4-questionnaire.pdf

3.1. Snow Leopard crime database

3.1.1. Range-wide comparisons

The database of seizures and observations from 12 Snow Leopard range countries totals a minimum number of over 700 (710) Snow Leopards poached or traded from 2003-June 2016 (Figure 4). The total number in the first half of the analysis period (451: 2003-2009) was 74% higher than in the second (259: 2010 – June 2016). Market surveys account for most of this difference, making up nearly half of all detected Snow Leopards in the first part of the period, but just 10% of the second. The numbers of Snow Leopards in other observations otherwise were roughly equivalent for the two time periods, although half of the number for the second period (49) consisted of poaching estimates of low reliability, whereas the first period included only direct and indirect observations (observation reliability defined in Figure 2; detailed breakdown of observations in Figure A1.1). The number seized rose 16%, from 115 in the first to 133 in the second period. Only 12 Snow Leopards were seized or observed in trade in non-range countries since 2003 (Table 3) (excluded from the analysis).

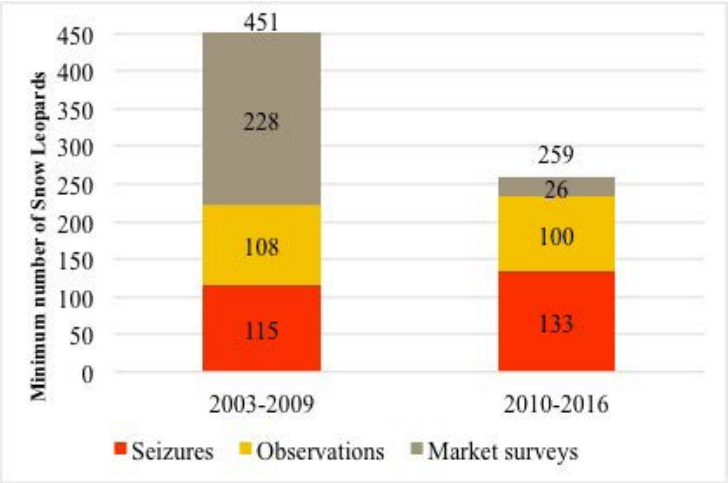

Figure 4. Minimum number of Snow Leopards detected in seizures, observations and market surveys

Country	Seizures and observations
Australia	Observed: pelt in shop in Melbourne for sale, reportedly "pre-Convention" (S. Noras *pers.comm.*)
European Union	Seized: from 2005-2016, six Snow Leopards (products, dates and countries not available by press time: EU-TWIX, V. Sacre *in litt.*, 2016)
Ukraine	Observed: pelt rug (reportedly originating from Nepal) for sale by carpet dealer (shkury-kovry.com.ua)
United Arab Emirates	Seized: 2004 - 3 pelts (CITES Trade Database)
United States	Seized: 2007 - 1 pelt; 2014 - 1 pelt (CITES Trade Database)

Table 3. Snow Leopard seizures and observations outside range countries

Figure 5 shows the minimum number of Snow Leopards seized and observed for three categories of record: poaching, smuggling and trade. These categories were assigned, where sufficient information was available, according to the stage in the trade chain where detection occurred, as described in Methods and illustrated in Figure 1. The number of poached Snow Leopards seized doubled (from 31 to 60), and the number observed rose as well. The numbers detected in smuggling were roughly equivalent: (29 seized in the first quarter, and 24 seized and observed in the second). The numbers seized in trade were the same (55 in each quarter), while the numbers observed in trade and in market surveys declined by 80% (from 280 to 54). There were more market surveys in the first half of the analysis period (13) than the second (5), but they were repeated in the same places (Kabul, Afghanistan and cities in western China), and far fewer skins were seen.

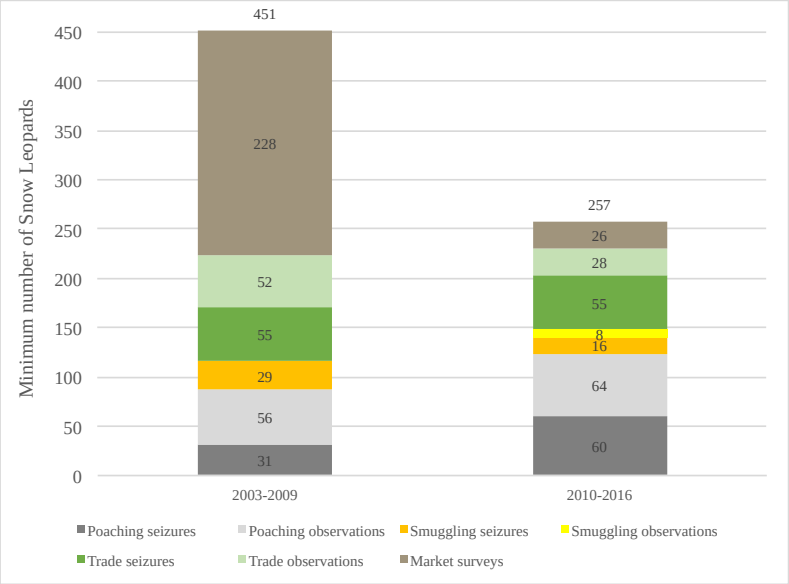

Figure 5. Minimum number of Snow Leopards detected at three different stages of the trade chain (poaching, smuggling and trade)

Time series data is available only for two sites to chart the decline in detail in trade and market survey observations. Figure 5 shows surveys which were repeated in the same trade sites (Kabul, Afghanistan and Linxia, Gansu province, China – both home to longstanding fur markets). The number of Snow Leopard skins seen openly for sale in markets by researchers has fallen markedly, particularly in China. However, seizures were still made in 2013, suggesting that illegal trade continues in a less public fashion. Skins were seen openly for sale as recently as 2014 in Kabul's Chicken Street fur markets (Moheb and Paley, 2016), and there have been no known trade seizures in Afghanistan.

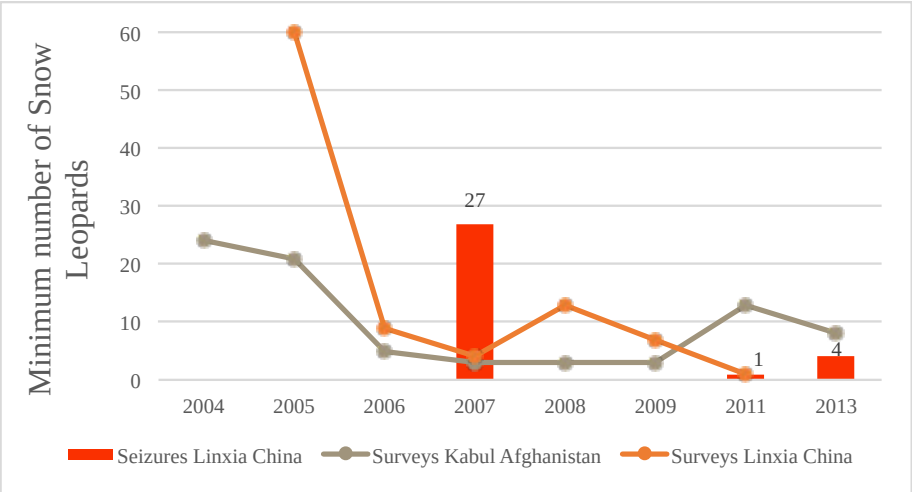

Figure 6. Minimum number of Snow Leopards skins seen in repeated market surveys in Afghanistan (Kabul) and China (Linxia), compared to numbers reported seized in Linxia
Market survey sources: Afghanistan (Manati, 2009; Johnson and Wingard, 2010; Kretser et al., 2012; Maheshwari and von Meibom, 2016 and A. Maheshwari in litt., 2016); China (EIA 2012 and in litt., 2016)

3.1.2. Country comparisons

Figure 7 shows the minimum number of Snow Leopards seized and observed by country. China had by far the highest total (309), followed by Afghanistan (137), then Russia (118). Afghanistan's total consists almost entirely of market surveys (135 Snow Leopards). China also had a large number of Snow Leopards observed in market surveys (106 in 2003-2009), but seizures make up 36% of China's totals in the first half of the analysis period and 78% of the second. Russia's totals consist primarily of poaching observations, in both halves (34% from 2003-2009 and 51% from 2010-2016).

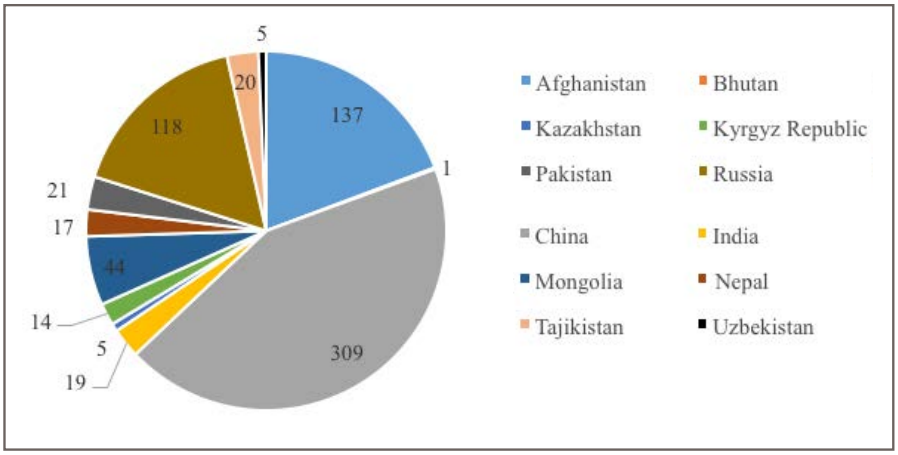

Figure 7. Minimum number of Snow Leopards in seizures and observations by country, 2003-June 2016

Because Snow Leopards are not evenly distributed among range countries, in Table 4 we divided each country's percentage share of Snow Leopard crime (Figure 7) by its share of Snow Leopard range (Table 2). Red highlights countries where the percentage is substantially higher than one: in other words, where the country's share of reported Snow Leopard crime is disproportionately greater than its share of Snow Leopard range. Of the three countries with the highest totals from Figure 6, only China's is proportionate to its share of Snow Leopard range. Both Afghanistan and Russia have small areas of Snow Leopard range, but high rates of Snow Leopard crime. This reflects

relatively high numbers of observations in the two countries. In Afghanistan, the skin trade is relatively open despite its illegality, and there have been more market surveys there than in any othe country. Russia had intensive anti-poaching and monitoring efforts from 2005-2014 (Paltsyn *et al.*, 2016).

Country	Ratio of Snow Leopard crime share to range share
Afghanistan	22.85
Bhutan	0.27
China	0.74
India	0.46
Kazakhstan	0.33
Kyrgyz Republic	0.38
Mongolia	0.43
Nepal	1.43
Pakistan	0.64
Russia	14.43
Tajikistan	0.57
Uzbekistan	1.22

Table 4. Ratio of Snow Leopard crime share to Snow Leopard range share
The ratio is each country's share of total Snow Leopard seizures and observations (from Figure 6) divided by share of total Snow Leopard range (Table 2). Red highlights countries with ratios substantially above one.

3.1.3. Types of Snow Leopard products

Figure 8 shows that skins are by far the most common type of Snow Leopard product: 78% of 674 Snow Leopards detected, where the product type could be determined, were skins. Skins appear to be used for home display, as only two records of garments were found: one Snow Leopard coat for sale in Kabul, Afghanistan (WCS, 2015) and one reportedly from Kazakhstan for sale in Urumqi, Xinjiang, China for US$165 in 2006 (M. Ma *in litt.,* 2013), in contrast to earlier observations when coats were seen in market surveys in India and Nepal (Dexel, 2002; Theile, 2003).[3] Bones are used like those of the Tiger for traditional medicine (Annex 2), although the skull is generally treated as an object for display or ceremony. Carcasses largely represent animals which had not yet been butchered for their most valuable parts — skin and bones — but use of meat and other fleshy body parts has been reported (Ma, 2012; Nawaz, 2012).

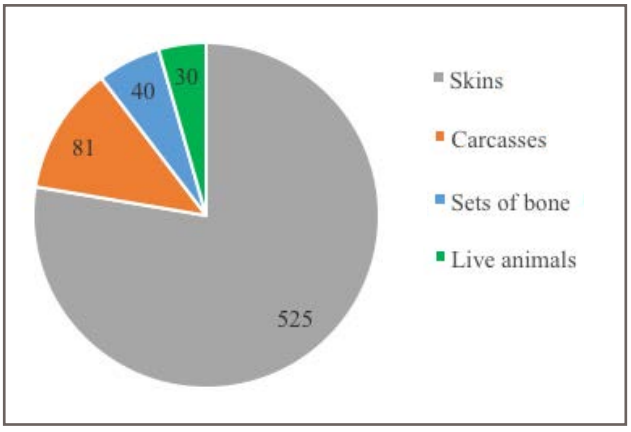

Figure 8. Minimum number of Snow Leopards in seizures and observations by product type, 2003-June 2016

[3] Although big cat-trimmed cloaks, particularly Leopard and Tiger, were popular in the early to mid-2000s among ethnic Tibetans (Nowell and Xu, 2007), Li *et al.* (2013) found from interviews that Snow Leopard fur was not favored for garments, as the hairs are too long, easily shed, and the rosette pattern indistinct.

Name of photographer not disclosed for security reasons (Rosen, 2014). Photo provided by Tatjana Rosen/Panthera

Snow Leopard skin for sale in Dushanbe, Tajikistan.

© Ablimit Abdukadir

Snow Leopard bones seized in China's Xinjiang province in 2010. The animal was poached in the eastern Tianshan mountain range, seized in the town of Turpan, and the case prosecuted in the provincial capital of Urumqi.

Live animals (often cubs) were the least common, and the total includes some cases where live animals were captured (sometimes under the pretext of being "rescued") and government authorities were voluntarily summoned to take care of them. This amounts to the removal of Snow Leopards from the wild population, but cannot be ascribed as due to trade demand. Also included were several cases of attempted poaching: live animals observed by camera trap with a wire snare or steel trap around the neck or leg. However, live animals are also sold illegally, as 80% (24 out of 30) live Snow Leopards were detected in the trade chain in China, the Central Asian Republics, and Russia. Known destinations for live wild animals included zoos (Deutsche Presse, 2016), circuses (Theile, 2003), the homes of private citizens (Paltsyn *et al.,* 2012) and, reportedly, illegal trophy hunts (Saidov *et al.,* 2016).

Teeth and claws were also observed. Sixty to eighty claws were seen in markets in Urumqi between 2004-2005 (Ma [2012] and *in litt.* [2013], and claws were found to be the most common item advertised in a 2016 TRAFFIC online market survey in China (Figure 9). Claws were described by both sources as having superstitious value ("for the exorcism of evil spirits", according to one website advertiser. Another website advertised a tooth as "for medicine, to cure angiocardiopathy"; the medicinal use of canine teeth was also reported by Li *et al.,* (2013). Overall, the TRAFFIC survey found six websites with 14 dealers posting 15 advertisements for 44 claimed Snow Leopard products. Because it is difficult to verify the authenticity of these items (including the bones), which were not visually observed, only the skin (which had a photograph as part of the advertisement) is converted to a minimum number of Snow Leopards (one) and included in the observations data set. The skin was among the items posted by three dealers in 2015 on social media. Claw prices ranged from US$36-60 each; one tooth was priced at $75. Teeth and claws (as well as the tongue of the Snow Leopard) were reported from one respondent in the 2016 expert survey as traded from India through the Shipkila Pass into the Tibet Autonomous Region.

© Roller Ma Ming

Snow leopard claws for sale in Urumqi market, Xinjiang, China 2005

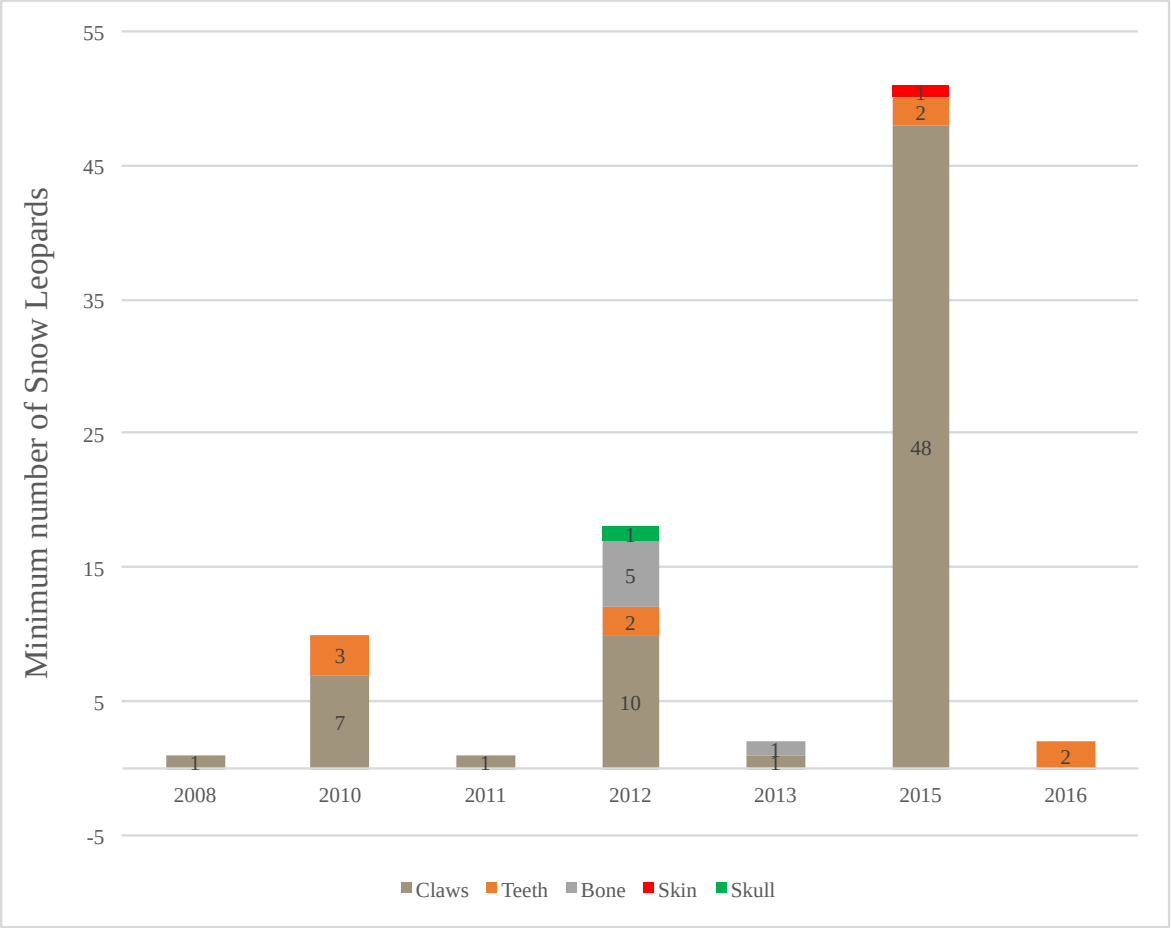

Figure 9. Types of claimed Snow Leopard products advertised on websites and social media in China from 2008-2016. *Source: TRAFFIC in litt., 2016*

3.1.4. Seizures

Considering only seizures, there were slightly more Snow Leopards seized in the second period (133 compared to 115 in 2003-2009) and a much greater number of seizure cases (78 in the 2010-2016 compared to 44 in 2003-2009). Figure 10 maps seizure locations from 2003-2016, showing the approximate locations (for cases with sufficient source detail) of poaching, smuggling and trade cases. As would be expected, poaching seizures have been made within Snow Leopard range, but so have most trade seizures, with the notable exceptions being China, Russia and Mongolia, particularly for the 2010-2016 period, when more seizures occurred in distant cities. Most Snow Leopards were seized in China (63% of 248).

Snow Leopard skin seized in China's Xinjiang province in 2013. The animal was poached in the central Tianshan mountain range, seized in the Wusu (Xiho) district, and the case prosecuted in the provincial capital of Urumqi.

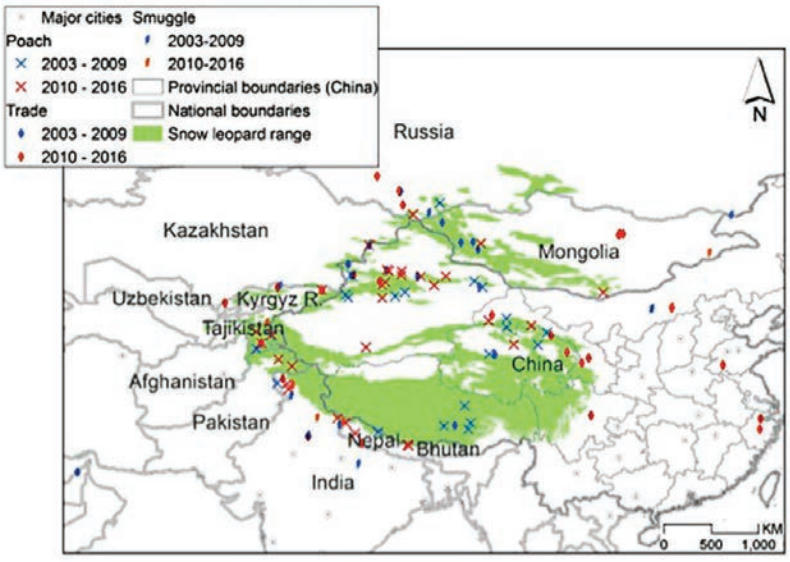

Figure 10. Map of Snow Leopard seizures superimposed on Snow Leopard range (from Figure 2)

The two largest seizure cases on record were made in the first analysis period: 17 Snow Leopard skins originating in Mongolia confiscated on the Russian border in 2004 (Paltsyn *et al.,* 2012), and 27 skins seized from a trader's house in Linxia city, China (Hearn, 2007), where market surveys had previously documented large numbers of Snow Leopard and other big cat skins for sale (EIA, 2008 and 2012). Such large seizures are indicative of organized trafficking activity (as well as law enforcement effort). Figure 11 breaks down seizure cases by the number of animals per seizure: total numbers of Snow Leopards are shown, so that 10 seizure cases of two Snow Leopards each are shown as 20 animals. The second period had more Snow Leopards intercepted in all categories of smaller seizure (from 1-3 animals per case), but the first period had more in large seizures (more than three animals per case). The average number of Snow Leopards in large seizure cases was 12 in the first period, compared to 4.8 in the second, although both periods had the same number of large cases (five). Table 5 shows that the majority of large seizures have been made in China, comprising 83% of Snow Leopards seized in large cases.

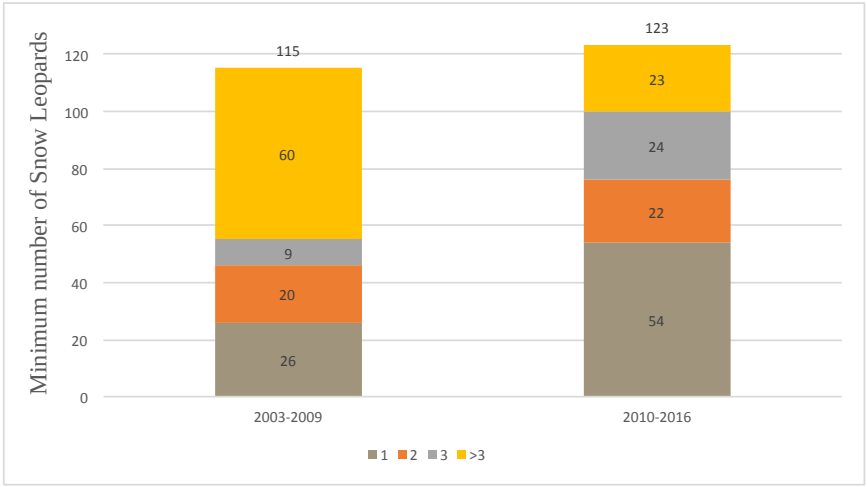

Figure 11. Minimum number of Snow Leopards in seizure cases by number of animals per case

Totals represent number of Snow Leopards, colors represent number of Snow Leopards per case – e.g., in the 2003-2009 period, 26 Snow Leopards were intercepted in single-animal cases.

Country	2003-2009	2010-2016	Total number of snow leopards
China	3	5	122
Russia	1		17
Mongolia	1		4
India			4
Total number of snow leopards	**56**	**24**	**147**

Table 5. Countries making large trade seizures including more than three Snow Leopards per case: number of seizure cases, and minimum number of Snow Leopards represented in the seizures

Overall, seizures made up 26% of the total Snow Leopards detected in 2003-2009, and 51% from 2010-2016 (Figure 4), showing the importance of including observations to better understand levels of poaching and illegal trade. Some countries with large numbers of observed Snow Leopards, such as Afghanistan (with 135 skins seen in market surveys), have made very few seizures (in this case, just one, of a live animal captured in a livestock corral by villagers who called the authorities to take it off their hands: Anon., *pers. comm.* 2013). Table 6 shows the result of dividing each country's total number of Snow Leopards seized by the number observed from 2003-2016 (including market surveys). The overall average is 0.54, meaning that there were roughly 50% more Snow Leopards observed in illegal trade compared to the number seized. However, this largely reflects the greater number of observations in the first half of the analysis period; in the second half, there were more Snow Leopards in seizures (133) than observations (126), giving a ratio of 1.05 for 2010-2016, compared to 0.34 in 2003-2009. India stands out for having many more Snow Leopards in seizures (18) than observations (1). Four countries have roughly equivalent numbers for the two categories: China, Mongolia, Nepal and Tajikistan. Bhutan and Kazakhstan have no known seizures. The limitations of the data should be borne in mind: seizures and particularly observations are not reliably and regularly published or accessible, and indeed the 2016 expert survey, discussed in the next section, reported case numbers for most countries substantially higher than in the observations database.

Country	Ratio of Snow Leopards seized to Snow Leopards observed
Afghanistan	0.01
Bhutan	0.00
China	1.08
India	18.00
Kazakhstan	0.00
Kyrgyz Republic	0.40
Mongolia	0.82
Nepal	0.89
Pakistan	0.24
Russia	0.34
Tajikistan	0.82
Uzbekistan	0.25
Overall average	**0.54**

Table 6. Ratio of number of Snow Leopards seized to observed from 2003-June 2016
The ratio is each country's number of Snow Leopards seized is divided by the number observed; a ratio of one would mean that the numbers are the same. Red highlights countries where seizures are greatly outnumbered by observations, resulting in a ratio substantially less than the overall average.

Figure 12 shows the minimum number of Snow Leopards in annual seizures by country (including only individual cases). China was the only country to make seizures every year, and seized more Snow Leopards than other countries in 11 out of 14 years, possibly reflecting the greater size of its Snow Leopard population as well as levels of enforcement.

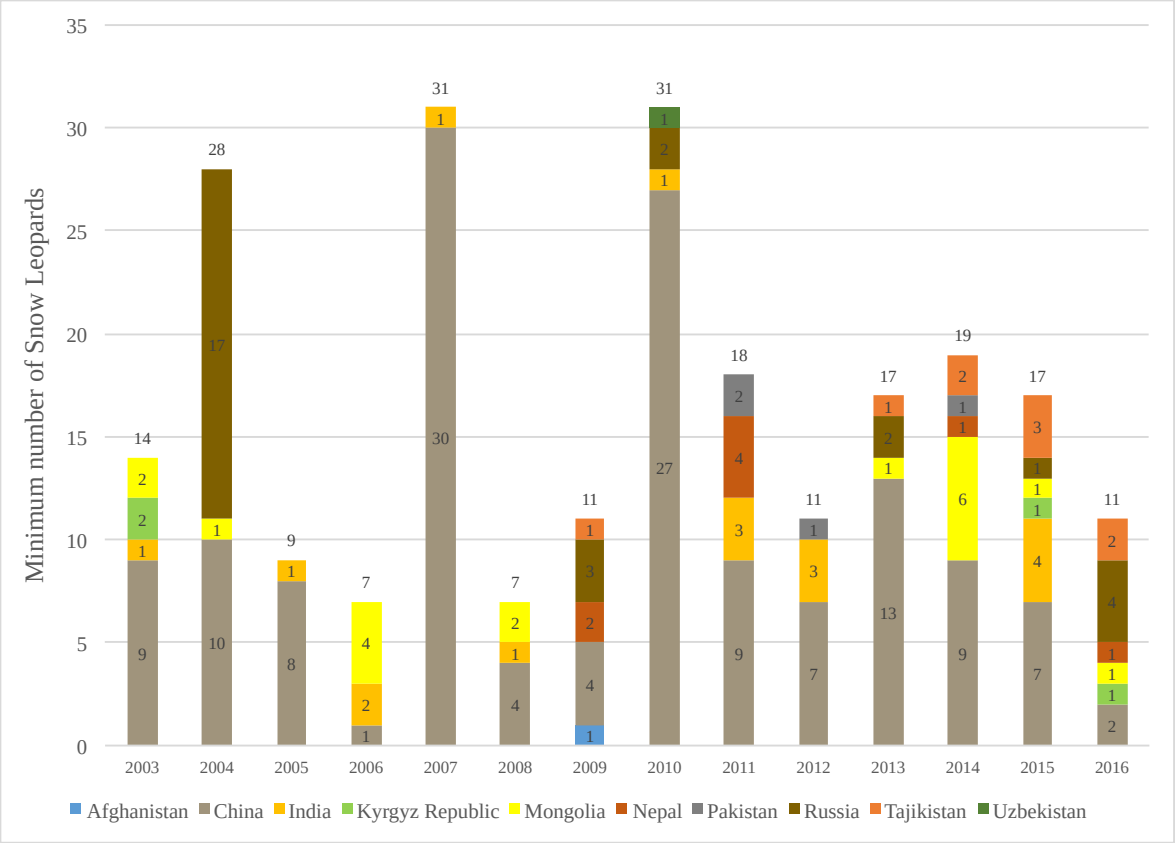

Figure 12. Minimum number of Snow Leopards in annual seizures by country, 2003-June 2016

Figure 13 looks in more detail at China's seizures by category (the point in the trade chain where the seizure took place) and province (only including provinces that made more than one seizure from 2003-2016). Most Snow Leopards have been intercepted in Xinjiang province. While there was greater search effort for this province, turning up a number of prosecutions which were not found in the Internet news search, in Qinghai province Li and Lu (2014) found that the results of their news search correlated well with the number of cases known to a Forestry official. In Gansu, there was one large seizure of 27 skins from a businessman's residence in the Chinese city of Linxia in 2007 (Hearn, 2007: shown also in Figure 5). Only six Snow Leopards were seized in 2003-2009, and one in 2010-2016, in the Tibet Autonomous Region, which probably has more Snow Leopards than any other province (Riordan and Shi, 2016). Inner Mongolia is estimated to have only a few Snow Leopards, and all its seizures were categorized as smuggling, rather than poaching or trade. Sichuan probably has a substantial Snow Leopard population (Riordan and Shi, 2016), but has made only one trade seizure, in Chengdu city in 2012 (Li and Lu, 2014). Six Snow Leopard skins were seized in two cases in 2011 and 2012 in Zhejiang province on China's east coast, far outside Snow Leopard range (Li and Lu, 2014).

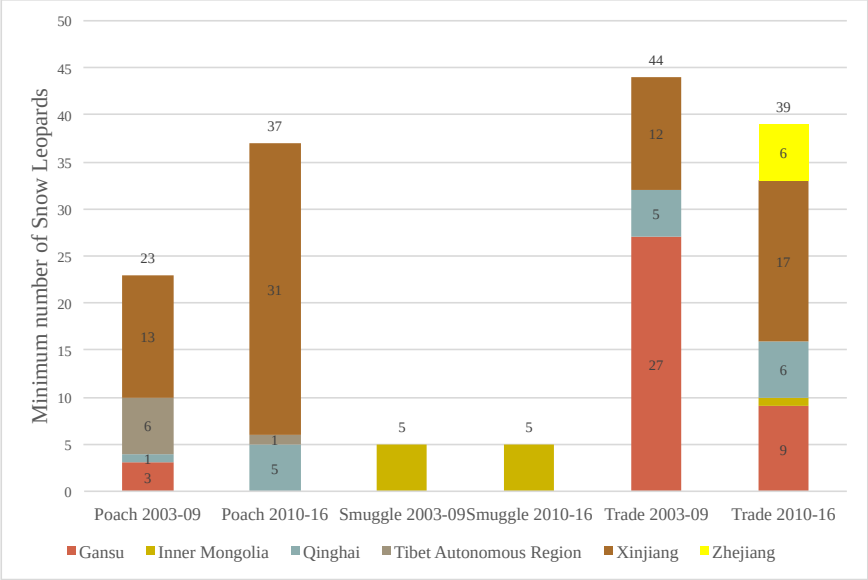

Figure 13. Minimum number of Snow Leopards seized in China by category and province
Sources: Li and Lu (2014), Li et al. (2016) and additional records collected by the authors

3.2. Expert survey

A total of 42 experts completed the 2016 survey (available from: www.traffic.org/storage/snow-leopard-annex4-questionnaire.pdf), with several reporting for more than one area or country. The number of respondents per country is shown in Table A1.1 in Annex 1; all countries had at least one expert reporting, several had more than five, and the average expert sample size per country is 3.5. They had worked from 1-25 years in Snow Leopard conservation, averaging 10.5 years, and had worked in the areas they reported on for an average of 9.1 years, spending 4.5 months per year in the field. The size of their areas of knowledge ranged from approximately 1,000 to 20,000 km², with an average of 12,108 km².

3.2.1. Snow Leopard poaching estimate

On average, in the years spent working in their areas, experts had direct knowledge of 4.2-6.6 cases of Snow Leopard poaching, and indirect knowledge (reports from observers they deemed reliable) of a further 8-10.5 cases. On average, they estimated they detected less than 38% of all cases actually occurring. These three levels of knowledge – direct, indirect and estimated – are equivalent to the three levels of reliability of observations in the Snow Leopard crime database (Figure 3). Combining the three yields an average total of a minimum of 32 and maximum of 45 cases per expert (Figure 14). Of their known cases, an average of two (30-48%) involved more than one Snow Leopard, typically a Snow Leopard mother with cubs. Dividing by the average number of years worked in their areas, the annual average number of known cases was 1.3-1.9, with an additional 2.2-5 cases suspected.

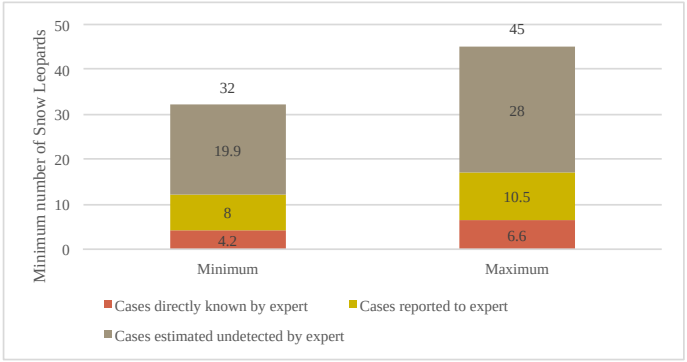

Figure 14. Average minimum and maximum numbers of known and suspected Snow Leopard poaching cases per expert

Averaging each expert's annual case rate per country, and extrapolating to Snow Leopard range, results in an overall annual poaching estimate of 221-450 Snow Leopards (Table 7), at least four times greater than the average annual number detected in seizures and observations (52) from 2003-2016. The experts' suspected detection rate of less than 38% suggests that poaching numbers could range much higher. China has by far the largest estimated number of Snow Leopards poached (103-236 per year). Altogether, almost all estimated poaching is estimated to occur in five out of 12 range countries, with a minimum of 47% in China, and most of the rest (44%) in India, Mongolia, Pakistan and Tajikistan. However, when comparing each country's share of estimated poaching to its share of Snow Leopard range (as in Table 4), only Nepal and Pakistan are highlighted for disproportionate offtakes, although India's ratio is also rather high. Bhutan, Kazakhstan, and Pakistan had particularly low average estimated rates of detection.

Country (n = expert area responses)	Average number of cases per 1,000 km²	Estimated number of Snow Leopards poached annually	Average suspected case detection rate
Afghanistan (2)	0.04-0.11	1-2	<58%
Bhutan (2)	0.21	2	<10%
China (9)	0.10-0.23	103-236	<44%
India (8)	0.21-0.53	21-45	<46%
Kazakhstan (1)	0.002-0.01	1	<10%
Kyrgyz Republic (2)	0.06-0.08	5-7	<63%
Mongolia (4)	0.15-0.22	34-50	<30%
Nepal (5)	0.19-0.80	6-23	<39%
Pakistan (6)	0.29-0.66	23-53	<20%
Russia (2)	0.12-0.18	2-4	<38%
Tajikistan (3)	0.23-0.29	20-25	<45%
Uzbekistan (2)	0.27-0.40	3-4	100%
Total (44)	**0.16-0.31**	**221-450**	**<38%**

Table 7. Number of Snow Leopards estimated poached annually, with average suspected rate of detection
As described in Methods, each expert's number of known poaching cases was divided by the geographic area of knowledge to obtain a case rate (number of cases per 1,000 km²). Expert case rates were averaged per country, and these were then extrapolated over each country's Snow Leopard range (Table 2). Each case is assumed to represent a single adult Snow Leopard.

Country	Ratio of Snow Leopard poaching share to range share
Afghanistan	0.33
Bhutan	0.92
China	0.72
India	1.62
Kazakhstan	0.03
Kyrgyz Republic	0.31
Mongolia	0.81
Nepal	2.16
Pakistan	2.07
Russia	0.65
Tajikistan	1.13
Uzbekistan	1.46

Table 8. Ratio of Snow Leopard poaching share to Snow Leopard range share
The ratio is each country's share of total Snow Leopard poaching (midpoint of national estimate from Table 7) divided by share of total Snow Leopard range (Table 2). Red highlights countries with ratios substantially above one.

3.2.2. Reasons for killing Snow Leopards

Retaliatory killing/Human-wildlife conflict (HWC)[4], is the primary known reason Snow Leopards are killed, accounting for 55% percent of cases range wide (Figure 15). Targeting for trade occurred at approximately the same frequency (21% of cases) as non-targeted or accidental capture (such as by snaring: 18%). Figure 16 compares the results by country. The countries where experts reported the highest frequency of killing for trade (33-42% of cases) were Afghanistan, the Kyrgyz Republic, Pakistan and Tajikistan. Countries where experts reported the lowest frequencies of retaliatory killing (10-34% of cases) were Bhutan (although the reasons for a large share of cases were unknown), Kazakhstan, Kyrgyz Republic, and Russia. High frequencies of retaliatory killing (65-100%) were reported from India, Nepal, Pakistan and Uzbekistan.

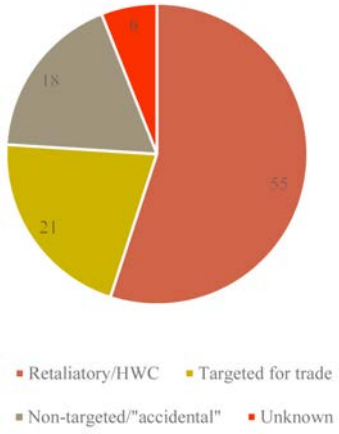

Figure 15. Average percentage frequency of four reasons for killing Snow Leopards
Retaliatory/HWC: Snow Leopard killed because of or to prevent livestock depredation. Targeted for trade: Snow Leopard killed to sell it. Non-targeted/"accidental": Snow Leopard was not deliberately targeted, but captured by an indiscriminate method (such as snaring) or killed opportunistically when encountered. Unknown: Reason for killing the Snow Leopard is unknown to expert for these cases.

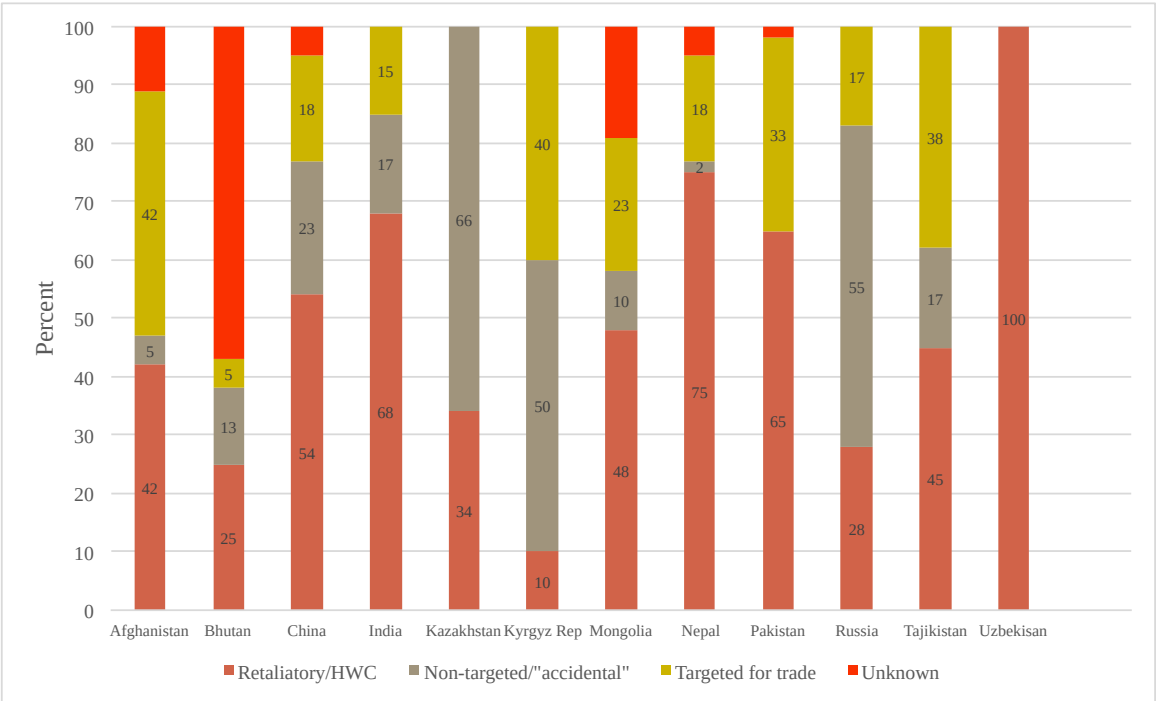

Figure 16. Average percentage frequency of four reasons for killing Snow Leopards, by country

[4] Mishra *et al.*, (2016) prefer the term "conservation conflict", clarifying that the conflict is not between people and Snow Leopards but between competing human interests: livestock production and wildlife conservation. Wangchuk *et al.*, (2016) label the term "conflict" a foreign one to Bhutan, where some level of predation was tolerated traditionally under Buddhism's aversion to killing animals, and warn that this term's use may lead to an attitudinal shift among herders.

Experts estimated the maximum percentage of livestock depredation incidents where the owner does not attempt to kill the Snow Leopard in retaliation at a little over half (52%). This suggests that although retaliatory killing is estimated to account for roughly half of Snow Leopard poaching, there is likely a 50-50 chance that such an attempt will take place after a depredation incident. The differences between countries are shown in Figure 17. Countries reporting a high tolerance of depredation (with respondents estimating that over 70% of incidents do not lead to retaliatory killing) included China and the Kyrgyz Republic (where depredation incidents are relatively rare: T. Rosen, *pers. comm.,* 2016). In contrast, experts in Bhutan, Kazakhstan, and Pakistan estimated that depredation is tolerated in fewer than a third of incidents.

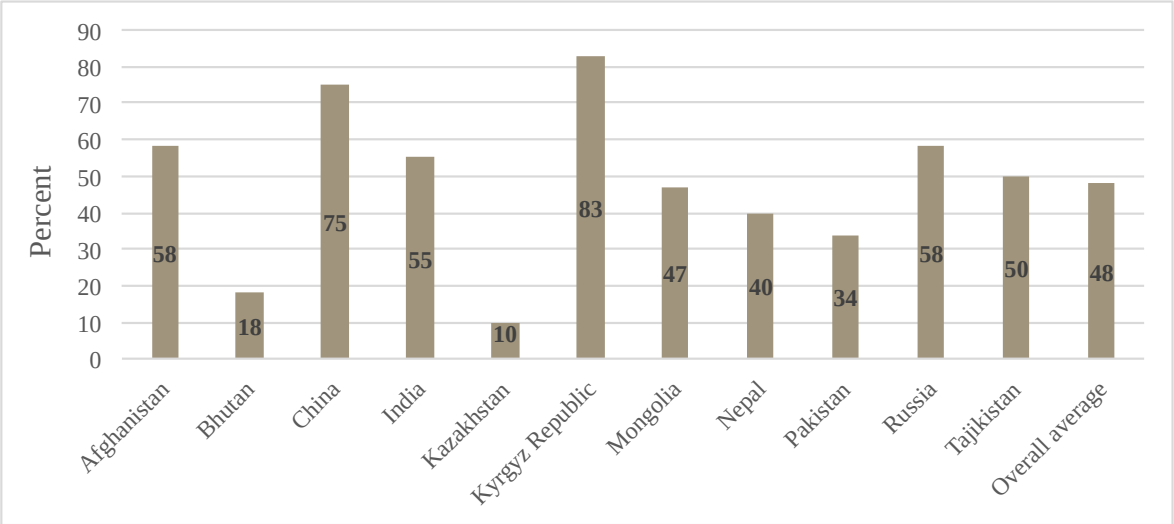

Figure 17. Maximum average percentage of livestock depredation incidents where experts estimate no retaliation toward the Snow Leopard ensues, by country

3.2.3. Methods of killing Snow Leopards

Experts were asked to rank seven different methods for killing or capturing Snow Leopards used in their areas of knowledge, with one point for the most frequently used method. Table 9 shows the average rankings for the top six methods by country; low scores reflect top average ranking. Shooting and trapping (both steel jaw traps and snares) were ranked most common overall, followed by clubbing and poisoning. Shooting and clubbing are inter-linked with trapping, used when the animal does not die in the trap, although they are also used if Snow Leopards are caught in villages or corrals. The use of poison appears to be more prevalent in South Asia, and was the top ranked method in India and Nepal, and the second most-common method in Pakistan. Nepal and India also ranked trapping as uncommon, unlike other countries. It is surprising that shooting received the top ranking in China, given that the government confiscated personal firearms in western China in the early 2000s, which was credited with leading to a reduction in hunting (Liu *et al.,* 2016). Live capture was generally reported as less common than killing methods in most countries, with the notable exceptions of Tajikistan and India. In India, the use of a traditional pit trap was reported, and electro-shock was reported as a common method in Nepal (and a rare method in India and Mongolia).

Country	Snare	Steel trap	Shoot	Club	Poison	Live capture
Afghanistan		3	1.5			
Bhutan	2					6
China	2.1	2.8	2	3.5	3	4.4

India	4.4	4.7	4.3	4	3.8	4
Kazakhstan	1	1	1			
Kyrgyz Republic	2	5	2.5			4
Mongolia	1.5	2	2.5	4		5
Nepal	5	4.3	4	5	3	5.4
Pakistan	6	3.3	1		2	4
Russia	1	2.5	4		7	6.5
Tajikistan	1.7	2	4	3	4	2
Uzbekistan		1	1	1		
Overall average	**3**	**3.2**	**2.7**	**3.5**	**3.4**	**4.5**

Table 9. Average ranking of methods for catching Snow Leopards, by country (lower scores = higher ranking) *Each expert ranked the methods most frequently used, with one point for the top method, two for the second most common, etc. This table shows the average score per method when expert results are combined.*

3.2.4. Reported outcomes after Snow Leopards are killed

On average, experts reported most incidents of retaliatory and non-targeted Snow Leopard killing resulted in an attempt to sell the animal or its parts (39% of known outcomes), with an attempt to hide it taking place 28% of the time. However, 33% was the average response for 'unknown outcome', showing considerable uncertainty. These results suggest that in addition to the average of 21% of Snow Leopards being targeted for trade, nearly 40% of the 73% non-trade poaching incidents (from Figure 15) result in an attempt to sell. This implies that over 60% of Snow Leopards killed could enter the trade chain. Illegal trade in Snow Leopards is fed not only by poachers, but by herders acting in retaliation for or to prevent livestock losses.

Country averages for the percentage of non-trade poaching incidents that result in an attempt to sell or hide the Snow Leopard are shown in Figure 18. The Kyrgyz Republic, Pakistan and Russia reported the highest selling outcomes (over 60% of retaliatory and non-targeted hunting incidents). Table 10 shows that 108-219 Snow Leopards potentially enter into illegal trade every year. Table 9 also shows the ratio of share of Snow Leopards entering illegal trade to share of species range, as in Tables 4 and 8. While China again has the highest number of animals estimated to enter trade by far (72), followed by Pakistan (24), Mongolia (17) and Tajikistan (10), only Pakistan and Nepal were again flagged for having disproportionate levels of Snow Leopards entering illegal trade (as in Table 8), although India's ratio is also rather high.

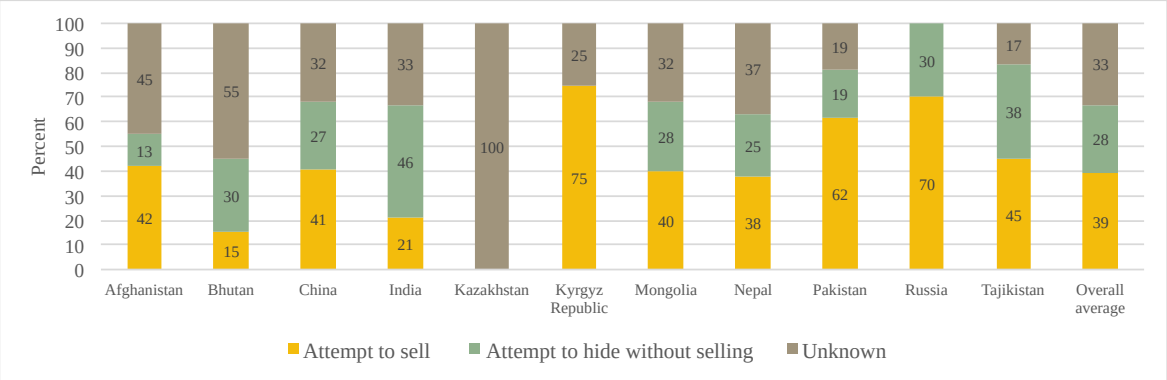

Figure 18. Hiding vs. selling: average percentage frequency for known incidents of retaliatory and non-targeted Snow Leopard killing by country

Country	Average estimated number of Snow Leopards entering illegal trade per year	Ratio of Snow Leopard trade share to range share
Afghanistan	<1	0.35
Bhutan	<1	1.14
China	51-117	0.85
India	7-15	1.70
Kazakhstan	No data	
Kyrgyz Republic	4-6	0.35
Mongolia	16-23	0.96
Nepal	3-12	2.56
Pakistan	17-39	2.44
Russia	2-3	0.77
Tajikistan	13-17	1.35
Uzbekistan	No data	
Total	**108-219**	

Table 10. Estimated number of Snow Leopards entering illegal trade annually per country, with its share compared to Snow Leopard range share

Average number of Snow Leopards entering illegal trade per year: *Percentage of each country's annual poaching estimate (from Table 7) which experts report is trade-targeted (from Figure 16) plus the percentage of retaliatory and non-targeted poaching that results in an attempt to sell the animal (Figure 18).*

Ratio of Snow Leopard trade share to range share: *The ratio is each country's share of total Snow Leopards entering trade (mid-point of the ranges given in the previous column) divided by its share of total Snow Leopard range (Table 2). Red highlights countries with ratios substantially above one.*

Regarding law enforcement outcomes of known poaching cases, only 14% were prosecuted, but otherwise the results were fairly evenly divided: 23% were investigated by authorities without prosecution, 16% were discussed at the project or community level, 27% had no known outcome, and 20% of the outcomes were unknown. That only 37% of known cases appear to have been subject to some form of law enforcement indicates that using only seizures as an indicator of illegal trade and poaching levels will underestimate the actual rates substantially. However, it is encouraging that an alternative form of deterrent, discussion at the community or project level, is employed some of the time.

Figure 19 consolidates these outcomes by country. No outcome was the most frequent outcome reported in Afghanistan, Kazakhstan, Nepal and Russia, suggesting the difficulties governments face in some areas enforcing legal protections for Snow Leopards. Sixty per cent or more cases were investigated and/or prosecuted in the Kyrgyz Republic, Mongolia and Tajikistan, and 40% in Bhutan, China and Nepal. Discussion at the community or project level was a common outcome reported in Afghanistan and India (more than 30% of cases), as well as China, Mongolia and Tajikistan (approximately 20% of cases). There were no reported prosecutions at all in Afghanistan and Pakistan, which also correlates with very low numbers of seizures there. Prosecutions were reported at a very low average frequency (1.3%) for India.

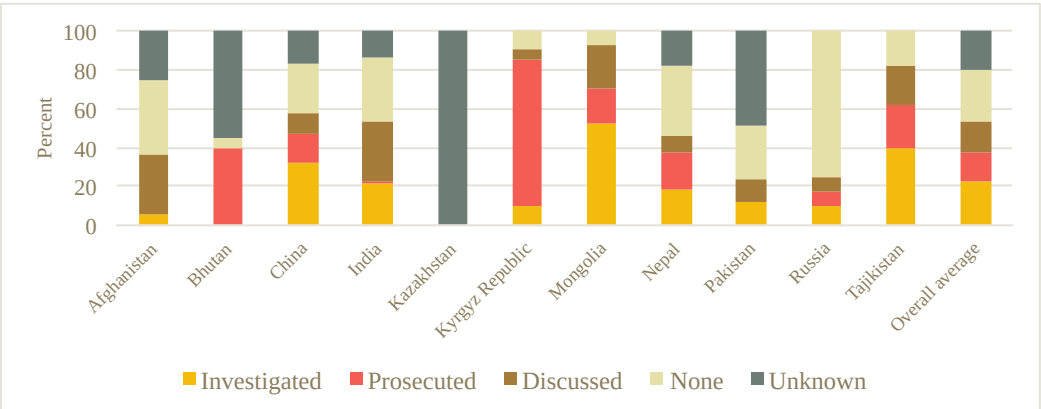

Figure 19. Average percentage frequency of law enforcement outcomes for known cases of Snow Leopard poaching by country

3.2.5. Markets for Snow Leopards and their parts

Asked if there is significant illegal trade in the areas where they work, 57% of experts said yes, 39% said no, and 4% weren't sure. However, when answering subsequent survey questions, many of the "No significant trade" respondents described local involvement and trade routes. Only 33% of the "No" respondents did not indicate whether locals or foreigners were involved, nor describe trade routes used. Therefore, trade exists in most areas where experts work, even if it is not perceived to be significant.

Figure 20 shows expert responses, averaged by country, to two survey questions: whether there is significant illegal trade (0-100 range on chart) in the areas where they work and whether there is foreign involvement in it (100-200 range on chart). China had the lowest percentage response for significant trade, with only experts from Xinjiang province considering it significant, and except for Xinjiang, trade was described as primarily local, with little foreign involvement – the foreign involvement in Xinjiang refers to illegal imports. Respondents from Afghanistan were divided over whether illegal trade was occurring at significant levels in the areas where they worked, but all indicated that primarily foreigners were involved. The majority of respondents in Mongolia, Nepal, Pakistan, Russia and Tajikistan all felt that there was significant illegal trade in their countries.

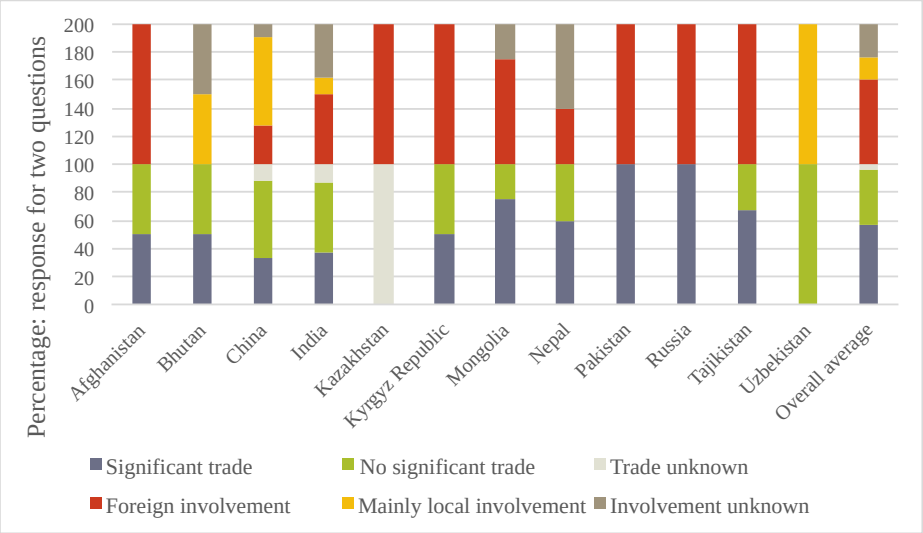

Figure 20. Average percentage frequency of 2016 survey respondents indicating whether their country has significant illegal trade and foreign involvement in the trade
This figure consolidates percentage responses to two questions so country results for each can be compared together: whether there is significant illegal trade (1-100 range) and whether there is foreign involvement in it (101-200 range).

Table 11 shows recent prices paid to poachers reported by experts from the areas where they work. There was generally a wide price range within countries; consistently low prices (in US dollars) were reported only from Afghanistan, Mongolia and Nepal, and these prices may not be considered low in the local economies.

Country	Live	Skin	Bones (per kg)	Carcass
Afghanistan	140; 100-200			
Bhutan	7,000	1,000	2,000	6,000
China	1,000-1,200; 6,000-10,000	300-3,000; 4,000-5,000	100-200; 100-300	3,000; 3,000-6,000; 9,000
India		500; 15,000		500; 10,000
Kazakhstan		500-5,000		

Kyrgyz Republic (no data)				
Mongolia		100; 300 (2); 400		75; 500
Nepal		300; 500		75
Pakistan	2,000-5,000	100; 200; >1,000 (2); 1,000-2,000		
Russia		500-5,000		1,000
Tajikistan	5,000 (2)	1,000 (2)	800	2,000
Range	1,200-10,000	100-15,000	100-2,000	75-10,000

Table 11. Experts' reported prices in US$ paid to people who have poached Snow Leopards
Individual expert responses shown separated by semi-colons. (2) = 2 respondents gave same price or price range. Blank space = no responses.

The surveyed experts described illegal markets and trafficking routes for the countries where they have worked (Table 12); the variation in detail provided precludes mapping. In-country illegal trade was reported in Afghanistan, China, India, Nepal, Pakistan, Russia and Uzbekistan. Most experts described trafficking routes which led to other countries; only experts from China did not report that destinations for poached Snow Leopards lay outside national borders. China (most frequently) and Russia (from Mongolia, primarily, as well as from the Central Asian republics) were the most commonly identified destinations for Snow Leopards from other countries.

Country	Illegal markets and trafficking routes identified by experts
Afghanistan	Sold in markets in Kabul, Darwaz and Chitral. Smuggled to Pakistan and Europe via Tajikistan
Bhutan	From Haa district (BT) to Jumoo and Assamsa, T.A.R., China
China	From Snow Leopard range in Xinjiang and nearly all other adjoining countries to city markets in Urumqi, Kashgar, Xinji, Haining and eastern China. From Snow Leopard range in Qinghai to city markets in Xining, Yushu prefecture, Linxia and Golmud
India	Arunachal Pradesh State: locally, Guwahati in Assam, and some cross-border trade to Myanmar and Nepal. Northwest India: locally Bhaba and Pin valleys, Shipkila, Sumdo, Demchok and Darchula; some trade across borders to China, Afghanistan, Pakistan and possibly Tajikistan
Kyrgyz Republic	Into Russia and China
Mongolia	Cross-border to China and Russia
Nepal	Central Nepal: to T.A.R., China by multiple routes including Lo Manthang-Nechung; Manang-Surkhang-Gara; Sangta-Dolpa; Upper Mustang-Pokhara-Kathmandu-Tatopani-Khasa, and via the Kodari border crossing (which closed following the earthquake in April 2015). From India (Delhi and Pithoragarh) through western Nepal (Darchula, Mahendranagar, Tinkar) to Taklakot (Hilsa), T.A.R., China (where controls said to have been strengthened in 2015).
Pakistan	Poaching reported from valleys of Shigar, Chorbat, Misgar, Chipursan, Haramosh, Naltar. Trade centers: Upper Hunza, Broghal, Gilgit city market, Peshawar, Lahore. Smuggling routes: to Afghanistan markets via Darwaza Pass and Wakhan corridor; to China via Karakoram Highway and Khunjerab Pass
Russia	Poaching in Sayano-Sushensky Nature Reserve and Tyva Republic to Krasnoyarsk district in Russia. Poaching in Altai Republic with trade in Barnaul, Novosibirsk and Moscow. From Mongolia (Bayan-Olgii aimag) to Russia's Altai Republic. To China (skins smuggled via Russian Far East).
Tajikistan	To Russia (from Dushanbe airport); Kyrgyz Republic (by helicopter, by road to Osh, through Bordobo and Kyzlart pass, through Jirgatal); China (Rangkul, Murghab, Shaimak). From Afghanistan (through Ishkashem)
Uzbekistan	No illegal trade observed in the area covered by the survey, although some experts reported in skins and live animals in the past. To Tajikistan and to China via Kyrgyz Republic and Kazakhstan

Table 12. Illegal trade routes described by experts in the 2016 survey

4. DISCUSSION AND CONCLUSIONS

4.1. Range-wide overview

Based on the average number of cases known to the 42 experts surveyed in 2016 over the average of nine years spent working in their geographic areas of knowledge, 221-450 Snow Leopards were estimated to have been poached annually since 2008, with 55% killed in retaliation for livestock depredation, and 108-219 potentially entering the trade chain. This is the first range-wide poaching estimate, but there is little available information to compare to gauge its accuracy, or infer a trend given no past estimates are available. The only previous poaching estimate based on a methodology other than educated guesses by experts that could be located is from Li and Lu (2014), of 11 Snow Leopards poached annually since 2000 in China's Sanjiangyuan region (located in Qinghai province in the eastern part of the Tibetan plateau). Their method was based on interviews with local people in 44 villages, which focused in part on the killing of Snow Leopards, and with results extrapolated to all 185 villages located near Snow Leopard habitat in that region. Applying the average estimated poaching rate for Qinghai province from the 2016 expert survey (0.15-0.34/1,000 km^2) yields an estimate of 13-30 Snow Leopards poached in Sanjiangyuan Snow Leopard range (89,602 km^2: Li *et al.,* 2013) since 2009 (with eight years being the average duration experts had worked in Qinghai). It is possible that better information was available for this region to the experts surveyed for this report, given potential knowledge gained from the large numbers of villager interviews conducted by Li *et al.* (2013,2014), but the close correlation between the previously published poaching estimate and the one derived from the method used in this report is encouraging.

Given the uncertainties about population numbers, as well as the low average estimated rate of detection (less than 38%), it is difficult to assess the impact an annual offtake of 221-450 could have on the viability of the species. Although China had by far the highest seizures and observations (309 Snow Leopards from 2003-2016) and annual poaching estimates (102-236), its share of Snow Leopard crime was not disproportionate to its large share of Snow Leopard range (at least 60%). Countries flagged for having disproportionate levels of crime included Afghanistan and Russia (seizures and observations), and Nepal and Pakistan (annual poaching and trade estimates). For Russia and Afghanistan, the flagging reflects relatively high numbers of observations in the two countries. In Afghanistan, the skin trade is relatively open despite its illegality (and thus more transparent), and there have been more market surveys there than in any other country. Russia had intensive anti-poaching and monitoring efforts from 2005-2014 (Paltsyn *et al.*, 2016). Russia and Afghanistan both had relatively low estimated poaching rates (1-4 per year) – while these estimates could be too low, it suggests the likelihood that many of the trade observations in these countries involve Snow Leopards poached elsewhere (for Russia, particularly Mongolia). Both Nepal and Pakistan have had recent scientific surveys covering large areas and finding low numbers of Snow Leopards (R.K.Sharma unpublished data, Nawaz and Hameed, 2015).

What is clear is the likelihood that the scale of Snow Leopard crime is much higher than apparent from annual averages of seizures (18) or combined seizures and observations (52) from 2003-June 2016. Two studies estimated the probability of detecting crime in Tigers (Sharma *et al.,* 2014) and Leopards (Raza *et al.,* 2010) in India, applying mark-recapture methods to mapped incidents collected from public sources and databases maintained by WPSI and TRAFFIC. For Leopards, the probability was as high as 50%, and for Tigers, 39% in recent years. The geographic scale of the Snow Leopard crime database precludes use of this technique, which is better suited for smaller areas, but the expert survey results suggest that the probability of detecting Snow Leopard crime is much lower. This could be in part due to the challenges of law enforcement in the Snow Leopard's remote montane habitat. Indeed, the survey found that an average of 23% of known cases were investigated by authorities, and only 14% prosecuted. Most countries had more observations of illegal trade than seizures, especially from 2003-2009. From 2010-June 2016, the number of Snow

Leopards in observations (126) was roughly equivalent to those in seizures (133), but the expert survey results suggest that many observations go unrecorded. This highlights the importance of having informer networks to provide information on illegal poaching and trade to authorities

The Snow Leopard crime database analysis found that, from 2003-2009 to 2010-2016, the number of Snow Leopards in poaching seizures and observations rose, remained steady in smuggling, and steady in trade seizures. However, the number observed in trade and market surveys declined steeply. There are three possible interpretations of this situation. First, it could be that the limitations of available data and the authors' ability to collect all of it has resulted in an incorrect picture. It is apparent that illegal trade has become more clandestine and difficult to detect in most countries, so that secondly, it could be increasing, as indicated by the apparent rise in poaching numbers. However, the decline in large seizure cases, which are indicative of organized trafficking activity, points to a third possibility: that trade (and perhaps demand) is declining (while becoming less visible), but local people continue to opportunistically sell Snow Leopards they poached primarily to protect livestock (55% of cases known to experts) or caught accidentally by non-targeted hunting methods such as snares (18%).

Due to the uneven availability of details in the source material, we could not analyze the trade records comprehensively to try to determine patterns in how Snow Leopards are marketed. According to an analysis of 108 prosecutions of wildlife crime in China's Xinjiang province from 2001-2016, only five out of 30 cases (17%) involving Snow Leopards also included other species which also frequently appeared in the case records (e.g., Argali *Ovis ammon*, Ibex *Capra ibex*, Goitred Gazelle *Gazella subguttorosa,* Red Fox *Vulpes vulpes*, Lynx *Lynx lynx* and Himalayan Snow Cock *Tetrogallus himalayensis*) (A. Abkukadir *pers. comm.* 2016). In other words, most seizures involved only Snow Leopards, suggesting opportunistic poaching and trade. Also, most of the case indictments were for poaching (87%), with 65% of these cases also including transport and attempted sale; just 13% of the Xinjiang Snow Leopard crimes involved only illegal trade. This suggests that apprehension of the poacher in the attempt to find a buyer may be the most effective node to target in the trade chain.

Although no definitive evidence was found, there are anecdotal reports that Russian outfitters have secretly organized illegal trophy hunts in Kazakhstan, the Kyrgyz Republic and/or Tajikistan (Rosen, 2015; Saidov *et al.,* 2016). Russia's Environment Ministry opened an investigation in 2015, in coordination with Interpol, after receiving a photo of a well-known wealthy Russian citizen posing with what appeared to be a trophy-hunted Snow Leopard, to determine its authenticity; authorities in the Kyrgyz Republic and Tajikistan were said to be carrying out their own investigations of the matter (Anon., 2015a). Illegal recreational hunting by politically powerful "VIP hunters" has been described as a growing problem in Russia (Braden, 2015). That there is potential demand for Snow Leopard trophy hunting is indicated by the Mongolian government's initiative in 2011 to include permits for four Snow Leopards among the animals with annual quotas for legal hunting available to foreign citizens; the permits were cancelled soon after they were announced in the face of public disapproval (Roddis, 2011).

However, with skins being the main product in trade (78%), the primary consumer interest in Snow Leopards appears to be for display, with some observations of skins hanging on walls in homes and restaurants, as well as stuffed taxidermy specimens. Priced in the thousands of US dollars, skins were recently described as a "symbol of wealth and power" in Central Asia (Davletbakov *et al.,* 2016). However, there probably exists very little in the way of a definable consumer segment deliberately seeking out such items. They are most likely purchased opportunistically – "impulse buys" – and most consumers probably only buy one in their lifetime. Once in a home, the illegal possession has very low probability of detection, and moreover law enforcement authorities may be reluctant to investigate in such situations. The purchase itself also has a low probability of detection, as indicated by the sharp decline in observed numbers of Snow Leopard skins being offered for sale. While growing personal wealth in Asia is widely understood to be a primary driver of illegal wildlife

trade, poverty is also recognized as a driver, and the Snow Leopard trade may be more a function of rural people in Snow Leopard habitat attempting to make money and make up for the costs of livestock losses to predators than of wealthy people placing orders for luxury household decorations. This suggests that the most effective way to curb Snow Leopard crime may not be through attempts to reduce demand, but to reduce supply, through actions which reduce local peoples' incentives to poach and sell Snow Leopards. This notion is reflected in the aphorism behind the title of this report: an ounce of prevention equals a pound of cure. Preventing livestock losses, offsetting the costs of losses and improving community support for Snow Leopard conservation are the most important approaches to tackling the problem of Snow Leopard trafficking.

4.2. Country Summaries

This section summarizes and discusses combined results from the database and survey for the 12 Snow Leopard range countries.

Afghanistan: Afghanistan had the most skins seen in market surveys from 2003-2016 (135) and was flagged as having a disproportionate level of Snow Leopard crime relative to its small share of Snow Leopard range. Snow Leopard crime is much more transparent in this country than in any other. Skin numbers seen in markets have declined; WCS-led capacity building and military buyer awareness education efforts have contributed (WCS, 2016). However, they were observed openly for sale as recently as 2014 (Moheb and Paley, 2016). There have been no known trade seizures, suggesting a real need for improved law enforcement. It is possible that many of the skins come from other countries, as indicated by surveyed experts' (possibly too) low estimates of poaching (1-2 per year from the Wakhan corridor since 2008), by being identified as a destination for Snow Leopards poached in India and Pakistan, and by the presence of non-native cat skins (Tiger) in Kabul fur markets (D. Lawson *pers comm.,* 2016). Skins have also left Aghanistan, with known destinations including neighboring Pakistan, as well as carried overseas (knowingly or inadvertently) by military and other contractors working there.

© D. Lawson, WCS

Snow Leopard, Tiger and Leopard skins for sale at a shop in the Chicken St. fur district, Kabul, Afghanistan in 2011.

Bhutan: Only one poaching observation was recorded for Bhutan in 28 years (Annex 3), and this country was previously considered to be virtually immune from illegal trade. However, the survey results indicate that experts believe the case detection rate to be very low, and that most livestock depredation incidents result in attempts at retaliatory killing. An illegal trade route was identified from Haa district to cross-border areas of the Tibet Autonomous Region in China.

China: China is home to most of Snow Leopard range (at least 60%, and more if unconfirmed range on the Tibetan plateau is included), and has by far the highest number of seizures, with its 155 animals seized by law enforcement making up 63% of the total from 2003-2016 (247). It also has the highest estimated poaching offtakes (103-236 per year since 2008), with 51-117 animals estimated to enter illegal trade. It should be noted that these high totals are proportionate to its high share of Snow Leopard range, and only 33% of experts from China indicated significant illegal trade in the areas where they work. However, China's market does not consist solely of locally poached cats: it is reported as a major Snow Leopard trade destination by experts from all neighboring countries along its borders. The vast majority (83%) of Snow Leopards seized in large cases (more than 3 animals per case) were in China, an indicator of organized trafficking activity, as well as enforcement effort. The largest known seizure of 27 skins was made in 2007 in the city of Linxia (Gansu province), home to a famous fur market where surveys in 2005 counted 60 skins. Since then, there have been very few products seen there or elsewhere openly for sale, an indication that law enforcement has been effective at reducing availability, but illegal trade continues, including on the Internet where TRAFFIC documented a skin and multiple claws and teeth for sale between 2008-2016. China is the only reported destination for Snow Leopard bones, and the only country where they have been observed in market surveys (one case: Nowell and Xu, 2007) and in one case of a manufactured traditional medicine (Annex 2).

India: India has very few published observations of poaching and illegal trade; one expert who has worked in Ladakh for many years said that local people are well aware of the Snow Leopard's protected status and very wary of sharing information. India had the second highest number of seizures from 2010-June 2016 (12). With an estimated 21-45 Snow Leopards killed annually, experts indicate that most poaching (66%) is retaliatory in nature, with relatively few attempts to sell. However, India comes close to having a disproportionate level of both poaching and trade, given its range size (third largest). A high frequency (33%) of outcomes of retaliatory killing are unknown (as to whether there is a subsequent attempt to hide or sell the Snow Leopard), and only 1% of cases are reported prosecuted, although the frequency of cases discussed at the community level is relatively high (32%). Illegal trade was described as both local and to all neighboring countries.

An old Snow Leopard carcass, missing its head, was found near a road in Ladakh, India in 2016.

Kazakhstan: With only five observations since 2003 and no known seizures, very little information is available about poaching and illegal trade, although they are considered to be serious threats. In east Kazakhstan, surveys found lower than expected evidence of Snow Leopard presence, and the Snow Leopard Fund receives periodic reports of illegal skin sales, describing poaching as "apparently carefully hidden" (SLF, 2013). The expert survey indicated a very low tolerance of livestock depredation, with 90% of incidents likely resulting in attempted retaliation, and estimated the poaching case detection rate as very low (10%).

Kyrgyz Republic: Poaching and trade have declined since the 1990s, when poaching was estimated at 90-120 animals per year, and over 200 pelts were observed in regional exhibitions marking the thousand-year anniversary of Manas in 1995 (Koshkarev and Vrypaev, 2000). Sixteen Snow Leopards were seized between 2000-2002, through an anti-poaching unit Grupa Bars established by the German NGO NABU. Seizures and observations for 2003-2016 total just 14 Snow Leopards, but Daveletbakov *et al.* (2016) write that "trapping and killing…is still documented in many parts of the country", and in the Alay mountains Taubmann *et al.* (2015)

found high probabilities of local extinction in proximity to areas with human activity. The expert surveys did not flag the country for high levels of poaching or trade (possibly in part due to depleted populations), but it was reported as a destination for poached animals from Tajikistan, and respondents indicated that the country mainly serves as a supplier and transit point for China and Russia. President Atambayev led the founding of the GSLEP, demonstrating national commitment to conservation, and experts reported the highest level of case prosecution of any country (75%).


©NABU

NABU's Grupa Bars anti-poaching unit with confiscated Snow Leopard pelts.

Mongolia: Mongolia is the second largest Snow Leopard range country after China, and has the second highest annual poaching estimates from the 2016 expert survey (34-50), with 17 estimated to enter illegal trade. Mongolia's economy is centered on nomadic livestock production, and 48% of poaching was reported by the survey to be retaliatory for livestock protection, with 40% of cases resulting in an attempt to sell. Up until the early 2000s, illegal trade was carried on openly in the country (Annex 1), and in 2006 it was estimated that 100 Snow Leopards were poached annually (Wingard and Zahler, 2006; because the provenance of their estimate is unclear, it was not included in the Snow Leopard crime database). The 2016 expert survey found that 75% of experts still consider that there are significant levels of illegal trade, largely destined for China and Russia. However, seizures and observations fell from 214 Snow Leopards in 1989-2002 (Annex 1) to 32 in 2003-2009 and 12 in 2010-June 2016. WWF Mongolia announced that 2014 and 2015 were Zero Poaching Years for Snow Leopards in the Altai-Sayan region, with no incidents detected in that part of the country (WWF MN, 2016). Still, nine Snow Leopards were seized from 2013-2016 (Figure 9; WWF Mongolia *in litt.,* 2016), and this along with the survey results suggests that parts of the country are still experiencing Snow Leopard crime. Poaching can be very difficult to detect: every one of over 1,000 herders interviewed in 2005 knew of the Snow Leopard's protected status, and none admitted to having killed Snow Leopards in retaliation for livestock depredation (Wingard and Zahler, 2006). A Snow Leopard conservationist died under mysterious circumstances in 2015, and there is suspicion that his death was linked to his opposition to mining in Snow Leopard habitat (Tolson, 2016). While Snow Leopard poaching and illegal trade do not appear to be involved in this case, the incident is suggestive of an atmosphere of intimidation that may make it more difficult to gauge the true scale of threats to Snow Leopards.

Nepal: Nepal had 19 seizures and observations from 2003-2016, and evidently has less illegal Snow Leopard trade in comparison to other big cats, with the government's seizure stockpile containing only three Snow Leopard skins compared to 69 Tiger skins and 49 Leopard skins (Yadav, 2016). However, Nepal had the highest estimated level of retaliatory killing (75% of known poaching cases), and its 6-23 Snow Leopards poached, with 38% entering in trade, were flagged as disproportionately high compared to its small share of Snow Leopard habitat (about 30,000 km^2). One expert who has worked in the country for decades stated that retaliatory killing is on the rise (R. Jackson pers. comm., 2016), an observation supported by comparison of the 2002 and 2016 expert survey results (Annex 1). Western Nepal had a relatively high known case rate (3 per 1,000 km^2) and low estimated rate of detection (under 10%). One of the observations from this region was that hunting (trapping and shooting) is carried out during the lucrative annual wild harvest of caterpillar fungus *Ophiocordyceps sinensis*, with a newspaper report of three Snow Leopards having been killed (Singh, 2016). Nepal is both a source and transit point (from India) for illegal wildlife trade to China, and retaliatory killing provides a supply of Snow Leopards which may be fed into the more established illegal trade in Tigers and Leopards.

Pakistan: Pakistan was flagged by the expert survey results as having disproportionately high levels of poaching (estimated at 23-53 Snow Leopards per year), primarily retaliatory (65%), with high likelihood of an attempt to sell the Snow Leopard (62%). However, the country has not made any trade seizures, despite the reported availability of skins in local markets (SLN, 2014). The only seizures have been when local villagers captured stock-raiding Snow Leopards and called the government for assistance (it is legal in Gilgit-Baltistan province, the main area for Snow Leopards, to kill or capture a Snow Leopard in defense of human life [SLN, 2014]), although Snow Leopards rarely attack people in comparison to other big cats). Illegal trafficking routes from the country point to Afghanistan and China, and recent camera trap and DNA surveys found low Snow Leopard numbers in some of the country's best habitat (Nawaz and Hameed, 2015).

Russia: Despite having a small share of Snow Leopard range (20,000 km^2: a little over 1%), Russia had one of the highest level of seizures and observations (118 Snow Leopards) after China, including both poaching and trade, and was flagged for having disproportionate levels of Snow Leopard crime (in part reflecting intensive anti-poaching and monitoring effort from 2005-2014: Paltsyn *et al.,* 2016). It was identified as a trade destination from Mongolia and the Central Asian republics, and had among the highest reported prices for skins (up to US$5,000) in both 2002 (Annex 1) and 2016. The second-largest ever single seizure, of 17 skins, took place on the border, coming from Mongolia in 2004. Six months of camera trap surveys in 2010 detected no Snow Leopards at all in the Argut River Basin, previously thought to contain Russia's largest known population. Although some cats persist in some parts of the watershed (with the population currently estimated at 15-17: S. Spitsyn *pers. comm.,* 2016), the losses are attributed to widespread use of wire snares, a primary source of income for local residents (SLC, 2013). Fifty-five per cent of Snow Leopard poaching was estimated to be non-targeted by the expert survey, the second highest national rate after Kazakhstan. Although no definitive evidence has yet been found, Russian outfitters have reportedly attempted to organize illegal Snow Leopard trophy hunts in Kazakhstan, the Kyrgyz Republic, and/or Tajikistan (Rosen, 2015; Saidov *et al.,* 2016), and the Russian authorities opened an investigation together with Interpol in 2015 (Anon., 2015a).

© Tessa McGregor

One of the largest seizures of snow leopard pelts took place in Russia's Altai Republic in 2004

Tajikistan: The 2016 expert survey estimated that 20-25 Snow Leopards are poached annually in Tajikistan, with 10 potentially entering illegal trade. Experts report that Snow Leopards have been trafficked to Russia, China, and the Kyrgyz Republic, and also within the country, with skins and live animals having been observed in houses in the capital Dushanbe. Live capture of Snow Leopards was described as a more common poaching method in Tajikistan than any other country, in part for suspected illegal trophy hunting, as noted by Saidov *et al.* (2016). The expert survey reported one of

© S. Michel

Eight month-old Snow Leopard cub seized in Tajikistan in 2008. His mother was killed by a "well-known poacher" and the skin sold (Rosen, 2014). The cub died before he could be transferred to a zoo.

the higher average rates of targeted poaching for trade of any range country (38%). Tajikistan had the fifth-highest number of seizures in the 2010-2016 period (8), and the expert survey reported relatively high average reported rates of investigation (40%) and prosecution (22%) of known cases by government authorities.

Uzbekistan: Uzbekistan is the smallest Snow Leopard range country (10,000 km^2), and even with relatively low average estimated poaching levels (three per year), this is high compared to its share of range. However, because the methodology is not sensitive to trend, the average may reflect higher poaching levels in the past. Uzbekistan had a relatively low ratio of seizures (1) to observations (4), and all were categorized as trade. All known poaching cases were categorized by the experts surveyed as retaliatory in nature, with a detection rate of 100%; however, the outcomes of these cases were unknown.

5. RECOMMENDATIONS

Recommendations focus on addressing the leading cause of Snow Leopard poaching (retaliatory killing/Human-Wildlife Conflict) as well as measures to stem illegal trade, and are primarily targeted at the 12 Snow Leopard range countries. They are aligned with existing recommendations and planned actions, including CITES recommendations, CoP17 Decisions and consultant's reports around implementation of Resolution Conf. 12.5 (CITES 2015, 2016; Nowell and Pervushina, 2014); the Global Snow Leopard and Ecosystem Protection Program (GSLEP, 2013, 2015, n.d.); the SLN's Snow Leopard Survival Strategy (SLN, 2014); and WWF's Snow Leopard Species Action Plan (WWF, 2015 and Sharma, 2016). There was also an informal discussion about recommendations to address poaching and illegal trade at the Second China Snow Leopard Forum, held in Urumqi, Xinjiang province 24-26 August 2016 (B. Weckworth, Panthera, *pers. comm.*).

Recommendations are grouped according to four primary actors in Snow Leopard conservation: 1) governments of Snow Leopard range countries; 2) communities living in Snow Leopard range; 3) conservation organizations and Snow Leopard experts; and 4) donor governments and agencies.

5.1. Recommendations to governments of Snow Leopard range countries

5.1.1. Support efforts to mitigate retaliatory killing of Snow Leopards

The results of this report show that retaliatory killing/Human Wildlife Conflict is the leading cause of Snow Leopard poaching, which feeds into illegal trade. It is important for governments to support and expand the approaches developed by the Snow Leopard conservation community to address this issue. Mishra *et al.* (2016) propose a three-pronged strategy: 1) reduce livestock losses (e.g., through the construction of predator-proof corrals [Mohammed *et al.,* 2016; Paltsyn *et al.*, 2016] and promotion of improved herding practices [Nawaz *et al.,* 2016a]); 2) offset livestock losses (e.g., through community livestock insurance [Kunkel *et al.,* 2016] and government compensation programs [e.g., Chen *et al.,* 2016], and 3) improve the social carrying capacity for Snow Leopards (e.g., through education [Hillard *et al.,* 2016] as well supporting conservation-linked initiatives to strengthen local livelihoods [Agvaantseren *et al.,* 2016; Namgail *et al.,* 2016]). Governments should also create trained HWC rapid response teams, and protect the Snow Leopard's wild ungulate prey base (Lovari and Mishra, 2016), through both enhanced anti-poaching as well as trophy hunting linked to community benefits (Nawaz *et al.*, 2016b; Reading and Amgalanbaatar, 2016; Michel and Rosen, 2016).

5.1.2. Address legislative shortcomings

A full analysis of range country legislation was beyond the scope of this report, but national and provincial laws, as the basis for enforcement, should clearly assign administrative responsibility for illegal taking, storage, transportation, collection, ownership, acquisition, and the sale or consignment of Snow Leopards and their products, parts, or derivatives (as has recently been accomplished in Russia). Legislation in Pakistan's Gilgit-Baltistan province should be amended to remove the exemption allowing the killing or capture of Snow Leopards in defense of human life and property. Mongolia should amend its legislation as envisioned in its National Snow Leopard and Ecosystem Program (NSLEP). Other range country governments are encouraged to adopt China's "Zero Tolerance" approach to online advertising for protected species products, working closely with major e-commerce trading site companies and nongovernmental organizations. China's ban on auctions (without permission) of pre-Convention/pre-national trade ban items derived from protected species (SFA, 2012) is also recommended as a best enforcement practice. Kazakhstan and Russia need to ensure that their legal protections for Snow Leopards are harmonized under the Eurasian Customs Union to ensure that illegal trade cannot be facilitated by open borders.

5.1.3. Capacity building for law enforcement agencies

This report identifies the following countries as priorities for increasing law enforcement capacity against illegal Snow Leopard trade (based on seizures, observations and poaching estimates): Afghanistan, China, India, Mongolia, Nepal, Pakistan, Russia and Tajikistan. Afghanistan is particularly important as there is a clear need to increase capacity across multiple agencies. The Wildlife Conservation Society has developed a mobile app to aid Customs identification (WCS, 2015) and a set of training modules for relevant government agencies in Afghanistan (P. Zahler *in litt.,* 2016); these now need to be implemented and should be funded as a matter of priority. In all range countries there is the need for greater information sharing between provincial and national agencies responsible for enforcing wildlife laws and other branches of government, including Customs, police, and the judiciary. Multi-agency teams should be incentivized for performance and anti-corruption, and be provided with the latest technical tools (SMART, Zero Poaching). Mobile response teams can respond quickly to remote enforcement needs identified by informants.

5.1.4. Increase transboundary law enforcement cooperation

Most seizures have taken place in China, showing that not only is that country most likely the major area of illegal trade, but that it is also being addressed seriously through enforcement (although this could be improved through much greater adoption of community-based anti-poaching programs). China shares borders with every other Snow Leopard range country and has been identified as a primary destination for poached Snow Leopards, China should increase its cooperation with neighboring governments to share intelligence and coordinate enforcement efforts.

Illegal trade in Snow Leopards, outside China, is largely international, with poached Snow Leopards being moved across borders. More support should be given to the newly created Central Asian Snow Leopard and Wildlife Enforcement Network (SLAWEN) (GSLEP, 2015), as well as the operationalization of the South Asia Wildlife Enforcement Network (SAWEN), to focus the attention of all range countries on illegal Snow Leopard trade, and increase the professional capacity of participating governments to conduct intelligence-led anti-poaching and trade seizures (Beale and Botezatu, 2016). Regular trans-boundary meetings between environment enforcement, Customs and border officials are essential.

5.2. Recommendations for communities in Snow Leopard range

5.2.1. Threat assessments

Village interviews and key informant surveys are part of the GSLEP Snow Leopard Landscape management process (GSLEP n.d.), and it is recommended that collection of information on Snow Leopard poaching and illegal trade be part of the threats assessment for these (and other) areas. Interviews could be conducted by trained leaders of the involved communities, as has been the successful practice of WWF in Russia and western Mongolia from 2000-2013 (M. Paltsyn, *pers. comm.*, 2016). Interviews can be conducted anonymously and, as circumstances dictate, in the local language.

5.2.2. Community-based conservation management

Given the difficulty of protecting Snow Leopards in remote montane habitat, government authorities should devolve management responsibility to reliable local organizations and institutions whenever possible. Community benefits from wildlife conservation are key to increasing conservation benefits to Snow Leopards. Community-based conservation programs are probably the single most important approach to reducing retaliatory killing, poaching and trafficking, and should be considered a high priority for funding support across Snow Leopard range. The primary needs are for funding, training and equipment. Such organizations need to be carefully designed to foster self-reliance and sustainability, to provide or generate economic incentives to protect Snow Leopards, and deter an understandable reluctance to self-police. One option is the practice of "soft enforcement," (Wingard and Zahler, 2006), with alternative remedial actions for transgressions (such as the signing of no-hunting and informant contracts in exchange for benefits, or the fining of a livestock animal instead of financial penalties), as well as the option to summon government authorities when outsiders are involved or the transgression is serious or repeated. The rapid and regular removal of snares is just one example of the benefits of this approach, and could be incentivized with "snare swaps" where snares can be exchanged for useful household items (WWF Mongolia, in Sharma, 2016) or for camera traps (as in Russia: M. Paltsyn *pers. comm.,* 2016). Community organizations can take two main forms:

Community governance organizations: Community-based conservation organizations are being developed to various degrees in almost all Snow Leopard range countries, and many include ranger patrols and intelligence collection on poaching and illegal trade (Zahler and Paley, 2016). Traditional hunters can be some of the most effective members of anti-poaching teams operated by these organizations in cooperation with government authorities. Employment as rangers allows traditional hunters to use their considerable skills in a way that is directly connected with conservation, and their integrity can be verified through Snow Leopard population monitoring. While such programs have been started in many range countries (including Afghanistan, India, the Kyrgyz Republic, Mongolia, Nepal, Russia, Pakistan and Tajikistan), they often struggle for funding support and need to be expanded in scale.

Religious institutions: Shen *et al.* (2012), Li *et al.* (2014) and Liu *et al.* (2016) discuss the important role Buddhist monasteries play in wildlife conservation in general and for Snow Leopards in particular (about 80% of Snow Leopard range coincides with areas where Buddhism is practiced). With appropriate training and recognition, monasteries could not only deter poaching and trade through traditional practices, but play a more active role in law enforcement by alerting authorities to the presence of outsiders and leading soft enforcement remedial actions. This is particularly recommended for the Tibetan Plateau, where pilot programs have been started (Liu *et al.,* 2016), and there is little expert presence (Figure 2) but numerous monasteries.

This option has been less explored in other areas of Snow Leopard range, but traditional indigenous religious elements have been incorporated into community management organizations in northern

Pakistan (Mock, 2016), conservation messages have been delivered in religious sermons (WWF Pakistan in Sharma, 2016) and the Snow Leopard Conservancy has developed an alliance of Central Asian Snow Leopard cultural practitioners (Colorado and Ryskulova, 2016).

5.3. Recommendations to conservation organizations and Snow Leopard experts

5.3.1. Snow Leopard crime database

TRAFFIC should partner with SLN to continue to build on the database created for this report. Many experts have the opportunity to observe or collect reports on the poaching and trade of Snow Leopards, but the academic publishing process is not an ideal way to capture this information. A suitable platform should be created for experts to easily input their observations from the field. This could be designed in the form of a simple mobile app (using a common platform such as Viber, WeChat and the like), which would allow rapid uploading of Snow Leopard poaching reports and spatial information. This would aid both monitoring and analysis, as well as serve as an important means of rapid communication with law enforcement authorities, preferably through a trained database focal point to liaise through the GSLEP Secretariat.

5.3.2. DNA and photographic databases

A DNA database for key species is being explored on a regional level for Southeast Asia, and India's national photographic Tiger database has already identified the origin of several Tigers seized in Nepal (Govt. of India, 2016). Snow Leopard experts and their community and government partners frequently collect Snow Leopard scat for DNA analysis and camera trap photos. This information is usually kept in separate research groups for publication in the academic and conservation literature. The Snow Leopard Network should explore creation of a centralized database repository for genetic and photographic information as an aid to law enforcement in seizure cases.

5.3.3. Market monitoring Seizures and observations indicate that Snow Leopards are sometimes seized or sold with other high mountain wildlife products in medicinal and fur markets. Markets dealing in such products should be monitored regularly for potential illegal trade in Snow Leopards. Priorities are markets in cities and large towns in Afghanistan, China and Pakistan. In addition, more systematic online surveys should be undertaken in all range countries as social media and web advertisements are becoming the primary advertising mechanism for illegal wildlife trade. Documentation of illegal trade should be provided to relevant government authorities as soon as practicable.

5.3.4. Expert study of demand for Snow Leopards

More information is needed to better understand why consumers are motivated to illegally purchase Snow Leopard products, and how they find them. This may be most effectively approached through government cooperation, allowing interviews of people who have been arrested buying or selling Snow Leopard products.

5.4. International donors

International donors should prioritize funding for Snow Leopard conservation in range countries, and in particular assist in implementation of the GSLEP. Given the importance of China as the largest Snow Leopard range country (and center of illegal trade), the country should take a more active role in the future of GSLEP. As noted by the CITES Standing Committee (CITES, 2015), range country governments require financial and technical assistance to build additional capacity and resources to effectively implement CITES Resolution Conf. 12.5 (Rev. CoP16).

REFERENCES

Acharya, R. (2014). *Snow leopard field survey in remotest Nepal.* Mohamed Bin Zayed Species Conservation Fund blog. http://www.speciesconservation.org/blog/snow-leopard-field-survey-in-remotest-nepal/, accessed 10 February 2016.

Agvaantseren, B., Allen, P., Dashzeveg, U., Mijiddorj, T. and Rullman, J.S. (2016). *Handicrafts: Snow Leopard Enterprises in Mongolia.* Pp 169-172 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Alexander, J.S., Cheng Cheng, Z., Kun, S. and Riordan, P. (2016). *A spotlight on snow leopard conservation in China.* Integrative Zoology. DOI: 10.1111/1749-4877.12204.

Anon. (2012). *Snow leopard injures four before his tragic end.* Pakistan Today, 22 January.

Anon. (2015a). *Ministry of Natural Resources and Environment of the Russian Federation demands an investigation into Pavel Te's involvement in illegal hunting for Snow Leopard.* <http://zapovednik-khakassky.ru/en/news/ohotnik-na-snezhnogo-barsa-popalsya-v-seti-feysbuk-5722.html>, accessed 9 September, 2016.

Anon. (2015b). *Russian citizen suspect of Snow Leopard poaching arrested in Siberia.* Russian Legal Information Agency (RASPI), 11 September.

Anon. (2016a). *Ak-Suu district police arrest 49-year-old Askarbek who shot a Snow Leopard.* Turmush, 18 January (in Russian). https://translate.google.com/translate?sl=ru&tl=en&js=y&prev=_t&hl=en&ie=UTF-8&tbb=1&u=http%3A%2F%2Fwww.turmush.kg%2Fru%2Fnews%3A275570&edit-text=

Anon. (2016b). *Tragedy as three Snow Leopards die in trap set by poachers in Altai mountains.* Siberian Times, 1 June.

Anon. (2016c). *Two held for Snow Leopard poaching.* Kathmandu Post, 13 March.

Anon. (2016d). *Gang of animal hide traders busted, Snow Leopard skin seized.* India Today, 5 May.

ARTG. (2016). Jian Bu Qiang Shen Wan. ARTG ID 126978: *Public summary record for approved medicine sponsored by Beijing Tong Ren Tang Australia Pty Ltd*, Australian Therapeutic Goods Administration.

Beale, N. and Botezatu, I. (2016). *Law enforcement in Snow Leopard conservation.* Pp 257-267 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

BBC. (2016). *Hunt for the grey ghost.* BBC Earth http://www.bbc.com/earth/bespoke/story/hunt-for-the-grey-ghost/index.html, accessed 31 July 2016.

Bhatnagar, Y.V., Mathur, V.B., Sathyakumar, S., Ghoshal, A., Sharma, R.K., Bijoor, A., Raghunath, R., Timbadia, R. and Lal, P. (2016). *India.* Pp 457-565 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Blomqvist, L. and Sliwa, A. (2016). *Role of zoos in Snow Leopard conservation: management of captive Snow Leopards in the EAZA region*. Pp 293-300 Pp 543-559 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Braden, K. (2014). *Illegal recreational hunting in Russia: the role of social norms and elite violators.* Eurasian Geography and Economics, 55(5): 457-490.

Buffon, G.-L. (1761). *La panthere, l'once et le leopard.* Pp 151-172 in Buffon, G.-L., Compte de and Daubenton, L.J.M., eds. Histoire Naturelle, Generale et Particuliere avec la Description du Cabinet du Roi, vol. 9. De l'Imprimiere Royale, Paris, France.

Chen, P., Gao, Y., Lee, A.T., Cering, L., Shi, K. and Clark, S.G. (2016). *Human–carnivore coexistence in Qomolangma (Mt. Everest) Nature Reserve, China: Patterns and compensation*. Biological Conservation, 197: 18-26.

CITES (2015). *Asian Big Cats: Report of the Working Group.* SC66 Com 11.

CITES. (2016). *Asian Big Cats: Report of the Standing Committee.* COP17 Doc. 60.1.

Coghlan, M.L., Maker, G., Crighton, E., Haile, J., Murray, D.C., White, N.E., Byard, R.W., Bellgard, M.I., Mullaney, I., Trengove, R. and Allcock, R.J. (2015). *Combined DNA, toxicological and heavy metal analyses provides an auditing toolkit to improve pharmacovigilance of traditional Chinese medicine (TCM).* Scientific reports, 5.

Colorado, A. and Ryskulova, N. (2016). *Shamanism in Central Asian Snow Leopard cultures.* Pp 205-209 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Davletbakov, A., Rosen, T., Anarbaev, M., Kubanychbekov, Z., Jumabai Uulu, K., Samanchina, J. and Sharma, K. (2016). *Kyrgyzstan.* Pp 419-425 Pp 293-300 Pp 543-559 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Deutsche Presse. (2016). *Chinese trial over Snow Leopard deaths.* 20 August, < http://www.news.com.au/world/breaking-news/chinese-trial-over-snow-leopard-deaths/news-story/4bdd6faabb159672c76c3960d4bd4ce6>

Dexel, B. (2002). *The Illegal Trade in Snow Leopards – a Global Perspective.* Naturschutzbund Deutschland (NABU), Berlin, 34 pp.

EIA. (2008). *Skin Deep: The Need for Effective Enforcement to Combat the Asian Big Cat Skin Trade.* Environmental Investigation Agency, 5 pp.

EIA. (2012). *Briefing on Snow Leopards in Illegal Trade: Asia's Forgotten Cats.* Environmental Investigation Agency, 2 pp.

Esipov, A., Bykova, E., Protas, Y. and Aromov, B. (2016). *Uzbekistan.* Pp 439-447 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Farrington, J.D. and Li, J. (2016). *Climate change impacts on Snow Leopard range.* Pp 85-96 in in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Gaski, A.L. and Johnson, K.A. (1994). *Prescription for Extinction: Endangered Species and Patented Oriental Medicines in Trade.* TRAFFIC USA, Washington DC, USA.

Goodrich, J.M. (2010). *Human–tiger conflict: a review and call for comprehensive plans.* Integrative Zoology, 5(4): 300-312.

Govt. of India. (2016). *Asian Big Cats: Proposal of India.* CITES CoP17 Doc. 60.2.

Gratwicke, B., Mills, J., Dutton, A., Gabriel, G., Long, B., Seidensticker, J., Wright, B., You, W. and Zhang, L. (2008). *Attitudes toward consumption and conservation of tigers in China.* PLoS One, 3(7), p.e2544.

GSLEP. (2013). *Global Snow Leopard and Ecosystem Program.* Snow Leopard Working Secretariat, Bishkek, Kyrgyz Republic.

GSLEP. (2015). *Regional Enforcement Strategy to Combat Illegal Wildlife Trade in Central Asia, 2015-2018.* Snow Leopard Working Secretariat, Bishkek, Kyrgyz Republic.

GSLEP. (No date). *General Guidelines for Snow Leopard Landscape Management Planning.* Snow Leopard Working Secretariat, Bishkek, Kyrgyz Republic.

GSLEP. (2016). *The first step: 20 by 2020 – Securing at least 20 healthy populations of Snow Leopards across the cat's range by 2020.* http://www.globalsnowleopard.org/our-work/the-first-step-20-by-2020/, accessed 15 July 2016.

Hearn, K. (2007). *Record cache of Snow Leopard skins seized in China.* National Geographic News, 10 September http://news.nationalgeographic.com/news/2007/09/070910-snow-leopards.html, accessed 13 July 2016.

Hillard, D., Weddle, M., Padmanabhan, S., Ale, S., Khuukhenduu, T. and Almashev, C. (2016). *Environmental education for Snow Leopard conservation.* Pp 245-255 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Hussain, S. (2003). *The status of the snow leopard in Pakistan and its conflict with local farmers.* Oryx, 37(01): 26-33.

Jackson, R., Mallon, D., McCarthy, T., Chundawat, R.A. & Habib, B. 2008. *Panthera uncia.* The IUCN Red List of Threatened Species 2008: e.T22732A9381126. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T22732A9381126.en. Downloaded on 31 July 2016.

Johansson, Ö., McCarthy, T., Samelius, G., Andrén, H., Tumursukh, L. and Mishra, C. (2015). *Snow leopard predation in a livestock dominated landscape in Mongolia.* Biological Conservation, 184: 251-258.

Johnson, M.F. and Wingard, J.R. (2010). *Wildlife trade in Afghanistan.* Wildlife Conservation Society, Kabul.

Khan, B., Ablimit, A., Nawaz, M.A., Ali, R., Khan, M.Z. and Jaffaruddin, R.K. (2014). *Pastoralist experience and tolerance of snow leopard, wolf and lynx predation in Karakoram Pamir Mountains.* J. Bio. Environ. Sci, 5(4): 214-229.

Kitchener, A.C., Driscoll, C.A. and Yamaguchi, N. (2016). *What is a Snow Leopard? Taxonomy, morphology and phylogeny.* Pp 3-12 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Koshkarev, E.P. and Vyrypaev, V. (2000) *The snow leopard after the break-up of the Soviet Union.* Cat News 32:9-11.

Kretser, H.E., Johnson, M.F., Hickey, L.M., Zahler, P. and Bennett, E.L. (2012). *Wildlife trade products available to US military personnel serving abroad.* Biodiversity and conservation, 21(4): 967-980.

Kunkel, K., Hussain, S. and Khatiwada, A. (2016). *A review of lessons, successes, and pitfalls of livestock insurance schemes.* Pp 173-178 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Lewis, M. and Songster, E.E. (2016). *Studying the Snow Leopard: reconceptualizing conservation across the China–India border.* BJHS Themes June: 1-30.

Li, J. and Lu, Z. (2014). *Snow leopard poaching and trade in China 2000–2013.* Biological Conservation, 176: 207-211.

Li, J., Yin, H., Wang, D., Jiagong, Z. and Lu, Z. (2013). *Human-snow leopard conflicts in the Sanjiangyuan Region of the Tibetan Plateau.* Biological Conservation 166: 118-123.

Li, J., Wang, D., Yin, H., Zhaxi, D., Jiagong, Z., Schaller, G.B., Mishra, C., Mccarthy, T.M., Wang, H., Wu, L.A.N. and Xiao, L. (2014). *Role of Tibetan Buddhist monasteries in snow leopard conservation*. Conservation biology, 28(1): pp.87-94.

Li, J., Xiao, L.Y. and Lu, Z. (2016). *Challenges of Snow Leopard conservation in China.* Sci. China Life Sci. doi: 10.1007/s11427-016-5067-9 .

Li, J., Yin, H. and Lu, Z. (2016). *Tibetan Buddhist monastery-based Snow Leopard conservation*. Pp 200-206 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Li, Y.M., Gao, Z.X., Lix, X.H., Wang, S. and Niemela J. (2000). *Illegal wildlife trade in the Himalayan region of China.* Biodiversity & Conservation 9(7): 901-918.

Liu, W. (1994). *On the Tibetan endangered animals leopard class.* Journal of Tibet University 9: 79–81. (In Chinese.)

Liu, Y.L., Weckworth, B., Li, J., Xiao, L.Y., Zhao, X. and Lu, Z. (2016). *China: the Tibetan Plateau, Sanjiangyuan region.* Pp 514-522 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Lovari, S. and Mishra, C. (2016). *Living on the edge: Depletion of wild prey and survival of the Snow Leopard.* Pp 69-76 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Ma, M.R. (2012). *Market prices for the tissues and organs of Snow Leopards in China.* УДК 599.742.7 (516): 119-122.

Maheshwari, A. and von Meibom, S. (2016). *Monitoring illegal trade in Snow Leopards (2003-2012).* Pp77-84 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Mallon, D.P., Harris, R.B.and Wegge, P. (2016). *Snow Leopard prey and diet.* Pp 43-55 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Mallon, D. and McCarthy, T. (2016). *Future prospects for Snow Leopard survival.* Pp 587-595 in in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Manati, A.R. (2009). *The trade in Leopard and Snow Leopard skins in Afghanistan.* TRAFFIC Bulletin 22(2): 57-58.

McCarthy, T. and Mallon, D. (Eds.). (2016). *Snow Leopards.* Elsevier, New York, 612 pp.

McCarthy, T., Mallon, D., Sanderson, E.W., Zahler, P. and Fisher, K. (2016). *What is a Snow Leopard? Biogeography and status overview.* Pp 24-41 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Michel, S. and Rosen, T. (2016). *Hunting of prey species: A review of lessons, successes and pitfalls – experiences from Kyrgyzstan and Tajikistan*. Pp 236-244 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Miller, D.J. and Jackson, R.M. (1992). *Livestock and Snow Leopards: Making room for competing users on the Tibetan Plateau.* Proceedings of the 7th International Snow Leopard Symposium. Xining, Qinghai, China.

Mir, S. (2011). *Wildlife department to probe leopard death.* Pakistan Tribune, 28 February.

Mir, S. (2014). *Wild cats: Snow Leopard cub dies of injuries despite treatment*. Pakistan Tribune, 19 January.

Mishra, C. and Fitzherbert, A. (2004). *War and wildlife: a post-conflict assessment of Afghanistan's Wakhan Corridor*. Oryx, 38(01): 102-105.

Mishra, C., Redpath, S.B. and Suryawanishi, K.R. (2016). *Livestock predation by Snow Leopards: Conflicts and the search for solutions.* Pp 59-68 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Mock, J. (2016). *Snow Leopards in art and legend of the Pamir.* Pp 210-213 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Mohammed, G., Mostafawi, S.N., Dadul, J. and Rosen, T. (2016). *Corral improvements.* Pp 180-183 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Namgail, T., Majumder, B. and Dadul, J. (2016). *Himalayan homestays: Fostering human-Snow Leopard coexistence.* Pp 164-168 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Nawaz, M.A. and Hameed, S. 2015. *Research Update 2008-2014 Snow Leopard Program, Pakistan, draft report prepared for Snow Leopard Red List Assessment Team.* Downloadable from: http://slf.org.pk/publications/scientific-papers/

Nawaz, M.A., Ud Din, J., and Buzdar, H. (2016a). T*he Ecosystem Health Program: A tool to promote the coexistence of livestock owners and Snow Leopards.* Pp 188-196 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Nawaz, M.A., Ud Din, J., Shah, S.A. and Khan, A.A. (2016b). *The Trophy Hunting Program: Enhancing Snow Leopard prey populations through community participation.* Pp 220-227 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Nowell, K. (2000). *Far From A Cure: The Tiger Trade Revisited.* TRAFFIC International, Cambridge, UK, 100 pp.

Nowell, K. and Jackson, P. (1996). *Wild Cats: Status Survey and Conservation Action Plan.* IUCN, Gland, Switzerland, 382 pp.

Nowell, K. and Pervushina, N. (2014). *Review of implementation of Resolution Conf. 12.5 (Rev. CoP16) on Conservation and trade in tigers and other Appendix-I Asian big cats.* IUCN and TRAFFIC report prepared for the CITES Secretariat, 65th meeting of the CITES Standing Committee, Geneva, 7-11 July. SC65 Doc. 38 Annex 1, 70 pp.

Nowell, K. and Xu, L. (2007). *Taming the Tiger Trade: China's Markets for Wild and Captive Tiger Products Since its 1993 Domestic Trade Ban.* TRAFFIC East Asia, Hong Kong, 64 pp.

Nizami, A.H. (2012). *Endangered species: Snow Leopard shot dead by villagers in Kashmir.* The Express Tributine Pakistan, 16 April.

Paltsyn, M., Poyarkov, A., Spitsyn, S., Kuksin, A., Istomov, S., Gibbs, J.P., Jackson, R.M., Castner, J., Kozlova, S., Karnaukhov, A., Malkyh, S., Korablev, M., Zvychainaya, E. and Rozhnov, V. (2016). *Russia.* Pp 501-512 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Paltsyn, M.Y., Spitsyn, S.V., Kuksin, A.N. and Istomov, S.V. (2012). *Snow Leopard Conservation in Russia.* WWF Russia, Krasnoyarsk, 100 pp.

Riddell, M. (2004). *Newcastle University's Snow Leopard Research Expedition Report: Kazakhstan 2004*, 88 pp.

Riordan, P and Shi, K. (2016). *China: Current state of snow leopard conservation in China.* Pp 523-531 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Roddis, H. (2011). *Hunting permits issued by Mongolian government for endangered Snow Leopards rescinded following public backlash.* Earth Times, 24 March.

Rosen, T. (2014). *Conservation between hope and despair.* National Geographic Cat Watch blog http://voices.nationalgeographic.com/2014/12/03/conservation-between-hope-and-despair/

Rosen, T., Hussain, S., Mohammad, G., Jackson, R., Janecka, J. E., and Michel, S. (2012). *Reconciling sustainable development of mountain communities with large carnivore conservation: Lessons from Pakistan.* Mountain Research and Development 32(3): 286-293.

Saidov, A., Karimov, K., Amirov, Z. and Rosen, T. (2016). *Tajikistan.* Pp 433-437 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Sanderson, E.W., Mallon, D., McCarthy, T., Zahler, P. and Fisher, K. (2016). *Global strategies for Snow Leopard conservation: a synthesis.* Pp 543-559 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

Schreber, J.C.D. (1775). D*ie Saugethiere in Abbildungennach der Natur mit Beschreibungen*, vol 2(14). Wolfgang Walther, Erlangen, Germany.

SFA. (2012). *Notice on illegal auction of Rhinoceros horn, Tiger bone, and Elephant ivory.* State Forest Administration Notification, Beijing, China (in Chinese). http://www.forestry.gov.cn/portal/zrbh/s/1492/content-521905.html, accessed 9 September, 2016.

Sharma, K., Wright, B., Joseph, T. and Desai, N. (2014). *Tiger poaching and trafficking in India: Estimating rates of occurrence and detection over four decades.* Biological Conservation, 179: 33-39.

Sharma, R.K. (2016). *Snow Leopard Species Action Plan Implementation Meeting 23-25 Pokhara, Nepal: Notes and Outcomes.* WWF unpublished report, 20 pp.

Shen, X., Lu, Z., Li, S. and Chen, N. (2012). *Tibetan sacred sites: understanding the traditional management system and its role in modern conservation.* Ecology and Society, 17(2): 13.

Singh, B.T. (2016). *Illegal hunting rife in Bajhang during Yarsa collection time*. Kathmandu Post, 15 May.

SLC. (2013). *Russia.* Snow Leopard Conservancy website http://snowleopardconservancy.org/russia-2/, accessed 27 July 2016.

SLF. (2013). *Saving Snow Leopards in East Kazakhstan.* Project report of the Snow Leopard Fund 2013, 12 pp.

SLN. (2003). *Snow Leopard Survival Strategy,* McCarthy, T. and Chapron, G. (Eds). Snow Leopard Trust, Seattle, USA.

SLN. (2014). *Snow Leopard Survival Strategy, revised version, 2014*. 1. Snow Leopard Network, Seattle, USA.

SLT. (2016). *Statement of concern on Snow Leopard population estimates.* Snow Leopard Trust blog, 25 July < http://www.snowleopard.org/statement-of-concern.html>, accessed 31 July 2016.

Smith, B. (2016). *Snow Leopard DNA found in Chinese medicine sold in Australia.* Sydney Morning Herald, 4 February. http://www.smh.com.au/technology/sci-tech/snow-leopard-dna-found-in-chinese-medicine-sold-in-australia-20160204-gmlfi3.html

Spearing, A. (2002). *The Snow Leopard in Zanskar, Jammu and Kashmir, NW India.* Proceedings of the Snow Leopard Survival Strategy Summit, May 2002, Seattle, USA. International Snow Leopard Trust, Seattle, USA.

Stoner, S. (2014). *Tigers: exploring the threat from illegal online trade.* TRAFFIC Bulletin 26(1): 26.

Stoner, S., and Pervushina, N. (2013). *Reduced to Skin and Bones Revisited: An Updated Analysis of Tiger Seizures from 12 Tiger Range Countries (2000-2012).* TRAFFIC, Cambridge, UK.

Stoner, S. and Krishnasamy, K. (2016). *Reduced to Skin and Bones Re-examined: An analysis of Tiger seizures from 13 range countries from 2000-2015.* Briefing Paper. TRAFFIC, Southeast Asia office, Malaysia.

Theile, S. (2002). *Fading Footprints: The Killing and Trade of Snow Leopards.* TRAFFIC, Cambridge, UK, 73 pp.

Tolson, M. (2016). *Mining licenses, Snow Leopards, and a mysterious death.* The Diplomat, 22 February. < http://thediplomat.com/2016/02/mining-licenses-snow-leopards-and-a-mysterious-death/>, accessed 10 September 2016.

Tuyatsatsral, Ts., Ganbold, B., Ganbat, O., Enkhee, Ch. and Nyambat, N. (2009). *"Buy Sheep" Program and Environmental Planning of Herder Communities Assessment Report.* WWF Mongolia, 77 pp.

Wangchuk, T.R. and Tharchen, L. (2016). *Bhutan.* Pp 449-456 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

WCS. (2015). *Wildlife Alert Mobile App*. Wildlife Conservation Society, Kabul, Afghanistan.

WCS. (2016a). *The Snow Leopard – world's most mysterious big cat – may be more common than previously thought.* Wildlife Conservation Society press release, 5 July. <http://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/9083/The-Snow-Leopard-Worlds-Most-Mysterious-Big-Cat-May-Be-More-Common-than-Thought.aspx> accessed 31 July 2016.

WCS. (2016b). *Wildlife trade in Afghanistan.* Wildlife Conservation Society http://wcsafghanistan.org/Additional-info/Wildlife-Trade.aspx accessed 25 July, 2016.

Wen, B. (2002). *Illegal trade of Snow Leopards in China: an overview.* In: Proceedings of the Snow Leopard Survival Strategy Summit, May 2002, Seattle, USA. International Snow Leopard Trust, Seattle, USA.

Wingard, J.R. and Zahler, P. (2006). *Silent Steppe: The Illegal Wildlife Trade Crisis in Mongolia.* Mongolia Discussion Papers, East Asia and Pacific Environment and Social Development Department, World Bank,Washington D.C., 147 pp.

WWF. (2015). *Snow Leopard Species Action Plan 2015-2020.* Gland, Switzerland.

WWF. (2016). *Don't count on higher Snow Leopard numbers – it's the threats to their survival that are increasing.* World Wide Fund for Nature press release, 4 August. < http://wwf.panda.org/wwf_news/?275031/Dont-count-on-higher-snow-leopard-numbers-its-the-threats-that-are-increasing>

WWF MN. (2014). *Offenders, who illegally hunted Snow Leopard, have been arrested.* WWF Mongolia News, 5 May.

WWF MN. (2016). *WWF Mongolia celebrates the second Zero Poaching Year of the Snow Leopard.* Press release, 18 August.

WWF NP. (2011). *Two arrested with Snow Leopard pelts.* WWF Nepal News, 31 May.

WWF/TRAFFIC (2005). *Proceedings of the Workshop on Curbing Market Demand for Asian Big Cat (ABC) Skins.* Lhasa, 3-6 August 2005, 85 pp.

Yadav, P. (2016). '*Destroy seized wildlife items.*' Kathmandu Post, January 28.

Zahler, P. and Paley, R. (2016). *Building community governance structures and institutions for Snow Leopard conservation.* Pp 151-162 in McCarthy, T.M. and Mallon, D.P. (Eds.), Snow Leopards. Elsevier, New York.

ANNEXES

Annex 1. Long term trends in Snow Leopard crime: comparison of two TRAFFIC reports (2003 and 2016)

Some data from the main report are presented again here for comparison, but figures and tables in the main report are also referred back to. New tables and figures included in this annex are numbered A1.1, A1.2, etc.

Seizures and observations from the two seven-year periods presented in the report (2003-2009 and 2010-June 2016) are compared to two previous periods of equivalent length (1989-1995 and 1996-2002), for a total of four quarters. For the first two quarters, the main sources are reports on illegal trade in Snow Leopards by TRAFFIC (Theile, 2003) and Naturschutzbund Deutschland (NABU) (Dexel, 2002), both of which compiled cases from numerous sources as well as undertaking primary research. Two other key references for this time period were Li *et al.* (2000) and Wen (2000), both focused on illegal trade in China.

Some questions in the 2016 expert survey presented in the report were similar to those asked in a TRAFFIC survey conducted at the Snow Leopard Survival Summit, held in Seattle, Washington in 2002 (available from: www.traffic.org/storage/snow-leopard-annex4-questionnaire.pdf). Not all results from the survey were included in the first TRAFFIC Snow Leopard report; the 2002 survey responses were provided by S. von Meibom (*in litt.*, 2016).

A1.1. Snow Leopard crime database

Including results from 1989-2002, the Snow Leopard crime database totals a minimum number of nearly 1,800 (1,789) Snow Leopards poached, captured or traded since 1989 (Figure A1.1). The number of Snow Leopards detected from 1989-2002 (1,083) decreased by 35% in 2003-2016 (710). There were nearly three times as many observations (587) (mostly poaching estimates of low reliability) in 1989-2002 compared to 2003-2016 (204). The minimum number of Snow Leopards seized was highest in 1989-1995 (212), but rose in the three subsequent quarters (from 89 to 133). Only 11 Snow Leopards were seized or observed in trade in non-range countries from 1989-2002 (Table A1.1), very similar to the 12 reported in Table 2.

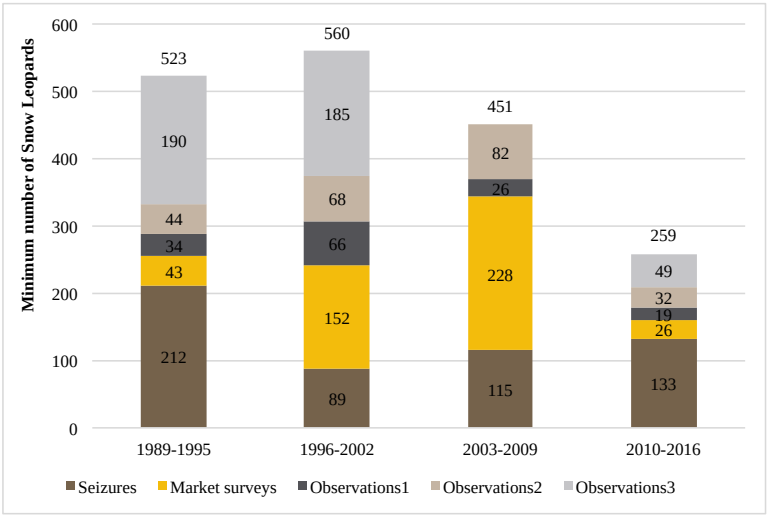

Figure A1.1. Minimum number of Snow Leopards detected in seizures, observations and market surveys over four quarters from 1989 to June 2016. *See Figure 3 for observation reliability score (1-3)*

Country	Seizures and observations
France	Seized: one live Snow Leopard, smuggled by car overland from Kyrgyzstan (Dexel, 2002)
Germany	Observed: sale of skin and skull online (Dexel, 2002)
Indonesia	Observed: a skin rug advertised for sale in the Jakarta Post newspaper (Theile, 2003)
Poland	Observed: 3 pelts for public sale by Russian citizens (Dexel, 2002)
United Arab Emirates	Seized: 2002 - 1 pelt (CITES Trade Database)
United States	Seized: 1995 - 4 pelts (originating from Pakistan) (Dexel, 2002)

Table A1.1. Snow Leopard seizures and observations outside range countries (1989-1995)

The number of Snow Leopards in poaching observations was nearly three times higher in the first two quarters (331 compared to 120) (Figure A1.2), but most of the data from 1989-2002 are expert estimates of low reliability (Observations2). There were nearly four times as many Snow Leopards observed in trade in 1989-2002 (235 compared to 80 in 2003-2016). The number of smuggling seizures was largest in the first quarter (69), mostly made in Mongolia (59), with 10 in Tajikistan.

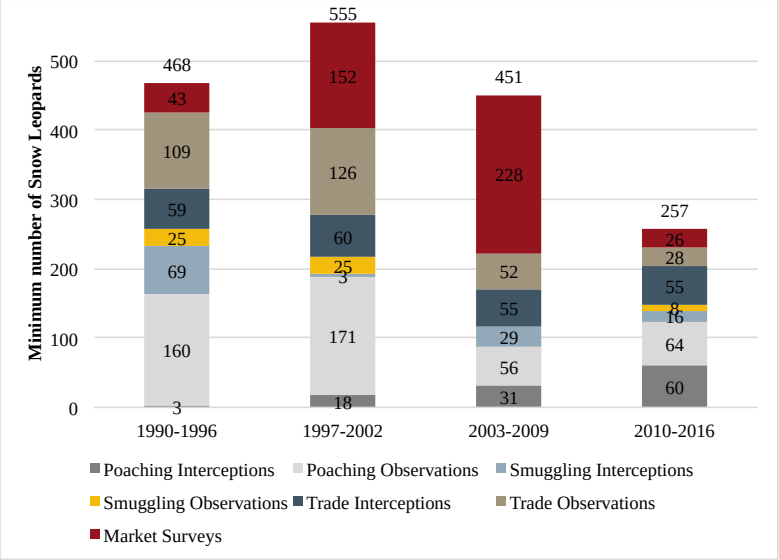

Figure A1.2. Minimum number of Snow Leopards detected at three different stages of the trade chain (poaching, smuggling and trade) over four quarterly periods, 1989 - June 2016

Figure A1.3 compares country totals for seizures and observations (including market surveys). Snow Leopard crime appears to have fallen since 2002 in most countries, most in India, the Kyrgyz Republic, and Mongolia.

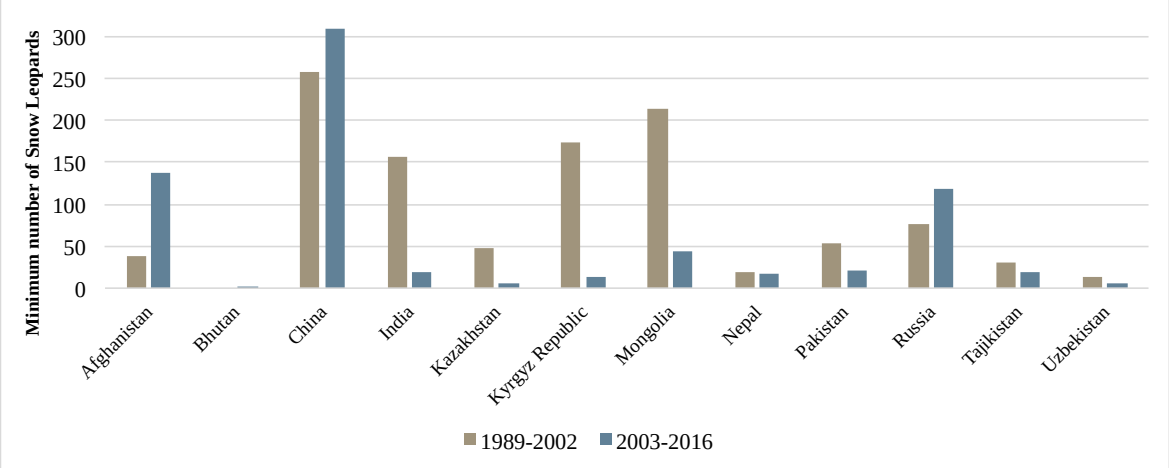

Figure A1.3. Minimum number of Snow Leopards in seizures and observations by country, 1989 - 2002 and 2002 - June 2016

Table A1.2 shows the number of cases and Snow Leopards in large seizures. The third quarter had the largest numbers.

Country	1990 - 1996	1997 - 2002	2003 - 2009	2010 - 2016	Total number of snow leopards
China	1	2	3	5	122
Russia			1		17
Mongolia			1		4
India		1			4
Total number of snow leopards	40	27	56	24	147

Table A1.2. Countries making large seizures of more than three Snow Leopards in trade: number of seizure cases, and minimum number of Snow Leopards represented in the seizures (1989-June 2016)

Skins were the most common product in trade in from 1989-2002 (85%), as in 2003-2016 (78%). No bones were seized or observed in the first quarter.

Our finding of lower Snow Leopard crime in 2003-2016 (710 Snow Leopards) than in 1989-2002 (1,083) is in contrast to Maheshwari and von Meibom (2016), who reported almost twice as many snow leopards in illegal trade in recent years (481: 2003-2012) than from 1993-2002 (260). The difference is attributable in part to our longer time period of analysis, our collection of additional records, and our inclusion of poaching interceptions and observations, for reasons discussed in the Introduction. We also included additional earlier interception records (e.g., 49 snow leopard pelts confiscated in Mongolia "before 1992" (Theile, 2003) and 72 snow leopard skins and carcasses confiscated between 1989-1998 in China's Qinghai and Xinjiang provinces: Li *et al.,* 2000).

That snow leopard killing, capture and trade may have taken place at higher levels in the past is suggested by a number of reports. In China's Tibet Autonomous Region (TAR), snow leopards and other predators were hunted for cash bounties paid by many district government authorities for skins up until the passage of China's Wildlife Protection Law in 1989. Pelt tallies probably under-represent the level of hunting as prices paid were low; one official estimated 2/3 of the pelts were sold privately rather than to the government (Miller and Jackson, 1992). One expert estimated that 200-300 snow leopards were hunted per year in the TAR (Liu, 1994). Alexander et al. (2016) collected other published estimates of snow leopard offtake in China: 20-30 skins per year for a similar bounty program in Sichuan province from the 1960s-1980s; 73 captured live in Qinghai province for zoos between 1968-1984; and an average of 30 skins per year traded annually in one part (Yili Kazakh Automomous Prefecture) of Xinjiang province between 1955-1965, with 135 in 1965. Dexel (2002) collected published records of offtake from Russia and Central Asia: from the 1940s-1960s, dozens of live animals per year were shipped to zoos from the Kyrgyz Republic and Tajikistan. Koshkarev and Vyrypaev (2000) report hundreds of skins seen at festivals in the Kyrgyz Republic in the early 1990s. In South Asia, in parts of Pakistan's Gilgit-Baltistan province, villagers estimated that 205 snow leopards had been killed in the 20 years before the start of a conservation program, Project Snow Leopard, in 1998 (Rosen *et al.,* 2012). Rodenburg (1977) estimated that 50-80 skins were sold in Afghan markets per year in the 1970s.

A1.2. Expert surveys

Nearly twice the number of experts, a larger sample size, participated in the 2016 survey (Table A1.3), with some reporting for more than one country. Only Afghanistan was missing from the 2002 survey.

Country	2002 Respondents	2016 Respondents
Afghanistan	0	2
Bhutan	1	2
China	3	9
India	1	8
Kazakhstan	2	1
Kyrgyz Republic	2	2
Mongolia	2	4
Nepal	4	5
Pakistan	4	6
Russia	1	2
Tajikistan	1	3
Uzbekistan	2	2
Total	23	42

Table A1.3. Number of experts per country for the two TRAFFIC surveys
One expert in 2016 reported for four countries, for a total of 46 country responses

The 2002 survey was not structured in a way to permit a poaching estimate, but it did ask if Snow Leopard killing had changed since the early 1990s, while the 2016 survey did not ask about trend. Overall, the results were evenly split concerning decrease (33%) vs. increase (28%); 24% of respondents did not know, and 13% indicated no change. Respondents within some countries did not agree on trend (China, Nepal, and Pakistan) (Figure A1.4), possibly reflecting knowledge of different areas (in addition to inherent uncertainty). Respondents from Kazakhstan and the Kyrgyz Republic indicated an increase, whereas the respondent from Russia indicated a decrease, with no change reported from Tajikistan and Uzbekistan.

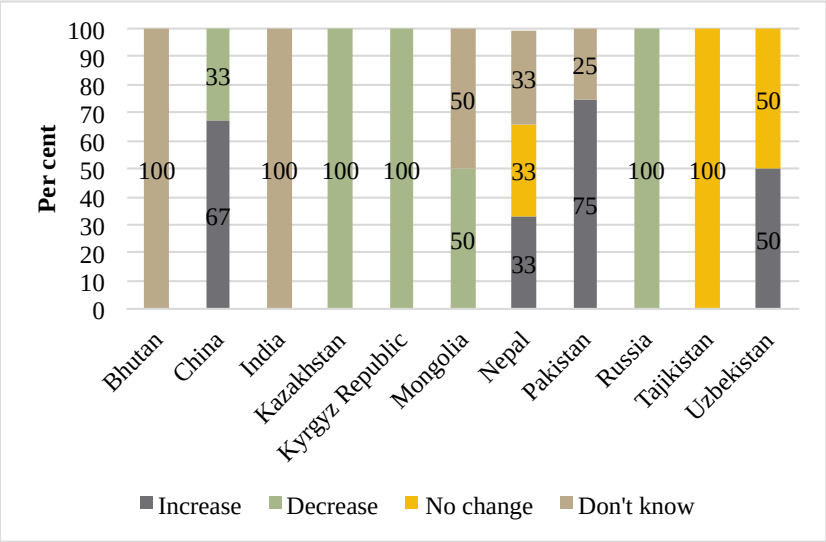

Figure A1.4. Frequency of average country responses on trends in Snow Leopard killing since the early 1990s (2002 survey)

Both the 2002 and 2016 surveys asked about the top reasons for killing Snow Leopards, in slightly different ways. In the 2002 survey, experts were asked to rank the importance of six reasons for killing Snow Leopards in their country. For this analysis these were combined into three to match the 2016 survey: Retaliatory/Human-wildlife conflict (HWC), Targeted for Trade and Non-targeted/"Accidental". In the 2016 survey, respondents were asked to estimate to proportion by percentage the cases they knew of among each of these three reasons, and Unknown/Other was also an option. The 2002 point rankings were converted into percentages of total responses, and the results of the two surveys are compared in Figure A1.5. In both surveys, retaliatory killing was given

as the primary reason for killing Snow Leopards, but the frequency was higher in 2016 (55%) than in 2002 (46%). Killing for trade was the second highest reason in both surveys, but the frequency was lower in 2016 (21%) compared to 2002 (29%).

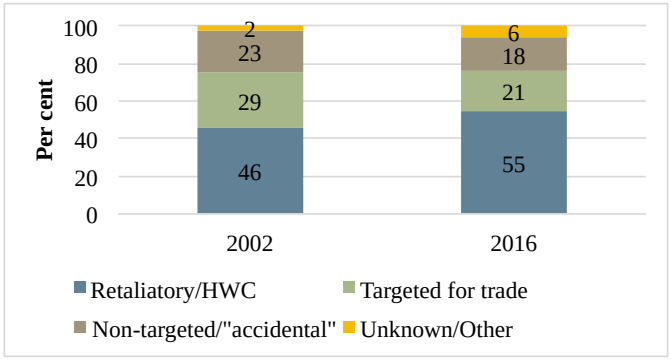

Figure A1.5. Average percentage frequency occurrence of four reasons for killing Snow Leopards: Comparison of two survey results (2002 and 2016)
Retaliatory/HWC: Snow Leopard killed because of or to prevent livestock depredation. Targeted for trade: Snow Leopard killed to sell it. Non-targeted/"accidental": Snow Leopard was not deliberately targeted, but captured by an indiscriminate method (such as snaring) or killed opportunistically when encountered. Unknown: Reason for killing the Snow Leopard is unknown to expert for these cases.

Figure A1.6 compares the two survey results by country, averaging all responses per country. Retaliatory killing was reported as more common in nearly every country in 2016, and most countries also reported lower frequencies of killing for trade in 2016.

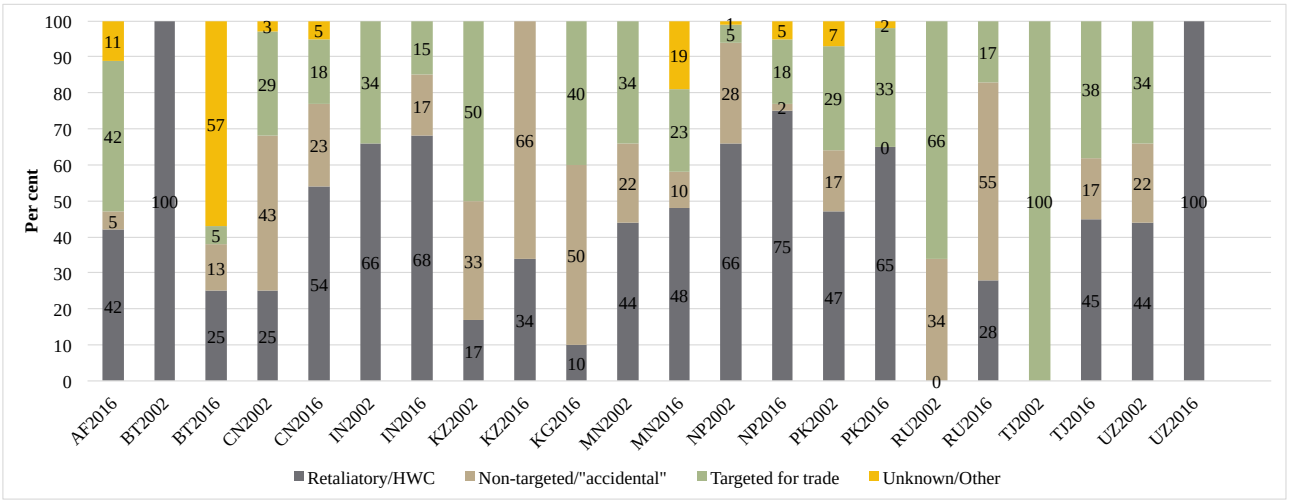

Figure A1.6. Average percentage frequency occurrence of four reasons for killing Snow Leopards by country: comparison of two survey results (2002 and 2016)
Country abbreviations: AF – Afghanistan (no data for 2002), BT – Bhutan, CN – China, IN – India, KZ – Kazakhstan, KG – Kyrgyz Republic, MN – Mongolia, NP – Nepal, PK – Pakistan, RU – Russia, TJ – Tajikistan, UZ – Uzbekistan

Both surveys used the same multiple choice method to collect information on how Snow Leopards are killed or captured, asking experts to rank them in order of most to least common, although the 2016 survey offered more choices. For the 2002 survey, trapping was ranked most common, followed closely by guns, with poisoning noted only in India and Pakistan as common. Notable differences between country responses in the two surveys include that trapping was ranked most common in Nepal in 2002, and least common in 2016. Poisoning was ranked as the most common reason in Pakistan in 2002, and the second most common (after shooting) in 2016. In 2002,

Uzbekistan respondents indicated that trapping was more common than shooting; no responses were received in 2016.

Both surveys explored the potential linkage between retaliatory killing and trade by asking about the outcome when a Snow Leopard is killed or captured. This was posed as a general "what happens after a Snow Leopard is killed" question in 2002, with a choice between selling it or hiding it. In 2002, 72% of respondents chose the "sell" option and 28% the "hide". Figure A1.7 shows the reported outcomes by country; the skin was reported as the most commonly taken after a Snow Leopard was killed. Differences among countries include that taking of the bones was only very prominent in China, though also noted as rare in Kazakhstan and Pakistan. Three countries where retaliatory killing/HWC was given as the most common reason for killing Snow Leopards in 2002 — India, Nepal and Pakistan — also indicated that the most common outcome of a Snow Leopard killing was to dispose of the carcass without attempting to sell. Other parts reported taken included meat (Mongolia) and the skull, used for cultural and religious practices among some people practicing Tibetan Buddhism (India and Nepal).

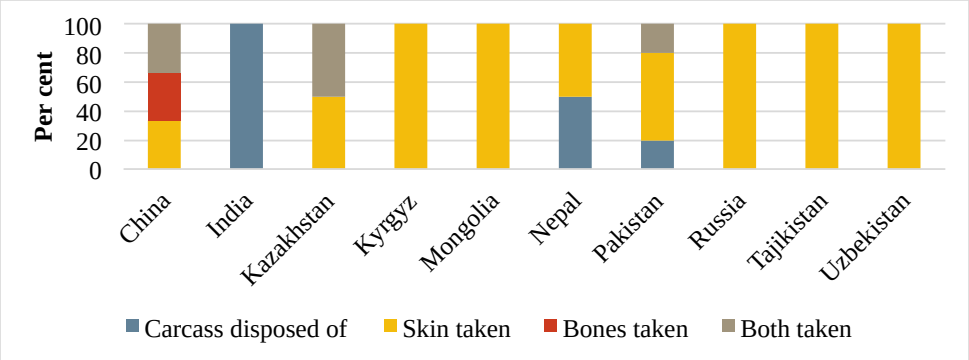

Figure A1.7. Hiding vs. selling 2002: likely outcome (average percentage frequency) of Snow Leopard killings by country

The 2002 survey asked if there was any public trade in Snow Leopard parts, and only two out of 22 respondents, both from Mongolia, indicated that Snow Leopards trade was not conducted secretly. In other words, all respondents indicated the presence of illegal trade. They were also asked if the trade was structured and well-organized or not – 41% didn't know, and those that had an opinion were evenly split as to whether it was organized or random.

As in 2016, most respondents in 2002 also reported that Snow Leopard parts were destined for markets outside the country (Figure A1.8). Local use was also indicated in a few countries, notably Kazakhstan and Russia. Russians (the "new" Russians, or Russian tourists) were indicated as the primary buyers/destination by respondents from the Central Asian republics. While China was also frequently reported as a destination, it is notable that Chinese respondents in 2002 did not consider there to be any local use (a situation that has changed considerably, as shown by the 2016 survey as well as interceptions and observations), and instead identified areas outside the Chinese mainland. In South Asia, India was reported most frequently as the destination, a situation which has also likely changed with the closing of its traditional fur markets in Jammu and Kashmir. Nepal's reported local use included for making high-end traditional coats and coats collars and trim; the use of big cat cloaks for ceremonial occasions has declined greatly since the mid-2000s (Nowell and Xu, 2007).

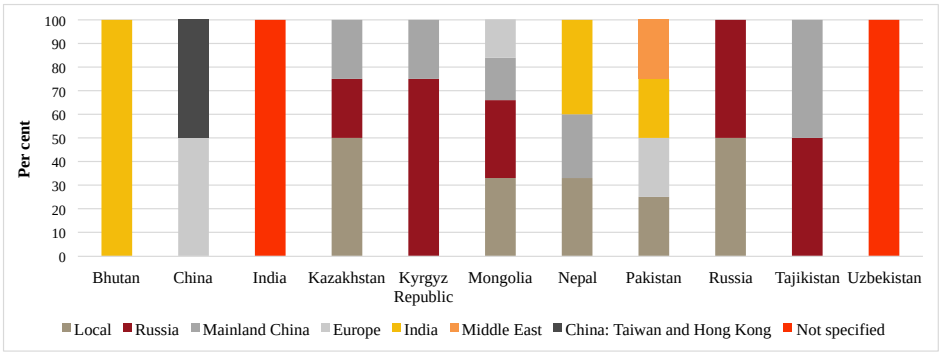

Figure A1.8. Average percentage frequency of local vs. international trade destinations reported by experts in 2002, by country

Both surveys asked about prices for Snow Leopards and their parts. In 2002 (Table A1.4), very high prices were reported for skins from the Central Asian republics, and may represent the perceived value at the presumed end market in Russia. It is notable that the two countries with the highest reported level of local use in 2002, Kazakhstan and Russia (Figure 1.8), also reported the highest end prices at the local level. Prices for both live animals and bones were reported by two respondents from China; this suggests that there was a substantial market there at that time, even if the end destination was generally perceived as outside the country. Most respondents (2/3) did not know whether prices had increased since the early 1990s, with a quarter saying that they had, and one respondent from Russia saying prices had decreased (despite the high reported values in Table A1.4). Comparing both Tables 1.4 and 11, prices in China, Nepal and Pakistan appear to have increased strongly (although not for bones in China, interestingly).

Country	Local level				End prices			
	Live	Skin	Bones	Others	Live	Skin	Bones	Others
China	124-620	124-372	124-1115, 50-300		434-805	434-805	248-743	
Kazahkstan		100-4000, 100-200				40-50000, 4000	15000	
Kyrgyz Republic					10-22000	800-2000		
Mongolia		200		372 (skin with skull and paws)				
Nepal		30-200						
Pakistan		40-50, 118, 50-100				100-200, 1500		
Russia		200-5000						
Tajikistan						5000		
Uzbekistan		100						

Table A1.4. Local and end-use prices reported in 2002 for Snow Leopard products (USD, not adjusted for inflation)

The results of the 2002 expert survey support findings from the Snow Leopard crime database that illegal trade in Snow Leopards over the past 14 years has decreased since the 1989-2002 period. Although the differences are not large, the frequency of killing for trade decreased from 29% to 21%, and in 2002 most experts (72%) indicated that there would be an attempt to sell a Snow Leopard after it had been killed, compared to 60% in 2016.

Annex 2. Comparison of Snow Leopard and Tiger trade

Illegal Tiger trade is better studied and has been an international priority for a longer period of time. But the dangers Tiger trade poses to other Asian big cats, and the benefits of a unified approach, were recognized by CITES Parties in 2002, when they extended their primary body of recommendations on Tiger trade, initiated in 1994, to the Snow Leopard (Conservation of and trade in tigers and other Appendix-I Asian big cat species: Resolution Conf. 12.5 [Rev. CoP16]).

Snow Leopard trade bears many similarities to Tiger trade. For both, the main forms in trade are skins, bones, whole carcasses and live animals (Figure A2.1), as well as teeth, claws, and meat, all of which command high prices. Retaliatory killing is a major problem for both species (Goodrich, 2010; Mishra *et al.*, 2016). While Tiger trade is more global (many manufactured medicines such as wines and pills have been seized in the US and Europe: Nowell and Pervushina, 2014), most seizures are in range countries, and China appears to be a primary demand center, as for Snow Leopards. Five Snow Leopard range countries are also home to Tigers (Bhutan, China, India, Nepal and Russia), and both species have global cooperative range country fora dedicated to their conservation (the Global Tiger Recovery Program and the GSLEP).

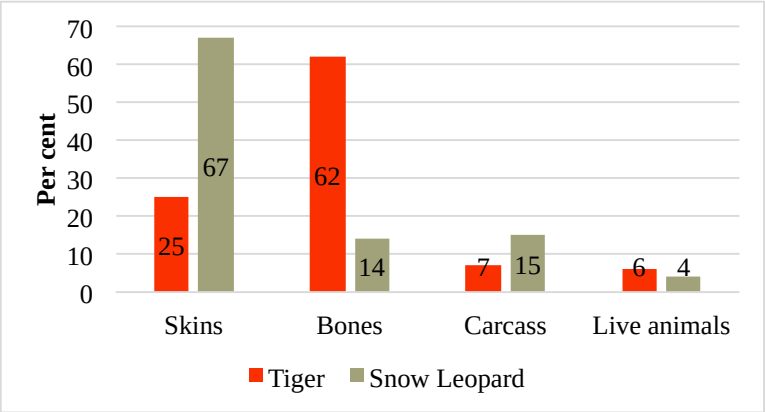

Figure A2.1. Percentage frequency of different trade forms in Tiger and Snow Leopard seizures, 2000-2015
Tiger source: Stoner and Krishnasamy (2016)[5]

Seizures from the Snow Leopard crime database was sorted into four different periods from 2000-2015 to match TRAFFIC's most recent analysis of Tiger seizures made in range countries, and the number of seizure cases and the minimum numbers of the two species represented in the seizure cases are compared in Figure A2.2. It is clear that the numbers for Tigers are much greater than for Snow Leopards. Tiger population size is just as controversial among experts as it is for Snow Leopards, but the larger number of Tiger seizures is probably not reflective of a greater number of Tigers. There is likely more demand for Tigers than Snow Leopards. This is reflected in the fact that Tiger seizures contain more animals on average than Snow Leopard seizures; i.e., 2.6 Tigers per seizure from 2012-2015 (Figure A2.2), compared to 1.5 Snow Leopards. This is also indicated by the much higher numbers of Tiger products seen in Internet surveys (Stoner, 2014). Another factor is that captive Tigers are increasingly present in illegal trade, so that the numbers do not solely reflect animals taken from the wild (CITES, 2016).

[5] Stoner and Krishnasamy (2016) give a detailed breakdown of seized Tiger products by the various descriptors used in the original source material. The Tiger seizures include other products besides those graphed in Figure A2.1, including teeth, claws, wine, meat and genitalia. Only Tiger skins, bones, carcasses and live animals were used to compare with the Snow Leopard database, since no Snow Leopard claws, teeth, meat or other body parts have been seized individually, although they are known from observations to exist in illegal trade. The units for Tigers are not standardized, but because this graph is simply an index of relative product frequency (and not the minimum number of animals these represent, which is shown in Figure A2.2), these various units were combined unaltered. Tiger skins represents whole skins (758) and skin pieces (330), for a total of 1,088 skin units. Carcasses were considered to include the descriptors carcass (3), dead specimen (263), whole specimen (1) and body (23) (total 290). Three different descriptors were used for bone: skeleton (75), bones (947) and kilograms of bone (1,694) (totaling 2,716 bone units).

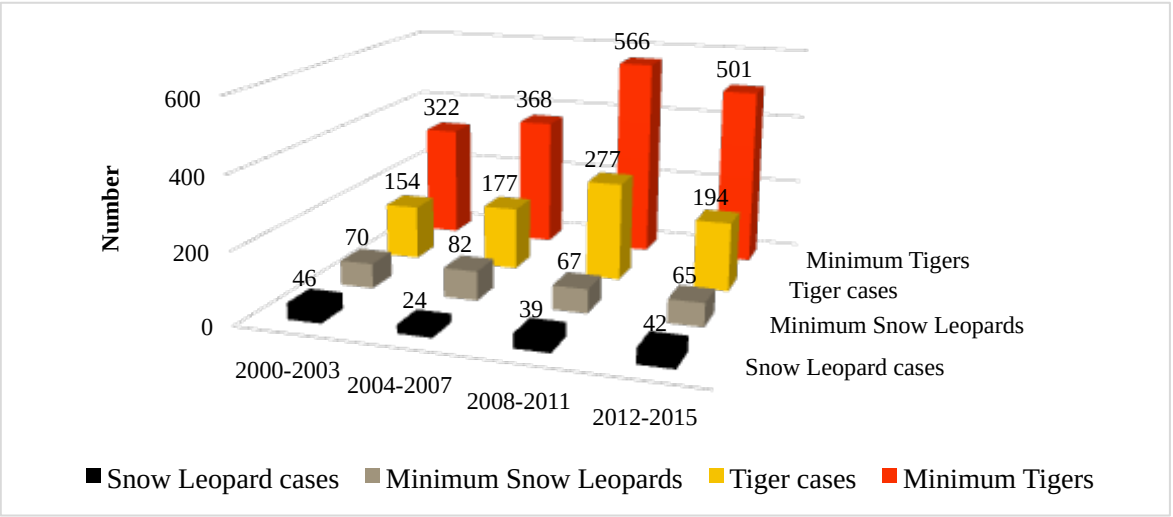

Figure A2.2. Comparison of number of seizure cases and minimum numbers of Snow Leopards and Tigers seized over four quarterly periods, 2000-2015

Tiger source: Stoner and Krishnasamy (2016)

For both Tigers and Snow Leopards, both Stoner and Krishnasamy (2016)and this report used a similar methodology of converting each seizure record into a minimum number of big cats (e.g., two skins are considered two animals, whereas one skin and one set of bones is considered to represent a single animal).

Snow Leopard breeding techniques have improved markedly over the last few decades (Blomqvist and Sliwa, 2016); before 1960, zoo populations consisted of wild-caught animals, primarily from the Kyrgyz Republic (Koshkarev and Vrypaev, 2000). There is little evidence that Snow Leopards are being bred in large numbers in captivity in the same way as Tigers are (with thousands reportedly in China, and also in some Southeast Asian countries: Stoner and Krishnasamy, 2016). China has stated that for the Snow Leopard "no permits have been issued for commercial purposes," and that "there are no legal industries using snow leopard fur or bone for commercial purposes" (GSLEP 2013: Table 5). However, one taxidermy company in China advertised a stuffed Snow Leopard for sale in 2014 along with other Asian big cat specimens, and showed a photo on its website of a government permit allowing it to legally sell a wild Tiger skin. The type of Tiger permit shown (the authenticity of which has not been verified) has been mainly, but not exclusively, issued for animals bred in captivity (Nowell and Pervushina, 2014: 37), and it is unknown if the Snow Leopard offered for sale was wild, captive-bred, legal or if in fact real at all. While there is the possibility that captive-bred Snow Leopards may enter illegal trade, Snow Leopard trade exists essentially entirely of wild animals, a key difference from Tiger trade.

There is also an apparent difference in trend: the number of Tigers seized increased by 55% from 2000-2007 to 2008-2015, while the number of Snow Leopards declined by 13% (Figure A2.2). For Tigers, skin seizures are decreasing while bone seizures are increasing (TRAFFIC, 2016). This is another key difference between the two cat trades: that bone products are much less common for Snow Leopards than for Tigers (and skins more common) (Figure A2.1). However, Snow Leopard was recently detected using sophisticated genetic techniques (Coghlan *et al.,* 2015) in traditional medicine capsules manufactured by the prominent Beijing Tong Ren Tang Company (Smith, 2016), purchased in Australia, of unknown age. Only plant materials were listed in the English ingredients (ARTG, 2016), but the same preparation sold in China lists "Os Pardis" (Leopard bone) in the ingredients (D. Banks *in litt.*, 2016). China prohibited the use of Leopard *Panthera pardus* bone as a substitute for Tiger bone in 2006, although manufacturers were allowed to use up their existing stocks (Nowell and Xu, 2007). Although Snow Leopard bone is mentioned in ancient Chinese medicinal texts (Alexander *et al.,* 2016), it is not known to have ever been listed as an approved ingredient in manufactured Chinese medicines during the time when the use of big cats in such products was still legal (Gaski and Johnson, 1994). It has never been allowed for use as a substitute

for either Tiger or Leopard, and so the preparation found in Australia is illegal in that country for false labeling, as well as in China, even if produced before the 2006 Leopard bone ban.

Although there are substantial levels of "Tiger-human" conflict, Tiger poaching is widely perceived to be primarily demand-driven. There is high product awareness for Tigers: 93% of 1,880 Chinese adults randomly surveyed in 2007 said they had used Tiger medicinal products at some point in the past (Gratwicke *et al.,* 2008). The rise of Tiger farming also indicates that businessmen think there is significant consumer demand. In contrast, the 2016 expert survey for this report indicates that trade is not considered the primary driver for Snow Leopard poaching, even in areas which were flagged as having relatively high trade rates. This suggests that conducting the kind of public awareness campaigns that are such a prominent feature of the Tiger trade control strategy might not lead to the desired result of significantly reducing poaching.

Such a demand-reduction approach might be suitable for some areas in Central Asia where there is a long history of use and display of Snow Leopard pelts, however, there is a danger that a broader campaign could backfire by actually increasing general awareness of the Snow Leopard as a desirable consumer item. While little is known about consumer motivations and it could be useful to learn more, there is a danger that awareness campaigns may serve more to stimulate new demand than deter existing demand. People who buy Snow Leopard skins are unlikely to be repeat customers (unlike those who consume Tiger medicinals), and it is unlikely that many people actively seek out Snow Leopard skins (and those who do will be very difficult to identify as any kind of a typical market segment), but rather purchase them opportunistically. The Snow Leopard trade appears to be driven more by supply (primarily by animals killed to protect livestock) than by demand, and Recommendations in this report focus largely on stemming the problem at the source, in the communities living with Snow Leopards, rather than in the cities where their skins may wind up.

© WWF

Consumer awareness campaigns like those conducted for Tigers may do more harm than good for Snow Leopards, by stimulating interest in a relatively obscure product.

Annex 3. Tables of minimum numbers[6] of Snow Leopards in range country seizure and observation records from the crime database

This annex contains the minimum number of Snow Leopards in seizure and observation records for type, category and form of Snow Leopard product in four tables: Table A3.1 2010-June 2016; Table A3.2 2003-2009; Table A3.3 1996-2002; Table A3.4 1989-1995. Sources for the database records are listed underneath each table. It was not always possible to determine the category (poaching, smuggling, trade) or form of Snow Leopard product (skin, carcass, set of bones, live), so that the totals for these sections of the tables may be less than the totals under type of record. Form of Snow Leopard product totals may be higher than types of Record totals because they are summed for each product, rather than for the minimum number of Snow Leopards, as shown under type and category of record, and used throughout this report. See Figure 3 for key to observation reliability scores (1-3). A blank cell in a table denotes no data found, and may not necessarily represent a lack of seizures or observations.

[6] Each record was converted into minimum number of Snow Leopards (e.g., two skins are considered two Snow Leopards, whereas one skin and one set of bones is considered to represent a single animal). (1,694) (totaling 2,716 bone units).

	AF	BT	CN	IN	KZ	KG	MN	NP	PK	RU	TJ	UZ	Totals
Record Type													
Seizures			82	12		2	9	6	4	9	8	1	**133**
Market surveys	22		4										**26**
Observations1	1	1	7		1		3	3	1	2			**19**
Observations2			12			1		3	5	9	2		**32**
Observations3						9				31	9		**49**
Totals	**23**	**1**	**105**	**12**	**1**	**12**	**12**	**12**	**10**	**51**	**19**	**1**	**259**
Record Category													
Poaching Seizures			36	3		1	2	5	4	4	5		**60**
Poaching Observations		1	12			9	3	3	1	26	9		**64**
Smuggling Seizures			5	6			2				3		**16**
Smuggling Observations										8			**8**
Trade Seizures			41	1		1	5	1		5		1	**55**
Trade Observations	1		7		1	1		3	5	8	2		**28**
Market Surveys	22		4										**26**
Totals	**23**	**1**	**105**	**10**	**1**	**12**	**12**	**12**	**10**	**51**	**19**	**1**	**257**
Form of Snow Leopard													
Skins Seized			52	7		2	4	4		6	3	1	**79**
Skins Observed	1		6		1	10		3	6	16	9		**52**
Skins Market Surveys	22		4										**26**
Carcasses Seized			20	3			5	2	2	3	2		**37**
Carcasses Observed							2	3					**5**
Sets of Bone Seized			13	2				2		1	2		**20**
Sets of Bone Observed													**0**
Sets of Bone Market Surveys												0	
Live Seized			6						2		2		**10**
Live Observed		1	1				1			1	2		**6**
Totals	**23**	**1**	**102**	**12**	**1**	**12**	**12**	**14**	**10**	**27**	**20**	**1**	**235**

Table A3.1. Seizure and observation records, 2010-June 2016

Sources: Ale et al. (2016), Anon. (2012), Anon. in litt. (2013 and 2016), Anon. (2016,a,b,c,d), E. Bykova and A. Esipov in litt. (2013), Daveltbakov et al. (2016), Environmental Investigation Agency in litt. (2016), Johansson et al (2015), Khan et al. (2014), Kretser et al. (2012), Kuksin (2016), Li and Lu (2014), Li et al. (2016), Ma (2012), A. Maheshwari in litt. (2016), Maheshwari and von Meibom (2016), Mir (2011 and 2014), Nizami (2012), Paltsyn et al. (2012), M. Paltsyn in litt. (2016), T. Rosen in litt. (2016), Saidov et al. (2016), Singh (2016), Wildlife Protection Society of India in litt. (2016), WWF MN (2014), WWF NP (2011), WWF Mongolia in litt. (2016), WWF Pakistan in litt. (2016), WWF/TRAFFIC (2005)

Column1	AF	BT	CN	IN	KZ	KG	MN	NP	PK	RU	TJ	UZ	Totals
Record Type													
Seizures	1		73	6		2	9	2		21	1		**115**
Market surveys	113		106				9						**228**
Observations1			9	1			3			9		4	**26**
Observations2			16		4		11	3	11	37			**82**
Observations3													**0**
Totals	**114**	**0**	**204**	**7**	**4**	**2**	**32**	**5**	**11**	**67**	**1**	**4**	**451**
Record Category													
Poaching Seizures	1		23	1			2	2		1	1		**31**
Poaching Observations			14	1	4		12	1	1	23			**56**
Smuggling Seizures			5	5		2				17			**29**
Smuggling Observations													**0**
Trade Seizures			45				7			3			**55**
Trade Observations			11				2	2	10	23		4	**52**
Market Surveys	113		106				9						**228**
Totals	**114**	**0**	**204**	**7**	**4**	**2**	**32**	**5**	**11**	**67**	**1**	**4**	**451**
Form of Snow Leopard													
Skins Seized			48	5			7	2		20			**82**
Skins Observed			9	1			2	3	11	31		1	**58**
Skins Market Surveys	113		106				9						**228**
Carcasses Seized	1		22	1			2						**26**
Carcasses Observed			1				7			5			**13**
Sets of Bone Seized			13							1			**14**
Sets of Bone Observed			1				5						**6**
Sets of Bone Market Surveys			1										**1**
Live Seized			1			2					1		**4**
Live Observed			2							5		3	**10**
Totals	**114**	**0**	**204**	**7**	**0**	**2**	**32**	**5**	**11**	**62**	**1**	**4**	**442**

Table A3.2. Seizure and observation records, 2003-2009

Sources: Anon. in litt. (2013), E. Bykova and A. Esipov in litt. (2013), Environmental Investigation Agency in litt. (2016), Johansson et al (2015), Johnson and Wingard (2010), Khan et al. (2014), A. Kuksin in litt. (2016), Li and Lu (2014), Ma (2012), Manati (2009), Paltsyn et al. (2012), Riddell (2004), T. Rosen in litt. (2016), Theile (2003), Tuyatsatsral et al (2009), Wildlife Protection Society of India in litt. (2016), Wingard and Zahler (2006), WWF MN (2008), WWF Mongolia in litt. (2016), WWF Pakistan in litt. (2016), WWF/TRAFFIC (2005)

	AF	BT	CN	IN	KZ	KG	MN	NP	PK	RU	TJ	UZ	Totals
Record Type													
Seizures			41	11		16	16		4	1			**89**
Market surveys			25	110			6		11				**152**
Observations1	11		8		1		32		1	7		6	**66**
Observations2			29	12	1	1	1		13	5		6	**68**
Observations3			50		16		25		24	60	10		**185**
Totals	**11**	**0**	**153**	**133**	**18**	**17**	**80**	**0**	**53**	**73**	**10**	**12**	**560**
Record Category													
Poaching Seizures			9	1			3		4	1			**18**
Poaching Observations	8		59	12	17					74		1	**171**
Smuggling Seizures			1	2									**3**
Smuggling Observations							25						**25**
Trade Seizures			31	8		16	5						**60**
Trade Observations	3		26			1	33		38	4	10	11	**126**
Market Surveys			25	110			6		11				**152**
Totals	**11**	**0**	**151**	**133**	**17**	**17**	**72**	**0**	**53**	**79**	**10**	**12**	**555**
Form of Snow Leopard													
Skins Seized			31	9		11	13						**64**
Skins Observed	10		23	4	2		57		37	4		9	**146**
Skins Market Surveys			25	110			6		11				**152**
Carcasses Seized			6	1		1	3						**11**
Carcasses Observed			4	8			1			5			**18**
Sets of Bone Seized			5			5							**10**
Sets of Bone Observed	1		1	2			5						**9**
Sets of Bone Market Surveys												0	
Live Seized				1		5			4				**10**
Live Observed			1			1			1	1	10	3	**17**
Totals	**11**	**0**	**96**	**135**	**2**	**23**	**85**	**0**	**53**	**10**	**10**	**12**	**437**

Table A3.3. Seizure and observation records, 1996-2002
Sources: E. Bykova and A. Esipov in litt. (2013), Dexel (2002), Environmental Investigation Agency in litt. (2016), Hussain (2003), Koshkarev and Vyrypaev (2000), A. Kuksin in litt. (2016), Li and Lu (2014), Mishra and Fitzherbert (2004), Paltsyn et al. (2012), Spearing (2002), Theile (2003), Wen (2002), Wildlife Protection Society of India in litt. (2016), WWF Mongolia in litt. (2016), WWF Pakistan in litt. (2016)

	AF	BT	CN	IN	KZ	KG	MN	NP	PK	RU	TJ	UZ	Totals
Record Type													
Seizures			72	19			108		1		10	2	**212**
Market surveys	25							18					**43**
Observations1	2		8			22	1				1		**34**
Observations2			24	5	10			2		3			**44**
Observations3					20	135	25				10		**190**
Totals	**27**		**104**	**24**	**30**	**157**	**134**	**20**	**1**	**3**	**21**	**2**	**523**
Record Category													
Poaching Seizures				1					1			1	**3**
Poaching Observations	2		15	5		135				3			**160**
Smuggling Seizures							59				10		**69**
Smuggling Observations							25						**25**
Trade Seizures			40	18								1	**59**
Trade Observations			39		34	22	1	2			11		**109**
Market Surveys	25							18					**43**
Totals	**27**		**94**	**24**	**34**	**157**	**85**	**20**	**1**	**3**	**21**	**2**	**468**
Form of Snow Leopard													
Skins Seized			42	18			108				10	1	**179**
Skins Observed	2		28		34	157	26	2			1		**250**
Skins Market Surveys	25							18					**43**
Carcasses Seized			30									1	**31**
Carcasses Observed			14	5						3			**22**
Sets of Bone Seized													**0**
Sets of Bone Observed													**0**
Sets of Bone Market Surveys													**0**
Live Seized				1					1				**2**
Live Observed			3								10		**13**
Totals	**27**		**117**	**24**	**34**	**157**	**134**	**20**	**1**	**3**	**21**	**2**	**540**

Table A3.4. Seizure and observation records, 1989-1996
Sources: Dexel (2002), Hussain (2003), Koshkarev and Vyrypaev (2000), Li et al. (2000), Mishra and Fitzherbert (2004), Paltsyn et al. (2012), Spearing (2002), Theile (2003), Wen (2002

OCTOBER 2016

TRAFFIC, the wildlife trade monitoring network, is the leading non-governmental organization working globally on trade in wild animals and plants in the context of both biodiversity conservation and sustainable development.

For further information contact:
TRAFFIC
Headquarters Office
David Attenborough Building
Pembroke Street
Cambridge CB2 3QZ
UK

Telephone: (44) 1223 277427
E-mail: traffic@traffic.org

UK Registered Charity No. 1076722,
Registered Limited Company No. 3785518.

TRAFFIC
the wildlife trade monitoring network
is a strategic alliance of
WWF
IUCN