FAR FROM A CURE: THE TIGER TRADE REVISITED

by Kristin Nowell

One, two, three, four, five –
Go to the mountains to wipe out the tiger.
But instead of tigers,
We found only squirrels[m]

"A very popular nursery rhythm, these four lines can be recited by almost every Chinese growing up in this century. Simple as it is, the song tells several facts about the tigers in China: there used to be a lot of tigers in the wild; they fell victim to a number of large scale "anti-pest" campaigns, and now they are on the verge of extinction…"

From an article in the *China Daily*, 3 September 1998, the Year of the Tiger (Gong, 1998).

Credit: J. Sellar, CITES Secretariat

Members of CITES Tiger Mission team visit markets in Phnom Penh, Cambodia, June 1999

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PREFACE

Apart from specialists, few people were worried about the status of the Tiger at the end of the 1980s. Attention focused on India, where the normally secretive and seldom-seen big cats had become highly visible in the Ranthambhore Tiger Reserve. Photos and films shown all over the world portrayed them behaving naturally in the open in full daylight. Indian authorities reported that the overall population in the country, estimated at under 2000 in 1972 and declining, had risen to well over 4000 by 1989 as a result of conservation measures.

The Amur (Siberian) Tiger, which had been thought to number fewer than 50 in the Russian Far East in the 1940s, was increasing and repopulating old habitats under the Soviet regime. Some of these Tigers were coming from neighbouring China, once the heartland of the species range, where a substantial number had remained. Little attention was paid to other Tiger areas, especially Southeast Asia.

The general sense of complacency affected even Tiger specialists. But there were already ominous portents of what was to come. In 1986, several Tigers were poached in the northern Indian reserve of Dudhwa and there was speculation that they might have been killed for their bones for Chinese medicine, for, in the same year, it was reported in Chinese newspapers that the authorities were establishing a Tiger farm to provide bones for medicines.

There was nothing new about the demand for Tiger bones for medicine. They had been in use for centuries. Russian scientists recalled that, in former times, frozen carcasses were bought by Chinese traders, and hunters sold Tiger skeletons to China in the 1930s and as late as 1958.

When the Chinese Communist Party gained power in 1949, the South China Tiger was seen as a threat to agricultural development. It was declared a pest and officially appointed teams hunted it down. Chinese scientists say that over 3000 skins were handed in during 1950s and 1960s. A few Tigers remained and were given legal protection, but the population had been virtually exterminated. China, however, had a massive stock of bones.

It is reasonable to speculate that, by the mid-1980s, China's bone bank was running low and, with few Tigers left in the wild in China, demand for bones from neighbouring Tiger countries increased, perhaps explaining the poaching of Tigers from Dudhwa in 1986. In 1992, Ranthambhore sprang into the headlines. Well-known Tigers were no longer being seen. A member of a traditional hunting tribe was caught with a Tiger skin and skull. He disclosed that he took bones to a butcher in a nearby town, who was found to be in contact with illegal traders. Not long afterwards, in September 1993, investigations by TRAFFIC India led to seizures of caches amounting to 400 kg of Tiger bones in the Tibetan quarter of Delhi, apparently bound for China across the Himalayan passes.

Meanwhile, the Soviet Union had collapsed and with it law and order in the Tiger area of the Russian Far East. In a land where hunting was, and still is, a way of life, the value of Tiger skins and bones for sale to China, the Koreas, Japan and Taiwan became an incentive to kill Tigers. It became clear that a heavy toll was being taken, and fears arose that the Tiger would be exterminated in a few years.

Investigation of Customs records in South Korea revealed that hundreds of kilogrammes of Tiger bones had been legally imported in the years leading up to 1993. Countries of origin for the bones were listed, indicating that Sumatra was the major source.

As the situation became alarming, Judy Mills and I wrote *Killed For A Cure: A review of the worldwide trade in Tiger bone* (Mills and Jackson, 1994). We judged that poaching of Tigers for bones and other parts constituted an imminent threat to the survival of the species, while not discounting the decline in prey through poaching and the continuing threat of erosion of habitat. That was also the view of various authorities, notably CITES and the US Government. The CITES Standing Committee and the Conference of the Parties to CITES called for international action to check the illegal trade in Tiger parts. The US Government imposed sanctions on Taiwan, a major market for Tiger parts, and threatened China with the same. Both banned international and domestic trade.

In the Russian Far East, international NGOs moved to support the establishment of anti-poaching brigades, which soon showed a high level of effectiveness. In other places, including China, educational programmes were launched to urge the public to reject Tiger-based products because they threatened one of the world's most charismatic animals. Furthermore, conservationists co-operated with Chinese medical scientists and practitioners to develop and promote alternatives to Tiger-based medicines.

Nevertheless, illegal trade has continued, as shown by many seizures of bones and skins in India and Nepal and the visibility of Tiger products in open markets in Southeast Asia. Investigators have uncovered extensive availability in North America, Europe and Australasia of products from China said to contain Tiger derivatives. Clearly, Tigers are still threatened by poaching and illegal trade, but are those threats still as serious as a few years ago? Are Tiger numbers declining or, as some have said, actually increasing? Unfortunately, although there have been improvements in Tiger conservation in recent years, there are few reliable data on almost all aspects.

The Tiger's secretive way of life in dense forests and its vast range hinder attempts to obtain a clear idea of the numbers, although winter snows in the Russian Far East and sandy soils in lowland Nepal have enabled scientists to read tracks and come up with reasonable estimates. Attempts to perform a total count in India, which has more than half the surviving Tigers, have been criticised on the grounds of faulty methodology and the announced results have been attacked as exaggerated. It can only be said that we do not know how many Tigers there are nor whether they are declining in number, stable, or increasing. Whatever the truth, the remorseless erosion of habitat and prey depletion continue and are the ultimate threat to the Tiger's survival in the wild.

Poaching and trade in Tiger products are covert activities. Seizures by the authorities represent only the tip of the iceberg in relation to what the total contraband must be. It is a situation similar to that of the illegal drug trade. Some of those tracking illegal activities believe that traders have become more circumspect, making it more difficult to detect them.

This report is devoted to a review of the illegal trade on the basis of studies and investigations by people in many countries. It shows the manifold difficulties of assessing the trade. However, the conclusion is that, while the availability of Tiger-based medicines has been substantially reduced since the early 1990s, trade remains a serious threat to the Tiger's future, particularly in Southeast Asia.

Peter Jackson
Chairman, Cat Specialist Group
IUCN - The World Conservation Union

EXECUTIVE SUMMARY

Introduction

Tiger bone has been used as a treatment for rheumatism and related ailments for thousands of years in traditional Asian medicine. In the early 1990s, it became evident that medicinal trade in Tiger bone threatened to drive the already endangered Tiger *Panthera tigris* to extinction in the wild. The importance of this threat was documented in the 1994 TRAFFIC report, *Killed For A Cure: A Review of the Worldwide Trade in Tiger Bone* (Mills and Jackson, 1994). Since the report's publication, there has been increased national and international investment in Tiger conservation and trade control and promotion of substitutes for Tiger bone. But what progress there has been has brought new challenges and some old problems remain to be tackled. This report relies primarily upon market surveys, rather than on official trade statistics, which were the primary source for *Killed For A Cure*, since, with few exceptions, Tiger trade is now illegal. The report compares markets for Tigers and their parts and products in the late 1990s to the early 1990s, to examine the extent to which trade continues to threaten the Tiger going into the new millennium.

Forms in which Tigers are traded

Nearly every part of the Tiger has a value. Live Tigers are sold as exotic pets. Traditional Asian medicine uses Tiger bone in a number of different formulae. Skin is made into magical amulets and novelties, as are teeth and claws, while Tiger penis is an ingredient of allegedly powerful sexual tonics. However, many of these parts and products are fake Tiger, made from the parts of other, more common animals. It is not clear what effect the plethora of fakes has on wild Tiger populations. Fakes may satisfy some consumer demand which would otherwise have an impact on wild Tigers, or they may stimulate increased demand for genuine Tiger parts.

The supply: the origin of illegal trade in Tigers and their parts

Although Tigers in captivity have served as a source of supply to the trade, the primary source has been wild Tigers. Tigers are not only killed illegally for trade, but also because they are a danger to people and damage impoverished livelihoods when they prey on livestock. Population models suggest that Tiger populations may be able to sustain low levels of poaching, but moderate to high levels greatly increase the risk of extinction, even tens of years after the poaching occurs.

Progress in Tiger trade control since the early 1990s

- The Tiger has not become extinct in any range State, despite fears in the early 1990s that this may happen. There has been greatly increased investment in all aspects of Tiger conservation, including anti-poaching, biological monitoring, local community development, public education, and capacity-building. Progress in India, Nepal and the Russian Federation is particularly notable, although problems remain.

- Indian Government authorities seized over 500 kg of Tiger bone, destined for China, in 1993, and China also reported substantial seizures. Official seizures in the late 1990s fell from these peaks, suggesting a decline in illegal trade (although seizure statistics alone cannot show trends without reference to records of enforcement and data-collection effort).

- Prices reported for Tiger parts in Tiger range States by hunters and traders are generally lower or unchanged from the 1990s. While there is continued illegal trade, at least there have not been major price increases, which would increase the financial incentive to poach Tigers.

- In some Tiger range States (India, Nepal, Indonesia, the Russian Federation and Malaysia), Tiger poaching is frequently the result of human-Tiger conflict. There was considerable alarm about the illegal trade threat to Tigers in these countries in the late 1980s to early 1990s. While some illegal trade continues, it no longer appears to be the primary threat, indicating progress in Tiger trade control.

- There is little evidence to indicate the existence of major supplying markets in the range States of Bhutan, Malaysia and the Democratic People's Republic of Korea (North Korea). While Bhutan and North Korea have probably never been major suppliers, trade records showed substantial exports of Tiger bone from Malaysia in the late 1980s to early 1990s.

Problems in Tiger trade control in supplying markets

- Major illegal supplying markets still operate openly in key Southeast Asian range States, especially Cambodia, Indonesia, Lao PDR, Myanmar and Vietnam. Market surveys indicate sizeable trade volume and, for various reasons, there has been little enforcement action by authorities against poachers and traders.

- Supplying markets in most other range States, including Bangladesh, China, India, Nepal, the Russian Federation and Thailand, are more covert, but still operational.

- Although India and the Russian Federation may have supplied less Tiger bone to the Asian medicinal trade in the late 1990s, a sizeable market for Tiger skins persists.

- Other large cats are poached for substitutes for Tiger bone. Leopard *Panthera pardus* bone is the most common substitute, but the Leopard is also a threatened species in Asia.

- China and Thailand are home to several large captive collections of Tigers. These collections have been called Tiger farms, because one of the reasons for their development in the late 1980s to early 1990s was to explore the possibility of supplying the trade in Tiger bone. Trade bans have prevented these plans from coming to fruition, and now the farms function as tourist attractions, although there is some evidence of illegal trade from all of them. Proponents have argued that a stable, legal source of Tiger bone for the medicinal trade could relieve poaching pressure on wild populations, but others feel that wild Tigers are best protected by eliminating consumption of their parts and that Tiger farms jeopardize progress in that area.

The processing: manufacture and production of Tiger-bone medicines

Traditional preparations including raw Tiger bone would be mixed with herbs and other ingredients by a pharmacist or doctor for a patient. In the late twentieth century, such medicines became factory-produced on a large scale. China stands out as the major producer of Tiger bone pills, plasters and medicinal wine, but such medicines were also made in factories in the Republic of Korea (South Korea) and other Asian countries. It is impossible to ascertain how much genuine Tiger bone these medicines contain. Current

forensics techniques cannot detect the presence of Tiger bone in processed mixtures and many in the traditional medicine community say that these medicines are Tiger in name only. However, it is possible that real Tiger bone may have been used at highly dilute quantities.

Progress in Tiger trade control since the early 1990s

- Manufacture of Tiger-bone medicines has officially ceased in key former producer countries (China and South Korea). China is promoting bone of *sailong* (a very common type of mole rat, *Myospalax* spp.) as a substitute for Tiger bone.

- Market surveys suggest that the Tiger-bone medicines seen for retail sale are mostly old stocks, rather than of recent production.

- Tougher legislation was enacted in 1999 in the USA and Australia to prohibit trade in any product claiming to contain Tiger. In line with CITES Resolutions and related actions, most CITES Parties now treat anything labelled as Tiger as real Tiger, providing a "safety net" while research continues towards finding forensic techniques to identify Tiger components accurately in processed medicines.

Problems in Tiger trade control in processing markets

- In the late 1990s, a Japanese manufacturer was producing a brand of Tiger penis pills which were on sale for over USD27 000 per bottle. In December 1999, the Japanese Government announced amendments to national legislation to take effect from April 2000, which prohibit sale of such products. Medicines labelled as containing Tiger bone were still being produced in Vietnam in the late 1990s and also possibly in Thailand and Malaysia. Counterfeit medicines labelled as containing Tiger bone were apparently being produced without official sanction in China.

- Many manufacturers have changed their packaging so that Tiger bone no longer appears in the contents. However, just as it is not possible to determine whether medicines labelled as containing Tiger bone really do, it is equally impossible to tell if the new medicines really do not contain Tiger bone.

The demand: retail consumer markets for Tigers and their parts and products

Progress in Tiger trade control since the early 1990s

- Surveys in the late 1990s in China and other major non-range consuming markets show that availability of Tiger-bone medicines has declined. It is no longer a typical experience in most major cities around the world to walk into a traditional Asian pharmacy and find a variety of Tiger-bone preparations.

- Increased enforcement of domestic trade bans and increased co-operation with the traditional medicine community have helped to reduce retail sale and use of Tiger-bone medicines.

- The first attitudinal studies have been carried out to identify consumers of Tiger-bone medicines, and find out their motivations. Less than five per cent of consumers surveyed in Hong Kong, Japan and the USA said they had ever taken Tiger-bone medicines. Most said they supported wildlife conser-

vation and would use alternatives to Tiger bone, if such alternatives were considered efficacious by respected doctors and were readily available. However, they would still seek out Tiger bone if thought essential for treatment of illness.

- Wholesale prices reported for raw Tiger bone on the black market in China and South Korea were lower in the late 1990s, suggesting a drop in demand from retail outlets. However, black market price data are often not reliable. Higher retail prices were reported for these two countries in the late 1990s, possibly reflecting the increased risks of selling Tiger bone at the retail level.

Problems in Tiger trade control in retail consumer markets

- Although imports of Tiger parts were prohibited in 1980 and imports of "pre-Convention" manufactured medicines were halted in 1993, domestic trade in medicines and tonics containing Tiger parts was still widespread in Japan in the late 1990s and retail prices were among the world's highest. In December 1999, the Japanese Government announced amendments to its national legislation, which already regulated Tiger hair, skins, teeth, claws and their derivatives, to ban the domestic sale of products containing Tiger bone and Tiger penis, as of April 2000.

- Several Tiger range States have significant consumer markets for Tiger parts, especially Vietnam, Thailand and Indonesia. Illegal retail trade in Tiger parts and products continues in China and several non-range consumer States, but in a more secretive fashion, making it difficult to assess trade organization and volume.

Controlling illegal international trade in Tiger products

Progress since the early 1990s

- Trade bans have led to a sharp decline in international trade in Tiger parts and products, as reported to CITES and in other national government trade data sources. Seizures reported by non-range consumer States have also declined over the 1990s.

- Two major Tiger range States, Cambodia and Myanmar, joined CITES in the late 1990s. Most range and non-range consumer States are now Party to CITES, with the exceptions of Bhutan, Lao PDR and North Korea. The Global Tiger Forum, proposed in 1994 for inter-governmental co-operation among Tiger range States, received the five national ratifications necessary for it to come into effect in 1999. Range States have signed a number of other bilateral and multi-lateral agreements relevant to Tiger conservation and trade control in the late 1990s. Trade control workshops were held in a number of Tiger range States in the late 1990s to provide government officials with training and expertize.

Problems

- The international Tiger trade now operates almost exclusively through smuggling, by means of what has been referred to as "an army of ants" - large numbers of individuals smuggling small volumes of goods through a variety of channels. This type of trade is very difficult to eliminate.

Conclusions and recommendations

Since the publication of *Killed For A Cure* in the early 1990s, there has been greatly increased investment in Tiger conservation and Tiger trade controls. Significant progress has been made over the 1990s in reducing the use of Tiger bone in traditional Asian medicines in China and non-range consuming States. Progress is also evident in Tiger range States India, Indonesia, Nepal and Russia, where key Tiger populations in have been protected by anti-poaching measures as well as by programmes which help local communities to benefit from Tiger conservation.

However, despite an apparent substantial fall in consumption of Tiger-bone medicines in former major consuming States, there is little evidence for a major reduction in Tiger poaching. While advances were made in the 1990s towards reducing use of Tiger bone in traditional Asian medicine, the fight to save the Tiger risks being lost if conservationists become complacent with the successes met so far. The conservation community should continue to treat traditional Asian medicine as a leading threat to wild Tigers, while also expanding efforts to eliminate trade in Tiger skins and curios.

Tiger-bone medicines and tonics are an ancient tradition and people will try to obtain them, even at some risk, for years to come. If medicinal trade is able to survive underground, it will provide an incentive for commercial poaching of Tigers, increasing the risk of extinction for vulnerable wild populations. However, underground trade will be difficult to detect by conventional market survey techniques in consuming markets. Potential consumers of Tiger medicines are widely dispersed and number in the hundreds of millions, while there are not many more than 150 individual wild Tiger populations. In the future, it will be more efficient to prevent illegal Tiger trade by increasing law enforcement and trade monitoring capacity at the source of supply, in rural areas near wild Tiger populations.

Recommendations emerging from this report include the following:

In **supplying markets**,

- Improved enforcement of trade bans, with aid on an international scale
- Development of programmes which provide incentives against Tiger poaching
- Boosting anti-poaching capacity
- Creation of specialized enforcement units, particularly in China.
- Raising the political profile of Tiger conservation
- Participation of all Tiger range States in CITES and the Global Tiger Forum
- Integration of trade monitoring capacity into Tiger conservation projects
- Improved collection of poaching data, in order to gauge more accurately the impact of illegal trade on wild Tiger populations
- Regular monitoring of major wildlife markets
- Increased penalties for Tiger poaching and illegal trade
- Investment in managing human-Tiger conflict.
- Enforcement of prohibitions against trade in any products from Tiger farming

In **processing markets**,

- Increased attention to Tiger-bone gelatin
- Ending the manufacture of Tiger tonics in Japan and Vietnam
- Examination of Tiger-bone stocks in China
- Identification of producers of counterfeit Chinese Tiger-bone medicines

In **retail consumer markets**,

- More vigorous enforcement of domestic trade bans in certain countries, including use of specialized enforcement units for undercover investigations
- Continued close work with traditional medicine practitioners to eliminate Tiger trade and promote use of substitutes, with such work in Vietnam being of high priority
- Continuation of work to raise conservation awareness
- Careful discrimination between real and fake Tiger parts and products
- More consistent reporting of seizures to the CITES Secretariat
- Regular surveys of availability of Tiger parts and products to discern changes in the market
- More attitudinal surveys to identify and understand consumer demand
- Continued efforts to develop effective forensic techniques for identification of Tiger constituents in manufactured products
- Prohibition of trade in any products claiming to contain Tiger

INTRODUCTION

The Tiger *Panthera tigris* is among the world's most endangered species (Baillie and Groombridge, 1996). In the twentieth century, three subspecies have become extinct - the Javan and Bali Tigers of Indonesia, and the Caspian Tiger of south-west Asia. Wild Tigers are found only in Asia, the most densely populated region on earth. Habitat loss has been the primary cause of the Tiger's endangerment and, correspondingly, protection of Tiger habitat has been the main focus of Tiger conservation programmes (Nowell and Jackson, 1996). India's Project Tiger has been the model for such conservation work and from the early 1970s the Government of India established reserves in key areas to conserve the world's largest national Tiger population (Panwar, 1986).

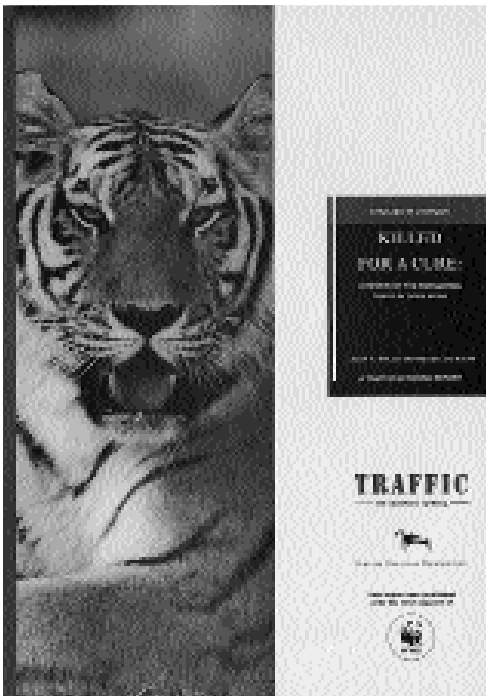
Although revered and protected by the taboos of some tribal groups, during its long association with the people of Asia the Tiger has been hunted for sport and killed to protect humans and livestock. This, and the fact that there has been trade in Tiger body parts, especially the bones, since ancient times, has also contributed to its endangerment. Heptner and Sludskii (1972), for example, point to the rising price of Tiger skins as leading to the eventual extinction of the Tiger in Russian-controlled parts of Central Asia in the late 1800s to early 1900s. Commercial international trade in most subspecies of Tigers and their body parts was banned under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1975, but trade in the Amur or Siberian Tiger remained permissable, with regulation, until 1987, a situation which facilitated continued international traffic in Tiger products. Even after the Amur Tiger was accorded the same level of protection under CITES as the other subspecies, such trade persisted: until 1993, China exported Tiger-bone medicines to Japan, claiming that they were manufactured from "pre-Convention" Amur Tigers, i.e. obtained before 1987 (Anon., 1999a). Chinese authorities have also claimed that their exports in the early 1990s were legal because the manufactured medicines were not "readily recognizable" as Tiger parts and, as such, were exempt from CITES restrictions (Mills and Jackson, 1994).

In 1990, the IUCN/SSC Cat Specialist Group sounded the alarm, linking reports of intensive poaching in India and Nepal, the Tiger's South Asian stronghold, with market demand for Tiger bone for traditional Asian medicine (Jackson, 1990). These reports were underscored in August 1993, when authorities in New Delhi, in co-operation with TRAFFIC India, seized nearly 400 kg of Tiger bone from a Tibetan trader and uncovered a major smuggling route through Nepal into China (Anon., 1994c,h). In the same year, trade investigators reported the existence of major medicinal markets for Tiger bone in the Republic of Korea (South Korea) (Mills, 1993) and Taiwan (Highley, 1993, LaBudde, 1993 and Nowell, 1993).

Shutting down medicinal markets for Tiger bone shot to the top of the global environmental agenda in late 1993-1994. India called together Tiger range States (countries with wild Tiger populations) to establish the Global Tiger Forum (Anon., 1994g). By the time the TRAFFIC report *Killed For A Cure: A Review of the Worldwide Trade in Tiger Bone* (Mills and Jackson, 1994) was published in August 1994, international trade in Tiger bone and Tiger-bone medicines had become illegal around the world and domestic trade in these was banned in most countries. Nevertheless, and although no country has officially exported raw Tiger bone for commercial purposes since CITES entered into force, the report's findings included evidence of an extensive illegal trade in Tiger products.

Killed For A Cure relied upon four sets of trade data (**Table 1**). Of key importance were records of international trade in Tiger bone in Taiwan, South Korea, Japan and China during periods when such trade was legal in these locations, although of questionable legality in Japan and China, as described above. These

records allowed a window into the size of the traditional medicine market for Tiger bone. They also showed how the market was evading CITES trade controls. For example, South Korea and Taiwan imported Tiger bone from CITES Parties which, contrary to requirements, had not recorded its export. In 1990-92, Japan reported importing from China a much lower quantity of manufactured medicines than China reported having exported to Japan. Also during 1990-92, China exported large quantities of manufactured Tiger-bone medicines to countries which did not record imports of the same, although required by CITES to do so, and in 1993 China failed to report the export of 1563 kg of Tiger bone to South Korea (just before such trade was banned in that country).



Killed For A Cure, TRAFFIC's 1994 report on the worldwide trade in Tiger bone

Besides drawing on these data, *Killed For A Cure* also included information from market surveys, mostly carried out by TRAFFIC. These were general wildlife trade surveys, not specifically focused on Tiger trade, but they nonetheless collected useful information on availability of, and prices for, Tiger bone and Tiger-bone medicines. The surveys were carried out in the late 1980s to early 1990s in Tiger range States, most of them with laws protecting Tigers and banning trade in their parts. Finally, Mills and Jackson (1994) also collected information for the report through correspondence and interviews with national government authorities, traditional medicine practitioners and Tiger specialists.

Table 2 outlines the organization of international trade in Tiger bone in the early 1990s. Most Tiger range States had active markets supplying bone for the traditional medicine trade. Indonesia, China, Malaysia and Thailand were indicated by South Korean Customs statistics as suppliers, while India was indicated by its own records of seizures of Tiger bone bound for export. Cambodia, Lao PDR, Myanmar, Nepal, and the Russian Federation (hereafter referred to as Russia) were identified as suppliers through market surveys and reports from Tiger specialists.

Besides being a supplier of Tiger bone in the early 1990s, China also stood out as being the largest manufacturer of factory-produced Tiger-bone medicines, according to its own export records and according to records of seizures by other CITES Parties (**Table 3**). China's role as the leading manufacturer was further emphasized in another landmark TRAFFIC report, *Prescription for Extinction: Endangered Species and Patented Oriental Medicines in Trade* (Gaski and Johnson, 1994), which listed 73 brands of medicine manufactured in China which claimed Tiger bone as an ingredient in the early 1990s. Later estimates by Chinese researchers indicate that more than 200 brands of Tiger medicinals were manufactured in China in the early 1990s (Li and Zhang, 1997). China was not alone as a major manufacturer: trade surveys and interviews in South Korea identified five companies in that country, estimated to use 600-700 kg of Tiger bone per year between them. A single company, *Ik Su Pharmaceuticals*, accounted for the majority of production (Mills and Jackson, 1994). While China exported most of its manufactured medicines, in South Korea they were primarily consumed on the domestic market.

Table 1

Sources for Tiger bone trade statistics in the 1994 TRAFFIC report *Killed For A Cure: A Review of the Worldwide Trade in Tiger Bone*

- Exports of manufactured medicines claiming to contain Tiger bone reported by the Government of China in its annual reports to CITES (1990-92);
- Imports of manufactured Tiger-bone medicines to Japan, reported by Japan in its CITES annual reports (1990-92);
- Customs records of imports of raw Tiger bone to South Korea (1970-1993) and Taiwan (1980-90); and
- Seizures of Tiger bone and Tiger medicines reported by member countries in their annual reports to CITES (1981-92).

Source: Mills and Jackson, 1994.

Table 2

Markets for Tiger-bone medicines in the early 1990s

Major supplying markets (exporters and sellers of Tiger bone)
Indonesia, China, *India, Russia,* Thailand, Malaysia, *Cambodia, Lao PDR, Myanmar, Vietnam, Nepal*

Major processing markets (factory-manufactured Tiger-bone medicines)
China, *South Korea*

Major entrepots importing and exporting Tiger bone and Tiger-bone medicines
Hong Kong, Singapore, Macau

Major consumers (importers) of Tiger bone
South Korea, Taiwan, Japan, *China*

Major consumers (importers) of Tiger-bone medicines
Japan, USA, Canada, Belgium, Malaysia

Note: Markets are listed roughly in order of their importance, largest first. Italics indicate market surveys as primary data source. Plain type indicates primary data source as trade statistics (CITES annual reports of imports, exports and seizures; Customs records).

Source: Mills and Jackson, 1994.

Table 3

Exports of Tiger derivatives from China from 1990-92, according to its annual CITES reports

Quantity and unit	Primary importer reported by China
266 500 packages of pills (estimated at 100 pills/package)	Japan (99%), Belgium (1%)
247 529 containers (boxes, bags, cartons)	Hong Kong (70%, mostly for re-export), Singapore, Macau, USA
71 014 kg of derivatives	Japan
57 186 bottles wine	Japan (70%), Russia (26%)
16 752 cartons wine	Hong Kong (57%), Malaysia (18%)

Source: Mulliken and Haywood, 1994 and Mills and Jackson, 1994.

South Korea and Taiwan stood out as great consumers of Tiger bone, according to trade records up to and including the early 1990s. South Korean Customs data record nearly 9000 kg of Tiger bone imported over a 24-year period - the equivalent in weight of 750 Tiger skeletons (based on an average weight of 12 kg each) (**Table 4**). For its part, Taiwan imported about 12 000 kg of Tiger/bear bone over a 10-year period (**Table 4**).

Table 4

Exports and imports of Tiger bone according to Customs records from South Korea and Taiwan

Exports of Tiger bone

Exporter	Years	Total (kg)	Average annual	Primary importer(s)
Indonesia	1973-92	4094	205	South Korea
China	1991-93	2415	805	South Korea
Thailand	1970-89	607	30	South Korea
Malaysia	1978-81, 1992-93	493	82	South Korea
India	1973-81	248	28	South Korea

Exports of Tiger/bear bone[1, 2]

Hong Kong	1981-86	7245	1149	Taiwan
Singapore	1980-87	3949	494	Taiwan
Taiwan	1982-90	2008	223	Japan (95%), South Korea
Malaysia	1985	740	740	Taiwan

Imports of raw Tiger bone

Importer	Years	Total (kg)	Average annual	Primary exporters
South Korea	1970-93	8981	374	Indonesia (45%), China (27%)

Imports of Tiger/bear bone[2]

Taiwan[1]	1980-90	12 139	1103	Hong Kong (60%), Singapore (33%)

[1] Only major exporters are listed. These exports were not reported to CITES by the exporting Parties, but were identified through the Customs records of South Korea and Taiwan. [2] Taiwan Customs records group Tiger and bear bones into a single category, so that it is impossible to determine what proportion of the reported trade was actually Tiger. However, it is likely that most of it was eventually sold on the domestic market as Tiger bone. Bear bone is often used as a substitute for Tiger bone or to fake it.

Source: Mills and Jackson, 1994.

China, too, was indicated as a major consumer of Tiger bone in the early 1990s, identified as such not only by the size of its Tiger-bone medicine industry, but by seizures in India and Russia of bone *en route* to China and by numerous anecdotal reports from bordering countries in Southeast Asia. China has thus been a supplying, processing and consuming market. Japan's role as a consumer of raw Tiger bone was based upon the export, reported by Taiwan in 1990, of 1900 kg of "Tiger/bear" bone, which was not reported by Japan. Its role as a major consumer of manufactured Tiger bone medicines is on more solid ground: Japan imported large quantities of "pre-Convention" Tiger-bone medicines from China in the early 1990s. Seizures of manufactured Tiger-bone medicines in the USA and Canada showed these countries also to

have sizeable consuming markets. China also reported exporting large quantities of Tiger-bone wine to Malaysia and Russia (see **Table 3**).

Killed For A Cure argued that "the most serious threat presently to Tigers' survival is the use of their bones in Oriental medicine" (Mills and Jackson, 1994). At the ninth meeting of the Conference of the Parties to CITES, held in Fort Lauderdale, in November 1994, a Resolution was passed exhorting the Parties to prohibit domestic trade in Tiger bone (an area technically beyond the remit of the Convention, which focuses on trade between nations). The Resolution also called for a number of additional measures aimed at stopping the use of Tiger parts for traditional medicine (Mainka, 1997). Under diplomatic pressure and threat of trade sanctions, China, Taiwan and South Korea took rapid and extraordinary legal and enforcement actions against their domestic traditional medicine markets (Hemley and Mills, 1999).

Since the early 1990s, investment in conservation of wild Tiger populations has greatly increased. In part, this has been possible because of major new donations, including from the governments of the USA, UK, and Taiwan, and from major international organizations such as the Global Environment Facility. Some range State governments - notably those of India, Nepal, China and Russia - have also devoted significant financial and personnel resources to Tiger conservation. Large conservation organizations, including WWF (World Wide Fund for Nature) and the Wildlife Conservation Society (WCS), have increased funding for Tiger conservation projects, and a number of small new organizations focusing on Tigers have sprung up in many countries. ExxonMobil corporation, which has the Tiger as its logo, supported establishment of the Save the Tiger Fund, which has been a significant source of funding for Tiger conservation projects and influential in raising public awareness of the Tiger's endangerment. Such investment has enabled research into Tiger status and ecology; strengthening of anti-poaching capacity; monitoring of trade in Tiger parts and products; raising of public awareness; and development initiatives for local communities located near wild Tigers (Seidensticker *et al.*, 1999). These projects are providing a foundation for securing key Tiger populations.

Credit: J. Selby, CITES Secretariat

Male and female Amur Tigers

Table 5 shows estimates of national Tiger populations in the early and late 1990s, compiled by the IUCN/SSC Cat Specialist Group. National estimates of Tiger populations are highly sought after, but difficult to achieve. Russia has probably been most successful in this task, with its Tiger population confined to one area and with the advantage of snow cover to make finding Tiger tracks easier (Matyushkin *et al.*, 1996). At the other end of the scale, there has been no effort to estimate the size of the Tiger population in Lao PDR, although it is likely to be relatively large (Duckworth and Hedges, 1998).

Differing national Tiger estimates in the early and late 1990s do not necessarily imply an increase or a decline in Tiger population size. Even in Russia, where researchers are relatively confident in their assessment of Tiger status in the late 1990s, earlier estimates were derived by more speculative methodologies and do not provide sound points for comparison with subsequent assessments. The early 1990s estimate for Cambodia is an educated guess (D. Ashwell, pers. comm.); the late 1990s estimate, based on interviews with local hunters, used a more quantitative methodology, but is still a rough estimate (Nowell *et al.*, 1999). Most of the estimates shown in **Table 5**, particularly those from the early 1990s, were educated guesses which fall short of scientific standards. Yet while Tiger specialists will argue passionately about whether national estimates are incorrect by tens or by hundreds, most would probably agree that total number of wild Tigers is unlikely to be much higher than the total estimates in the range of 5000-7000 shown in **Table 5**. In other words, the Tiger is still an endangered species of high conservation priority.

Table 5

Estimates of national Tiger populations in the early and late 1990s

Country	Estimated numbers of wild Tigers	
	Early 1990s	**Late 1990s**
Bangladesh	300-460	362
Bhutan	50-240	67-81
Cambodia	100-200	500-700[a]
China	30-80	71-97[b]
India	2750-3750	2500-3750
Indonesia	600-650	400-500
Lao PDR	Present	Present
Malaysia	600-650	491-510
Myanmar	Present	230-465
Nepal	150-250	93-97
North Korea	<10	>8[c]
Russia	150-200	330-371
Thailand	150-600	250-501
Vietnam	200-300	<100[d]
Totals	**5090-7390**	**5421-7555**

Sources: **Early 1990s** (1986-1994): Mills and Jackson,1994. **Late 1990s** (1995-1999): Seidensticker *et al.*, 1999, with the following exceptions: [a] Nowell *et al.*, 1999; [b] Sun *et al.*, 1999 (11-13 Tigers in north-east China); [c] Anon., 1999g; [d] Do Tuoc and Le Trong Trai (in prep.)

Killed For A Cure has been the leading reference for those in the conservation community seeking to understand trade in Tigers. Since publication of that report, definite progress may be seen in some aspects of controlling the trade. Most of the major consuming markets identified in *Killed for a Cure* (**Table 2**)

now claim to have eliminated, or to be in the process of eliminating, domestic trade in Tiger-bone medicines (Mainka, 1997 and Sellar *et al.*, 1999). Moreover, while law enforcement necessarily targeted traditional Asian medicine practitioners and dealers, there are also numerous examples of that community's willingness to co-operate with trade restrictions and to use non-endangered substitutes for Tiger in medicine. The present report describes what was known about Tiger trade in the late 1990s and will examine to what extent illegal trade in Tiger bone can still be considered the leading threat to the Tiger's survival. Markets for live Tigers and other Tiger parts and products besides bone are also examined. What progress there has been towards Tiger conservation since the early 1990s has brought with it new challenges, while some old problems remain to be tackled.

SOURCES AND METHODS

While *Killed for a Cure* was able to draw information on international trade in Tiger parts from official trade statistics, such data are scant now, since there is no longer any legal international trade in Tiger parts and many countries do not routinely report seizures of Tigers and their parts and products. In order to gain insight into present-day trade, therefore, this report relies primarily on information collected by market surveys and interviews with traders and traditional medicine practitioners. A survey was designed specifically for this report by the author, to access the knowledge and informed opinions of doctors, pharmacists and traders in traditional Asian medicine communities (because many doctors also sell medicines and many traders and pharmacists informally prescribe medicines, these categories of respondent are not easily distinguishable). Surveys were organized at short notice by TRAFFIC Network offices and carried out in July-August 1999 in two Tiger range States and three non-range States. These locations are felt to be representative, as appropriate, of supplying and consuming markets for Tiger-bone medicines in Indochina and consuming markets in North America and major Asian cities. Numbers of surveys conducted in each location varied between nine and 92 and details of the questions posed and means by which the surveys were conducted are given in **Annex 1**.

Other market surveys, both published and unpublished, carried out by NGOs and governments from the late 1980s to the 1990s were also consulted and these are listed in **Table 6**.

Otherwise, sources accessed during research for this report include the following:

- **Information provided by national governments** obtained by TRAFFIC offices for this report;

- **Unpublished information contributed by experts on Tigers** and Tiger trade associated with TRAFFIC, the IUCN/SSC Cat Specialist Group, and other NGOs;

- **Articles and reports on Tiger conservation**, trade, and traditional Asian medicine, including media reports in the press, from radio, television and the Internet;

- **Imports, exports, and seizures of Tiger parts and derivatives reported by CITES Parties**, based on the CITES annual report database managed by the World Conservation Monitoring Centre (see Mills and Jackson, 1994 for a discussion of the limitations of this data source);

- **Official CITES documents and reviews**. CITES has actively sought to improve trade controls for Tigers, and official reports of these activities constituted an important source of information for this report. The Resolution approved by CITES Parties in 1994 called for improvement in domestic

control of trade in Tiger parts and derivatives and Mainka (1997) reviewed progress in implementing these controls by both Tiger range and non-range States. In 1993 and 1999, the CITES Standing Committee organized two missions comprising delegations of experts charged with raising the profile of Tiger conservation and trade control issues, collecting relevant information, and advising on how Tiger protection could be improved. In 1993, the mission visited China, Taiwan and South Korea (Anon., 1993a) while the 1999 mission visited 14 Tiger range States and non-range consumer States (Sellar *et al.*, 1999; **Table 6**).

- **Data collected by TRAFFIC India** on seizures of Tigers and their parts and products. Since 1993, the Indian Government has authorized TRAFFIC India to collect such information, obtained primarily from State Forest departments, which in turn receive the information from field offices and Tiger reserves, but also from news reports. The TRAFFIC database includes seizure records from before 1993, although these are likely to be less systematically collected. Tiger mortality records, collected from the same sources, are also maintained (R. Dutta, TRAFFIC India, *in litt.*, 1999).

- **Data collected by Zoo Outreach**. TRAFFIC's databases for southern India are known to be incomplete and to add to its data, TRAFFIC India commissioned Zoo Outreach Organization, ZOO, (Coimbatore, India) (Zoo Outreach) to collect information on Tiger mortality, seizures and trade in this region. Zoo Outreach compiled their database in the same way as TRAFFIC, through communication with government officials and review of news sources (Anon., 1999b,d). In this report, Zoo Outreach data have been incorporated into the TRAFFIC India database for purposes of analysis.

- **Data collected by the Wildlife Protection Society of India (WPSI)**. Since 1994, WPSI has maintained national databases on Tiger seizures and mortality, with reports collected from government authorities and the news media. In addition, the databases include cases of illegal trade detected by WPSI's own undercover investigators, who were sometimes able to view and photograph the items in trade. Other cases were reported by informants (A. Kumar, WPSI, *in litt.*, 1999), but these cases did not result in seizure and they are not classified as such in this report.

Although TRAFFIC and WPSI used similar data collection methods for seizures, the amounts reported in the databases differ. This report presents both sets of data.

All monetary figures in this report are in US dollars (USD), as appropriate for the time data were collected, not adjusted for inflation. Other currencies were converted into US dollars at historical rates using the Web-based currency converter developed by Olsen and Associates (http://www.oanda.com/converter/cc_table).

Previous publications on Tiger trade have distinguished between countries with wild Tiger populations and those without by using the terms "Tiger range State" and" Tiger consumer State" to apply to each, respectively (e.g., Mills and Jackson, 1994 and Mainka, 1997). However, many Tiger range States also have domestic consumer markets for Tigers and their parts and products. This report therefore uses the terms "Tiger range State" and "non-range consumer States", the latter referring to countries with no wild Tiger populations which import Tiger parts and products. Similarly, while earlier work has used the term "traditional Chinese medicine", this report uses "traditional Asian medicine" to refer to the diversity of medicinal practices involving Tiger parts in East, South and Southeast Asia.

Table 6

Methodologies for market surveys used in this report

Market(s) for wildlife products visited and inspected for sale of Tiger parts

Survey location	Survey reference
Bangladesh	Gillie, 1997
Cambodia	Nash, 1992b; Martin and Phipps, 1996; Srifa *et al.*, 1997; Ware, 1997; Anon., 1999w; Sun Hean, 1999
China	Fuller and Wang, 1992; Li and Li, 1998; Li and Wang, 1999,
Lao PDR	Chazeé, 1990; Martin, 1992; Srikosamatara *et al.*, 1992; Nash, 1997; Srifa *et al.*, 1997
Myanmar	Martin, 1997; Anon., 1999c,t; Davidson, 1999, Nash, 1992c
Thailand	Srikosamatara *et al.*, 1992
Vietnam	Nash, 1997; Compton and Le, 1998; Li and Li, 1998

Traditional medicine shops/clinics/markets visited and asked for Tiger-bone medicines by anonymous investigator

Survey location	Survey reference
Australia	Callister and Bythewood, 1995; Chan and Chen, 1995
China	Gaski and Johnson, 1994; Guo *et al.*, 1997; Mills, 1997; Banks *et al.*, 1999; Li and Wang, 1999
France	Anon., 1995d
Germany	Anon., 1995d
Hong Kong	Anon., 1999u,r,o; Banks *et al.*, 1999
Indonesia	Plowden and Bowles, 1997; Theile *et al.*, in prep.
Japan	Anon., 1998a; Anon., 1999f
Lao PDR	Martin, 1992; Anon., 1999e,j
Malaysia	Chan, 1995a; Sukumaran, 1999
Myanmar	Martin, 1997; Anon., 1999k
The Netherlands	Anon., 1995d; Anon., 1998a
New Zealand	Callister and Bythewood, 1995; Chan and Chen, 1995
Singapore	Chan, 1995a
South Korea	Mills, 1993; Chan, 1995b; Anon., 1999s
Taiwan	Highley, 1993; LaBudde, 1993; Nowell, 1993
Thailand	Chan and Chen, 1995
USA	Gaski and Johnson, 1994; Anon., 1998a-c; Gaski, 1998; Bolze *et al.*, 1998
UK	Anon., 1995b; Banks *et al.*, 1999
Vietnam	Anon., 1993a; Nguyen *et al.*, 1999

Traditional medicine shops/clinics/markets inspected by government authorities

Survey location	Survey reference
Canada	Dyck *et al.*, 1998
Japan	Anon., 1998j
Taiwan	Anon., 1994b

Telephone calls to traditional medicine shops and clinics to ask if Tiger-bone medicines available

Survey location	Survey reference
Japan	Anon., 1999r
South Korea	Chan, 1995b; Anon., 1999s

Table 6 (continued)

Methodologies for market surveys used in this report

Knowledgeable individuals interviewed openly about trade in Tigers and their parts and products

Survey location	Survey reference
Cambodia	Martin and Phipps, 1996; Duckworth and Hedges, 1998; Heng, 1999; Nowell *et al.*, 1999; Sellar *et al.*, 1999; Sun Hean, 1999; Weiler *et al.*, 1999; Annex 1
Canada	Sellar *et al.*, 1999; Annex 1
China	Tan, 1987; Anon., 1993b; Gaski and Johnson, 1994; Guo *et al.*, 1997; Li and Li, 1998; Sellar *et al.*, 1999
India	Galster *et al.*, 1994; Currey, 1996; Kumar and Wright, 1997; Anon., 1999b,d; Banks *et al.*, 1999; Kumar and Wright, 1999; Wright and Kumar, 1999; Sellar *et al.*, 1999
Indonesia	Indrawan *et al.*, 1999; Sellar *et al.*, 1999
Lao PDR	Baird, 1995; Duckworth and Hedges, 1998
Japan	Sellar *et al.*, 1999
Malaysia	Sellar *et al.*, 1999
Myanmar	Anon., 1999k; Lewis, 1993; Sellar *et al.*, 1999
Nepal	Pringle *et al.*,1999; Sellar *et al.*, 1999
The Netherlands	Sellar *et al.*, 1999
Russia	Anon., 1994a; Chestin, 1998; Sellar *et al.*, 1999
Singapore	Annex 1
South Korea	Anon., 1993b; Mills, 1993
Taiwan	Anon., 1993b; Chou *et al.*, 1995; Annex 1
UK	Sellar *et al.*, 1999
USA	Sellar *et al.*, 1999
Vietnam	Compton and Le, 1998; Compton *et al.*,1998; Duckworth and Hedges, 1998, Le, 1999; Nguyen *et al.*, 1999; Sellar *et al.*, 1999, Annex 1

Knowledgeable individuals asked about Tiger trade by investigator posing as a student or a potential buyer

Survey location	Survey reference
Cambodia	Martin and Phipps, 1996; Srifa *et al.*, 1997; Sun Hean, 1999
China	Low, 1991; Day, 1993; Mills, 1997; Li and Wang, 1999
India	Currey, 1996; Kumar and Wright, 1997; Kumar and Wright, 1999; Wright and Kumar, 1999
Indonesia	Plowden and Bowles, 1997; Indrawan *et al.*, 1999
Lao PDR	Martin, 1992; Srikosamatara *et al.*, 1992; Nash, 1997; Srifa *et al.*, 1997; Anon., 1999e,j
Myanmar	Lewis, 1993; Martin, 1997; Anon., 1999k
Singapore	Galster *et al.*, 1994
South Korea	Galster *et al.*, 1994; Chan, 1995b
Russia	Galster *et al.*, 1994
Taiwan	Highley, 1993; LaBudde, 1993
Thailand	Srikosamatara *et al.*, 1992
Vietnam	Galster *et al.*, 1994; Nash, 1997; Compton and Le, 1998; Compton *et al.*, 1998; Li and Li, 1998; Le, 1999; Nguyen *et al.*, 1999
USA	Galster *et al.*, 1994

Potential consumers interviewed openly about use of Tiger medicines

Survey location	Survey reference
China	Cui and Lin, 1998
Japan	Anon., 1998k
Hong Kong	Lee, 1980; Lee, 1998; Lee *et al.*, 1998
USA	Bolze *et al.*, 1998; Lee *et al.*, 1998

Commercial websites searched for advertisement of Tiger products for sale

Survey location	Survey reference
Japan	Anon., 1999f,r,o

FORMS IN WHICH TIGERS ARE TRADED

Traditional Asian medicines

The first references to use of Tiger bone in traditional medicines date back more than 1500 years in China. In the herbal compendium, *Mingyi Bielu*, or *Records of Famous Physicians* (Tao Hongjing, circa 500 AD), Tiger bone was said to have the properties of "warding off harmful air, killing evil pathogens, stopping convulsions, and curing carbuncles and ulcerative scrofula." Subsequent herbals have instead emphasized its anti-inflammatory, strengthening and pain-relieving properties for rheumatoid pain, tendonitis and muscular paralysis. Before its removal by the government from the official Pharmacopoeia of the Peoples Republic of China in 1993, Tiger bone was listed for "strengthening tendons and bones, dispelling rheumatism, and relieving pain" and used to treat "pain in joints, tendons and bones, and asthenia in loins and legs" (But, 1995).

Medicinal practices from China spread throughout Asia and were adopted, with modifications, by other cultures. In Japan and South Korea, the terms for traditional medicine translate literally as "Chinese medicine". Other Southeast Asian and South Asian countries have developed their own unique traditional medicine systems. Pharmacist Nguyen Xuan Thu (1993) considered Tiger bone to be "one of the most highly valued drugs in traditional Vietnamese medicine." In addition, many indigenous tribal groups in the region practise their own forms of traditional medicine, in which Tiger bone is often a component (Baird, 1995; Heng, 1999; Anon., 1999e).

The Chinese have led research into the pharmacological properties of Tiger bone in their search for acceptable substitutes. They have found that Tiger bone, as well as other animal bones, has measurable anti-inflammatory effects (reviewed in Chu and But, 1997). A number of researchers have focused on examination of the amino acid constituents of Tiger bone and But (1995) has suggested that the gelatinous ossein in Tiger bone could possibly be the component that imparts its therapeutic value. In general, ossein makes up about one-third of bone weight, the remainder comprising inorganic components, primarily calcium salts. The greater the ossein content of bone, the more elastic the bone, and more resistant to fracture.

Tiger bone is taken in a variety of ways - one group of Chinese researchers found over 20 different methods of processing Tiger bone in preparation for clinical use (Li and Zhang, 1997). The forms most commonly encountered in surveys are described below.

Credit TRAFFIC Southeast Asia

Tiger bones seen on a TRAFFIC survey in Myanmar in 1999

Raw bone powder mixed with other dried medicinal ingredients. In traditional medicine preparation in East Asia, Tiger bone is first soaked in an acidic liquid, usually wine, and then roasted to dry it thoroughly. The dried bone is then ground to a powder in small amounts for mixing with other ingredients in various classic combinations by pharmacists and practitioners. An ancient

Chinese herbal compendium (*Prescriptions for Universal Relief*: 1406 A.D.) lists over 100 prescriptions containing Tiger bone as an ingredient (Zhang, 1995). Average daily dosages are given in modern Chinese literature as three to six grammes of Tiger bone per day (Hsu *et al.*, 1986; Zhang, 1990; Bensky and Gamble, 1993 and Mills and Jackson, 1994). The dried prescription is then usually steeped in wine or water and the liquid drunk.

Tiger bone gelatin. In Southeast Asia, Tiger bone is condensed down to a gelatin by cleaning the bones of meat and marrow and then boiling them in several changes of water for several days. The bone pieces are filtered out and the remaining liquid is gradually reduced to a glue-like consistency, which hardens as it cools into an odourless black cake (see **Box 2**). It is cut, most often, into 100-g squares for retail sale and generally taken by dissolving small pieces in medicinal wine (Nguyen, 1993, Cao, 1997 and Nguyen *et al.*, 1999). This form of Tiger-bone preparation is especially popular in Vietnam, where it is called *cao*.

Credit: TRAFFIC Southeast Asia

Pieces of "Tiger-bone" gelatin, wrapped in plastic, on sale in Myanmar, in 1999.

Credit: C. Alibu, TRAFFIC

Typical Chinese-manufactured Tiger-bone wines, formerly in widespread use

Tiger-bone wine. Medicinal wine with some quantity of powdered Tiger bone added is a common commodity throughout many Asian medicine markets. Some homemade preparations contain visible bone pieces, but factory-produced wines do not.

Other **manufactured medicines** with Tiger bone powder listed as an ingredient take the form of pills, "tea balls", adhesive plasters or poultices. Li and Zhang (1997) report that, before such production was banned in China, in 1993, 226 companies were manufacturing over 40 different formulae containing Tiger bone. Significant manufacturing of similar medicines has also taken place in South Korea, Hong Kong and Taiwan.

Credit: TRAFFIC Southeast Asia

"Tiger" medicines on sale in the mid-late 1990s in Malaysia.

Credit: J.A. Mills, TRAFFIC

Production and sale of this medicine, shown here in 1993, is now illegal in South Korea.

In Malaysia, **medicated massage oil** claiming to contain Tiger bone or Tiger bone substitutes is sold for external application for sore joints and muscles (Chan, 1995a; Sukumaran, 1999 and Chen Hin-Keong, *in litt.*, 1999).

Credit: N. Awang Anak, TRAFFIC Southeast Asia

Medicated "Tiger" oil and gel found on sale in Malaysia in mid-late 1990s

Although bone is the part of the Tiger most sought after for medicine, other parts are also used. For example, among more commonly used Tiger parts in Lao traditional medicine are the teeth, which are taken powdered to help relieve fever (Martin, 1992 and Baird, 1995), while the Lao Research Institute for Medicinal Plants, run by the Ministry of Health, listed Tiger gall bladder as part of a mix to treat diabetes (Baird, 1995). The Materia Medica of India lists Tiger fat as a treatment for leprosy and rheumatism (Nadkarni, 1993). Bottles labelled as Tiger fat have been sold at Poipet wildlife market in Cambodia throughout the 1990s (Nash, 1992b and Sun Hean, pers. comm., 1999). Bits of hairless Tiger skin have also been seen on sale in Cambodia for relief of fever (Martin and Phipps, 1996) and zoos in China and Taiwan have done brisk business in Tiger urine for rheumatism (Parry-Jones and Mills, 1994 and Anon., 1997a) and faeces for alcoholism (Nowell and Jackson, 1996).

Credit: Sun Hean

Bottles labelled as containing Tiger fat, on sale in Poipet market, Cambodia in 1999

Tiger tonics

There is a fine line between use of Tiger parts to treat illness and the use of Tiger parts as tonics to improve the health and vigour of a person who may not be unwell. Tiger bone is not only used in formal prescriptions, however, but also taken by many Vietnamese as a "supertonic" (Nguyen, 1993) to mitigate the effects of stress and environmental pollution (Nguyen *et al.*, 1999). In Myanmar, the small first rib bones of the Tiger are known as "Tiger strength" and are soaked in wine to make a strength-giving tonic (Anon., *in litt.*, 2000). The bones shown in the photograph adjacent, taken during a TRAFFIC survey in Myanmar in 1999, are likely to be genuine Tiger, according to an anatomist (B. Van Valkenburgh, *in litt.*, 2000).

Credit: TRAFFIC Southeast Asia

Tiger rib bones seen during surveys in Myanmar in 1999

Food from wild animals, and Tiger meat in particular, is considered a powerful health tonic by some Asian cultures (Chang, 1989). The importance attached to the health-giving properties of food is apparent in

the Chinese saying that, "to cure a disease, one should depend on medicine for 30% and on taking proper rest and proper foods for 70%" (Lee, 1980). The eating of Tiger meat attracted adverse publicity in July 1998 when Japanese celebrities feasted on stir-fried Bengal Tiger on the television programme *World Gourmet Trip*, filmed at a restaurant in Shanghai (Anon., 1998m).

Credit: TRAFFIC East Asia-Japan

Advertised as health supplements, "Source of Energy" pills (top of picture), are labelled as containing Tiger penis, seahorse, and liver of soft-shelled turtle. "Source of Dragon and Tiger" pills (below) are also labelled as containing Tiger penis. The Source of Energy pills are advertised as costing over USD27 000 (1USD = JPY108) in 1999

The most infamous Tiger tonic is the penis, considered to promote sexual virility. Tiger penises are most commonly sold whole and dried, to be soaked in wine of the customer's choosing, but most of these Tiger penises are likely to be fake (see **The role of fakes**). Tiger penis wine and pills have also been observed, especially in Japan, with pills on sale for over USD27 000 per bottle (Anon., 1999f). Tiger penis soup has been served in Taiwan (Highley, 1993), but Tiger penis is not known to be taken, as one French Customs official told reporters after confiscating 50 Tiger penises, "grated on your food like cheese" (M. Day *in litt.*, 1993). The anti-impotence drug named Viagra, (almost the Sanskrit word for Tiger - *Vyaghara)*, was introduced in the late 1990s: armchair theorists have speculated that its availability will reduce the demand for Tiger penis as a sex tonic (Dreweke, 1998).

Luxuries, novelties and charms

There is market demand for Tiger skins for display purposes, for example as rugs, and Tiger skulls are sold for wall-mounting as trophies. Skins have also been known to be used for accessories and clothing, such as purses and jackets and in Southeast Asia, particularly Indonesia, small pieces of skin are sold as magic amulets or charms. Tiger whiskers are also used as charms, as well as teeth and claws, often made into jewellery, and Tiger clavicles (collar bones, also known as "majestic" or "floating" bones), have long been considered a symbol of power in China. According to ancient texts, officials wore such bones around their necks to "give them poise and inspire the envy of the common people" (Read, 1982). Tourist attractions and a variety of private individuals are interested in purchasing live Tigers for display and as pets. Wild Tigers may be preferred for this purpose as captive-bred Tigers may suffer from inbreeding,

Credit: Chris R. Shepherd, TRAFFIC Southeast Asia

Tiger skin on sale in Myanmar in 1999

resulting sometimes in cub deformities and high mortality rates. Wild Tiger cubs are occasionally offered live on the black market following capture after the mother has been killed, but few survive in rough market conditions.

The role of fakes

The role of fake Tiger parts and products in the market is becoming increasingly evident and was considered sufficiently problematic in China to warrant the publication of a pictorial encyclopaedia to help practitioners and traders distinguish between authentic and faked wildlife ingredients used in Chinese medicine (Lin and Chen, 1988). Numerous articles have been published in Chinese medicine journals with detailed descriptions of fakes encountered in the market (Chen 1990, 1991; Ding, 1983, 1985; Meng, 1989 and Song, 1991). Unfortunately, many articles published in newspapers and conservation journals, particularly in the West, show photos of fakes but label them as if authentic. **Annex 2** provides photographs and descriptions to illustrate differences between real and fake Tiger parts.

Bones on sale as Tiger bones are often from other animals. The most stylized fake is a lower "Tiger leg", with tendons, painted fur, and claws made of polished bovine horn glued on to the leg bones of young cattle. This has been widely reported but has been most apparent in China, where such fakes are frequently sold by street peddlers (J. Mills and K. Nowell, pers. obs.) Distinguishing between bones of Tigers and those of other carnivores is not necessarily as easy as identifying such artefacts made with cattle bones, but distinctions are possible. In one case in 1998-99, a carnivore biologist in Vietnam found that five out of ten "Tiger" skeletons offered for identification were in fact bear skeletons (Nguyen *et al.*, 1999) and over a ten-year period, a Chinese researcher found "the bones of yaks, bovines, buffaloes, camels, Snow Leopards, horses, civets and pigs' legs among the counterfeits for Tiger bones" (Chen, 1990).

Fake Tiger bone on sale at Shanghai flea market, February 1997

It is possible, even probable, that much of the "Tiger bone" content of manufactured pills, plasters and wine is fake. Many vendors in Indochina have indicated that the cheapest brands of Tiger-bone gel do not actually contain Tiger (Nguyen *et al.*, 1999; Anon., 1999e and Nash, 1997) and many practitioners also believe the Tiger bone in manufactured medicines is not real. Certainly, South Korea's main manufacturer of Tiger-bone pills, *Ik Su Pharmaceutical Company*, was charged in 1994 with violating health laws by substituting bones of herbivorous animals for Tiger bone (Mills and Jackson, 1994). Other manufacturers have reported using real Tiger bone at very dilute dosages (Gaski and Johnson, 1994), far below the traditional daily over-the-counter dose of three to six grammes, and possibly so dilute as to be undetectable by practical forensics techniques (Espinoza *et al.*, 1994). Since manufacture of Tiger-bone medicines was prohibited in East Asia in a high-profile manner in the early 1990s, many manufacturers have used labels which suggest the presence of Tiger bone without specifically listing it as an ingredient.

Fake Tiger parts are not limited to those used in medicine. Most dried Tiger penises seen in wildlife markets are really bull penises, with exaggerated barbs carved with a small knife (Ding, 1985; Chen, 1991; Song, 1991 and Lin and Chen, 1988; see **Annex 2**). Genetic analyses carried out at the University of Guelph in Canada found that half of 46 dried penises purchased in Asian markets in both Asia and Western

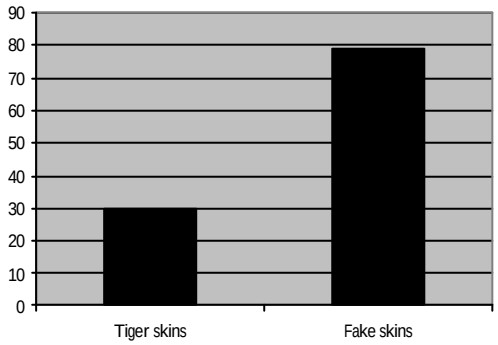
countries labelled as "seal penis" were actually from different animals (Lavigne *et al.*, 1999). Since Tigers are much rarer than seals in the wild, and given the demand for the commodity, the proportion of fakes among "Tiger penises" on the market is probably higher.

Tribal people in India, displaying fake Tiger skins

Fake Tiger skins are common, particularly in India, where fakes have been seized by government authorities more often than real Tiger skins (**Figure 1**). A report by TRAFFIC India identified villages known for producing fakes in 11 districts in South India alone (Anon., 1999b). The most infamous is a village of Hakki Pikki tribals near Shimoga district in Karnataka, who craft their fake Tiger skins with a level of artistry that has fooled several wildlife inspectors. They are unique in their production of fake Tiger cubs. Domestic cats are bleached, stripes are painted on with black hair dye, and the animals fed a dose of *sindhoor*, the vermilion dye worn along the hairline by many married women in India, which "acts on the voice of the animal and makes its voice hoarse and gruff…like a muffled roar" (Rao and Dikshit, 1997).

Figure 1

Seizures of real and fake Tiger skins in southern India, 1994-99



Source: Zoo Outreach reports to TRAFFIC India (Anon., 1999b, d).

Fake Tiger claws and teeth are also widespread in souvenir markets. In some cases there is not much attempt to disguise the fact these are artificial. In Lao PDR, for example, outsized "Tiger" canine teeth are made of clay, with an image of a sitting Tiger engraved at one end (Anon., 1999e). Other fake teeth are made from resin and fake claws from bovine horn. Even whole skulls made from resin have been seen on sale in Bangkok, Thailand, in 1993 (S. Broad, *in litt*., 1999). Prior to carrying out their Tiger trade survey in 1999 in Vietnam, biologists from the Institute of Ecological and Biological Resources spent a day at the natural history museum in Hanoi, refreshing their knowledge of the appearance of various Tiger parts. They subsequently estimated that 50-70% of the teeth and claws they found in the souvenir markets which claimed to be from Tigers were not so (Nguyen *et al.*, 1999).

It is possible that the conservation community's growing awareness of the prevalence of fake Tiger parts and products reflects a declining supply of wild Tigers (Hemley and Mills, 1999). Chen (1990) wrote that, "Tiger bone counterfeits have been found in the markets [in China] for more than ten years," which dates

back to about the time when "an alarming decline in [Tiger] numbers" was becoming apparent in China (Lu and Sheng, 1986). However, Chang Hsien-Cheh of the China Medical College in Taichung, Taiwan, argues (pers. comm. in Chan, 1995a), that fake Tiger parts have always been a tradition in Chinese medicine. Tigers are powerful, dangerous animals which would have been more difficult to kill a thousand or even a hundred years ago, prior to the spread of modern firearms. Chang suggests that real Tiger parts were historically so rare that only the emperors and nobility could enjoy them, whereas the common people made use of substitute bones that were Tiger in name only.

The prevalence of fakes makes it difficult to judge the real impact of trade in Tiger products on wild Tiger populations - indeed, difficult to judge whether or not official statistics of imports and exports from the early 1990s, when trade was still legal in key consuming markets, offer a valuable index of former or potential rates of Tiger bone consumption. South Korea's former annual consumption of Tiger bone (**Table 4**) might have averaged the equivalent of about 31 Tigers per year (374 kg of bone and an approximate weight of 12 kg per skeleton). If a proportion was fake Tiger bone (a distinct possibility given the above-mentioned prosecution of *Ik Su Pharmaceutical Company* for using fake bone), annual consumption of genuine Tiger bone would have been less. On the other hand, if unrecorded trade in Tiger bone was also taking place (despite low import tariffs (Mills, 1993)), then consumption was higher. Unless investigators can and do distinguish between real and fake articles in the market, the impact of trade on wild Tiger populations cannot be evaluated clearly.

Many conservationists feel the best strategy for saving wild Tigers is to eliminate markets for all their parts and products – real and fake. This is the thinking behind the laws passed in a number of countries which permit the steep penalties applying to illegal traders of real Tiger parts to be applied to those trafficking in any product claiming to contain Tiger, even if it actually contains none at all. On the other hand, it is possible that widespread availability of manufactured medicines labelled as containing Tiger bone but containing none relieve trade pressure on the Tiger, by providing a cheaper alternative to the traditional prescription using raw bone. A Chinese research team is working on synthesizing Tiger-bone powder, mimicking the amino acid profiles of real Tiger bone in the laboratory (Chu and But, 1997, P. But, pers comm., and L. Huang, pers. comm., 1999). It is clear that they would want to market this substance as "artificial Tiger bone", with an explicit link to the Tiger - which may prove confusing for those enforcing new laws prohibiting imports of anything labelled as containing Tiger. If it comes to market, time will tell whether self-declared fake Tiger bone proves as popular as fraudulent imitations.

Whatever the benefits or otherwise of promoting fake Tiger products, it is important to distinguish between the authentic and inauthentic. To encourage a better understanding of the complex role of fakes in the Tiger trade, this report attempts to distinguish between real and fake items whenever possible. It is also important to distinguish between fakes and substitutes - most conservationists seek to remove the face of the Tiger from traditional medicine by promoting the use of Tiger bone substitutes, not of Tiger bone fakes.

THE SUPPLY: THE ORIGIN OF ILLEGAL TRADE IN TIGERS AND THEIR PARTS

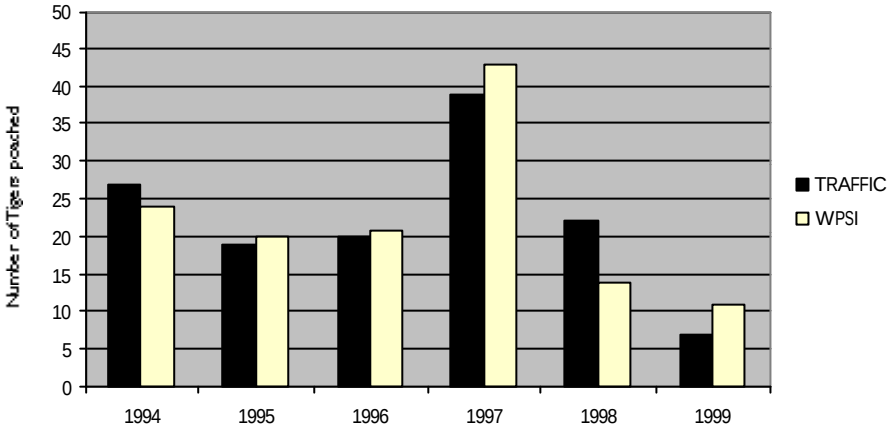
Tigers wild and farmed

The Tiger trade has been supplied mainly from wild Tigers which have been poached, or killed illegally. Poaching can be very difficult to detect and few range States systematically collect and analyse information on incidents of Tiger poaching. NGOs in India stand out for their efforts to compile national databases on Tiger mortality. TRAFFIC and WPSI databases show an average of 22 cases of Tiger

poaching per year were reported in India between 1994-99 (**Figure 2**). Total Tiger deaths, including poaching, registered in the TRAFFIC database averaged 46 Tigers per year for the same period (**Figure 3**). It is notable that these figures suggest reported poaching remained at a relatively steady level during the late 1990s. A meaningful analysis of trend is, however, impossible without information on enforcement and data collection effort during the same period. Undoubtedly many Tiger deaths go unrecorded. Evidence of illegal trade in Tiger bone and skins in India suggests that actual poaching levels have been and remain substantially higher than those detected by authorities and NGOs. In the early 1990s, illegal trade was in fact the main indicator of poaching pressure on wild Tiger populations throughout Asia.

Figure 2

Tiger poaching in India, 1994-99



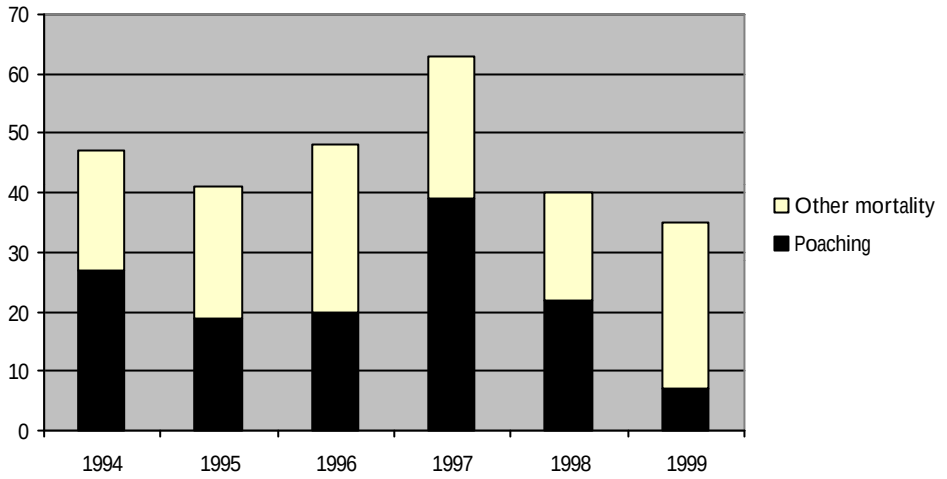
Note: Poaching classified as illegal killing, but not necessarily for purposes of trade.

Source: Unpublished databases maintained by TRAFFIC India and the Wildlife Protection Society of India (WPSI).

Tigers are killed for two reasons: to earn money from the trade in Tiger products and to protect humans and livestock from Tigers. It is important to attempt to distinguish between the two motives. Although killing Tigers that attack livestock or people may be illegal, the threat to the Tiger from this defensive killing is not of the same order as the threat from commercial poachers, who aggressively seek out Tigers on behalf of distant consumers. Tigers in conflict with people constitute a local problem likely to be a feature of conservation management for as long as Tigers and people continue to compete for space and sustenance. However, population dynamics models suggest that Tiger populations may be resilient to steady low offtakes (Karanth and Stith, 1999), such as would be expected to arise from such conflicts. Commercial poaching, on the other hand, could result in higher offtakes, increasing the chances of sharp population declines or extinction of vulnerable Tiger populations (Kenney *et al.,* 1994). Kenney *et al.*, (1994) emphasize, moreover, that "it is unwise to be complacent even if anti-poaching efforts are successful", since the demographic consequences of poaching might not be immediately obvious and extinction may occur many years after poaching is reduced or eliminated. Commercial poaching has the potential to eliminate Tigers from what would otherwise be wilderness strongholds, far from people.

Figure 3

Tiger mortality in India from poaching and other causes, 1994-99



Note: "Other mortality" includes natural death, accidental death (e.g. if struck by a train) and unknown causes.

Source: Unpublished database, TRAFFIC India.

Although killing Tigers is now illegal in all Tiger range States, exception is often made by the authorities (by policy or by practice) if the Tiger is killed to defend human life or livestock. However, the distinction between killing for profit and killing for protection is often blurred. Tigers killed for trade may be misrepresented to the authorities as having been killed to prevent depredation. Even where Tigers have been killed for taking livestock, which they frequently are near human settlements, the financial incentive to trade the body parts of such Tigers remains. Such use of "pest Tigers" was demonstrated in the past: from the early 1950s until 1977 the Government of China offered a bounty for Tigers killed in a national campaign to eliminate pests. In the provinces south of the Yangtze river, fur trade records show that around 3000 Tigers were killed during this period. Average annual trade fell from about 393 skins per year in the early 1950s to just five per year by the mid-1970s (Lu and Sheng, 1986), indicating a precipitous decline in the wild population. The South China Tiger is now considered the most endangered Tiger subspecies and is virtually extinct in the wild (Nowell and Jackson, 1996 and Tilson *et al.,* 1997).

Development of management solutions for situations where Tigers live alongside people is a high priority for conservationists (Nowell and Jackson, 1996). These include: having government authorities rather than local villagers capture or kill problem Tigers; compensating villagers quickly and adequately for livestock (and human) losses to Tigers; improving livestock protection and management; and developing alternative livelihoods. Such measures should help reduce human-Tiger conflict and a villager's incentive to trade in Tiger parts - especially if demand from distant consumer markets can be curtailed.

The late 1990s saw some spectacular success in building anti-poaching capacity (see **Increased investment in Tiger conservation**), particularly in Russia (Galster and Eliot, 1999), which was undergoing a surge of Tiger poaching in the early 1990s, amidst economic and political chaos. In general, however, anti-poaching capacity is reported still to be insufficient to protect Tigers. In 1997, a comprehensive assessment of potential Tiger habitat ranked over 85% as subject to moderate-to-high poaching

pressure (Dinerstein *et al.*, 1997). Even the few parks considered by Dinerstein *et al.* (1997) to be relatively safe for Tigers still have problems: in Thailand's Khao Yai National Park, two Tigers were poached in 1999 (S. Galster *in litt.*, 1999) and rangers have been involved in gunfights with poachers (P. Cutter *in litt.*, 1999).

While wild Tigers have been the most visible source of supply for consumer markets, Tigers in captivity have also been used. Some people have argued that "farming" Tigers for their parts has the potential to benefit Tiger conservation, by satisfying market demand and eliminating the financial incentive to poach ('t Sas-Rolfes, 1998). Others view Tiger farming and the prospect of a legal trade in farmed Tiger parts and products as risking any gains made in reducing consumer demand and controlling illegal trade (Hemley and Mills, 1999 and Sellar *et al.*, 1999). Tiger farming is discussed in more detail later.

Tiger trapped and shot by a local hunter in Cambodia's Cardamom Mountains, 1997

Progress in Tiger trade control in supplying markets since the early 1990s

Increased investment in Tiger conservation

At the beginning of the 1990s, it seemed possible that the Tiger would be extinct in the wild by the year 2000 (Meacham, 1997). As it is, all 14 Tiger range States entered the new millennium without having lost their Tigers. While populations are at critically low levels in several range States, particularly China (Qiu, 1996; Ma *et al.*, 1997; Tilson *et al.*, 1997; Duckworth and Hedges, 1998; Miquelle, 1998 and Sun *et al.*, 1999) and the Democratic People's Republic of Korea (North Korea) (Anon., 1999g), Tigers still exist in the wild. Substantial effort, including financial investment, has helped secure key Tiger populations, particularly in Bhutan, India, Indonesia, Malaysia, Nepal, and Russia. Tiger conservationists have long been active in India, Russia and Nepal, but research effort is more intensive there now, of a higher quality, and coupled with numerous initiatives to integrate Tiger protection measures with development incentives for the benefit of local communities (Seidensticker *et al.*, 1999). Advances in building anti-poaching capacity in most range States have been greatest in India, Indonesia, Malaysia, Nepal, Russia and Thailand and these programmes are also developing local intelligence networks to collect information to aid detection and prevention of poaching (Maskey, 1998; Galster and Eliot, 1999; Kumar and Wright, 1999 and Sellar *et al.*, 1999). Meanwhile, other programmes are exploring ways to help local people benefit

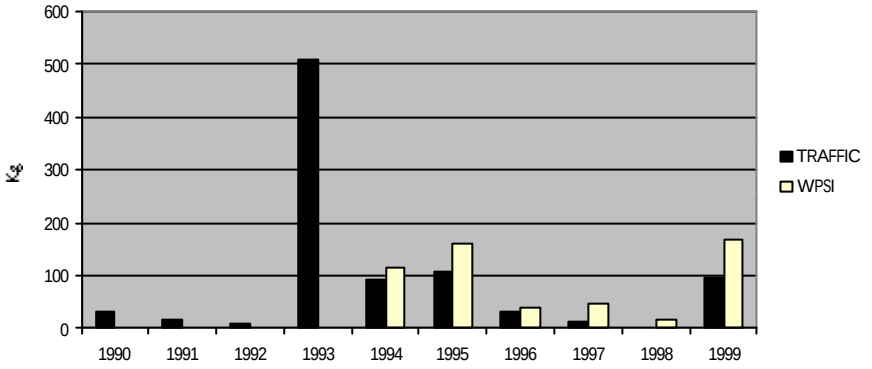
from protected Tiger populations, through ecotourism and community development initiatives (Thapar, 1989, Dinerstein *et al.*, 1999 and MacKinnon *et al.*, 1999). Research programmes in Bangladesh, Bhutan, Cambodia, China, Indonesia, Lao PDR, Malaysia, Thailand and Vietnam have begun since the early 1990s and each range State has at least one active project gathering data on the status and distribution of Tigers. Most have drafted national Tiger action plans.

Seizures of Tiger bone have fallen from early 1990s peaks in India and China

India and China were the only Tiger range States where government authorities seized large quantities of Tiger bone in the early 1990s. In the late 1990s, seizures declined in both countries.

Figure 4

Official seizures of Tiger bone in India over the 1990s, according to two NGO databases



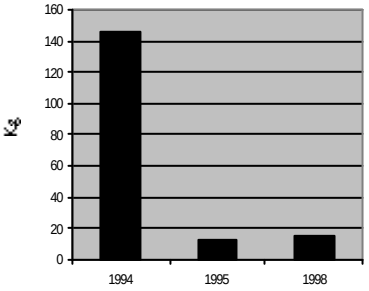
Sources: Unpublished databases, TRAFFIC India (1990-June 1999) and Wildlife Protection Society of India (WPSI) (1994-October 1999).

The largest Tiger bone seizures have been in India, probably because it has the largest Tiger population, and an active conservation community. Seizures were low before 1993, but that year they peaked at over 500 kg, with 400 kg resulting from a single case. Seizures in the late 1990s fell from the 1993 peak, but not to levels as low as in 1990-1992 (**Figure 4**).

In 1994, Chinese authorities burned 50 kg of "authentic and artificial" Tiger bone confiscated from traditional medicine street stalls. They also confiscated eight Tiger skeletons, according to the government's report to the CITES Tiger technical mission in 1999 (Anon., 1999h). Since 1994, seizures of raw Tiger bone have declined, according to this report (**Figure 5**). Single cases involving Tiger bone were reported in 1996 and 1997, but quantities were not specified.

Figure 5

Government seizures of Tiger bone in China from 1994-98



Note: Tiger skeleton weight estimated at 12 kg. Single seizures of Tiger bone were reported in 1996 and 1997, but no quantities were specified.

Source: Reported to the 1999 CITES Tiger Technical Mission by the Chinese Government (Anon., 1999h).

Declines in reported seizures may indicate declining levels of illegal trade, but seizure statistics alone cannot show trends without reference to records of enforcement and data collection effort and Tiger hunters and traders may have become more sophisticated at avoiding detection. Illegal trade still persists in India and China, as discussed below under **Problems**.

Prices for raw Tiger parts lower or unchanged in most range States

Table 7 shows prices paid for Tiger parts at the supplying end of the trade in the early and late 1990s. Two price categories are included: prices paid to hunters, and prices paid by traders at the wholesale level. The wholesale trader prices for Tiger skin are problematic to interpret, because in many cases they were reported from traders at large wildlife markets who sell to both retail and wholesale customers. These prices are probably on the high side and may appear to exaggerate profits for Tiger skin traders. There are no data on supplier prices for Tiger bone or Tiger skin from peninsular Malaysia, Bangladesh, Bhutan or North Korea for any time during the 1990s (see **Table 7**).

As with most data relevant to Tiger trade, price data are patchy and difficult to come by because markets have gone underground. Prices reported to undercover trade investigators who are strangers may not be representative of prices typically paid amongst industry contacts who know each other well. Prices vary and are not necessarily consistent: for example, hunters in Cambodia reported receiving a higher average price for a whole Tiger carcass from traders in 1997 (Cat Action Treasury (CAT), unpublished data; **Box 1**) than wholesale traders reported receiving from other traders in 1999 (Sellar *et al.*, 1999). In general, however, prices paid to hunters by traders are lower than prices paid between traders.

If the prices reported in **Table 7** are accurate, they suggest progress in Tiger trade control, for prices have not increased markedly over the 1990s in most Tiger range States. While Tigers and their parts remain valuable commodities, at least prices have not risen sharply. Lack of a major price rise implies that the trend of increasing consumer demand for Tiger parts that was apparent in the early 1990s has been halted. Declining wholesale prices reported from Russia, China, and India in the case of skins, suggest declining market demand. In Vietnam and Cambodia, this is not the case (**Table 7**; **Box 1**), and this is discussed below(**Supplying markets still operate in some key range States**).

Tiger poaching not primarily driven by trade in some range States

In some range States, poaching pressure is not solely commercial and Tigers are frequently killed in order to protect human life and livestock. Given the crowded state of Asia, conflict with people will be the wild Tiger's lot for the foreseeable future and, since India has large numbers of both Tigers and people, human-Tiger conflict is most pronounced in that country. In southern India, collection of data on Tiger mortality for the TRAFFIC Network by Zoo Outreach found Tigers killed "mainly due to human-Tiger conflicts, though the incident sometimes leads to collecting paws, claws, or in certain cases, skin" (Anon., 1999d). The report lists a number of cases where Tigers were poisoned because they had attacked or threatened livestock, and carcasses were buried or left to rot in the forest. Most of India's poaching cases have been reported from southern India, but there have been relatively few seizures of Tiger bone or Tiger skins, compared to the north (**Figure 6**). While seizures of Tiger bone have declined in India (**Figure 4**), reported poaching pressure has remained relatively steady (**Figure 2**). This suggests that poaching may not be driven primarily by trade, although there is still a significant illegal trade in Tiger parts, as discussed in the next section under **Problems**.

Table 7

Wholesale prices (USD) for Tigers and their parts in supplying markets: early 1990s compared to late 1990s

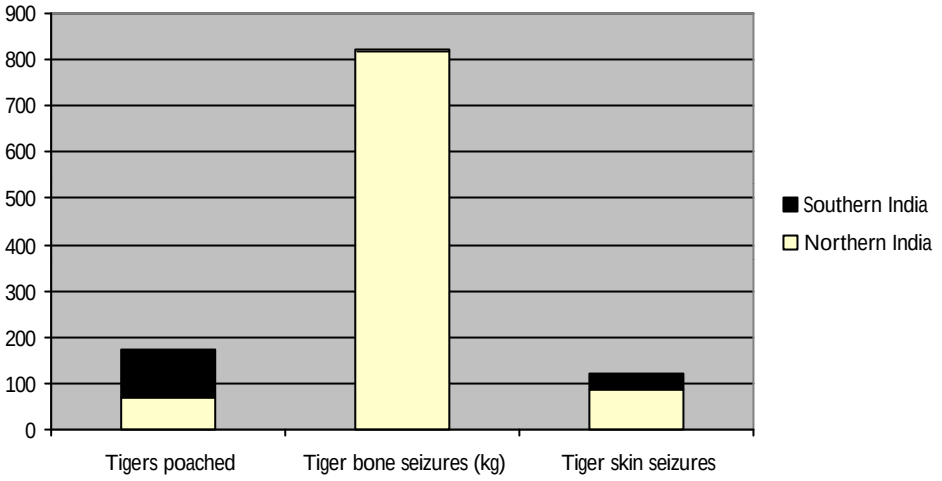
Time	Country	Whole carcass		Skeleton		Per kg bone		Skin		Live Tiger	
		H	T	H	T	H	T	H	T	H	T
Early 90s	Cambodia		1500				55-250		400-900	200-250	400-500
Late 90s		1110	500-700			169	221	149	468 -1092		800
Early 90s	China						404-539				
Late 90s							126-172				
Early 90s	India	56				15	200-300	440	1390-2220		
Late 90s						40	488-780	118-236	976-1463		
Early 90s	Indonesia						250				
Late 90s						14	20-200				
Early 90s	Lao PDR					60-90	76-250	150-200	400-800		
Late 90s				540-800		42-160					1000
Early 90s	Myanmar						200-300		55-2535		
Late 90s		150-2000	317				50-240	1500	42-1807		
Early 90s	Nepal					100-130					
Late 90s						100-146					
Early 90s	Russia	1000-3000	3000-6000	1000-2000	2000-5000	20-100	50-300		5000-15 000		
Late 90s		3000		600	2000				1500-3000		
Early 90s	Thailand										2000
Late 90s									311-1167		350-700
Early 90s	Vietnam				1000		100-125				1620
Late 90s		1000-2642	2140-3357		1430-3570		225-320		153-2000		1540-3000

Note: Prices have not been adjusted for inflation. H = Prices paid to hunters by traders; T = Prices paid to traders by other traders. Blank = no data.

Sources: (E = early 1990s; L = late 1990s). Cambodia: E - Martin and Phipps, 1996; L - Srifa *et al.*, 1997; Ware, 1997; Compton *et al.*, 1998; Anon., 1999w; Heng, 1999; Nowell *et al.* 1999 and in prep.; Sellar, *et al.*, 1999; Sun Hean and J. Mills, *in litt.*, 1999. Lao PDR: E - Chazée, 1990; Martin, 1992; Anon., 1999j. Russia: E - Anon., 1994a; L - Chestin, 1998; Sellar *et al.*, 1999; J. Mills, pers. comm., 1999. Myanmar: E - Tan, 1987; Lewis, 1993; Martin, 1997; L - Martin, 1997; Glaser, 1998; Anon., *in litt.*, 1998; Anon., 1999c. Vietnam: E - Nash, 1993; Galster *et al.*, 1994; Mills and Jackson, 1994; L - Anon., 1996a; Torode, 1996; Compton *et al.*, 1998; Le, 1999; Nguyen *et al.* 1999. Thailand: E - Nash, 1992a; L - Mainka, 1997. India: E - Anon., 1997b; Jackson, 1992; Mills and Jackson, 1994; Galster *et al.*. 1994; Currey, 1996; L - Hanfee, 1998, Pringle *et al.*, 1999; TRAFFIC India staff, *in litt.*, 1999; Wildlife Protection Society of India staff, *in litt.*. 1999. Indonesia: E - Tilson and Traylor-Holzer, 1994; L - Plowden and Bowles, 1997; Theile *et al.* in prep. Nepal: E - Anon., 1991; Mills and Jackson, 1994; L - Pringle *et al.*, 1999; C. McDougal, pers. comm., 1999. China: E - Becker, 1986; Tan, 1987; L - Mills, 1997.

Figure 6

Comparison of Tigers poached and seizures of Tiger parts in northern and southern India from 1993-99



Note: Southern India includes States of Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu.

Source: Unpublished database, TRAFFIC India and Zoo Outreach.

Human-Tiger conflict is also described by experts as being a major motivating factor in the persecution of Tigers in Russia and Sumatra (Sellar *et al.,* 1999). Malaysia and Nepal have significant levels of Tiger-human conflict and often local people summon government authorities to deal with Tigers which attack livestock or people (TRAFFIC Southeast Asia staff, *in litt.*, 1999 and D. Smith, pers. comm., 1999). Livestock losses to Tigers have also been frequently reported from Lao PDR. Killing a Tiger for livestock protection is legal in Lao PDR and the government has reported receiving about 10 requests per year for assistance with stock-raiding Tigers (Duckworth and Hedges, 1998).

Even if the motivation for killing Tigers is not primarily for trade, conflict with people poses a real challenge to efforts to eliminate markets for Tiger products, because it promises a continuing opportunity for supply. However, the fact that commercial motives are not the foremost may been interpreted as a positive sign by those attempting to control Tiger trade.

Little evidence to indicate the existence of major supplying markets in several range States

Malaysia does not appear to have any significant trade in raw Tiger parts (although manufactured medicines labelled as containing Tiger bone are still available in its domestic consumer market, as discussed in **Retail Consumer Markets**). There have been few seizures of raw Tiger parts in peninsular Malaysia during the 1990s (**Table 8**). According to an extract from one of its reports, the second CITES Tiger Technical Mission "spoke to a variety of persons and organizations that, potentially, were in a position to be aware of Tiger poaching and illicit trade. Whilst no in-depth studies have been conducted, it seems that criminal activities are concentrated in rural areas but, even there, are apparently at a level below that experienced in other range States" (Sellar *et al.,* 1999).

Table 8

Prosecution cases involving raw Tiger parts in peninsular Malaysia, 1990-98

Year	Case	Penalty
1995	Possession of Tiger bones and piece of Tiger skin	Case taken to court, fined USD1433
1996	Possession of teeth and claw	Case compounded, fined USD123
1998	Possession with intent to sell Tiger meat (plus other wild animal meat)	Case taken to court, fined USD2763

Source: Law Enforcement Division, Dept. of Wildlife and National Parks, peninsular Malaysia, *in litt.* to TRAFFIC Southeast Asia, 1999.

There are no reports of Tiger trade in Bhutan, although officials report that Tigers are killed to protect livestock (Mainka, 1997). North Koreans were reported to purchase Tiger parts from their forestry concessions in the Russian Far East and Tiger-bone wine was seen for sale at tourist sites in North Korea (Mainka, 1997), but there is no evidence to indicate that North Korea, with its small Tiger population (Anon., 1999g), plays a significant role in the Tiger trade.

Problems in Tiger trade control in supplying markets

Supplying markets still operate openly in some key range States

The surveys listed below, carried out in the late 1990s, showed that significant supply markets for live Tigers and Tiger parts, especially bones, still operated openly in the key range States concerned:

- **Cambodia** (Martin and Phipps, 1996; Ware, 1997; Srifa *et al.*, 1997; Heng, 1999; Nowell *et al.*, 1999; Sellar *et al.*, 1999; Sun Hean, 1999 and CAT, unpublished data, 1998);
- **Indonesia** (Plowden and Bowles, 1997; Indrawan *et al.*, 1999; Tilson, 1999; Anon., 1999i and Theile *et al.*, in prep.);
- **Lao PDR**(Anon., 1999e,j);
- **Myanmar** (Anon., 1999c,t and CAT, unpublished data, 1998); and
- **Vietnam** (Compton *et al.*, 1998; Le, 1999 and Nguyen *et al.*, 1999).

These countries are all believed to harbour sizeable and important Tiger populations (**Table 5**). According to information collected in Cambodia, Myanmar and Vietnam, poaching of Tigers there is primarily driven by commercial interest in trade in the animals and/or their parts. In Lao PDR and Indonesia, human-Tiger conflict motivates some persecution of Tigers, but there are indications that this is often a cover for commercial interest (Griffiths, 1994 and Anon., 1999e).

Cambodia has been one of the main supplying markets for Tiger trade over the 1990s (**Box 1**). Myanmar and Lao PDR are also key suppliers, with very limited local consumption of Tiger parts. Most people interviewed (see sources of information cited above) reported to trade investigators that hunting and trade in Tigers caters largely for foreign markets, particularly China, Vietnam and Thailand. Large areas of Myanmar (Arakan Yoma, Chin Hills, North Myanmar and Pegu Yoma) are reported by locals to be

depleted of Tigers, hunted for the Chinese medicine market in the late 1980s and early 1990s (Johnsingh and Sukumar, 1996; Rabinowitz and Saw Tun Khaing, 1998 and CAT, unpublished data). In Lao PDR, Tigers are still widespread, according to field surveys, but probably at relatively low densities (Duckworth and Hedges, 1998). In all five countries there is a great deal of subsistence hunting and the Tiger's prey base is being depleted.

FOCUS ON A MAJOR SUPPLYING MARKET: CAMBODIA

Cambodia has some of the most extensive and unfragmented stretches of forest in Asia, with forest cover estimated at close to 60% in the late 1990s (Sun Hean, *in litt.,* 1999). Three decades of conflict have kept the forests of Cambodia off limits to the conservation community, but not the international timber trade, which has illegally logged large areas (especially in Kampong Thom and Pailin regions - see **Figure 7**). However, Cambodia has since implemented a major programme of forest reform and instituted a logging ban, backed up with military force. The Khmer Rouge has surrendered, and the country's impoverished people and rich natural resource base have finally gained the support and investment of the international community.

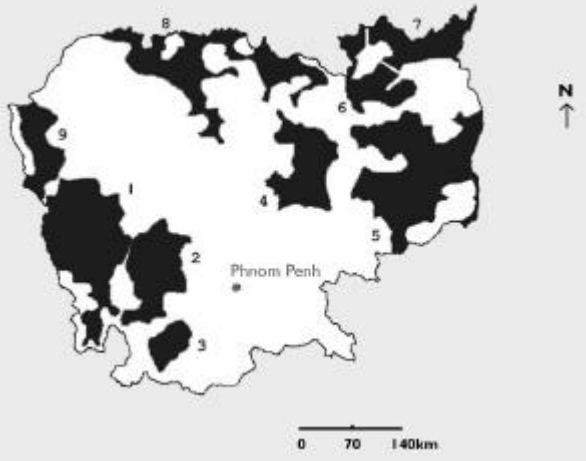
In order to gather information about the status of the Tiger and other large mammals, Cat Action Treasury (CAT) and the Wildlife Protection Office (WPO) of the Ministry of Forestry, Agriculture and Fisheries organized interviews of experienced hunters around the country. The interviews were conducted by a team of Royal University of Agriculture (Phnom Penh) graduates, who had specialized in studying wildlife use and were experienced at interviewing and working with local hunters. The team interviewed over 150 hunters in 1998, and brought back information from parts of Cambodia never before visited by conservation researchers (CAT/WPO, unpubl. data).

Substantial trade in Tiger parts has been reported from Cambodia by market surveys in the 1990s. The hunters interviewed by the CAT/WPO project in 1998 identified poaching as the main threat to Tigers (**Table 9**). On average, each hunter knew of about five Tigers killed in his area in 1997, and about five people who hunted Tigers. Most Tiger populations were indicated as decreasing. The only ones that were not, notably, were the areas with estimated low Tiger populations (Nowell *et al.,* 1999) and no reported Tiger trade (**Table 10**). There were very few reports of Tigers attacking livestock, but 77% of people interviewed in the sparsely populated Cardamom Mountains region reported Tiger attacks on people, primarily wood collectors and loggers (Weiler *et al.,* 1999).

There was little variation in the prices per kilogramme of Tiger bone reported by hunters (**Table 10**). Hunters from western Cambodia tended to quote prices in Thai baht, and indicated Thailand as the major destination. Other regions indicated Phnom Penh and Vietnam as major destinations, and quoted prices in US dollars. Average prices for Tiger skin varied widely, and were less, on average, than a kilogramme of Tiger bone. Hunters indicated large price increases for Tiger parts since the early 1990s. This suggests strong commercial poaching pressure on Tigers for the medicinal market.

Figure 7

Estimated distribution of Tiger populations in Cambodia



Key: 1. Cardamom Mountains; 2. Phnom Oral; 3. Elephant Mountains; 4. Kampong Thom; 5. South of Sre Pok; 6. North-east Buffer; 7. Virachey; 8. Northern Plains; 9. Pailin.

Source: Nowell *et al.,* 1999.

Table 9

Tiger status and threats in nine forested areas of Cambodia in 1998, from interviews with local hunters

Region	No. of hunters interviewed	% of respondents describing local Tiger populations as....			% of respondents identifying major threat to Tigers as....		In 1997, each respondent knew of, on average.....	
		Increasing	Stable	Decreasing	Logging	Hunting	No. of Tiger hunters	No. of Tigers killed
1	31	42%	0	58%	0	89%	8	14
2	9	14%	29%	57%	33%	66%		
3	12	55%	45%	0			<1	2
4	11	10%	30%	60%	83%	17%		
5	37	11%	0	89%	52%	76%	3	3
6	8	0	0	100%	63%	88%		1
7	12	33%	9%	58%	0	86%	8	2
8	17	0	0	100%	24%	88%	3	3
9	16	0	0	100%	81%	75%		3
Average	**153 (total)**	**20%**	**7%**	**73%**	**41%**	**77%**	**5**	**5**

Notes: See **Figure 7** for key to regions. Blanks indicate no data available.

Sources: Unpublished data, 1998 - Cat Action Treasury and the Wildlife Protection Office, Government of Cambodia.

Table 10

Information about Tiger trade in nine forested areas of Cambodia in 1998, from interviews with local hunters

Region	% of respondents indicating presence of active Tiger trade	Average reported price for Tiger parts (USD)		% of respondents indicating price increase since early 1990s	Main buyers of Tiger parts named as....
		Bones (kg)	Skin		
1	100%	187	106	100%	Thailand, Phnom Penh
2	17%				
3	0				
4	0				
5	100%	162	349	92%	Phnom Penh, Vietnam
6	100%				
7		150	14	100%	Phnom Penh
8	65%	186		100%	Thailand, Vietnam
9	33%			100%	Thailand
Average	**60%**	**169**	**149**	**98%**	

Notes: See **Figure 7** for key to regions. Blanks indicate no data available. Phnom Penh is the capital of Cambodia.

Source: Unpublished data, 1998 - Cat Action Treasury and the Wildlife Protection Office, Government of Cambodia.

Heng Kimcchay, who studied traditional Chinese medicine at university and who participated in the interviews with hunters in 1998, interviewed pharmacists and traders around Cambodia for this report (Heng, 1999). Pharmacists were both Khmer and Chinese. They all indicated that Tiger trade was active and that the price for Tiger bone had increased since the early 1990s (**Table 11**). Their average price of USD221/kg corresponds well with the average price of USD169 that hunters reported receiving from traders (**Table 10**). The traders and pharmacists indicated that the volume of Tiger parts in trade had declined since the early 1990s, which corresponds with hunter reports of declining Tiger populations (**Table 9**). Traders and pharmacists all reported very little domestic consumption of Tiger parts in Cambodia, saying that most Tiger parts were exported. Most preferred to continue trading in Tiger bone, rather than use substitutes, although many pharmacists indicated that the domestic market usually used herbal substitutes and other animal bones, because locals cannot afford Tiger bone.

Table 11

Information about Tiger trade in Cambodia in 1999, from interviews with pharmacists and traders

Location and no. of interviews (in brackets)	% of respondents indicating presence of Tiger trade	Since the early 1990s, % of respondents reporting that volume of trade in Tiger bone had....			Since the early 1990s, % of respondents reporting that price of Tiger bone had....			Average price (USD) of Tiger bone/kg	% of respondents who say they....	
		Increased	Decreased	Stayed the same	Increased	Decreased	Stayed the same		Prefer to continue trading in Tiger bone	Find Tiger bone substitutes acceptable
Battambang (4)	100%	0%	100%		75%	0%	25%	233	33%	66%
Phnom Penh (15)	100%	0%	73%	27%	80%	0%	20%	239	62%	38%
Preah Vihear (5)	100%	0%	60%	40%	75%	0%	25%	202	100%	0%
Pursat (9)	100%	0%	45%	55%	100%	0%	0%	212	83%	17%
Average	**100%**	**0%**	**66%**	**31%**	**77%**	**0%**	**17%**	**221**	**66%**	**44%**

Sources: Heng, 1999 and **Annex 1**.

In 1999, Sun Hean, the Deputy Director of the Wildlife Protection Office, carried out a national wildlife trade status survey in order to make recommendations for implemention of CITES (Sun Hean, 1999). He found that most of the products used in traditional Asian medicine, including Tiger bone, went to Vietnam through illegal border crossings, as well as by boat along the Mekong River. On the other hand, most of the products used for decoration, or as symbols of strength and power, including Tiger skins, went to Thailand through the notorious border market of Poipet (**Table 12**). Given their prevalence in Cambodia, landmines are used by hunters to kill Tigers and at Poipet pieces of skin are often sold, from Tigers killed in this way. No fake skins have been reported. A total of eight live Tiger cubs were seen for sale around the country, all of them wild-captured.

"Tiger penises" have been reported on sale at Poipet through the 1990s (**Table 12**). However, none of the hunters or pharmacists and traders interviewed in 1998-1999 (**Tables 9** and **11**) were aware of the penis as a potentially valuable product (Ouk Kimsan and Heng Kimcchay, pers. comms, 1999).

Estimates of the volume of Tiger trade based on interviews with traders have been made. In the capital city of Phnom Penh, two traders estimated their combined annual trade at 38-43 Tigers (Martin and Phipps, 1996). In 1996, two Poipet traders each claimed to sell more than ten skins per year (Srifa *et al.,* 1997). In May 1999, a Poipet trader told a trade investigator he had sold six Tiger skins so far that year (Anon., 1999w). Based on market observation and interviews with all the major traders, Sun Hean (1999 and *in litt*., 1999) estimates that 100 skins were sold in Poipet in 1998-1999, or an average of 50 per year. While other wildlife products leave the country through a variety of illegal border crossing points, traders said that most of the country's Tiger skins were funnelled out through Poipet.

Table 12

Volume of Tiger products available at Poipet market in the 1990s, according to market surveys

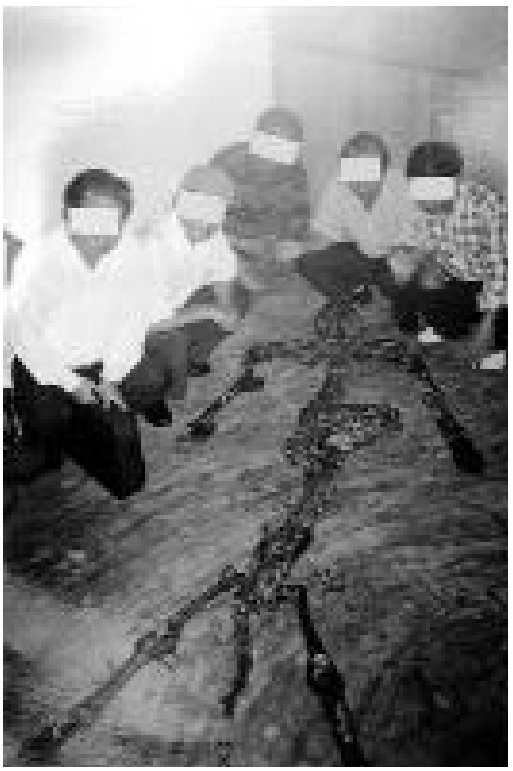
Survey year	Skin	Bones	Skull	Claws and teeth (real and fake)	Bottled fat (fake)	Penis	
						real	fake
1992	5	no	Leopard	yes	yes	no	no
1994	yes	yes	yes	yes		no	no
1996	5	no	no	400		2	yes
1997	3	no	1	>100		no	yes
1999	5	no	3	14-20	yes	yes	yes

Notes: Blank = no data available. Yes = present but not counted. No = not present.

Sources: 1992 - Nash, 1992b; 1994 - Martin and Phipps, 1996; 1996-97 - Srifa *et al*., 1997; 1999 - Anon., 1999w; Sun Hean, 1999; Sun Hean, *in litt.*, 1999.

The situation for the Tiger in Cambodia looks set to improve at the turn of the millennium. Many hunters interviewed in 1999 indicated that they had complied with a national gun amnesty and were no longer in possession of firearms (Sun Hean *et al.,* in prep.). In 1999, the Wildlife Protection Office carried out a series of workshops for provincial officials, many of whom heard for the first time that conservation of Tigers was of national and international priority (Weiler *et al*., 1999). While Cambodia was one of the major supplying markets for Tiger products in the late 1990s, there is hope that, in peacetime and with support from the international community, the trade can be brought under control. The WPO now proposes to establish field offices in the main Tiger areas, and hire former hunters to carry out track-based surveys, to monitor Tiger populations and Tiger poaching.

Indonesia and Vietnam have well-developed domestic retail markets for Tiger products and reports to trade investigators indicate that much of the supply of raw Tiger parts is consumed in-country (see sources listed above). According to the majority (57%) of 92 knowledgeable people interviewed about the source of Tiger parts by Nguyen *et al.* (1999), the Vietnamese market is supplied primarily by Tigers from Lao PDR and Cambodia for its own internal trade. Just 18% indicated Vietnam as the main source of supply. Nguyen *et al.*, (1999) concluded that "despite the lure of higher prices from traders in China and elsewhere, the high demand in the Vietnamese domestic market means that a higher proportion of the limited supply of real Tiger bone will be consumed inside Vietnam." Vietnam's primary retail market is for medicinal Tiger-bone gelatin, or *cao*. This is discussed in following chapters on processing and consumer markets and in **Box 2**.



A Tiger skeleton on sale in a traditional Chinese medicine shop in Ho Chi Minh City, Vietnam, in 1999

Tiger trade in Indonesia is relatively open. Bone is sold for traditional Asian medicine and small pieces of skin, whiskers, teeth and claws are sold as magical amulets, to give protection to the wearer. Estimates of Tiger poaching have ranged from 42 animals per year in the early 1990s (Tilson and Traylor-Holzer, 1994) to 33 per year in 1998-99 (Anon., 1999i, **Table 13**).

Table 13

Tiger poaching cases reported in Sumatra, Indonesia, 1998-99

Location	Number of Tigers killed
Bukit Barisan Selatan National Park	24
Bukit Tiga Puluh National Park	6
Way Kambas National Park	5
Kerinci Seblat National Park	2
Outside protected areas	29
Total	**66**

Notes: Monitoring programme did not cover northern Sumatra. In early 1990s, Tiger poaching was a serious threat to Tigers in this region, particularly around Gunung Leuser National Park.

Source: Monitoring project organized by WWF-Indonesia (Anon., 1999i).

There has as yet been no evidence of large exports of Tiger bone from Indonesia in the late 1990s. The country was reported as having been the major exporter of Tiger bone to South Korea formerly (**Table 4**). According to South Korean Customs statistics, 3994 kg of Tiger bone were imported from Indonesia from 1970 to 1992. If these statistics are correct, if the bones were all genuine, then at an average weight of 12 kg per skeleton, Indonesia exported the equivalent of 333 or an annual average of 17 Tigers during that period, and three-quarters of the amount was exported after Indonesia joined CITES. None of this trade was reported by Indonesia to CITES (Mills and Jackson, 1994).

Supplying markets continue underground in most other range States

South Korean import data presented in *Killed For A Cure* indicated that - after Indonesia - China, Thailand, Malaysia and India were the major suppliers of raw Tiger bone. Malaysia no longer appears to be a major supplier now, although it is difficult to say for certain. A Tiger that killed two people in 1998 was determined by post mortem to have signs of injury from a snare and shotgun wounds (Anon., 1998d,e). Later that year, a Tiger accidentally hit and killed by a public bus had been stripped of its eyes, tail, lower hind legs, tongue, jaw and testicles by the time the authorities arrived (Anon., 1998f).

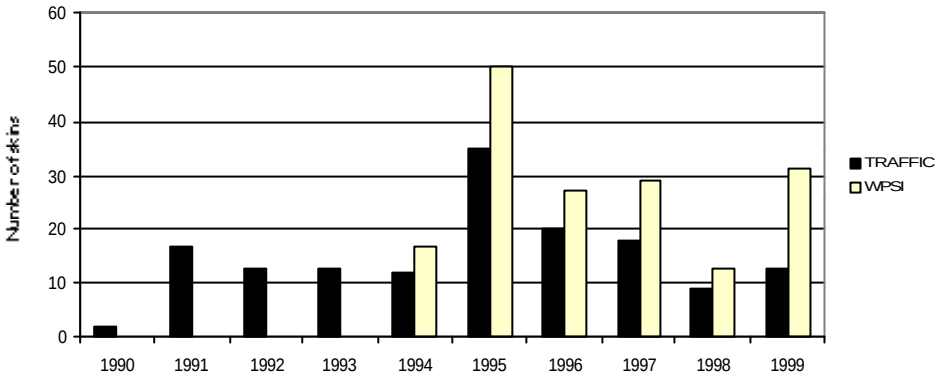
Since 1993, trade has been documented in India mainly by undercover investigations, with major NGO involvement, especially from TRAFFIC India and WPSI (Anon., 1994h; Currey, 1996; Anon., 1997b; Kumar and Wright, 1999 and Sellar *et al.*, 1999). While progress has been made in closing in on illegal wildlife traders, few have actually been prosecuted (Kumar and Wright, 1999 and Banks *et al.*, 1999). **Figures 4** and **8** show continued seizures of raw Tiger parts in the late 1990s, most in northern India, closest to the border with Nepal and the main trade route to China. While official records of seizures of Tiger bone have fallen from the peak of over 500 kg in 1993, undercover investigations by WPSI suggest that substantial illegal trade in Tiger bone is still taking place. **Figure 9** shows amounts of Tiger bone on the black market additional to those shown in **Figure 4**, reported to, and viewed by, WPSI investigators. If these reported incidents are accurate, they show strong continued demand for Tiger bone.

The supplying market in China was never very obvious even in the early 1990s. Gaski and Johnson (1994) report only a few cases of raw bone for sale in traditional medicine wholesale markets and Low (1991) had to make extensive black market contacts in order to uncover trade in Tiger skins in China in 1990 (**Table 14**). Little wholesale trade in raw Tiger parts was detected in China in the late 1990s (Mills, 1997, Banks *et al.*, 1999).

However, although China has very few wild Tigers left (**Table 5**), it is a potential supplying market, owing to its large captive Tiger population and interest in farming Tigers for their parts (see **Tiger farms**). China also remains a commonly reported destination for Tiger skins and Tiger bone reported by other range States (Anon., 1999e,j,k; Galster *et al.*, 1999; Heng, 1999; Kumar and Wright, 1999; Nguyen *et al.*, 1999 and Pringle *et al.*, 1999).

Figure 8

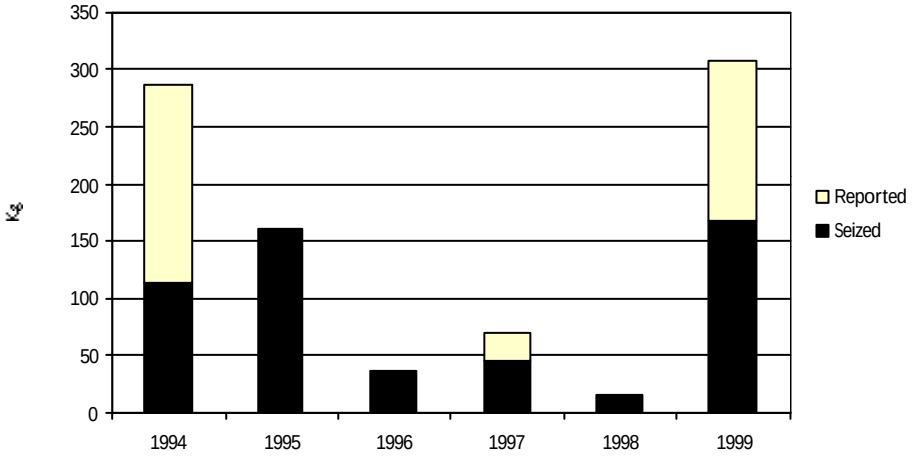
Seizures of Tiger skins in India over the 1990s, according to two NGO databases



Sources: Unpublished databases, TRAFFIC India (1990-June 1999) and Wildlife Protection Society of India (WPSI), 1994-99.

Figure 9

Seizures of Tiger bone and unconfirmed reports of additional illegal trade in India, 1994-99



Source: Unpublished database, Wildlife Protection Society of India (WPSI).

Table 14

Large cat skins seen and reported in the black market trade in south-east and north-east China, 1990

Species	Number of skins seen	Number of skins reported available
Tiger	10	8
Leopard	35	22
Snow Leopard	11	20+
Clouded Leopard	12	14+

Source: Low, 1991.

While there has been little documentation of significant levels of commercial poaching in Thailand in the 1990s, Tigers have been found to occur at lower densities than researchers have predicted (Rabinowitz, 1993 and Harmer, 1998). Some of the most notorious wildlife markets in Asia, documented throughout the 1990s to be dealing in large numbers of Tigers and other big cats, are located just across Thailand's borders in Cambodia, Lao PDR and Myanmar and they cater for a Thai clientele. Most hunters from eastern Cambodia identified Thais as the major buyers of Tiger parts, especially skins but also bone, and quoted prices in Thai baht (**Box 1**). Tiger bone and Tiger penises were observed for sale in Bangkok's Chinatown in 1999 (C. Shepherd, *in litt.*, 1999; S. Galster, *in litt.*, 1999). Thailand also has at least one major Tiger farm (see **Tiger farms**).

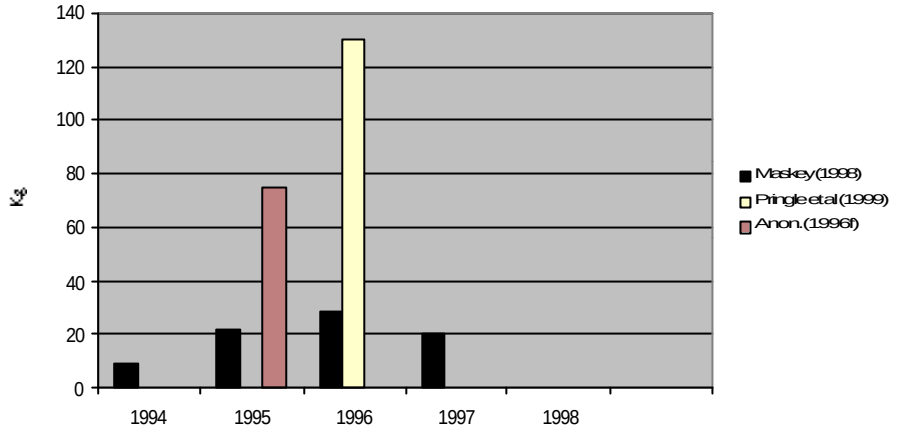
Although seizures have declined in Nepal and Russia, illegal trade and Tiger poaching continue. In Nepal, a major report to analyse compliance with CITES requirements found "credible evidence for a significant and at least semi-organized international trade involving large cat bones…" (Pringle *et al.*, 1999). While key Tiger areas including Royal Chitwan and Bardia national parks are well protected, more remote areas are not. For example, the warden of Suklaphanta park in the far western part of Nepal was recently dismissed, having been implicated in dealing illegally in Tiger bone (Pringle *et al.*, 1999). The northern border with Tibet has only limited police and Customs presence and it was in this region that a 130-kg parcel of Tiger bone, believed to have originated in India, was seized in the post in 1996 (Pringle *et al.*, 1999; **Figure 10**). In April 1999, WPSI received unconfirmed information that 140 kg of Tiger bone was smuggled from India to Nepal (Wright and Kumar, 1999 and **Figure 9**). Nepal appears to play a role in the supplying market primarily by serving as a collection or transit point for Tiger parts originating in other range States.

Russia made great improvements to its anti-poaching capacity in the late 1990s (Galster *et al.*, 1999), but illegal trade continues. The Operative Specialized Inspection to Conserve Amur Tigers and other Rare and Endangered Species of Flora and Fauna, otherwise known as Inspection Tiger, has made a number of seizures of Tiger bone and skins since its establishment in 1994 (**Figure 11**). Inspection Tiger personnel estimate that 20-30 Tigers were poached in 1998 (K. Eliot, *in litt.*, 1999) and 25-30 in 1999 (Anon., 1999l) in Primorsky Kray. Primary destinations for Tiger parts were identified as South Korea, China, Japan and the Russian domestic market (Anon., 1999l).

In Bangladesh, there have been reports of substantial trade in Tiger skins (Kumar and Wright, 1997 and Anon., 1999m), as well as a souvenir trade in teeth and claws (Gillie, 1997 and Anon., 1999m). However, there are no reports of trade in Tiger bone, although trade investigations are underway (TRAFFIC India staff, *in litt.*, 1999). In the late 1990s, the three Sundarbans sanctuaries were understaffed and wildlife guards were under-equipped (Anon., 1999m).

Figure 10

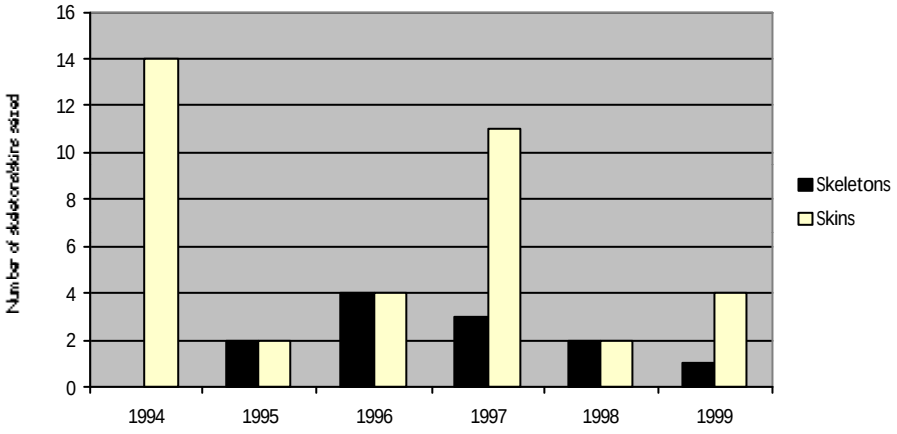
Seizures of Tiger bone in Nepal in the late 1990s, according to three different sources



Notes on sources: Maskey (1998) includes seizures from three protected areas (Chitwan, Bardia and Parsa National Parks) from 1994-98. He does not include eight seizures of Tiger bone, mostly whole skeletons (estimated at 12 kg/skeleton), from around Chitwan in 1995 reported in *Cat News* by C. McDougal (Anon., 1996f). Pringle *et al*., (1999) record seizure of a parcel containing 130 kg of Tiger bone posted from southern Nepal to northern Nepal.

Figure 11

Seizures of Tiger skins and skeletons by Russian anti-poaching units, 1994-99



Note: An unknown number of Tiger skeletons was also seized in 1994.

Source: Inspection Tiger and Global Survival Network, unpublished data.

Some supplying markets have seen a shift in the late 1990s from Tiger bones to Tiger skins

In the early 1990s, there were reports from India of poachers taking Tiger skeletons but leaving the skins (Nowell and Jackson, 1996). There are signs that the market emphasis in the late 1990s may have shifted to Tiger skins (A. Kumar *in litt.*, 1999). The widespread availability of fake skins in India indicates high demand for Tiger skins (**Figure 1**). **Figure 8** shows seizures of Tiger skins by Indian Government authorities according to TRAFFIC and WPSI databases. Most of the skins were seized separately from Tiger bone. It is possible that some of the reported seizures were actually fake skins, although both organizations tried to verify seizures when possible. Unlike bone seizures (**Figure 4**), skin seizures have increased during the 1990s.

One of the skins seized in a major haul of Tiger parts made in India, in 1993

Observers in Russia indicate a similar trend (Sellar *et al.*, 1999). Black market prices for a Tiger skin in the late 1990s were higher than those for a skeleton (**Table 7**). Inspection Tiger anti-poaching personnel believe that the trade in Tiger bone to China has declined and become more secretive since China banned medicinal trade in late 1993. They report increased interest in Tiger skins from South Korea, China and Japan, as well as from the newly rich in Russia and the former Soviet republics (Anon., 1999l and Sellar *et al.*, 1999). Since 1994, Inspection Tiger has seized Tiger skins more frequently than Tiger bone (**Figure 11**).

In 1999, China made several large seizures involving at least 11 Tiger skins, but no bone (Anon., 1999n). In 1990, Low (1991) found substantial numbers of Tiger and other cat skins for sale through undercover investigations (**Table 14**); none were on open display at any market, but were instead kept in traders' homes. This type of trade can only be detected through undercover investigations and informants and is difficult to eliminate.

Poaching pressure on other large cats for Tiger bone substitutes

As discussed in the chapter **Forms in which Tigers are traded**, the bones of other large cats are often substituted for Tiger bone in the medicine trade. Some sources indicate that this is a frequent occurrence. For example, a well-informed source estimated that in western Nepal, 95% of what is called "Tiger bone" in the trade is actually Leopard *Panthera pardus* bone (Pringle *et al.*, 1999) and the owner of a karaoke shop in Haiphong, Vietnam, offered Nguyen *et al.* (1999) two frozen "Tigers", which were actually Clouded Leopards *Neofelis nebulosa*. Of seven so-called Tiger skeletons which the survey team observed, two were Tiger skulls mixed with the bones of other animals and one was a Leopard skeleton (Nguyen *et al.*, 1999).

As discussed in the next chapter, **The Processing: Manufacture and Production of Tiger-bone Medicines**, Leopard bone is increasingly seen in place of Tiger bone on the labels of manufactured medicines (Chan, 1995a, Mills, 1997 and Sellar *et al.*, 1999). There has been little research into the status of the Leopard and Clouded Leopard in Asia (Nowell and Jackson, 1996). Many observers reported to the CITES Tiger Technical Mission their concern that the trade was turning to other cat species as acceptable substitutes for Tiger bone (Sellar *et al.*, 1999). Although trade in bones is not well documented for these species, skin trade has been substantial and it is likely that the bones are traded as well.

According to data collected by TRAFFIC India (**Figure 12**) and WPSI (**Figure 13**), seizures of Leopard skins have been much higher than Tiger skins during the 1990s. Higher incidence of Leopard skin seizures are not surprising, since Leopards are more abundant than Tigers in India and also in high demand. Seizures of Leopard bone, however, have been at a much lower level than Tiger bone seizures, despite the higher number of Leopard skins in trade (**Figures 14-15**). Since Leopard bone is a common substitute for Tiger bone, this suggests the possibility that some of what was reported as Tiger bone in the trade and seizure data has actually been Leopard bone, especially since it is very easy to mistake Leopard bones for Tiger bones, size being the main distinguishing feature.

Figure 12

Seizures of Leopard and Tiger skins in India, 1990-98, according to TRAFFIC India

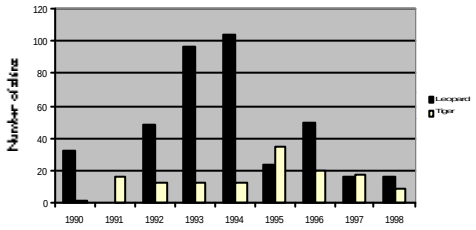
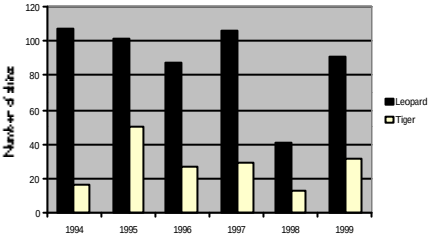


Figure 13

Seizures of Leopard and Tiger skins in India, 1994-99, according to the Wildlife Protection Society of India



Sources: Unpublished databases, TRAFFIC India and Wildlife Protection Society of India

Figure 14

Seizures of Leopard and Tiger bone in India, 1990-98, according to TRAFFIC India

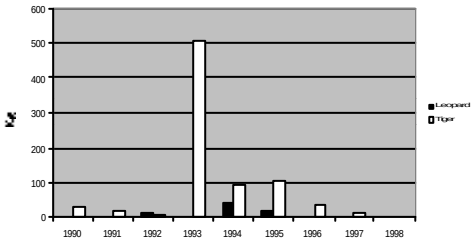
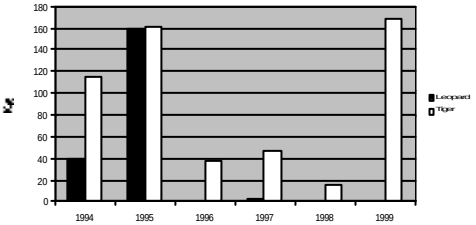


Figure 15

Seizures of Leopard and Tiger bone in India, 1994-99, according to the Wildlife Protection Society of India



Sources: Unpublished databases, TRAFFIC India and Wildlife Protection Society of India

Substantial skin trade has also been documented for other large Asian cats, yet not for their bones. It is possible, even likely, that the skeletons from other large cats have been sold as Tiger bone. Throughout the 1990s, the wildlife market at Tachilek in Myanmar, across the border from the Thai town of Mae Sai, was a notorious centre of trade in large cat skins. Srikosamatara and Sutheethorn (1994) described Tachilek as having the biggest market for cat skins and dried penises they had ever seen. **Table 15** shows the high volume of cat skins of different species recorded by trade investigators. Trade in Clouded Leopards has clearly increased since 1992. Srifa *et al.*, (1997) found from interviews in Aranyaprathet district, Thailand, across the border from Cambodia's Poipet market, that young Clouded Leopards were in demand from wild animal breeders. One broker claimed to have sold 52 young Clouded Leopards between 1992 and 1997.

Table 15

Skins of large cats counted for sale at Tachilek Wildlife Market, Myanmar

Year	Tiger	Leopard	Clouded Leopard
1992[1]	5	16	20
1994[2]	8	24	20
1998[3]	4	7	70+
1999[4]	16	26	95

Sources: [1] Nash, 1992c; [2] Martin, 1997; [3] Davidson, 1999 and [4] Anon., 1999c.

There are reports from those Central Asian republics of the former Soviet Union which border China that poaching of Snow Leopards *Uncia uncia* for the skin and bone trade increased in the late 1990s (R. Jackson and E. Koshkarev, International Snow Leopard Trust, pers. comms, 1999).

In Hong Kong, a TRAFFIC investigator was told that a wine contained Jaguar *Panthera onca* bone (Anon., 1999o). Some manufactured medicines have replaced the image of a Tiger with that of an African Lion *Panthera leo* (Mills, 1997). So far there is no evidence that the bones of either species are being taken from the wild and fed into the Asian medicinals trade. It is possible, however, that sometimes bones from captive animals are used illegally.

Tiger farms

Meacham (1997) opened his book on Tiger conservation with a statement startling to many: "The Tiger is in no danger of extinction." He does not refer to Tigers living in nature, but to the large number of Tigers living in captivity. Most major zoos in the world have Tigers and indeed co-operate in breeding programmes to maintain genetic health and subspecies purity, in case they are ever called upon to reintroduce Tigers to the wild. There are thousands of additional Tigers held by private collectors, circuses, and roadside attractions. Altogether, there are probably at least 6000 Tigers in captivity (S. Christie, *in litt.*, 1999), perhaps more than are left in the wild.

Tigers in captivity are an alternative source to supply the trade in Tigers and their parts. Zoos in Taiwan and China have sold Tiger faeces and urine to customers (Nowell and Jackson, 1996 and Anon., 1997a). The stir-fried Bengal Tiger eaten by celebrities on Japanese television reportedly came from a Tiger which had died in a zoo (Anon., 1998m). In 1989, two Chinese manufacturers of Tiger-bone medicines surveyed by TRAFFIC claimed their bone came from captive Tigers (Gaski and Johnson, 1994) and China indicated in its annual reports to the CITES Secretariat, 1990-1992, that a small fraction of its manufactured medicines were derived from captive-bred Tigers (Mulliken and Haywood, 1994).

Between them, China and Thailand have at least three major captive Tiger populations (**Table 16**). The Hengdaohezi Felidae Breeding Centre, in north-east Heilongjiang province, China, was the first to open, in 1986. It has since established a spin-off Siberian Tiger Park, where tour buses are driven through large fenced areas of Tigers. Tourists pay USD7 for a chicken or USD250 for a cow to be fed as live prey to the big cats (Mickleburgh, 1998 and Smith, 1998), an activity which may soon be prevented by the introduction of new animal welfare regulations presently in preparation (Anon., 1999p). The Xiongsheng Bear and Tiger Mountain Village, near Guilin, in south-western Guangxi province, is a second major Tiger breeding centre in China. The best-known operation in Thailand is the Sri Racha Tiger Zoo, but there are three to four others, including the Pata Crocodile Farm (C. Shepherd, TRAFFIC Southeast Asia, *in litt.*, 1999). The owners of the Tiger breeding operations in China and Thailand have stated their desire to "farm" Tigers for bones and skin. They are officially prevented from doing so by national trade bans, and appear to be using their large Tiger populations mainly as tourist attractions.

"Wildness training" - tourists pay to have live chickens fed to big cats at the Tiger park in Guilin, China, pictured here in 1999

Table 16

Increasing Tiger populations in three Tiger "farms" in China and Thailand

Year	Sri Racha (Thailand)	Hengdaohezi (China)	Bear and Tiger Mountain Village (China)
1986		8	
1987		22	
1990		48-50	
1991	4		
1992	9	62	
1993		69	12
1994	35		
1995	31	57	13
1996		67	
1997	40		
1998	130	104-110	101
1999	185	100+	171-200

Sources: Anon., 1990; Martin *et al.*, 1991; Nash, 1992a; Day, 1993; Anon., 1994d; Chan and Chen, 1995; Tacey, 1995; Shi, 1996; Shivaraman, 1997; Anon., 1998h; Mickleburgh, 1998; Smith, 1998; J. Robinson, *in litt.*, 1998; Anon., 1999y; Southworth, 1999; S. Christie, S. Galster and J. Mills, *in litt.*, 1999.

Tigers breed well in captivity, and breeding establishments are not limited to range States. Highley (1993) and LaBudde (1993) describe several instances of captive Tigers being farmed and killed in Taiwan in the early 1990s. In South Korea, undercover investigators from a local wildlife group, KARMA, were told that Tiger skins from captive animals could be purchased in the country (S. Kang, TRAFFIC East Asia, *in*

litt., 1999). In Japan, the Hokkaido Siberian Tiger Park operated from the early 1980s up until 1999, when it was shut down by authorities (A. Ishihara, TRAFFIC East Asia-Japan, *in litt.*, 1999). It reportedly held up to 47 Tigers in the late 1990s, but when inspected by authorities in May 1999 only nine Tigers were evident (Anon., 1999o). Its pamphlets advertised "the best quality Siberian Tiger fur" and "the production of Tiger bone, the miracle medicine valued in China from ancient times" (Anon., 199la and TRAFFIC East Asia-Japan staff, *in litt.*, 1999).

The "wildness training" arena at the Tiger park at Guilin, China. The sign on the archway, dated June 1999, informs visitors that fierce Tigers are allowed to prey on pigs and cattle "in order to cultivate and resume the tigers' wild nature".

China proposed farming Tigers for their bones before the international conservation community had woken up to the fact that Tiger populations were declining. News of the establishment of the Hengdaohezi Tiger Felidae Breeding Centre was reported by a member of the IUCNCat Specialist Group in 1987, who wrote, "The plan is to breed Tigers there and make a profit…The bone is essential for the manufacture of drug wine, which is widely sold in Southeast Asia, and the shortage of bone is driving up the price, which is now USD400-540 per kg" (Tan, 1987). In the same year, the Chinese delegation at the sixth meeting of the Conference of the Parties to CITES supported the proposal to transfer of the Siberian Tiger subspecies from Appendix II to Appendix I (Jackson, 1987). The proposal was approved, which effectively made any export of Tiger-bone products from commercially captive-bred Siberian Tigers illegal. China's support of the transfer of the Siberian Tiger to Appendix I ended up at odds with its desire to export Tiger-bone medicines from the Hengdaohezi Tiger breeding centre. Since all Tigers were now listed in Appendix I, registration of any operation breeding the species in captivity for commercial purposes required approval by a two-thirds' majority vote of all Parties to CITES. Proposals from China seeking approval to export Tiger-bone medicines derived from the Hengdaohezi breeding centre met with strong opposition in the run-up to the meetings of the Conference of the Parties to CITES in 1992 and 1994 and were withdrawn before formal discussion. China did not submit such a proposal to the 1997 CITES meeting, despite previous news reports that it had plans to do so (Neale and Holland, 1997).

The Chinese have pioneered wildlife farming - Guo *et al.* (1997) reported the existence of 15 000 farms raising 17 species for production of parts valued in traditional Asian medicine. Their list did not include the two Tiger breeding centres (**Table 16**), but one Leopard farm was noted. There are indications from the Chinese Government of continued support, or at least tolerance, of the production of Tiger-bone medicines from Tigers which die naturally or are culled from captivity (Hemley and Mills, 1999) and there is some evidence that some illegal trade has taken place. While the Hengdaohezi Tiger centre claims to have kept all parts from dead Tigers under lock and key, Day (1993) suggested that undercover sales were happening. In the centre's freezer, there were apparently fewer Tiger penises than there should have been. It is perhaps not a coincidence that a different investigator was told in December 1992 by a worker at a Taiwan restaurant that the Tiger penises for their soup came from "north-east China and Thailand" (Highley, 1993). Various visitors to the farm over the 1990s have inspected the contents of the centre's Tiger freezer and there appears to be a discrepancy between approximately 60 carcasses seen by reporters in 1998, and 36-48 reported by the government to the CITES Tiger Technical Mission in 1999 (**Table 17**).

Table 17

Number of Tiger carcasses reported in cold storage at the Hengdaohezi Tiger breeding centre, China

Year	Number of Tiger carcasses	Source
1990	10	Martin *et al.*,1991
1993	26	Day, 1993
1994	26	Mills, 1997
1998	60-64	Mickleburgh, 1998; Smith, 1998
1999	36-48	Anon., 1999h; Sellar, *et al.*,1999

Newspapers reported that the Bear and Tiger Mountain Village was selling bottles of Tiger-bone wine in late 1999 (Bennett, 1999; Southworth, 1999). Although the wine bottles were not labelled as containing Tiger parts, salespeople assured visitors that the wine actually did contain Tiger bone. In an attempt to convince visitors, they were shown earthenware vats of wine, one of which was opened to reveal a Tiger skull soaking. According to Southworth (1999), centre personnel explained how they skirted the law prohibiting sale of Tiger derivatives: "We accept a donation then offer a free bottle of wine…The large bottle of wine comes with a certificate for export, so you have no trouble taking it out of China. We deliberately don't label bottles with the word or image of the Tiger so it is easier to export."

Tigers at Thailand's Sri Racha Tiger Zoo are fed meat from associated commercial crocodile and pig farms. Tigers are breeding rapidly (**Table 16**). Sri Racha has developed a technique of pulling young Tiger cubs off their mothers at a young age and suckling them with farrowing pigs, so that the Tiger mothers can breed again as quickly as possible. The owner of a traditional medicine shop in Bangkok told an investigator in 1999 that he had many Tiger penises in stock, which, since he had bought from Sri Racha Tiger farm, were not illegal in his opinion (TRAFFIC Southeast Asia staff, *in litt.*, 1999). The Thai Government has officially refuted any support for commercial breeding of Tigers for trade in their parts, and affirmed that they would consider this illegal (Anon., 1995c). It was reported to TRAFFIC Southeast Asia that the government was commissioning a study of Tiger farms in 1999.

There is a school of thought that sees the existence of Tiger farms as progress, not as a problem. There are thousands of hybrid, genetically impure Tigers in captivity and many are euthanized, even in modern high-budget Western zoos, for lack of space. When the Chinese first proposed registering their operation for the commercial captive breeding of Siberian Tigers with CITES in 1992, they argued that "the limited legal trade of the derivatives and products of [captive] Tiger will reduce the poachers' desire on the wild population" (Anon, 1992c). The regional news magazine *Asiaweek* agreed. "If the global captive population of approximately 6000 Tigers were managed like a cash crop," the writer in *Asiaweek* suggested, "in no time the domestic Tiger would be an important economic resource, and poaching would be about as profitable as hunting for hen eggs in the jungle" (Holland, 1993). This point was argued further by t'Sas-Rolfes (1998). "Because Tigers breed easily in captivity," he wrote, "farming could provide a substantial volume of Tiger products in a relatively short time, thereby greatly reducing their market prices…The lower market price would reduce the incentives to poach." While this argument may be attractive in theory, in practice there are too many variables which would confound its success (Meacham, 1997). Prices can behave erratically in black markets. Moreover, the costs of maintaining captive Tigers are considerable and it is in no way certain that this would be a cheaper way of obtaining Tiger bone than purchasing a wild Tiger carcass from an impoverished hunter.

Tiger cubs with farrowing sow, photographed in 1999 at Sri Racha Tiger park, Thailand

T'Sas-Rolfes (1998) also argued that "purchasers [of products from Tiger farms] would be motivated mainly by the knowledge that they would be buying the genuine item. Illegal (that is, poached) Tiger bone would be far less attractive because it could be fake." Yet Asia has widespread problems with counterfeit brands of all sorts of products, including Tiger-bone medicines (see next chapter, **The Processing: Manufacture and Production of Tiger-bone Medicines**). Even if the farmed Tiger medicines were labelled and sealed, counterfeits would still be a likelihood and the legal trade could serve as a cover for illegal trade (Hemley and Mills, 1999).

Some reports indicate that the Tiger breeding centres have increased, rather than decreased, pressure on wild Tiger populations. Because major problems with inbreeding have been reported, the centres are reported to purchase wild-caught Tiger cubs to improve their breeding stock. An employee at the Pata Crocodile Farm suggested to an investigator that one of their cubs came from Cambodia (TRAFFIC Southeast Asia staff, *in litt.*, 1999). Meanwhile, traders in Cambodia (Heng, 1999 and Sun Hean, 1999) and India (Anon., 1996d) have reported to investigators that live cubs were sent to Thailand.

Legalized Tiger farming would send a mixed message to consumers of traditional medicine, who would understandably be confused about whether it was acceptable or not to use Tiger-bone medicines. Traditional medicine communities of East Asia, at least, seem to be reaching agreement with those in conservation that use of endangered species jeopardizes export-based growth of their industry (Liang, 1999), although there is support for the concept of Tiger farming among some government officials and members of the traditional medicine community. Another problematic aspect of Tiger farming is that the international conservation community can do little to prevent its legalization for domestic use and trade. CITES has no authority over national regulation of captive breeding for domestic markets in member countries.

THE PROCESSING: MANUFACTURE AND PRODUCTION OF TIGER-BONE MEDICINES

Introduction: millions of manufactured medicines, but how much Tiger?

Before Tiger bone can be consumed as medicine it must be processed. Traditional methods of processing raw bone include grinding it into powder and reducing bones into gelatin by boiling (see **Box 2**). In the late twentieth century, the scale of processing increased with the factory production of various forms of Tiger-bone medicines in large quantities.

China stands out as having been the major producer. Before production was banned in 1993, over 200 factories produced pills, powders, plasters and tea balls with Tiger or Leopard bone listed as an ingredient (Mills, 1997 and Li and Zhang, 1997). *Killed For A Cure* documented exports of large amounts of purported Tiger-bone medicines from China to 26 countries between 1990-1992 (Mills and Jackson, 1994; **Table 3**). South Korea had five manufacturers producing Tiger-bone medicines in the early 1990s (Mills and Jackson, 1994). Other locations which had factories producing packaged Tiger-bone medicines in the late 1980s to early 1990s include Taiwan, Hong Kong, Thailand, Vietnam and Malaysia. The volume of trade in manufactured medicines labelled as containing Tiger bone has far outstripped documented trade in raw Tiger bone.

China and Japan have also produced tonic pills and wines which purport to contain Tiger penis. *Golden Gun Capsules*, made in China but with wording on packaging translated into Japanese and English are a typical example. According to the package, "regular usage promotes virility and leads to potent sexuality." Virility potions sometimes claim the inclusion of Tiger bone, rather than Tiger penis, such as the Chinese-manufactured *Seahorse Genital Tonic Pills* (Environment Canada staff, *in litt.* to TRAFFIC North America-Canada, 1999).

Several organizations keep databases of Asian medicinals purporting to include endangered species. TRAFFIC's database has been published in Gaski and Johnson (1994) and a number of Chinese-manufactured medicines are also listed in Mills (1997). The US National Fish and Wildlife Forensic Laboratory has its database online, with links to forensic test results and photographs of the packaging and contents (http//toltecs.lab.rl.fws.gov/lab/am/). China's Department of Health publishes English language directories to its pharmaceutical manufacturers and their products (e.g., Anon., 1993b).

It is impossible to ascertain visually whether this wide array of pills, plasters, tea balls, tinctures and wines actually contain Tiger parts. The techniques of forensic science are also as yet unable to identify genuine Tiger bone contents in these preparations. Calcium has been detected in the contents of some manufactured medicines purporting to contain Tiger bone, but the calcium could be derived from a mineralogical source other than bone or from bone from a species other than Tiger (Espinoza *et al*., 1994 and in Petrar, 1999).

The best technique for determining Tiger content in medicines would be to search for a unique segment of Tiger DNA, so that any Tiger body part could be detected. However, making medicines typically involves heat processing, which destroys DNA. The UK Forensic Science is researching the use of the polymerase chain reaction (PCR) technique to amplify any tiny bits of Tiger DNA that might survive heat processing. One problem they are meeting with is that other components of Asian medicinals interfere with the PCR

replication process. Several possible ways of extracting purified DNA while eliminating these inhibitory substances are being tested, by adding tiny quantities of Tiger DNA to medicinal preparations to determine whether the desired level of detection can still be consistently achieved (J. Wetton, pers. comm., 1999).

In Taiwan, the forensics lab at the Ministry of Justice Investigation Bureau has developed an anti-serum which is specific to Tiger bone. When chickens were injected with a solution of ground Tiger bone, they produced antibodies in high titre which were specific to Tiger bone. These antibodies were not produced when injected with solution made from other animal bones (Pu *et al*., 1999). It is not clear that this method could detect minute quantities of Tiger bone in processed medicines, however, and its reliance on animal testing makes it unlikely to find wide acceptance.

Until these or other forensic tests for detecting Tiger bone can be perfected, the question of how much real Tiger bone was and is used in manufactured medicines cannot be satisfactorily answered. Percentages of Tiger bone by weight in factory-produced medicines vary on contents lists between 2.5% (*Chinese Chufeng Toukuwan* pills, China) and 24% (*To Chung Fu Quat* pills, Hong Kong) (Anon., 1995d). The label on a bottle of *Tong Ren Tang* Tiger-bone wine for sale in Japan indicated a ratio of 100 g of Tiger bone per 15 kg of wine (Anon., 1999r). Many inside the industry claim that such labels are bogus and real Tiger bone was never used (Gaski and Johnson, 1994, Mills, 1997, Petrar, 1999 and Sellar *et al*., 1999). Practitioners surveyed for this report in Canada, Singapore, Taiwan and Vietnam also indicated that they believed most purported Tiger-bone medicines do not contain genuine Tiger bone. Practitioners in the two places where law enforcement has been high profile (Canada and Taiwan) were more emphatic about this than practitioners in places where trade in Tiger bone has not been so controversial (**Table 18**).

There is evidence that real bone, at least some of it from Tigers, was used in manufactured "Tiger bone" medicines. In the early 1990s, the Governments of South Korea and China registered substantial stocks of

Table 18

Traditional practitioners' opinions of whether Tiger medicines currently available mostly contain real Tiger bone or fake or substitute Tiger bone

	Real Tiger bone	Fake or substitute	Do not know
Tiger range State and no. of practitioners surveyed (in brackets)			
Vietnam (92)	16%	55%	28%
Non-range consumer markets and no. of practitioners surveyed (in brackets)			
Canada (26)	23%	54%	23%
Singapore (24)	17%	48%	30%
Taiwan (9)	0	44%	56%

Note: Cambodia excluded from this table because there is little domestic use of Tiger-bone medicines.

Source: Annex 1.

Tiger bone held primarily by manufacturers (**Table 19**). Galster *et al.*, (1994) took photographs of a bone-crushing machine at a Chinese factory in Harbin, which manufactured Tiger-bone plasters at the rate of half a million per day. They wrote, "The business manager admitted that sometimes they cheated by not using real Tiger bone when making the plasters, but offered on-site inspection of the production line to any potential buyers who wanted real Tiger bone products." In 1999, the *Beijing Tong Ren Tang* company, formerly a major producer of Tiger-bone wine, showed the CITES Tiger mission its stocks of Tiger bone, sealed by the government. They appeared to be genuine and were rotting (Sellar *et al*., 1999).

Credit: J.A. Mills, TRAFFIC

Guard outside stocks of Tiger bone sealed by the Government of China in 1993. This photograph was taken during the 1999 CITES Tiger mission

Table 19

Government-registered stocks of Tiger bone (held primarily by traditional medicine manufacturers) in China and South Korea in the early 1990s

Year	Country	Kg of Tiger bone	Source
1993	China	626	Anon., 1999h
1994	South Korea	943[a]	Mills and Jackson, 1994

[a] Total stocks classified as those registered with the Ministry of Health and Social Affairs in May 1994. Most (852 kg) was listed as Tiger-bone powder (Mills and Jackson, 1994).

Note: In 1996, the South Korean Government reported the incineration of 793 kg of Tiger bone (Mainka, 1997). The Chinese stocks have been sealed since 1993, according to the Government and major pharmaceutical manufacturers (Anon. 1999h and Sellar *et al.*, 1999).

Manufacturers in China have previously reported using Tiger bone in very dilute quantities, far below the typical over-the-counter dose of three to six grams (**Table 20**). Gaski and Johnson (1994) carried out the following theoretical calculation: "According to one musk-Tiger medicine manufacturer in Chengdu, Sichuan visited in 1989, only about 50 grams of Tiger bone are used for each batch of 108 000 plasters known as *Natural Musk and Tiger-Bone Plaster*. The Tiger was obtained from the Chengdu Zoo in 1985. This is equal to 0.0023 grams of Tiger bone in each five-plaster package that sells for about USD2-2.50 in Asian markets in the United States. At today's black market price for Tiger bone (USD130/kg or 0.13/g), the Tiger content in one five-plaster box is only worth USD0.0003". The US National Fish and Wildlife Forensic Laboratory has not found any detectable amount of bone material in FTIR (Fourier transform infrared spectroscopy) tests of this brand of Tiger-bone plaster, nor in four other Tiger-bone plasters tested (Espinoza *et al.*, 1994). The amount of bone material may be too small to detect, or it may not be there at all.

Retail prices for manufactured Tiger-bone medicines tend to be inexpensive (**Table 21**) compared to retail prices for raw Tiger bone (see **Table 28**). Prices for processed medicines made with Tiger bone substitutes do not differ much from those labelled as containing Tiger bone (**Table 22**). This is consistent with Tiger bone in manufactured medicines being at extremely low concentrations or absent.

Table 20

Quantities of Tiger bone used in factory-produced medicines reported by Chinese manufacturers

Quantity of Tiger bone	Quantity of manufactured medicine made from this amount	Quantity of product per gramme of Tiger bone
50 g	108 000 packets of plasters[1]	2160 packets
One Tiger skeleton (approx. 12-18 kg)[2]	13.5 million five-plaster packets (1.5 year's production)[1]	900 packets
17 g	100 bottles wine[1]	5.8 bottles of wine
[3]18 kg 37.5 kg	6000 bottles wine[2] three years' total usage by two major manufacturers, 1990-93[3]	0.33 bottles of wine

Sources: [1] Gaski and Johnson, 1994; [2] Mills, 1997; [3] Guo *et al.*, 1997.

Table 21

Retail prices (USD) for processed medicines listing Tiger bone as an ingredient in the late 1990s

Country[1]	Pills	Plasters	Wine, liquor and tinctures	*Cao* (gel)	Medicated oil
Range States					
China		0.30-0.50	7-10		
Lao PDR		0.20			
Malaysia	2-5	1	14		3
Myanmar					8
Thailand	2	0.40-0.60	42		
Vietnam			1-2	110-180	
Non-range consumer States					
Australia	9	2	19		
Canada	4	1.5	24		
Japan	30-65 (sm) 90-130 (lg)		32-57 (sm) 62-113 (lg)		
South Korea	3	0.70	15-22		
USA	4	2	85	36	

Note: [1] Prices have been averaged for markets in italics.

Sources: **Cambodia**: K. Heng, *in litt.*, 1999. **China**: Mills, 1997. **Lao PDR** Anon., 1999e. **Malaysia**: Chan, 1995a. **Myanmar**: Anon., 1999k. **Thailand**: Chan and Chen, 1995. **Vietnam**: Nguyen *et al.*, 1999. **Australia**: Chan, 1995b. **Canada**: Dyck *et al.*, 1998. **Japan**: Anon., 1998a; Anon., 1999f,o. **Singapore**: Chan, 1995a. **South Korea**: Anon., 1999s. **USA**: Anon., 1998b.

FAR FROM A CURE: THE TIGER TRADE REVISITED

Table 22

Retail prices (USD) in the late 1990s for processed medicines made with Tiger bone substitutes, or claiming similar restorative properties to Tiger-bone medicines

Country[1]	Pills	Plasters	Wine, liquor	*Cao* (gel) per 100-g square
Range States				
Cambodia				5
China		0.20-1.25	2-9	
Lao PDR		0.2		3-12
Malaysia		1.40		
Vietnam				14
Non-range consumer States				
Australia		0.75-1.50		
Canada	10	1.5	11	
Singapore		1-1.50		
USA		1.70	45	

Note: [1] Prices have been averaged for markets in italics.

Sources: **Cambodia**: Heng, K., *in litt.*, 1999. **China**: Mills, 1997. **Lao PDR**: Anon., 1999e. **Malaysia**: Chan, 1995a. **Thailand**: Chan and Chen, 1995. **Vietnam**: Nguyen *et al.*, 1999. **Australia**: Chan, 1995b. **Canada**: Dyck *et al.*, 1998. **Japan**: Anon., 1998a; Anon., 1999f,o. **Singapore**: Chan, 1995a. **South Korea**: Anon., 1999s. **USA**: Anon., 1998b.

Significantly higher prices are usually a clue to the authenticity of a Tiger item – the higher the price, the more likely it is to be real (**Table 30**). The high prices paid for processed Tiger medicines (**Table 21**) and vitality potions (**Table 26**) in Japan may well indicate that this country has a higher consumption of real Tigers than other non-range consuming States. The high retail prices for Tiger-bone gelatin in Vietnam may indicate a higher proportion of authentic Tiger contents also (**Table 21**). Gels made from Tiger bone substitutes are much cheaper (**Table 22**).

Progress in Tiger trade control in processing markets since the early 1990s

Manufacturing of medicines containing Tiger parts has officially ceased in former key producing States

By the late 1990s, all former manufacturing markets had officially prohibited manufacturing of any medicinal product listed as containing Tiger ingredients. In South Korea, the main producer was prosecuted by the government for using fake Tiger bone in 1994 and declared bankruptcy (Mills and Jackson, 1994 and Mainka, 1997). TRAFFIC surveyed potential manufacturers of Tiger-bone medicines in China before and after it banned production (1993) by posing as a fictitious Hong Kong trading company enquiring after availability of these medicines (Mills, 1997). While most manufacturers surveyed before the ban confirmed their factories were producing Tiger-bone medicines for export, after the ban most said that they were no longer producing these medicines (**Table 23**) (Mills, 1997). In China, Tiger bone is now often replaced in traditional formulae with substitutes such as Leopard bone and the bone of *sailong* or mole rat (*Myospalax* spp.). While the Leopard is a protected species and its use as a substitute for Tiger should not be legal or encouraged, mole rats are considered abundant pests and are intensively hunted in China because of the damage they cause to crops. In 1993 it was reported that every year 37.5 t of *sailong* bone were harvested from the plains of Qinghai, China - and the average weight of a *sailong* is just 200 g (Chu and But, 1997).

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Table 23

Surveys of willingness among manufacturers in China to produce and export processed Tiger-bone medicines

Year	No. of manufacturers surveyed	Percentage reporting that they were producing and were willing to export Tiger bone medicines
1991	31	68%
	China bans manufacturing of processed Tiger-bone medicines in 1993	
1995	32	3%

Source: Mills, 1997.

Mostly old stocks seen in market surveys

Retail market surveys in the late 1990s found mostly old stocks of Tiger-bone medicines. No medicines with Tiger bone on the label were date-stamped as having been produced after the 1993 trade ban in China (although many had no date stamps) (Chan, 1995a,b; Bolze *et al.*, 1998, Dyck *et al.*, 1998, Gaski, 1998 and Sukumaran, 1999). For example, out of 17 products labelled as containing Tiger seen in New York in 1996, 10 (59%) were dated prior to 1993 and the remainder had no date (Bolze *et al.*, 1998). Of those practitioners surveyed for this report in Canada, Singapore and Taiwan, those who thought that stocks of manufactured medicines were mostly old outnumbered those who believed stocks were new, although many did not know whether they were old or new, or thought they were a mixture of both (**Annex 1**).

Imports of Tiger-bone medicines into Japan were prohibited in April 1993. Japan had previously been a major importer of processed medicines from China, which were described as being made from "pre-Convention" stocks or from Tiger bone obtained prior to 1987, when the Siberian Tiger was transferred from CITES Appendix II to Appendix I (Anon., 1999a). In 1995, importers were asked by the Federation of Pharmaceutical Manufacturers Associations to mark their stocks of Tiger-bone medicines with a special CITES stamp or sticker to indicate that they were legally imported prior to 1993. According to inspections by the Japanese Government, the five companies which had imported Tiger-bone medicines from China and Taiwan had marked and sold off their inventoried stocks by October 1998 (Anon., 1999a and Sellar *et al*., 1999).

In response to telephone investigations in 1997 by the conservation group, the Environmental Investigation Agency (Anon., 1999r) which showed wide retail availability of Tiger-bone medicines in Japan, Japanese Government officials inspected eight pharmacies in January 1998. They found that all of them had the proper marks on their products or that they had sold off their stocks (Anon., 1998j). However, retail surveys by TRAFFIC East Asia-Japan in 1998 found that only about one-third of medicines for sale actually were marked as being legitimate pre-Convention stocks. This either suggests that importers did not mark all their stocks as requested, or that new Tiger-bone medicines have been smuggled in from China - origin of most manufactured Tiger-bone medicines in Japan -, where some factories may still illegally produce medicines labelled as containing Tiger bone (Mills, 1997) (see **Problems in processing markets**).

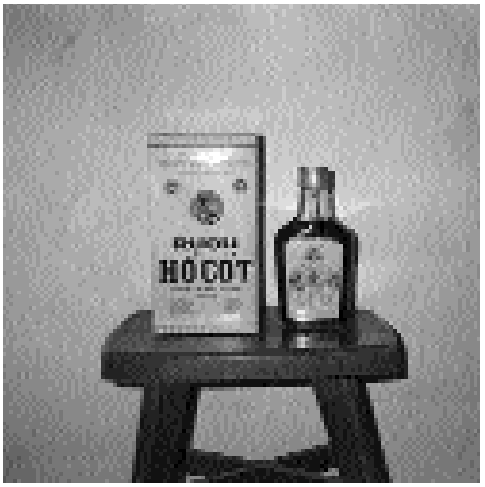
Several major non-range consuming States enacted tougher legislation in 1999 prohibiting trade even if Tiger bone contents are non-recognizable

It is not yet possible to detect with forensic techniques the presence of Tiger bone in manufactured medicines which claim to contain it. Some countries, such as Canada (Petrar, 1999), have had difficulties prosecuting traders, because they could not prove manufactured medicines contained genuine Tiger bone. In 1994, CITES Parties urged the treating of "any product claiming to contain Tiger as a readily recognizable derivative and therefore subject to Appendix I provisions" (*Res. Conf. 9.13*). A TRAFFIC review of compliance with this Resolution, published in 1997 (Mainka, 1997) found that, of the 14 Tiger range States, only China had legislation conforming with this CITES requirement. Several important non-range consuming States amended their national legislation at the end of the 1990s to prohibit trade in any product claiming to contain Tiger parts, including the USA (1998) and Australia (1999) (Anon., 1999t, TRAFFIC Oceania staff, *in litt.*, 1999).

Problems in Tiger trade control in processing markets

Manufacture and processing continue in several key markets despite official prohibitions

Although trade in Tiger parts and products is banned in Vietnam and although the majority of 92 traders and pharmacists interviewed were aware of this, at least one Vietnamese company (*Lai Chau Pharmaceutical*) was manufacturing Tiger-bone wine in 1999 (Nguyen *et al.*, 1999). The main use of Tiger bone in Vietnam is for *cao* (**Box 2**). A number of companies and shops offer a *cao*-processing service for customers who bring them Tiger bone. In order to build up their customer base, these companies and shops also offer assistance to find real Tiger bone and other necessary additives including bear and Serow *Capricornis sumatraensis* bone. Nguyen *et al.*, (1999) found that *cao* was consumed throughout the country, but especially in major cities, each of which had at least one shop conducting business in Tiger bone and *cao*.



Credit: TRAFFIC Southeast Asia-Vietnam

Local Tiger-bone wine (left) and imported Chinese Tiger-bone wine seen on sale during surveys conducted in Hanoi and Dien Bien Phu, Lai Chau province, Vietnam, in 1999

There is widespread suspicion in Vietnam of any *cao* not known to be genuine. The most egregious example of such *cao* is a product known as Hong Kong *cao* (with a Chinese name which translates as *Straight-up Pilose Antler-Tiger-bone Glue*). This sells at USD14/100 g (**Table 22**), far cheaper than locally produced *cao* which sells at USD93-180/100 g (**Table 21**). Nguyen *et al.* (1999) note that "this lack of trust among Vietnamese customers is believed to be the main reason why Chinese manufactured patent medicines are not sold in any visible quantity in Vietnam". It is not known where the Hong Kong *cao* is actually produced. This same brand was noted in the early 1990s by a TRAFFIC survey (Nash, 1993).

TRAFFIC investigators noted Tiger-bone gelatin for sale in traditional Chinese medicine shops in Myanmar (Anon., 1999k) and gathered information that Vietnamese and Chinese traders also produced gelatin in Oudomxay province, in the north of Lao PDR (Anon., 1999e). Tiger-bone gelatin mixed with the bones of other cats was also available at traditional Lao pharmacies, which offer the same bone-processing service to their customers as described above for Vietnam and two ethnic Chinese traditional medicine shops in the Lao capital also sold Tiger-bone gelatin, labelled as having been produced in Thailand. Pangolin scales were frequently mentioned in Lao PDR as being an important additive to *cao* (Anon., 1999e). Thailand was also identified as a producer of Tiger-bone gelatin sold in the USA (Galster *et al*., 1994) and Taiwan (Highley, 1993) in the early 1990s and Thai-manufactured gelatin (*Ya Kao Kradoog Sua*) was seized in the late 1990s by Canadian authorities (Environment Canada staff, *in litt*. to TRAFFIC North America - Canada, 1999).

Hong Kong-made *cao* on sale in some shops in Ho Chi Minh City, Vietnam, seen during surveys in 1993 and 1999. The Chinese name of this brand translates as *Straight-up Pilose Antler-Tiger-bone Glue.*

Thai-manufactured Tiger-bone gelatin seized by Canadian authorities in the late 1990s

After undercover investigations at traditional Asian pharmacies in San Francisco and Los Angeles in August 1994, Galster *et al.*, (1994) wrote: "Gels seem to be increasing in popularity as the Tiger bone product of choice in the United States. While a few merchants admitted that some of their Tiger bone might possibly be fake, several were adamant about the genuine quality of the gels: 'The raw bone may not be real. In mainland China they secretly kill the Tiger and make the gel. It is real.' The gels are packaged and shipped as small hard blocks of material after being cooked down to a dry, dense tar (the actual product resembles a small bar of dark soap wrapped in tissue paper). The inoffensive appearance of the gels apparently contributes to the ease of passing the products through Customs, while the product's preparation makes analysis and determination of the contents difficult." Indeed, there have been no seizures of Tiger-bone gel by US Customs, according to the National Fish and Wildlife Forensic Laboratory's online Asian medicinals database.

Surveys in Malaysia in 1995 (Chan, 1995a) and 1999 (Sukumaran, 1999) also identified Macau and Malaysia as producers of Tiger-bone gels. In 1995, three brands were seen (two made in Malaysia) but in 1999, only one brand made in Malaysia, *Foo Kow Yok Wong*, was still widely available.

THE PRODUCTION OF *CAO* IN VIETNAM

Adapted from *The trade and use of Tiger and Tiger products in Vietnam* (Nguyen *et al.*, 1999).

In Vietnam, the Tiger is recognized as "The King of the Jungle". It is believed that its bones are imbued with medicinal properties by the very wildness in which it lives, by the powerful mix of fresh air, water, exercise and prey-stalking. Accordingly, in the opinion of doctors of traditional Vietnamese medicine, bones from captive-bred Tigers could never be as powerful.

Cao, also known as Tiger-bone balm, gelatin, jelly, paste and glue, is believed to help relieve pain from bone diseases, rheumatism and bruising, according to traditional Vietnamese medicine. It is also prescribed as an energy tonic for the elderly. *Cao* is sold as an odourless, solid, black cake. It is thought that most of the balm sold on the market is either fake or contains very little actual Tiger bone. Vietnamese use various checks for the authenticity of *cao* which include the following:

- Placing a piece of balm in front of a dog. If it feels threatened and runs away, there is said to be some Tiger bone in the balm.
- Placing a small piece of *cao* in alcohol. If it contains genuine Tiger bone, the balm will reportedly dissolve in the alcohol and change to rice-white colour.
- Burning a small piece held on the end of a toothpick above a glass of water. If it drips into the water with a blood red colour, the *cao* is said to be real. Fake *cao* is said not to turn to liquid nor give off a red colour.

Using anything other than home-made *cao* is in any case thought to be a second-rate measure which does not compare with producing it first-hand from authenticated Tiger bone. Many traditional medicine shops in Hanoi, Ho Chi Minh City, Da Lat and Nha Trang sell locally-produced *cao* but sales are at a low level because people do not believe that it is real Tiger *cao*. It seems that customers prefer to buy Tiger bone and hire someone to process *cao* at their house for their own use. The following are step-by-step instructions for making *cao*:

- **Obtain real Tiger bone**. Buy Tiger bone through a middleman known to the Tiger trader. Seek expert opinion to verify if the bone is actually from a Tiger, not bear bone or other felid species and check for lead or mercury incorporated into the bone to add weight. The four knee-bones and skull are the most valuable bones in a Tiger skeleton, believed to carry the strongest medicinal properties.

- **Clean the bone**. If Tiger bone is sold clean and dry, it is ready for use. If unwashed, the meat must first be removed. In the past, this was done by putting the Tiger bone in a bamboo basket in a stream for about 20 days. Water from the stream would wash away the meat, after which the basket was hung on a bamboo pole for around three weeks to allow the bone to wind-dry. These processes are rarely followed these days for fear that the Tiger bone will be stolen or confiscated. Instead, meat is removed from the bone with a knife and the bone is dried indoors. The bones are broken to remove the marrow, and the pieces can be immersed in a tincture of ginger to take away their smell.

- **Add other ingredients**. It is unlikely that 100% pure Tiger *cao* would be produced as it is believed that Tiger bone alone will not be effective enough to treat a range of ailments. A traditional combination is one whole Tiger skeleton, one Asiatic Black Bear *Ursus thibetanus* skeleton and four macaque *Macaca* spp. skeletons. It is said that Tiger bone is "hot" so it will be balanced by the "cooler" bear bone, while the macaque bone enhances the combined effect of the two other animals' bones. Such a combination is sometimes referred to as: "one king, one general and four soldiers". Sometimes Serow bone is substituted for monkey bone, depending on availability.

- **Boiling process**. Boil cleaned bones in water for seven to 10 days. The first three days are called *nuoc mot* (first water), after which pour in more water and boil the mixture for another three days before filtering off the bones and reducing the paste further until all the water has evaporated. This process must be supervised by an expert – knowledge is usually handed down through family connections – to ensure that the maximum amount of *cao* is derived from the process. Finally, when the mixture has reached the proper glue-like consistency pour onto a tray coated with oil (to prevent sticking) and when cool cut into 100-g pieces.

On average, one kilogramme of Tiger bone is said to produce 100-120 g of pure Tiger *cao*. However, with the addition of other bones to the mixture, this ratio may alter. In reality there is no pure Tiger *cao* on the market. The proportion of real Tiger bone is usually less than 50%, often it is less than 10%, and sometimes the product contains no real Tiger bone at all. Of 92 interviewees surveyed, 15% reported that *cao* contains real Tiger bone, 55% claimed that *cao* also contains substitute bones from other animals, and 41% maintained that *cao* contains no Tiger bone whatsoever.

A Tiger skull displayed by a Tiger-bone *cao*-maker in Hanoi, Vietnam, seen during survey work in 1999

In times when Tiger bone is in short supply, substitutes are resorted to, with the first choice among *cao*-makers usually being bones of other felid species such as the Leopard and Leopard cat *Prionailurus bengalensis*. The resultant product is still marketed as Tiger *cao*, there being no incentive to change the label with the price of Tiger *cao* (USD93-180/100 g) much higher than that for *cao* made from other animal bones (USD21/100 g).

Cao can be eaten neat but is more usually broken into small pieces and dissolved in medicinal wine. One traditional recipe for convalescents calls for 1-20 g of *cao* to be placed with a little alcohol inside a chicken, which is steamed until the bones soften, at which point the liquid is pressed out and drunk.

"Tiger penis" and Tiger *cao* on sale in Ho Chi Minh City in 1999

The Japanese Government informed the CITES Tiger Technical Mission that there had never been any manufacturing of Tiger-bone medicines in Japan and that Tiger-bone medicines available had all previously been imported from China and Taiwan (Sellar *et al*., 1999). Indeed, most manufactured medicines seen in retail surveys were of Chinese origin (Anon., 1999f), but surveys have also discovered a Japanese company making extremely expensive "vitality" pills (over USD27 000 for 100 g) purportedly containing Tiger penis (Anon., 1999f,o). TRAFFIC East Asia-Japan staff contacted the company, which claimed that they had imported the Tiger penis before Japan joined CITES (A. Ishihara, *in litt.*, 1999). More discussion of the retail market for Tiger penis in Japan follows in the next chapter.

It is possible that some companies in China continue to manufacture medicines containing genuine Tiger bone. One manufacturer surveyed by TRAFFIC in 1995 indicated that it was still capable of producing Tiger-bone medicines. The company suggested that medicine packaging could be altered to facilitate import or export (Mills, 1997). Surveys in Malaysia and Singapore documented several brands reputedly made in China (Chan, 1995a). However, Chan thought it likely that these could have been produced in Southeast Asia to appear as if made in China. Not only did faulty translations and other clues point to this possibility, but Chinese factories identified by the packaging of similar medicines were "adamant that the goods were fraudulent or counterfeit and had not been made by them", according to staff of the Beijing CITES Management Authority, who had visited the manufacturers implicated (Sellar *et al*., 1999).

Label changes: what do they mean?

Several surveys have documented a decreasing retail availability of manufactured medicines listing Tiger bone as an ingredient and an increasing availability of medicines with Tiger bone substitutes (**Table 24**). Both UK and Netherlands officials reported to the CITES Tiger Technical Mission that they had detected an increase in medicines claiming Leopard bone as an ingredient (Sellar *et al*., 1999).

Table 24

Reported percentage availability in retail markets of medicines a) labelled as containing Tiger bone and b) medicines not labelled as containing Tiger bone but i) as containing bones of another cat species, ii) showing a picture of a Tiger or another large cat, or iii) showing a formula which formerly or traditionally would have contained Tiger bone

Country	Manufactured meds labelled Tiger bone		Manufactured meds labelled Tiger bone substitutes	
	Early 1990s	Late 1990s	Early 1990s	Late 1990s
China	9%	3%	<1%	56%
Malaysia	73%	38%	few	24%

Sources: **China**: Mills, 1997 (early 1990s = 1994; late 1990s = 1996). **Malaysia**: Chan, 1995a (early 90s); Sukumaran, 1999 (late 90s).

Many Chinese manufacturers have changed the names and packaging of certain products to indicate that Tiger bone is no longer used. For example, *Beijing Tong Ren Tang*, the former major manufacturer of Tiger-bone wine, has replaced the character for Tiger (*hu*) with a different character of the same sound which means "protect" – the new name still sounds like 'Tiger-bone Wine' but means 'Bone-protecting Wine' (Chan, 1995a). Similarly, a medicine labelled as musk and Tiger-bone plaster, depicting a Tiger on its label has now substituted Leopard bone for Tiger bone in the ingredients list, been renamed as "Heavenly Emperor" plaster, and features a lion on the packet. The new version was widely available in Australia in 1995 (Callister and Bythewood, 1995), while the old version was more common in Malaysia (Chan, 1995a,b). **Box 3** tracks label changes in one type of Chinese-manufactured Tiger-bone medicine.

Just as conservationists cannot be certain how much of the old processed medicines really contained Tiger parts, so too is it uncertain whether the new processed medicines really do not. The question, "Do manufacturers continue to use Tiger bone and just change the label?" was apparently the most sensitive one asked during interview surveys carried out for this report: most informants in Canada, Singapore and Taiwan claimed to be unsure (**Annex 1**).

Some Chinese manufacturers told a TRAFFIC consultant in 1989 that their medicines had different formulae for domestic and export markets and, in some cases, different formulae for different export markets (Gaski and Johnson, 1994), while another Chinese manufacturer indicated to TRAFFIC in 1995 that it was just the label of their Tiger-bone wine that had changed, not the contents (Mills, 1997). Similarly, in retail surveys in Europe, New York and Hong Kong, shopkeepers insisted to investigators that Tiger bone was still used, and that only the labels had been changed to avoid trouble (Anon., 1995d, Anon., 1998b, Anon., 1999u). Some forms of label changing do seem to imply that Tiger bone is still in the contents, such as the simple use of black ink to obliterate the words "Tiger bone" on several packets found during TRAFFIC surveys in American cities (Gaski, 1998). Other packages purchased during surveys in Europe and North America had "Tiger bone" removed from the English name or ingredient list, but not from the Chinese name or ingredient list (Anon., 1995d, Bolze *et al.*, 1998 and Gaski, 1998).

Dutch Customs officials reported to the 1999 CITES Tiger Technical Mission that they were aware of cases where consignees receiving shipments of Asian medicinals would bring pre-printed labels to the warehouse with them to cover up original packaging mentioning endangered species content. They also reported correspondence between importers and manufacturers in China encouraging the re-labelling or re-naming of ingredients (Sellar *et al.*, 1999).

Musk and Tiger-bone plaster (left), clearly labelled as containing Tiger bone and showing a Tiger on the packet front, was renamed and repackaged (right), to remove references to Tiger

LABEL CHANGES IN *PILULAE CORTICIS EUCOMMIAE ET OSSIS TIGRIS*

Adapted from a *Survey of Tiger-bone medicine in Peninsular Malaysia* (Sukumaran, 1999).

Market surveys of traditional Chinese medicine outlets in Malaysia have documented label changes in the Li Shih brand (Guiyang Chinese Medicine Factory, Guizhou province, China) of *Pilulae Corticis Eucommiae et Ossis Tigris* pills. While the old variety includes Tiger bone in its list of ingredients, the newer ones omit it.

The oldest variety consists of shiny, pungent black pills (like all Tiger-bone pills seen) in a glass bottle and packaged in a bright green box with a large, prominent picture of a Tiger emblazoned on it. While all its ingredients are listed in Chinese, on one side of the box it states in large print, *PILULAE CORTICIS EUCOMMIAE et OSSIS TIGRIS*. The Chinese ingredient list includes Tiger bone at 6.8% (Chan, 1995a).

The newer version of this medicine retains virtually the same packaging, except that the ingredients were listed externally in both Chinese and English, and the claim *PILULAE CORTICIS EUCOMMIAE et OSSIS TIGRIS* is omitted (the picture of the Tiger is still present, however). The ingredients listed on the outside of the box make no mention of Tiger bone or, indeed, bone of any kind. The external ingredient list claims 24.7% of Cortex Eucommiae; however, the pamphlet folded within the box lists only 17.9% Cortex Eucommiae, with the difference made up by 6.8% Dog-bone glue.

Another version of this medicine seen in the 1999 survey was identical to the above, i.e. with no mention of Tiger bone, but, in addition, was without a picture of a Tiger on the box.

The oldest variety was seen in 31% of shops and pharmacies surveyed in peninsular Malaysia in the early 1990s (Chan, 1995a). In 1999, it was seen only in some old stocks of a few out-of-the-way shops in Penang and Kota Bahru (4% of 115 shops surveyed). The newer, second variety mentioned above was very widespread, however, and was probably the most commonly encountered Tiger-bone (strictly speaking, psuedo-Tiger bone) pills. The third variety was only seen once, in Johor Bahru.

In 1995, a counterfeit of this brand was seen in Singapore. It was called *Cortex Eucommiae Tiger-bone Pills*, and no manufacturer was listed, although the city of origin was given as "Foo Nam" (Hunan, China). Chan (1995a) noted, "It is very likely that this brand is not made in China."

Pills in packaging which resembled the oldest variety were seen for sale in South Korea during market surveys in 1998 (S. Kang, TRAFFICEast Asia, *in litt*., 1999).

Credit C. Allan, TRAFFIC

The oldest variety of this brand of pills (right) states Tiger bone contents, while a newer version (left), although still depicting a Tiger on the box, has no mention of Tiger bone in the ingredients

THE DEMAND: RETAIL CONSUMER MARKETS FOR TIGERS AND THEIR PARTS AND PRODUCTS

Introduction: can a wild Tiger be worth more than the sum of its parts?

Demand from retail-level consumers has played an important role in driving the Tiger towards extinction. Tigers, and nearly every part of them, are of value and used in the following ways, for example.

- Live Tigers, for breeding and display
- Skins, for novelties, interior decoration, souvenirs and fashion items
- Skin pieces, hair and whiskers, for magical amulets
- Bones and other body parts, for medicine
- Skulls for trophies
- Teeth and claws for jewellery and souvenirs
- Penis and other organs and bodily fluids for health tonics
- Meat for gourmet exotica

The price tables presented in this report help to illustrate the sort of economic challenge at hand. Retail prices for various Tiger parts are shown in **Tables 25-28**. Prices for Tiger parts as souvenirs and novelties are available mainly from markets in Tiger range States (**Table 25**), although these markets cater largely for tourists from non-range States. Prices for Tiger penis have been reported for both range and non-range States (**Table 26**), although they are generally higher in non-range States, with Japan standing out as paying the highest prices. **Table 27** shows prices reported for various other Tiger parts and **Table 28** shows wholesale and retail prices reported for raw Tiger bone from major consuming markets.

At retail level, taking a crude average of all prices collected by surveys (and shown in the tables), the retail value of the sum of all Tiger parts is over USD70 000 (for an adult male: **Table 29**). Assessing such a sum will always be difficult, given that retail markets for Tiger parts are crowded with fakes, shrouded in secrecy and clouded by hype. At either end of the spectrum are the absurdly low sums that have been paid to poor hunters to shoot Tigers and the astronomically high prices that have appeared in the media to grab the public's attention. Based on this average of range and non-range price data, then, a Tiger worth a few hundred or a few thousand US dollars to a poacher (**Table 7**) ends up being sold for tens of thousands of dollars in retail markets.

The Tiger trade industry has involved substantial amounts of money and people all over the world. If conservationists can claim some progress in shutting down the trade - and indeed they can, as will be shown in this chapter - then that is a significant achievement. However, retail prices remain high and Tiger parts are still available in a number of markets, both openly and underground, and so the battle to change consumer practices everywhere is not yet won.

In the future, those monitoring trade must improve their efforts to distinguish between real and fake Tiger parts and products. **Annex 2** contains some diagnostic features of real and fake Tiger parts. Price may sometimes be an indication of authenticity: **Table 30** shows the price difference reported for real and fake Tiger parts within the same market and time period. It can be seen that fakes are never more expensive than real parts and indeed these are typically priced 5-10 times higher than fakes in range States and many more times higher in non-range consumer States. The same pattern is indicated in **Table 26** for Tiger penis, although investigators have not felt confident about identifying the authenticity of the higher-priced penises and they may be skillful fakes.

Table 25

Retail prices (USD) reported for Tiger parts as souvenirs and novelties

Country	Skin	Lower leg	Teeth	Claws	Skull
Range States					
Bangladesh					
Late 1990s			20-90	80	
Cambodia					
Early 1990s	400-900		67-80	4-10	20-120
Late 1990s	468-1092		90-195	120	176-975
China					
Early 1990s	1550-13 710	120			
Late 1990s		300			
India					
Early 1990s	1390-2220				
Late 1990s	976-1463				
Indonesia					
Early 1990s			20	20	
Late 1990s			34-68	2-16	
Lao PDR					
Early 1990s	400-800		10-27	10-23	
Late 1990s		120	13-41		
Myanmar					
Early 1990s	55-2535		80		15-80
Late 1990s	42-1807	17	24	10-22	15-417
Russia					
Early 1990s	5000-15 000				
Late 1990s	1500-3000				
Thailand					
Early 1990s					
Late 1990s	311-1167				19-97
Vietnam					
Early 1990s			30-100		
Late 1990s	153-2000	107-143	65-100	57-105	
Non-range consumer States					
Singapore					
Early 1990s	1100-1250				
South Korea					
Early 1990s	7500-15 000				
Late 1990s	2500-7300				
Taiwan					
Early 1990s	2000-3000				1200

Note: Prices have not been adjusted for inflation. Blank = no data available.

Sources: **Bangladesh**: Gillie, 1997. **Cambodia**: E - Martin and Phipps, 1996. L - Srifa *et al*,. 1997; Ware, 1997; Anon., 1999w; Sellar *et al.*, 1999; Sun Hean, *in litt*., 1999. **China**: E - Low, 1991; Fuller and Wang, 1992; Gaski and Johnson, 1994; L - Banks *et al*., 1999. **India**: E - Anon., 1997b; Currey, 1996; L - TRAFFIC India staff, *in litt*., 1999; WPSI staff, *in litt*., 1999. **Indonesia**: E - Tilson and Traylor-Holzer, 1994; L - Plowden and Bowles 1997. **Lao PDR**: E - Chazée, 1990; Martin, 1992; L - Anon. 1999e. **Myanmar**: E - Lewis, 1993; Martin, 1997; L - Glaser, 1998; Anon., 1999c,k; Sellar *et al.*, 1999. **Russia**: E - Anon., 1994a; L - Chestin, 1998; Sellar *et al*., 1999; J. Mills, pers. comm., 1999. Singapore: Anon., 1989. **South Korea**: E - Galster *et al.*, 1994; L - Anon., 1999s; S. Kang, *in litt.*, 1999. **Thailand**: L - Mainka, 1997. **Taiwan**: E - LaBudde, 1993. **Vietnam**: E - Anon., 1993a; L - Compton *et al.*, 1998; Le, 1999; Nguyen *et al.*, 1999.

Table 26

Retail prices (USD) reported for Tiger penis

Time period	Country	"Fake" or low price range	Unit	"Real" or high price range	Unit
Tiger range States					
Late 1990s	Cambodia			170-250	whole
Early 1990s	China	75	whole		
Late 1990s	China	48-145	whole		
Late 1990s	Indonesia	3	whole	100-150	whole
Late 1990s	Lao PDR	6	whole		
Early 1990s	Myanmar	12	whole	150	whole
Late 1990s	Myanmar	10	whole	400	whole
Late 1990s	Vietnam	21-50	whole	500	testes only
Non-range consumer States					
Late 1990s	Australia	260	whole		
Late 1990s	Hong Kong	170	whole		
Late 1990s	Japan	120-487	whole	840-2500	whole
Late 1990s	Japan	800-1252	ingredient in virility pills: 50 g	15 652	ingredient in virility pills: 50 g
Late 1990s	Japan	2191	ingredient in virility pills: 100 g	27 000	ingredient in virility pills: 100 g
Early 1990s	Singapore	100			whole
1986	Taiwan			1715	whole
Early 1990s	Taiwan	8-15	whole	320	soup
Late 1990s	USA	35	prescription	90-180	prescription
Late 1990s	USA			572	whole

Note: Blank = no data available.

Sources: **Australia**: Callister and Bythewood, 1995. **Cambodia**: Srifa *et al.*, 1997; Heng, 1999. **China**: E - Gaski and Johnson, 1994; L - Anon., 1999v; Banks *et al.*, 1999. **Indonesia**: KSBK (Indonesian wildlife NGO) staff, *in litt.*, 1999; Theile *et al.*, in prep. **Japan**: Anon., 1998a, 1999f,o; Sellar *et al.*, 1999. **Lao PDR**: Anon., 1999j. **Myanmar**: E - Lewis, 1993; Anon., 1996b; Martin, 1997; L - Anon., 1999k. **Singapore**: Martin *et al.*, 1991. **Taiwan**: Low, 1991; Highley, 1993; Chang *et al.*, 1995. **USA**: L - Anon., 1998b. **Vietnam**: Torode, 1996; Nguyen *et al.*, 1999.

Table 27

Retail prices (USD) reported for miscellaneous Tiger parts and body products

Year	Country	Gall bladder	Eyes	Nose	Meat	Tendons	Blood	Fat	Urine	Clavicle or "floating bone"
1999	Cambodia							5.50/bottle		
1997	China								0.50/litre	
1990	Lao PDR			78						
Late 1990s	Nepal									10 000
1986	Taiwan		170		37/kg		57/litre			
1999	Vietnam	100				36-50/set				

Note: Blank = no data available.

Sources: **Cambodia**: Sun Hean, pers. comm., 1999. **China**: Anon., 1997a. **Lao PDR**: Martin, 1992. **Nepal**: Pringle *et al.*, 1999. **Taiwan**: Low, 1991. **Vietnam**: Nguyen *et al.*, 1999.

Table 28

Wholesale and retail prices (USD/kg) for raw Tiger bone in major consuming markets

Country	Wholesale	Retail
China		
Early 1990s	404-539	1106-1950
Late 1990s	126-172	2425
Japan		
Early 1990s		
Late 1990s	2000	4350-21 740
South Korea		
Early 1990s	1600-1833	1667
Late 1990s	730-1083	6205-6500
Taiwan		
Early 1990s	1012-1280	2133-3300
Late 1990s		

Note: Blank = no data available. Prices have not been adjusted for inflation.

Sources: **China**: E - Tan, 1987 and Gaski and Johnson, 1994; L - Li and Wang, 1997 and Mills, 1997. **Japan**: Anon., 1999f,o. **South Korea**: E - Mills and Jackson, 1994; L - Chan, 1995c and Anon., 1999s. **Taiwan**: E - Highley, 1993; Mills and Jackson, 1994 and Nowell, 1993.

Table 29

Average estimated retail value (USD) of an adult male Tiger's parts

12 kg bone	61 651
Skin	3049
Penis	3285
20 kg meat	1000
10 litres blood	600
Skull	366
Teeth and claws	900
Miscellaneous other organs	250
Total	**>70 000**

Source: Tables 25-28.

Table 30

Comparison of difference in retail price (USD) for real and fake Tiger parts

Part	Real	Fake	Difference	Where	When
Bone	1012-1280	20-267	4-64x	Taiwan	Early 1990s
Skin	1379	224-559	3-8x	India	Late 1990s
Teeth	65-100	11	6-10x	Vietnam	Late 1990s
Claws	57-105	11	5-10x	Vietnam	Late 1990s

Sources: **Bone**: Highley, 1993; Nowell, 1993 and Mills and Jackson, 1994. **Skin**: Rao and Dikshit, 1997 and TRAFFIC India staff, *in litt.*, 1999. **Teeth and claws**: Nguyen *et al.*, 1999.

Progress in Tiger trade control in retail consumer markets since the early 1990s

Surveys document lower retail availability of Tiger-bone medicines in China and most non-range consumer States

Comparison of results of market surveys and law enforcement inspections carried out in the late 1990s with those carried out in the early 1990s show markedly reduced retail availability of Tiger-bone medicines (**Table 31**). The difference between availability in the early and late 1990s is most striking for two former major consuming markets: Taiwan and South Korea. For most markets for which there are few or no data in the early 1990s, late 1990s surveys show low availability.

There are still evident "problem areas" (particularly Vietnam and Japan), as well as some less apparent ones, as will be discussed later in this chapter. In general, however, it is no longer possible to stroll into a traditional pharmacy at random and take one's pick from a variety of openly displayed Tiger-bone medicines in China, or in most non-range consumer States. This situation is quite different from that in the early 1990s, when *Killed For A Cure* was published.

Wholesale prices for Tiger bone decreased in the late 1990s according to market surveys

Wholesale prices for raw Tiger bone in China and South Korea, as reported by surveys, have fallen from the early 1990s to the late 1990s (**Table 28**). The wholesale price reported in **Table 28** for Japan is low given the high retail prices there. Although there are no data available for Taiwan for the late 1990s, wholesalers and other knowledgeable people interviewed there indicated that very few, if any, would dare to trade in Tiger bone at the wholesale level, given the likelihood of high penalties if discovered (Nowell, 1998).

A fall in wholesale prices would appear to support a theory of declining retail demand. However, **Table 28** shows that retail prices for raw Tiger bone appear to have risen in China and South Korea, despite a lower wholesale price. Perhaps this is a reflection of the increased risks of selling stocks of Tiger bone at the retail level.

Increased enforcement of trade bans in China and most non-range consumer States

China and most non-range consumer States have conducted a series of enforcement inspections of traditional medicine outlets (Anon., 1993a; Anon., 1994e,f; Anon., 1995a,b; Mainka, 1997; Mills, 1997; Dyck *et al.*, 1998; Hemley and Mills, 1999; Petrar, 1999 and Sellar *et al.*, 1999). In China, Hong Kong, Taiwan and South Korea, authorities inspected a high proportion of all traditional medicine outlets. Many national authorities have developed brochures and information sheets specifically to explain Tiger trade bans to the traditional medicine community. China, Taiwan, and South Korea conducted registrations of privately-held Tiger bone stocks. Authorities in China, Taiwan and South Korea burned confiscated Tiger bone to raise awareness of illegality further, and high penalties have been meted out for trade ban violations. In 1995, for example, the owner of a medicine shop who had sold Chinese-manufactured Tiger-bone medicines was fined USD66 500 in Hong Kong (Anon., 1996e). Australia and the USA have enacted new legislation which treats any product claiming to contain Tiger as if it actually contained Tiger. Mainka (1997) and Sellar *et al.* (1999) have detailed descriptions of many aspects of Tiger trade control enforcement.

Table 31

Comparison of proportions of retail pharmacies selling Tiger-bone medicines during the early and late 1990s

Country	Made-to-order raw bone preparations		Manufactured medicines (pills, plasters, etc.)		Wine		Tiger-bone gel/*cao*		Tiger-bone medicated oil or raw Tiger fat	
	Early 90s	Late 90s	Early 90s	Late 90s	Early 90s	Late 90s	Early 90s	Late 90s	Early 90s	Late 90s
Range States										
Cambodia	few	few		few		yes		few	yes	few
China	few	few		<1-14%		0.4-4%				
Indonesia		7%								
Lao PDR	few	few	no	few	no	no	yes	many		
Malaysia	no	no	73%	38%	22%	10%	28%	11%	9%	few
Myanmar	29%	few		few		few		yes		yes
North Korea					yes					
Thailand	yes	few	67%	yes	17%					
Vietnam		few	yes	few	yes	many	many	many		no
Non-range consumer States										
Australia		no		14%		yes		few		
Belgium			80%	20%	seiz	10%				
Canada		no		0-54%		0-14%		seiz		
France		4%		12%		28%		no		
Germany		no		14%		7%		2%		
Hong Kong[1]	yes	zero-few	many	13%	many	3%	seiz	no		
Japan	no	6%	90%	26-53%	30%	20-31%				
Netherlands		0-17%		33-83%		7%		seiz		seiz
New Zealand		no		20%		no		no		
Singapore				9%	yes			1%		
South Korea	many	few	many	12-18%		yes				
Taiwan	59%	<1%	few	seiz	yes	seiz	yes	no		
UK	yes	no	50%	seiz	yes	no	seiz			seiz
USA	yes	few	>50%	24-67%	many	yes	yes	seiz		

Key: Blank = no data available; no = absent according to surveys and/or market inspections; yes = present according to surveys, but data insufficient to estimate volume; few = limited availability according to surveys; many = wide availability according to surveys; seiz = items seized in this period by national authorities; % = percentage of pharmacies surveyed where Tiger-bone medicines were available.

[1] Hong Kong now a part of China since 1997, but treated separately in this table.

Sources: E = Early 90s. L = Late 90s. **Cambodia**: E, L - Heng, 1999. **China**: E - Gaski and Johnson, 1994; Mills, 1997; L -Mills, 1997; Li and Wang, 1997. **Indonesia**: L - Plowden and Bowles, 1997. **Lao PDR**: E - Martin, 1992; Baird, 1995; L - Anon., 1999e. **Malaysia**: E - Chan, 1995a; L - Sukumaran, 1999. **Myanmar**: E - Martin, 1997; L - Anon., 1999k. **North Korea**: E - Mainka, 1997. **Thailand**: E - Chan and Chen, 1995, McDougal, 1991. **Vietnam**: E - Nash, 1993; Galster, *et al.*, 1994; L - Nguyen, *et al.*, 1999.

Australia: L - Callister and Bythewood, 1995; Chan, 1995b. **Belgium**: E - Mills and Jackson, 1994; Anon., 1995a; L - T. De Meulenaer, pers. comm., 1999; **Canada**: L - Dyck, *et al.*, 1998; Gaski, 1998; Environment Canada staff, *in litt.*, 1999; A. Marr, pers. comm., 1999. **France**: L - Anon., 1995d. **Germany**: L - Anon., 1995d. **Hong Kong**: E - seizure info. in Mainka, 1997; L - Banks, *et al.*, 1999; Anon., 1999u. **Japan**: E,L - TRAFFIC East Asia - Japan, unpubl. data; L - Anon., 1999r. **Netherlands**: L: Anon., 1998a; TRAFFIC, Europe staff, *in litt.*, 1999; R. Melisch, *in litt.*, 1999. **New Zealand**: L - Callister and Bythewood, 1995; Chan, 1995b. **Singapore**: L - Chan, 1995a. **South Korea**: E - Mills and Jackson, 1994; J. Mills, pers. comm., 1999; L -Chan, 1995c; Anon., 1999s. **Taiwan**: E - Highley, 1993; Nowell, 1993a,b; L - Anon. 1994b; Anon., 1995e, 1998l; M. Phipps, pers. comm., 1999. **UK**: E - Anon., 1995b; L - Banks, *et al.*, 1998; TRAFFIC Europe staff, *in litt.*, 1999. **USA**: E - Gaski and Johnson, 1994 and Galster, *et al.*, 1994; L - Anon., 1998b,c; Bolze *et al.*, 1998; Gaski, 1998; E. Espinoza, USFWS Wildlife Forensics Lab., pers. comm., 1999; A. Marr, pers. comm., 1999.

Increased enforcement activity appears to have had a marked impact on retail availability of Tiger-bone medicines, according to market surveys. **Table 32** compares percentages of pharmacies selling Tiger-bone medicines before and after law enforcement sweeps, during which government officials inspected large numbers of pharmacies and publicized trade bans.

Table 32

Effect of high-profile law enforcement campaigns on retail availability of Tiger bone medicines

Non-range consumer States	Retail availability of Tiger-bone medicines before enforcement sweeps		Retail availability of Tiger-bone medicines after enforcement sweeps	
	% of pharmacies with Tiger-bone medicines	Survey date(s)	% of pharmacies with Tiger-bone medicines	Survey date(s)
Vancouver and Toronto, Canada	30-58%	1996-97	zero	1999
London, UK	50%	1994	zero	1997
Seoul, South Korea	wide availability	1993	few	1998
Taipei, Taiwan	59%	1993	0-1%	1994; 1999

Sources: **Canada**: Before - Gaski, 1998; After - A. Marr, pers. comm., 1999. **South Korea**: Before - Mills and Jackson, 1994; After - Anon., 1998k. **Taiwan**: Before - Highley 1993; After - Anon. 1994b; M. Phipps *in litt.*, 1999. **UK**: Anon., 1995b; After - Banks *et al*., 1999.

In Taiwan, researchers from Yang Ming University and the Department of Health carried out wide-ranging confidential interviews with traditional doctors and pharmacists to study their use of and attitudes towards endangered species medicine (Chou *et al.*, 1995). Both groups indicated that they had virtually ceased to trade in Tiger bone after high-profile enforcement campaigns in 1993-94 (**Table 33**).

Table 33

Usage of Tiger bone before and after high-profile law enforcement in Taiwan, according to a survey of traditional pharmacists and doctors

	Percentage of respondents indicating use of Tiger-bone medicines	
Year	Pharmacists	Doctors
Before (1992-93)	33%	15.8%
After (1994-95)	0.3%	0%

Source: Chou *et al.*, 1995.

From surveys conducted for this report, it is noteworthy that in Singapore, where there has not been high-profile law enforcement, practitioners estimated that one-third of the traditional medicine community was still trading in Tiger medicines. In Taiwan and Canada, by contrast, where enforcement campaigns have been carried out, practitioners believed very few of their colleagues were still trading in such products (**Table 36**).

Increased co-operation between the conservation community and traditional medicine community in China and most non-range consumer States

Attempts by some conservationists to open dialogue with practitioners of traditional Asian medicine may be counted as a factor underlying reduced retail trade in Tiger-bone medicines. Symposia to bring together representatives from the two sides with the aim of finding common ground, particularly with respect to developing and promoting substitutes for endangered medicinal species, have been held in the late 1990s in Hong Kong, China, Australia, the USA and UK (Hemley and Mills, 1999 and Liang, 1999). The focus on increased co-operation is covered in more detail in **Annex 3**.

Understanding the consumer: attitudinal surveys

There have been a number of sociological studies undertaken in the late 1990s aimed at accurate identification of consumers of Tiger-bone medicines and gaining more insight into their motivations and attitudes towards conservation. Attitudinal surveys have been carried out in: Shanghai (China) (Cui and Lin, 1998); Hong Kong (Lee, 1998); Japan (Anon., 1998k); Taiwan (Chou *et al*., 1995), New York (Bolze *et al*., 1998) and San Francisco (Lee *et al*., 1998).

These surveys found that Tiger-bone substitutes would be acceptable to most user and consumer groups (see also **Annex 1**). Respondents also expressed strong support for endangered species conservation, even though a sizeable proportion stated they would be willing to take Tiger-bone medicines if they were ill, despite the Tiger's endangerment, or the illegality of such medicines (**Table 34**). Consumers in China were most likely to feel this way.

Table 34

Consumer usage of Tiger-bone medicines and willingness to use in the future, according to attitudinal surveys

Survey	**Percentage responding yes to: "Have you ever taken or used Tiger-bone medicines?"**
Hong Kong TCM users (403)[d]	4.1%
General public in Japan(1172)[a]	2.9%
New York middle school (65)[b]	3.1%
San Francisco, Chinese general public (409)[d]	4.4%
	Percentage responding yes to: "If you were ill, would you use Tiger-bone medicines (despite illegality/the Tiger being endangered)?"
Hong Kong TCM users (403)[d]	19.1%
General public in Japan (1172)[a]	0.9%
San Francisco, Chinese general public (409)[d]	31%
Shanghai general public (1159)[c]	51.5%
Shanghai middle school students (600)[c]	38%
Shanghai TCM university students (182)[c]	38.1%

Note: TCM = Traditional Chinese Medicine. Total number of respondents given in parentheses.

Sources: [a] Anon., 1998k; [b] Bolze *et al.*, 1998; [c] Cui and Lin, 1998; [d] Lee *et al.*, 1998.

A key finding of some of these surveys is that users of traditional Asian medicine rely on prescriptions from their practitioners and do not actively seek out Tiger-bone medicines on their own (Cui *et al.*, 1998 and Lee *et al.*, 1998). This suggests that conservationists have been right to, and should continue to, focus on practitioners of traditional medicine in order to reduce usage of Tiger bone.

A further finding revealed that 90% of doctors and 80% of pharmacists in Taiwan reported no change to their income as a result of the prohibition of trading in medicines made from Tigers and other endangered species (Chou *et al.*, 1995). This would seem to indicate that, despite Tiger bone having been widely available in Taiwan (**Table 32**), trade in Tiger bone by most traditional doctors and pharmacists was not of a sufficiently high volume for a reduction to cause loss of income. This theory of low volume trade would tally with the low usage rates reported by other consumer groups - see **Table 34**. The uniformity of the low response rate, given different cultures and survey methods, is striking. It would seem that only a tiny proportion of the consumer groups surveyed feel dependent on Tiger-bone medicines for maintenance of their health. It should be noted in this context that, one company in China, the *Beijing Tong Ren Tang* company, former major manufacturer of Tiger-bone wine in China, has complained of substantial loss of income due to the government's prohibition, and is seeking compensation (Sellar *et al.*, 1999).

Problems in Tiger trade control in retail consumer markets

Domestic trade widespread in Japan

Japan stands out as the only major consuming market where domestic trade in Tiger medicines was legal throughout the 1990s. Market surveys by TRAFFIC and others found Tiger-bone medicines and tonics for sale in 26-53% of pharmacies and other outlets surveyed in the late 1990s (Anon., 1999f,r,o).

Imports of Tiger-bone medicines into Japan were prohibited in 1993, but afterwards retailers were allowed to sell off their stocks. As previously explained, importers were asked to mark pre-1993 stocks with special CITES stickers, but participation was voluntary and two-thirds of the Tiger medicines seen in market surveys by TRAFFIC were not marked (TRAFFIC East Asia-Japan staff, *in litt.*, 1999). This raises the possibility that new stocks are being brought into the country, despite import bans and indeed survey results indicate that most of those saying they had purchased Tiger-bone medicines had done so overseas (in China, Hong Kong, Malaysia or Thailand) and had brought them back to Japan as part of their ordinary luggage. Only a few had purchased their medicines in Japan (Anon., 1998k). Japanese Customs statistics also record Tiger medicines imported to Japan in the late 1990s (**Table 35**). Interestingly, none of the new manufactured medicines from China, with Tiger bone taken out of the name or ingredient list, have been seen in surveys in Japan (A. Ishihara, *in litt.*, 1999), suggesting that medicine using Tiger-bone substitutes is not popular with Japanese consumers.

Table 35

Tiger parts and derivatives forfeited upon detection by Japanese Customs

Year	Number of cases	Number of items forfeited
April 1994-April 1995	68	396
April 1995-April 1996	24	1290
April 1996-April 1997	28	387
April 1997-April 1998	31	432

Source: A. Ishihara, TRAFFIC East Asia-Japan, *in litt.*, 1999.

Japan is conspicuous as the major consuming market for Tiger penis products. One brand of Tiger penis pills, made by a Japanese manufacturer and sold in six national outlets was reported to cost over USD27 000 for 100 pills (Anon., 1999f). "Natural dried penis of Tiger, from the hinterland of Lao PDR," selling for nearly USD2500 has been featured alongside X-ray spectacles in a catalogue selling sex aids and seemingly authentic dried Tiger penises have also been seen for sale in retail shops in Japan (Anon, 1999r; Sellar *et al.*, 1999). Several brands of "Three Penis" wine, purportedly including Tiger penis and of Chinese manufacture, were sold alongside Tiger-bone wine at Chinese pharmacies, restaurants and food shops in the late 1990s (Anon., 1999f,r,o). Tiger-bone wine has also been offered online by at least three Japanese websites (Anon., 1999f,r,o).

"Natural dried penises of genuine Tiger and seal" were advertised in 1998-99 in this Japanese catalogue as "good for life, longevity.....energy" and "highly valued as ingredients for authentic Chinese cuisine".

In December 1999, the Japanese Government announced that it would amend its legislation, the *Law for the Conservation of Endangered Species of Wild Fauna and Flora* (LCES), to add Tiger bone, Tiger penis, and products derived from these ingredients and intended for human consumption (including external application) to the list of prohibited substances. Previously, the law regulated only Tiger hair, skins, teeth, claws and products derived from these substances. The new restrictions enter into effect from 1 April 2000, according to a press release issued by Japan's Environmental Agency, dated 20 December 1999. The

Japanese Government is reviewing whether or not to include in the amendment Tiger bone or penis "not for consumption", (for display purposes, for example). In addition, the Environmental Agency of the Japanese Government has stated that the new amendment is expected to cover products claiming to contain Tiger parts as if they actually contain the same. However, if a trader claims that a product does not contain Tiger bone, the burden of proving genuine Tiger contents, which is often not possible, even using advanced forensic techniques, will still rest with the government.

Several range States still have consumer markets for Tiger products

Conservationists have focused on shutting down retail markets in non-range consuming States, but some Tiger range States have consumer markets, the importance of which is undeniable. All such markets are illegal, but not completely covert.

Traders and practitioners in Vietnam say that domestic demand for authentic Tiger gel medicines is high enough so that most of the Tiger bone brought into the country is consumed there, rather than being exported to China (Nguyen *et al.*, 1999), as might be expected, given the high volume of illegal wildlife exports that have been documented from Vietnam to China (Li and Li, 1998 and Li and Wang, 1999). While wholesale prices in China appear to have fallen (**Table 28**), in Vietnam they have risen, while the volume of Tigers in trade has fallen (Nguyen *et al*., 1999). Interviews with traders in Cambodia and Lao PDR, the main suppliers to Vietnam's Tiger market, also indicate that prices for Tiger bone have increased (Anon., 1999e,j and Nowell *et al.*, 1999; **Box 1**).

Processed Tiger-bone medicines of Chinese and Southeast Asian origin are still relatively widely available in Malaysia (**Table 24**). Sukumaran (1999) was able to locate Tiger-bone medicines in over a third of shops surveyed in Malaysia, despite an atmosphere of secrecy in the trade. He wrote, "It can safely be stated that almost everyone involved in the trade appeared to be intensely aware of the illicit nature of items containing Tiger parts, and, furthermore, were very cautious and suspicious of any direct enquiries toward that end. In many cases, there was a marked shift in attitude when it became clear that we were interested in medicines containing Tiger parts. Very often, questions regarding Tiger parts in medicine were met with anything from bland professions of ignorance to surly denial."

Credit: J. Sellar, CITES Secretariat

Piece of Tiger skin seen by the CITES Tiger mission team in a market in Phnom Penh, Cambodia, in 1999

Tiger bone and Tiger penis (probably fake) were seen for sale in 1999 in Bangkok, Thailand (S. Galster, *in litt.*, 1999). Evidence from neighbouring countries points to Thailand as having a significant retail market for Tiger skins, trophies, and teeth and claws (Mainka, 1997, Martin, 1997, Anon., 1999w,c, Nguyen *et al*., 1999 and Sun Hean, 1999). Both Tiger souvenirs (skin amulets) and raw Tiger parts for medicine (penis and bone) are reported as available in retail markets in Indonesia (Indrawan *et al*., 1999, Theile *et al.*, in prep. and Anon., 1999i). In India, undercover operations by NGOs have revealed the existence of a number of dealers in Tiger and other cat skins for the domestic market (Currey, 1996 and Kumar and Wright, 1999). In Russia, Tiger skins have been advertised for sale in newspapers, aimed at a new retail market of Russian business people (Anon., 1999l and Galster, 1999).

Markets undercover: evidence for continued underground retail trade and consumption in China and non-range markets

Old traditions are not easily changed, and making Tiger medicines illegal will not necessarily eliminate the will to use them. Indeed, some have feared that high profile media attention to the Tiger's endangerment would encourage unscrupulous individuals to stockpile Tiger bone, speculating on higher demand and prices as Tigers became rarer (t'Sas-Rolfes, 1998 and Hemley and Mills, 1999). In fact, it may be difficult to store raw Tiger bone without decomposition and rot, as testified to by the decay of substantial stocks of bone held by *Beijing Tong Ren Tang* company (Sellar *et al*., 1999). Certainly, relatively low wholesale prices for Tiger bone in former major consuming markets in the late 1990s (**Table 28**) indicate that so far speculative interest does not seem to be a significant factor at work in sales of the product.

Belief in the efficacy of Tiger medicines remains high, according to surveys of public attitudes (Cui and Lin, 1998 and Lee *et al*., 1998) and although leading figures in traditional medicine communities have publicly embraced the use of Tiger bone substitutes in Taiwan (Chang *et al*., 1995), results of surveys of doctors and pharmacists by colleagues show that most such professionals remain unconvinced of the comparative efficacy of substitutes relative to Tiger bone. Just 27% of pharmacists and 45% of doctors considered that substitutes were available and of those who considered them available, most thought substitutes only partially effective (Chou *et al*., 1995). Surveys conducted for this report asked practitioners if they thought most of their colleagues preferred to continue to use Tiger bone as opposed to substitutes. In Vietnam, in particular, the majority (76%) of traders and practitioners preferred using Tiger bone as opposed to substitutes and Canada also stands out as having a sizeable percentage (42%) in this category (**Annex 1**, question 11).

Surveys carried out for this report show that practitioners in Canada, Singapore and Taiwan - which may be representative of most major non-range consuming markets - believe that trade in Tiger-bone medicines has continued at a low level, despite trade bans. The percentage of the community estimated still to be trading in Tiger medicines was highest in Singapore (31%), which has not put the same degree of effort into law enforcement as have Taiwan and Canada (**Table 36**). Practitioners in Canada and Singapore indicated that not just old stocks of manufactured medicines, but fresh raw bone preparations were still frequently used (**Annex 1**). Retail surveys in China and major non-range consuming States have all found a small proportion of pharmacists willing to supply Tiger medicines upon request, including raw bone preparations (**Table 31**).

Surveys of consumer attitudes found that only a small percentage of those questioned had used Tiger-bone medicines (**Table 34**), yet the combined effect of consumer use has still been high enough to endanger Tigers in the wild. Therefore, even a reduction in usage to minimal rates may still result in enough consumer demand to threaten Tiger populations. It is also possible that there may be core groups of consumers faithful to Tiger medicines and tonics that conservationists have not yet identified and reached. Tiger penis certainly seems to be a staple item in the sex trade, which will always be difficult and dangerous to research and "co-operate" with. The editor of the *California Journal of Oriental Medicine* recently suggested that martial artists were a significant consumer group for Tiger medicines and tonics (Fennen, 1998).

There are indications that demand for Tiger parts and products from former major non-range consuming States has been exported. A number of key supplying markets in Tiger range States in Southeast Asia cater for tourists, who assume the risk of smuggling back to their home country. The Tiger "farms" in China

Table 36

Interview surveys with traditional medicine practitioners and pharmacists indicate continued illegal trade in Tiger products in 1999, despite bans

	% of respondents indicating continued illegal trade	Estimated % of the traditional medicine community involved in using Tiger bone
Range States		
Cambodia (35)	97%	2-10%[1]
Vietnam (92)	78%	41-46%[1]
Non-range consuming States		
Canada (26)	27%	2%
Singapore (24)	30%	31%
Taiwan 1999 (7)[2]	29%	1%
Taiwan 1995 (463)	0.1%	n/a

Notes: [1] Lower figure is average percentage of traditional doctors estimated by interviewees to be trading in Tiger bone medicines. Higher figure is estimated percentage of wholesale medicinal traders. In Cambodia, most interviewees said there was little domestic use of Tiger bone by traditional doctors and that most Tiger bone was exported. [2] Two interviewees who are not in the traditional medicine industry were removed from the sample for this table.

Source: **Annex 1** (questions 1 and 4), and Taiwan 1995 from Chou *et al.*, 1995.

and Thailand cater largely for tourists from Taiwan, Hong Kong, Japan and South Korea. Tiger meat was seen on the Chinese-language menu of a restaurant catering for Chinese visitors in the northern province of Oudomxay, Lao PDR, in 1999 (TRAFFIC Southeast Asia - Vietnam, *in litt.*, 1999). At the main tourist hotel near Royal Chitwan National Park in Nepal, the hotel manager reported that he was approached by a Chinese guest, who showed him a "floating bone" (clavicle) of a Tiger, and offered to pay USD10 000 for another (Pringle *et al.*, 1999). The TRAFFIC survey in Lao PDR reported a case of a "foreign man" visiting a village and asking specifically for Tiger collar bones (Anon., 1999e).

CONTROLLING ILLEGAL INTERNATIONAL TRADE IN TIGER PRODUCTS

Introduction: dealing with an army of ants

In order to understand the volume and flow of international trade in Tiger products, *Killed For A Cure* relied upon import and export data from China, Taiwan and South Korea, when such trade was still legal. Now that international trade is everywhere prohibited (Mainka, 1997 and Sellar *et al.*, 1999), it has become more difficult to gauge trends. There are no more legal bulk exports of raw bone or processed medicines from China. Now conservation authorities must deal with what the Chinese call an "army of ants" - large numbers of individuals smuggling small volumes of goods through a variety of channels (Anon., 1999e).

Progress in international trade control since the early 1990s

International trade in Tiger bone and other Tiger derivatives drop sharply in the late 1990s, according to Customs statistics and CITES annual reports

There has been a pronounced decline in international trade in Tiger bone and other Tiger derivatives according to official trade data (**Table 37**). After China prohibited export of Tiger-based medicines in 1993, no more legal trade was reported by CITES Parties. The data for the late 1990s in **Table 37** consist of seizures only.

Table 37

International trade in Tiger bone and Tiger derivatives in the early and late 1990s, according to Customs statistics and CITES annual reports

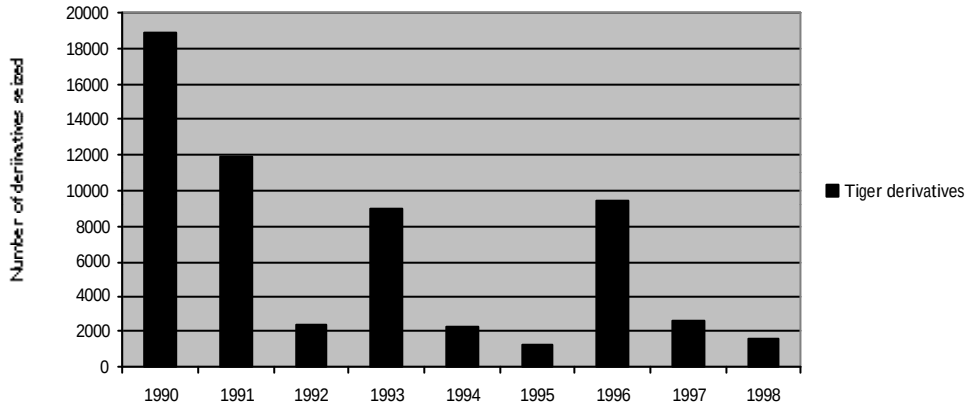
Period	Tiger bone (kg)	Tiger derivatives (units)
1990-1993	**6000**	**27 million**
1994-1998	**100**	**16 000**

Note: Totals have been rounded. Totals for 1990-93 include imports of Tiger bone reported by Customs in South Korea and Taiwan. Units reported for Tiger derivatives vary from kg to "grains". Although it is impossible to standardize these units, a decline in volume in the late 1990s is evident from the data.

Sources: Mills and Jackson, 1994 and CITES annual report data (J. Caldwell, *in litt.*, 1999).

Figure 16

Seizures of medicines labelled as containing Tiger bone in the USA over the 1990s



Source: Mills and Jackson, 1994. CITES annual report data from the database managed by the World Conservation Monitoring Centre and 1998 data from the US Law Enforcement Management System database, US Fish and Wildlife Service.

Figure 16 shows seizures of Tiger derivatives reported from the USA throughout the 1990s, during which period there were no legal imports to that country. (Imports of Tiger derivatives were banned in the USA in 1975, but domestic sale was not prohibited nationally until 1999.) Seizures of Tiger derivatives, primarily manufactured medicines from China, were lower in the late 1990s compared to the early 1990s. Most seizures were of just a few items, but two large seizures of 1840 and 5000 items in 1996 pushed up the total for that year (US Fish and Wildlife Service, Law Enforcement Management Information System, unpublished data).

More range and non-range consumer States are Parties to CITES

Cambodia and Myanmar joined CITES in 1997, leaving only Bhutan, Lao PDR and North Korea of the Tiger range States yet to join. All major non-range consumer markets are members, with the exception of Taiwan, which cannot join CITES because it is not recognized as a separate State by the United Nations. Taiwan, however, has strong legislation for controlling domestic and international wildlife trade which is compliant with CITES.

Trade control workshops

TRAFFIC, the CITES Secretariat, and other organizations have hosted a number of educational and training workshops for trade control officials in Tiger range States. While most have addressed general wildlife trade issues, the Tiger was the major focus for workshops held in Cambodia, China, India and Russia (Anon., 1999l, Weiler *et al*., 1999, TRAFFIC India and TRAFFIC East Asia staff, *in litt.*, 1999). The CITES Tiger Technical Missions in 1993 and 1999 focused on improving Tiger trade control issues in selected range and non-range consuming States (Anon., 1993a, Sellar *et al*., 1999).

Tiger treaties

Eleven of the 14 Tiger range States met in India in 1994 to establish the Global Tiger Forum, an inter-governmental forum for co-operation in Tiger conservation and trade control (Anon., 1994g). The Forum was finally ratified by the minimum of five countries necessary for it to come into effect in 1999, when Bangladesh joined at the Millennial Tiger Conference, held in March 1999, in India. The other four ratified Tiger range State members are Bhutan, India, Myanmar and Vietnam. At the March 1999 conference, the UK announced that it would become the first non-range State to join the Forum (Anon., 1999z). The Forum aims to eliminate illegal trade in Tiger parts, increase the protected area network of Tiger habitats, and promote training, awareness-building and scientific research. While the Forum has potential to raise the profile of Tiger conservation on Asian political agendas, many observers feel it will be a “paper Tiger”, with no “teeth”, unless more range States join and participate.

A number of other bilateral and multi-lateral agreements which affect Tiger conservation and trade are in effect between various countries (**Table 38**). Although these treaties and agreements represent progress, much more needs to be done, and Tiger conservation and trade control are still not sufficiently high priorities on most national political agendas (Mainka, 1997; Thapar, 1999, and Sellar *et al.*, 1999).

Table 38

Bilateral and multilateral agreements affecting Tiger conservation and trade control

Range States	Trade control	Conservation
Bhutan		India
China	India, Vietnam	India, Russia, USA
India	China, Nepal	Bhutan, China, Nepal, USA
Indonesia		Malaysia
Malaysia	Thailand	Indonesia
Nepal	India	India
North Korea		Russia
Russian Federation		China, North Korea, USA
Thailand	Malaysia	
Vietnam	China, Taiwan	
Non-range consumer States		
Belgium	EU	
France	EU	
Germany	EU	
Netherlands	EU	
Taiwan	Vietnam, USA	
UK	EU	
USA	Taiwan	China, Russia

Sources: Mainka, 1997; Anon., 1999g,x.

Problems in international trade control

Many ways to smuggle a Tiger

In a number of range States - particularly Cambodia, Indonesia, Lao PDR, Myanmar and Vietnam - Tiger trade is carried on fairly openly, despite legal prohibitions. In some cases it is a matter of payments to corrupt officials to circumvent controls, in other cases, there is simple indifference on the part of enforcement officials or else regulating Tiger trade is not seen as a priority. In Lao PDR, villagers are required to contact district Agriculture and Forest offices for permission and/or assistance when troubled by stock-raiding Tigers. Provincial governors are often informed at this stage. Any remains of Tigers killed by villagers are required to be turned over to district offices, which are then to send the remains to the provincial forest office, which must finally bring them to the national offices in Vientiane. Although a TRAFFIC survey documented several Tiger kills where remains were turned over by villagers to district and provincial authorities (such as the case in Bokeo province, shown on this report's cover, apparently no remains from these kills were ever received by the national authorities (Anon., 1999e). Where officials are less co-operative, smugglers are more clever. Large stretches of international border in south and Southeast Asia are poorly guarded. A variety of items, including Tiger parts and products, is carried by knowledgeable porters who know the paths to avoid guard posts (Pringle *et al.*, 1998, Anon., 1999e, Nguyen *et al.*, 1999 and Sun Hean, 1999).

Another favoured smuggling method is through anonymous parcels in the post. Chinese officials recently discovered a major wildlife skin smuggling group using this method. Eleven Tiger skins were confiscated and a total of 5000 animal skins were believed to have been sent by post from Myanmar to China to avoid border checks (Anon., 1999n). Officials in the Netherlands began checking packages posted from China beginning in January 1999 and within seven months they found 4000 cases of undeclared traditional Asian medicine products, 400 (10%) in violation of CITES requirements (S. Theile, TRAFFIC Europe, *in litt.*, 1999).

Russian officials emphasized that they think sea routes are of particular importance for wildlife trade, since the volume of goods is greater than at airports or border crossing points and shipments are therefore thought to be less likely to be checked (Sellar *et al.*, 1999).

Processing Tiger bone reduces its bulk and makes it more difficult for authorities to detect. (It also makes it more difficult to determine whether it is genuine Tiger bone, so traders and consumers may also be deceived.) Traders in Vietnam and Nepal told investigators that bone is crushed or reduced to powder in order to make it easier to smuggle into China (Pringle *et al*., 1998 and Nguyen *et al.*, 1999). One national park official in Nepal said he had heard of a case where powdered Tiger bone was rolled into cigarettes to avoid detection. In Lao PDR, Chinese traders reportedly process bone into gelatin before carrying it across the border (Anon., 1999e). In Myanmar, a Burmese traditional medicine practitioner described his observations of Chinese medicinal traders in the border town of Ruili making Tiger-bone gelatin. It was poured into compartments of bamboo to cool and thus hidden was easier to smuggle to China (Magwe Win Myint, 1991).

CONCLUSIONS: IS TRADITIONAL ASIAN MEDICINE THE LEADING THREAT TO THE TIGER AS WE ENTER THE TWENTY-FIRST CENTURY?

Since the publication of *Killed For A Cure* in the early 1990s, there has been greatly increased investment in Tiger conservation and Tiger trade controls. Significant progress has been made over the 1990s in reducing the use of Tiger bone in traditional Asian medicines in China and other non-range consuming States. Factory-produced Tiger-bone medicines, formerly produced by the millions, are no longer being legally manufactured. Market surveys in the late 1990s show greatly reduced availability of Tiger-bone medicines in China, South Korea, Taiwan, North America and Europe. Traditional medicine communities in these countries understand that Tiger bone can no longer legally be used, and have co-operated with conservationists by promoting substitutes for Tiger bone and helping to raise awareness of the need to conserve endangered species among their members, including patients. Progress is especially evident in South Korea and Taiwan, highlighted by trade statistics published in *Killed For A Cure* as having been major consumers of Tiger bone. At the end of the 1990s their consumer markets appear essentially to have been eliminated, although some illegal trade may continue undetected.

Progress is also evident in Tiger range States. *Killed For A Cure* reported alarming levels of commercial Tiger poaching in India, Russia, Indonesia and Nepal in the early 1990s. Since then, all of these range States have made progress in protecting key Tiger populations, thanks in part to increased investment in anti-poaching measures. All Tiger range States had at least one major project focused on Tigers in the late 1990s, and as the millennium turns the Tiger is accorded high conservation priority nationally and internationally.

Outside key protected areas with strong anti-poaching protection - parts of Russia, India and Nepal - a general decrease in Tiger poaching is not evident. The numbers of Tigers killed illegally in India and Indonesia did not vary much over the 1990s. Comprehensive poaching data are not available for other Tiger range States, but market surveys showed continued availability of Tiger bone and other parts (skins, teeth and claws) in most range States, especially those in Southeast Asia. While prices reported for Tiger parts in the range States did not increase over the 1990s, neither did they fall. Seizures of Tiger bone declined over the 1990s in India, Russia and China, but illegal Tiger bone trade continues in these countries. In India and Russia annual seizures of Tiger skins remained steady, and China made several large skin seizures in the late 1990s.

Despite an apparent substantial fall in consumption of Tiger-bone medicines in former major consuming States, there is little evidence for a major reduction in Tiger poaching. There could be a number of reasons for this, including the following: -

- Reliable data on Tiger population numbers and Tiger deaths are necessary to identify trends, and for most Tiger populations such data are not available. It is possible that fewer Tigers are being poached, but this cannot be detected without a major increase in Tiger population monitoring efforts.
- Widespread fakery of Tiger parts and products obscures the volume of genuine Tiger parts in trade. Much of the volume of trade that was reduced in major consuming States could have been based on fake Tiger parts; on the other hand, much of what appeared in supplying markets could have been fake.
- Tigers are frequently killed to protect human life and livestock, and this sort of poaching would not be reduced by declining market demand for Tiger-bone medicines, although it has served as a source of supply.
- It is also possible that consumption of Tiger bone continues at a substantial volume in major consuming States, in a secretive fashion that is difficult to detect by market survey techniques.
- Finally, other consuming States not targeted by the conservation community, especially Vietnam and Japan, may have increased their consumption of Tiger medicines over the 1990s.

Most Tiger specialists would agree that between 5000 and 7500 Tigers remain in the wild. Hunting of Tigers for the traditional Asian medicine market has played a major role in bringing them to this level of endangerment. In addition, Tigers are threatened by loss, degradation and fragmentation of habitat, depletion of their wild prey base, and conflict with local people. These pressures have resulted in small Tiger populations and sufficiently few animals that existing markets for Tiger-bone medicines (Vietnam being of particular note) and for other Tiger products, such as skins and novelties, still pose a major threat. The significance of the trade threat varies by region and with individual Tiger population. While major advances were made in the 1990s towards reducing use of Tiger bone in traditional Asian medicine, the fight to save the Tiger risks being lost if conservationists become complacent with the successes met so far. The conservation community should continue to treat traditional Asian medicine as a leading threat to wild Tigers, while also expanding efforts to eliminate trade in Tiger skins and curios.

Most potential consumers of Tiger-bone medicines say they support wildlife conservation and would consider using alternatives, yet Tiger-bone medicines and tonics are part of an ancient tradition and people will try to obtain them, even at some risk, for years to come. If medicinal trade is able to survive underground, it will provide an incentive for commercial poaching of Tigers, increasing the risk of extinction for vulnerable wild populations. However, underground trade will be difficult to detect by conventional market survey techniques in consuming markets. Potential consumers of Tiger medicines are widely dispersed and number in the hundreds of millions, yet there are not many more than 150 individual wild Tiger populations (Dinerstein *et al.*, 1997). In the future, it will be more efficient to increase efforts to detect illegal Tiger trade at source, by improving trade monitoring capacity in rural areas near wild Tiger populations. High-profile law enforcement campaigns have been a major factor in reducing availability of Tiger medicines in non-range consuming States. Tiger range States, particularly in Southeast Asia, where illegal Tiger trade currently is carried on rather openly, must similarly increase their enforcement efforts.

RECOMMENDATIONS

Over the 1990s, many recommendations have been issued for improvement of Tiger trade controls (e.g. Anon., 1993a; Gaski and Johnson, 1994; Jackson and Kemf, 1994; Mills and Jackson, 1994; Norchi and Bolze, 1995; Nowell and Jackson, 1996; Hemley and Bolze, 1997; Mainka, 1997; Mills, 1997; Gaski, 1998; Hemley and Mills, 1999; Kumar and Wright, 1999 and Sellar *et al*., 1999). There has been some progress in implementing these recommendations (Mainka, 1997, Hemley and Mills, 1999 and Sellar *et al*., 1999), but the Tiger is still endangered and trade remains a serious threat. Attention is drawn below to previous recommendations that have not been satisfactorily addressed and new recommendations are made.

Supplying markets

Enforce trade bans. The international community should increase political pressure on Cambodia, Indonesia, Lao PDR, Myanmar, Thailand and Vietnam and offer technical support, to raise the profile of Tiger conservation and trade control. Technical support could include on-the-job training, in addition to occasional meetings and workshops and the creation of reward programmes for officials in protected areas who take action against Tiger trade.

Develop programmes which provide incentives against commercial Tiger poaching. Such incentives could include paying local informants for information; developing economic alternatives for hunters; hiring local trade monitors; and raising awareness about Tiger conservation and penalties for illegally killing Tigers.

Improve anti-poaching capacity. There have been advances in Russia and in parts of India, Indonesia, Nepal, and Thailand. More improvement is needed in all of these countries, but of top priority are range States where anti-poaching efforts are poorly funded, staffed, and equipped. These include Bangladesh, Cambodia, Lao PDR, Myanmar, and Vietnam.

Develop specialized enforcement units for undercover investigations. Where Tiger trade is covert in some range States, including China, Russia, India, Malaysia and Nepal, government authorities have a legal responsibility to control trade and should take responsibility for developing official undercover investigative capacity. Specialized enforcement units focusing on illegal trade in Tigers and other endangered species should be created, as urged strongly by the 1999 CITES Tiger Technical Mission.

Raise the political profile of Tiger conservation. Wildlife conservation calls for difficult political choices, the sacrifice of short-term gain for long-term benefit. In all Tiger range States, even India, the Tiger is still all too frequently the loser. Concerned governments should use their economic and diplomatic resources to raise the political profile of Tiger conservation in Tiger range States at the highest levels. The cancellation of international aid to Cambodia spurring the government to stop widespread illegal logging and US threats of trade sanctions against China, Taiwan and South Korea, leading to huge improvements in Tiger trade controls are examples of such an approach. If economic threats are used, they should be coupled with a readiness to provide economic assistance for controlling trade in Tigers.

All Tiger range States should participate in CITES and the Global Tiger Forum Bhutan, Lao PDR and North Korea should join CITES. Those Tiger range States which have not already done so should join the Global Tiger Forum. The Forum has the potential to become the leading force in Tiger conservation,

by allowing range States to co-ordinate management of Tiger populations which span country borders and to improve law enforcement by sharing information about cross-border illegal trade. Its meetings of high-level officials should be supplemented by more frequent meetings between field staff. Russian and Chinese specialists should be encouraged to continue their efforts to co-operate with North Korea, to allow the international community to assist with conservation of that country's remaining wild Tigers.

Integrate trade monitoring capacity into Tiger conservation projects. Projects should build on their contacts with local officials, rangers, villagers and conservationists to develop databases of information about Tiger mortality, poaching and trade specific to discrete Tiger populations. Field projects should include close attention to compilation of information on poaching motivation and make this available for wider analysis (see recommendation below to improve collection of poaching and trade data). This recommendation applies to all range States, while noting advances made in India, Indonesia, Nepal and Russia.

Improve collection of poaching and trade data. All range States should have centralized databases to keep records of incidents of Tiger mortality, poaching, illegal trade and seizures. It may be more efficient for governments to contract database management to a non-governmental organization, such as the Indian Government has done. TRAFFIC India and WPSI should meet regularly to standardize their databases. Databases should record sufficient detail about poaching incidents to determine the primary motivation as trade, human-Tiger conflict, or accident. Databases should provide an indication of the reliability of each incident recorded. Governments must organize information channels to make sure all incidents are entered into the databases. Tiger range States should commission a feasibility study for an international Tiger poaching database, modelled on the MIKE programme (Monitoring Illegal Killing of Elephants) currently being developed by CITES for the African and Asian Elephants. The IUCN/SSC Cat Specialist Group should be closely involved with developing standardized data collection methods for Tiger poaching. The CITES Parties should consider developing a Tiger trade database similar to the one they have commissioned for ivory (ETIS, the Elephant Trade Information System) (Anon., 1999q).

Regular monitoring of major wildlife markets. Major range State wildlife markets, most notably Cambodia's Poipet and Myanmar's Tachilek and Shuili markets, should be monitored regularly for sale of Tigers and their parts and products. Information recorded should include number of items seen and price. Investigators should preferably be based locally and must be careful to distinguish real and fake Tiger parts and products (**Annex 2**).

Increase penalties for Tiger poaching and illegal trade. It is recommended that penalties be increased to give them more deterrent power. Awareness of the importance of Tiger conservation should be raised among the judiciary, notably in Russia and India.

Invest in managing human-Tiger conflict. Tigers killed to protect human life and livestock serve as a potential supply source for trade in Tiger parts. Measures which have helped to reduce conflicts in some areas, including payment of compensation and establishment of trained problem animal control officers, should be implemented around all major Tiger populations where such conflict is a problem. This is a priority in Lao PDR, Indonesia and Bhutan, in particular.

Enforce prohibitions against trade in any products from Tiger farms. China, Thailand and other countries should ensure that trade restrictions against Tiger parts and products extend to those derived from captive Tigers. The large Tiger collections in China and Thailand should be monitored closely by wildlife authorities in those countries to ensure that no illegal trade is taking place.

Processing markets

Pay more attention to Tiger-bone gelatin (*cao*). In Southeast Asia, especially Vietnam, government authorities and wildlife trade monitoring organizations should focus on *cao*-makers to eliminate effectively production of Tiger-bone medicines. Customs authorities in consuming markets should be made aware that gelatin is a common form of such medicine, although not readily recognizable as such if it is not labelled as containing Tiger bone. Forensic scientists should be supplied with samples of Tiger-bone gelatin to see if genuine Tiger bone can be detected with the techniques currently under development.

End manufacturing of Tiger tonics in Japan and Vietnam. The Government of Japan should enforce strictly the amendments to the LCES, which enter into effect in April 2000, and prohibit further production of, and trade in, Tiger penis tonics. The Government of Vietnam should take steps to end production of Tiger-bone wine, which is in contravention of national legislation prohibiting trade in Tiger parts.

Examine stocks of Tiger bone in China. China is the only range State still to have substantial stocks of Tiger bone, which provide an opportunity to gain greater understanding of how the Tiger trade operated in the recent past. China should allow qualified mammalogists and geneticists to examine the bone stocks to help determine their origin. Security measures should be enhanced to prevent any illegal use of the stocks.

Identify producers of counterfeit Chinese Tiger-bone medicines. Tiger-bone medicines are no longer legally produced in China, but counterfeit Chinese medicines have been turning up in consuming markets. Authorities from consuming markets which make such seizures should attempt to trace these medicines back to their source through the would-be importer, in order to identify where the counterfeits are being produced, who is producing them, and if they actually contain Tiger bone.

Retail consumer markets

Enforce trade bans. Retail consuming markets for Tiger parts and products in the late 1990s operated fairly openly in Japan, The Netherlands, parts of the USA (e.g. New York), Vietnam, Indonesia, Thailand and Malaysia. Government authorities in these countries should be encouraged and assisted to enforce existing laws prohibiting domestic trade.

Continue to co-operate with traditional Asian medicine communities. The current dialogue and co-operation between the conservation and traditional Asian medicine communities is more constructive than the atmosphere of confrontation prevalent in the early 1990s. The assistance of traditional medicine communities in raising awareness of the need to cease use of Tiger derivatives is critical and their help in monitoring illegal trade essential now that markets for Tiger-bone medicines are going underground. Conservationists should expand their outreach efforts to traditional Asian medicine communities in Tiger range States other than China that have consuming markets, especially Vietnam, Malaysia, Thailand and Indonesia, and research and promotion of Tiger bone substitutes should continue. Surveys conducted for this report showed a strong public demand for Tiger-bone medicines in Vietnam and therefore more public awareness work is particularly recommended for this country.

Develop specialized enforcement units for undercover investigations. Specialized enforcement units to focus on illegal trade in Tigers and other endangered species should be created to investigate evidence of covert retail Tiger trade in some consuming markets, particularly China, South Korea, Singapore and, to a lesser extent, Taiwan. These units should be trained in undercover investigative techniques. Establishment of such units is also recommended for Canada and Japan.

Continue to raise conservation awareness in consuming markets. Many practitioners and consumers of traditional Asian medicines say they support wildlife conservation. Conservationists should continue public education programmes which raise awareness of the Tiger's endangerment and the illegality and unacceptability of consuming Tiger parts and products.

Discriminate between real and fake Tiger parts and products. A short training course and manual should be developed to aid wildlife trade monitors and government officials in distinguishing genuine Tiger parts from fakes. Future surveys in supplying and consuming markets should be carried out only by investigators who have received such training.

More consistent reporting of seizures to CITES. CITES Parties should be encouraged to report annually on all seizures of Tiger parts and products. In annual reports, Tiger derivatives should be described in terms of number of packages and total weight of all packages. Tiger bone and Tiger penis should be listed as such, rather than as derivatives or body parts. CITES Parties should attach a list with detailed descriptions of the items seized. Details should include discrimination of real and fake Tiger parts whenever possible. This reporting could fall under the international Tiger poaching monitoring programme discussed previously under recommendations for supplying markets.

Regular monitoring of consuming markets. It is too soon to tell whether the reduced availability of Tiger parts and products in consuming markets will be an enduring trend and therefore major consuming markets should be surveyed regularly, using anonymous investigative techniques wherever appropriate and feasible.

More attitudinal surveys to identify and understand consumer demand. Attitudinal surveys should be carried out in consuming markets not so far the subject of such research, including Vietnam, Singapore, Thailand, South Korea and Indonesia. More survey work should be done in Japan, China (including major cities such as Guangzhou and Beijing) and Taiwan. Survey scope should be expanded to include questions about attitudes toward fake Tiger parts and products and Tiger farming. Results of the surveys should be fed into efforts to raise conservation awareness in consuming markets.

Continue efforts to develop effective forensic techniques. Research in the USA, UK and Taiwan to identify Tiger constituents of traditional Asian medicines should continue. China's forensic centre should also focus on identification of Tiger bone.

Prohibit trade in any products claiming to contain Tiger. It is recommended that Canada amend its legislation to treat any product claiming to contain Tiger as actually containing Tiger. Canada has previously experienced problems prosecuting cases involving Tiger products, because the government was unable to demonstrate that the Tiger contents were genuine. Japan may experience similar problems unless the burden of proving genuine Tiger contents or otherwise can be lifted from the government and applied to traders. In addition, Japanese law should ensure that it prohibits trade in Tiger bone and penis for any purpose, not just for human consumption.

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ANNEX 1: QUESTIONNAIRE SURVEY USED FOR THIS REPORT

In Cambodia (abbreviated as KH below) and Vietnam (VN), the interviews were carried out by investigators with prior experience in Tiger interview surveys (Heng, 1999 and Nguyen *et al*., 1999). Institutional support was received from Cambodia's Wildlife Protection Office and Vietnam's Institute of Ecological and Biological Resources.

In Taiwan (TW), leading figures of the traditional Chinese medicine community and wildlife trade experts were contacted by TRAFFIC East Asia-Taipei staff. Because of the sensitive nature of the Tiger trade issue in Taiwan, few people consented to participate in the survey.

In Singapore (SGP), interviews were done personally, and by mail survey with anonymous reply. The Total Health Foundation and several private consultants organized the survey through their contacts in the traditional medicine community.

In Canada (CAN), the questionnaire was distributed by post only, with anonymous reply, to the membership of the Chinese Medicine and Acupuncture Association of Canada. Between 500-600 surveys were sent out, but only 26 people responded (< 5% response rate). The low response rates in Canada and Taiwan underline the sensitive nature of medicinal trade in Tiger bone, and emphasize the importance of building relationships of trust with reliable informants.

Other abbreviations given below include MY (Malaysia), LA (Lao PDR), and TH (Thailand).

Some questions were inadvertently omitted in some areas and some were phrased differently by different investigators. These cases are noted below.

The total number of interviews conducted in each area is listed in parentheses under Question 1. Responses are given as percentages, with number of responses in brackets. Responses are pooled and averaged for Tiger range States and non-range consuming markets.

Q1. Does medicinal trade in Tigers continue in this country (despite the ban)?

	Yes	No	Don't Know or No Answer (DK)
Tiger range States			
KH (35)	97% [34]	3% [1]	0
VN (92)	78% [72]	12% [11]	10% [9]
Average	**83% [106]**	**10% [12]**	**7% [7]**
Non-range consuming markets			
CAN (26)	27% [7]	12% [3]	62% [16]
SGP (24)	30% [7]	35% [8]	35% [9]
TW (9)	22% [2]	33% [3]	44% [4]
Average	**27% [16]**	**24% [14]**	**49% [29]**

Q2. Has the volume...

	Increased	Decreased	Same	DK
Tiger range States				
KH	0	66% [23]	31% [11]	3% [1]
VN	22% [20]	62% [57]	4% [3]	12% [12]
Average	**16% [20]**	**63% [80]**	**11% [14]**	**10% [13]**
Non-range consuming markets				
CAN	0	31% [8]	0	69% [18]
SGP	4% [1]	26% [6]	44% [11]	26% [6]
TW	0	11% [1]	0	89% [8]
Average	**2% [1]**	**25% [15]**	**19% [11]**	**54% [32]**

Q3. Has the price…

	Increased	Decreased	Same	DK
Tiger range States				
KH	77% [27]	0	17% [6]	6% [2]

**this question inadvertently omitted in Vietnam*

Non-range consuming markets				
CAN	12% [3]	0	19% [5]	69% [18]
SGP	4% [1]	22% [5]	48% [11]	26% [7]
TW	0	0	11% [1]	89% [8]
Average	**7% [4]**	**8% [5]**	**29% [17]**	**56% [33]**

Q4. What percentage of practitioners/traders do you estimate currently trade in Tiger bone?

	Average	Range	DK
Non-range consuming markets			
CAN	2% [9]	n/a	65% [17]
SGP	31% [11]	0-90%	56% [13]
TW*	1% [3]	0-2%	44% [4]

** Two Taiwan respondents removed from the sample for this question because they are not part of the Chinese medicine community.*

Tiger range States			
KH traders	10% [17]	1-25%	52% [18]
KH doctors	2% [21]	0-10%	40% [14]

	Most	Few	None	DK
VN traders	46% [42]	16% [15]	1% [1]	37% [34]
VN doctors	41% [38]	10% [9]	1% [1]	48% [44]

Q5. Where does the supply of Tiger bone currently come from? (**Note**: some respondents noted more than one source.)

Tiger range States

	Old stocks	VN	LA + KH	KH	China (Beijing)	DK
KH				100%	6%	0
VN	8%	18%	57%			17% [16]

Non-range consuming markets

	DK	China	MY	TH	Asia	Africa	Captivity	Fakes
CAN	92% [24]				100%			
SGP	17% [4]	79%	5%	5%		21%	5%	
TW	89% [8]						100%	

Q6. Is the Tiger bone currently available to retail pharmacies and traders mostly…

	Raw bone	Manufactured meds	Both	DK
Tiger range States				
KH	66% [23]	14% [5]	0	20% [7]
VN	49% [45]	16% [15]	0	36% [32]
Average	**54% [68]**	**16% [20]**	**0**	**31% [39]**

Non-range consuming markets				
CAN	19% [5]	4% [1]	12% [3]	65% [17]
SGP	13% [3]	30% [7]	22% [5]	35% [9]
TW	0	0	0	100% [9]
Average	**14% [8]**	**14% [8]**	**14% [8]**	**59% [35]**

Q7. Is the supply of Tiger bone now mostly…

	Old stocks	New or imports	Both	DK
Tiger range States				
KH	14% [5]	86% [30]	0	0
VN	8% [7]	92% [85]	0	0
Average	**9% [12]**	**91% [115]**	**0**	**0**
Non-range consuming markets				
CAN	27% [7]	8% [2]	4% [1]	66% [16]
SGP	44% [11]	4% [1]	35% [8]	17% [4]
TW	22% [2]	0	0	78% [7]
Average	**34% [20]**	**5% [3]**	**15% [9]**	**46% [27]**

Q8. Are the contents of the Tiger medicines currently available mostly…

	Real Tiger bone	Fake Tiger bone or substitute	DK
Tiger range States*			
KH*	63% [22]	37% [13]	0
VN	16% [15]	55% [51]	28% [26]
Average	**29% [37]**	**50% [64]**	**21% [26]**

** Cambodia respondents emphasized that there is little domestic trade in Tiger-bone medicines and most Tiger bone is exported. Vietnam respondents emphasized that few over-the-counter Tiger bone gelatins are authentic, and the purchaser must make special arrangements to make sure real Tiger bone is used.*

Non-range consuming markets			
CAN	23% [6]	54% [14]	23% [6]
SGP	17% [4]	48% [12]	30% [8]
TW	0	44% [4]	56% [5]
Average	**17% [10]**	**51% [30]**	**32% [19]**

Q9. If real Tiger bone is used, how much does it take to make a certain quantity of medicine?

Tiger range States: *Question not asked in Cambodia. For Vietnam, see* ***Box 2*** *in main report.*

	Tiger bone as percentage of medicine components	DK
Non-range consuming markets		
CAN	20%	96% [25]
SGP	5.4%	65% [16]
TW		100% [9]

Q10. Do manufacturers continue to use Tiger bone and just change the label?

Tiger range States

This question was not understood in Cambodia and Vietnam. In Vietnam, 81% of respondents insisted that they would want to keep Tiger *bone on the label, especially if there was really* Tiger *bone in the contents.*

Non-range consuming markets

	Yes	No	DK
CAN	8% [2]	15% [4]	77% [20]
SGP	0	9% [2]	91% [22]
TW	0	44% [4]	56% [5]
Average	**3% [2]**	**17% [10]**	**80% [47]**

Q11. Do you think most practitioners/traders prefer a controlled legal trade in Tiger bone, or can it be replaced easily by substitutes?

	Tiger bone preferred	Substitutes acceptable	DK
Tiger range States			
KH	46% [16]	23% [8]	31% [11]
VN	76% [70]	0	24% [22]
Average	**68% [86]**	**6% [8]**	**26% [33]**
Non-range consuming markets			
SGP	8% [2]	35% [8]	56% [14]
TW	0	78% [7]	22% [2]
Average	**6% [2]**	**45% [15]**	**49% [16]**

In Canada, this question was divided into two parts, 11a and 11b:

Q11a Do you think most practitioners/traders prefer a controlled legal trade in Tiger bone?

Yes	No	DK
42% [11]	8% [2]	50% [13]

Q11b. Can Tiger bone be easily replaced by substitutes?

Yes	No	Some cases	DK
58% [15]	23% [6]	4% [1]	15% [4]

ANNEX 2: RECOGNITION OF TIGER PARTS IN TRADE

by Bonnie C. Yates, US Fish and Wildlife Service, National Fish and Wildlife Forensics Laboratory

Note: **Use of the information presented here by an untrained observer for legal purposes would be neither pertinent nor appropriate**.

Some parts and products in wildlife markets are not what they appear to be. There is a need for conservation and law enforcement purposes to ascertain whether parts and products claimed to be derived from Tigers are genuine. An entire art form has evolved out of creating false products for a wide range of goods. These are fairly frequently found in a broad range of markets types, from street markets in Asia to high street shops in Europe. The items also vary in quality from the bizarrely crude to the sophisticated and convincing.

What follows is a guide to recognition of genuine and fake Tiger parts and products, based on the author's experience in examining these. Simple, visual features and knowledge of products more commonly encountered are described below, wherever possible, recognizing that the observer will not usually have to hand the tools to conduct scientific examinations, nor even necessarily be able to handle an object. Clues are given to arm the observer with the means of making the best judgment possible under such circumstances.

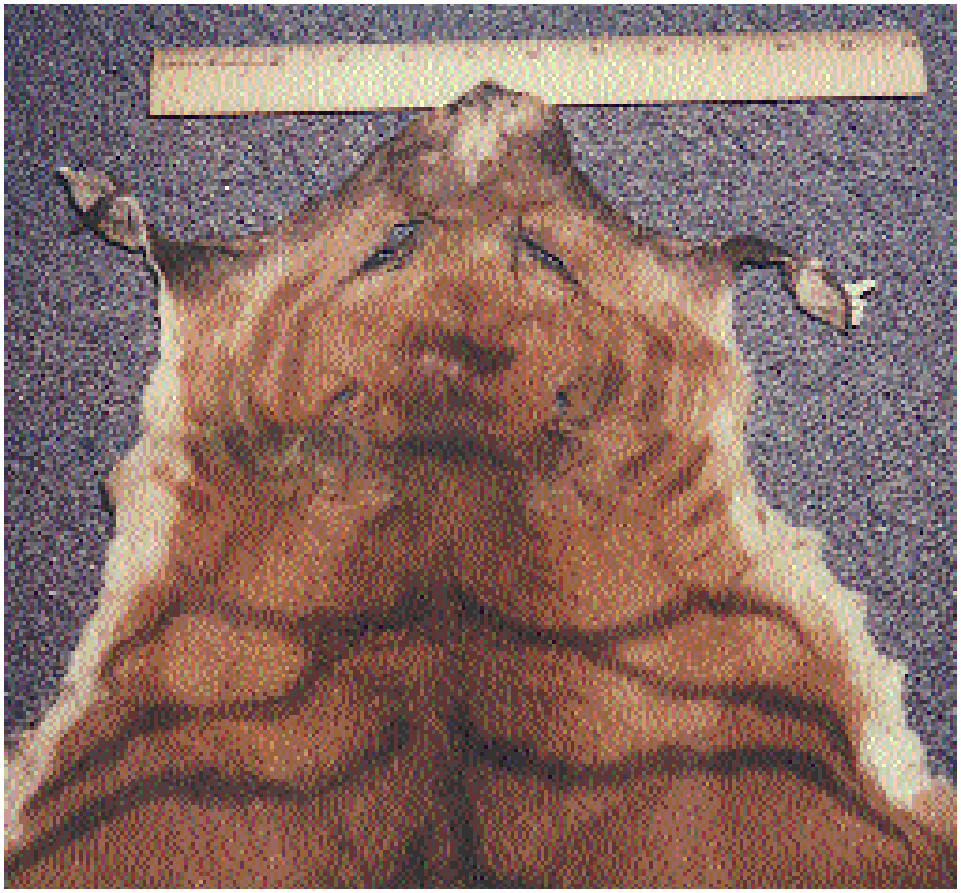
Skins

The striped hide of a Tiger is one of the most easily recognized animal parts in the world. Once salted, dried, and folded inside-out, however, the recognizable elements are no longer so apparent, yet it may be possible to deduce the size of the animal, or spot a body part which may provide a clue to the species. The skin of a Tiger (excluding a cub or yearling) should be roughly the size of a roll-up camping mattress, which would fold up to make a 2-ft (0.61 m) square, if folded into three from top to bottom, and therefore the number of main folds in a skin may be helpful in determining its animal origin. If the skin is smaller than this, the fur around the edges of the skin may provide clues; if the fur is slightly curly, this may indicate a juvenile Tiger, (although this would be impossible to conclude without further information).

If fur pattern is visible, the Tiger's characteristic orange and black colouration may be exposed. Otherwise, it may be possible to see white hairs along the underside of the skin, where cut edges are usually exposed. These hairs are short near the Tiger's face and longer at the throat and belly.

Painted and/or dyed dog hides have been fashioned to look like Tiger hides. In such cases, the dark stripes are not visible on the underside of the hairs, which can be seen by stoking the hairs "against the grain" where the striping is located. Sometimes colour comes off at the touch, which obviously indicates that the skin is not genuine Tiger (**Figure 1**).

Other things to look for are appropriate and accurate patterning, especially on partial hides or objects covered with hide patches. For example, Tigers lack stripes on their feet and lower extremities. Likewise, stripes should not run across obvious seams in products made from hide patches sewn together.



Credit: Wildlife Institute of India

Figure 1: Dog hide dyed to resemble Tiger cub skin

Claws

Tiger claws are made of keratin, (a fibrous protein also found in hooves, hair, horn, feathers, etc.) and cover the last bones of the paw. They may be found in trade as part of a paw, or attached to the bone only. Otherwise, they may be completely detached and left raw or processed into jewellery. The keratin part of cat claws is pale - straw-coloured or amber - and its shape forms an arc that is almost circular. Bears, for comparison, have claws that are silvery black or striped with white, with profiles forming an arc that extends outward then curves down at the tip, which upon close examination is rounded. The tip of a Tiger claw tapers to a sharp conical point (**Figure 2**).

All cats have five claws on each front foot and four on each hind foot. The claws vary in size from toe to toe and by individual, according to age and sex. The claws of small Tigers (and lions) can overlap in size in comparison to the claws of large Leopards (and Jaguars). Generally, however, the arc of the largest claws of big cats measures about three centimetres.

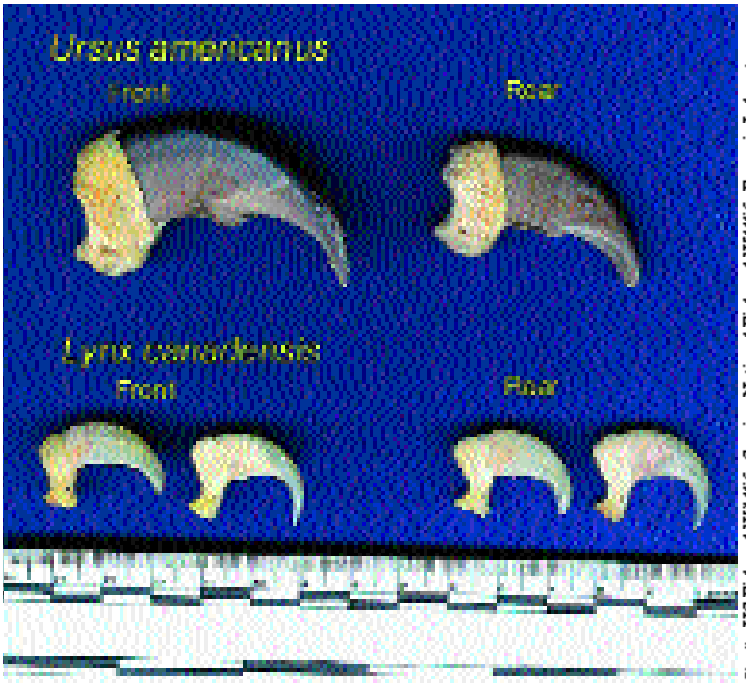


Figure 2: Comparison of bear claws (above) and cat claws (below)

Skulls and teeth

Skulls of Tigers and lions can easily be distinguished from those of bears by noting the presence of a least one groove on the sides of each canine tooth. Cats have these grooves located part way between the margin of the enamel and the tip of the tooth. They should not be confused with longitudinal cracks in the canine teeth that often coincide with (and run directly through) these grooves. (The cracks are caused by differences in the mineral composition of the different layers in the tooth and how these layers respond differently to drying.) In the big cats of mature age, the edges of the grooves are pocked by pin-point-sized cavities; these may still be visible even if the groove is parted by the drying cracks (**Figure 3**).

If the canine teeth are missing from a skull, the shape of the cheekteeth (viewed with the skull in profile) may be useful to note. In cats, these teeth are characterized by shearing edges that form V-shaped outlines. In bears, by contrast, the largest cheekteeth have broadened, grinding platforms with slightly bumpy biting surfaces.

Figure 3, showing groove placement in canine tooth. (The tooth on the right is a plastic replica.)

If single canine teeth are in question, such as may be seen adorning necklaces and other craftwork, the enamel grooves may be searched for, in order to identify cat. If the widest part of a canine tooth with grooved enamel exceeds 2.4 cm, the tooth is probably too large to be from a Leopard and is therefore either from a lion or a Tiger.

Other measurements are generally not helpful unless the skulls can be handled and the handler knows what "landmarks" to measure. The length of some bear skulls can be the same as some skulls of big cats.

Penises

Genuine Tiger genitalia are unlikely to be found openly in trade. What is usually sold as Tiger comes from cattle - after undergoing some modification. Penises of cats are known to have barbs on the tips and skilled craftsmen reproduce this feature on cattle penises by making tiny V-shaped cuts over the surface of the glans (tip) (**Figure 4**). By hanging the modified penis upside down, the edges of these little cuts curl under during drying and form barb-like projections. The glans may be densely covered in very small barbs or sparsely covered by larger projections (up to one centimetre), depending on the skill of the worker and desired appearance of the product. Some bovine organs are tipped with three curled appendages and some tips may be pierced with a hole for suspension (**Figure 5**).

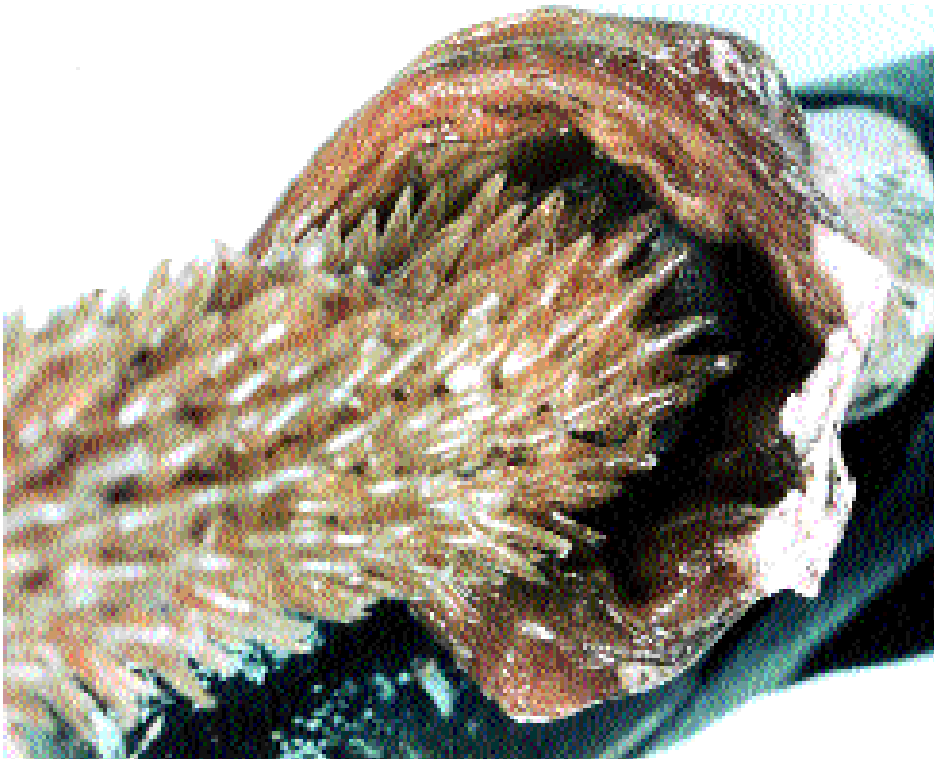
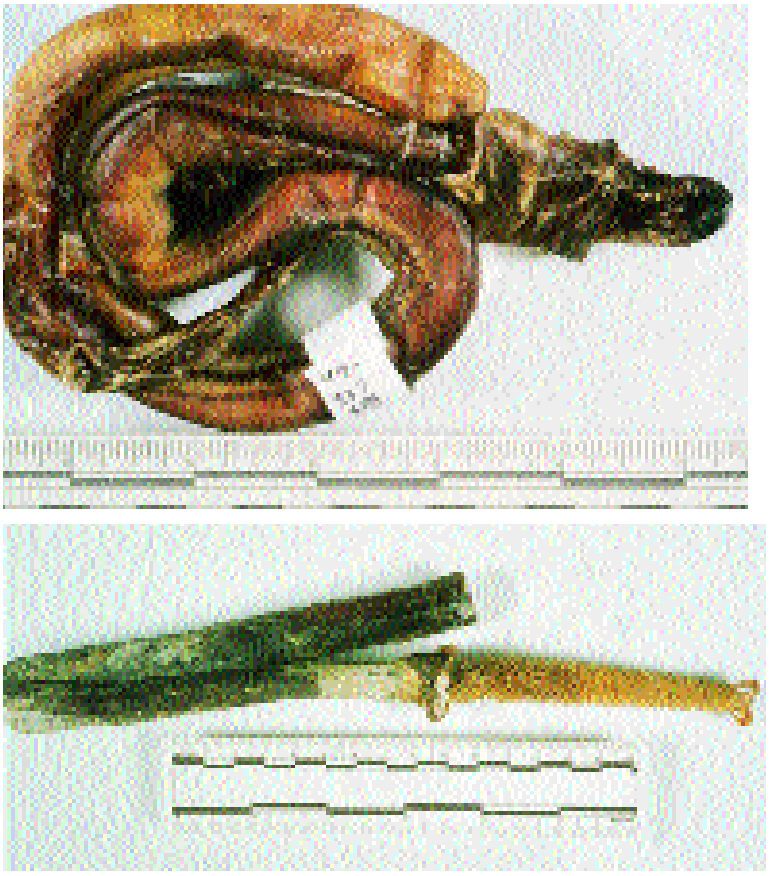


Figure 4: Base of modified cattle penis showing V-shaped cuts

Because genuine Tiger penises are so rare, craftsmen and the consumer apparently no longer know what a real Tiger penis looks like and therefore continue to fabricate and purchase barbed penises. **Figure 6** shows a genuine Tiger penis that has been dried. Notice the size of the glans penis and that the barbs are imperceptible. **Figure 7** shows a Tiger penis and the diminutive barbs in a fresh state.

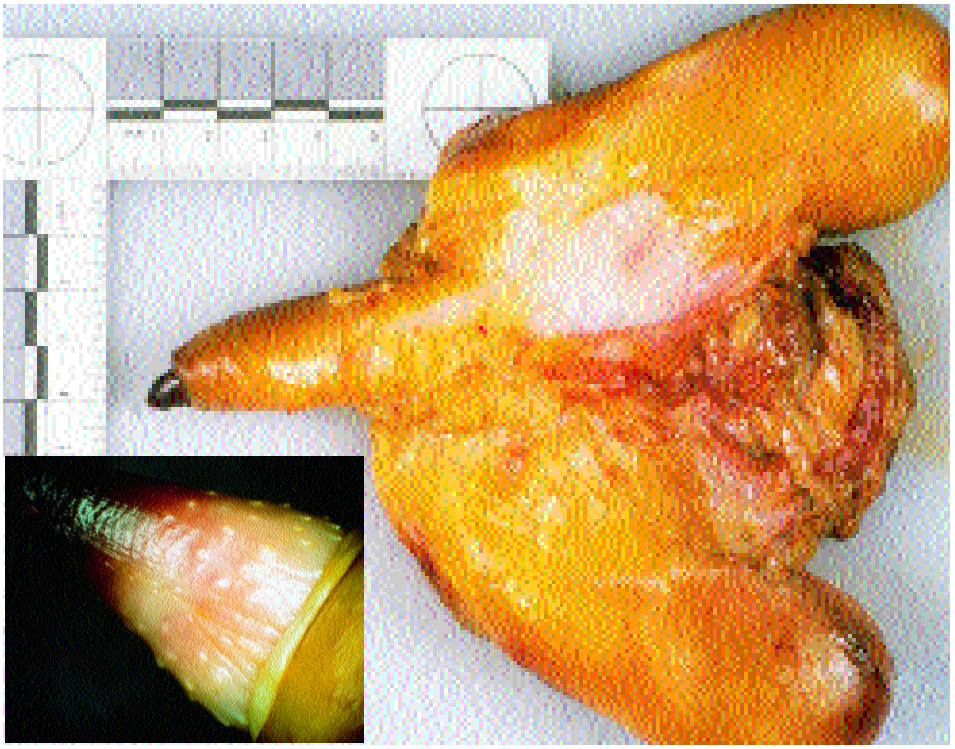


Credit: US Fish and Wildlife Service, National Fish and Wildlife Forensic Laboratory, Ashland, Oregon

Figure 5: Two styles of modified cattle penis

Credit: US Fish and Wildlife Service, National Fish and Wildlife Forensic Laboratory, Ashland, Oregon

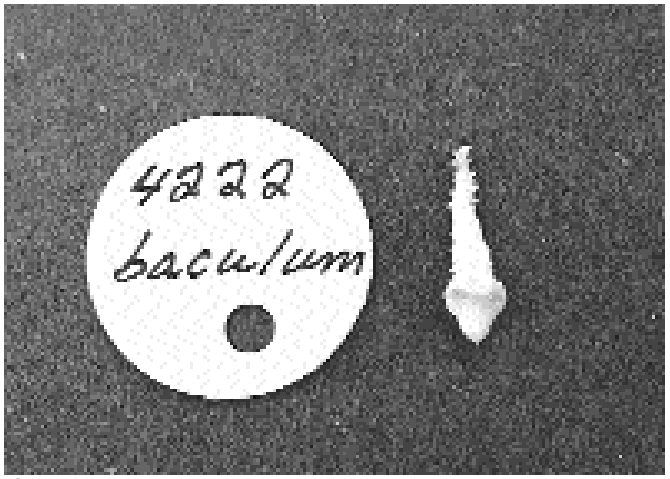
Figure 6: Dried Tiger penis with close-up of tip



Credit: US Fish and Wildlife Service, National Fish and Wildlife Forensic Laboratory, Ashland, Oregon

Figure 7: Fresh Tiger penis with inset close-up of tip

Deer and seal penises are also used for medicinal purposes and domestic dog penises are frequently used as replacements for deer and seal but may be detected with x-rays by the distinctive groove visible on the internal baculum bone (*os penis*) of the dog. Deer and cattle penises lack the os penis altogether, whereas seal bacula may be distinguished by features common to each of the two seal families. Tigers have a small triangular baculum **(Figure 8**), but it is seldom visible, even in an x-ray, being obscured by folds in dense, dried tissues and an expert is required to interpret the x-rays.

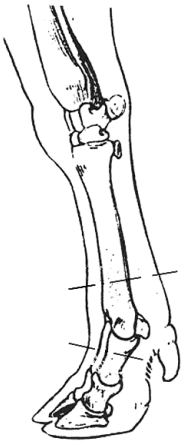


Credit: Museum of Vertebrate Zoology, University of California, Berkeley

Figure 8: Tiger baculum - size approximately 5 x 2 cm

Bones

Bones are sold in one of three forms: (a) as whole joints, either fresh or dried, (b) dry fragments, or (c) rendered into another product, such as powders, plasters, paste, or wine. If the bones are processed by burning, pulverizing, cooking, etc., detection of anything more than the elemental constituents of calcium or phosphorus is rarely possible, although the latest advances in testing may sometimes achieve this (see main report). If bones are sold dry and fragmented, expertise in osteology and direct comparison with known skeletal standards is required, in order to attempt to identify the species.



Credit: Adapted from Ellenberger *et al.* (1956). *An Atlas of Animal Anatomy for Artists*. Dover Publications

Figure 9: Drawing of a cattle leg with lines showing position of cuts used to fabricate the item in **Figure 10**

When observing whole joints, usually from one of the limbs, the presence of distinctive lower leg bones may be used to distinguish genuine Tiger parts from those of cattle, which are commonly substituted. Tigers, lions, and bears have a set of five bones, or four in the hind feet of cats, (metapodials) corresponding to each digit, similar to those in the palm of human hands or arch of human feet. These bones are roughly similar in overall shape and size to their human counterparts. By contrast, the equivalent bone structure in cattle is a single long bone to which the first pair of toe bones is joined (see **Figure 9**). To make a fake Tiger foot, the hoof from a cattle leg is usually cut off, leaving two stumps about two centimetres in diameter, which is what remains of the first set of toe bones (**Figure 9**). In some cases, the small accessory hooves have been pulled forward and shaped to resemble remnant Tiger claws, as in **Figure 10**. While these clues may be used to indicate cattle or cat bones, a trained osteologist would be required for definitive identification.

Credit: US Fish and Wildlife Service, National Fish and Wildlife Forensic Laboratory, Ashland, Oregon

Figure 10: Fake Tiger foot; note stripes on toes and inaccurate colour

Summary of clues for identification

Part	Genuine Tiger	Substitute
hides	flame-like dark stripes white blotches on face/neck no stripes on feet	painted stripes on surface only of hairs colour comes off
skulls/teeth	grooved enamel on canines shearing molars	no grooves on enamel of canines grinding molars
claws	pale keratin arc as partial circle tips conically pointed and sharp	dark or striped keratin arc is lengthened tips tapered and slightly rounded
penis	small glans with imperceptible barbs	long tapering glans covered with barbs cut marks visible beneath barbs
bones	if whole leg joints, look for multiple metapodials	if whole leg joints, look for single metapodial and two toe bones

ANNEX 3: THE SYMBIOTIC MATCH OF TRADITIONAL MEDICINE AND WILDLIFE CONSERVATION

Talk presented by Judy Mills, Director, TRAFFIC East Asia, at the 'Healthy People, Healthy Planet' International Conference on Traditional Chinese Medicine and Endangered Wildlife Conservation, *held from 30 October-1 November 1999 in Beijing. The Conference was organized by the State Administration for Traditional Chinese Medicine and the National Centre of Traditional Chinese Medicine. WWF and the American College of Traditional Chinese Medicine were joint organizers.*

"A few short years ago, some believed that traditional Chinese medicine (TCM) and wildlife conservation were enemies, one working against the other. The genesis of this misconception arose from lack of communication and understanding on the part of both sides.

This perceived antagonism came to light when international trade in rhinoceros horn and Tiger bone were banned by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). There followed threats of trade sanctions against countries, including China, that were still trading domestically in these prized medicines from highly-endangered species. In the end, the United States did impose limited trade restrictions on Taiwan for this reason. What began as a debate over use of wildlife turned into a debate concerning national and cultural sovereignty, as well as debate over whether human or animal welfare was more important. Common ground seemed hemispheres apart.

Looking back, it is easy to see the roots of the misconceptions that made so-called "enemies" of TCM and wildlife conservation. TCM saw wildlife conservationists as the reason for loss of important medicines and livelihoods. Conservationists saw TCM as a primary reason for the possible loss of entire species. Neither side saw the situation clearly nor fully. Neither side communicated with the other. Neither understood the good intentions of the other.

TRAFFIC opened a regional office in Hong Kong in 1994, largely because of the region's consumption of wildlife as medicine. TRAFFIC East Asia's early research noted that laws and law enforcement, even threats of international trade sanctions, did not stop all illegal trade in endangered species for medicinal purposes. It also showed that this residual illegal trade was due, in part, to the fact that bans on trade in items such as rhino horn and Tiger bone were decided by government wildlife authorities and conservationists, without input from the TCM industry. In addition, the bans contradicted a centuries-old allegiance to an effective form health care integral to Chinese culture.

These are the factors which led TRAFFIC and WWF, with the Hong Kong government, in 1995, to organize The First International Symposium on Traditional Chinese Medicine and Wildlife Conservation. Since then, there have been similar meetings in Australia, the United States, a second time in Hong Kong, and now, in China. All have aimed to enlist TCM communities in the wildlife conservation issues that they affect and which, in turn, affect them. At the same time, these meetings were designed to "educate" conservationists about the efficacy and necessity of TCM and other traditional medicine systems.

In the early stages of this dialogue, the TCM community asked why conservationists were suddenly meddling in the business of TCM when TCM had enjoyed centuries of success with no attention from conservationists. Some TCM specialists declared that China held boundless supplies of wild medicinal plants and animals. At least one called it a plot by the Western world to destroy TCM and supplant it with synthesized pharmaceuticals.

At the same time, some conservationists were equally ill-informed. Some declared that TCM as a whole must be stopped, and that TCM was unnecessary given the widespread availability of synthesized drugs.

These arguments were mostly monologues in different languages. One side did not hear nor understand the other. Many angry words were spoken. Stalemate resulted.

The truth is that TCM specialists were among the first keen observers of nature, albeit for consumptive reasons. In addition, TCM specialists in China noted with concern the decline of wild medicinal species long before the international conservation community became impassioned with the issue. In fact, at the inception of the People's Republic of China 50 years ago, public health officials registered their concern that some medicinal resources were running low in the wild. From this grew China's experiments with farming and propagating wild animals and plants of medicinal value. While some conservationists and animal welfare organizations criticize these approaches for negative conservation effects and/or cruelty, it is nonetheless important to recognize that TCM specialists were, in their own way, concerned about and addressing scarcity of wild resources. It is here that TCM and conservation find solid common ground.

The reason that this dialogue has grown and spread is that both sides need one another.

Conservationists cannot hope to prevent unsustainable use of wild species of medicinal value without the co-operation and collaboration of the TCM industry. Similarly, TCM stands to lose the use of more and more species of medicinal value if they do not engage in conservation efforts.

This fact will become increasingly clear as the status of many medicinal plants and animals in the wild worsens. In some cases, their supply already is severely limited and declining further. If illegal trade continues at current rates, supplies of musk, ginseng and other prized medicinal ingredients may well go the way of Tiger bone and rhino horn - that is, banned from international and domestic trade. Ultimately, uncontrolled consumption will deprive traditional medicine systems and the world of their most precious wild resources.

Sustainable utilization of some wild resources may never be possible, due to their precarious state in the wild. However, there are other instances where sustainable use might be possible, if the traditional medicine industry and wildlife conservationists work together to design and follow sustainable practices. Here are three scenarios that illustrate this.

Tigers might be called the "worst-case scenario". Tigers have declined to perhaps 5000 or fewer in the wild. Those that remain are in fragmented habitats under threat from human encroachment and over-harvest of timber and non-timber forest products. The Tiger's "condition" might be called a "triage situation," in medical terms. While Tigers do breed well in captivity, farming them for their bones is not a viable option at this time, for two important reasons.

Firstly, all efforts for Tigers now should be focused on conserving them in the wild, along with their habitats and their prey. Farming Tigers could easily shift the focus away from wild Tigers to developing Tiger farming.

Secondly, unscrupulous traders could easily sell the bones of wild Tigers as bones from farmed Tigers, further increasing commercial demand and, therefore, poaching pressure enough to eliminate many remaining wild Tiger populations.

In sum, the use of, or trade in, Tiger bone as medicine is not likely to be allowed until Tiger populations are safe and secure in the wild.

Wild Asian ginseng provides a more positive scenario, though it, too, may be in danger of extinction in the wild, if conservationists and traditional medicine interests do not make concerted efforts to ensure its survival.

The last viable populations of wild Asian ginseng are in the Russian Far East. However, poaching of wild Russian ginseng is rampant.

At an international ginseng conference in Hong Kong this year, representatives of the ginseng industry voiced their support for conservation of these last wild populations, as sources of genetic diversity and integrity for cultivated populations. They agreed that conservation of Asian ginseng in the wild is in their best interest. Therefore, stopping the poaching and illegal trade in wild Russian ginseng is in their best interest. Yet stopping these illegal activities will require close co-operation and collaboration between conservationists and traditional medicine traders.

Musk is another example of what might be possible, if we work together. Some musk deer populations are already listed in Appendix I of CITES and, therefore, are banned from international trade, due to over-exploitation of the male scent gland for use in medicines and perfumes.

A proposal to list all musk populations in Appendix I may be submitted by a Party for consideration at the eleventh meeting of the Conference of the Parties to CITES in Nairobi, Kenya, in April 2000. This proposal has been prompted by widespread poaching of musk deer and documented illegal trade in huge amounts of musk pods. However, renowned musk deer specialist Michael Green has proposed an alternative to further trade bans on musk. He suggests that methods could be created for catching wild musk deer alive, harvesting their musk, then setting them free. Such a scheme would bring income to people living near musk deer, thereby giving them incentive to conserve musk deer and their habitat.

At the same time, traditional medicine manufacturers would be given a sustainable source of musk. However, such an option would only be possible with maximum co-operation and collaboration between the traditional medicine industry and conservationists.

These three examples have been simplified to underscore the common thread that binds them. It is the same thread that has brought conservationists and traditional medicine specialists together in meetings such as this one. Our continued and strengthened dialogue will lead to an alliance that can ensure that trade in wild species of medicinal value is conducted legally and in a way that can be monitored fully to prevent over-use, trade bans and extinctions of wild species. In this scenario of co-operation and collaboration, both sides "win".”

ANNEX 4

Official statement emerging from the 'Healthy People, Healthy Planet' International Conference on Traditional Chinese Medicine and Endangered Wildlife Conservation *(30 October to 1 November 1999), in Beijing*.

"Participants highly commended the Chinese government and people in their efforts and achievements in developing Traditional Chinese Medicine in order to find sustainable sources of medicinal materials as well as carrying out research on substitutes of endangered species.

Participants agreed that traditional Chinese medicine is a Chinese national treasure and has made a great contribution to the health of mankind. People need traditional Chinese medicine and the variety species used in TCM.

In order to meet these demands, and taking into consideration that some species are seriously endangered, the participants agreed that strengthening the protection of natural resources and endangered species is necessary and the research, development, and application of alternative treatments should be enhanced. On the basis of consensus, the participants emphasized the following:

1. To continually promote and develop traditional medicine and traditional Chinese medicine in particular.
2. To ensure the dissemination of correct information on the TCM healthcare system, including scientific research, education, principles of herbal medicines, and on the regulation of trade and application of TCM.
3. To encourage the TCM community, including government and non-governmental organizations, to maintain regular contact with wildlife conservation organizations.
4. To encourage the use of substitutes for endangered species.
5. To further strengthen the standardized management of traditional medicine to ensure that the trade of medicine which contains animal and plant parts is conducted in a legitimate and sustainable manner.
6. To ensure that local communities benefit from the use of their natural resources in TCM.

Participants agreed to actively strengthen the exchange and cooperation between TCM institutions and wildlife organizations in order to realize the harmonization of the health of mankind and the environment."