

NORTHEAST CHINA TIGER CONSERVATION ACTION PLAN



**A result of the July 2006 International Workshop on
Trans-boundary Tiger and Habitat Conservation**

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Preface

The Amur tiger (*Panther tigris altaica*) is one of the most endangered species in the world. Currently, there are between 428-502 Amur tigers living in Russia (Miquelle et al. 2007) and a much smaller population surviving in China, perhaps less than 20 (Yang 1998, Sun 1999). However, there are vast tracts of forests - ideal habitat for the Amur tiger - situated throughout eastern Jilin and Heilongjiang provinces, and along the border between China and Russia. Additionally, tigers are regularly crossing the border from Russia into China. Therefore, if the appropriate steps are taken in a timely manner, it is feasible to recover the Amur tiger population in China with little disturbance to forestry production or local communities.

Since the successful *International Workshop to Develop a Recovery Plan for the Wild Amur Tiger Population* (sponsored by the US Fish & Wildlife Service, the Wildlife Conservation Society, and the Heilongjiang Forestry Department) in Harbin in 2000, many conservation projects in the provinces of Heilongjiang and Jilin have been developed. The Hunchun Tiger Leopard Reserve was established in December 2000, and several other reserves are either under development or in the application stages. In December of 2002, a workshop was held to discuss the development of a wildlife recovery program in Hunchun, thereby increasing the level of communication between academics, officials, and those concerned with tiger populations in Heilongjiang and Jilin provinces. Several long-term conservation and monitoring stations were established in key areas such as Dongfanghong, Yingchun, Suiyang, and Mulin forests. Monitoring results from both provinces have clearly shown that the number of tigers is increasing in the region. Practical conservation programs have been developed to recover the Amur tiger population, while simultaneously many education programs have also been implemented to raise conservation awareness among the local populations.

In the last five years, along with a number of successes, new challenges have arisen. Snares are still the most serious threats to tigers and their prey. Yang et al. (1998) estimated that as many as 2,200 ungulates may be killed by snares in Hunchun alone, and although many snares have been removed, reports of tigers and leopards killed by snares are still not uncommon.

Across most of the forested lands that are potential tiger habitat, local people rely on the forest's abundance of plant and animal products for sustenance and economic solvency. Intensive livestock grazing in forests compete with wild ungulates for forage, leading in some cases to destruction of croplands (by wild boar) and reducing the abundance of natural prey for tigers. Furthermore, free-ranging livestock left overnight in forested areas are easy prey for tigers, further increasing the sense of competition between local people and wildlife. Local frog breeders (whose numbers in tiger habitat have increased in recent years) use snares to catch ungulates in order to earn additional income, further decreasing natural prey

for tigers.

Consequently, it is not surprising that the number of tiger attacks on livestock increased between 2005 and 2006. Not only have tigers attacked and eaten many cattle and sheep, there have been two cases of humans being attacked by tigers in recent years, with one resulting in death of the villager. Such conflicts between humans and tigers understandably lead to a reduced tolerance for tigers by local people.

Compounding the problem, existing protected areas for tigers are far too small amounting to less than 2,300 km² in total. However, based on known home range requirements in Russia, a population that includes 20 adult resident female tigers would require at least 10,000 km² of continuous habitat (Xie, 2006). The current size of protected areas does not come close to meeting the requirements for maintaining current populations, much less recovering population numbers.

Administration of reserves continues to lag behind what is needed in terms of management, monitoring, and anti-poaching activities. Further exacerbating these problems, local bureaucratic issues prevent management at Hunchun reserve to occur independently from local government branches. This greatly slows the process of hiring well-trained staff and implementing needed conservation measures.

With all of this in mind, conservation of the Amur conservation is at a critical stage. While problems exist, reasonable solutions exist in most cases. However, for these solutions to be implemented, it is imperative for the country to take the measures necessary to achieve conservation goals set for Amur tigers or progress will come to a standstill, or worse, begin to break down.

Recognizing the importance of these issues, the Wildlife Conservation Department of the State Forestry Bureau (SFA), the Conservation Department of the Jilin Forestry Bureau, the Conservation Department of the Heilongjiang Forestry Industry, Wildlife Conservation Society (WCS), and the World Wide Fund for Nature (WWF) successfully held the “*International Workshop on Restoration of the Trans-boundary Amur Tiger Population*” from July 24th to the 25th, 2006, in Yanji, Jilin Province. It was sponsored by the United States Fish and Wildlife Service (USFWS) and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). Relevant agencies, institutes, and experts from both China and Russia attended this meeting. The workshop focused on defining workable solutions to the problems preventing recovery of Amur tigers in China and on strengthening transboundary cooperation. The most important outcome of this workshop was the development of this “*Amur Tiger Conservation Action Plan*,” which is intended to at as a guiding document for implementation of a recovery program for tigers in northeast China. We intend for this plan to be a living document that will be amended over time as needed, and thus, not only are concrete actions recommended, but mechanisms for implementation and management are also presented to ensure structures exist to ensure longevity to the process. We hope that this action plan, which was the result of extensive collaborative efforts, will be

both a milestone and guiding document in the attempt to restore Amur tigers in China.

Chapter One

The Status of Amur tigers in Northeast Asia, and Conservation Efforts in Northeast China

1.1. The Global Status of the Amur Tiger

The forests of northeast China, southeastern Russia, and Democratic Peoples Republic of Korea represent the original habitat for one of the most magnificent carnivores on earth, the Amur or Siberian tiger (*Panther tigris altaica*). This animal - once dominant in its natural range - is now one of the world's most endangered species. Today, there are currently around 500 Amur tigers remaining in the wild.

The general term “tiger” refers to *Panthera tigris*, of which there were traditionally eight recognized subspecies distributed across Asia: the Bali tiger (*Panthera tigris balica*), the Caspian tiger (*Panthera tigris virgata*), the Javan tiger (*Panthera tigris sondaica*), the Bengal tiger (*Panthera tigris tigris*), the Indo-Chinese tiger (*Panthera tigris corbetti*), the Amur or Siberian tiger (*Panthera tigris altaica*), the South China tiger (*Panthera tigris amoyensis*), and the Sumatran tiger (*Panthera tigris sumatrae*). A recent molecular analysis suggests that a ninth Malayan subspecies may also exist (Luo et al. 2004). Three of these subspecies, the Bali tiger, the Caspian tiger, and the Javan tiger have become extinct in the last 60 years (Jackson, 2000) and the South China tiger is either already extinct in the wild (Tilson et al. 2004) or on the verge of extinction.

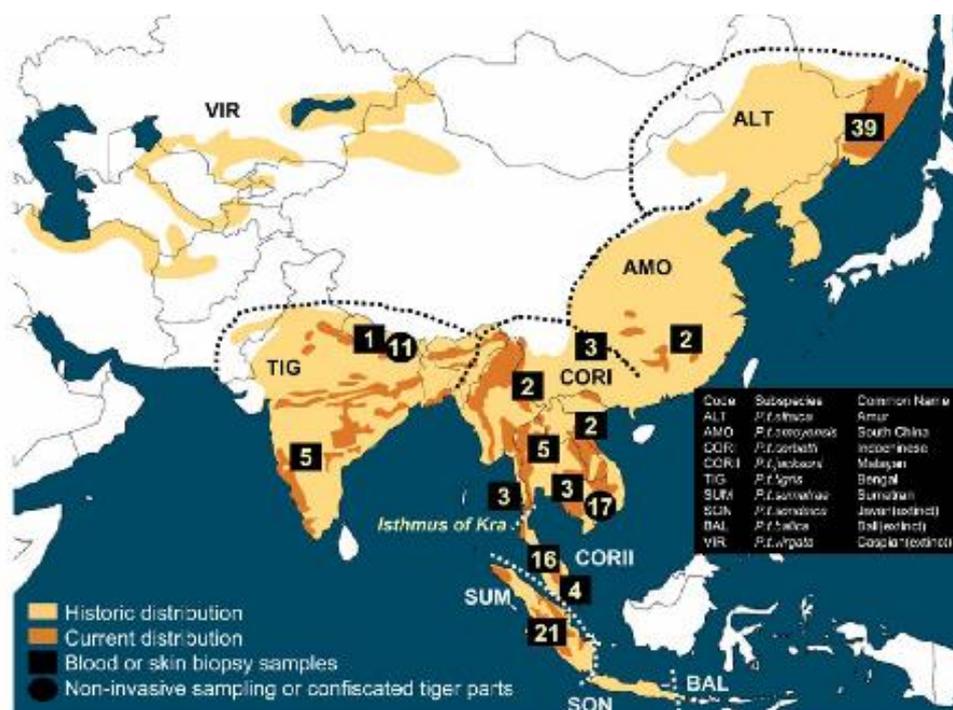


Figure 1.1. Historic and current distribution of the Amur tiger (Shujin et al. 2004)

The Amur tiger was once distributed across the vast forests of northeastern China, the Russian Far East, and the Korean peninsula. In the mid 1800’s, the Amur tiger’s distribution spanned west to the Yabulufu Mountains, north to Daxing’anling, south to Korea, and east to the Sea of Japan (Figure 1.1). In the last century, due to the degradation of habitat, poaching, and intensive hunting of both tigers and ungulates (the primary prey of Amur tigers), the Amur tiger’s population and distribution greatly declined (Ma, 1979) (Figure 1.1).

Although the Amur tiger’s range previously extended far into Russia, in 1940 it was estimated that there were only 20 to 30 wild Amur tigers remaining in Russia (Kaplanov 1948). However, due to steps taken by the Russian government the tiger population has recovered (see section 1.3).

In China, the Amur tiger was once widely distributed in Daxing’anling, Xiaoxing’anling, Laoyeling, Zhangguangcailing and Changbai mountains. However, today their range is limited to the far northeastern regions of China in Zhangguangcailing, Laoyeling, Dalongling and Wandashan, and numbers have decreased drastically. Based on surveys from the 1970s, there were approximately 151 tigers in northeast China, while more current surveys that indicate there are no more than 20 tigers remaining in the region.

In South Korea, the tiger has been extinct for more than half a century. In the north, little is known about the status of Amur tigers. Although there are reports of Amur tiger tracks and tiger habitat in Korea survey by the DPR Korean Institute of Geography failed to provide conclusive evidence of the presence of tigers (Institute of Geography 1998). Figure 1.2 shows the present status of tigers in northeast China and the Russian Far East.

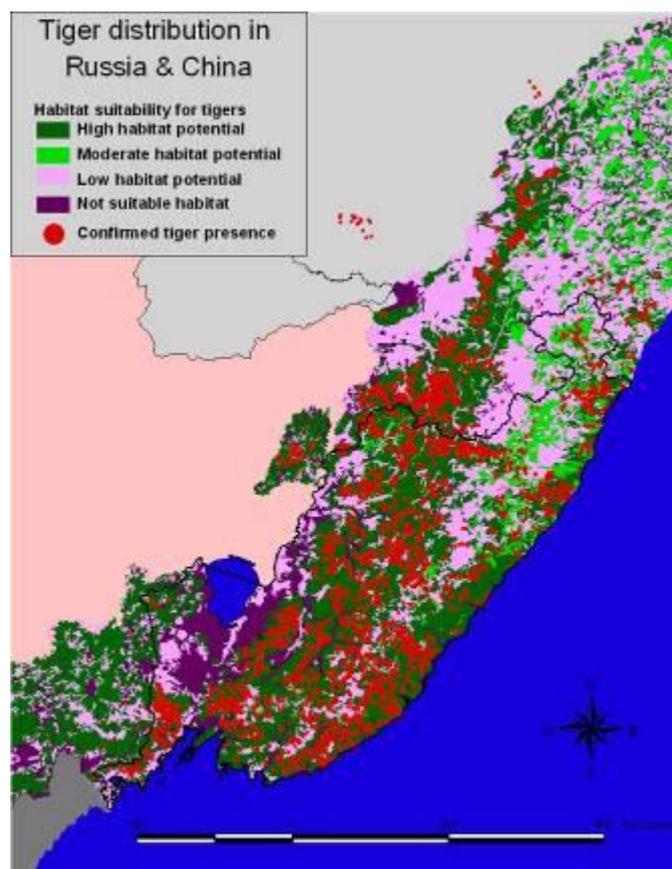


Figure 1.2. Present distribution of Amur tigers based on surveys in northeast China (1998-1999) and Russian Far East (2005) (WCS Russia). Habitat potential based on analysis of land cover types and relative abundance of tiger tracks (Miquelle et al. 2007).

1.2. The Status of Amur Tiger Populations in China

In the last century, and especially the last fifty years, Amur tigers have greatly decreased in numbers due to poaching, elimination of prey, and habitat degradation. During the 1970s tigers were still present in the Greater Khingan Mountains and west Wandashan Mountains, and were common in the Zhangguangcailing Mountains and for hundreds of kilometers along the mountainous area of the Jilin-Heilongjiang border (Figure 1-3). By the time surveys were conducted in the late 1990s, tigers were found only in the East Wandashan Mountains, and in the eastern portions of Jilin Province and the border region of Jilin-Heilongjiang (Figure 1-4). Presently in China, the Amur tiger is only distributed in small forested areas of Heilongjiang and Jilin Provinces mostly close to the Russian border. Based on surveys in 1998 and 1999, it was estimated that a maximum of 9-13 tigers were in northeast China. Currently, Amur tigers have been reported in Jilin Province (Dalongling, Haerbaling, and Zhangguangcailing) and in Heilongjiang Province (Eastern Wandashan Mountains, Northern Laoyeling, Southern Zhangguangcailing and Northern Laoyeling) (Figure 1-5). The majority of tigers have been reported in the Eastern Wandashan Mountains, Southern Laoyeling, and Dalongling. However, outside of these forests, there are still expansive tracts of habitat suitable for tigers,

including Xiaoxing'anling and Changbaishan forests, where tigers once flourished, and where recovery is still possible.

1.2.1 Status of the Amur Tiger in Jilin Province

In the 1998 winter, a survey on tiger and leopard populations was conducted by the Jilin Wildlife Protection Association Hunchun, Wangqing, and Antu counties (Han et al, 2001). The results indicated that there existed 5 to 9 tigers in Jilin distributed in Harbaling, Zhangguangcailing and Dalongling (Table 1-1).



Figure1-3. Amur tiger location in 1974-1976,



Figure1-4 Amur tiger location in 1998-1999



Figure 1-5: Amur tiger for Figs 3-5 from and WCS and

locations in 2005-2006 (Data Hunchun Nature Reserve Heilongjiang Forestry

Industry Bureau Monitoring Stations, unpublished)

Time	Harbaling	Zhangguangcailing	Dalongling	Changbai Mountain	Total
1998 - 1999	1	3	3-5	0	7-9

Table 1-1. The Amur Tiger population in Jilin province 1998 (Yang et al. 1998)

During the 1970s tigers were believed to occur in 6 isolated forested zones (Han et al. 2001). However, by 1998, evidence of tigers was found in only three of these tracts, specifically, the Dalongling, Harbaling and Zhuangguangcailing regions (Figure 1-6).



Figure 1-6. Historic and Current Distribution Map of Amur tiger in Jilin Province (Han et al, 2001)

Since 1998, there have been no additional large-scale surveys conducted on the Amur tiger in Jilin Province. However, because the majority of reports of Amur tigers appear to be concentrated in Hunchun Reserve, the Nature Reserve has conducted monitoring and obtained additional information on tigers, including:

- In 2002, there were 16 sightings of Amur tigers.
- In the spring of 2003, Amur tigers were sighted 10 times. These observations include three reports of tiger cub tracks and three reports of adult tigers with cubs.
- On January 22, 2003, the first camera trap photo of an Amur tiger in China was taken

in Hunchun Reserve.

- In 2003, 18 domestic animals were killed by tigers.
- In 2004, 32 domestic animals were killed by tigers.
- In 2005, 21 domestic animals were killed by tigers.
- On January 16, 2006, another camera trap photograph of a tiger was taken.
- Between January and October of 2006, 26 domestic animals were killed by tigers (CITATION?)

Of special significance are the reports of tiger cubs, which suggest that breeding females are present in Hunchun Reserve.



Figure 1-7. The first photo, of a wild Amur tiger in China, January 22, 2003, taken in Hunchun Reserve with a camera-trap.



Figure 1-8. A camera trap photo of a wild Amur tiger, January 16, 2006, in Hunchun Reserve

Based on the above data from Hunchun reserve, it is estimated that there are 9-10 Amur tigers currently in Jilin Province, located mainly in the Dalongling, Haerbaling, and Zhangguangcailing regions (Table 1-1). Information about Amur tiger numbers is very limited in all regions except for the Hunchun Reserve. There is some information available from the Huannihe Reserve and the southern Changbai Mountains (which indicate the possible presence of tigers), but reports are sporadic and have not been confirmed.

Hunchun's data suggest that numbers of Amur tigers in Jilin province have slowly increased. The Amur tiger's range, since 2000, has shown a trend of expanding west. The number of Amur tiger tracks on the periphery of Hunchun Nature Reserve indicates that tigers could disperse to the west, if habitat and prey populations are recovered, and protection is provided.



Figure 1-9. Reports of tiger tracks in and around Hunchun Nature Reserve, 2004.

1.2.2 Status of the Amur Tiger in Heilongjiang Province

1.2.2.1 Distribution and Population

In Heilongjiang, prior to the 1960s, the range of the Amur tiger was still quite extensive, occurring throughout Daxing'anling Xiaoxing'anling (Lesser Khingan Mountains), Zhangguangcailing, Laoyeling, and eastern and western Wandashan. However, by the end of the 1960's, the Amur tiger was extinct in the Daxing'anling region. According to a two year survey conducted in 1974, there were 81 Amur tigers distributed in Heilongjiang Province, including eight in Xiaoxing'anling (Lesser Khingan), 28 in the Wandashan Mountains, 28 in Zhangguangcailing, and 17 in Laoyeling (Figure 1-10).

By the beginning of the 1980s, the Amur tiger was extinct in Xiaoxinganling (Lesser Khingan). Currently, according to a survey carried out in 1999 by Sun et al. (1999), only five

to seven Amur tigers exist in Heilongjiang Province. It was estimated that two to four of these tigers were present in Eastern Wandashan, two were in southern Laoyeling, and one in the southern Zhangguangcailing.

Data obtained from the local forestry bureaus in 2003 and 2004, confirmed that tigers were still present in Heilongjiang in the eastern Wandashan Mountains, southern Laoyeling, and southern Zhangguangcailing, with some evidence of tigers present in northern Zhangguangcailing (Figure 1-11). This region encompasses 30,000 km², of which 11,000 km² are suitable habitat for the Amur tiger (Sun, 2006).

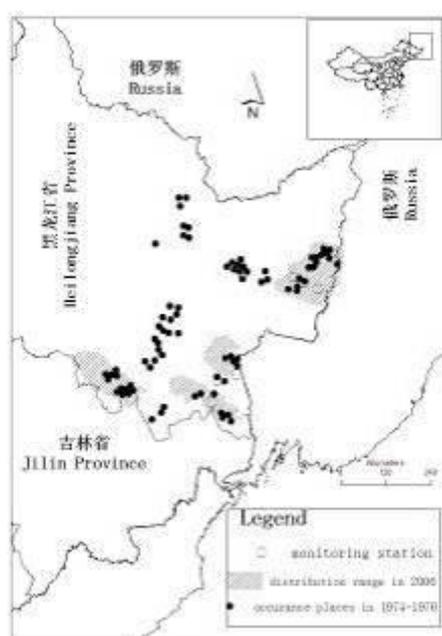


Figure 1-10. Amur tiger distribution map for Heilongjiang Province in 1974-1976

The carcass of a wild boar (*Sus scrofa*) apparently killed by tigers was found in the Fenghuangshan Nature Reserve on December 20, 2004. From the number and size of tracks, it was estimated that there were two or three Amur tigers at this kill. In Suiyang, a cow was reported missing on December 6, 2005. Three days later, the carcass was found, with tracks at the kill site suggesting that a female tiger with her cubs had made this kill. Amur tiger tracks appeared again in Suiyang on December 14, 2005. The remains of a sheep were found near Baigou village, only 25.9 km from the site where the cow was killed on December 9th. Based on track sizes, it appeared that a different tiger was present at this second site.



Figure 1-11. The carcass of a wild pig found in Fenghuang Mountain reserve



Figure 1-12. the carcass of a cow found in Dongning; Figure 1-13: the carcass of a sheep found in Dongning

Census year	Area	Number of tracks reported	Number of tigers verified	Estimated number of Amur tigers			Total population estimate
				Male	female	sub-adult	
1998-1999 (Sun et al. 1999)	E Wandashan	10	2—4	3-4			5—7
	S Laoyeling	4	2	1-2			
	N Laoyeling	0	0				
	S Zhangguangcailing	2	1	1			
2000—2001 (Sun Haiyi, unpub)	E Wandashan	14	4—5				5—6
	S Laoyeling	0	0				
	N Laoyeling	0	0				
	S Zhangguangcailing	2	1				
2002—2003 (Sun Haiyi, unpub)	E Wandashan	10	4—5	1—2	2	1	7—9
	S Laoyeling	4	1—2	1—2			
	N Laoyeling	0	0				
	S Zhangguangcailing	5	2	1	1		
2003—2004 (Sun Haiyi, unpub)	E Wandashan	11	5—6	1—2	2	2	9—11
	S Laoyeling	13	3—4	1—2	1	1	
	N Laoyeling	0	0				
	S Zhangguangcailing	1	1	1			
2004—2005 (Sun Haiyi, unpub)	E Wandashan	11	4—6	1—2	2	1—2	10—14
	S Laoyeling	13	3—4	1—2	1	1	
	N Laoyeling	5	3—4	1	1—2		
	S Zhangguangcailing	0	0				

Table 1-2. Amur Tiger Population in Heilongjiang Province

Reports of tigers in Heilongjiang from recent monitoring activities suggest that tiger numbers

are increasing (Table 1-2), with the majority of reports coming from eastern Wandashan and southern Laoyeling (Table 1-2). Based on these monitoring data collected between 2002 and 2005 (Sun Haiyi, unpubl), 43.6% of confirmed reports of tigers come from eastern Wandashan and 39.8% from southern Laoyeling. Sightings are much less frequent in southern Zhangguangcailing (10.7%) and northern Laoyeling (5.9%), and probably represent temporary dispersals of single individuals: No records of tigers in southern Zhangguangcailing have been reported after March 2003, and tracks in northern Laoyeling were reported only after December 2003. In summary, in the past few years in Heilongjiang Province, no notable change in the range of the Amur tiger has been observed. However, the activity of the Amur tiger has been decreasing gradually in southern Zhangguangcailing, while it has been on the rise in southern and northern Laoyeling (Figure X – 1.14, shown as the black hatches).

1.3. Status of the Amur Tiger in Russia

In the 19th century, the Russian Far East represented less than one-third of the Amur tiger's habitat, with the majority of habitat located in northeastern China and on the Korean peninsula. Today, the situation is reversed and more than 95% of the Amur tiger population is found in Russia.

The tiger now occupies almost all suitable forest habitats in Russia. Three separate populations of Amur tigers now exist in the Russian Far East: 1) in the Sikhote-Alin Mountains; 2) in southwest Primorye, and 3) Pogranichny and Khankaiski Raions (counties) in west Primorye. Tigers from the Sikhote-Alin population have contact with China only along the Strelnikov Ridge that forms the border between Primorskii and Khabarovskii Krai (provinces), and which provides a vital linkage to potential tiger habitat in the eastern Wandashan Mountains of Heilongjiang, China. Pogranichny and Khankaiski counties retain only a small track of suitable habitat that links with northern Laoyeling and Fenghuangshan Nature Reserve in Heilongjiang. The Southwest Primorye tiger population resides along the border between Russia and China, with contact to Southern Laoyeling and Hunchun, as well as possibly retaining contact with habitat in the People's Democratic Republic of Korea (DPRK) (Figure 1-14).

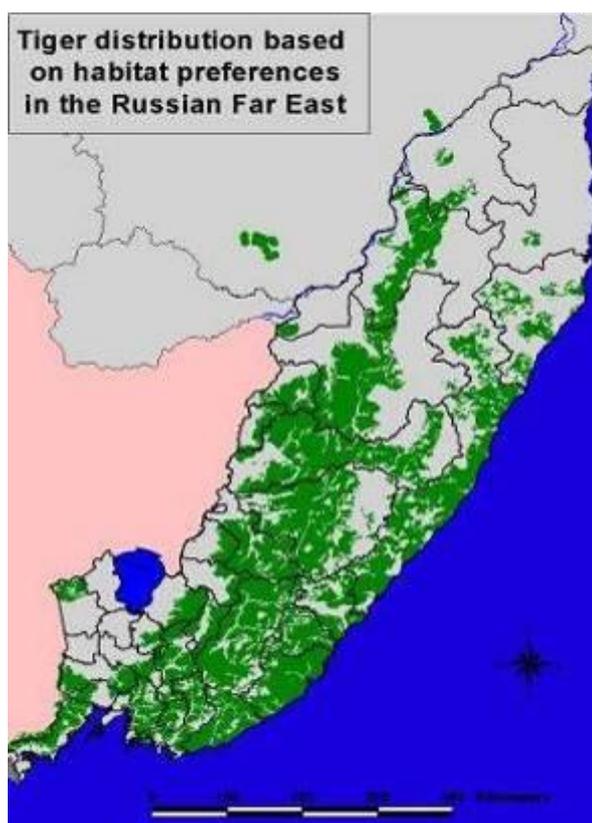


Fig1-14. Distribution Map of Tigers in Russia (from Miquelle et al. 2007)

Tigers were nearly eliminated from Russia in the 1940s Amur tiger conservation has been very successful in Russia. From 1940 to 2005, tiger numbers were restored in the Russian Far East from 20-30 individual tigers to 400-500 individuals (Table 1-3).

Census year	Primorsky Krai	Khabarovskii Krai	Total number of individuals	Source of Information
1940			20-30	Kaplanov, 1947
1959	55-65	35	90-100	Abramov 1962
1970	129-131	20	149-151	Yudakov & Nikolaev 1973, Kazarinov 1979
1979	179-195	34	206-229	Pikunov et al. 1983
1985	210-220	-	240-250	Pikunov 1990
1996	351-405	64-71	415-476	Matyushkin et al. 1996
2005	357-425	71-77	428-502	Miquelle et al. 2007

Table 1-3. Number of tiger during 1940-2005 (From Miquelle et al. 2007)

The main factors contributing to the restoration of Amur tiger populations in Russia were:

1. Prohibition on hunting tigers was officially enacted in 1947, and has been in effect ever since;
2. Strict controls on capture of tiger cubs was initiated in 1965 (removal of cubs for the world’s zoos seriously reduced the reproductive potential of the population when it was at low levels);
3. Establishment of a network of protected areas that act as core zones within Amur tiger habitat (Figure 1-15)

- Maintenance of large tracks of intact forest ecosystems (Figure 1-15).

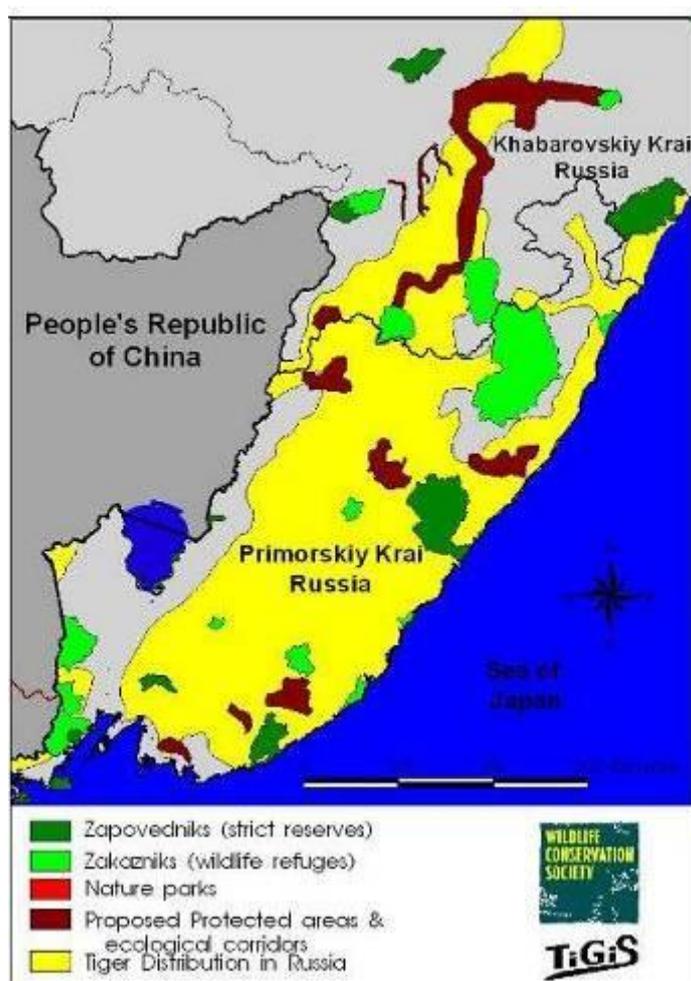


Figure 1-15. Map of National Protected Areas in Tiger Habitat of Russia

- Prohibition on the logging of valuable tree species: Korean pine and Mongolian oak.
- Strong law enforcement capacity of inspectors of both the State Hunting Wildlife Management Service and the special anti-poaching team “Inspection Tiger.”
- Establishment of a carefully controlled sustainable hunting system outside protected areas.
- Census of tiger populations conducted in all known natural habitats across the Russian Far East on a regular basis.
- Monitoring of tiger populations: annual surveys to assess status of tiger population in 16 key areas. The monitoring acts as an “early warning” signal for changes in population size or distribution.

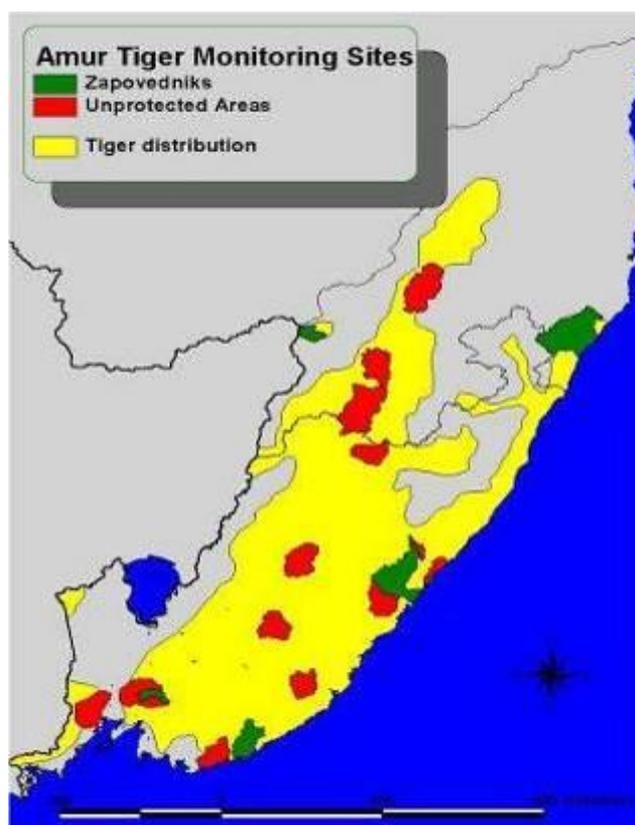


Fig.1-16. Distribution Map of Amur tiger monitoring areas in Russia (Miquelle 2004)

1.4. The Status of Amur Tiger Habitat

The vegetative zone of Xiaoxing'anling, Wandashan, Zhangguangcailing, Laoyeling, and Changbaishan in China, the Russian Far East, and northern Korea, all fall into the northeast region of the East Asian vegetation zone. The distinguishing characteristics of these forest complexes are the presence of the following species: Korean pine (*Pinus koraiensis*), Manchurian ash (*Fraxinus manshurica*), and Amur basswood (*Tilia amurensis*). From 1949, the forests in northeast China have gone through periods of intense deforestation, resulting in a net loss of suitable habitat for tigers.

The vegetation land cover in remaining tiger habitat in Northeast China can be classified into five types: mixed coniferous forest, mixed coniferous and broadleaf forest, secondary forest, shrublands, and swamp and meadow. The regions with the greatest concentrations of Amur tiger sign are mixed coniferous and broadleaf forest, which have an abundance of Korean pine, and secondary deciduous forests comprised mainly of Mongolian oak (*Quercus mongolica*) Yellow birch (*Betula davurica*), and Poplar (*Populus davidiana*). In most areas, Korean pine makes up less than 40% of the total vegetation.

In Heilongjiang, the forests in the four regions where the Amur tiger still occur are well connected and provide suitable habitat for the primary prey species of Amur tiger, including roe deer (*Capreolus capreolus*) sika deer (*Cervus nippon*), wild boar (*Sus scrofa*), and red

deer (*Cervus elaphus*).

The eastern Wandashan forest is under management of the Dongfanghong and Yingchun Forest Bureaus which together cover an area of 14,000 km². Mixed conifer-broadleaf forest, dominated by *Korean pine*, and deciduous-broadleaf forest are the main forest types in this region. The more remote regions of this forest still retain largely intact Korean pine forest. Due to the rugged terrain, timber in this region was not exploited until recent years. It is separated from Russia by the Ussuri (Wusuli) River, and it borders Russia a total distance of 400 km from north to south. The Wandashan represents the most important habitat for Amur tigers in northern Heilongjiang, and the existent Korean pine forest stands represent excellent habitat for prey (especially red deer and wild boar).

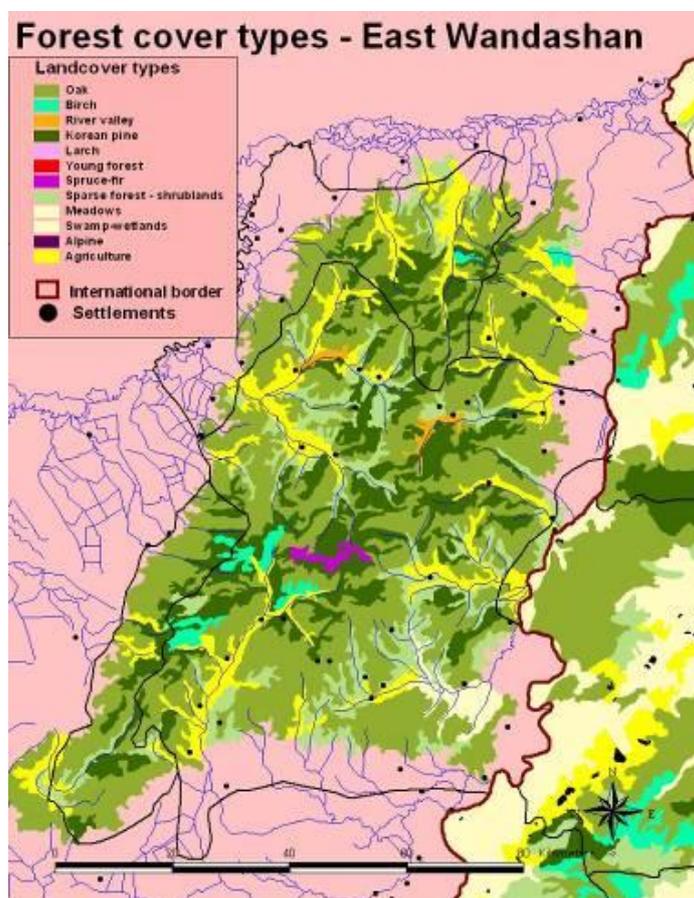


Fig1-17. Forest cover types in the eastern Wandashan Mountains

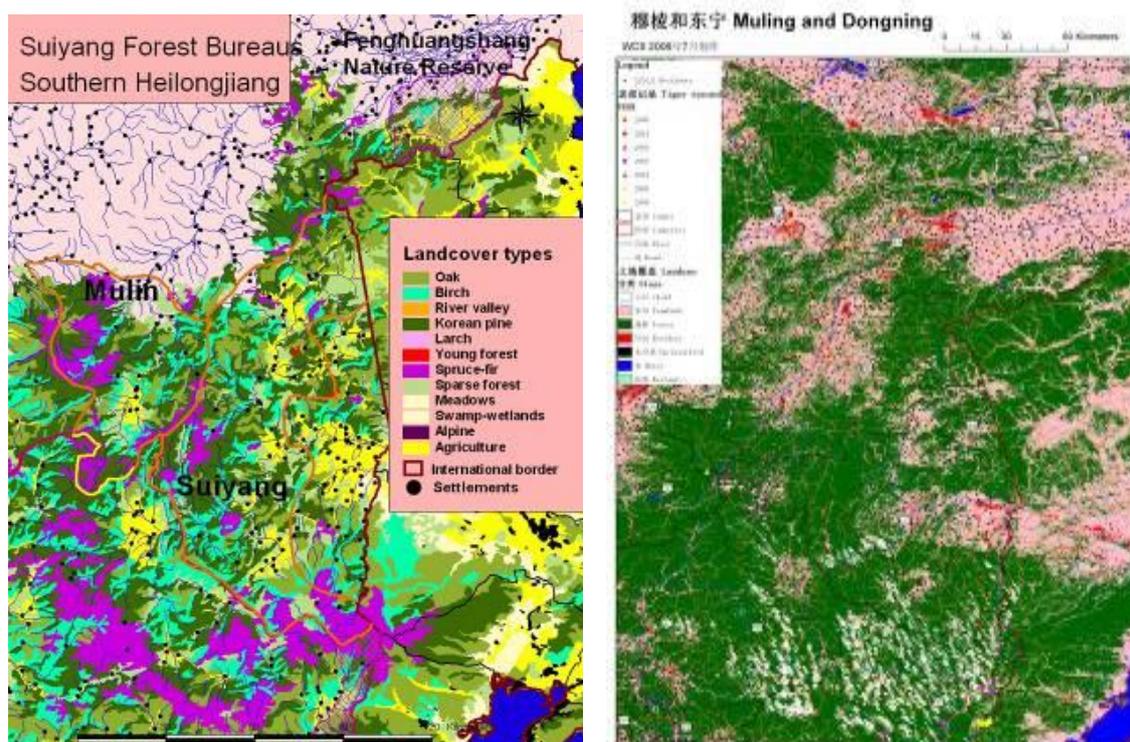


Fig1-18a, b: Suiyang and Mulin Forest Bureaus and surrounding area

Although long exploited, there still exist extensive forest tracts in Suiyang in southern Heilongjiang (Figure 1-18). The vegetation in this region is managed by the Suiyang and Mulin Forest Bureaus. It spans an area of 10,000 km². Temperate mixed conifer-broadleaf forest is the typical vegetation type in this region. Deciduous-broadleaf secondary forest also occurs in portions of this mountainous region. The eastern portion of this region borders Russia.

Extensive forests in eastern Jilin extend from Russia west along the Jilin-Heilongjiang border, with spruce-fir forests cover in the higher elevations. Northeastern Jilin including Jinxin, Banshi, Yangpao, Madida, the Chunhua area of Hunchun city, and Fuxin Village of Wangqing spans an area of 3,740 km². The Hunchun reserve extends east to Hunchunling, bordering Russia, and north to Dalongling, adjacent to Heilongjiang Province. The Suifeng River acts as the border with DPR Korea in the south, and the Hunchun River drains from the north. Most of the terrain is composed of low hills 800 to 1,000 meters above sea level, with the highest elevation at 1,138 meters. The main vegetation is broadleaf forest and secondary forests of *Quercus mongolica*.

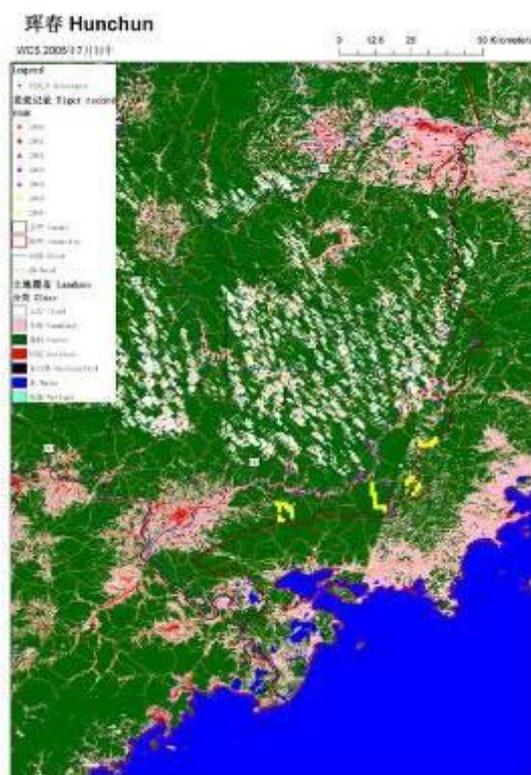


Fig1-19: Tiger Distribution in the Hunchun nature reserve and its surrounding area

1.5. The Status of Prey Species

1.5.1. Heilongjiang Province

Surveys of track density for ungulates in Heilongjiang province in 2006 suggest that relative density of ungulate populations is highest in the Wandashan region (Sun, 2006), and moderately high in southern Laoyeling (Table 1-4). Southern Zhuangguangcailing had the lowest track densities of all sites for all species measured (Table 1-4).

Region	number of transects	Total length Km	wild boar			roe deer			red deer		
			number of fresh tracks	Track density	Relative density	number of fresh tracks	Track density	Relative density	number of fresh tracks	Track Density	Relative density
N Wandashan	7	44.0	25	0.57	High	59	1.34	High	14	0.32	high
S Laoyeling	9	66.1	26	0.39	Relatively high	55	0.83	Relatively high	17	0.26	Relatively high
N Laoyeling	5	38.8	15	0.38	Relatively high	33	0.76	low	6	0.15	low
S Zhuangguangcailing	6	40.7	13	0.32	low	31	0.81	Relatively low	9	0.22	Relatively low
Total	27	181.6									

Table1-4. Track density, measured as the number of fresh tracks (less than 24 hours old) per km, as an indication of relative abundance of ungulates in potential tiger habitat in Heilongjiang Province during 2003-2004 (Sun, 2006)

Zhang Minghai assessed trends of the prey populations in the Wandashan from 2002 to 2004. Results indicated that mean population density was 0.20 ± 0.03 red deer/km², 0.5 ± 0.04 roe deer/km² for roe deer, and 0.34 ± 0.027 wild boar/km². Comparing the results of this survey to those conducted 13 years earlier (Zhang, 2006), it appears that prey populations have decreased: red deer decreased at an annual rate of 13.48%, roe deer 12.69% and 1.89% for wild boar (Figure 1-20)

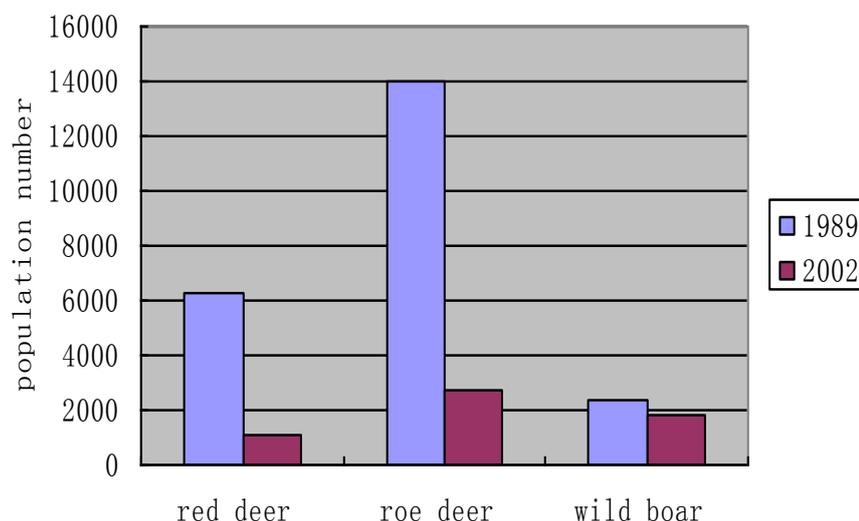


Figure 1-20. Changes in prey populations over 13 years in East Wandashan Mountains (Zhang 2004)

1.5.2 Jilin Province

From 2003 to 2004, Yue Wu (published data?) and colleagues set up 27 transect lines in the Qinglongtai forest of Hunchun nature reserve to survey ungulate density. Results suggest that red deer densities are quite high in this forests, and sika deer densities low (Table 1-5). This contrasts sharply with information from nearly Southwest Primorye, Russia, where sika deer densities are much higher than red deer. Estimates for other species, except for roe deer in 2003, suggest that other ungulate densities are quite low. .

Animals/km ²				
	Mixed Coniferous-broadleaf forests		Mongolian oak–birch forest	
	2003	2004	2003	2004
Red deer	0.58	1.91	0	0.04
Sika deer	0.08	0.15	0.15	0.39
Roe deer	1.27	0.15	0.04	0.15
Wild boar	0.03	0.01	0.04	0.02

Table 1-5: Ungulate population density in Qinglongtai Forest, Hunchun

1.6. Socioeconomic Situation in Areas Containing Suitable Tiger

Habitat in Northeast China

With forests covering about 30% of the total land in the two provinces, forestry is a major economic activity. The highly fertile soils and relatively sparse human population have also allowed northeast China to become a major agricultural area, with the cultivated land area in the Ussuri River Basin doubling between 1975 and 1993.

In the 1950's, due priorities to increase industrial production, little investment was made to improve technology and equipment. As a result, the industry base of this region was gradually left behind. During the last decade, the northeast's economic growth rates were consistently below the national average, and the two provinces, Heilongjiang and Jilin, appeared to suffer from chronic economic decline.

Many of the counties in the two provinces have been designated poverty alleviation zones by the national or provincial governments. The unemployment rate in both Jilin and Heilongjiang is over 8%. Heilongjiang's heavy dependence on natural resource extractive industries, whose profitability has declined due to the depletion of oil, coal, and forestry reserves, has been one of the principal reasons for its economic troubles. With 46% of the nation's oil and a third-place ranking among provinces in coal production, Heilongjiang's economy is still characterized mainly by extraction of raw natural resources (Zhang Endi,

2004).

The lagging economic situation, and a dependence on a declining natural resources industry, is likely a driving force for locals to poach tigers and their prey. In order to reduce poaching on ungulates and tigers, local people's needs must be addressed; this is a basic requirement for a successful conservation strategy for tigers.

1.7. Tiger Conservation Efforts in Northeast China

The Chinese government has developed and conducted many conservation programs on Amur tiger conservation. WCS has also been involved in many of these activities since 1998 and WWF China since 2002. At the international level, there have also been a number of initiatives focused on tiger conservation in China. The following is a summary of what has been accomplished in relation to tiger conservation in northeast China.

1.7.1. Laws, Regulations and Policies for Protecting Tigers

At the national level, China has established a legislative system for wildlife and forest management. Including the *National Forest Law* issued in 1984; the *Wild Animal Protection Law* issued in 1989 and several associated regulations, including *Implementation Regulations on the Protection of Terrestrial Wildlife*, *Implementation Regulations on the Protection of Wild Aquatic Animals*, *Regulations on the Protection of Wild Plants*; *Regulations on Nature Reserve Management*, and *Provisional Regulations on the Management of Scenic Landscape and Historical Sites*. Especially important for tiger conservation, the Chinese government issued the “*Decree Banning Trade in Rhinoceros Horn and Tiger Bone*” on the 29th of May, 1993.

In Jilin, a *Decision for a Five-Year Ban on Hunting Wild Animals in Jilin Province* was issued in 1996; *Several Provisions on Banning Hunting Terrestrial Wild Animals in Jilin Province* in 1997; and a *Compensation Method for Personal and Property Damage Caused by the Jilin key Protected Terrestrial Wild Animals* was issued in 2006.

In Heilongjiang, the *Heilongjiang Wild Animal Protection Regulation* was issued in 1996; at the provincial level in Heilongjiang, the *Regulation Measure for Heilongjiang Nature Reserve* was issued in 1996; *Heilongjiang Regulation for Wild Medicinal Materials Resources Conservation and Management* in 1998; *Heilongjiang Forest Management Regulation* issued in 1997 and revised in 2004; and the *Heilongjiang Hunting Regulation for Foreigners* was issued in 1986.

During Boris Yeltsin's trip to Beijing in 1997, a Sino-Russian International Protocol on Tiger Protection was signed.

While these legislative decrees and policies have played an important role in conserving wild

Amur tigers, their prey and habitat, a review of existing legislation is needed to determine how they can better be enacted and enforced to meet the needs of Amur tigers.

1.7.2. Amur Tiger Nature Reserves

Several Amur tiger nature reserves have been established in northeastern China. In Laoyeling Heilongjiang, the Fenghuangshan National Nature Reserve and Raohe Nature Reserve were created, and in the Wandashan Mountain region the Raohe Dajiahe Provincial Nature Reserve and Dongning Niaoqingshan Provincial Nature Reserve were created. Monitoring stations were established in Raohe County and Dongning County, and monitoring spots were established in Xiaobeihe in Ning'an, Fenghuangshan Mountain in Jidong and Zhengzhudao in Hulin. The total area of all four reserves amounts to 2,300 km².

Hunchun Nature Reserve was gazetted in 2000, and then upgraded to a national nature reserve in 2005. The State Forestry Administration has invested approximately one million US dollars into the reserve, and a management plan was developed with the help of WWF in 2005. Because it borders an established population of tigers in Russia, the Hunchun Nature Reserve plays a pivotal role as a “stepping stone” in recovery of Amur tigers and their prey in northeast China. Since the reserve’s establishment, tiger and/or leopard tracks have been documented more than 70 times. Four pictures of wild Amur tigers have been taken by camera traps. Establishment of tigers in Hunchun is a critical first step that will provide a source population for dispersal to other areas of Jilin and southern Heilongjiang provinces. Thus, a well-managed and secure Hunchun reserve is essential for the recovery process to begin.



Figure 1-20: The Establishment Ceremony of Hunchun Nature Reserve

There have been efforts to develop standard conservation stations and specialized administration agencies. The development projects for three other nature reserves (Raohe Dajiahe, Dondning Erduan, and Ning'an Xiaobeihu) are in the application process and conservation stations are being developed in these regions.

An international planning team consisting of Chinese, Russian and American specialists developed a *Sustainable Land-use Plan for the Ussuri Basin* in 1996. Recommendations arising from this plan included the creation of two international protected areas for large

carnivores. **As a follow-up to these early trans-boundary planning efforts, in 2002 UNDP implemented a** “Feasibility Study on Establishing the Lower Tumen River Area Transboundary Biosphere Reserve” that would promote linkages in reserve management between China, Russia, and DPR Korea along their mutual borders. Unfortunately, this planning effort resulted in no concrete results.

1.7.3. Wildlife Conservation

In Heilongjiang the local government has issued special hunting prohibition regulations in the primary recovery zone for Amur tigers in Dongning, Hulin, Raohe, Ning’an, Jidong, and Mulin counties. This restriction should greatly assist the recovery of ungulate populations. The local government has also increased their efforts to prevent illegal hunting, and with assistance from NGO’s, has conducted several campaigns to remove snares, which the primary mode of poaching in the region. Over the last three years, over 7,000 snares have been removed from Hunchun Nature Reserve with help from WCS. Snare removal should assist in recovering ungulate population densities to a level that will allow full recovery of tigers.

The local forestry department annually cooperates with relevant departments (such as the Administration for Industry and Commerce and the Public Security Department) to carry out inspections of the food industry and local markets for illegal transportation, processing, and sales of wildlife and wildlife products. The forestry police annually organize activities to protect forest resources, include wildlife. In 2006, they also initiated as the “Green Storm” campaign and similar programs to intensify criminal investigations of tiger poaching. The forestry police have also increased patrols of mountainous regions, arresting poachers, clearing snares, and confiscating guns, ammunition, and other hunting tools. This has helped to control poachers and to alleviate some of the threats to tigers and their prey.

1.7.4. Monitoring

To assess effectiveness of conservation efforts, and to determine trends in populations of both tigers and their prey, monitoring programs are essential. To meet the needs of conservation programs, habitat and ecological corridor restoration, and monitoring, local forestry departments have recruited more staff, and they now offer professional training for conservation station managers. They have also cooperated with WCS, institutes and universities to establish a professional monitoring team with the technical skills needed for Amur tiger conservation.

Eight monitoring stations have been established by WCS-China in Heilongjiang Province, and six monitoring stations were established in the Hunchun Nature Reserve by the Forestry Bureau (Figure 1-22). Local people are asked to promptly report tracks so that monitoring

staff can be dispatched quickly to the sites to assess reliability of the evidence and to collect more detailed information. An impressive amount of evidence of tiger presence has been collected since the establishment of these monitoring stations (Figure 1-23).



Fig 1-22. Monitoring Stations Established in NE China

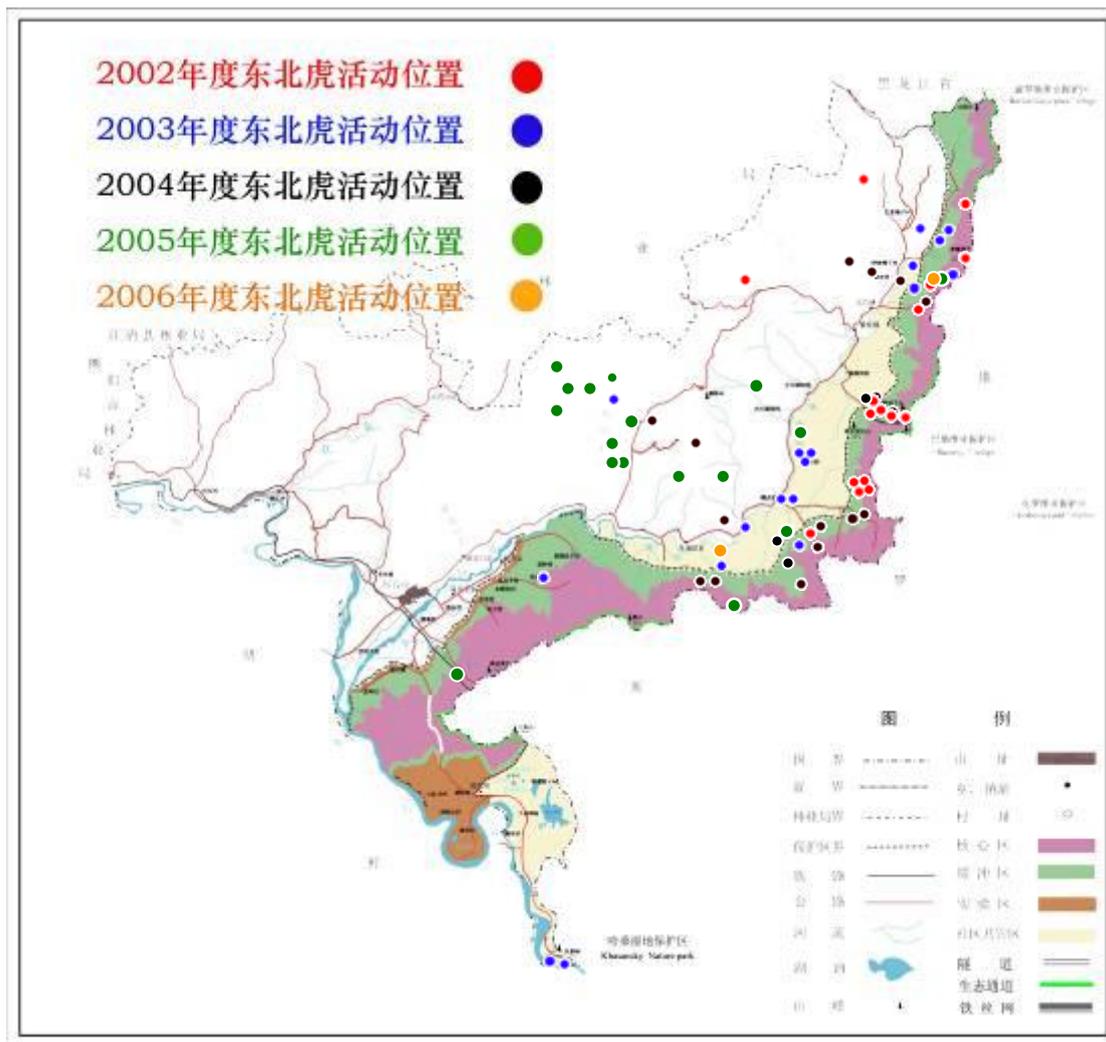


Figure 1-23. Reports of tigers in Hunchun Reserve, 2002-2006, based on data collected by the Hunchun Reserve monitoring program.

1.7.5. Compensation for Livestock Depredation.

In recent years, there have been an increasing number of livestock depredations by tigers in Jilin Province. Until a government program was put into effect, WCS initiated a tiger compensation project in Hunchun Nature Reserve to mitigate tiger-human conflict during 2002-2004 with funds from 21st Century Tiger and Tigris Foundation. Table 1.6 shows the number of reported livestock depredations by tiger in and around Hunchun, Jilin between 2000 and 2005. In October 2006, the Jilin government issued the *Compensation Method for Personal and Property Damage Caused by the Jilin key Protected Terrestrial Wild Animals*. Although this compensation plan has not yet been implemented, it is the first government regulation to determine appropriate actions and compensation when domestic animals are killed by tigers.

Period	Cows	Horses and mules	Other animals	Total animals	Number of incidents	Value \$US	Compensation
15 July - 31 Dec 2002	12	2		14	9	\$3,120	\$1,330
1 January – 31 Dec 2003	15	4	3 (2 dogs, 1 sheep)	22	18	\$3,327	\$1,300
1 January – 31 Dec 2004	26	7		33	32	\$7,003	\$2,850
1 January – 30 July 2005	10	0		10	5	\$2,600	\$1,300
Total	63	13		79	64	\$16,050	\$6,780

Table 1.6 Livestock kills by tigers compensated in and around the Hunchun Nature Reserve, 2002-2005 (WCS China, unpublished data)

1.7.6. Public Awareness

Local forestry departments have used all types of media and many different methods to raise public awareness of conservation issues. At the same time, much emphasis has been placed on communication with policy-makers at all levels of government to explain the significance Amur tigers to the preservation of a healthy ecosystem. WCS has initiated a variety of education activities in local communities, primary and middle schools, and with military personnel (specific to the areas within and adjacent to Hunchun Reserve) since the summer of 2002. These include:

- Over twenty “Model Schools for Tiger Conservation” have been set up in both Jilin and Heilongjiang.
- A teachers’ training workshop using the WCS textbook “Teachers for Tigers” was organized in Jilin (and will also be organized in other areas of northeast China).
- Tiger conservation exhibits were held and theatrical troupes performed in the region to attract public attention and increase support for tiger conservation.
- An essay competition was held that involved students utilizing their writing and critical thinking skills pertaining to tiger conservation.
- A summer camp was held to bring children together to learn about tigers and tiger conservation.
- A meetings of village leaders meetings was held for representatives from every village in Hunchun nature reserve. At the meeting, controversial issues such as how to deal with conflicts between tigers and local people, how to compensate those people whose livestock were taken by tigers and leopards, and how to educate poachers were discussed. These discussions became a foundation for resolving some of these problems.
- WCS-China has also collaborated with green groups from universities to organize educational activities to raise awareness among local people.
- Over the past three years, more than 7,000 snares have been removed from the Jilin Hunchun Nature Reserve, utilizing a volunteer network.

Chapter Two

Threats to the Amur Tiger

Amur tigers have been facing a myriad of threats for over a century. Clearing of land for agriculture and economic development has greatly decreased and fragmented the available habitat for tigers in northeast China. Tigers have been hunted both legally and illegally for their fur, for use in medicine, and because of their threat to human beings and domestic livestock. Hunting of both tigers and their prey has played a critical role in the collapse of the tiger population in northeast China. Besides these threats, more subtle ones exist that are related to legislation, policy, education, and the economic status of people living in tiger habitat today.

Nonetheless, it is clear that the critically endangered status of the Amur tiger today results directly and indirectly from human activities, and that if the tiger is to survive and recover in northeast China, changes in these activities must occur. Recovery of the tiger population will be dependent on the alleviation and, in some cases, the eradication of existing threats. Hence, an understanding of these threats is an essential prelude to developing an Amur Tiger Conservation Action Plan. Following is a description of the current major threats to tigers in northeast China, and how they impact tiger numbers and distribution.

2.1. Inadequacies in Policy and Legislation

At the national and provincial levels, the government has issued many laws, regulations and policies (see Chapter 1, section 1.7.1). However, there are many gaps, loopholes, and ambiguities in terms of the underlying principles and policies, as well as the mechanisms for implementation. For example, the regulations defining management of Nature Reserves are very inflexible and are not adaptable to local conditions, and do not adequately address conflicts between conservation and development objectives. These restrictions also hinder the possibility of establishing large protected areas in populated areas. Small nature reserves, while good for certain species, are ineffective for animals that require large areas. One female Amur tiger requires 450 km² of tiger habitat in order to survive (Miquelle et al. 1999). The largest Amur tiger reserve in China (Hunchun) is approximately 1,000 km², and is far too small to sustain more than just a few tigers.

In northeast China, establishing a 10,000 km² nature reserve without human activity (according to nature reserve regulations) is impossible. Local people who live within potential tiger range rely on resources from the forest for food, medicine, livestock grazing, and household supplies. Many of these activities do not impinge on conservation objectives, yet intensive harvest of some items, such as Korean pine

nuts, which are a key over-wintering food for wild boar and other prey species, negatively impacts habitat quality. There is a need to find flexible and rational forest management policies to protect tiger habitat while meeting the needs of local people.

Areas with less stringent restrictions (perhaps special “management zones” within Forest bureaus) are needed that allow controlled human use, but protect habitat for tigers and prey, to ensure connectivity between strictly protected nature reserves. Such a network of strictly protected reserves plus management zones could be used to restore wild tigers to northeast China, but ensure access to needed natural resources for local people. In addition, Currently some protected areas system are used to facilitate development of the local economy, clearly a contradiction in priorities.. Although economic development and wildlife conservation do not often share the same goals, it is possible to devise mechanisms that ensure development minimizes impact on wildlife. Such should be a goal of an integrated management and development plan.

2.2. Habitat Loss and Degradation

Originally tigers most likely occurred across all forested areas of northeast China, except in the high elevation conifer forests where the absence of food and presence of deep snow make such habitats unsuitable. In Russia today, tigers are most often found in broad-leaved (mainly oak forests) or mixed coniferous-broad-leaved deciduous forests (Korean pine-deciduous forests) in mid to low elevation mountainous areas. In these regions, prey densities are generally high. These same habitats should be the primary focus of tiger habitat conservation today in China.

China is a developing country with a dense human population and an intense and growing need for natural resources. With a long history of exploitation of natural resources, most of the natural landscape has already been altered, damaged, or completely destroyed.

Conflict and competition for natural resources between man and nature has risen in conjunction with the increasing human population and pressing need for economic development. This makes conservation of natural resources, including wildlife, increasingly more challenging. Habitat deterioration and fragmentation are some of the main factors that have led to the reduction in distribution and population size of many mammals in China, some even to the point of extinction

In the mid 19th Century, eastern Heilongjiang and Jilin Provinces were covered by expansive tracts of primary forest with a sparse human population and an abundance of wildlife. However, this situation began to change towards the end of the 19th Century when the Qing government, determined to strengthen China’s border regions, initiated a policy that relocated many Chinese citizens from China’s interior to border regions such as eastern Heilongjiang. Much of this migration resulted in rapid development and deforestation of these regions. During the 1930’s and 1940’s, along with greater industrial development, intensive logging operations decimated large

tracts of forest habitat. One result of these endeavors was the gradual change of forest composition from large stands of primary conifer and mixed conifer-broad-leaved forests to secondary broad-leaved forests.

Today, the conversion of forest land into agricultural land and urban areas continues to reduce forest cover while logging continues to change the composition of the forests that remain. The continued conversion of forest land results in the overall reduction, degradation, and fragmentation of tiger habitat.

Not all logging is necessarily detrimental to tigers, and controlled logging is not incompatible with tiger conservation. However, clear cutting completely destroys tiger habitat, and recovery of the forest is a long process, if it can occur at all. Selective logging, which thins the forest, but retains an intact forest, can in some circumstances actually benefit tigers as it increases forage production for ungulates by opening forest canopies and allowing sunlight to reach the forest floor. However, logging operations must be carried out carefully and strategically in order to be compatible with tiger conservation. Ideally, Korean pine (*Pinus koraiensis*) and Mongolian oak (*Quercus mongolica*), trees that provide mast crops for ungulates, should not be harvested in tiger management zones. Similarly, riparian forests (in valleys) should not be harvested as these forests are especially important wintering habitat for many ungulates. In contrast, harvest of larch has little impact on tigers and prey, as it provides no forage or value to tiger habitat. Therefore, carefully controlled selective logging can be compatible with tiger conservation, but if it is carried out, management of roads associated with logging activity is essential (see section 2.2.2).

Tigers require large tracts of intact forest ecosystems to survive. According to data collected in Russia, each adult female requires on average approximately 450 km² of habitat with adequate prey to survive and raise healthy young (Miquelle et al. 1999). In order to maintain a population of 20 breeding female tigers, approximately 9,000 km² of well-connected habitat is necessary. However, there are no reserves in China that cover such a large area. The Changbaishan Nature Reserve, established in 1960, previously held abundant wildlife such as the Amur tiger, Chinese leopard (*Panthera pardus*), and Sika deer (*Cervus nippon*). However, the reserve covers only 1,964 km² making it incapable of retaining a viable population of tigers on its own. Large-scale nut collection from Korean pine trees also occurs within the reserve, greatly reducing food availability for ungulates. Because of its limited size, and exploitation of resources even within the reserve, the Amur tiger, Chinese leopard, and sika deer have gone locally extinct in the Changbaishan Nature Reserve.

For tigers to survive in places like Changbaishan Reserve, land planing and recovery of habitat must be conducted to ensure that reserves are managed as part of a larger interconnected system of forest tracts. Such interconnected forested networks would provide tigers the opportunity to move across extensive landscapes, and to interact as a single, intact large population. The establishment of small nature reserves (such as the Chunhua Amur Tiger Nature Reserve covering 696 km² and the Mutianling Amur Tiger Nature Reserve covering only 496 km²) shows a lack of understanding of the

area requirements of tigers. These reserves are surrounded by developed regions, which make them ecologically isolated “islands.” Small and isolated wildlife populations suffer loss of genetic diversity and often go extinct due to genetic drift, inbreeding, and stochastic events such as disease or other environmental disasters.

Originally, many forest patches (that are presently considered potential tiger habitat – such as Western and Eastern Wandashan, Northern and Southern Laoyeling, and Northern and Southern Zhangguangcailing) were connected by continuous forest. Now these forests are isolated by a human-dominated landscape that blocks tiger migration. Western Wandashan and Lesser Khingan are totally isolated from other forest patches in China and Russia. This is the primary reason for the tiger’s continued absence in these regions. Nonetheless, there exist opportunities for securing connectivity amongst remaining forest tracts. There exist today sufficiently large continuous tracts of forests where tigers could thrive, but efforts must be made to ensure they remain intact and interconnected.

2.2.1. Habitat Fragmentation and Loss of Dispersal Corridors

The process of extinction often begins with fragmentation of habitat into numerous small parcels, followed by localized extinction of populations in each of these habitat islands. When wildlife populations become isolated and small in size, any number of factors can lead to localized extinction.

Of critical importance is the protection of existing ecological corridors between Russian and China. The best chance for recovery of wild populations of tigers and leopards in both the Wandashan and Changbaishan Mountains will be to ensure connectivity with existing populations in Russia. Tigers from Russia do presently cross the international boundary and supplement the existing Chinese population. To ensure a rapid and natural recovery, it is vital that these corridors be protected on both the Russian and Chinese side of the border.

Three such corridors have been identified that currently provide linkages for tigers and other wildlife between China and Russia (Figure 2.1):

1. The Wandashan-Strelnikov Corridor links the Eastern Wandashan Mountains to the Sikhote-Alin Mountains through the Strelnikov Range, a relatively narrow sliver of habitat that represents the provincial boundary between Khabarovsk and Primorye (Figure 2-1). The key to survival of the tigers in Wandashan will be an ecological corridor that links the Wandashan tigers to the Sikhote-Alin population in Russia. Evidence that tigers presently cross the Ussuri River (international boundary) exists (Sun 1999, Miquelle et al. 2007) and emphasizes the need to secure this natural corridor. Only one place exists where such a corridor is possible – linking the central part of the Wandashan with the Strelnikov Range on the Russian side. The Khabarovsk Krai Administration has legally gazetted their portion of the Strelnikov Range as an ecological corridor, but nothing yet has been done in Primorye or Heilongjiang.

2. The Northern Laoyeling-Pogranichny corridor provides contact between a very small population of tigers in western Primorye with suitable tiger habitat in northern Laoyeling. China has upgraded the Fenghuangshan Nature Reserve, but unfortunately this reserve contains little tiger habitat. Forested lands to the west and south along the Russian border represent more important habitat, and direct linkages to tiger habitat on the Russian side of the border.

3. The entire boundary between Southwest Primorye and Hunchun Province provides opportunities for movement of tigers, leopards, and prey species across the border, as the region is covered with quality forests on both sides. To the south, there is also a linkage to DPR Korea from Russia via a sliver of suitable forest habitat in China. The Hunchun Tiger and China Nature Reserve, created in 2000 and upgraded in 2005, protects this corridor on the Chinese side, and Russia has two refuges (Barsovy and Borisovkoe Plateau Zakazaniks) that ensure linkages. However, initial efforts by UNESCO to create an international transboundary biosphere reserve have stalled. Cooperative management of this network of reserves would greatly improve biodiversity conservation efforts in the region.

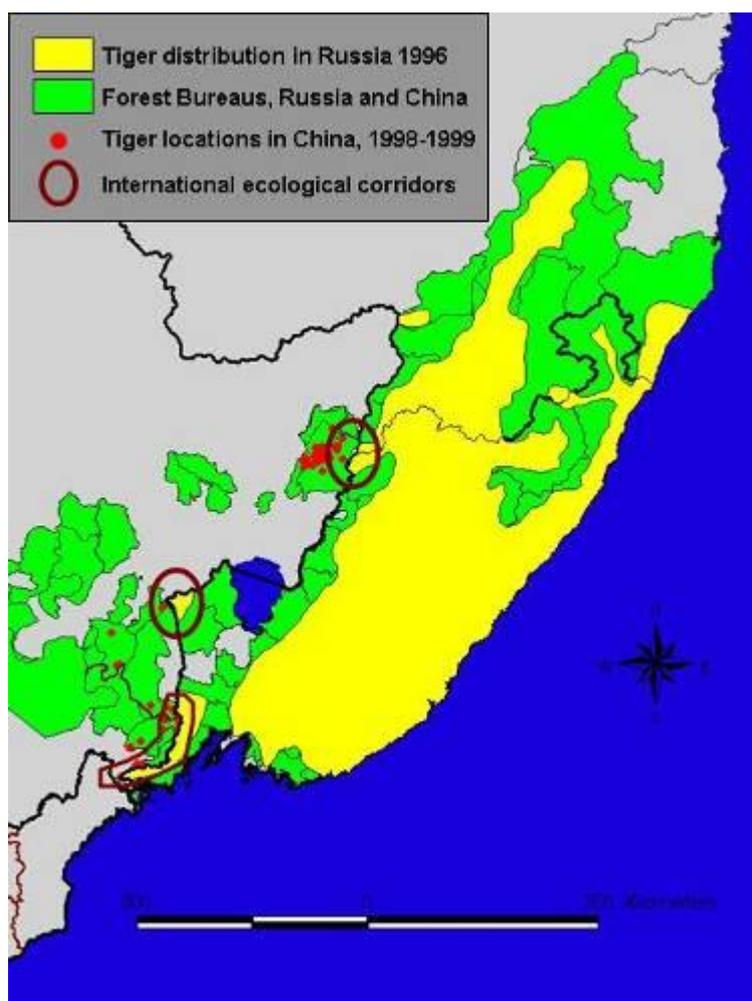


Figure 2.1. Ecological corridors linking Russian, Chinese, and North Korean tiger habitat

Fragmentation of habitat has already occurred across much of Heilongjiang and Jilin Provinces, and localized extinction has already occurred in some of those parcels – (e.g. the Western Wandashan, Lesser Khingan Mountains, and Changbaishan Reserve). Presently Northern Laoyeling is probably isolated from Southern Laoyeling by degraded, heavily used habitat and a major highway that crosses this region. Fragmentation of eastern Hunchun from western Hunchun is presently avoided only by a narrow silver of habitat at the northernmost reaches of the province. A second ecological corridor via Dongjingcheng Forest Bureau could link Southern Laoyeling with Southern Zhangguangcailing Region. We consider this process a long-term plan, and have not developed the concept further in this Action Plan because we believe that conservation efforts in Heilongjiang should focus on quality habitat patches close to the Russian border. Other potential fragmentation points may also exist. To avoid further extinctions, and to reverse the current trend, it is critical that existing and potential fragmentation points be identified through landuse analysis, and connectivity among habitat patches be maintained or recreated.

2.2.2. Forest Roads and Access to Tiger Habitat

Around the world it has been documented repeatedly that where roads provide access to forest ecosystems, large carnivore and prey densities decrease dramatically (Kerley et al. 2002). Roads provide access to both legal and illegal hunting of wildlife, and allow people easy access to a much larger percentage of wildlife habitat. Roads and associated human disturbances can have detrimental impacts on large carnivore populations through increased mortality from vehicle collisions and poaching, and through increased encounters with humans resulting in aggressive interactions with people or disturbance while hunting, at kills, or at dens. Data from Russia has demonstrated that tigers in areas with roads suffered greatly from poaching, and had lower survival of cubs (Kerley et al. 2002). Therefore, roads and associated human activities resulted in decreased survival and reproductive success for tigers.

While it is possible to log forests in a way that is compatible with tiger conservation, as mentioned in section 2.2, controlling access to roads is of vital concern. Existing and proposed forest logging roads need to be evaluated and managed in a comprehensive and effective fashion. There are three possible ways to reduce access to key tiger areas that are provided by roads:

1. First, some roads which are no longer necessary could be destroyed or otherwise made impassible. Many roads created for natural resource extraction, especially logging, have a long life when logging in the area is finished. Roads provide easy access for the lazy poacher, and provide a means of a quick “getaway” when the poaching is done. They also increase fire danger, as the majority of forest fires are man-caused. Closure of roads does not work in all cases, because some are just too important to local people. But careful closure of a subset of roads that no longer serve a number of useful purposes, including: 1) decreasing chance of fire; 2) increasing

ungulate numbers; 3) reducing pressures on fish populations; 4) reducing conflicts between people and tigers; 5) provide additional security for a subset of the tiger population.

2. Secondly, on some important secondary roads it may be possible to establish gates that could be manned with guards whose job is to limit access only to those people who have permission and a reason to use the area. Alternatively, locks may be used on gates, with keys available only to those officials who need access. This option is in many ways ideal because it provides all law-abiding citizens access to areas that they may use for fishing, wood collection, or herb collection, but guards can insure that nothing illegal is taken out of the forest.

3. Thirdly, through careful planning the location of new roads can be chosen to avoid sensitive areas. This issue needs greater attention because as road construction continues, access to remote places also increases. Unless there is a way to control where and how roads are built, there will soon be no remote havens for tigers in northeast China.

2.3. Low Prey Density

No matter how well forests are protected from further degradation and fragmentation, there must be an adequate prey resource for tigers if they are to survive in those remaining forest tracts. Tigers require high densities of large ungulates – red deer, wild boar, sika deer, and to a lesser extent, roe deer. In Heilongjiang Province, red deer and wild boar were probably historically the most important prey species for tigers. In Jilin, these species, plus sika deer, are key prey. Unfortunately, these three prey species are sparsely distributed at exceedingly low densities across most of the proposed regions for recovery of tigers in northeast China (see Section 1.5 for more detail). Based on existing data, it is clear that present densities of ungulates in northeast China are insufficient to support a population of healthy, reproducing tigers. An increase in numbers of sika deer and wild boar in Hunchun and southern Laoyeling could help to recover tiger numbers there, but elsewhere an increase in numbers of red deer, and wild boar will be essential.

If illegal poaching of tigers is stopped, prey density will be the key factor determining whether Amur tiger populations will increase or decrease in northeast China. Using data on prey biomass and tiger densities derived from India and Russia, Miquelle et al. (2005) derived an estimate of the relationship between prey biomass and the potential number of tigers that can exist in a region (Figure 2.2).

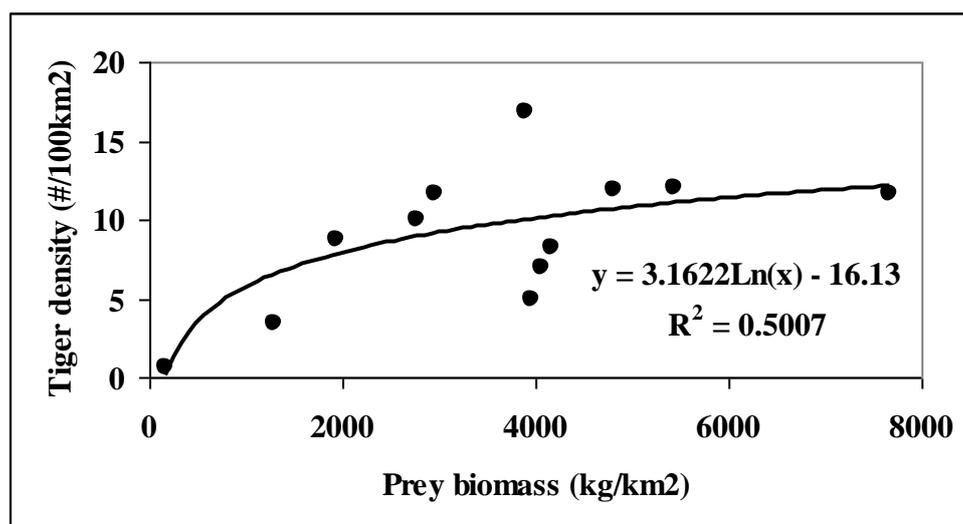


Figure 2.2: The relationship between tiger density and prey biomass (reproduced from Miquelle et al. 2005)

An important conclusion from these data is the implication that at prey biomasses less than 125 kg/km, tigers are unlikely to persist in a region. Thus, an important goal of tiger conservation is increasing wild prey abundance above this level. If we assume that a given prey species (e.g. wild boar or red deer) averages 150 kg (average for adult females and males combined), then it is possible to extrapolate the necessary prey density required (Table 2.1). This calculation suggests that prey densities need to be above 0.8 animals/km² in order for tigers to survive. Of course, if tigers rely on smaller prey (e.g., sika deer) prey densities will have to be even higher. These calculations provide a basis for defining conservation goals in recovering prey numbers.

Table 2.1. Potential tiger densities (reported as animals/100 km²) given known prey biomass, using the relationship derived in Figure 2.2. Prey density is estimated assuming that average weight of an individual prey species is 150 kg.

Prey biomass (#/ km ²)	Prey density (#/km ²)	Expected tiger densities (#/100 km ²)
125	0.8	0.08
150	1.0	0.66
170	1.1	1.05
200	1.3	1.56
300	2.0	2.84

Another way to approach the tiger-prey relationship is to consider annual kill rates of

tigers. To meet energetic requirements, tigers need about 50 large prey animals per year (about one per week). Assuming that the prey population can only sustain 10% annual mortality from tiger predation and not experience a decrease in size, for every tiger there needs to be at least 500 prey animals available per year. However, if a prey population can sustain 20% annual kill rates by tigers, then there need to be about 250 prey animals per tiger. However, based on research by Minghai Zhang, prey density of red deer and wild boar combined ($0.2 + 0.34 = 0.54$ animals/km²) in Wandashan Mountain is still below the minimum needed to sustain tigers (Table 2.1).

As long as ungulate numbers are low, tigers dispersing through good forest habitat will be forced to adopt a nomadic existence, and will likely sustain themselves by killing domestic livestock. Where adequate prey densities exist, and where good forest habitats occur, tigers will “settle down” to establish home ranges and maintain permanent residency. If tigresses find areas with sufficient prey densities to raise young, they will establish permanent home ranges, and male tigers will shortly establish residency there as well. Hence, management actions to increase prey densities will be an essential component of any plan to recover tiger populations.

Tigers can survive in forest ecosystems only where high densities of their prey species are available. But these same species are the object of intensive harvest by humans for food, for sale, and for medicinal properties. Hunting has been banned in northeast China since the 1980's, and possession of guns is illegal. Unfortunately, snares (Figure 2.2), and more recently poisoning, have become the most popular and easiest method to hunt ungulates. In addition to killing ungulates, snares are also capable of killing tigers. There have been many reports of tigers being killed by snares, and one such animal (which was wounded by a snare) killed a local woman in Hunchun before dying itself from wounds inflicted by the snare (Figure 2.3). Snares represent one of the greatest threats to the survival of the Amur tiger in northeast China, because of their capacity to simultaneously eliminate the prey population and directly kill tigers. Based on snares observed along survey routes, Yang et al. (1998) reported that snare density in the winter of 1998 in Hunchun County may have been as high as 0.068 snares/ha. This indicates that there were over 22,000 snares set and active within Hunchun County alone. Given the observed capture and mortality rate of snares located on routes (9.8% of snares had killed an ungulate), these estimates imply that snares could kill as many as 2,200 ungulates per year in Hunchun County.

Poisoning of ungulates is a new and developing threat. Local villagers apparently use XXX and induce ungulates to eat it by XXXX. Apparently, the meat is still salvageable and edible after such poisoning. Reports suggest that use of this poison is on the rise, and thus represents a serious new threat to recovering ungulate numbers.

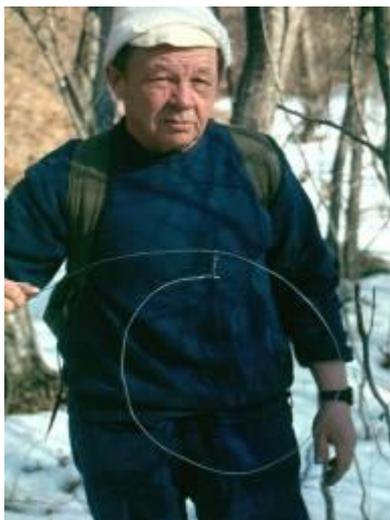


Fig 2-3. Clearing snares in 1998.



Fig 2.4. Tiger injured by a snare killed a woman before dying of wounds from the snare.

Hunchun Reserve, in cooperation with WCS, has initiated a snare removal campaign. In 2002, about 5,000 snares were removed in Hunchun Reserve alone. In 2006, another campaign successfully removed XXX snares in the Reserve and surrounding lands. Training surveys conducted in winter 2007 suggest that snare abundance is decreasing in Hunchun Reserve, but more work must be done here and across tiger recovery zones (WCS unpublished data)

2.4 Livestock Depredation by Tigers

Livestock depredation is most likely to occur when prey densities are low, forcing tigers to come into close association with humans in order to find adequate food. The animosity of local villagers towards tigers, as a result of livestock depredations, degrades local support for tiger conservation and support of protected areas. In worst case scenarios, livestock owners take matters into their own hands, and will kill tigers as retaliation for depredations on their livestock.

There are ways to reduce conflict generated by tiger depredations on livestock. First, improved husbandry techniques can greatly reduce the probability of depredation occurring. In Hunchun Reserve for example, livestock are often grazed illegally within strictly protected management units, both day and night. Enforcement of reserve regulations, i.e. keeping cattle out of these management units, would reduce the chance of depredation and therefore help reduce conflict. Also, if livestock are brought into fenced enclosures at night that are in close proximity to villages, rather than be permitted to ‘free-range’ in tiger habitat, the chances of being attacked by a tiger is greatly reduced. Leaving livestock in the forest at night is almost guaranteed to result in high depredation rates, as tigers do not differentiate between domestic and wild animals when seeking prey, but given a choice, they will prefer to stay in the forests, and avoid close contact with humans. A full assessment of existing livestock husbandry practices, how those practices can be altered to reduce conflict, and

development of mechanisms for assisting local people to implement these changes, is a critical first step in alleviating human-tiger conflicts.

Despite such changes, some depredations are likely to occur, especially when prey numbers are low. A fair and equitable compensation program needs to be devised and enacted that promptly compensates livestock owners for losses that are clearly the result of tiger depredation, as well as rewards those who are trying to mitigate human-tiger conflicts.

Beginning in 2003, WCS worked with Hunchun Reserve to develop a compensation plan for tiger depredation (with support provided by Tigris Foundation). The intent of this program was to provide interim support to local people until a government-sponsored compensation program could be developed. The goal of this program was to compensate local people for losses of livestock, and to reduce negative attitudes towards tigers. During the 4 years of the program, 97 livestock were killed, and a total of XX yuan was distributed.

Throughout this program, social surveys indicated that support for Hunchun Reserve by local people increased, suggesting that compensation may have assisted in changing people's attitudes toward the reserve as well as toward tiger conservation.

Year	# Livestock Killed	Amount compensation paid (RMB)
2003	18	
2004	32	
2005	21	
2006	26	

Table 2.2. Number of livestock killed in and around Hunchun Reserve, 2003-2006.

Such a compensation program, with rewards dependent on changes in the way farmers manage their livestock, is needed across the tiger recovery zone. There are many examples of compensation programs for carnivore depredation around the world, some of which have been very effective. The lessons learned can be used as a basis for developing an effective compensation program.

2.5. Human-Tiger Conflicts

Wherever people and large carnivores co-exist, conflict situations will arise. The situation with tigers in northeast China is no different. Livestock depredation is an economic hardship and a nuisance to people and the presence of tigers close to human settlements often causes alarm and concern. Dogs are often a favorite and easy target for tigers, and although attacks on humans are extremely rare, they do occur. Even if

not directly threatened, if people believe their safety is jeopardized, they will most likely not tolerate the close proximity of tigers, and there is a tendency to resolve any conflict situation by ‘eradicating’ the problem – thus killing the tiger. These killings can be an important mortality factor for small populations of endangered species.

Presently, there is no existing mechanism for dealing with human-tiger conflict situations in northeast China. The goal of a human-tiger conflict mitigation program must address the dual objectives of ensuring the safety and sense of local people’s well-being in local villages, and to minimize the human-caused mortality rates of wild tigers.

In Russia, a document intended for local communities that explains how to behave in areas inhabited by tigers has been printed and circulated. In Russia, human-tiger conflicts are addressed by a specialized team called “Inspection Tiger” which is a part of the federal government. WCS has provided training to Inspection Tiger personnel, and continues to work closely with them to provide expertise, when needed, to capture problem animals. Captured animals are assessed, and appropriate actions are taken dependent on the situation. Each conflict situation has unique characteristics, but a standard set of guidelines is used to assist in the decision-making process. Depending on the situation, sometimes no action is taken but to monitor the situation. Alternatively, tigers are simply scared away from an area using specially designed techniques, or they are captured, radio collared, and sometimes translocated to a new area where the chances of encountering humans are reduced. If a tiger is very sick, in extremely poor condition, or it has killed a human, it may be euthanized. Most importantly, there exists a well-trained team that is capable of responding to these situations, thus providing local people a sense that their safety is of concern to the government.

2.6. Reduced Management Capacity in Protected Areas

Most existing protected areas in northeast China are managed by people in Forestry Bureaus or representatives of the Forest Industry Bureau whose past or present occupation is primarily focused on exploitation of forest resources. As such, they have little or no training in wildlife or natural resource management, and often little interest in managing protected areas, as their primary responsibilities and expertise are elsewhere. Similarly, staff working in local forestry bureaus and forestry industries have often been re-assigned to protected areas, again with little or no training. There are no trained wildlife professionals working in any reserves, and few staff members with higher education or a background in reserve management. Given these conditions, it is not surprising that protected areas are not fulfilling their roles in effectively protecting natural resources. For protected areas to act effectively as high quality tiger fulfill their role in recovering prey and tiger numbers, and to act as “sources” for dispersal of tigers to new areas, training and capacity building, and close cooperation with management and staff of protected areas is essential.

2.7. Lack of Information on the Ecology of Amur Tigers in the Wild

Research on Amur tiger populations in China has been sporadic and qualitative. There is a lack of accurate information on Amur tiger ecology, density, spatial distribution and home range sizes in China. There is also little to no knowledge about prey population densities and the condition of tiger habitat in China. Research into various aspects of tiger ecology would greatly increase understanding of what is needed to ensure long-term viability of tigers in northeast China.

Currently there is a simple monitoring system that has been established in northeast China that has provided a substantial amount of information on distribution and activities of tigers (Figure 1-23). Despite these achievements, there are several factors limiting the effectiveness of the monitoring system to provide sound information for decision making. There is still a lack of staff, equipment (such as four-wheel-drive vehicles, GPS devices and digital cameras) and there is a lack of training for field staff on such basic items as use of GPS. Because of these factors, the accuracy and precision of the monitoring program is far below what is possible. Expansion and improvement of this monitoring system would greatly increase our understanding of tiger distribution and numbers.

2.8. Socioeconomic Factors

Many of the counties in the two provinces identified for recovery of tigers have been designated for poverty alleviation by the national or provincial government. The unemployment rate in both Jilin and Heilongjiang is over 8%. Heilongjiang's heavy dependence on natural resource industries, whose profitability has declined due to the depletion of oil, coal, and forestry reserves, has been one of the principal reasons for its economic troubles. With 46% of the nation's oil and a third-place ranking among provinces in coal production, Heilongjiang's economy is still characterized mainly by raw natural resource exploitation (Zhang Endi, 2004).

The lagging economic situation has forced many local people to depend on exploitation of local natural resources, including poaching of tigers and their prey. In order to reduce poaching of ungulates and tigers, local people's needs must be addressed, ideally in a way that links economic opportunities to concrete conservation objectives. While poverty reduction per se may not necessarily result in reduced levels of resource extraction by local people's, if poverty reduction is linked to conservation initiatives, it becomes a powerful tool to achieve the dual objectives simultaneously..

2.9. Poor Awareness and Participation of Local Communities

Many of the problems associated with local communities are due to the lack of awareness among local people regarding the importance and need for wildlife conservation. In general, the education level of local people is relatively low, and consequently they rely on a subsistence economy that depends on extracting and using local natural resources, including collection of mushrooms, ginseng, herbs, and firewood, free-grazing domestic animals, and snaring of local ungulates for meat. Many local people have deep-rooted beliefs, for example in Traditional Chinese Medicine (TCM), and thus the interest in poaching of tigers is not just economic. Currently, new activities have become popular including breeding frogs and cultivating plants that have a high economic value in forest plots. Many local people are not aware that their activities are negatively impacting tiger numbers, or how to adjust their behavior to reduce the potential for conflicts with a recovering tiger population.

Generally, local people are aware of existing laws and regulations prohibiting hunting and livestock grazing in nature reserves. However, these activities continue, partly because some local people have no alternative source of livelihood, and partly because there is no enforcement of regulations, and no mechanism for reporting violations.

There are few incentives or policies to involve local people in conservation, and tiger conservation is mainly driven from outside the local communities. Information and knowledge are either lacking or simply not transferred to local people, widening the gape between local communities and efforts taken to save the tiger. Mechanisms to engage local people, and bring them into the conservation process, must be developed to address this issue.

2.10. Development Projects

Plans exist for construction of a major railway between Heilongjiang and Liaoning Provinces that will run through one of the primary recovery zones for Amur tigers. The disturbance and development associated with construction will act as a barrier to movement of tigers, and may increase chances of mortality, and diminish the integrity of tiger habitat in this region.

2.11. Tiger Hunting and the Wildlife Trade

There is a large demand for tiger products in Asia, which means that the Amur tiger has a high economic value on the black market. There are 15 tiger products that are commonly used in Traditional Chinese Medicine (TCM), including tiger blood, bones, and penis. Rugs and other decorations made from tiger skins are sold at high

prices. Even tiger bone fetches high prices in the Chinese medicine market. For example, in the 1950's, 500 g of tiger bone was worth 200 RMB and a complete tiger skull was worth 4000~5000 RMB (500 – 625 USD). Tiger bones have been used as the main ingredient of a popular medicine called tiger bone wine. Driven by the possibility of an extremely high profit, tigers have been poached for many years. Currently, there is still illegal hunting for tigers along the Chinese-Russian border and in Russia for tiger trade.

The exact level of poaching that an Amur tiger population can tolerate is unclear, but in China, where there are less than 20 individuals remaining, any poaching of wild tigers will seriously impact the population. The illegal trade in tiger parts is a serious and primary threat to tigers worldwide. However, the scope of activities needed to address this issue are outside the scope of this action plan, and while the importance of this issue is acknowledged here, it will not be addressed in this document.

Chapter Three

Visions, Goals, and Objectives of the Action Plan

3.1. Long-term Vision

According to monitoring efforts and surveys carried out over the last five years, wild Amur tigers are mainly present in two completely isolated areas of Northeast China: the Changbaishan region and the eastern Wandashan region (Figure 3-1). In the Changbaishan region (the red circle around number 2 in Figure 3-1) tigers are mainly distributed in Hunchun and Wangqing of Jilin Province and the southern Laoyeling region of Heilongjiang Province. This entire region is ecologically connected to southern Primorye Krai (Khasan, Nadezhdinsky and western Ussuriski) and western Primorye

Long-term and short-term Amur Tiger restoration goals

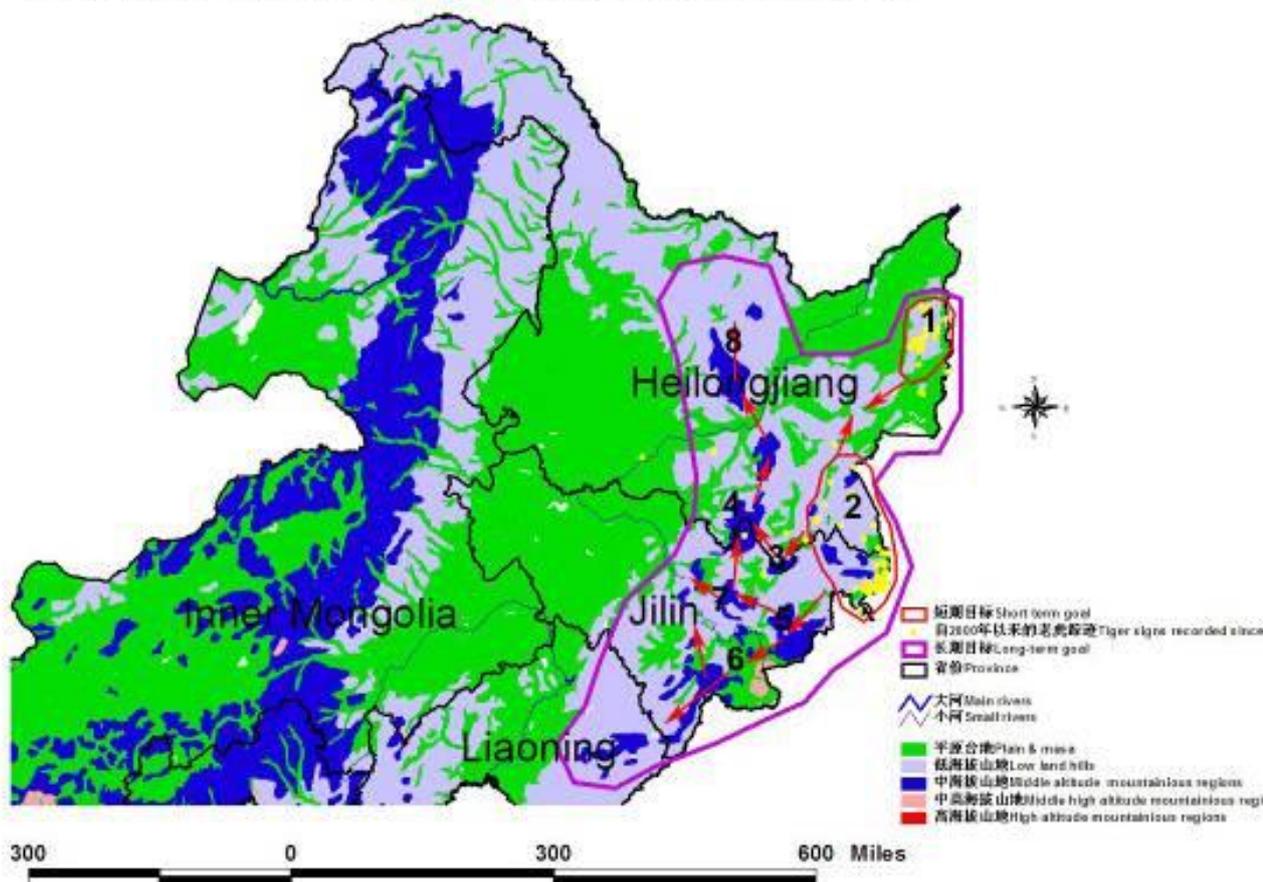


Fig 3-1. Long-term and short-term visions for Amur Tiger Conservation in northeast China. Note: 1. Eastern Wandashan, 2. Dalongling, Laoyeling, 3. Harbaling, 4. Zhangguangcailing, 5. Eastern Changbaishan, 6. Western Changbaishan, 7. Dunhua, 8. Lesser Khingan Mt.

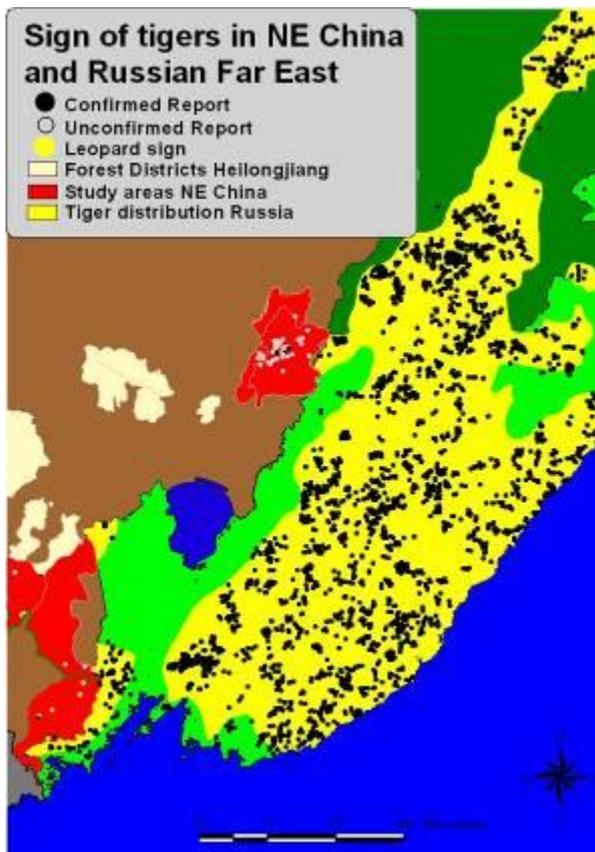


Figure 3-2: Sign of tigers in NE China and Russian Far East

(Pogranichny Raion) in Russia (Figure 3-2). The eastern Wandanshan region (the red circle around the number 1 in Figure 3-1) is connected with the tiger population in Sikhote-Alin Mountain of Primorskii and Khabarovskii Krai of Russia via the Strel'nikov Range (Figure 3-2).

If tigers can be successfully restored in these two areas, then the two sites can serve as sources for further expansion of the tiger population over the mountains to the west and south. There are several paths of recolonization that have been identified (Figure 3-1). From the Hunchun region, tigers could expand west and north to Harbaling (area 3), Zhangguangcailing (area 4), and perhaps even return to the Lesser Khingan Mountains if suitable corridors are established (area 8). Tigers could also disperse west and south into Dunhua (area 7) and eventually back into Changbaishan Reserve, a former stronghold for the northeast tiger. Movement of tigers out of the eastern Wandashan to the west is more unlikely because of extensive human settlements, but connectivity and movement to and from the Russian Sikhote-Alin population is essential to ensure its long-term survival. Therefore, with suitable conservation actions initiated, there is great potential for recovery of tigers in Northeast China.

The long term goal is to restore the Amur tiger population in the Changbaishan Mountains, Wandashan and Xiaoxin’anling (Lesser Khingan) Mountains. This area could potentially hold at least 200 tigers, although such an increase may take more than 50 years.

3.2. Short-term Vision

In order to have a stable Amur tiger population in China, the short-term vision is the establishment of a population that can act as a source for dispersal and recolonization to occur. The short-term vision is to restore population numbers in the eastern Changbaishan region (Dalongling, Laoyeling) and the eastern Wandashan region.

Specifically, the short-term goals for these two regions are:

1. In the Changbaishan region: To increase the number of tigers to 10-15 individuals by 2015.
2. In the Wandashan Region: To increase the number of tigers to 5-10 individuals by 2015.

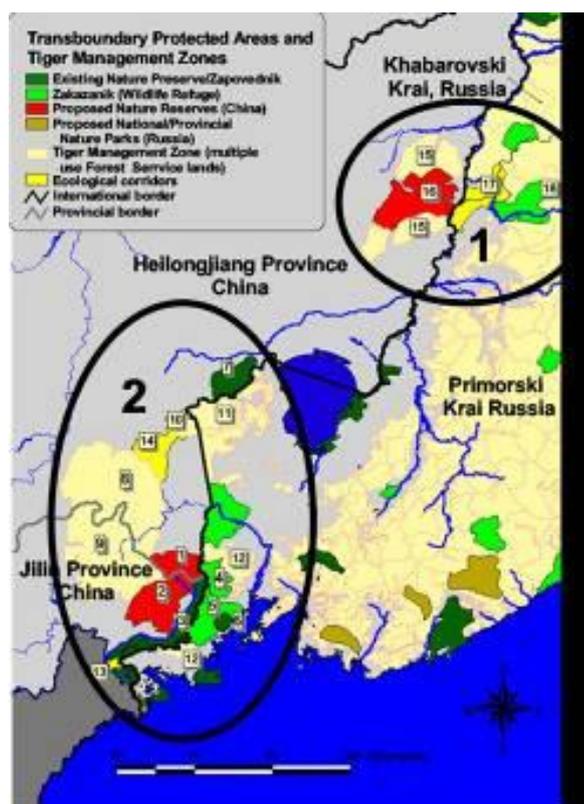


Figure 3-3: The two key areas for a short term goal of restoring Amur tigers.

Currently, each of these two areas (the Changbaishan region and the eastern Wandashan region) contains perhaps three to seven tigers which are believed to be coming mainly from Russia. Although existing reports suggest there may be even higher numbers of tigers, many of these animals are probably “ephemeral,” that is,

animals that may be dispersing through a region, but do not remain in any one location for long. The numbers used in the above short-term goals refer to permanent resident tigers in each region, and therefore are not directly comparable to present survey results.

3.3. Objectives

The main objective of this action plan is to achieve these two short-term visions. While it is believed that it is possible for these two regions to sustain even greater numbers of tigers, the focus is on restoration over a relatively short-time frame to focus attention on immediate actions needed to initiate the recovery process. To achieve this short-term vision, a number of objectives will have to be obtained that address and alleviate the threats as defined in Chapter 2. Specifically, these objectives are to:

1. Review and recommend changes in wildlife and landuse policies that impinge on the potential for effective tiger recovery efforts.
2. Develop and implement a landuse plan that clearly defines tiger management zones, identifies needs in terms of protected areas and ecological corridors, and addresses and makes recommendations on management issues that negatively impact tigers, including forest road construction.
3. Increase prey densities to 5-10 animals/10 km² in key recovery zones in both eastern Changbaishan and eastern Wandashan.
4. Develop long-term solutions to livestock depredations by tigers by improving livestock husbandry techniques, enforcing protected area policies, and developing a successful compensation program.
5. Develop mechanism to address tiger-human conflicts in an effective and efficient manner that ensures human safety and welfare, and reduces human-caused mortalities of tigers.
6. Increase the capacity of staff and managers of protected areas to achieve the objectives of protected area management plans and to implement effective monitoring, anti-poaching, and management programs.
7. Increase the body of knowledge on tigers and their prey in northeast China by developing effective research and monitoring programs.
8. Explore and develop mechanisms that improve the livelihoods and economic condition of those people “compromised” by tiger conservation efforts, but ensure that economic incentives are linked to successful conservation initiatives.
9. Improve awareness and interest in conservation and ecological issues locally

through an active education program focused specifically on local people and administrators.

10. Monitor, assess, and make recommendations on the potential impact of large-scale development projects that may negatively impact tiger recovery efforts in northeast China.

The above stated long-term and short-term visions and goals, as well as the objectives of this action plan are based on a number of fundamental assumptions. The first and most important is the assumption that recovery of tigers will not occur unless existing threats, responsible for driving tigers to critically low numbers, are greatly diminished or eliminated. In short, unless these threats are mitigated, it will be impossible to recover tigers. Therefore goals and objectives, as defined above, and actions, as defined in Chapter 4, are specifically designed to address threats as defined in Chapter 2.

Secondly, it is assumed that the most cost-effective, efficient, and simplest means for recovery of tigers in northeast China is to use the existing population in Russia as a source for re-establishment of tigers in China. It has been demonstrated multiple times in the past ten years that tigers regularly cross the border from Russia into China (and vice versa) and hence the exchange of individuals is still occurring. It is assumed that if existing threats are addressed, tigers dispersing into China will remain there if conditions are suitable. More specifically, if habitat is protected in China along the Russian border, ungulate populations increase, and snares are removed, emigrating tigers will establish permanent residence in China, and will eventually begin to reproduce.

Ultimately, long-term viability of tigers on both the Russian and Chinese side will be greatly enhanced if tigers are managed jointly as single transboundary units. Therefore, both the short-term vision, goals, and objectives are focused on areas near the Russian border for both the Changbaishan and the Wandashan Regions because these areas have the greatest potential for quick recovery, as evidenced by the fact that some tigers still occur there (Figure 3.2). Once this source population is established, dispersal to other sites in the west, south and north, will be much more likely, and therefore, close cooperation with scientists and officials in Russia is essential.

Considering use of captive animals for supplementing the wild population demonstrates a clear lack of understanding of the factors that are limiting tiger numbers in northeast China, and of how recovery can occur. Release of captive tigers will not diminish existing threats, and therefore will not assist in recovery. Moreover, if those threats are reduced, tigers will return to the region naturally, with no need of interference by humans or supplementation with captive individuals. If those threats are not eliminated, tigers will never survive in the wilds of northeast China, no matter what else is done. Any plan to release captive individuals would likely damage recovery efforts in at least four ways:

1. Focus on release of captive animals will divert efforts that should be focused

on reducing threats to wild tigers;

2. Proposing release of captive tigers fails to educate local people and administrators about the real threats for wild tigers, and therefore slows the process of diminishing those threats;
3. Release of captive tigers of unknown lineage could negatively impact the genetic composition of the wild population, or may result in introduction of new diseases into the wild population;
4. It is exceedingly difficult to raise tigers in captivity that are not habituated to humans. Tigers habituated to humans will invariably seek out human settlements since they associate people with food. Habituated tigers could cause considerably problems and ultimately result in negative publicity for recovery efforts.

An important conclusion of this approach is the recognition that the release of captive-bred tigers for recovery in northeast China is unnecessary, and could be highly detrimental to the recovery process of wild Amur tigers.

The urgent need to develop and implement a recovery plan immediately cannot be overemphasized. While tigers still exist in Wandashan, and are scattered across Laoyeling and Zhangguangcailing, it is important to implement plans that can save the remaining tigers. Attempts to recreate a population after tigers become extinct in northeast China will be more difficult by several orders of magnitude. Therefore, it is essential to create and implement a recovery plan immediately.

Chapter 4

Conservation Action Plan for Wild Amur Tigers in Northeast China

In order to achieve both short-term and long-term visions, goals and objectives, the following actions need to be taken:

4.1 Policies and Legislation

Goal: To review and recommend changes in wildlife and landuse policies that affect tiger recovery efforts.

Action: 1.1: Improve capacity for implementation of existing wildlife and habitat conservation related policies and regulations. Chapter 1 lists relevant policies and regulations on wildlife and habitat conservation. They cover protection of endangered wildlife, nature reserve management, forest conservation, wild medicinal resource protection, conflict compensation, hunting regulation, etc. If these laws and regulations are effectively and efficiently implemented, many existing threats will be greatly reduced. Therefore, detailed polices and regulations should be studied, the needs (including institutional, personal, financial and training) and mechanisms to implement them should be identified, .

Action 1.2: Review wildlife (natural resource) management system, legislation, and policies at the national and provincial levels. Management systems for landuse, wildlife, forest and grazing should be studied and gaps identified. There are currently reviews being undertaken at the national level for the *Wild Animal Protection Law* and the *Nature Reserve Management Regulation*, and these reviews, and future ones, should be assessed in relation to tiger conservation. The results of the reviews should be distributed among relevant bodies, with the ability to provide feedback and recommendations before the reviews are either carried out or finalized. Therefore, there is a need to evaluate gaps, overlaps, inconsistencies, and shortfalls as well as determine the relationship with and between existing laws and policies. This process will help provide solid information and recommendations on how to improve the management system and policies for tiger conservation in Jilin and Heilongjiang.

Action 1.3: Review land use policies and management zones to provide recommendations to improve land use planning in priority restoration zones. Restoration of tiger populations in areas defined by both short and long-term visions will require appropriate land use plans and the establishment of a network of

personnel for conservation and management. This review would focus on definitions associated with protected area categories and associated legislation, as well as on actual land use planning. Definitions for a system of management zones inside and outside protected areas does not yet exist in China, yet, for conservation of the Amur tiger there is a need to create such categories (see Chapter 2.1 for more detail). Russia has protected areas, also known as zapovedniks (very strict reserves where lay people are not permitted to enter and human activities other than research are not allowed) and zakazniks (multiple-use reserves, where logging and other human activities permitted but monitored). At the regional level, Khabarovsk Province has even provided a legislative definition of ecological corridors, and created a suite of such corridors to link key protected areas. What is lacking in China are protection and management zoning that defines allowable activities that are compatible with tiger conservation; e.g., selective logging and well-managed grazing may be acceptable outside protected areas, but not in strictly protected core zones. In China, a protected area is synonymous with no logging. However, tigers can survive in areas with limited or particular kinds of logging, thus complete cessation of logging is not necessarily required.

The review will provide solid information and recommendations on how to improve land use planning in Jilin and Heilongjiang provinces in a way compatible with restoration of tigers.

Action 1.4: Incorporate conservation plans into national and local financial budgets. Some funding for nature reserve development does exist, and comes mainly from the national level. However, these available funds are not enough for daily operation of these nature reserves in a way conducive to recovery of tigers. Besides these limited funds, there is virtually no available funding from the provincial or local level. For instance, even though announcements of a governmental compensation program have been issued in Jilin in September 2006, there is, as yet, insufficient funding to implement this program. Conservation plans and their financial needs should be incorporated annually into national and local financial budgets. This funding would help ensure the integrity of important ecosystems, and would benefit not only the wildlife that live there, but for the local people as well.

Action 1.5: Establish a working group that consists of Chinese and Russian experts and government officers to address transboundary tiger conservation objectives. The goal of this working group is to improve transboundary cooperation in managing the “meta” population of tigers, and address key issues for tiger conservation, such as creation of a transboundary reserve, ensuring connectivity of habitat across boundaries is preserved, and even coordination in anti-poaching activities. The working group would foster communication between Russia and China on tiger conservation, share lessons learned, techniques, and plans, and collectively create and implement solutions to solve key problems. Issues to be addressed would include: creating and restoring habitat corridors, mitigating tiger-human conflict, reducing poaching, and improved control of illegal trade of endangered species across their mutual borders. WCS and WWF have programs and

offices in both China and Russia which will aid in increasing communication between these two countries. Expertise and experiences from Russia on tiger conservation will greatly benefit tiger conservation efforts in China. Russian experts should be invited to participate and assist in design of proposed conservation actions, and will be very helpful in lending their expertise to provide training on monitoring tigers, prey, habitat, and human-threats, as well as providing overall management advice.

4.2 Habitat Protection and Landuse Planning

Goal: Develop and implement a landuse plan that clearly defines tiger management zones, identifies needs in terms of protected areas and ecological corridors, and makes recommendations on how to balance tiger conservation objectives and development priorities.

As described in Chapter 2, maintaining a large population of tigers in one continuous habitat block requires more land than currently exists in any single reserve in China. Therefore development of tiger recovery zones, which include both protected and unprotected Forest Bureau lands, will require careful planning that must be conducted in conjunction with local stakeholders.

Establishing nature reserves is an important method of ensuring there exists adequate “core” habitat for Amur tigers, where secure habitat with high prey densities, free of human disturbance, exists. Hunchun Nature Reserve has played a very important role in beginning the recovery of tigers in the Changbaishan Region. However, other types of lands should be designated and included in a landuse plan to increase the amount of tiger habitat. The establishment of well-designed corridors would allow tigers to disperse into China from Russia and gradually expand from the eastern border areas to the whole eastern mountain region of northeast China. However, on multiple use areas there will need to be some mechanisms in place that increase security for both prey species and tigers.

Action 2.1: Analyze existing and potential habitat and corridors. Initially, an analysis of existing and potential habitat, as well as an analysis of existing or potential corridors, should be carried out. This would help in prioritizing and designating the best places for tigers and their prey, and in determining where corridors should occur.

Action 2.2: Develop land use plans for Changbai Mountain and Wanda Mountain landscapes. Because local people live in these areas and rely on natural resources for their livelihoods, it is recommended that land-use plans be created, utilizing GIS and other mapping tools, in conjunction with the needs of local people, and other stakeholders in a participatory manner.

Action 2.3: Establish the Dongfanghong Nature Reserve in the Eastern Wandashan Mountains. Dongfanghong has applied, albeit unsuccessfully, for the establishment of a nature reserve. This failure was due to the large human population

residing in the forest. Many of these people are staff of the Heilongjiang Forestry Industry. However, due to the areas potential for tigers and their prey, a continued effort should be made to establish a nature reserve in this area. The relocation of some Heilongjiang Forestry Industry staff out of the forest to reduce human disturbance in the region should be taken into consideration and be seen as a possible viable solution

Action 2.4. Establish three international ecological corridors between:

- 1. Wandashan-Strelnikov;**
- 2. Northern Laoyeling-Pogranichny**
- 3. Hunchun-Southwest Primorye.**

These international corridors are essential for movement of tigers across the Sino-Russian Border, and likely require cooperative agreements between the two governments.

Action 2.5: Formerly delineate and establish tiger recovery zones, protected areas and ecological corridors as defined in Actions 2.1 and 2.2.

Action 2.6: Develop logging road management plans for tiger recovery zones.

These plans should review the existing network of logging roads, determine when and where closure is feasible, define mechanisms for controlled access to roads that bisect key tiger habitat, determine who should control access, and how, and finally, define a management plan that defines how future roads will be built and managed..

Action 2.7: Avoid over harvest of mature Mongolian oak tree and Korean pine tree in both landscapes. Korean pine is considered the "bread" of the forest because so many animals (including prey species of tigers) forages on pine nuts. Oaks also produce a vast quantity of acorns, which are critical for the survival of ungulates. Both pine nuts and acorns are currently over-harvested by humans, reducing forage available for tiger prey species. Plans need to be developed to reduce human activity in key areas to protect these important forage resources for wildlife.

4.3 Prey Recovery

Goal: Increase prey densities to 5-10 animals/10 km² in key recovery zones in both eastern Changbaishan and eastern Wandashan.

Action 3.1: Provide incentives for Forestry Bureaus to remove snares. Snare removal is a key activity necessary for recovering prey densities, as well as tigers. Currently, NGO's support and encourage these activities, but it is recommended that Forestry Bureaus take primary responsibility for implementing and managing snare removal activities.

Action 3.2: Monitor ungulate density in key tiger distribution areas. Permanent survey routes can be established in key sites to monitor changes in ungulate density so that corresponding conservation measurements can be taken. It is important that unified and standardized methodologies be established to collect and analyze data for both Jilin and Heilongjiang province, and in a way that is compatible with Russian techniques as well.

Action 3.3: Investigate the potential for sustainable hunting estates to sustainably manage prey. Experience from Russia shows that well-managed hunting of prey does not negatively impact prey density; on the contrary, with good management to the forests, sustainable hunting is possible. It could possibly help to reduce poaching, and boost the local tourism industry thus positively impacting local livelihoods. However, a comprehensive study is first needed to determine baseline values for prey density and assess whether hunting estates could in fact function in a beneficial way to tigers and their prey, and to people. If so, then very strict regulations and enforcement would have to be issued.

4.4 Livestock Husbandry and Compensation Schemes

Goal: Develop long-term solutions to livestock depredation by tigers by improving livestock husbandry techniques, enforcing protected area policies, and developing a successful compensation program.

Action 4.1: Conduct trial projects for implementing the *Compensation Method for Personal and Property Damage Caused by the Jilin key Protected Terrestrial Wild Animals* issued in Oct 8 2006. Detailed compensation rules and well designed compensation programs would help mitigate human-tiger conflict and encourage local communities to support tiger conservation. Compensation programs should be designed to be able to change and impact local people's behaviours which would be positively impact the tiger's survival. Changes in local people's behaviours would need to be monitored to evaluate the success of compensation programs.

Action 4.2: Improve animal husbandry techniques by working with local communities. Free-ranging livestock are easy prey for tigers, and results in unnecessary conflicts with people. Improved husbandry techniques can greatly reduce levels of depredation, but local people need to be taught and induce to incorporate such approaches. Alternatives for people grazing livestock in tiger habitat should be addressed and in a participatory manner – through local stakeholder workshops and meetings. Education programs specifically focusing on better livestock husbandry techniques should be implemented, which include benefits to local people who adopt such practices. It is illegal to graze livestock within nature

reserves, however, there are still more than 100 free-ranging cattle grazing in the core area of the Hunchun Nature Reserve, where seven of them were killed by tigers in 2006. Awareness on existing regulations should be improved, and other methods should be explored to reduce the number of livestock in nature reserves. Grants and training to help local people change their traditional livestock management or explore alternative livelihoods should be initiated.

4.5 Mitigating Human-Tiger Conflicts

Goal: Develop mechanisms to address tiger-human conflicts in an effective and efficient manner that ensures human safety and welfare, and reduces human-caused mortalities of tigers.

Action 5.1: Develop plans with local stakeholders and provincial governments to mitigate conflict situations. Human-tiger conflicts are a threat to both tigers and humans. People living in tiger habitat need to be equipped with ways to avoid and mitigate tiger conflicts to avoid both harm to themselves and tigers. Mitigation schemes should be developed in conjunction with local people, and initially be implemented as ‘pilot-projects’ in order to determine best practices.

Action 5.2: Develop a brochure/booklet on ‘living with tigers’ for local villagers. Currently, WCS has printed and distributed mini-booklets on recommendations for living in tiger territory and grazing livestock. These types of pamphlets and brochures should be distributed widely. Developing these brochures could be done in conjunction with local communities, and workshops and meetings could be tailored to facilitate their creation.

Action 5.3: Assess the possibility (and if feasible create) a government sponsored Tiger Conflict Team and provide training to the team for dealing with conflict situations. Such a team exists in the Russian government in the Russian Far East, and training for this team has been provided both in Russia and overseas. This team is ‘on-call’ to assess human-tiger conflict situations. Their existence in Russia has been widely publicized in key tiger areas, so local people know they exist and how to get in contact with them if a conflict situation arises (such as livestock depredation, a problem tiger, a human attack, etc). It is recommended that this model be assessed, and determined if and how it could be used in China.

4.6 Enhancing Management Capacity

Goal: Increase the capacity of staff and managers of protected areas to achieve the objectives of protected area management plans and to implement effective monitoring, anti-poaching, and management programs.

Action 6.1: Establish a full-time field team to address key issues of tiger conservation in China. A full-time field team will be established and trained to conduct high-priority conservation field work. The team will be in the field full time and conduct monitoring of tigers and prey, snare removal, and education and training. The full-time team will work with nature reserve staff and local villagers.

Action 6.2: Build capacity in key nature reserves and forest bureaus. Reserve staff and other key people need to be identified and trained in conservation practices for tigers and their prey, so that they can formulate and implement practical and feasible management plans. This involves collecting and assessing ecological and biological information, implementing tiger and prey monitoring programs, enforcing grazing regulations, and conducting anti-poaching activities (patrols and snare removal). They need to be trained in existing laws and how they should be enforced; and an information link between key areas needs to be established to share information.

Action 6.3: Provide training courses on monitoring of tigers and prey and patrolling specifically for staff working in the two key areas. Reserve staff should receive training in monitoring methods for both tigers and their prey, as well as in the monitoring of human impacts. Training can be provided by both national and foreign experts.

Action 6.4: Provide professional training courses for managers and local government officials in conservation practices and management skills. Training courses should be provided and training materials prepared and distributed. This will improve the capacity and understanding of managers and of local government officials. The initial priority should be to focus on managers who are already working in the two key areas.

Action 6.5: Establish an information database and research center in Northeast China. The establishment of an information database would help in producing more systematic and standardized information on tigers in terms of distribution, number, sex, age, etc. The database could be easily made accessible for regular entering of information; it would facilitate analysis, and producing timely assessments and reports.

Action 6.6: Encourage forest bureaus, with assistance through training, to create and implement sustainable forest management. Training could be enhanced by incorporating examples of sustainable practices from around the globe, such as Forest Stewardship Council (FSC) certification and High Conservation value Forests (HCVFs). Such models should be assessed and relevancy determined for northeast China.

Action 6.7: Provide local and international training for local government officials and other experts. Training could be received locally, or internationally, in order to supplement and enhance existing management skills and conservation practices. Much expertise, due from years of experience, lies in Russia, and experts there are

willing to help with training and in the sharing of information.

Action 6.8: Improve the condition, capacity, and effectiveness of law enforcement in order to reduce poaching on ungulates and tigers. There is an urgent need to improve the implementation and enforcement of existing laws. The number and capability of patrolling staff, including the current status of their equipment, is currently insufficient to implement and enforce existing laws and therefore, should be greatly increased and enhanced. Full-time anti-poaching teams need to be established in the two key areas; these teams can also assist in continued snare removal and stop the poisoning of ungulates.

Action 6.7: Set up awards for excellence and provide training and field trips abroad. Having such an award would not only help boost morale, but create a system that rewards good work. Awards could be plaques given at award ceremonies, an end of year financial bonus, or the opportunity to receive additional, advanced training abroad.

4.7 Building Information on the Wild Tiger: Monitoring and Research

Goal: Increase the body of knowledge on tigers and their prey in northeast China by developing effective research and monitoring programs.

Research and monitoring on dynamics of tigers and their prey in Northeast China should be improved and continued. More data are needed in order to determine prey population densities, additional information on tiger biology, including home range size, dispersal patterns, and reproductive biology in the wild. It is critical that yearly information provides a basis for determining the trends in tiger numbers, which can be used in an adaptive management approach.

Action 7.1: Conduct comprehensive ungulate density and habitat surveys in key areas. There have not been any comprehensive surveys for ungulates across key areas. Baseline information and analyses will allow for recommendations to increase ungulate density, and monitor success of management actions.

Action 7.2: Conduct comprehensive tiger surveys in the two key areas. There has never been any preliminary information on how many resident tigers persist in the key areas and where each tiger is located. Anecdotal reports indicate that there are breeding females in China but what is needed is absolute confirmation and to determine more about their home ranges. The study will provide information about the biology and ecology of tigers in China, and would be a preliminary and necessary step in determining where and how to regulate human activities in important tiger areas.

Action 7.3: Establish a tiger monitoring network in Changbaishan and Wandashan Mountains. Eight monitoring stations have been established by WCS China in these areas (Figure 1-22). However, in some important areas, such as

Dongning and Raohe in Heilongjiang, and the whole of Jilin, there are no monitoring stations. More stations should be established and connected to form a complete monitoring network. Monitoring methods and observation forms should be standardized so that data collected in the network are compatible, and a comprehensive GIS database should be developed. An adequate number of part time staff serving the monitoring network should be hired and necessary monitoring equipment such as GPS and digital cameras need to be provided.

4.8 Improving Socioeconomic Status of Local People

Goal: Explore and develop mechanisms that improve the livelihoods and economic condition of those people ‘compromised’ by tiger conservation efforts, but ensure that economic incentives are linked to successful conservation initiatives.

Action: 8.1: Collect baseline socioeconomic data through surveys. Such data would be an important first step in better understanding the local situation and in determining the economic needs of the people and the feasibility and acceptance of creating sustainable/alternative livelihood practices.

Action 8.2: Explore a nature friendly economic development model for local communities, for instance a handicraft industry or cultivation of traditional medicinal herbs and other NTFP’s. The local economy in tiger areas currently relies mainly on natural resources, which brings in a small and inconsistent income. Building on the results of existent socio-economic surveys, help should be provided to local communities that improve earning potential of local communities through enterprises with low energy requirements and no pollution. Efforts should be made to improve the standard of local people and to help local people (especially hunters) to change their lifestyle.

Action 8.3: Assess the impact of tourism on natural resources and determine the possibility of ecotourism in the region. Tigers are a major draw for tourists and if feasible, could serve as a form of income, though well-managed ecotourism, for local people in the area. It is recommended that a feasibility assessment be made of the possibility for eco-tourism ventures.

4.9 Education and Participation of Local Communities

Goal: Improve awareness and interest in conservation and ecological issues locally through an active education program focused specifically on local people and administrators.

Particular attention needs to be placed on education as to why tigers need to be conserved, why they do what they do, their role in the ecosystem and how that benefits humans. Besides the dissemination of information through pamphlets, brochures, posters, etc, various activities targeted for different populations need to be

developed. For example, campus activities for students, performances and exhibits in communities, and community meetings, could all be collaborative as well as provide a forum for local people to voice their opinions, concerns, and share a stake in developing solutions to the issues surrounding tiger conservation. Education is ineffective when local people's interests are not taken into consideration.

Action 9.1: Involve local people in conservation. More opportunities and incentives should be provided for local residents to carry out activities such as snare removal, conservation education, and tiger patrols. Participatory community workshops can also be organized to determine problems with local conservation efforts, and how conservation efforts conflict with local interests.

Action 9.2: Organize educational activities aimed at people in villages close to tiger habitat. Various educational activities should be organized in order to raise conservation awareness of local people, and to provide them with basic knowledge on grazing, how to avoid close encounters with tigers, how to protect forest resources, etc. Priorities should be given to the two key areas.

Action 9.3: Provide tiger conservation classes in local primary and middle schools, develop model schools for wildlife conservation, and train teachers in these schools and provide opportunities for exchange. Education of school children is very important, as it fosters a conservation ethics from a young age. Students can also impact their family members by returning home with messages about conservation. A curriculum for local schools and training for teachers for conservation should be developed, and the WCS Teachers for Tigers manual (which is already being utilized in certain place) can serve as a model for education teachers about tiger conservation.

Action 9.4: To educate and train relevant stakeholders on existing laws and regulations. Current laws and regulations need to be shared with local people as many may not know what is legal or illegal. Legal jargon is often difficult to interpret thus educating stakeholders on these matters, in a relevant manner, as well as informing them as to the repercussions for not abiding by existing laws, is needed.

Action 9.5: Provide opportunities for journalists to visit North East China and report tiger conservation activities

Journalists may be interested in reporting on tiger conservation, anti-poaching activities, status of human wildlife conflict, sustainable livelihood approaches and other key issues which would help in spreading the message of tiger conservation not just in the NE region, but to other areas in China, and would reach many varying audiences, as well as serve as good national and international press for what China is doing to save the wild tiger.

4.10 Mitigating Development Projects

Goal: Monitor, assess, and make recommendations on the potential impact of large-

scale development projects that may negatively impact tiger recovery efforts in northeast China.

Action 10.1: Conduct impact assessment of the planned Dongbian Road to tiger conservation. The Dongbian Road is the road planned along the border of Russia and China and will pass through the range of the Amur tiger. This study will provide information for a better design of the road and will leave critical corridors for tigers and other wildlife intact.

4.11 Implementation of the Action Plan

Goal: To create a mechanism and governing body that would oversee implementation of the specific actions required to achieve the goals and objectives defined here, and to ensure a future for wild Amur tigers in northeast China.

Action 11.1: Set up an Amur Tiger Oversight Committee to oversee the implementation of the Action Plan, to meet annually to discuss effectiveness and relevancy of the Action Plan, to assess actions of the previous year, to define activities for the forthcoming year, and determine if changes or updates need to be made to the plan itself. An Oversight Committee should be created, preferably with the head committee member being a representative of the State Forestry Administration. Other representatives should come from relevant governmental (both regional as well as national) and non-governmental agencies.

Action 11.2: Raise funds to implement the Action Plan. Besides trying to incorporate the Action Plan into local and national financial budgets (Action 1.4), government and relevant departments, with help from WWF and WCS, should work together to apply for international funds (locally co-financed) to implement the Action Plan.

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