



**Review meeting on the NEASPEC Project,
“Study on Transborder Movement of Amur Tigers and Leopards
using Camera Trapping and Molecular Genetic Analysis”**

Rethinking the Amur tiger and leopard conservation in China

Guangshun Jiang Prof./Executive Director

Feline Research Center of Chinese SFA
College of Wildlife Resources, NEFU

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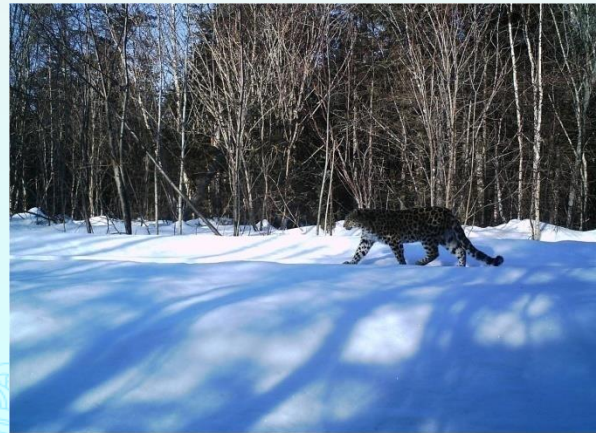
Outline:

1. Historical dynamics of Amur tiger and leopard population and habitat;
2. Potential and current habitat and population size of Amur tiger and leopard;
3. Population and habitat recovery procedure during recent two decades;
4. Effects of Natural forest Protection Program on Amur tiger and leopard habitat occupied;
5. Future challenge for saving Amur tiger and leopard in China.



◆ Key questions:

- ❑ 1) How are the Amur tiger and leopard population and habitat dynamics historically?
- ❑ 2) How about the potential population and habitat recovery is in China?
- ❑ 3) What actions really are prompting their recovery?
- ❑ 4) What are future challenges for big cat conservation in China and Russia?



1. Historical dynamics of Amur tiger and leopard population and habitat



图1 东北虎种群分布区的时空变化及迁移通道(资料来源: Baikov, 1925; 马逸清, 1983, 2005; 谭邦杰, 1989; 高中信等, 1993; 吴宪忠等, 1994; Matyushkin *et al.*, 1996; 赫俊峰等, 1997; 于孝臣等, 2000; 李彤等, 2001; 马建章和金崑, 2003; 孙海义等, 2005; Miquelle *et al.*, 2006)。图中字母A-Y表示河流、湖泊, 数字1-8表示城镇, 罗马数字I-VII表示山脉。

Fig. 1 Spatiotemporal dynamics of the distribution and movement corridors of the Amur tiger (Data from: Baikov, 1925; Ma, 1983, 2005; Tan, 1989; Gao *et al.*, 1993; Wu *et al.*, 1994; Matyushkin *et al.*, 1996; He *et al.*, 1997; Yu *et al.*, 2000; Li *et al.*, 2001; Ma & Jin, 2003; Sun *et al.*, 2005; Miquelle *et al.*, 2006). Letters A to Y denote the names of rivers and lakes, Arabic numerals 1 to 8 the names of cities and towns, and Roman numerals I to VII the names of mountains.



1. Historical dynamics of Amur tiger and leopard population and habitat

表1 中国境内东北虎种群数量的历史变化

Table 1 Historical changes in the population size of the Amur tiger in China

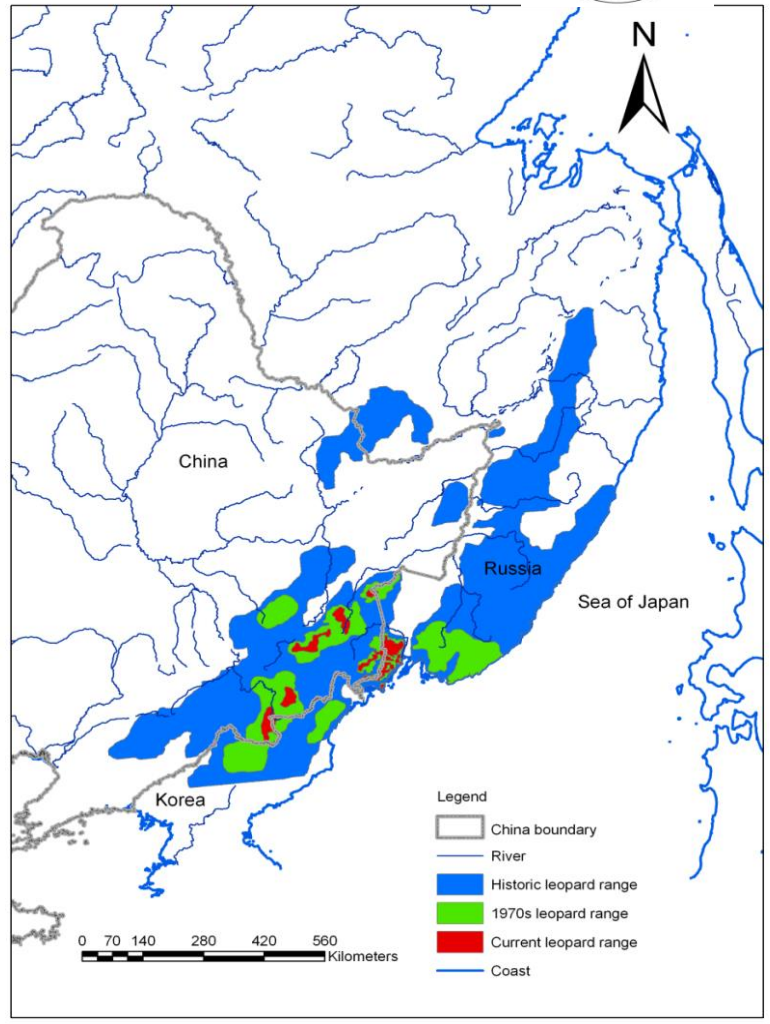
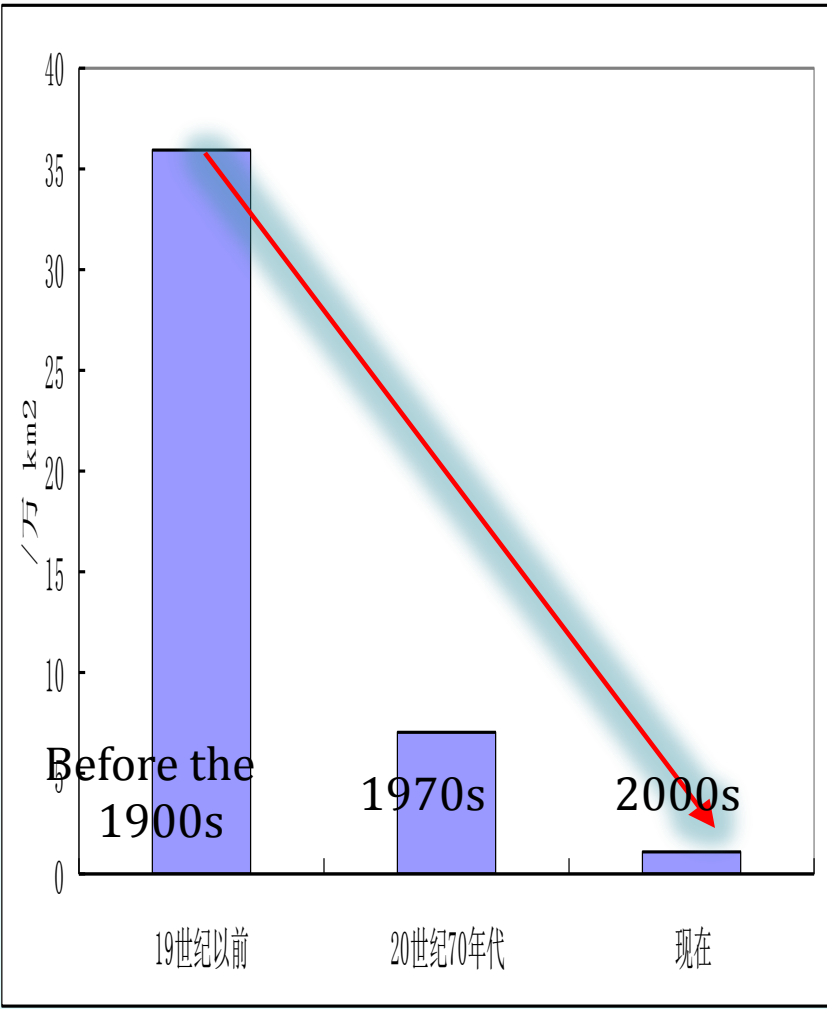
时间(年) Time (year)	东北虎种群数量(只) Amur tiger population size				资料来源 Data sources
	吉林 Jilin	黑龙江 Heilongjiang	中国 China	平均值 Average	
1890	-	-	1,200-2,400	1,800	Xu (徐学良), 1999
30年代 1930s	-	-	500	500	He <i>et al.</i> (赫俊峰等), 1997
50年代中期 mid-1950s	-	-	200	200	He <i>et al.</i> (赫俊峰等), 1997
1974-1976	70	81	151	151	Wu <i>et al.</i> (吴宪忠等), 1994; He <i>et al.</i> (赫俊峰等), 1997; Yu <i>et al.</i> (于孝臣等), 2000; Wang (王炳坤), 2004
1975	48	-	-	-	Li <i>et al.</i> (李彤等), 2001
1979	-	-	180-190	185	Ma (马逸清), 1983
1981-1984	12	18	30	30	He <i>et al.</i> (赫俊峰等), 1997; Li <i>et al.</i> (李彤等), 2001
1988-1991	6-8	10-14	16-22	19	Wu <i>et al.</i> (吴宪忠等), 1994; He <i>et al.</i> (赫俊峰等), 1997; Yu <i>et al.</i> (于孝臣等), 2000
1984-1985	-	-	20-30	25	Wang (王炳坤), 2004
1992	4-5	-	-	-	Li <i>et al.</i> (李彤等), 2001
1993	-	-	20-22	21	Wu <i>et al.</i> (吴宪忠等), 1994; Xu (徐学良), 1999
1998-1999	7-9	5-7	12-16	14	Li <i>et al.</i> (李彤等), 2001; Sun <i>et al.</i> (孙海义等), 2005; Jiang (蒋劲松), 2005; Yu (于孝臣), 2005
2001	-	8-12	-	-	Ma (马建章) & Jin (金崑), 2003
2003-2004	-	9-11	16-20	18	Sun <i>et al.</i> (孙海义等), 2005
2005-2006	-	12-14	-	-	Zhou <i>et al.</i> (周绍春等), 2008

"-"表示无数据, "-" means no data.



Tian et al. (2009) Biodiversity Science . 2009, 17 (3): 211-225

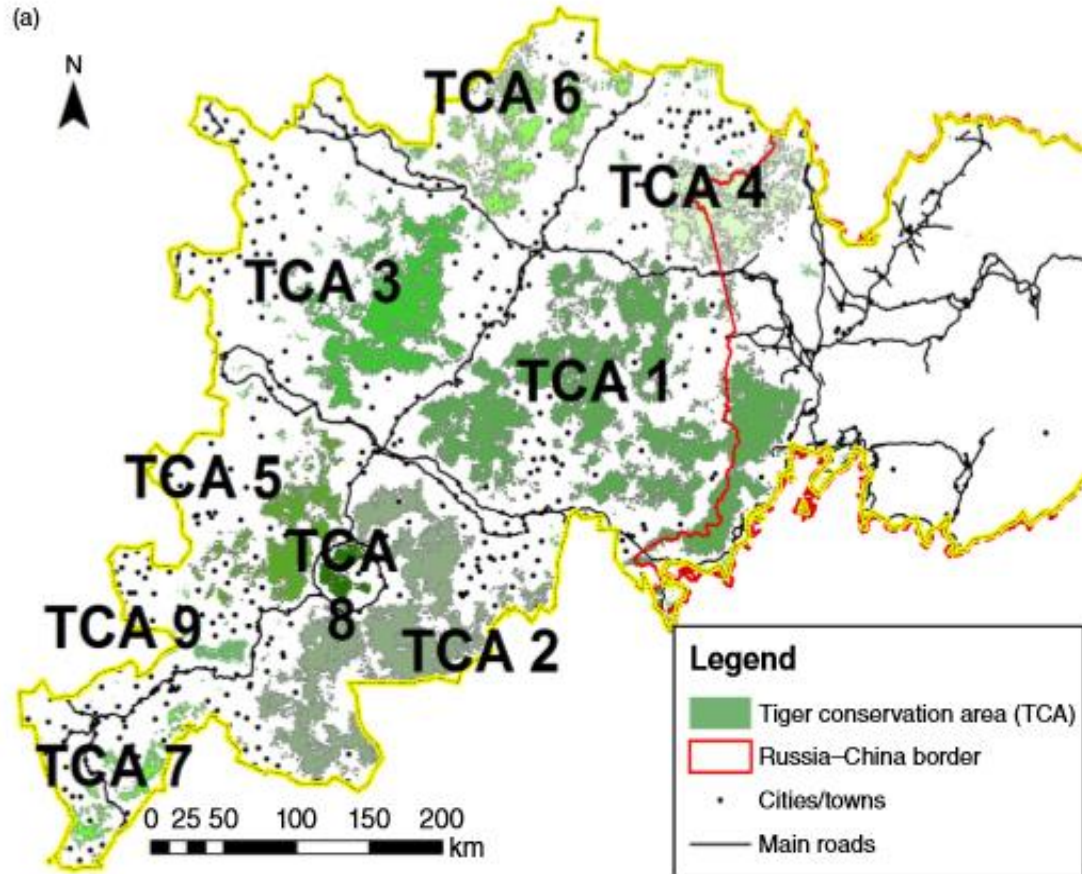
1. Historical dynamics of Amur tiger and leopard population and habitat



- Amur leopard range decrease from 360000 km² to only about 10000 km² , only 7-12 Amur leopard reported in China in 1998.

WWF-Russia. (2014) Amur-heilong database (GIS DATA)

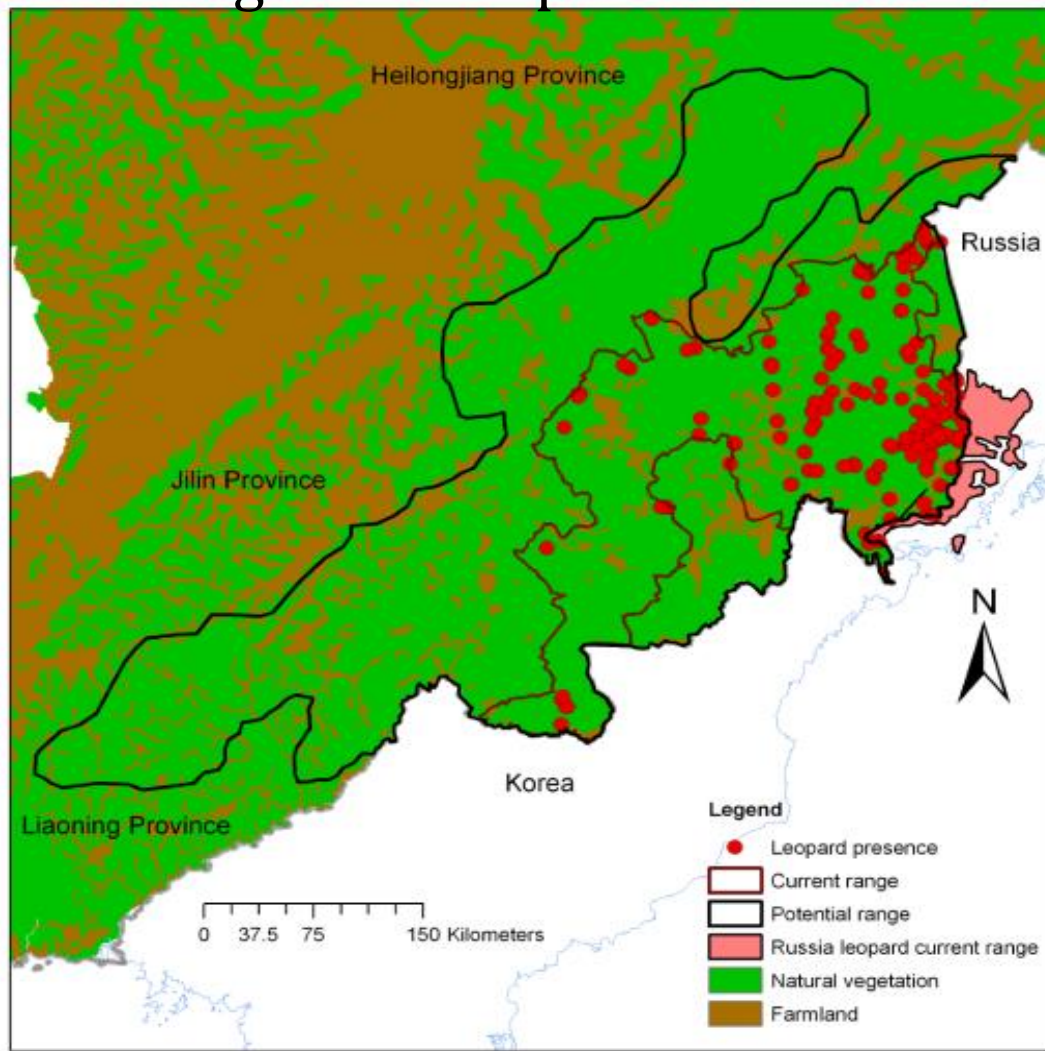
2. Potential and current habitat and population size of Amur tiger and leopard



- The potential of 98 (83–112) adult **tigers** could occupy all TCAs in the Changbaishan in China, not considering WDS.

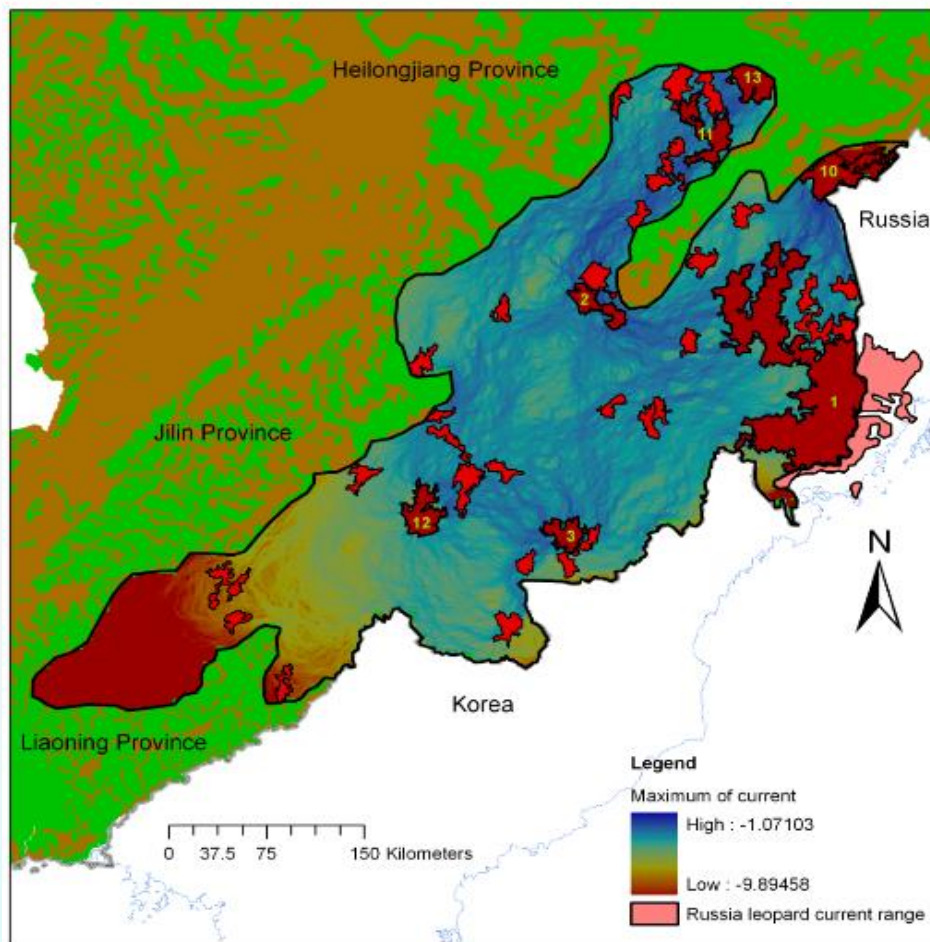
Hebblewhite et al. (2012). *Animal Conservation*. 15 , 579–592 .

2. Potential and current habitat and population size of Amur tiger and leopard



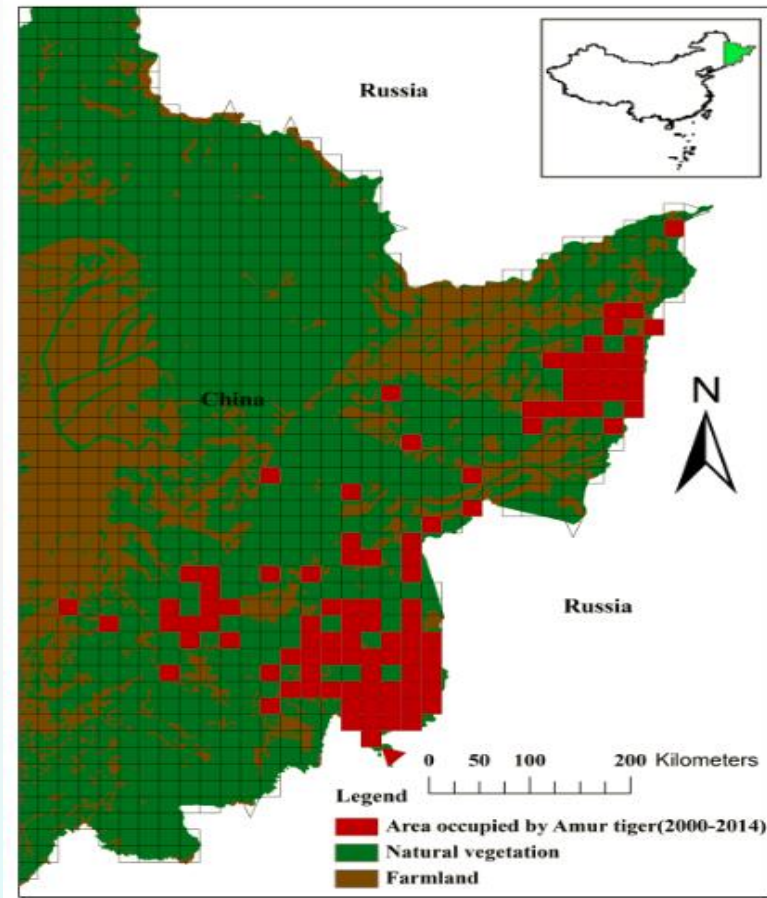
- The 48000 km² of **Amur leopard** Current range was found based on Amur leopard occurrence information from 1995 to 2015
Jiang et al. 2015, unpublished data.

2. Potential and current habitat and population size of Amur tiger and leopard



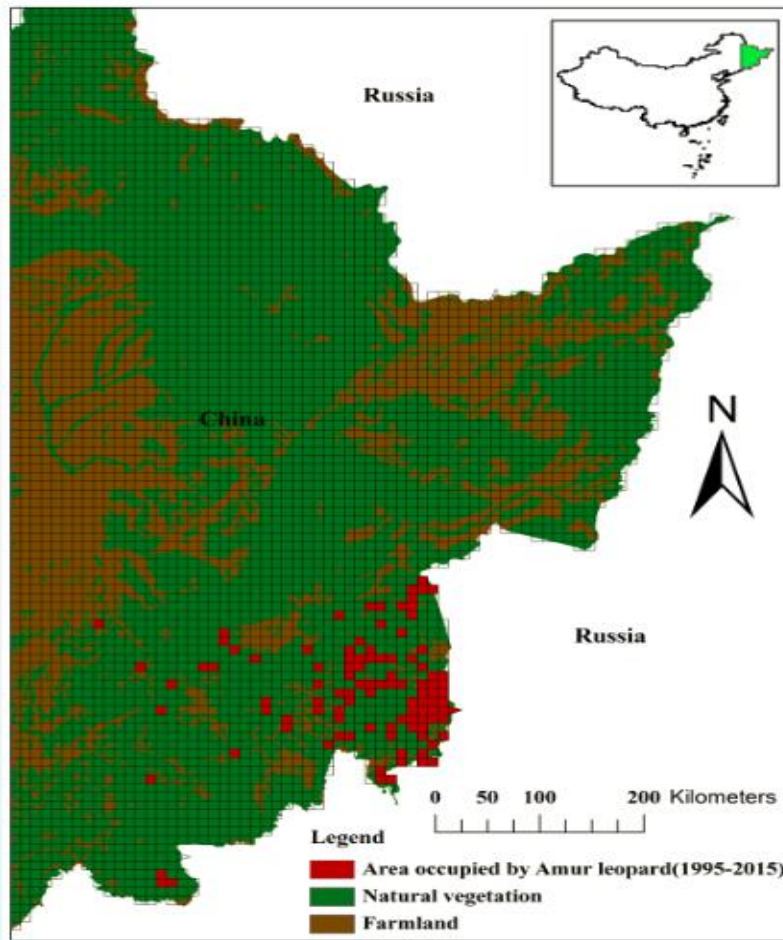
- The 21,173.7 km² of Amur leopard suitable habitat patches was found and these 37 patches (>100 km²) may support 195.1 (136.4~253.5) individuals. Jiang et al. 2015 (Unpublished data)

2. Potential and current habitat and population size of Amur tiger and leopard



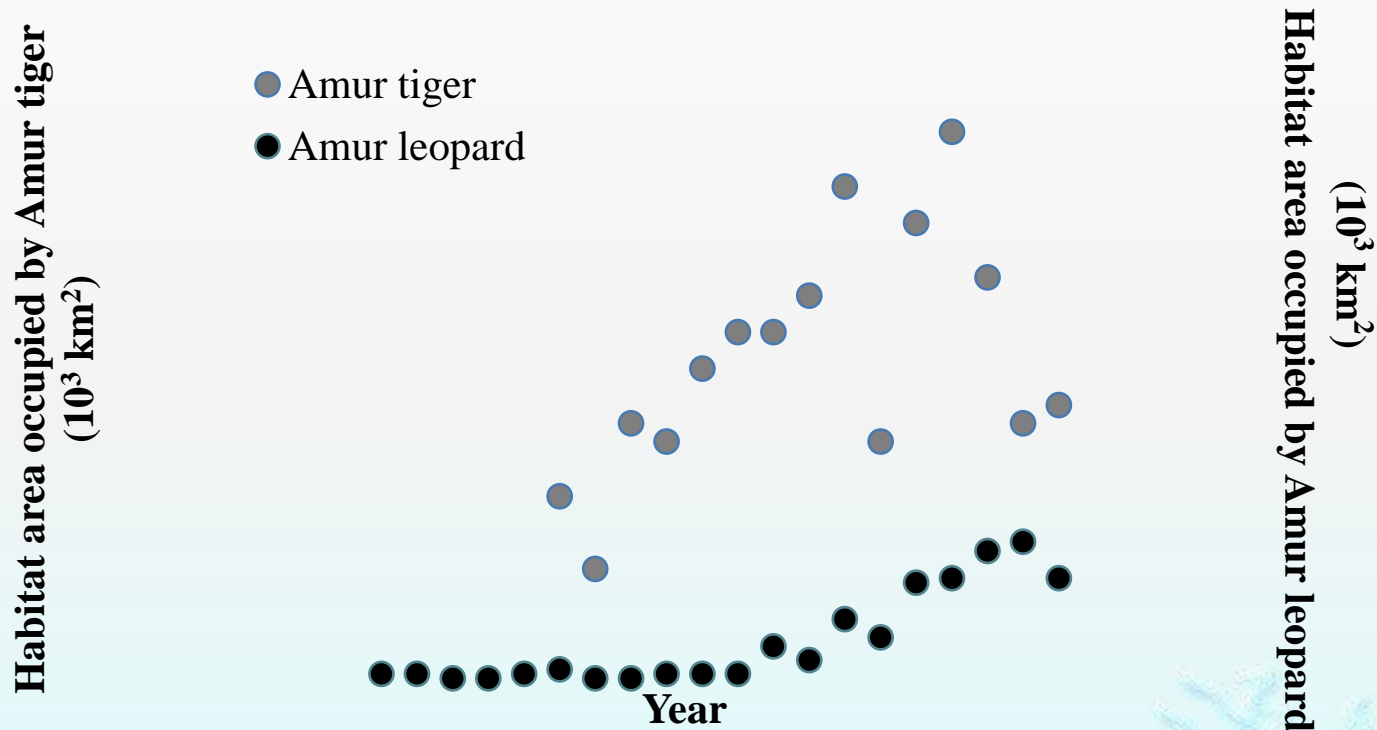
- The 779 occurrence of Amur tiger was recorded in this region, including 355 killing prey or livestock, 8 feces, 345 footprints, 71 photograph of camera trap;
 - Habitat areas (41200 km²) was occupied by Amur tiger from 2000 to 2014.
- Jiang et al. 2015 (Unpublished data)**

2. Potential and current habitat and population size of Amur tiger and leopard



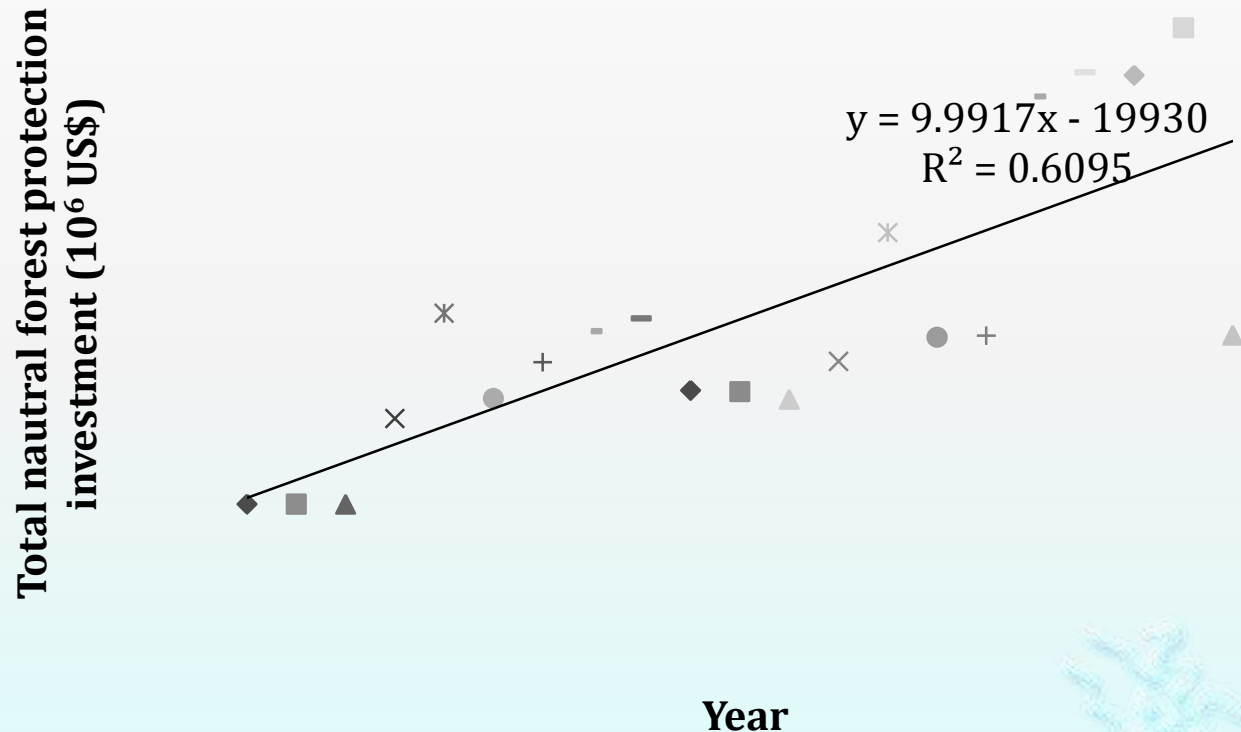
- The 643 occurrence of Amur leopard was found, including 24 killing prey or livestock, 26 feces, 133 footprints, 459 photos of camera trap during the past two decades.
 - Habitat areas (10200 km²) was occupied by Amur leopard from 1995 to 2014.
- Jiang et al. 2015 (Unpublished data)**

3. Population and habitat recovery procedure during recent two decades



(Jiang et al. (2015) Unpublished data)

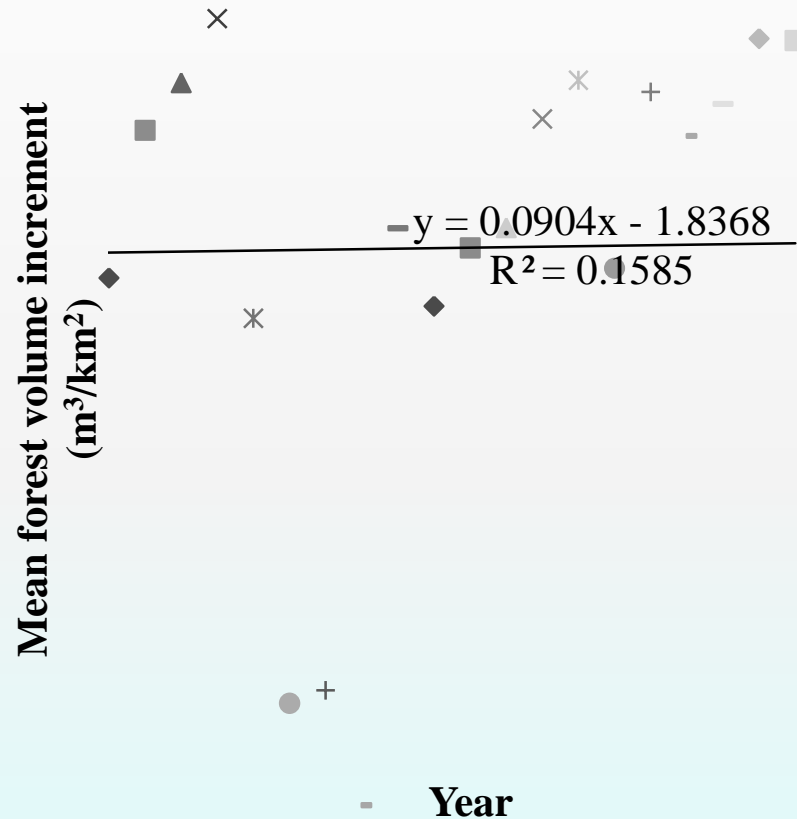
4. Effects of Natural forest Protection Program on Amur tiger and leopard habitat occupied



- From 1998, mean natural forest protection program investment is 1800 US\$ /km²
(Unpublished data)



4. Effects of Natural forest Protection Program on Amur tiger and leopard habitat occupied

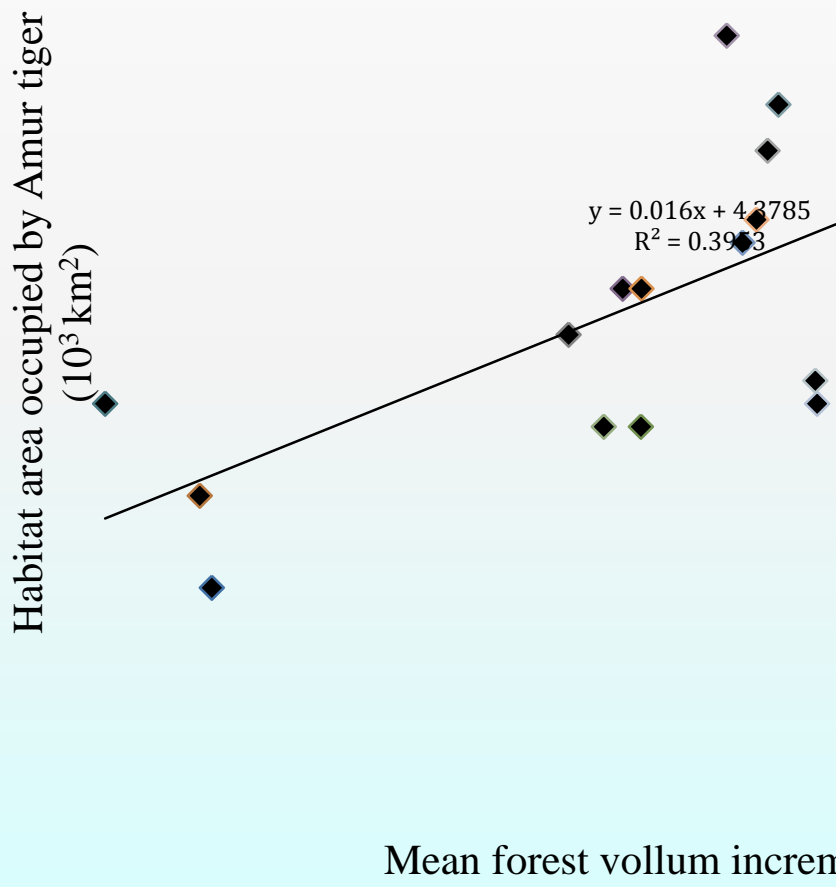


- Since 1998, mean natural forest volume grow linearly (Jiang et al. (2015) Unpublished data)

4. Effects of Natural forest Protection Program on Amur tiger and leopard habitat occupied

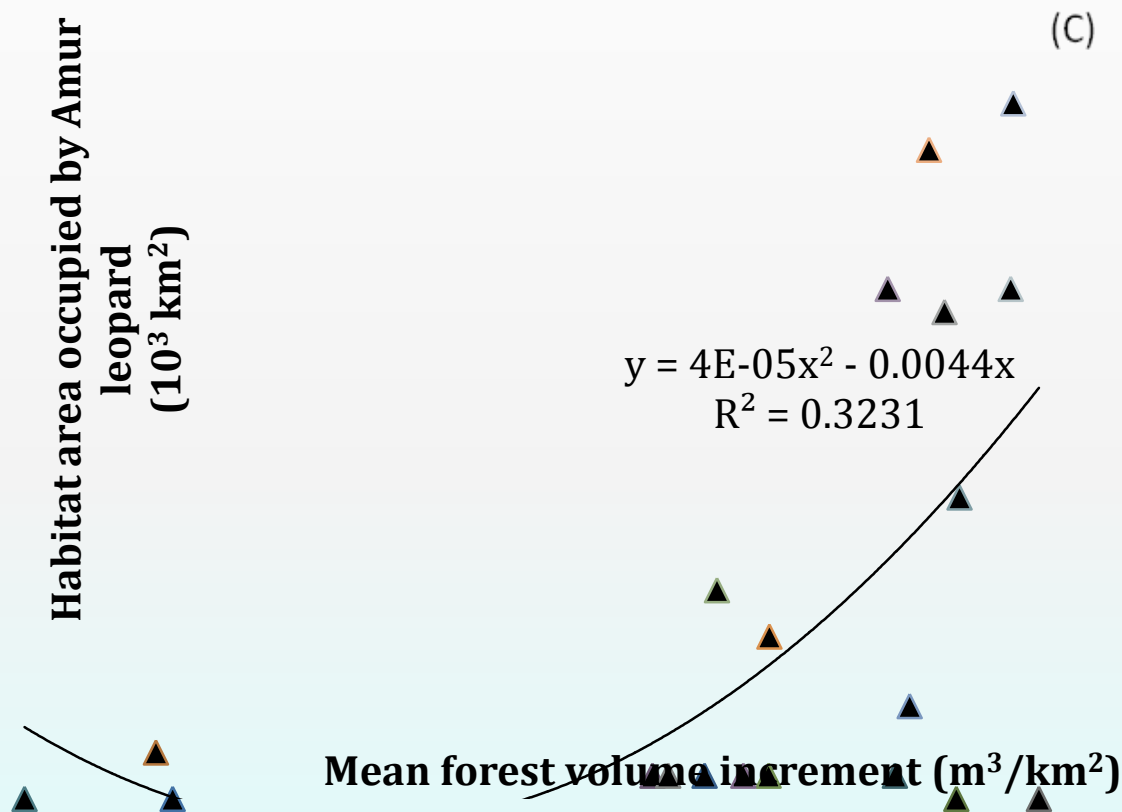


(B)





4. Effects of Natural forest Protection Program on Amur tiger and leopard habitat occupied



- Since 1998, the habitat area occupied by Amur leopards is significantly with the increase of mean forest volume increments per km^2 ($R = 0.481$, $n = 20$, $P = 0.032$) (Jiang et al. (2015) Unpublished data)

5. Future challenge for saving Amur tiger and leopard in China

5.1 **Changbaishan small Amur tiger population in China faces great risk** if it can not diffuse effectively, which is demonstrated by Russia population in Sikhote-Alin Biosphere Zapovednik: 1966–2012.

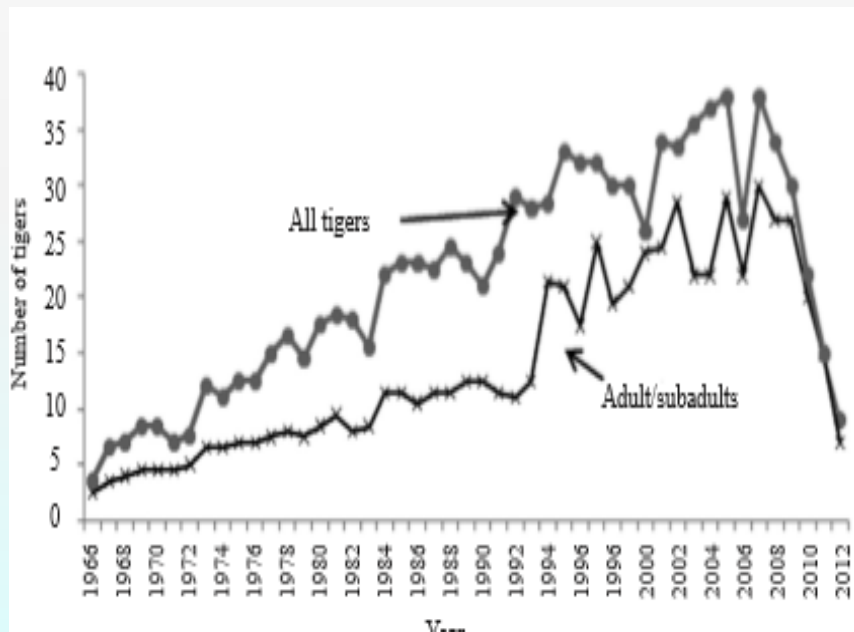
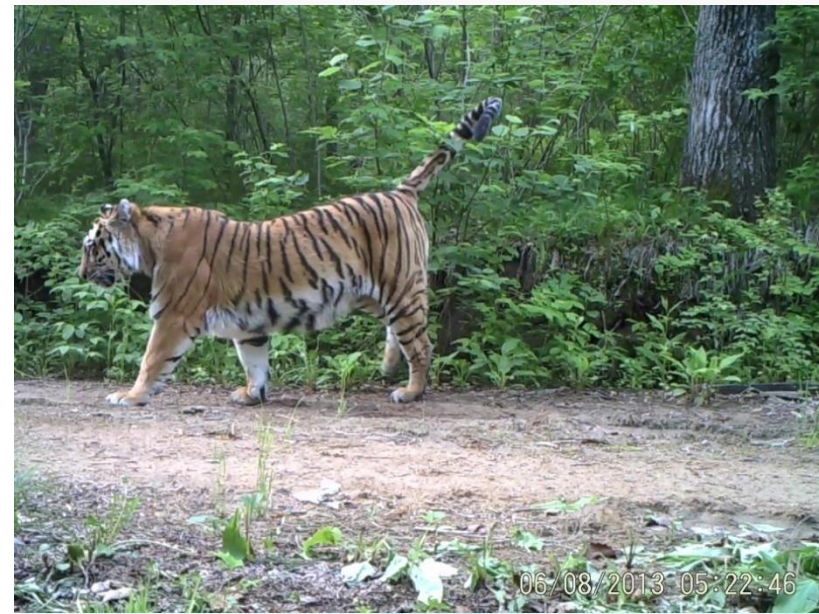
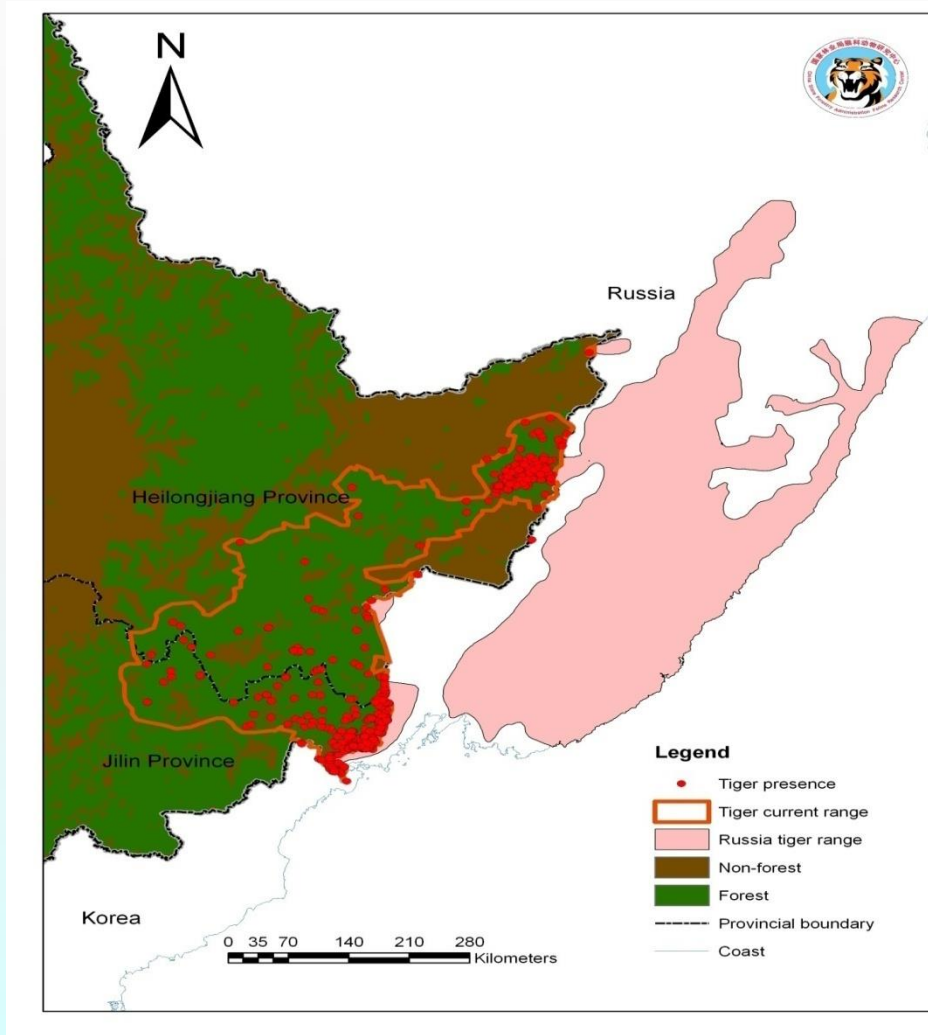


Figure 1 Location of Sikhote-Alin Biosphere Zapovednik in the Russian Far East.

Miquelle et al. (2015). *Integrative Zoology* 10, 315– 28.

5.2 Amur tiger conservation should endeavor to **link the population of Changbaishan and Wandashan**, then save the small population.



(Jiang et al. (2015) Unpublished data)

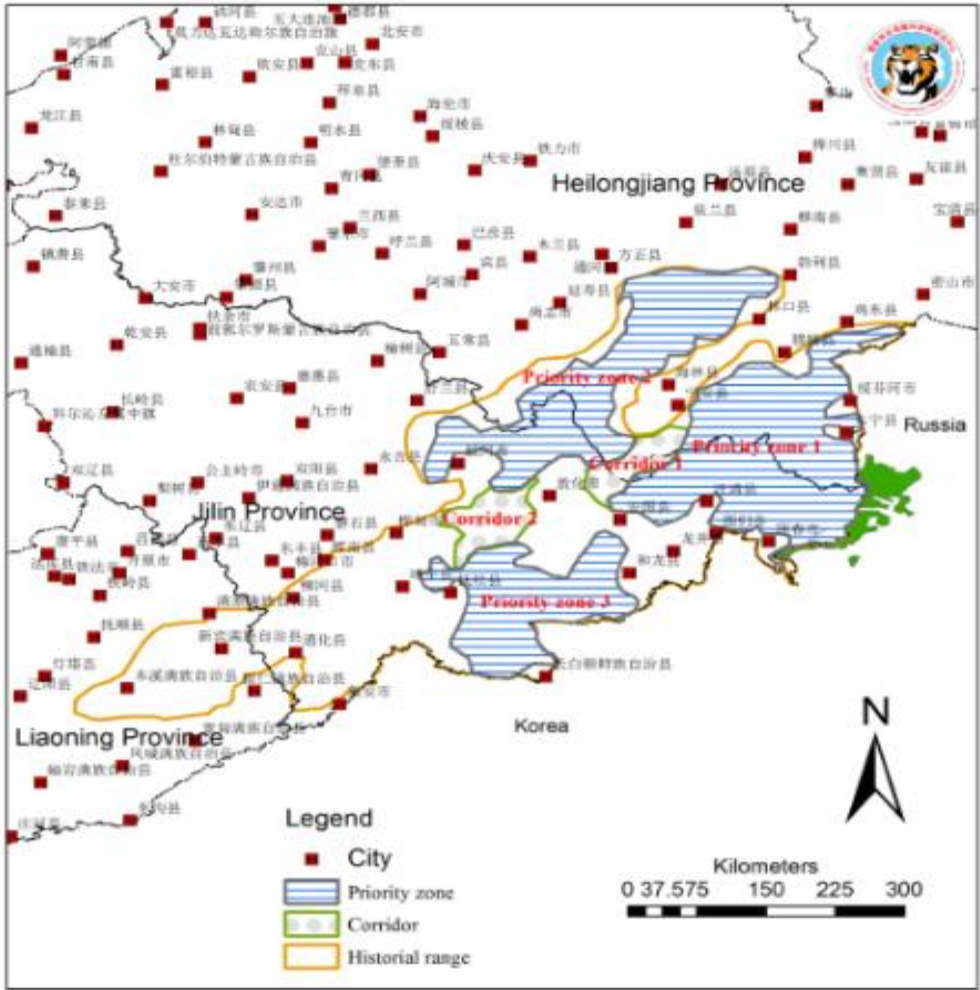
5.3 In Russia, **Amur tiger corridor** connecting Wandashan should be widened, and consider remove the military fences barriers among the Sino-Russia border areas for both countries.

5.4 Only depending the Russian Amur tiger growth is impossible for **doubling the number of tiger** in next tiger year (Miquelle et a. (2015).), which need promote the large potential habitat areas in China to be occupied by Amur tiger.

5.5 Urgent need to promote big Amur tiger population diffusion to save the small population for both countries by **multiple measures**, i.e., relocations etc.



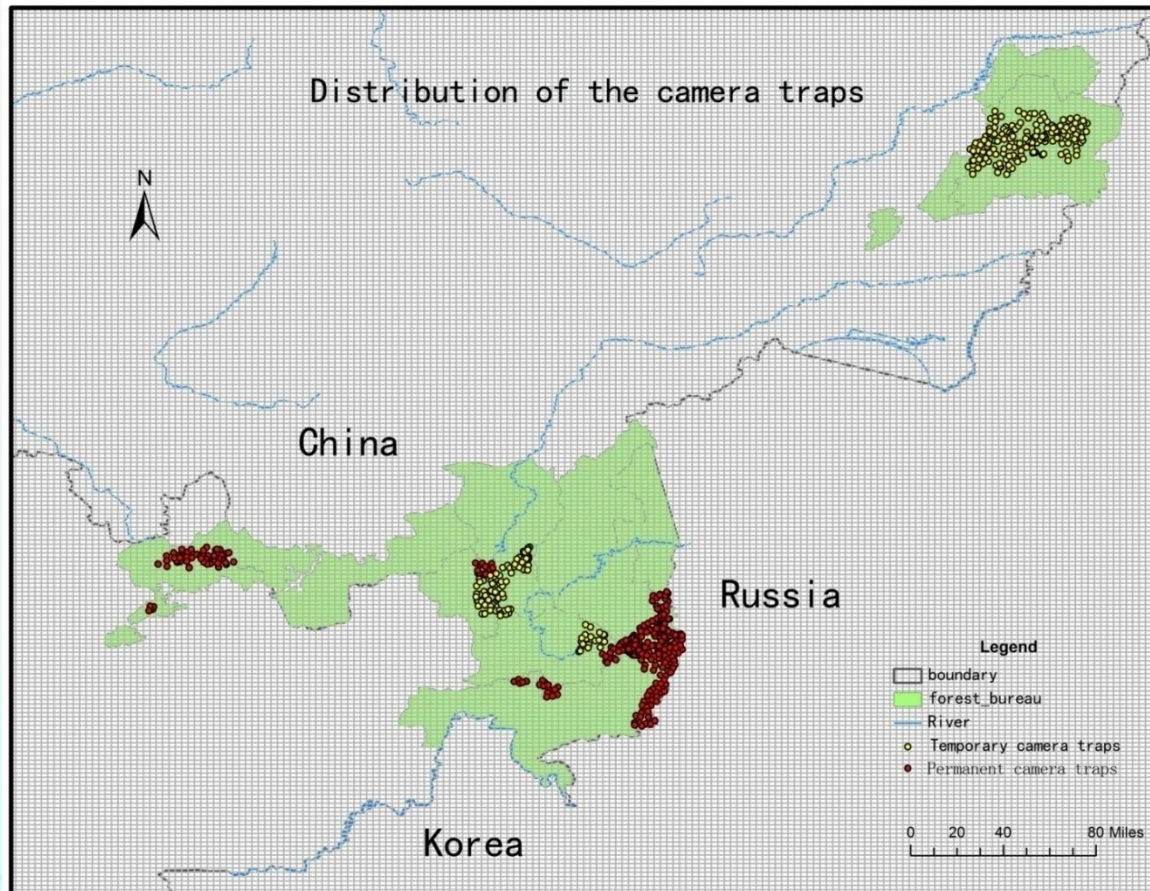
5.6 Amur leopard of Russia need Chinese Amur leopard support, and China should consider **the three corridors' construction** among Laoyeling, Zhangguangcailing and Changbaishan areas neighbor the North Korea.



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(Jiang et al. (2015) Unpublished data)

5.7 The 700 camera-traps cover little area of current big cats' ranges , and genetic samples need long time accumulation, but the basic dynamic data of population number and habitat area occupied by big cats are not enough clear.





*Thanks for the support of SFA, WCS, WWF
and local forest governments!*

Thank you for your attention!