Annex I.

Draft Report on the Results of Camera Trapping and Molecular Genetic Analysis[1]

Prepared by

Shevtsova Elena and Vitkalova Anna, the Land of the Leopard National Park, Russia

Guangshun Jiang, Jiayin Gu, Jinzhe Qi, Meng Wang, and Yao Ning, Feline Research Center of State Forestry Administration, China

Marina Igorevna Chaika, Valentin Yurievich Guskov, and Kostyria Alexey, Institute of Biology and Soil Science, Far Eastern Branch of Russian Academy of Science

Kostyria Alexey and Darman Yurii, WWF-Russia, Amur Branch

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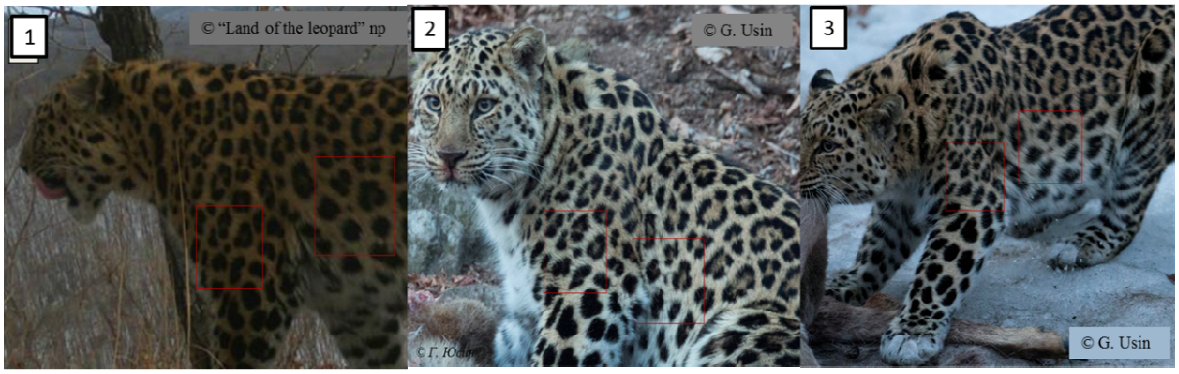
1. Camera trapping

"Land of the Leopard National Park" in the Russian Federation and Feline Research Centre of China exchanged the data from camera traps obtained from 2013 to 2015 and conducted a joint analysis in 2016.

1.1 Field work organization

Estimation of Amur leopard and tiger number by camera traps is possible due to the unique pattern of spots and stripes on the skin of these animals(figure 1) which as unique as human fingerprints. Thanks to this feature, individual identification of animals is possible base on images.

Figure 1: Unique Amur leopard pattern of spots



Since the pattern of the animal is asymmetrical on the left and right side (figure 2). Two camera traps facing each other are installed to capture an individual simultaneously from both sides.

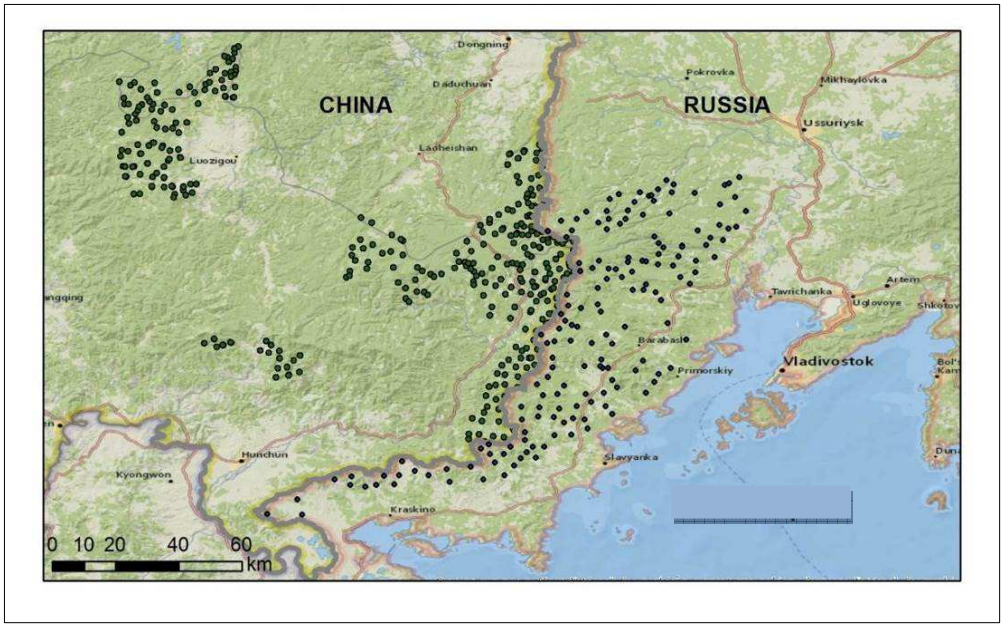
Figure 2: Asymmetrical spot pattern on left and right sides of the Amur leopard (one of the images has been reflected)

During 2013-2015, 314 camera traps were installed in 157 different points in the Russian side and 634 camera traps in 317 points in the Chinese side (figure 3).

The work involved 10 people in the Russian side and 21 people in the Chinese side.

Camera trapping project in the Russian side was implemented with the federal budget for the Land of Leopard National Park and financial support from "Far Eastern Leopards", an autonomous non-profit organization and the Russian Geographical Society.

Figure3: Camera traps locations in Russia and China



1.2. Data analysis

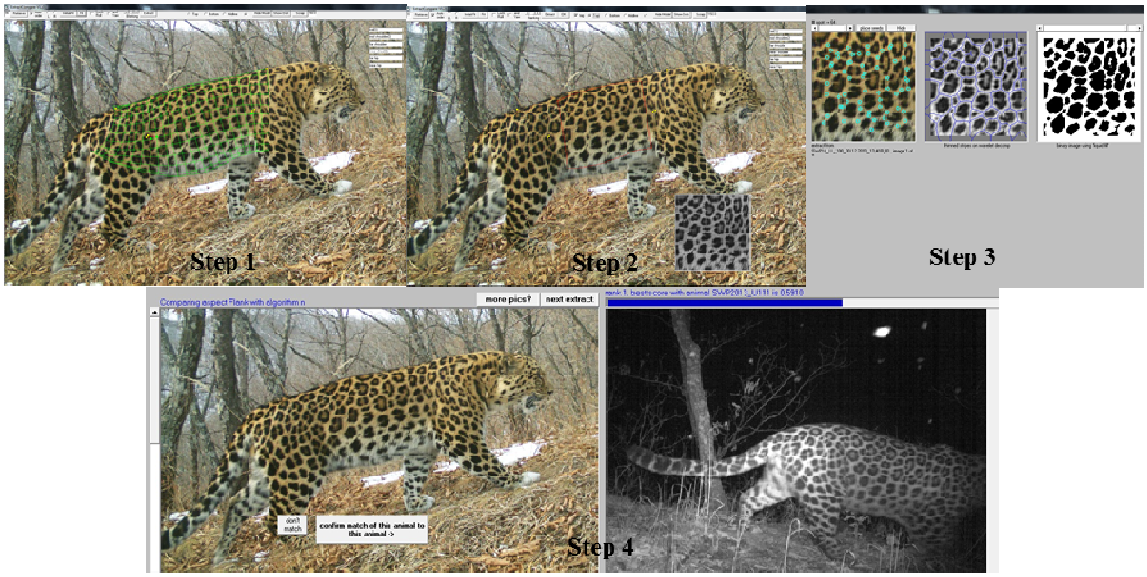
After signing of the agreement, two representatives from the Feline Research Centre (FRC) visited Vladivostok and jointly with "Land of the Leopard" National Park (LL) made an analysis of data from camera traps. Both sides had submitted at least one photo of left and right side of each Amur tiger and Amur leopard captured during the period from 2013 to 2015.

Leopard and tiger identification using camera traps images was done by two methods: manual and using the Extract-Compare software.

The Manual method is a visual comparison of spot (figure 1) or line patterns from different photos by a specialist without using any software.

The Extract-Compare software captures image of lines (or spots) on the animal's side and uses a standard algorithm to differentiate patterns on the skin in different individuals (figure 4).

Figure 4: Consistent individual identification of leopard specimens in *Extract-Compare* software



1.3. Results

1.3.1. Amur leopard

FRC provided images of 24 leopard individuals: 23 adults and 1 cub. 19 of them had images of both sides – left and right, 5 – only right or only left side.

LL provided images of 95 leopard individuals: 82 adults and 13 cubs. 81 of them had images of both sides and 14 – only right or only left side.

After precise analysis of the images using Extract-Compare software and visual comparison of spot patterns totally 105 leopard individuals were distinguished. Among them 91 adult leopards were identified and 14 cubs. Cubs were considered as individuals captured with mother and never seen again as adults. If the individual was captured as a cub but then seen alone as an adult it was considered as an adult in this dataset.

The joint data on leopard individuals is represented in Appendix 1 with the information about the matches between FRC and LL IDs.

Adult individuals were analyzed separately from cubs and the minimal number of captured adult individuals was calculated for different sex separately. Since some individuals were captured only from one side – only left or right side image is available for a leopard – the minimal number of individuals was calculated as number of individuals captured from both sides (LR) plus number of L- or R- individuals depending on what of these two numbers is bigger (see table 1).

Using the above calculation method we revealed that at least 89 adult leopard individuals were registered both in Russia and in China during 2013-2015 period – 41 female, 37 male and 11 leopards of unknown sex. 15 leopards (17% from the total number) were registered in both countries. Both females (8 individuals) and males (7 individuals) crossed the border. In the same time in each country, there are animals which never crossed the border. There are 66 such leopards in Russia and 8 leopards in China.

Table 1: Minimal number of adult Amur leopard individuals captured in 2013-2015 by camera traps in Russia and China

	Total (adult only)	Female	Male	Unknow sex
Totally in China and Russia	89	41	37	11
in China	23	9	10	4
in Russia	81	40	34	7
Individuals detected in Russia and China	15	8	7	0
in China only	8	1	3	4
in Russia only	66	32	27	7

During this three-year investigation, 10 breeding females were captured on both territories (see table 2).

In China, one female with two cubs was captured in the end of 2013 and in beginning of 2014. One of these 2 cubs (leo 9 = leo 28) still lives in China and has never been captured in Russia.

Totally 19 cubs of 9 females have been captured in Russia in the 2013-2015 period. 7 cubs were captured in 2015 and only future data will show how many of them will become new members of Amur leopard population. The existing data confirms that at least 6 cubs from 12 cubs born in Russia in 2013-2014 are still alive and 2 of them moved to China.

Table 2: Reproductive indexes of Amur leopard captured by camera traps

Number of cubs	2013	2014	2015	Females with cubs
in Russia	6	9	7	Leo 1F, Leo 5F, Leo 7F, Leo 16F,Leo 23F, Leo 39F, Leo 55F, Leo 66F, Leo 89F
in China	2	2	0	Leo 4

For each of the individuals photographed in both sides of international border several parameters of cross-boundary movements were calculated – number of encounters in each country, number of state boundary crossings, maximum distance moved from the border (see table 3).

Table 3: Cross-boundary movements of leopard individuals captured by camera traps during 2013-2015

LL-ID	FRC-ID	Number of encounters			% of encounters		Times Cross border	Max distance moved from the state border		Notes
		In China	In Russia	Total	In China	In Russia		In China	In Russia	
Leo 22M	Leo 25	2	71	73	2.7	97.3	4	0.64	8.7	
Leo 52M	Leo 1	44	19	63	69.8	30.2	10	37.6	4.9	
Leo 25M	Leo 24	1	41	42	2.4	97.6	2	1.9	7.9	
Leo 29M	Leo 3	10	31	41	24.4	75.6	9	36.3	5.7	
Leo 7F	Leo 26	1	30	31	3.2	96.8	2	7.1	15.5	
Leo 24M	Leo 21	1	27	28	3.6	96.4	2	0.6	7.1	
Leo 91M	Leo 12	10	5	15	66.7	33.3	5	9.3	5.4	
Leo 26F	Leo 17	2	13	15	13.3	86.7	1	0.46	3.5	
Leo 9F	Leo 10	6	5	11	54.5	45.5	1	23.7	4.9	Captured as a cub in Russia
Leo 63F	Leo 11	3	7	10	30	70	1	0.46	6.2	
Leo 89F	Leo 14	3	6	9	33.3	66.7	1	21.7	2.8	
Leo 54F	Leo 22	1	7	8	12.5	87.5	2	2.2	6.2	
Leo 49F	Leo 7	2	5	7	28.6	71.4	1	6.8	27.7	
Leo 13F	Leo 27	1	5	6	16.7	83.3	2	0.9	14.2	
Leo 81M	Leo 29	1	1	2	50	50	1	29.7	7	Captured as a cub in Russia

The analysis of cross-boundary movements shows that some leopards actively cross the border. They should be resident individuals having their home ranges both in Russia and in China. For example male leopard Leo 29 (=leo 3) crossed the border 9 times during 2013-2014, but totally it was captured there times more in Russia than in China, probably indicating that the biggest part of the home range is situated in Russia. Another male leopard Leo 52M (=leo 1) also actively moved between two countries. It crossed the border 10 times, but appeared in Russia only in 2014 while it was regularly captured in China starting from 2012. This can indicate that this leopard is resident in China and it visited Russia only one year, but 10 times during this year. Maybe it was searching for a female or trying to enlarge his home range. However, it was not captured in 2015 in Russia.

Other leopards crossed the border only once. For example two females - Leo 63F (=leo 11) and Leo 89F(=leo14). These females have been detected in China during 2 years (2012-2013). But since 2014 they have been seen only in Russia.

Two leopards moved across the border were cubs born in Russia. One of them is a young male (leo 29 = Leo 81M) who was captured only twice – first time in Russia in August 2014 and then in China in April 2015 almost 30 km from the border. Another case is a female Leo 9F=leo 10 who was born and captured as a cub with mother in 2013 on Russian territory. Then this leopard was captured alone in the beginning of 2014 by the same camera traps in Russia but in 2015 it crossed the border and moved to China 24 km from the border and was captured 6 times on Chinese side from May till December 2014. Leo 9F was not captured in Russia more. This can indicate the dispersion of young individuals from Russia to China. Future investigations will probably show if these individuals will become resident in China or not.

1.3.2. Amur tiger

FRC provided images of 26 tiger individuals: 22 adults and 4 cubs. 19 of adults had images of both sides – left and right, 3 – only left side, 1 – only right or left side.

LL provided images of 49 tiger individuals: 42 adults and 7 cubs. 37 of adults had images of both sides and 5 - only left side–, 3 only right or left side.

After precise analysis of the images using Extract-Compare software and visual comparison of spot patterns, totally 55 tiger individuals were distinguished. Among them 45 adult tigers were identified and 10 cubs. Cubs were considered as individuals captured with mother and never seen again as adults. If the individual was captured as a cub but then seen alone as an adult it was considered as an adult.

The joint data on tiger individuals is represented in Appendix 2 with the information about the matches between FRC and LL IDs.

Adult individuals were analyzed separately from cubs and a minimal number of captured adult individuals were calculated for different sex separately. Since some individuals were captured only from one side – only left or right side image is available for a tiger – the minimal number of individuals was calculated as number of individuals captured from both sides (LR) plus number of L- or R- individuals depending on which one is bigger (see table 4).

Using the above calculation method we revealed that at least 45 adult tiger individuals were registered both in Russia and in China during 2013-2015 period – 20 female, 15 male and 10 tigers of unknown sex. 19 tigers (42% from total number) were registered in both countries. Both females (8 individuals) and males (8 individuals) cross the border. At the same time in each country, there are animals which never crossed the border. There are 24 such tigers in Russia and 3 tigers in China.

This number does not represent the current number of individuals in the population since some of the tigers have been captured in 2013 or 2014 last time and were not seen on 2015. Calculation of individuals that were captured in 2015 results in 32 adult tigers (13 females, 10 males, 9 unknown sex) and 1 cub. 12 tigers (38 %) have been photographed in Russia and China.

Table 4: Minimal number of adult tiger individuals captured by camera traps during 2013-2015

	Total(adult only)	Female	Male	Unknown sex
Totally in China and Russia	45	20	15	10
in China	22	9	8	5
in Russia	42	18	15	9
Individuals detected in Russia and China	19	8	8	3
in China only	3	1	0	2
in Russia only	24	10	7	7

During three-year investigation, 6 breeding females were captured on both territories (see table 5).

Totally 16 cubs of 6 females have been captured in Russia in the 2013-2015 period. 1 cub was captured in 2015 and only future data will show if it will become a new member of far eastern tiger population. The existing data confirms that at least 6 cubs from 12 cubs born in

Russia in 2014 used to move to China, and 3 cubs were born in China and just caught in China.

Table 5: Reproductive Indexes of Amur Tiger Captured by Camer Traps

Number of cubs	2013	2014	2015	Females with cubs
in Russia	0	12	1	T1,T10(CT5), T7, T21
in China	0	5	0	CT3,CT18,CT5(T10)

For each of the individuals photographed in both sides of international border several parameters of cross-boundary movements were calculated – number of encounters in each country, number of state boundary crossings, maximum distance moved from the border (see table 6).

Table 6: Cross-boundary movements of tiger individuals captured by camera traps

LL-ID	FRC-ID	Number of encounters			% of encounters		Times cross border	Max distance moved from the state border	
		in China	in Russia	total	in China	in Russia		in China	in Russia
T_7F	CT1	21	14	35	60	40	10	5	7.9
T_3M	CT2	8	12	20	40	60	4	1.9	17
T_12F	CT3	5	5	10	50	50	2	1.6	2.5
T_11M	CT4	4	13	17	23.5	76.5	3	2.7	5.7
T_10F	CT5	3	2	5	60	40	1	36.3	4.4
T_4M	CT7	8	3	11	72.7	27.3	5	14.7	3.8
T_8F	CT8	2	13	15	13.3	86.7	2	1.9	4.4
T_26M	CT10	9	2	11	81.8	18.2	1	259.3	18.9
T_29M	CT11	2	1	3	66.7	33.3	1	0.9	2.3
T_31F	CT12	8	1	9	88.9	11.1	1	1.6	2.3
T_33M	CT13	8	11	19	42.1	57.9	1	1.6	16.2
T_32Un	CT15	1	1	2	50	50	1	0.7	4.4
T_30F	CT16	18	6	24	75	25	3	2.9	3.9
T_9F	CT17	2	7	9	22.2	77.8	1	4.8	4.4
T_13F	CT18	1	8	9	11.1	88.9	2	0.3	4.1

The analysis of cross-boundary movements shows that some tigers actively cross the border. They should be resident individuals having their home ranges both in Russia and in China. For example, CT1, CT2, CT7, CT16 had crossed the border at least 3 times during 2013 to 2014. Otherwise, there is a very clear trend of the dispersion of young individuals (even a breeding individual) from Russia to China, and in China tigers can move much further from the border than Russia. CT5 was caught with 4 cubs in Russia in the beginning of 2014, then she was caught in China with 2 cubs (CT21, CT24) in the end of 2014., and CT24 was caught later alone in China (39.7km from the border). After it, CT5 was caught alone 2 times in China in 2015(36.3km from the border).T1(only in Russia) was caught with 4 cubs in Russia, but one of the cubs(CT26) was caught in China as an adult looking(30.6km near the border). CT10 was caught in March of 2014 in Russia first time, then it moved to the place of China 259.3km from the border and never back to Russia till 2015.Other tigers crossed the border only once, but among 11 individuals, 9 of them moved from Russia to China, and 2 tigers moved from China to Russia.

2. Molecular genetic analysis

2.1. Research background

Researchers of Feline Research Center and "Land of the Leopard" National Park (LL) of the Russian Federation collected non-invasive samples (scat) from the field to identify individuals and their biological features including family tree and genetic conditions as well as their transborder movement. FRC collected samples during 2013-2015, LL during winter season 2015. The two institutes collected 207 and 193 suspected tiger and leopard feces samples. DNA extraction for laboratory test of sample collected in the Russian Federation was held by Institute of Biology and Soil Science (IBSS) of the Russian Academy of Science. Feline Research Center (FRC) of Chinese State Forestry Administration and Institute of Biology and Soil Science of Russian academy of science separately collected 207 and 135 suspected tiger and leopard feces samples during the year from 2013 to 2015. Marina Igorevna Chaika and Valentin Yurievich Guskov from Russia side were assigned to FRC of China to test the samples with Chinese experts, Meng Wang and Yao Ning.

2.2. Research Method

2.2.1. Sample collection

According to the principle of non-invasive sample collection, in winter, we found the feces along with the track where tigers and leopards haunt. And for guaranteeing the quality of DNA, the surface of samples should be avoided to be damaged when collection. There is one marked card in each sample bag, noted the geographic coordinate of collecting place, when the sample was collected and encode the sample. Put the packaged samples into the ice box filled with ice bag then store it in the fridge under -20℃. Extract samples from the ice box immediately after being transported to the local laboratory and then put them into refrigerator under -20℃ until extracting DNA.

2.2.2. DNA Extraction

DNA was extracted by QIAamp DNA Stool Mini Kit（Qiagen, Hilden, Germany）. Carry on step by step according to the step of the operation instructions. For the samples with low quality, we will decrease TE buffer solution moderately in the last step.

The first step is to identify the species.

Specific primer for leopard:
Ppo-CbF (5'-GTAAATTATGGCTGAATTATCCGG-3')
Ppo-CbR (5'-CATAACCGTGAACAATAATACGAC-3')

Specific primer for tiger:
Pta-CbF (5′-TTTGGCTCCTTACTAGGGGTG-3′)

Pta-CbR (5′-CCGTAAACAATAGCACAATCCCGATA-3′)

Amplify DNA with spices specific primer with 3 replications. Then confirm the PCR produced by agarose gel electrophoresis and sequence analysis the fragments with the product.

In the winter of 2015, Marina, Yao Ning and Professor Jiang went to Shu-Lin Luo'lab in Peking University to discuss doing and anlysing of the microsatellite. 11 microsatellites locus were used to amplify the tiger and leopard DNA samples [1]. At first, samples were amplified with 3 replications. The sample is heterozygous when the same peak repeats at least twice, and the sample is homozygous when the same peak repeats at least for 3 times. Unknown samples were repeated at most for 10 times but there was still no significant result. Then identify the individuals by the software of biology like GENEMAPPER Allelogram and so on.

Then amplify the X and Y Chromosome fragments on samples with certificated genotype by the sex-specific primer of P1-5EZ (5' -ATA ATC ACA TGG AGA GCC ACA AGC T-3'), P2-3EZ (5' -GCA CTT CTT TGG TAT CTG AGA AAG T-3') and Y53-3E (5' -CGC ATT CAT TGT GTG GTC TCG TG-3'), Y53-3F (5' -CGA CGA GGT CGA TAT TTA TAG C-3'). The sample is from female if there is only one DNA band, and the sample is from male if there are two DNA bands. Firstly we amplified these samples with 3 replications. If it appears two bands at least twice, we assume it is male sample, if it appears one band for three times then we assume it is female sample.

2.3. Result

2.3.1. Result of tiger and leopard in China

FRC collected 104 suspected Amur leopard feces and 103 suspected Amur tiger feces during 2013 to 2015. According to the result of amplified the genetic samples collected from the field with specific primer, there are 78 samples come from Leopard (*Panthera pardus orientalis)* and 93 from Tiger (*Panthera tigris*) (see table 1).

After amplifying 171 samples with 11 microsatellite locus, 4 of 11 microsatellite locus were exempted in leopard samples amplification because they were not polymorphic or there was a low rate of amplification. 18 leopard samples were amplified successfully in all of 7 remaining locus. After classification and comparison the genotypes of these samples, 9 individuals were identified in 18 samples. 7 of 9 individuals were detected for once, 1 of 9 individuals was detected for 3 times and 1 were detected for 8 times. 1 of 11 microsatellite locus was exempted in tiger samples amplification because they were not polymorphic or there was a low rate of amplification. 24 tiger samples amplified successfully in all of 10

remaining locus. After classification and comparison the genotypes of these samples, 19 individuals were identified in 24 samples. 16 of 19 individuals were detected for once and 3 of 19 individuals were detected for 2 to 3 times.

After identifying the gender of these samples by sex-specific primer, it reveals that 1 was from the female, 7 were from the male and one were from the unknown in leopard samples and 1 was from the female, 15 was from the male and 3 was from the unknown in tiger samples.

Table 1: Minimal number of leopard individuals captured during 2013-2015 by DNA test in China

species	Collected sample	Positive samples	Selected genotypes	Identified individuals
leopard	104	78	18	9
tiger	103	93	24	19

2.3.2. Result of tiger and leopard in Russia

Land of the Leopard collected 139 suspected Amur leopard and Amur tiger feces (29 for unknown) during 2013 to 2015. According to the result of amplified the genetic samples collected from the field with specific primer, there were 56 samples come from Leopard *(Panthera pardus orientalis)* and 65 from Tiger *(Panthera tigris)* (see table 2).

Amplifying 121 samples with 11 microsatellite locus: 24 samples of leopard samples amplified successfully in all of 7 remaining locus. After classification and comparison the genotypes of these samples, 16 individuals were identified in 24 samples. 11 of 16 individuals were detected for once and 5 of 16 individuals detected for 2 to 3 times. 24 samples of tiger samples were amplified successfully in all of 10 remaining locus. Then 12 individuals were identified in 24 samples. 7 of 12 individuals detected for once and 5 of 12 individuals detected for 2 to 4 times.

About identifying gender of these samples by sex-specific primer, it reveals that one for female, 15 for male in leopard samples and one for female, 11 for male in tiger samples.

Table 2: Minimal number of leopard individuals captured in 2015 by DNA test in Russia

Species	Collecte sample	Positive samples	Selected genotypes	Identified individuals
leopard	57	56	24	16
Tiger	49	65	24	12

2.3.3. Results of identity of the same individual

9 leopard individuals were identified from 18 Chinese samples and 16 leopards individuals were identified from 24 Russian samples, but only 2 individuals were detected both in China and Russia. 17 tiger individuals were identified from 24 Chinese samples and 12 tiger individuals identified from 24 Russian samples but no individual was detected both in China and Russia.

Table 1: Amur leopards identified by DNA test in China

Sample ID	Individual ID (*means for the same individual)	Time for collection	Located for collection	Person for collection
30	1	2013.5.8	Lanjia Wangqing	Jiang Guangshun Li Zhilin Zhang Hongjun
36	2*	2013.8.21	Lanjia Wangqing	Li Qi Cao Zhixin
63	2*	2013.9.26	Lanjia Wangqing	Cao Zhixin
65	3	2013.10.26	Lanjia Wangqing	Cao Zhixin
66	4	2013.10.26	Lanjia Wangqing	Cao Zhixin
74	2*	2013.11.9	Lanjia Wangqing	Cao Zhixin
88	5	2014.3.30	Lanjia Wangqing	Cao Zhixin
89	6	2014.3.31	Lanjia Wangqing	Cao Zhixin
94	4	2014.3.31	Lanjia Wangqing	Cao Zhixin
98	2*	2014.4.20	Lanjia Wangqing	Cao Zhixin
99	2*	2014.4.18	Lanjia Wangqing	Cao Zhixin Li Qi
101	2*	2014.4.19	Lanjia Wangqing	Cao Zhixin Mu Yanjun
107	2*	2012.12.13	Lanjia Wangqing	
108	4	2012.12.13	Lanjia Wangqing	

124	2*	2014.3.3	Lanjia Wangqing	Cao Zhixin
214	7*	2015.11.04	Hun Chun	Cao Zhixin
215	8	2015.11.04	52 Linban	Cao Zhixin
218	9	2015.11.04	HunChun	Cao Zhixin

Table 2: Amur tigers identified by DNA test in China

Sample ID	Individual ID	Time for collection	Located for collection	People for collection
2	1	2012.1.14	Madida Hunchun	Zhu Jiang Sheng Ledong Li Min
4	2	2012.4.14	Huangsongdianzi Hunchun	Lang Jianmin Gao Wenbin Xue Yangang
7	3	2012.12.18	Sanguan Hunchun	Lang Jianmin Gu Jiayin Xue Yangang
8	3	2012.12.18	Sanguan Hunchun	Lang Jianmin Gu Jiayin Xue Yangang
10	4	2013.1	Wulindong Dongfanghong	Gao Kejiang
11	3	2013.1.22	Naozhigou Hunchun	
13	5	2013.1.30	Xibeigou Hunchun	Lang Jianmin Gu Jiayin Li Zhilin
31	6	2013.5.24	Linghoushan Songlinmiao	Lang Jianmin Xue Yangang
46	7	2014.1.8	Sidaogou	Li Dongwei
152	8	2015.1.26	Madida Hunchun	
155	9	2015.1.29	Madida Hunchun	
172	10	2013.10.19	Xibeigou	
173	10	2013.12.6	Quliugou Madida	

174	11	2012.4.8	Quliugou Madida	
183	12	2011.12.18	Northwest of Madida	
228	13	2016.2.26	Heshangouli	Yang Eryan
226	14	2016.3.1	Heshangouli	Yang Eryan
159	15	2015.2.8	Huangnihe	
204	16	2015.12.24	Heping Muling	Gu Jiayin
205	17	2015.12.18	Huapi Frost farm Tianqiaoling Administration of Forestry	
209	18	2015.12.22	Dahuanggou	Wu Guoqing
231	19	2016.3.2	Shichang	
232	19	2015.11.11	Malugou	
233	19	2016.1.17	Yongpinggou	

Table 3: Amur leopards and Amur tigers identified by DNA test in Russia

Tube	Sample ID (bold type represented for samples with identified genotypes)	Individual ID (*represented for common samples between China and Russia)	Species	DNA concentration	Date of extraction	Tube Vol. (ml)
1	862	6	PPO	17.18	02.07.2015	1.5
2	863	2	PPO	22.9	17.06.2015	1.5
3	864	7	PPO	20.43	01.07.2015	1.5
4	865		PPO	23.08	15.06.2015	1.5
5	866	2	PPO	25.8	25.06.2015	1.5
6	867	2	PPO	21.21	25.06.2015	1.5
7	873	8	PPO	22.78	25.06.2015	1.5
8	880	3	PPO	37.02	30.06.2015	1.5
9	881		PPO	46.92	30.06.2015	1.5
10	884	4	PPO	136.68	22.06.2015	1.5
11	885		PTA	29.8	22.06.2015	1.5
12	887	9	PPO	25.27	11.06.2015	1.5

13	893	4	PPO	75.81	15.06.2015	1.5
14	894		PPO	34.55	26.06.2015	1.5
15	896	10	PPO	52.44	30.06.2015	1.5
16	907		PPO	15.57	02.07.2015	1.5
17	908	3	PPO	28.49	09.06.2015	1.5
18	909		PPO	41.4	30.06.2015	1.5
19	911	5	PPO	22.57	30.06.2015	1.5
20	914		PPO	23.56	19.06.2015	1.5
21	917		PPO	103.04	15.06.2015	1.5
22	919	4	PPO	37.43	25.06.2015	1.5
23	921		PPO	21.82	18.06.2015	1.5
24	922		PPO	42.85	16.06.2015	1.5
25	923	11	PPO	39.85	01.07.2015	1.5
26	928	5	PPO	28.98	17.06.2015	1.5
27	930		PPO	41.23	01.07.2015	1.5
28	940		PPO	15.81	18.06.2015	1.5
29	942		NEITHER	61.1	02.07.2015	1.5
30	964		NEITHER	138.33	22.06.2015	1.5
31	983	12	PPO	45.02	11.06.2015	1.5
32	986		PPO	22.97	24.06.2015	1.5
33	987		NEITHER	93.13	17.06.2015	1.5
34	989	13	PPO	40.48	11.06.2015	1.5
35	990	14	PPO	69.42	02.07.2015	1.5
36	995		PPO	45.1	15.06.2015	1.5
37	996		PPO	20.72	30.06.2015	1.5
38	997		PPO	23.07	16.06.2015	1.5
39	998		PPO	36.65	26.06.2015	1.5
40	999		NEITHER	53.48	02.07.2015	1.5
41	1002		NEITHER	159.05	16.06.2015	1.5
42	1004		PPO	25.55	01.07.2015	1.5
43	1005		PPO	87.08	08.06.2015	1.5
44	1009		PPO	35.89	15.06.2015	1.5
45	1010	1*	PPO	59.05	25.06.2015	1.5
46	1012		PPO	25.49	25.06.2015	1.5
47	1013		NEITHER	67.37	26.06.2015	1.5
48	1014		NEITHER	69.45	23.06.2015	1.5
49	1015		PPO	16.78	02.07.2015	1.5
50	1016		PPO	58.37	09.06.2015	1.5
51	1022		PPO	51.5	09.06.2015	1.5
52	1026		NEITHER	169.29	30.06.2015	1.5
53	1027	1*	PPO	67.33	19.06.2015	1.5
54	1028	15*	PPO	43.31	01.07.2015	1.5
55	1032		PPO	60.17	15.06.2015	1.5
56	1040		PPO	30.25	02.07.2015	1.5
57	1050		PPO	54.02	02.07.2015	1.5

58	861		NEITHER	159.11	15.06.2015	1.5
59	870		PTA	49.12	02.07.2015	1.5
60	871		PTA	54.25	30.06.2015	1.5
61	875		PTA	64.73	30.06.2015	1.5
62	876		PTA	20.73	17.06.2015	1.5
63	877		PTA	17.39	30.06.2015	1.5
64	888		PTA	31.41	18.06.2015	1.5
65	890		NEITHER	133.21	30.06.2015	1.5
66	892		PTA	23.69	24.06.2015	1.5
67	900		PTA	224.2	15.06.2015	1.5
68	903		PTA	23.22	26.06.2015	1.5
69	904	3	PTA	38.14	01.07.2015	1.5
70	918	2	PTA	47.5	25.06.2015	1.5
71	920	2	PTA	123.62	30.06.2015	1.5
72	924		PTA	36.8	15.06.2015	1.5
73	931		PTA	38.06	26.06.2015	1.5
74	933		PTA	356.24	15.06.2015	1.5
75	936	4	PTA	23.54	22.06.2015	1.5
76	945		NEITHER	127.65	25.06.2015	1.5
77	952	8	PTA	29.19	23.06.2015	1.5
78	953	7	PTA	15.55	15.06.2015	1.5
79	954		PPO	139.95	24.06.2015	1.5
80	955	3	PTA	313.63	15.06.2015	1.5
81	956	9	PTA	80.65	09.06.2015	1.5
82	959		PTA	20.96	02.07.2015	1.5
83	961		PTA	38.17	22.06.2015	1.5
84	962		PTA	58.94	23.06.2015	1.5
85	966		PTA	17.93	22.06.2015	1.5
86	969	5	PTA	34.13	25.06.2015	1.5
87	972	7	PTA	25.38	24.06.2015	1.5
88	973	5	PTA	15.58	30.06.2015	1.5
89	974	10	PTA	45.85	24.06.2015	1.5
90	975		PTA	18.88	25.06.2015	1.5
91	976		PTA	104.68	15.06.2015	1.5
92	980		PTA	15.43	19.06.2015	1.5
93	982	11	PTA	19.48	24.06.2015	1.5
94	984		PTA	32.81	01.07.2015	1.5
95	985		NEITHER	222.45	26.06.2015	1.5
96	993		NEITHER	190.38	24.06.2015	1.5
97	1000		PTA	26.99	18.06.2015	1.5
98	1019	2	PTA	35.82	22.06.2015	1.5
99	1021		PTA	21.1	09.06.2015	1.5
100	1023		PTA	32.36	25.06.2015	1.5
101	1025	2	PTA	15.51	15.06.2015	1.5
102	1029		PTA	32.96	25.06.2015	1.5

103	1034		PTA	62.04	17.06.2015	1.5
104	1037		PTA	36.96	01.07.2015	1.5
105	1048		PTA	16.78	22.06.2015	1.5
106	1051		NEITHER	72.6	30.06.2015	1.5
107	899		PPO	38.85	30.06.2015	1.5
108	901		PTA	18.93	19.06.2015	1.5
109	906		PTA	24.43	09.06.2015	1.5
110	910		PTA	32.39	24.06.2015	1.5
111	912		PPO	40.81	24.06.2015	1.5
112	913		PPO	202.91	09.06.2015	1.5
113	932	3	PTA	27.4	19.06.2015	1.5
114	934		PTA	59.58	26.06.2015	1.5
115	935	4	PTA	19.85	17.06.2015	1.5
116	937		PTA	75.47	18.06.2015	1.5
117	938		PTA	26.04	30.06.2015	1.5
118	939		PTA	24.7	02.07.2015	1.5
119	943	3	PPO	21.81	19.06.2015	1.5
120	944	6	PTA	38.84	18.06.2015	1.5
121	946		PTA	26.72	02.07.2015	1.5
122	947	4	PTA	22.85	25.06.2015	1.5
123	948	1	PTA	15.26	16.06.2015	1.5
124	957		PTA	29.58	02.07.2015	1.5
125	958		PTA	89.11	22.06.2015	1.5
126	967	4	PTA	28.01	23.06.2015	1.5
127	1001	1	PTA	48.89	15.06.2015	1.5
128	1008	6	PTA	16.75	11.06.2015	1.5
129	1024	12	PTA	50.7	26.06.2015	1.5
130	1043		PPO	37.86	18.06.2015	1.5
131	1045		PTA	15.23	02.07.2015	1.5
132	1046		PPO	50.25	02.07.2015	1.5
133	1047		PPO	28.3	17.06.2015	1.5
134	1052		PTA	23.17	16.06.2015	1.5
135	1053	16	PPO	27.66	22.06.2015	1.5

3. Discussion

The main reasons for the difference between camera trap data and genetic data are: 1. the area and distance to the border where the samples took are unknown because Russian side didn't provide the geographic coordinates to us. 2. Because of the quality of samples, DNA quality did not good enough for amplification. Only 28.8% and 42.9% of the leopard samples of Chinese and Russian amplified successfully, and 25.8% and 36.9% of the tiger. 3. To ensure the accuracy of the result, strict principles were used for data analysis. For example, we wiped off samples because they were not polymorphic or there was a low rate

of amplification, only the samples which were amplified the entire locus successfully would be used for analysis, and only the samples which all of the locus be the same would be identified as the same individual.

There are 12 tigers and 16 leopards identified from Russian samples, one leopard of them identified as the same individual with Chinese samples, while the camera trap 19 Amur tigers and 15 Amur leopards. At the same time, it is uncertain that if the sample area is adequate, if it is close enough to the border. So we can't reach the goal to analysis the spatial distribution across the border of China and Russia by DNA data.

Conservation of the Amur tiger and Amur Leopard populations can only be assured by implementing a set of activities that are aimed at conserving the animal itself, protecting its habitat and protecting the animals that make up its food source. These activities must take into account the special biological features of the subspecies' boreal existence as well as the lessons learnt from past years.

There are two main tasks necessary for conserving these populations. These are removing the causes of the decline in population number and minimizing the negative impacts that lead to the contraction and degradation of those habitats that are suitable for these carnivores. It is in these two areas where priority activities must be focused.

3.1 Developing international collaboration

Although the Russian Federation presently carries the main responsibility for the conservation of the Amur tiger and Amur leopard in the wild, the future of these two sub-species also depends on the status and condition of populations and its habitat in neighbouring countries, specifically China and North Korea. Small populations of these cats in border areas of China are apparently supplemented by individuals who cross over from Russia. Appearances of tigers and leopards in the northern parts of North Korea have also been recorded. Without uniting the efforts of neighbouring countries, it is not possible to assess the level of habitat degradation and the potential for restoring the Amur tiger's and leopard's natural range. It is also not possible to determine a size for the entire populations that can be sustained in the wild. Uniting global efforts will help foster the exchange of information and ideas and increase the possibility of being able to conserve not only the subspecies but also the entire tiger species.

The necessity of enhancing international collaboration in conserving and studying the Amur tiger and leopard is governed by a number of factors, first and foremost of which is the trans-boundary nature of human-related impacts.

Inter-state cooperation, both within the region and beyond, is worthwhile developing in the following directions:

- Participation in the Global Tiger Initiative which was announced by the World Bank provides a platform for international collaboration. Coordinated planning of activities in tiger conservation is a task that requires concentrating the efforts of all tiger range countries. The main objectives of the Global Tiger Initiative are:
  - to increase the effectiveness of conservation activities through the exchange of experience and information
  - to improve the enforcement of conservation law through exchanging experience and international cooperation in combating the illegal cross-border trade in products derived from rare and endangered animals species
  - to decrease the demand for tiger products by *inter alia* conducting public awareness campaigns amongst consumers in those countries where tiger products are being used in traditional medicine and where there is also a demand for tiger skins
  - to raise the effectiveness of tiger habitat protection
  - to develop incentives for supporting tiger conservation at the local level
  - to develop and improve innovative mechanisms for funding tiger conservation activities, eg. developing mechanisms for joint funding of conservation projects by using carbon credits to compensate for carbon retention, or by paying for environmental services.
- Establishment of international transboundary protected areas for the conservation of the Amur tiger and the Amur leopard.
- Coordination of activities to stop the illegal export and trade of products that are derived from the illicit hunting of tigers and other rare animals. Of special importance is the collaboration with China. On a local level, it is worthwhile for the customs services of the Russian Federation and neighbouring provinces in China to work together and exchange information on the cross-border movement of illegal animal products. It is also worthwhile for the respective state institutions to exchange information on illegal international trading routes in both countries.
- Coordination of research programs and cooperation between Amur tiger and leopard experts from different countries. Of special importance is the development of a joint methodology for monitoring Amur tigers and leopards in Russia and China. This will enable study results from both countries to be properly compared.
- Continuation of collaboration in the management of captive Amur tiger and leopard populations within the EEP, European Association of Zoos and Aquaria (EAZA) and the North American Tiger SSP of the AZA.

It is important to collaborate with international non-government conservation organisations, charitable foundations and other non-government bodies. Such collaboration helps to raise additional funding, exchange ideas, draw on best international experience and undertake joint work between Russian and foreign experts in the fields of conservation and research within the entire range of the Amur tiger and Amur leopard.

4. Conclusions

According to the results of this project, we can get main conclusions as followings:

- Camera trap monitoring is better than genetic check at understanding the cross border movement of Amur tigers and leopards which showed that 17% of all captured in Russia and China during 2013 to 2015 individuals of Amur leopards, and 42 % of Amur tigers were captured in both countries in this study. And the high density of Amur tigers and leopards in this area caused a strong requirement for diffusing out of the core area of Sino-Russia border areas for this small tiger and leopard population.

- Sino-Russian border fence or other human disturbance between the Land of Leopard National Park and Chinese Changbaishan is not a serious obstacle for the population of Amur tigers and leopards' movement. In this area, two countries' tiger and leopard is one population. However, it is still possible that Amur tigers and leopards just can use several import corridors where the border fences may be broken, which need further investigation.

- The study need detailed coordinate points of all the samples shared to determine specific corridors within the Sino-Russian border of Amur tigers and leopards' movement much clearer.

- For Amur tigers, it is urgent to conduct further research on the potential connection between this small population in Changbaishan mountain and the big population in Sikhote-Alin mountain to avoid the small population collapse because of disease risk of the small population.

- Because of much lower population number, Amur leopard conservation should be paid more attention to, and especially focus on expanding its habitat with weak competition capability with tigers.

- Because of frequent transborder movement of these Amur tiger and leopard populations, continuous Sino-Russia united monitoring is still needed well developed for efficient conservation monitoring after this project.

- More detailed genetic check with more samples is also needed to estimate the genetic diversity of these populations across the two countries, especially for exchange information of tigers across Sihote-Aline and Wandashan tiger population for next international tiger conservation work, then providing information for international ecological corridors across Sihot-Aline and Wandashan tiger population.

Appendix 1

Joint catalog of Amur leopard individuals captured by camera traps in Russia and China during 2013-2015

№	ID-LL*	ID-FRC*	Sex	Captured in 2013	Captured in 2014	Captured in 2015	Side	Adult/ Cub	The year when an individuals was captured as a cub	Notes
1	Leo 52M	Leo 1	M	Y	Y	Y	LR	adult		
2	-	Leo 2	M	Y	Y	N	LR	adult		
3	Leo 29M	Leo 3	M	Y	Y	N	LR	adult		
4	-	Leo 4	F	Y	Y	N	LR	adult		
5	-	Leo 6	UN	Y	N	N	R	adult		
6	Leo 49F	Leo 7	F	N	Y	N	LR	adult		
7	-	Leo 8	UN	Y	Y	N	LR	cub	cub in 2013 and 2014	cub of Leo 4
8	-	Leo 9 = leo18	UN	Y	Y	Y	LR	adult	cub in 2013 and 2014	cub of Leo 4
9	Leo 9F	Leo 10	F	Y	Y	N	LR	adult	cub in 2013	cub of Leo 7F
10	Leo 63F	Leo 11	F	Y	Y	Y	LR	adult		
11	Leo 91M	Leo 12	M	Y	Y	Y	LR	adult		
12	Leo 89F	Leo 14	F	Y	Y	Y	LR	adult		
13	-	Leo 15	M	N	N	N	L	adult		Excluded from the analysis 2013-2015
14	-	Leo 16 = leo 19	M	Y	N	N	R	adult		
15	Leo 26F	Leo 17	F	Y	Y	Y	LR	adult		
16	-	Leo 20	UN	N	N	Y	R	adult		
17	Leo 24M	Leo 21	M	Y	Y	N	LR	adult		
18	Leo 54F	Leo 22	F	Y	Y	N	LR	adult		
19	-	Leo 23	M	N	N	Y	R	adult		
20	Leo 25M	Leo 24	M	Y	Y	Y	LR	adult		

21	Leo 22M	Leo 25	M	Y	Y	Y	LR	adult		
22	Leo 7F	Leo 26	F	Y	Y	Y	LR	adult		
23	Leo 13F	Leo 27	F	Y	Y	Y	LR	adult		
24	-	Leo 28	UN	N	N	Y	R	adult		
25	Leo 81Un	Leo 29	UN	N	Y	Y	LR	adult	cub in 2014	Mother unknown
26	Leo 1F	-	F	Y	Y	N	LR	adult		
27	Leo 2M	-	M	Y	Y	N	LR	cub	cub in 2013, 2014	cub of Leo 1F
28	Leo 3M	-	M	Y	Y	N	LR	adult	cub in 2013, 2014	cub of Leo 1F
29	Leo 4F	-	F	Y	Y	Y	LR	adult	cub in 2013, 2014	cub of Leo 1F
30	Leo 5F	-	F	Y	Y	Y	LR	adult		
31	Leo 6Un	-	UN	Y	N	N	LR	cub	cub in 2013	cub of Leo 5F
32	Leo 8F	-	F	Y	Y	Y	LR	adult	cub in 2013	cub of Leo 7F
33	Leo 10M	-	M	Y	Y	Y	LR	adult		
34	Leo 11M	-	M	Y	Y	Y	LR	adult		Died in car accident in Oct 2015
35	Leo 12M	-	M	Y	Y	Y	LR	adult		
36	Leo 14M	-	M	Y	Y	Y	LR	adult		
37	Leo 15M	-	M	Y	Y	Y	LR	adult		
38	Leo 16F	-	F	Y	Y	Y	LR	adult		
39	Leo 17F	-	F	Y	Y	N	LR	adult		
40	Leo 18M	-	M	Y	Y	N	LR	adult		
41	Leo 19M	-	M	Y	Y	N	LR	adult		
42	Leo 20M	-	M	Y	Y	N	LR	adult		
43	Leo 21Un	-	UN	Y	Y	Y	LR	adult		
44	Leo 23F	-	F	Y	Y	Y	LR	adult		
45	Leo 27F	-	F	Y	Y	Y	LR	adult		
46	Leo	-	M	Y	Y	N	LR	adult		

	28M									
47	Leo 30M	-	M	Y	Y	Y	LR	adult		
48	Leo 31F	-	F	Y	Y	N	LR	adult		
49	Leo 32M	-	M	Y	Y	Y	LR	adult		
50	Leo 33F	-	F	Y	Y	N	LR	adult		
51	Leo 34M	-	M	Y	Y	Y	LR	adult		
52	Leo 35M	-	M	Y	Y	Y	LR	adult		
53	Leo 36M	-	M	Y	Y	Y	LR	adult		
54	Leo 37F	-	F	Y	Y	N	LR	adult		
55	Leo 38F	-	F	Y	Y	Y	LR	adult		
56	Leo 39F	-	F	Y	Y	Y	LR	adult		
57	Leo 40M	-	M	Y	N	N	R	adult		
58	Leo 41F	-	F	Y	Y	Y	LR	adult		
59	Leo 42M	-	M	Y	Y	Y	LR	adult		
60	Leo 43M	-	M	Y	Y	N	LR	adult		
61	Leo 44F	-	F	N	Y	Y	LR	adult		
62	Leo 45F	-	F	Y	Y	Y	LR	adult		
63	Leo 46M	-	M	N	Y	Y	LR	adult		
64	Leo 48F	-	F	N	Y	N	LR	adult		
65	Leo 50F	-	F	Y	Y	Y	LR	adult		
66	Leo 55F	-	F	N	Y	Y	LR	adult		
67	Leo 56F	-	F	Y	Y	Y	LR	adult		
68	Leo 57Un	-	UN	N	Y	N	LR	adult		
69	Leo 58F	-	F	N	Y	Y	LR	adult		
70	Leo 59M	-	M	N	Y	Y	LR	adult		
71	Leo 64M	-	M	N	Y	Y	LR	adult		
72	Leo 65M	-	M	N	Y	Y	LR	adult		
73	Leo	-	F	N	Y	N	LR	adult		

	66F									
74	Leo 67Un	-	UN	N	Y	N	R	cub	cub in 2014	cub of Leo 66F
75	Leo 68M	-	M	N	Y	N	LR	adult		
76	Leo 69F	-	F	Y	Y	Y	LR	adult		
77	Leo 70F	-	F	Y	N	N	LR	adult		
78	Leo 72Un	-	UN	N	Y	N	LR	adult		
79	Leo 73F	-	F	Y	N	Y	LR	adult		
80	Leo 74F	-	F	Y	Y	Y	LR	adult		
81	Leo 75F	-	F	Y	Y	Y	LR	adult		
82	Leo 76M	-	M	N	Y	Y	LR	adult		
83	Leo 77M	-	M	N	Y	N	R	adult		
84	Leo 78Un	-	UN	N	Y	N	L	adult		
85	Leo 79F	-	F	N	Y	Y	LR	adult		
86	Leo 80M	-	M	N	Y	Y	LR	adult		
87	Leo 82Un	-	UN	N	Y	Y	LR	adult		
88	Leo 84Un	-	UN	N	Y	N	LR	cub	cub in 2014	cub of Leo 55F
89	Leo 85Un	-	UN	N	Y	N	L	cub	cub in 2014	cub of Leo 55F
90	Leo 87M	-	M	N	Y	N	LR	adult		
91	Leo 88Un	-	UN	N	Y	Y	LR	adult		
92	cub 2 ofLeo 89F	-	UN	N	Y	N	R	cub	cub in 2014	cub of Leo 89F
93	Leo 90Un	-	UN	N	N	Y	LR	adult		
94	Leo 92F	-	F	N	N	Y	LR	adult	cub in 2014	cub 1 of Leo 89F
95	Leo 93F	-	F	N	N	Y	R	adult		
96	Leo 94F	-	F	N	N	Y	LR	adult		
97	Leo 96Un	-	UN	N	N	Y	L	adult		
98	Leo 97Un	-	UN	N	N	Y	R	adult		
99	cub 1	-	UN	N	N	Y	LR	cub	cub in 2015	cub of

	ofLeo 39F									Leo 39
100	cub 2 ofLeo 39F	-	UN	N	N	Y	LR	cub	cub in 2015	cub of Leo 39
101	cub 1 ofLeo 16F	-	UN	N	N	Y	L	cub	cub in 2015	cub of Leo 16F
102	cub 2 ofLeo 16F	-	UN	N	N	Y	L	cub	cub in 2015	cub of Leo 16F
103	cub 3 ofLeo 16F	-	UN	N	N	Y	L	cub	cub in 2015	cub of Leo 16F
104	cub 1 ofLeo 23F	-	UN	N	N	Y	L	cub	cub in 2015	cub of Leo 23F
105	cub 2 ofLeo 23F	-	UN	N	N	Y	L	cub	cub in 2015	cub of Leo 23F

ID-LL – unique number of leopard individual in the database of Land of the Leopard
ID-FRC – unique number of leopard individual in the database of Feline Research Center
F – Female
M – Male
UN – Unknown
Y – yes
N – no
L – left
R – right

Appendix 2

Joint catalog of Amur tiger individuals captured by camera traps in Russia and China during 2013-2015

№	ID-LL*	ID-FRC*	Sex	Captured in 2013	Captured in 2014	Captured in 2015	Side	Adult/Cub	The year when an individuals was captured as a cub	Notes
1	T_1	-	F	Y	Y	Y	LR	adult		
2	T_2	-	F	Y	Y	Y	LR	adult		
3	T_3	CT 2	M	Y	Y	Y	LR	adult		
4	T_4	CT 7	M	Y	N	N	LR	adult		
5	T_5	-	M	Y	Y	NO	LR	adult	died in 2014	
6	T_7	CT 1	F	Y	Y	Y	LR	adult		
7	T_8	CT 8	F	Y	Y	Y	LR	adult		
8	T_9	CT 17	F	Y	Y	N	LR	adult		
9	T_10	CT 5	F	N	Y	N	LR	adult		
10	T_11	CT 4	M	Y	Y	Y	LR	adult		
11	T_12	CT 3	F	Y	Y	N	LR	adult		
12	T_13	CT 18	F	Y	Y	N	LR	adult		
13	T_14	-	F	N	N	Y	R	adult		
14	T_16	-	M	Y	Y	Y	LR	adult		
15	T_17	-	F	Y	N	N	LR	adult		
16	T_18	-	M	Y	Y	Y	LR	adult		
17	T_19	-	UN	Y	N	Y	LR	adult		
18	T_20	-	F	Y	N	N	LR	adult		
19	T_21	-	F	N	Y	Y	LR	adult		
20	T_22	-	UN	N	N	Y	LR	cub	cub in 2015	cub of T_21F
21	T_23	-	F	N	Y	Y	LR	adult		

22	T_25	-	F	N	Y	Y	LR	adult		
23	T_26	CT 10	M	N	Y	N	LR	adult		
24	T_27	-	M	N	Y	Y	LR	adult		
25	T_29	CT 11	M	N	Y	N	LR	adult	cub in 2014	cub of T_7F
26	T_30	CT 16	F	N	Y	Y	LR	adult	cub in 2014	cub of T_7F
27	T_31	CT 12	F	N	Y	Y	LR	adult	cub in 2014	cub of T_7F
28	T_32	CT 15	M	N	Y	Y	LR	adult		
29	T_33	CT 13	M	Y	Y	Y	LR	adult		
30	T_34	-	UN	N	Y	N	L	adult		
31	T_35	-	M	N	Y	N	LR	adult		
32	T_36	-	UN	N	N	Y	LR	adult		
33	T_37	-	F e	N	N	Y	LR	adult		
34	T_38	-	M	N	N	Y	LR	adult		
35	T_39	-	M	N	N	Y	LR	adult		
36	T_40	-	F	N	N	Y	LR	adult		
37	T_41	-	F	N	N	Y	LR	adult		
38	T_42	-	UN	N	N	Y	LR	adult		
39	T_43	CT 23	M	N	N	Y	LR	adult		
40	T_44	-	UN	N	N	Y	R	adult		
41	T_47	-	UN	N	N	Y	L	adult		
42	T_48	-	UN	N	N	Y	L	adult	cub in 2014	
43	T_49	CT 28	UN	N	N	Y	LR	adult		
44	cub1 of T_1F	-	UN	N	Y	N	L	cub	cub in 2014	cub of T_1F
45	cub2 of T_1F	-	UN	N	Y	N	L	cub	cub in 2014	cub of T_1F

46	cub3 of T_1F	CT 26	UN	N	Y	Y	Y	Y	Y	Y
47	cub4 of T_1F	-	UN	N	Y	Y	Y	Y	Y	Y
48	cub1 of T_10F	CT 24	UN	N	Y	Y	Y	Y	Y	Y
49	cub2 of T_10F	CT 21	UN	N	Y	Y	Y	Y	Y	Y
50	cub3 of T_10F	-	UN	N	Y	Y	Y	Y	Y	Y
51	cub4 of T_10F	-	UN	N	Y	Y	Y	Y	Y	Y
52	-	CT6	UN	N	Y	Y	Y	Y	Y	Y
53	-	CT9	UN	N	Y	Y	Y	Y	Y	Y
54	-	CT14	UN	N	Y	Y	Y	Y	Y	Y
55	-	CT19	UN	N	Y	Y	Y	Y	Y	Y
56	-	CT22	F	N	N	Y	LR	adult		
57	-	CT25	UN	Y	N	N	R	adult		
58	-	CT27	UN	N	N	Y	L	adult		

ID-LL – unique number of leopard individual in the database of Land of the Leopard
ID-FRC – unique number of leopard individual in the database of Feline Research Center
F – Female
M – Male
UN – Unknown
Y – yes
N – no
L – left
R – right