

**Final report to WildCats Conservation Alliance from the
Zoological Society of London**

**Amur Tiger Conservation in Lazovsky Zapovednik and
Adjacent Areas, January-December 2017**



Image: Adult male Amur tiger "Petrovich", estimated age 5-7 years old, photographed using a camera trap in Lazovsky Zapovednik, December 2017. Tigers often walk on roads leaving them vulnerable to poaching.

Summary

The Zoological Society of London's (ZSL's) Amur tiger conservation project in Lazovsky Zapovednik and Adjacent Areas has achieved several successes over the past years thanks to generous support from ALTA. Our overall project goal was to develop our holistic programme for tiger conservation in the Lazovsky Zapovednik (LZ), Zov Tigra National Park (ZT), and adjacent areas. The following

provides a summary of our progress and achievements since the onset of the project and a more detailed description of our activities in 2017 (and supplementary information gathered January-April 2018). During this time, ZSL helped implement improved management plans that have increased the effectiveness of anti-poaching activities in the area, and continued long-term population and disease monitoring. Population monitoring results for 2017 reveal the effectiveness of our conservation strategies, including a stable and healthy population of reproducing adult tigers in the area. The fifth year of monitoring efforts in the unprotected area between LZ and ZT provided evidence that tigers are surviving and reproducing in those areas as well. Our aim is to continue to focus on anti-poaching efforts and address other threats that become apparent, e.g. wildfires, in protected areas and, in turn, increase tiger and prey numbers, verified by effective monitoring results. The continued success of our conservation activities will ensure a source of tigers for dispersal into adjacent unprotected areas with fewer tigers.

Key project achievements (2009 – 2017):

- Established a “first-step” partnership agreement between ZSL and the Russian NGO “ANO AMUR” to facilitate legal financial support for anti-poaching activities in the United Administrations of Lazovsky Zapovednik and Zov Tigra National Park (UALZZT). The first step focused on transferring funds to establish Rapid Response teams in the protected areas. The next-step agreement is planned for 2018 and will include transfer of funds for all project activities.
- Collaborated with partners at PRNCO tiger centre to increase tigers in historic ranges by providing veterinary care to rehabilitating injured and orphaned tigers until their release back to the wild. Dr. Misha Goncharuk (ZSLs wildlife veterinarian for Russia) has been instrumental in safe and effective immobilizations (anaesthesiology) of animals during capture, health checks, and preparations for release to the wild.
- Renewed partnership between ZSL and the protected areas of Lazovsky Zapovednik and Zov Tigra National Park.
- Increased accuracy of tiger monitoring, achieved through the expansion of camera trap surveys to two new areas, Zov Tigra National Park (beginning in 2011) and

the adjoining unprotected “Medved” hunting lease (MHL, beginning in 2013) and Southern Valley hunting lease (SVHL, beginning in 2016).

- Informed a proposed expansion of the Zapovednik territory to a size that better protects resident reproducing tigers through expanding our monitoring area and providing critical information on how tigers move from protected areas into unprotected areas. While the proposed expansion (initiated in 2013) is still undecided, we continue to update the proposal with newly discovered information on tiger movements from our ongoing surveys. In 2015 - 2017 we were able to document that tigers born in LZ populated both LZ and ZT as adults and reproduced, strengthening the idea that LZ provides a source of tigers into new areas.
- Beginning in 2013, improved tiger prey monitoring in ZT was achieved through collaboration with the National Park management to help them conduct winter track surveys of ungulates according to approved standards; information that now provides baseline numbers for winter count comparisons conducted by ULZZT staff.
- At the request of the Ministry of Natural Resources and Environment of the Russian Federation, we informed a planned range-wide tiger track count survey (conducted every ten years and occurring in February 2015) by providing data on recent population trends in LZ and ZT. Our input was requested based on ZSL’s camera trapping methods and expertise in using camera trap surveys in Russia’s low density tiger population and cold climate, which is accepted as best practice and used as a model.
- Increased tiger numbers, resulting from better anti-poaching management in protected areas.
- Arrest and conviction of an organised tiger poacher working near protected area boundaries.
- Improved wildlife disease management aimed at reducing threats to tigers, Amur leopards and other wildlife species.
- Completion of Russia’s only wildlife health laboratory to serve the area, disease monitoring to inform prevention strategies, and research to better understand the environmental source of canine distemper virus (CDV), fatal to tigers and leopards.
- In 2015, we co-authored “Disease risk assessment for re-introduction of Amur leopards (*Panthera pardus orientalis*) into the Russian Far East”. This document

will not only be used to inform plans for the re-introduction of leopards, but is also being used as a model for range-wide disease monitoring of threats to Amur tigers in Russia.

- Increased awareness of the plight of the Amur tiger, through educating local people using camera trap photographs. Our presentation has been integrated into LZ's and ZT's tourist programmes (and integrated in ULZZT in 2014), as well as the biology curriculum at the local primary and secondary school in Lazo attended by about 80 students annually.

Project update

ZSL's Amur tiger conservation project has seen some important achievements over the past year. The generous support from ALTA provided an important boost to the project continuing through 2017. The funds provided financial security for our work with Amur tigers, supporting our vital core monitoring (of population and disease), anti-poaching and educational activities. Your support also helped us expand our monitoring range in 2011 to include the nearby Zov Tigra National Park, a then-newly created protected area, within which little was known about the numbers and density of tigers. In 2013, we were able to include the Medved Hunting Lease, and later Southern Valley hunting lease, both situated between LZ and ZT. This in turn enabled the team to gain a greater understanding of tigers in the region and helped inform recommendations for further conservation action.

ALTA's support also helped us leverage additional funding in 2017 from sources including US Fish and Wildlife Service Rhinoceros and Tiger Conservation Fund, Hennig-Olsen ice cream, and the Indianapolis Zoo Conservation Fund.

Our key achievements against objectives in January-December 2017, with supplemental information from January-April 2018, are described below:

Monitoring of Amur tigers

Over the past 10 (2008-2017) years, ZSL has been using camera traps and conducting snow track surveys to monitor tigers in LZ; we have also been using these methods for the past 8 years in ZT (although we have been involved indirectly with tiger monitoring

since 2001). In November 2014, LZ and ZT were joined to form the United Administration of Lazovsky Zapovednik and Zov Tigra National Park (ULZZT), but they continue their original functions as a strictly protected area (LZ) and a national park (ZT), so we continue to refer to them as such. Because it is critical to understand how tigers move between the two protected areas, we extended our survey in 2013 to include the unprotected Medved Hunting Lease between LZ and ZT, managed by a private hunting club. In 2016, thanks to support from ALTA and other sponsors, we again extended our survey to include the Southern Valley Hunting lease (SVHL)(Figure 1). Monitoring a larger contiguous area provided better information about tiger survival, reproduction and movements through unprotected areas, where they are likely to be more susceptible to poaching. This year (2017), we continued our long-term tiger monitoring over the tiger landscape shown in Figures 1-3.

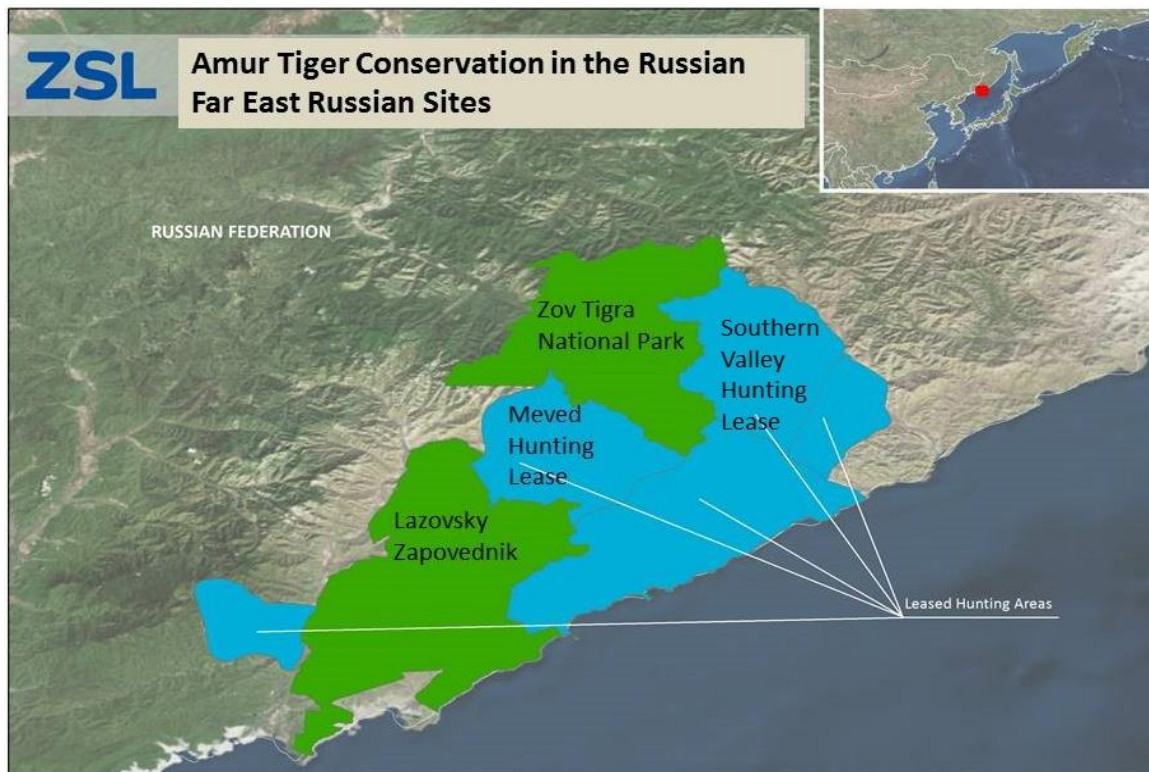


Figure 1. ZSL Russia Amur tiger conservation landscape, including Lazovsky Zapovednik (LZ), Medved Hunting lease (MHL), Southern Valley Hunting Lease (SVHL), and Zov Tigra National Park (ZT).



Figure 2. ZSL Russia Amur tiger conservation landscape showing tiger habitat in Lazovsky Zapovednik (LZ) and it's coastal boundary on the Sea of Japan. The area is mixed broad leaved and conifer forest with stunted oak tress at high elevations.



Figure 3. ZSL Russia Amur tiger conservation landscape showing tiger habitat in Zov Tigra National Park. The area is conifer and broad leaved forest tiger habitat on the Milogradovka and Ussuri rivers.

Together with UALZZT, we completed our annual camera trapping surveys between December 2016 and May 2017 (hereafter referred to as the “2017 tiger survey”), and again Between December 2017 and May 2018 (the “2018 tiger survey”) operating 60-paired camera trap stations in LZ, 28 in ZT, 25 in MHL, and eight in SVHL, over 90 day-periods (Figures 4 and 5). Forty camera traps were left in LZ and ZT year round to record supplemental information about resident tigers, including site persistence, body condition, and evidence of reproduction (cubs or lactating females). Due to numerous forest fires in April-May, the 2018 tiger survey results are only preliminary and minimal because 50% of our camera traps are still in the forest.

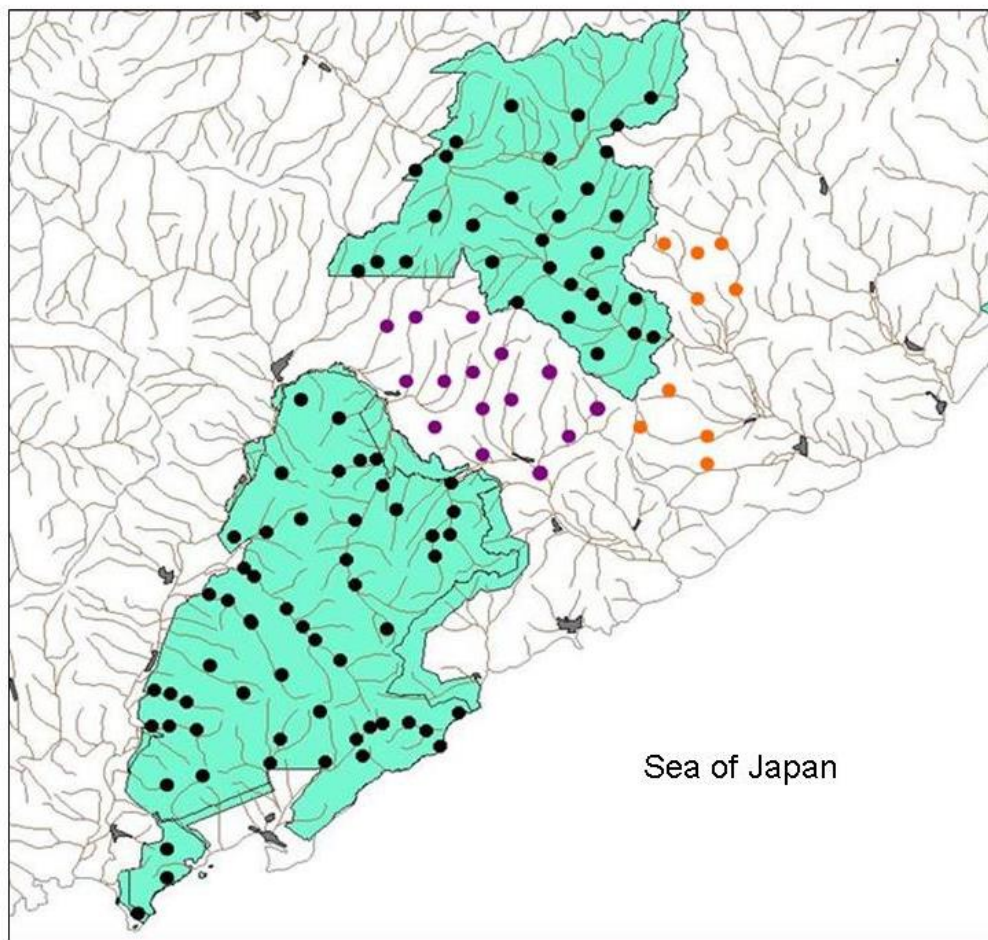


Figure 4. Camera trap locations with black dots in protected areas, purple dots in MHL, and orange dots in SVHL. The total survey area is roughly 2,800 km².



Figure 5: Two ZSL employees setting camera traps for the 2017 tiger monitoring survey.

For the 2017 camera trap survey conducted in combined areas LZ, ZT, MHL and SVHL we estimated 19-24 adult tigers analyzed using the program MARK for capture-recapture closed populations over a period of 13,341 trap/days, and 115 photographs of tigers. The minimum number of tigers identified from photographs was 19 adults: eleven females and eight males, and one new litter of cubs. For the 2018 tiger survey, preliminary results show a minimum of 18 adults: eleven females and seven males, and one new litter of cubs (Table 1). In April 2018, we recorded a second litter of three cubs (8-10 months of age) born in 2017. Mother tigers can be secretive and difficult to photograph during short tiger surveys. This example illustrates the value of supplementary trap days which provided valuable information on reproduction.

Comparisons with surveys from previous years suggest the tiger population is stable (Table 1 and Figure 6). For 2017 survey, we also recorded three sub-adults (2-3 years-of-age and independent of mothers) previously identified as cubs from photographs of family

groups. One additional sub-adult female previously identified as a cub was recorded in December 2017. Female tigers can give birth every 18-24 months, hence two new litters in 2017 is not unusual following eight litters in 2015-2016 because most females still have cubs from the previous year. The new litter recorded for 2017 (in LZ) are significant because 1) we have monitored one mother "Sabrina" since 2009 and this is her fourth litter of three cubs at her estimated age of 12 to 13 years, and 2) the second litter was born to mother "Tanya" and is the first successful reproduction in the Sharokia river area of LZ since intense poaching in 2009-2012. Information on survivorship and lifetime reproduction for tigers is rare and provides a measure of a healthy reproducing population. Reproductive depression and long recovery time after poaching has been recorded for tigers in other areas.

Table 1. Minimum number of adult tigers, litters of cubs and total number of cubs photographed during the surveys 2016-2017 and preliminary results during survey 2018 in combined areas of Lazovsky Zapovednik, Medved Hunting Lease, Southern Valley Hunting Lease and Zov Tigra National Park. Number in parentheses are totals added retrospectively after surveys end. Results from 2018 (shown in red) are still incomplete.

Sex	2016	2017	2018
Adult females	12	11	11
Adult males	8	8	7
Total adults	20	19	18
Sub-adults	0	3	
New litters	7	1(2)	1
Cubs	17	3(6)	3
Total number of tigers	37	25(28)	22

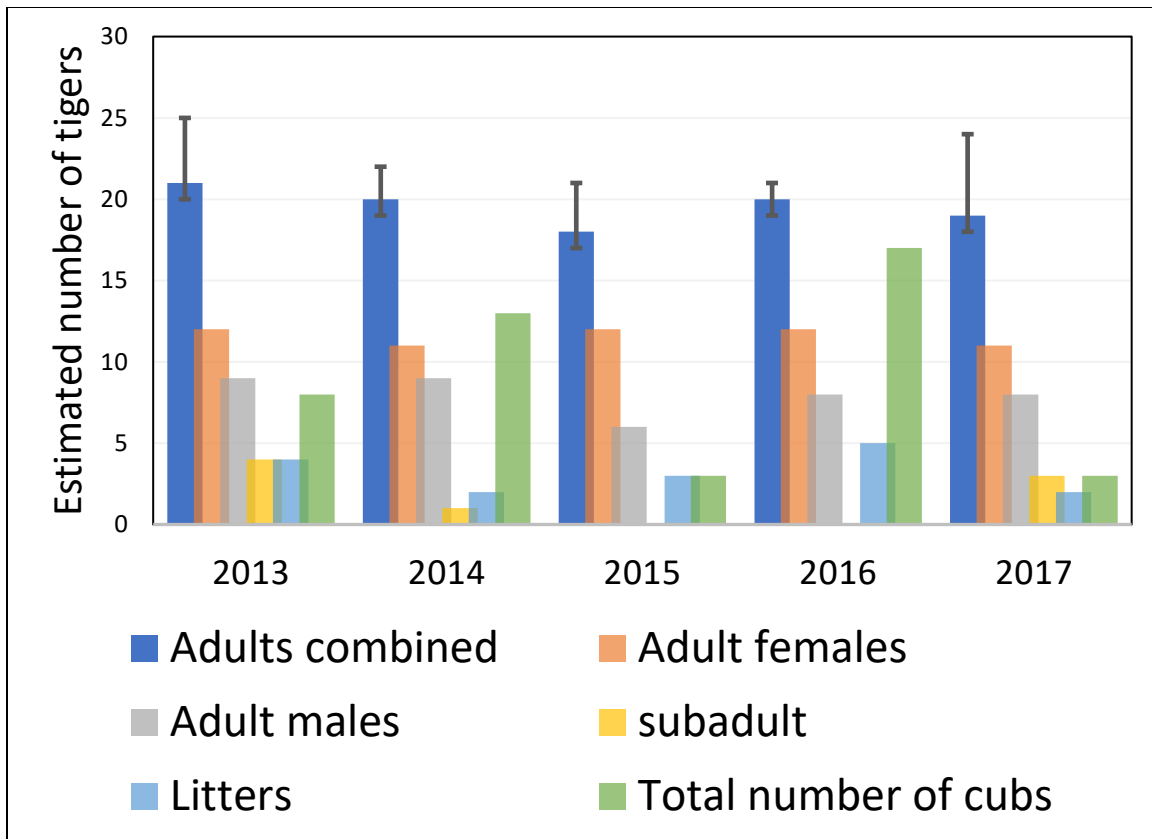


Figure 6. The number of tigers estimated each year (2013-2017) in combined areas LZ, ZT, MHL, and SVHL. Results are the estimated number of adult tigers and error bars are 95% confidence intervals; the minimum number of adult male and female tigers contributing to “adult combined” ; and sub-adults, litters and number of cubs recorded for each year. Only known tigers were listed as subadults (18-36 month-of age and independent of mothers) because age can be difficult to estimate after 18 months of age. Adult tigers were estimated during 90-day surveys in winter, but new litters were recorded for the year of estimated birth date regardless of when the litter was first discovered. For example if a litter born in December one year, we may only gain photographs or pug mark verification when cubs were as old as 16 months of age.

Since cubs stay with mothers for 18-24 months, family groups can be recorded in multiple years, hence long-term monitoring allows for collection of information about survivorship and dispersals when individuals stay within our survey area to be photographed. Eleven litters of cubs had estimated birth years in 2015 and 2018 (some photographed multiple times) and ranged in size from one to four cubs. Eight of those litters were photographed in the protected areas UALZZT (two litters in ZT and six in LZ) and two were recorded in MHL showing that reproduction is successful there as well.

Fifty individual adult and subadult tigers were photographed and 16 litters of cubs recorded during 36,540 trap days from 2013-2017 over combined survey area of LZ, ZT, MHL, and SVHL (25 males and 25 females) (Tables 2 and 3). Twenty tigers were recorded in only one year of surveys (12 males and 8 females) and 27 were recorded for 2 or more years. Breeding “resident” tigers are long-lived territorial animals with large home ranges, and have a high chance of being recorded each year by camera traps located within their territories. Only one female (F19) was not located in each consecutive year after first identification. After not being photographed in 2016, F19 was photographed again in 2017 with an injured right front foot and we suspect her absence was due to limited movements while she recovered from a trauma. In this study, tigers photographed in single years may be dispersing subadults, displaced adults, resident tigers using the edge of their home range where they travel less frequently, “new” tigers photographed for the first time on the last year of surveys and that may be located the next year, or animals that have died before the next survey year. Only one tiger’s death from natural causes was verified in spring of 2014 when his body melted out of river ice after he fell through the ice and drowned in winter. Prior to 2013 combined surveys, two tigers (1 male and 1 female) were confirmed poached after we identified them by comparing stripe patterns on their confiscated skins to camera trap photographs. We have no verified poached tiger from photographed tigers after 2013 but we know low levels of poaching continue.

Table 2. Photographic histories of 25 adult female tigers photographed in LZ, ZT, MHL, and SVHL from 2013 to 2018. "X" indicates the territory where a tiger was photographed, "X" indicates a tiger has been recorded in 2018, and numbers are sets of photographs taken of each tiger per year. Green cells represent tigers that were first identified as cubs from known mothers. Orange cells represent litter birth years.

ID	First Recorded	Territory				Year of survey						Name
		LZ	MHL	SVHL	ZT	2013	2014	2015	2016	2017	2018	
F04	2008	X				46	20	18	16	10	X	Sabrina
F05	2008	X	X		X	6	28	6	15	3		Lena
F08	2009	X				1	1	6				Luba
F09	2008	X				47	5	6	7	9	X	Maria
F10	2010	X	X			15	24	21				Dasha
F13	2011	X				24	18					Victoria
F15	2013	X				1						Goral
F16	2012		X		X	8	10	9				Tilda
F17	2011	X				5	11	5	7	5	X	Lucky
F18	2013				X	8						Limp
F19	2013				X	5	1	3	0	1	X	Ussura
F20	2013		X			2						Medved
F21	2013	X				1						Once
F22	2011	X				1	23	6	5	8	?	Ivy
F23	2014				X		1					Stripe
F24	2013				X		1	17	13	25	X	Kimberly
F25	2013				X		1	24	12			Leslie
F27	2014		X	X	X		1	24	96	38	X	Anna
F30	2016	X							23	26	X	Tanya
F31	2016	X							17	30	X	Izabella
F32	2015		X	X				2	23	4	X	Grace
F33	2015	X		X				1	1	1	?	F22cub
F35	2016		X						1	1	?	F32 Cub
F36	2015	X						1	1		X	F22 cub
F37	2018				X						X	Juk

Table 3. Photographic histories of 25 adult male tigers photographed in LZ, ZT, MHL, and SVHL from 2013 to 2018. "X" indicates the territory where a tiger was photographed, "X" indicates a tiger has been recorded in 2018, and numbers are sets of photographs taken of each tiger per year. Green cells represent tigers that were first identified as cubs from known mothers.

ID	First Recorded	Territory				Year of survey						Name
		LZ	MHL	SVHL	ZT	2013	2014	2015	2016	2017	2018	
M09	2009	X		X		44	52	45	42	56	X	Yasha
M11	2011				X	3						C boy
M12	2013	X				1						Big guy
M13	2012	X	X		X	8	30	31	13			Bobtail
M14	2012	X				21						
M15	2013	X	X			16	38					Misha
M16	2013	X				12						
M17	2013				X	1						K2
M18	2013				X	2						2stripes
M19	2014				X		20	72	68	3		Valara
M20	2013				X	1						0 stripe
M21	2011	X				1	30					Checkers
M22	2014				X		1					
M23	2011	X				1	1					drowned
M24	2014	X					6	1	1	3	X	Petrov
M25	2015	X						13	26	27	X	Ringtail
M30	2014	X					4					Goral
M32	2015	X						1	7			
M33	2016				X				18	35	X	David
M34	2015	X			X					52	X	Roger
M35	2016	X							1	15	X	Petrovich
M37	2015	X								16		
M39	2013		X			1						Tilda 1
M40	2013		X			2						Tilda 2
M42	2018				X						X	Juk

Our long-term monitoring work enabled us to investigate longevity and construct a population phylogeny (Tables 2 and 3): four of 12 tigresses with litters during 2013-2018 (F17, F22, F24, and F27) (Table 2) were first identified as the cubs of known mothers from LZ and ZT and they produced their first litters when they were from 4 to 6 years of age. On the other hand, F04 is thought to be 11-12 years old and is mother to her fourth litter (each with three cubs) in 2017 (her first litter was born in 2011)(Table 2). A sub-adult male tiger (M34, Table 3) born in LZ in 2015 to F04 was photographed numerous times in ZT and LZ in 2017 and as an adult in 2018, having dispersed from his natal home range, and a subadult female F35 also borne in LZ to F22 was recorded in SVHL, having dispersed from her natal home range. Our results support previous evidence that LZ and ZT functions as a core breeding area providing a source population of tigers capable of dispersing and recolonizing areas in which tiger populations had plummeted due to poaching. For example, two of three reproducing female tigers residing in ZT dispersed from natal LZ.

Our overall program goal is to continue to develop our holistic programme for tiger conservation in the Lazovsky Zapovednik (LZ), Zov Tigra National Park (ZT), and adjacent areas. The WildCats Conservation Alliance provided critical funds for critical tiger population monitoring used to measure the effectiveness of conservation activities. Wildfires, driven by severe drought, threatened tiger habitat in 2018. In April- May, when forest fires burned over 10,000 hectares of ZT's precious coniferous forests, UALZZT rapid response team (RRT) (supported by WildCats Conservation Alliance) were able to save three young tiger cubs (estimated 1 month of age) found by them on the edge of a burn while they fought the fires. Fresh mother tiger tracks in the area informed the expert RRT that cubs were not abandoned and so they acted quickly to put out the fire while keeping a safe distance from cubs to minimize disturbance to the animals and for their own safety. From information gathered during long-term monitoring, we suspect that the cubs belong to F24 (table 2). If the litter survives, future tiger surveys should provide an answer.

The following map (Figure 7), and camera trap photographs from the recently completed surveys illustrates how we continue to monitor reproduction, dispersal, and recruitment over generations as part of our long-term monitoring work.

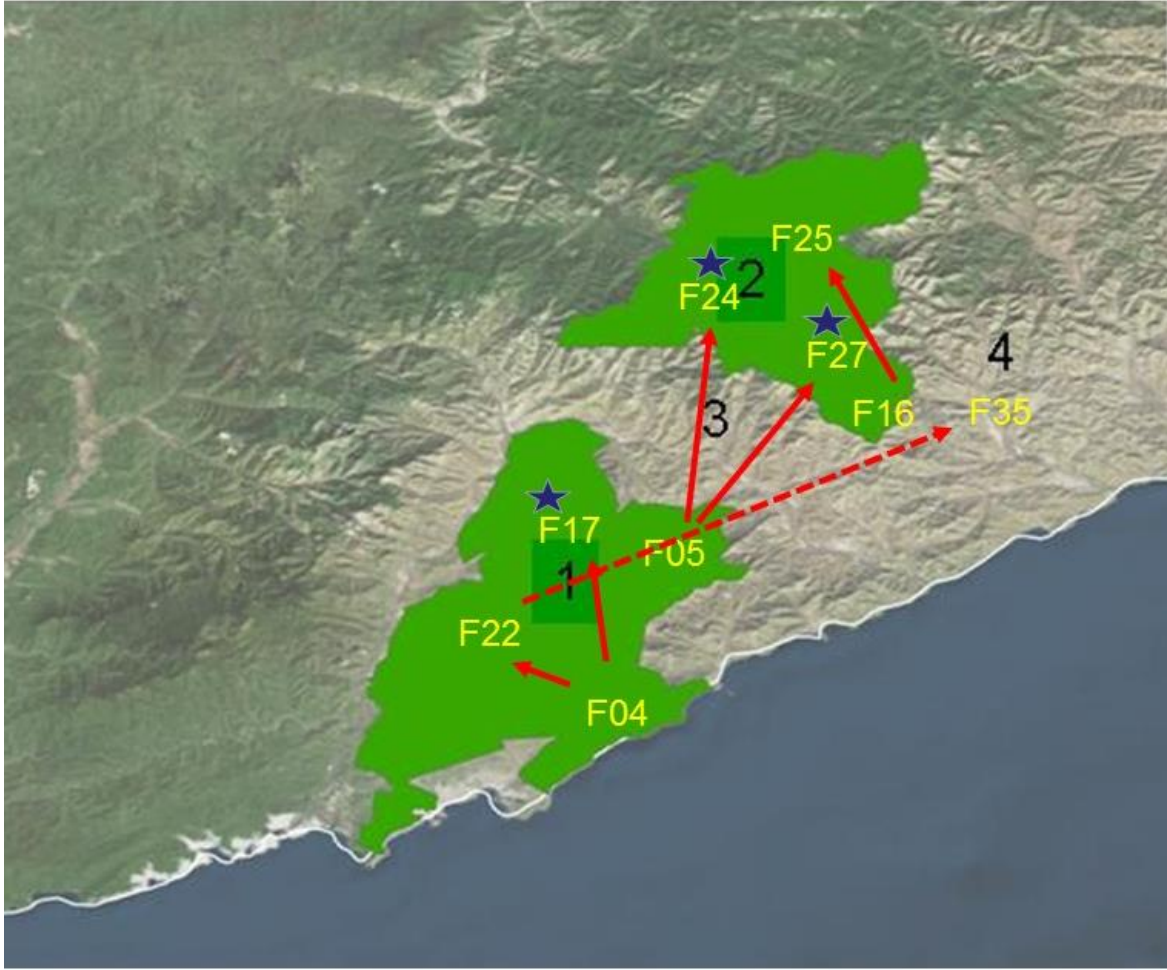


Figure 7. Resident female tigers (in yellow), their dispersed female offspring (indicated with solid red arrows pointing away from mothers) detected in our survey areas, third generation dispersing female offspring (indicated in dashed red arrows) detected in our survey areas, and young litters still traveling with their mothers (blue stars); all monitored with camera traps in LZ (1), ZT(2), MHL (3), and SVHL (4) from 2008-2017.



Figure 8 and 9. Resident female F4 “Sabrina” (top) with one of three cubs (above) and all three cubs (below) at a scent-marking tree in LZ January 2018. Their estimated birthday is June - July 2017. We have monitored Sabrina since 2008. Night time photographs of tigers with infrared flash on camera traps make tigers seem white, but they are normal colored brown with black stripes.



Figure 10. Male (right) and female (left) cubs from Sabrina's fourth litter photographed in May 2018. All three cubs had survived to 10-11 months of age with 2 males and one female.

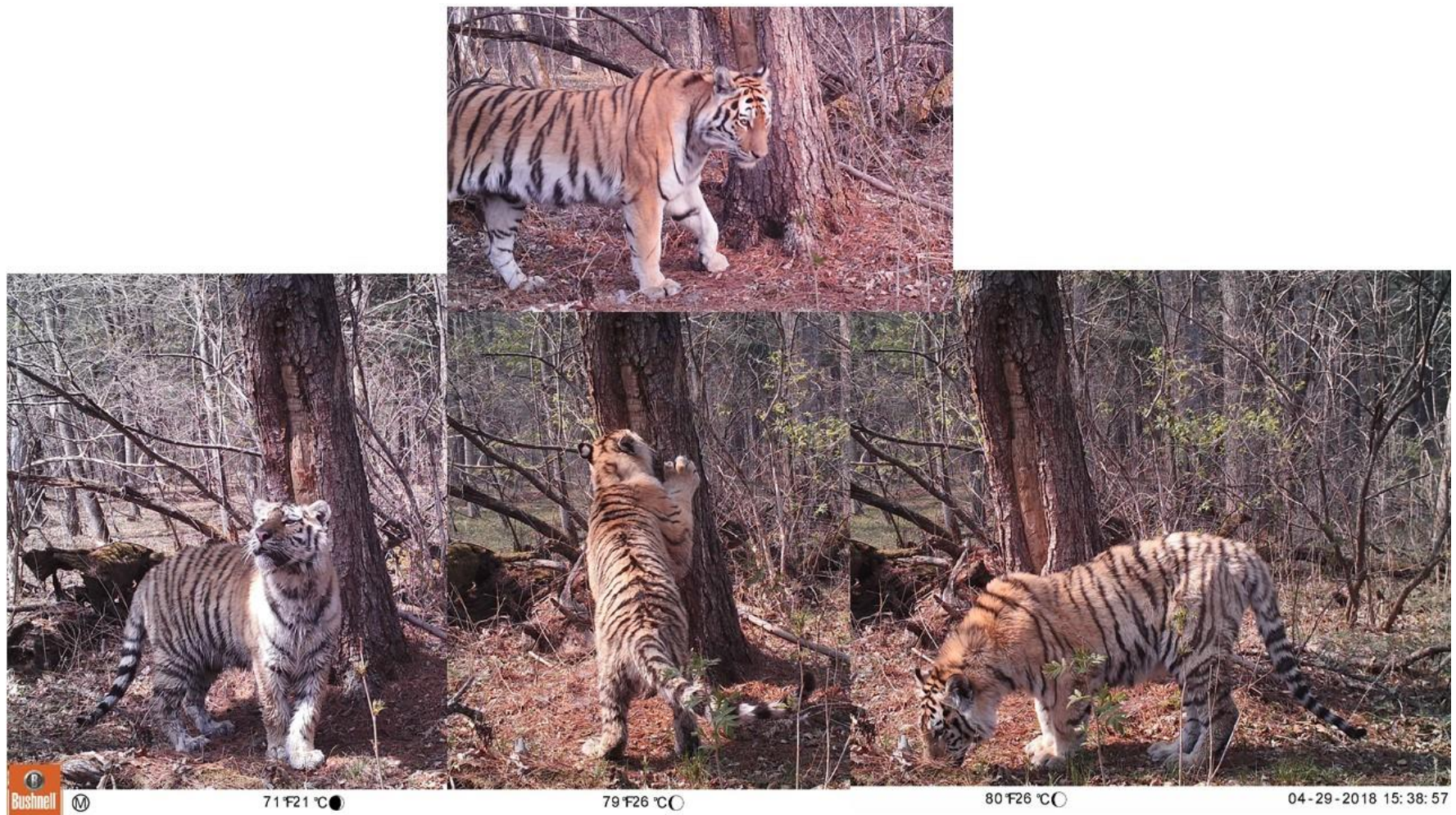


Figure 11. Three male cubs (bottom images) from F30's (Tanya) (Top image) litter at 9-10 months of age in April 2018. This is the first successful litter produced in Sharokia river area of LZ since intensive poaching in 2009-2012. We have monitored Tanya since 2016.



Figure 12. We detected that F19 (photographed here in September 2017) had a hurt left front paw and in these photos she is limping and holding her foot under her. We found tracks of a limping tiger as late as February 2018, and suspect it was her.



Figure 13. UALZZT and ZSL's rapid response team preparing to fight fires and shown here filling backpack water sprayers from available water source in remote ZT in May 2018.



Figure 14. Forest fire in ZT conifer forest in April 2018.



Figure 15. Smoke from fires in an overlook of Zov Tigra National Park May 20, 2018. The red arrow shows where three one-month old cubs were found on May 29 near a burned area. Nearby tracks indicated that the mother was still present and quick action by Rangers assured minimal disturbance while making sure no fires were still burning in the area. Fires were officially out on May 30th.