This report will be made public. If it contains confidential or sensitive information, please also provide a revised report for sharing with the public.

PUBLIC VERSION

Section I. Project Information	
Project Title: Monitoring populations of Amur leopards and tigers in Southwest Primorye, Russia	
Grantee Organisation: Wildlife Conservation Society (WCS)	
Location of project: Southwest Primorskii Krai, Russian Far East. Land of the Leopard National Park (LLNP) is approximately 43.100 N 131.200 E.	
Size of project area (if appropriate): 913.35 km^2	**No of tigers and / or Amur leopards in project area, giving evidence & source:** We have identified 31 Amur leopards and 21 Amur tigers identified in our study area based on our camera trap monitoring.
Partners: *(Please give details of partners, including communities, academic institutions etc. for this project.)* WCS has a formal agreement with LLNP to work within its borders and to survey leopards and tigers in the northern region of the national park, as part of the park-wide annual survey. We also inform the Nezhinoe Naval Hunting Lease of our camera trapping activities on their land (adjacent to LLNP), although legally we are not required to have formal approval to work there. To best orchestrate a transboundary camera trap database, we try to coordinate activities in China through WCS China and their contacts with Hunchun Nature Reserve (HNR) and the larger Northeast Tiger Leopard National Park (TLNP). However, recently, exchanges of information have not occurred.	
Project Contact Name: (*main contact via email)* Dale Miquelle, Jonathan Slaght	
Email: dmiquelle@wcs.org/jslaght@wcs.org	
Reporting period: February 1, 2021-January 31, 2022	

Please ensure that your report relates to the objectives and activities detailed in your proposal and logframe. Please include results data in Section II and Section III.

Section II. Project Results

Long Term Impact: (*How has this work contributed to the vision and long term impact that your project aims to achieve?)*

We have sought to institutionalize rigorous methods of population monitoring in the Russian Far East for nearly twenty years, and continue to make strides. Given that the current official estimates of tiger abundance in Russia are still based on expert assessments, demonstration of proper survey design, methods, and analyses are still critical. We believe that population monitoring with accurate estimates of abundance and density are essential to demonstrate real recovery (or decline) of endangered species and to avoid development of a false narrative of recovery for political purposes. We work with partners (both government and NGO) to ensure that rigorous, repeatable methods are used across the range of leopards and tigers in Russia.

Conservation Outcome: (*What are the actual changes that this project has achieved?)*

Amur leopards and tigers are Endangered subspecies. Consequently, the need for quality methodologies and analyses to understand population dynamics is of paramount importance. WCS seeks to ensure that high-quality methods and analyses are consistently used to assess population size and trajectory. Rigorous scientific methods provide LLNP management with the best possible to make management decisions, and provides an example of how to properly estimate tiger abundance. These activities also demonstrate our strengths as a science-based conservation organization, which helps us negotiate and be engaged in transboundary conservation activities.

These evidence-based survey methodologies have demonstrated that leopard numbers have increased over the past five to ten years in Southwest Primorye, which is a testament to improved law enforcement efforts and better management coming after the creation of Land of the Leopard National Park. The collective results demonstrate that recovery of tigers and leopard numbers is possible in northeast Asia when appropriate and dedicated management efforts are applied, and are a testimony to the value of dedicated monitoring efforts.

Summary of activities and achievements: *(Please provide a narrative summary for use in our communication materials Max 300 words)*

During the grant period, WCS Russia successfully conducted population monitoring of Amur leopards and Amur tigers across a nearly 1,000 km^2 study area in Southwest Primorye, Russia. This effort resulted in 1137 images of 34 individual leopards and 1009 images of 27 individual tigers. We also continued our work with the expert group on Amur leopards, which is moving forward with a reintroduction program for this Critically Endangered cat.

Details of activities and results: (*Please give detailed narrative of the results of each objective & output. Please include measures for example patrol numbers and distances covered, #people trained or #people attending meetings/workshops or refer to figures in your tables below)*

Objective 1: Continue monitoring in Nezhino and Northern Sectors of LLNP.

Activity 1.1. Deploy cameras

We set out 122 cameras at 62 sites from 13 January-09 February 2021. All sites but two were given two cameras in order to photograph both sides of passing animals.

Activity 1.2. Collect cameras

We removed cameras from the field between 12-26 May, 2021. Four cameras from two sites were stolen, resulting in recovery of 118 cameras.

Activity 1.3. Analyse data and develop report

On average, cameras collected data for 101 trap days, and resulted in 1137 images of leopards in 178 capture events. We identified 31 individual adults and 3 cubs from these images. Based on the results derived from the program SPACECAP, the average leopard density in 2021 was 1.58 leopards/ 100 km^2 (Table 1), which represents the highest leopard density of any year since we began monitoring in 2003. We also collected 1009 images of tigers in 132 capture events, resulting in the identification of 21 adult tigers and 6 cubs. Using SPACECAP, density analysis showed 1.05 tigers/ 100 km^2 (Table 2).

Looking at the number of tigers and leopards photographed over 19 years of surveys in Southwest Primorsky Krai, some trends are evident (Figure 1). Between 2003 and 2015, the number of leopards photographed ranged from 5 to 15, and averaged about 10 individuals per year. In 2016-2017 there was a significant increase and for the last 5 years the number of photographed leopards at the southern site has ranged from 16 to 21 individuals. A similar pattern can be seen in the combined study area, where the number of leopards has increased from 10-11 in 2014-2015 to 27-31 in the last 5 years. These data strongly suggest a significant increase of the number of leopards in recent years. The density estimates confirm the above trend. The number of tigers photographed indicates a similar pattern of population growth, with numbers ranging from 3 to 8 individuals in 2005-2014, followed by an increase in numbers from 8 to 19 adult tigers over the past 5 years. We also collected data of prey numbers, and added them to our long-term datasets (Figures 2-3).

Table 1. Density estimates of Amur leopards in the southern and combined study areas 2015-2021, derived from the spatial capture–recapture data using Bayesian spatially explicit hierarchical models in the software program SPACECAP.

Year	Average density (cats/100 km^2) $\overline{D} \pm S$	**D** 95% confidence interval	Sigma (km)	Sigma 95% confidence interval	Lambda (g0)	Lambda 95% confidence interval
2015_southern	0.64 ± 0.13	0.42-0.89	5.57 ± 0.54	4.54-6.65	0.027 ± 0.005	0.018-0.037
2015_combined	0.65 ± 0.097	0.48-0.81	5.17 ± 0.45	4.44-6.13	0.033 ± 0.005	0.023-0.044
2016_ southern	1.13 ± 0.28	0.62-1.67	4.83 ± 0.64	3.76-6.15	0.024 ± 0.006	0.015-0.038
2017_ southern	0.98 ± 0.23	0.52-1.42	5.65 ± 0.54	4.65-6.62	0.031 ± 0.006	0.019-0.042
2017_ combined	1.11 ± 0.189	0.75-1.47	5.12 ± 0.28	4.64-5.71	0.039 ± 0.005	0.029-0.050
2018_ southern	1.48 ± 0.37	0.8-2.2	5.25 ± 0.59	4.17-6.45	0.015 ± 0.003	0.009-0.021
2018_combined	1.2 ± 0.128	0.9-1.44	6.07 ± 0.40	5.36-6.85	0.021 ± 0.003	0.015-0.027
2019_ southern	1.5 ± 0.33	0.88-2.13	4.34 ± 0.34	3.68-4.99	0.043 ± 0.007	0.030-0.057

2019_ combined	1.27 ± 0.21	0.84-1.67	4.87 ± 0.27	4.35-5.41	0.035 ± 0.005	0.026-0.045
2020_ southern	1.44 ± 0.33	0.81-2.07	4.18 ± 0.50	3.27-5.09	0.026 ± 0.005	0.017-0.035
2020_ combined	1.4 ± 0.2	1.05-1.79	4.31 ± 0.34	3.63-4.95	0.026 ± 0.004	0.018-0.033
2021_ southern	1.77 ± 0.36	1.11-2.45	4.91 ± 0.59	3.88-6.15	0.016 ± 0.002	0.011-0.021
2021_ combined	1.58 ± 0.2	1.19-1.95	5.10 ± 0.36	4.46-5.79	0.021 ± 0.003	0.016-0.027

Table 2. Density estimates of Amur tigers in the southern and combined study areas 2015-2021, derived from the spatial capture–recapture data using Bayesian spatially explicit hierarchical models in the software program SPACECAP.

Year	Average density (cats/100 km²) $\overline{D} \pm S$	**D** 95% confidence interval	Sigma (km)	Sigma 95% confidence interval	Lambda (g0)	Lambda 95% confidence interval
2015_southern	0.73 ± 0.09	0.56-0.83	2.27 ± 0.50	1.43-3.23	0.021 ± 0.009	0.006-0.038
2015_combined	0.65 ± 0.16	0.35-0.95	6.21 ± 1.15	4.39-8.39	0.006 ± 0.002	0.003-0.011
2016_ southern	0.98 ± 0.47	0.15-1.9	6.92 ± 0.30	3.62-11.9	0.005 ± 0.002	0.002-0.009
2017_ southern	0.75 ± 0.23	0.34-1.2	5.02 ± 0.51	4.06-6.07	0.018 ± 0.003	0.012-0.024
2017_ combined	0.82 ± 0.20	0.43-1.2	4.76 ± 0.34	4.15-5.47	0.016 ± 0.002	0.011-0.021
2018_ southern	0.48 ± 0.23	0.01-0.92	8.95 ± 0.30	4.72-14.6	0.005 ± 0.002	0.001-0.010
2018_combined	0.35 ± 0.12	0.14-0.59	8.79 ± 0.18	5.84-12.5	0.006 ± 0.002	0.003-0.010
2019_ southern	1.32 ± 0.41	0.56-2.13	3.48 ± 0.47	2.66-4.46	0.015 ± 0.003	0.008-0.021
2019_ combined	0.76 ± 0.2	0.41-1.17	5.82 ± 0.65	4.66-7.12	0.008 ± 0.002	0.005-0.012
2020_ southern	1.8 ± 0.4	0.99-2.64	3.82 ± 0.42	3.06-4.68	0.012 ± 0.003	0.006-0.017
2020_ combined	1.17 ± 0.2	0.78-1.59	5.26 ± 0.50	4.36-6.29	0.009 ± 0.001	0.005-0.012
2021_ southern	1.9 ± 0.46	1.1-2.84	3.34 ± 0.25	2.86-3.85	0.076 ± 0.030	0.033-0.129
2021_ combined	1.05 ± 0.19	0.69-1.41	4.51 ± 0.26	4.06-5.06	0.057 ± 0.013	0.035-0.083

Figure 1. Number of Amur tiger and leopards over time in our study area.

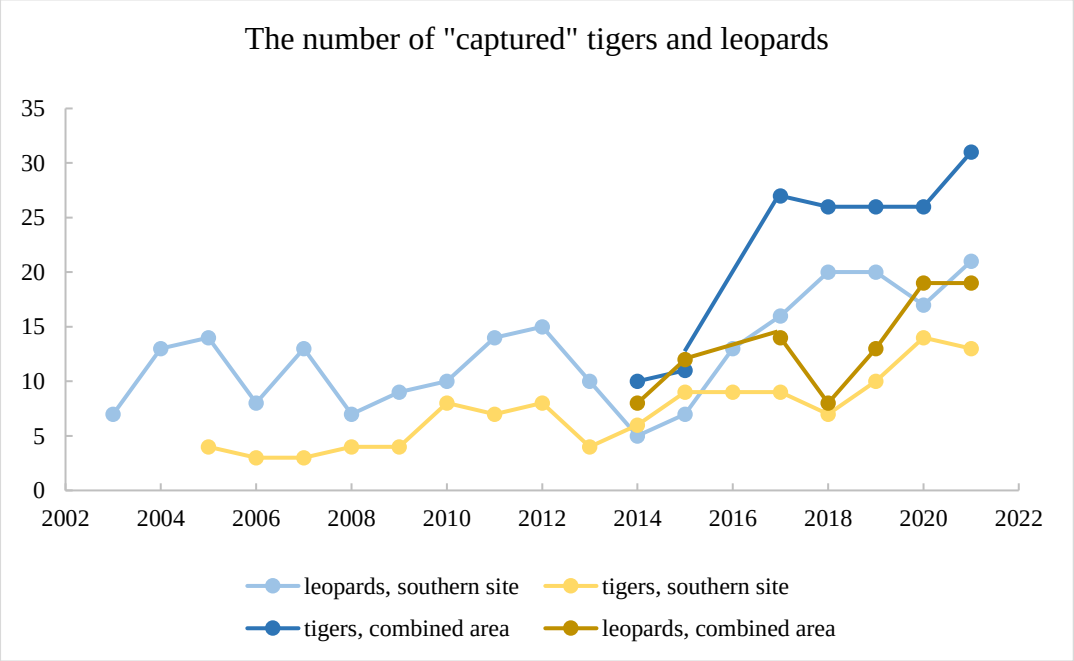


Figure 2. Relative Abundance Index (average number of individuals photographed/100 days of survey) of sika deer in the combined study area, 2015-2021

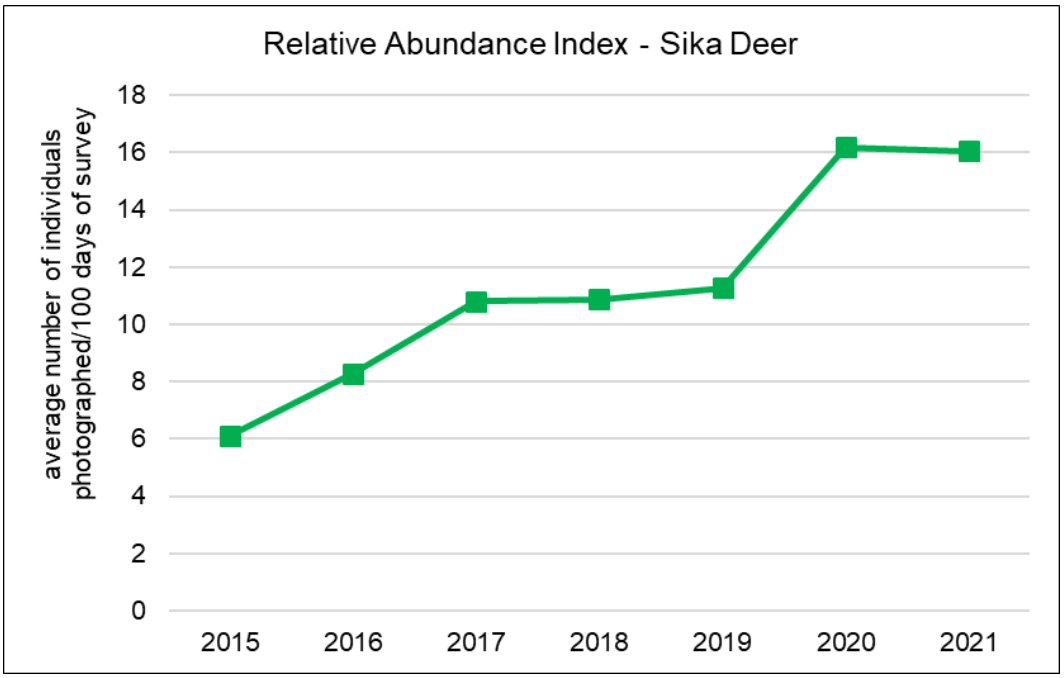
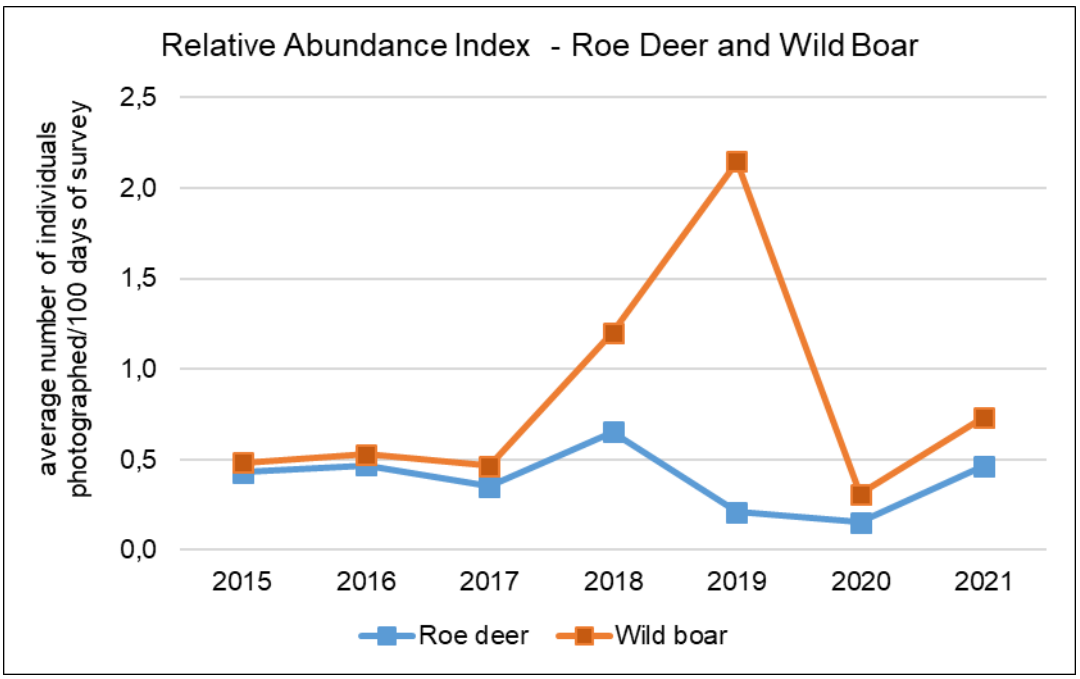


Figure 3. Relative Abundance Index (average number of individuals photographed/100 days of survey) of roe deer and wild boar in the combined study area, 2015-2021.



Objective 2. Deploy anti-poacher camera traps

Activity 2.1. Agree on process with LLNP administration & Activity 2.2 Deploy poacher cams.

We met with Yevgenii Stoma, our long-term collaborator at Land of the Leopard National Park, where he serves as the Deputy Director for Protection, and agreed on the process and schedule to deploy six anti-poacher camera traps in 2021. Two traps were deployed in winter 2021, followed by one more in spring, one in summer, and two in autumn (Table 2). They were well hidden along reserve access points believed to be most-used by poachers. Of the 110 total detections of possible violators, 24 (or 22% of the total) resulted in direct response, including 18 removals of individuals for trespassing, 5 fines levied, and 1 criminal case initiated.

Activity 2.3. Include camera trap data in SMART report.

We have been able to successfully integrate anti-poacher camera trap data into SMART reports. Images of violators and of vehicles are now being entered into the SMART database.

Table 2. Results from anti-poaching camera traps in Land of the Leopard National Park in 2021

Camera Trap #	**1**		**2**		**3**		**4**		**5**		**6**	
Date of Deployment	20.03.2021		25.03.2021		23.06.2021		17.08.2021		20.10.2021		29.11.2021	
Total Images	347		323		79		52		99		58	
Images of Violators	32		33		19		3		19		4	
People/Vehicles	32	0	32	1	19	0	3	0	19	0	4	0

Objective 3. Influence Amur Leopard Management

Activity 3.1. Work on Expert Group to develop effective recommendations for National Strategy.
The working group, which consists of 13 individuals from the Ministry of Natural Resources, Land of the Leopard National Park, Lazo Zapovednik, the Moscow Zoo, Severtsov Institute, WWF, Phoenix Fund, and WCS, met on December 17, 2021 to discuss the development of a National Strategy for Amur leopards. It was decided that plans for reintroduction would move forward, and there was long debate about the best site to focus these reintroductions: Ussuriisk or Lazo Reserves. The strongest case for Ussuriisk was that a reintroduction facility is already in place, funded by Severtsov Institute. However, the habitat around Ussuriisk, although close to existing leopard range, is considered less optimal than in Lazo, which is more remote and has high densities of Sika deer. Therefore, the expert group agreed to move forward with construction of a rehabilitation center in Lazo.

Key achievements of this project: (*Please give a bullet point list of key measurable outputs- for example xxx of staff trained in SMART monitoring techniques, xxx camera traps covering xxx km^2*)

- 60 pairs of camera traps set over 913.35 km^2
- 31 individual adult leopards and 3 cubs detected
- 21 adult tigers and 6 cubs detected
- 6 anti-poacher cameras deployed at Land of the Leopard National Park
- 18 trespassers removed from Land of the Leopard National Park, 5 fines levied, 1 criminal case opened
- 1 meeting on the National Strategy for Amur Leopards

Obstacles to success: Give details of any obstacles/challenges to success that the project has encountered. (*Any changes to the project that have affected the budget and timetable of project activities should have been discussed prior to the end of the project)*

n/a

Monitoring and Evaluation: (*Describe the methods used to monitor and evaluate the progress of the project)*

First, we monitored our progress based on our ability to deploy the target number of camera traps within the target deployment period, and the timely collection of units from the field. We have done this for many years now and this year was no exception. While we did lose some traps to thieves, the loss was minimal and we have taken steps to reduce future losses. Next, we evaluated our successes by the number of leopards and tigers we captured on camera, and in deriving a population estimate for our study area that we can compare to past years. This is only possible as the result of multi-year, sustained support from WCCA.

Shared learning: *(How will you share the outputs and learning from your project, in what format and with whom?)*

We produced a 2021 annual report in cooperation with LLNP staff that was shared with the Russian Ministry of Natural Resources. We have worked in collaboration with staff or LLNP in the preparation of a publication on results of leopard monitoring since 2014 in Russian. We are also in discussion over developing an English language publication in a peer-reviewed journal.

Media: *(Please provide a list of publications and media both local and national which mentions the work funded by this project and/or mentions WildCats Conservation Alliance)*

n/a

Have you provided at least 2 blogs? Y/N? Yes

Have you provided at least 10 high quality images with details of the relevant credit? Y/N?

Section III. Appendix (Please populate this section with details from section II)	
Did you carry out camera trapping as part of this project? Y/N yes	
If yes: **Total camera trap nights/days:** 6271	**Total area surveyed:** 913.35 km^2
Numbers of tiger/leopard/prey recorded: 1009 photos of tigers/1137 photos of leopards/1096 photos of prey (ungulates)	**Please include data on other species recorded** yes
Are numbers of tigers/leopards/prey increasing or decreasing in your project area? Please show trends Increasing. Please see Figures 1-3 above.	
Did you carry out other surveys? Y/N no	
If yes: **Please give details**	
Did you carry out patrolling as part of this project? Y/N no	
If yes:	

Total distance patrolled: **(please give figures for different methods, vehicle/foot/boat etc)**	**Total area patrolled:**	
Do you use Patrol Monitoring software such as SMART? Y/N no		
If yes: **Total distance patrolled using patrol monitoring software?**	**How do you collect data? Handheld devices/paper/other? Please give details?**	
Please provide comparison data on from your patrolling over time		
Please provide data on violations recorded/arrests/successful prosecutions		
Does your project work with local communities? Y/N no		
If yes: (please be as specific as possible and include gender split) **Who?**	**What did you do? Was it successful?**	**How many people did you reach?**
How do you measure the success of this activity?		
Did you carry out educational activities with adults or children? Y/N no		

If yes: (please be as specific as possible and include gender and numbers) **Who?**	**What did you do?**	**How many people reached?**
Have you seen behaviour change from these activities? (Please give details of your results and of how this is measured)		
Did you carry out training activities for any staff/community member on the project? Y/N no		
If yes: (please be as specific as possible and include gender split) **Who?**	**What did you do? Was it effective?**	**How many staff trained? How many others trained?**
How do you measure the effectiveness of this training?		
Did you carry out conflict mitigation activities with community members? no		
If yes: **Who?**	**What?**	**How main people did this include?**
Have you seen behaviour change from these activities? (Please give details of your results and how this is measured)		

Were any scientific papers/articles published because of your project? Y/N No
If so, please give details or provide copies.

What it Takes to Survive

Dale Miquelle

It's true that the Amur leopard cat, (*Prionailurus bengalensis euptilura*), a northern subspecies of the Leopard cat, is perhaps not as impressive as its larger cousin the Amur leopard, and of course does not have the charisma of the Amur tiger, but it is one of four cat species inhabiting the southern Russian Far East (the fourth being the Eurasian lynx). And even though the IUCN lists the Leopard cat a species of Least Concern, in Russia it is considered an Endangered species, and is protected by law. And it is a pretty interested cat in its own right. Despite the fact that the Amur leopard cat is generally only slightly larger than your average house cat, it makes a living in the same forests where tigers, leopards, and lynx roam, making it truly the "little kid on the block." To survive in that climate, surrounded by a host of bigger cats, requires a fair amount of grit, determination, and luck.

In the morning of December 23, 2021, a day after returning to Terney, the little village our field research station is based in, we got a call from staff at the Sikhote-Alin Reserve that there was a Leopard cat stuck in a tree just adjacent to the headquarters downtown. This seemed a bit odd, but sufficiently interesting that, despite temperatures that had dropped to around -30^{o} C and howling winds that brought the wind chill factor below -40 ^{o} C, my wife and I jumped into our truck (which miraculously started despite the cold) and drove over to investigate. Kolya Reebin, a reserve staff, was already there, perched on a ladder against a birch tree within a neighbor's yard. Far above Kolya, near the very top of the birch, was a ball of brown fur swaying wildly as the wind whipped the branches to and fro. Apparently, this cat had come out of the forest hoping to raid a nearby chicken coop, and had been chased up the tree by a dog. A second dog, chained up nearby, was a sufficient deterrent to keep the cat from trying an escape. It was not clear exactly what Kolya's plan was, but it was clear that he was not going to be able to reach the cat. It was equally clear that the cat was unlikely to come down while we were milling around beneath it.

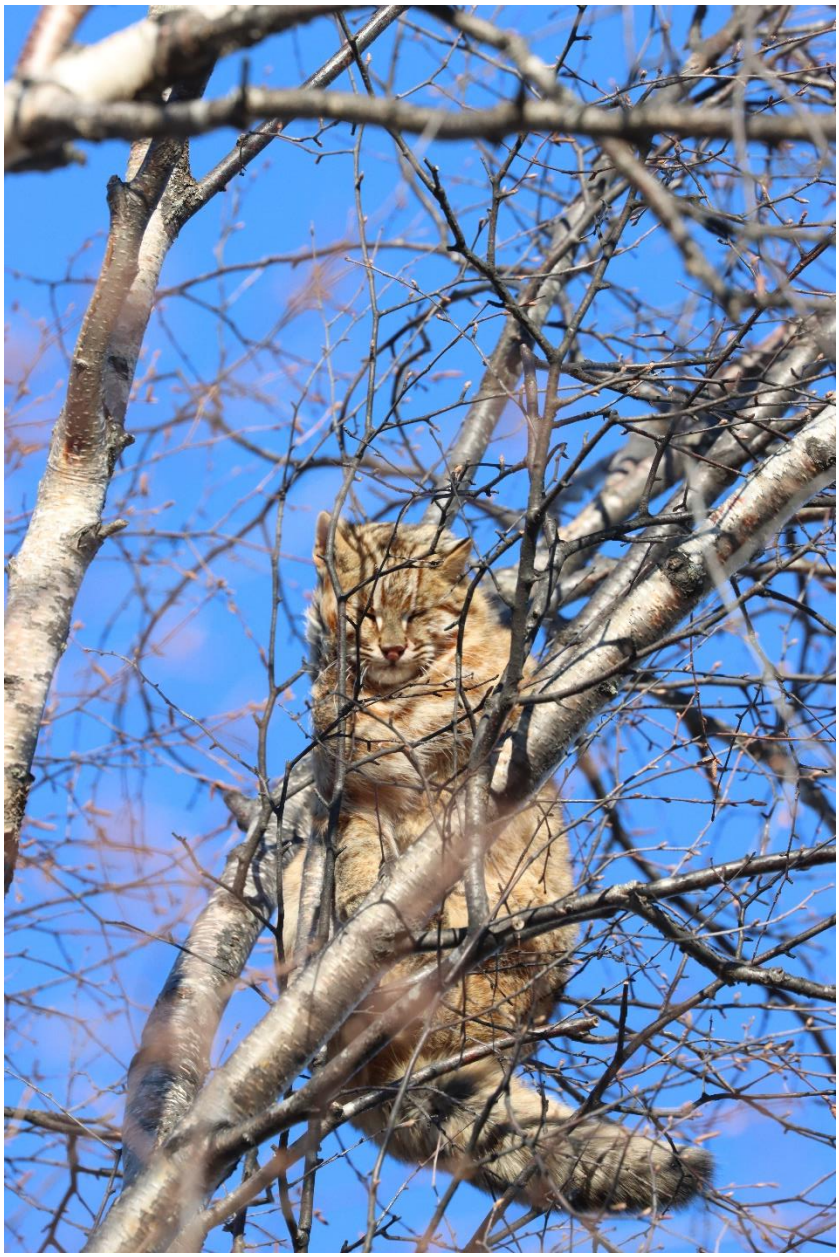
Sometimes, less is more. There didn't seem to be an easy way to encourage this cat out of the tree while gawking at it. Maybe, if left alone for a few hours, it would recognize that the chained dog below was not a threat, and be cold enough to try and make a break for freedom. We retreated and waited.

Kolya called us around 3 pm. The sun was starting to get low, the wind was still howling, and the cat had not moved. Even with the thickest of fur, it had to be freezing up there. My wife and I went up to the WCS garage, loaded the longest ladder we had, found the longest poles we had, and stuffed a plastic tarp into the back of my truck. Down at the reserve, we taped two poles end to end, creating a 7-meter harassment device. Kolya climbed higher into the tree with our longer ladder, while we stretched out the tarp with the faint hope that Kolya might knock the cat out of the tree, at which point we would, fireman-style, break its fall in the stretched out tarp. Getting the pole through the swaying branches and close to the cat far above while hanging on for dear

life was not an easy task for Kolya, but he was at least forcing the cat to move around a bit. And as the cat moved back and forth, we shifted our positions below, waiting for a falling ball of fur.

After 15 minutes, I felt the beginnings of frost bite on my cheeks. How had this cat put up with the bitter cold and wind all day in that tree? This was clearly a beast with grit and determination. But it seemed it was going to need some luck too, because it was becoming clear that Kolya was not going to knock that cat out of the tree. However, instead of waiting for mother luck to arrive, the cat took matters into its own hands. Deciding it had had enough of the harassment, the forest cat leapt to a neighboring tree, skidded down the trunk, and zipped around the corner of the house before we had a chance to realize what had happened. My wife and I hurried after the cat to the back of the house, where we watched it hightailing across the frozen Serebryanka River, disappearing into the brush on the other side.

Driving back up to our house, trying to warm my frozen cheeks, I was thinking that, while we hadn't saved any tigers today, nor any leopards, we had at least given one wild cat a second chance. Despite its size, it was clear that this cat had what it takes to survive in this challenging climate. It might not be the biggest cat in the Far East, but pound for pound, it's no doubt one of the toughest!



A Big Family

By Aleksandr Rybin

We have been monitoring Amur leopards and tigers in southwest Primorski Kray since 2003. For the first time in nearly two decades, this year, we observed an adult tiger with four cubs! Perhaps in more southern climes, such as India or Thailand, this is not so rare. But here, on the snowy edge of global tiger range, where prey densities are much lower than in the subtropics, successfully raising four cubs is a massive accomplishment.

It is worth noting that these young tigers are already about eight months old. Our data suggest that, on average, only 50% of cubs live to their first birthdays. That four cubs are still alive and apparently healthy indicates that their home is well protected, and that the number of deer and boar is high enough for the tigress to feed such a large gang.

We have already set out camera traps for the 2022 season, and are hopeful that when we collect them in May, we will see more images of this big, beautiful family.