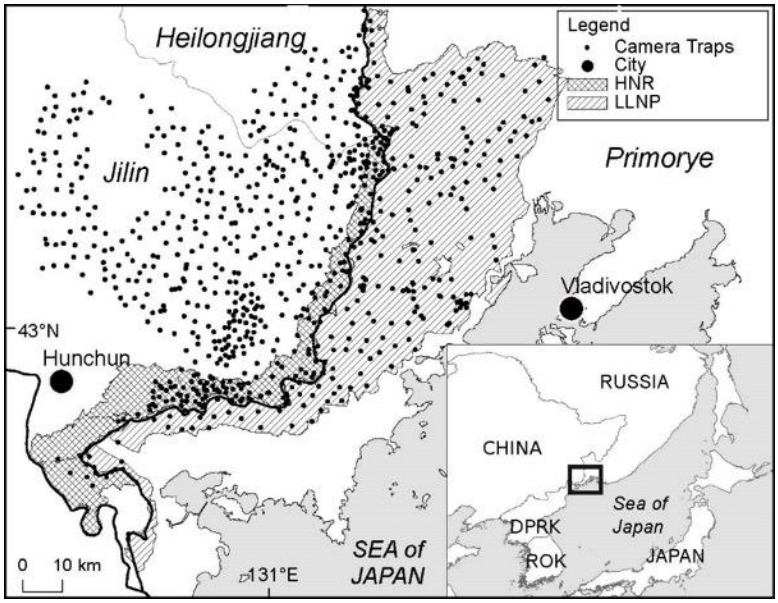
This report will be made public. If it contains confidential or sensitive information, please also provide a revised report for sharing with the public.

Section I. Project Information	
Project Title: Monitoring Populations of Amur Leopards and Tigers in Northeast China	
Grantee Organisation: Wildlife Conservation Society (WCS)	
Location of project: Hunchun Nature Reserve (HNR) and adjacent lands within Northeast China Tiger and Leopard National Park (NCTLNP), Hunchun County, Jilin Province, China, at approximately 42.41972 N, 129.86416 E  Map from: Vitkalova, AV, L. Feng, AN Rybin, BD Gerber, DG Miquelle, T Wang, H Yang, EI Shevtsova, VV Aramilev, and J Ge. 2018. Transboundary cooperation improves endangered species monitoring and conservation actions: a case study of the global population of Amur leopards. Conservation Letters e12574. DOI: 10.1111/conl.12574	
Size of project area (if appropriate): About 5,000 square kilometers	**No of tigers and / or Amur leopards in project area, giving evidence & source:** During the reporting period, WCS photographed 44 Amur tigers and 29 Amur leopards in HNR and Dahuanggou.
Partners: *(Please give details of partners, including communities, academic institutions etc. for this project.)* The Northeast China Tiger Leopard National Park (NCTLNP) administration is our primary partner, especially the Hunchun Bureau Branch (also called HNR Administration) and Hunchun Municipal	

Bureau Branch (also called Hunchun Municipal Forestry Bureau). We've been working on monitoring projects with them since before they became part of NCTLNP and are a trusted partner.
Project Contact Name: (*main contact via email)* Aimin Wang, Jonathan Slaght, Scott Waller
Email: awang@wcs.org; jslaght@wcs.org; swaller@wcs.org
Reporting period: February 1, 2022 – January 31, 2023

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 envision a future in which viable populations of Amur tigers and leopards are dispersed across the major forested landscapes of northeast China, connected to each other and Russian populations by ecological corridors. This year, we expanded our camera trap monitoring system in HNR to monitor these endangered big cats, and we facilitated information sharing with an important partner, NCTLNP. It is only due to long-term monitoring efforts like this that we can demonstrate an increase in tiger and leopard numbers in northeast China over time and evaluate the success of conservation actions in the region, such as the recent creation of NCTLNP. Long-term monitoring of tigers, leopards, their prey, as well as human use also allows us to compare conditions between sites and identify priority conservation actions to help us recover wild populations of Amur tigers and leopards. The area in northeast China where tigers and leopard populations can grow is expansive and managed by many different groups. The data sharing agreement we have with NCTLNP is therefore an important starting point for broader collaboration among stakeholders to take action to restore populations of these cats, and to apply proper monitoring methods so that we can document the results of those actions.

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

Through this grant, we expanded our camera trap monitoring of Amur tigers and leopards in both Hunchun Nature Reserve and Dahuanggou. Critical to this success was our collaboration with research staff at NCTLNP. This collaboration allowed us to pool resources to conduct monitoring across the entire extent of HNR, and our analysis of the resulting data provided a more complete understanding of the status of the tiger and leopard populations that straddle the Sino-Russian

border. We found multiple signs that this population is growing and expanding, and we documented multiple females with cubs, which are the key to promoting population expansion further inland into China. In Dahuanggou, we found a greater human presence, fewer prey, and consequently fewer tigers and leopards. Comparing these two areas highlights the need for more conservation work in Dahuanggou. Our partnership with NCTLNP is a strong example of the benefits that come with collaboration. We aim to continue encouraging collaboration with more partners to further expand the leopard and tiger conservation and monitoring network across Northeast China.

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

The WCS China Program has for years played an important role in the conservation of Amur leopards and tigers in northeast China, with most of our focus in Hunchun and surrounding areas. In 2022, with support from the WildCats Conservation Alliance, we continued our 10th year of camera trap monitoring within Hunchun Nature Reserve (HNR). Together with the Hunchun Bureau Branch of the NCTLNP, we deployed 115 pairs of camera traps in HNR and 30 pairs of camera traps in Dahuanggou, to the west. After analyzing photographs taken by these cameras, we identified 40 individual tigers and 28 individual leopards in HNR, including 4 tiger family units. This is an impressive increase from the 3 leopards and 7 tigers we found when we first started monitoring in 2013. Compared with 16 tigers and 16 leopards in 2021, 80% of the new tigers and 50% of new leopards in 2022 were due to the wider area and more cameras. In Dahuanggou, we identified 4 individual tigers and at least 1 leopard. This camera trap effort was part of a collaborative effort with the Hunchun Bureau Branch of NCTLNP to obtain monitoring data for the whole reserve. Our agreement with NCTLNP is an important starting point to encourage wider collaboration among stakeholders to document the status of Amur leopards and tigers across northeast China and determine which conservation actions are most likely to benefit these species.

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)*

<u>Objective 1: Monitoring populations of Amur leopards and tigers in Hunchun.</u>

Activity 1.1. Continue camera trap monitoring in HNR.

In 2022, we cooperated with the Hunchun Bureau Branch of NCTLNP to carry out camera trap monitoring in HNR, covering approximately 1,035 km^2 of key habitat for Amur tigers and leopards (Figure 1). WCS had the responsibility of deploying camera traps in the southern half of HNR, while Hunchun Bureau Branch took the responsibility for the northern half. In June, we changed out memory cards and replaced batteries from 50 camera trap sites of the southern HNR and deployed additional cameras at 65 sites in the northern HNR. After collecting memory cards again in November 2022, we produced a dataset from 50 sites in the southern HNR from November 2021 to November 2022, and 65 sites in the northern HNR from June to November 2022. Together, these cameras functioned for a total of 46,587 trap nights and produced 85,820 images and videos of wildlife and human activity. The raw data of tigers and leopards received from these camera traps

are presented below (Table 1). During the monitoring period, three cameras and seven SD cards were stolen.

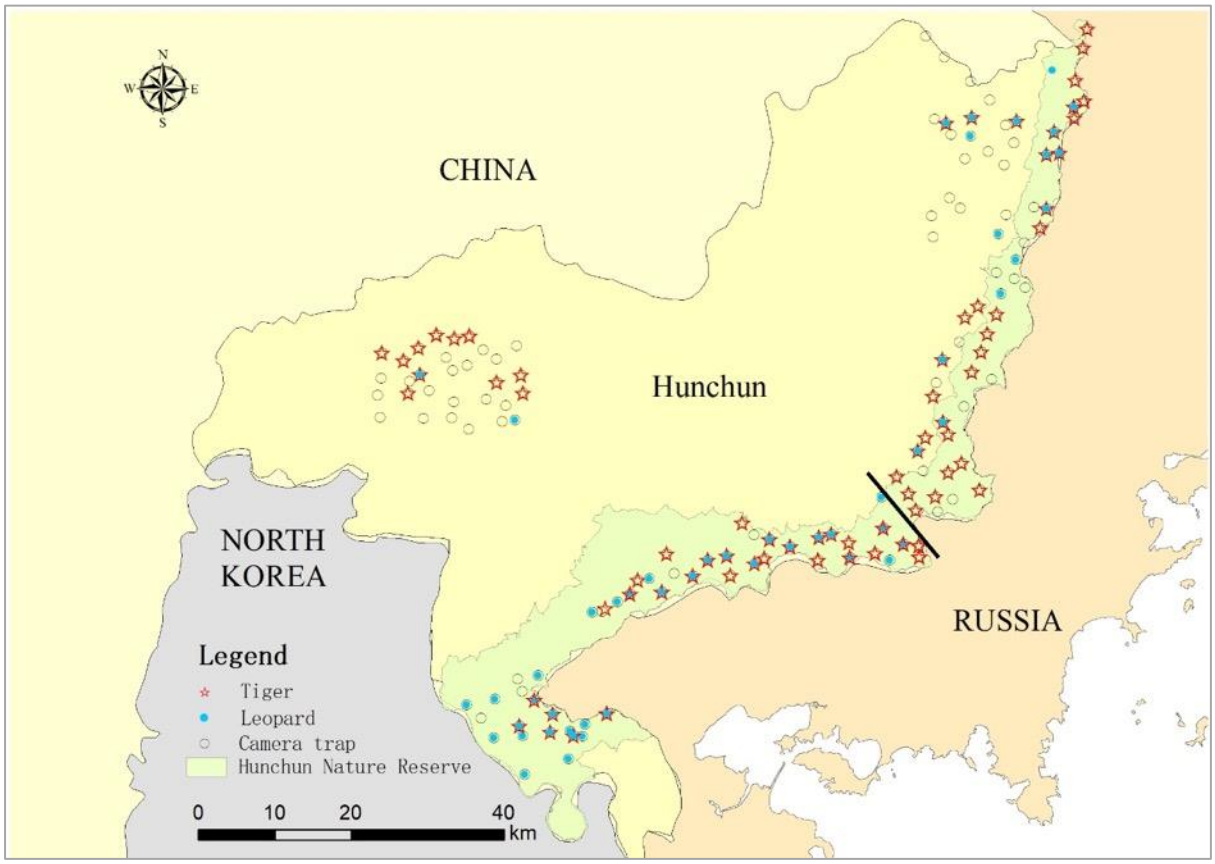


Figure 1. Locations of camera traps used to monitor Amur leopards and tigers in Hunchun Nature Reserve, as well as the Dahuanggou site to the west. Cameras where at least one tiger and/or leopard were detected are shown by shape and color.

During the monitoring period, Amur tigers and leopards were captured at 83 of the 115 camera trap locations (72%). Tigers were seen at 63 sites (55%), while leopards were photographed at 50 sites (43%). Thirty sites (26%) detected both species. By analyzing the unique stripe patterns of tigers and spot patterns of leopards, we identified 42 individual tigers (11 males, 9 females, and 20 of unknown sex) and 28 leopards (14 males, 8 females, and 6 of unknown sex). Of the 40 tigers identified by our team, 12 individuals had been seen in previous years and 30 were new individuals (including four family units: three were found in the middle of HNR and one in northern part of HNR). Of the 28 leopards photographed, 14 were recorded in the past and 14 were seen for the first time. We provide some sample images of these animals below (Figures 2-3).

Table 1. Summary of detections of Amur tigers and leopards from camera trap monitoring by WCS in 2022.

	Common Name	Encounters	Sites Represented	Images/Videos	Individuals
HNR	Amur tiger	615	63	1750	40
	Amur leopard	188	50	447	28
Dahuanggou	Amur tiger	41	11	106	4
	Amur leopard	2	2	3	1

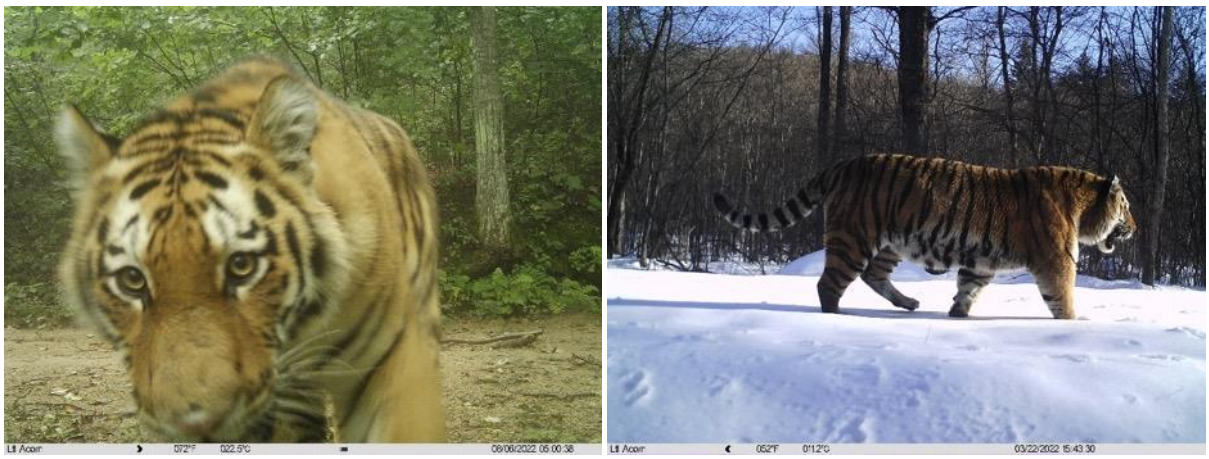


Figure 2. Two Amur tigers captured by our camera traps in Hunchun Nature Reserve during the 2022 monitoring season. Photos © WCS China

Figure 3. Two Amur leopards captured by our camera traps in 2022. Photos © WCS China

We have carried out camera monitoring in HNR for ten consecutive years, and the number of individual tigers and leopards we have observed has been increasing year by year (Figure 4). The great increase in numbers this year is partly explained by the increase in the area and number of cameras we used to conduct monitoring, thanks to our collaboration this year with NCTLNP research staff. We estimated that 80% of the new tigers and 50% of new leopards in 2022 were due to the wider area and more cameras, which indicates that tigers and leopard populations continue to increase in abundance. With the establishment of NCTLNP, the government has invested more effort in protection and restoration work, which has consequently improved the quality of habitat and created favourable conditions for tigers and leopard populations to become established and expand. Just this year, 15 female tigers and 5 female leopards were recorded with cubs in HNR, with a total of 33 tiger cubs and 8 leopard cubs. These are very encouraging findings, and we are looking forward to the continued restoration and expansion of the population, with HNR acting as a “source site” from which tigers and leopards can disperse into the interior of China.

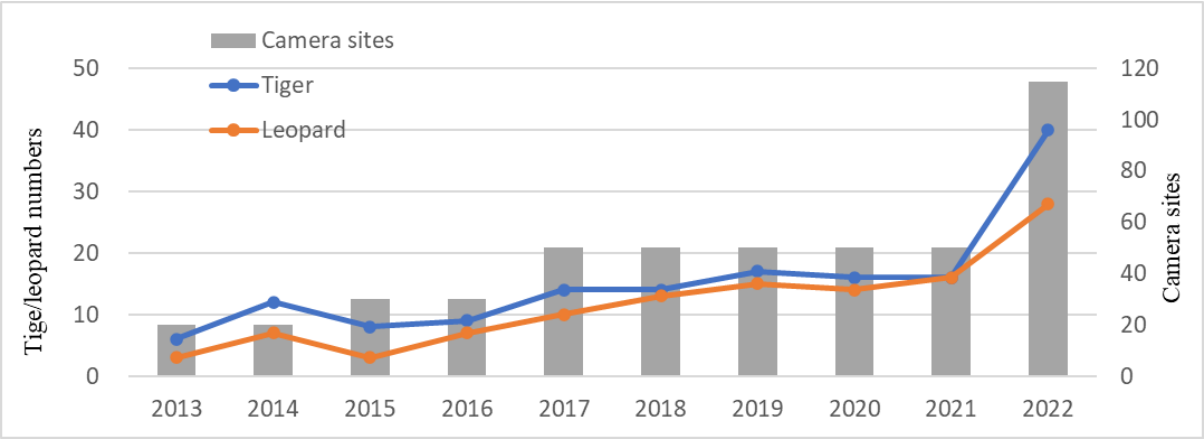


Figure 4. Trend of tiger and leopard population over the years in HNR.

In addition to Amur leopards and tigers, we also recorded other mammals, including wild boar, roe deer, sika deer, Asian badger, Manchurian hare, Asiatic black bear, red fox, leopard cat, raccoon dog, and yellow-throated marten. We analysed the data from June to November and found that human activity accounted for 39% of all captures, mainly of cattle, humans, and vehicles. Wildlife accounted for 61% of all captures, mostly ungulates (>79% of all animals), with sika deer accounting for about 78% of all ungulates (Figure 5). For ungulates, we analysed the data of the southern HNR from 2020 to 2022. According to the relative abundance index (RAI), sika deer were the most abundant prey species, significantly more than roe deer and wild boar. Their populations appear to be stable based on the last three years, as any trend over the years is not obvious (Figure 6).

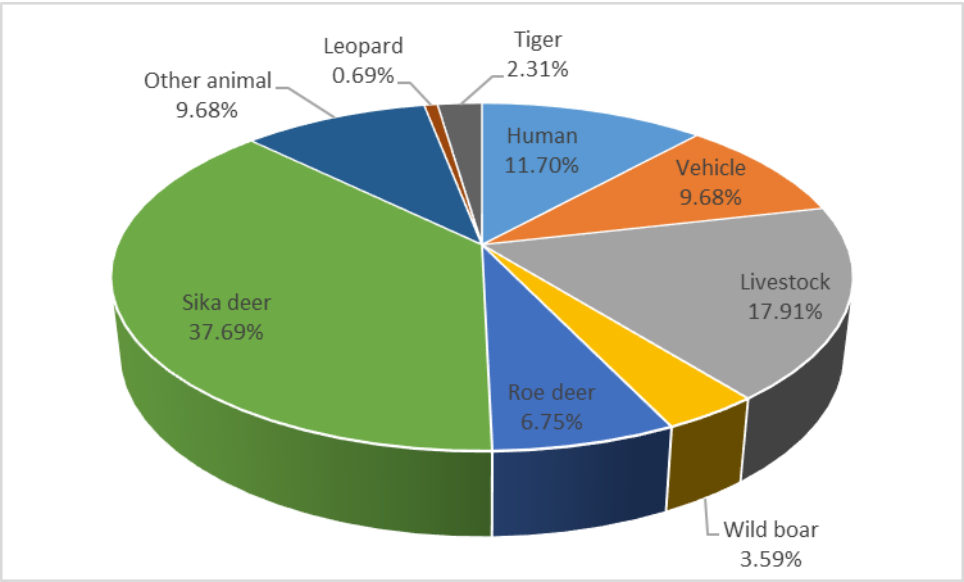


Figure 5. The proportion of human activities and wild animals in HNR.

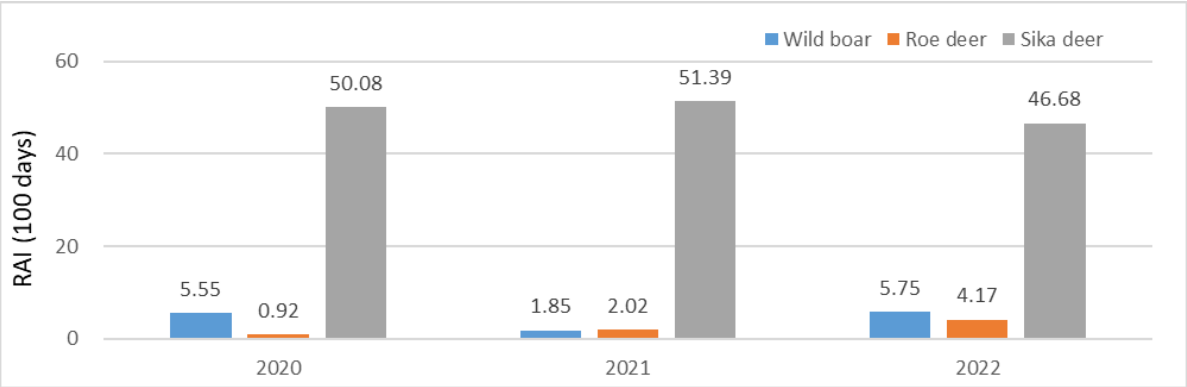


Figure 6. Estimates of relative prey abundance from 2020-2022 in HNR. Relative abundance indices (RAIs) are calculated as the number of independent detections of each prey species per 100 days of monitoring, averaged across cameras.

Activity 1.2. Continue and expand camera trap monitoring in Dahuanggou.

In 2022, we continued camera trapping in Dahuanggou (Figure 1). In addition to the original 20 sites, we added 10 more for a total of 30 sites that cover approximately 270 km^2 of Amur tiger and leopard habitat. We completed camera maintenance three times throughout the year, and then combined all images for a complete dataset including detections from November 2021 to November 2022. This monitoring period included 14,981 trap nights in Dahuanggou, during which we obtained 59,183 images and videos of wildlife and human activity. The raw data for tigers and leopards from Dahuanggou are presented in Table 1.

During the monitoring period, tigers were captured at 11 sites (37% of sites), and a single leopard was captured at 2 sites (7% of sites). Only one site had both tigers and leopards. We identified 4 individual tigers (1 male and 3 females), all of which had been captured in past monitoring efforts. Identity of leopards from three photos was not possible (only the tail was captured in one photo and the spots were unclear in two others) so it is possible that there are more leopards than we could identify in this site (Figure 7).

Figure 7. Photos of leopards captured in Dahuanggou.

Just as in HNR, we also recorded detections of other mammals. While the species composition was the same as in HNR, the proportions were different. We analysed the data from June to November and found that human activity accounted for 84% of all captures (Figures 8), including cattle, humans, and vehicles. Cattle accounted for a significant proportion of the non-wildlife captures, mainly due to grazing in the forest from May-October. This amount of human-related detections

stands in stark contrast to HNR, where human presence was considerably rarer, there were more prey, and many more tigers and leopards. In Dahuanggou, wild animals accounted for 16% of all captures, and most of these were ungulates (>70% of all animals). Roe deer accounted for about 58% of ungulate captures. Based on ungulate RAIS from 2020-2022, roe deer were the most abundant prey species, followed by wild boar. There were very few sika deer detected, in contrast to the number of prey detections in HNR (Figure 9). Sika deer numbers will likely have to increase considerably in this area before tiger and leopard numbers will recover.

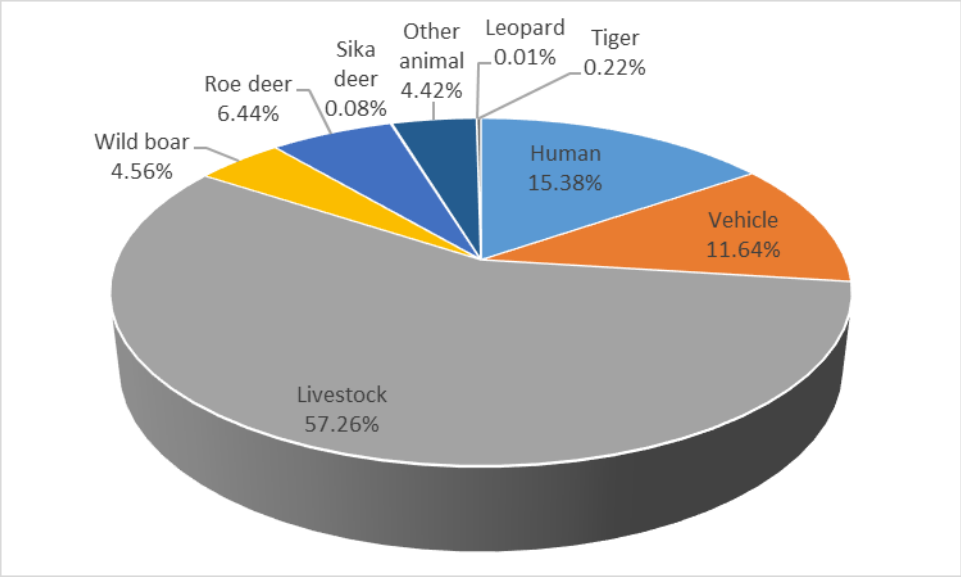


Figure 8. The proportion of human activities and wild animals in Dahuanggou.

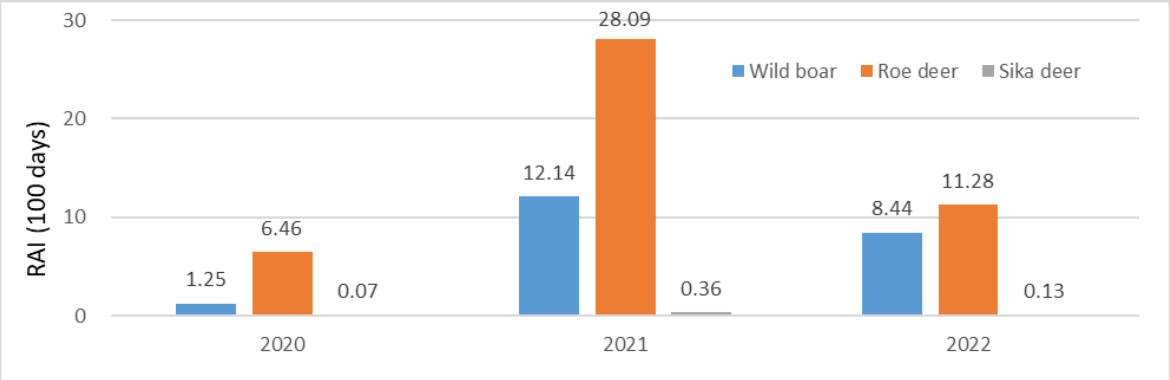


Figure 9. Estimates of relative prey abundance from 2020-2022 in Dahuanggou. Relative abundance indices (RAIs) are calculated as the number of independent detections of each prey species per 100 days of monitoring, averaged across cameras.

Activity 1.3. Data shared with partners to develop comprehensive report.

Cooperating with other conservation and management groups to share camera trap data can help us better understand the status of tiger and leopard populations across Northeast China, and better identify conservation priorities to support the recovery of these populations. During this project period, we had planned to work with the National Feline Research Center for data sharing, but they weren't involved in monitoring at that time, so we cooperated with NCTLNP to carry out camera monitoring within HNR. Thanks to this, we were able to obtain monitoring data across the entire area of HNR. This data suggests that the recovery prospects for tiger and leopard are encouraging. Of course, wider data sharing is a complex process, and it will take some time to form agreements with more partners to expand our monitoring network. WCS plans to continue participating in the process of promoting data sharing as much as possible.

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*)

- 290 camera traps deployed in a 1,305 km^2 study area;
- 44 individual tigers and 29 individual leopards (including 4 tiger family units) detected by our monitoring in HNR—up from a single tiger 20 years ago;
- 4 tigers and 1 leopard detected in Dahuanggou, to the west of HNR;
- Relatively low human presence and high abundance of sika detected in HNR to help support expanding tiger and leopard populations;
- Higher human use and lower abundance of preferred prey in Dahuanggou compared to HNR, highlighting two key areas of conservation priority in this area (prey recovery and reducing human disturbance).

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)*

During the project, we made some minor adjustments. Due to the COVID-19 pandemic, our first maintenance was delayed, so the number of camera maintenance events in the whole year was reduced. This part of the original costs of the project were used as a small part of the fund for NCTLNP to carry out monitoring in the northern half of the HNR, enabling us to finally obtain monitoring data across the whole reserve.

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

Our first indicator of success was the number of pairs of cameras we set up. Our personal, achievable target was 48 sites in HNR and 30 sites in Dahuanggou. Our second indicator of success was the number of camera maintenance trips. We exceeded our original target. In addition to our maintenance of 50 camera sites, we also obtained data from 65 monitoring sites in the northern part of HNR. We visited all cameras three times in Dahuanggou and two times in HNR over the course of the year. This number of trips also ensured reliable battery operation, sufficient storage space on

memory cards, and an unobstructed view of the target trail (especially in spring and summer, when vegetative growth can block the lens).

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

We shared camera monitoring results with local partners through communicating (including exchanging monitoring data), especially the Hunchun bureau branch and Hunchun Municipal bureau branch of NCTLNP.

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)*

None.

Budget Narrative:

Explanations for variances from the proposed budget in the financial report:

1. Personnel: 0 costs in Senior Scientific Officer and Short-term Data Analyst line items

China Program Senior Scientific Officer: the program team could not recruit a suitable candidate during this project period, therefore, the related works were assigned to Project Manager accordingly.

Short-term Data Analyst: the program team could not recruit a suitable candidate during this project period, therefore, the work was instead carried out by WCS staff**.**

2. Overspending in car rental line item

During the project period, the WCS field office cooperated with the Hunchun Bureau Branch of NCTLNP and other local partners to carry out camera trap monitoring in HunChun Nature Reserve, increasing the number of monitoring sites from 50 to 115. Local partners provided infrared cameras and WCS shared vehicles costs. Due to the increased number of sites, the car rental costs were higher than budgeted.

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

Yes (See the attachments)

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

Yes (See the attachments)

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:** 61,568 trap nights	**Total area surveyed:** 1305 km^2
Numbers of tiger/leopard/prey recorded 46 tigers and 29 leopards	**Please include data on other species recorded** Ungulates and other wildlife, and human activities.
Are numbers of tigers/leopards/prey increasing or decreasing in your project area? Please show trends	
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.		