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Winter Track Survey of the Amur Tiger (*Panthera tigris altaica*) in the Southwest Primorsky Province of Russia

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Keywords: Amur tiger | camera trap monitoring | Changbaishan | Land of the Leopard National Park | population dynamics | winter track survey

ABSTRACT

In Russia, range-wide winter track surveys of the Amur tiger (*Panthera tigris altaica*) are conducted every ten years using a standardized methodology based on snow track measurements. The southwestern Primorsky Province of Russia is one of the survey units and the core area for the Eastern Changbaishan population of the Amur tiger. During the 2021/2022 winter track survey, we estimated 43–46 adult and subadult tigers and 12 cubs across 5400 km^2 of suitable habitat. This figure represents a twofold increase compared to the 2014/2015 winter survey results. This is twice the number recorded in the 2014/2015 winter survey. Minimum counts derived from camera trap data confirmed an increase from 23 to 54 adults and subadults between the two surveys – 17% higher than the track survey estimate. Since 1996, the Amur tiger population in the region has grown more than sixfold and has become a source population for the subspecies restoration in the neighboring Jilin and Heilongjiang Provinces of China.

1 | Introduction

The southwest Primorsky Province of the Russian Far East and the Laoyeling Mountains of Northeast China are home to two iconic felids: the small, isolated Eastern Changbaishan (East Manchurian) population of the endangered Amur tiger (*Panthera tigris altaica*) and the only wild population of the critically endangered Far Eastern leopard (*Panthera pardus orientalis*). Both species are of the highest national and international conservation priority and have been the focus of targeted conservation efforts in recent decades. Historically, these big cats occupied vast expanses of Northeast Asia, including Northeast China, the Korean Peninsula, and the southern portion of the Russian Far East. However, both species experienced severe range reductions during the late 19th and early 20th centuries (Gao et al. 1993; Matyushkin et al. 1996; Pikunov et al. 2009; Yu et al. 2009).

The main population of the Amur tiger inhabits the Sikhote-Alin Mountains in Russia. Over the past decade, a new breeding population has been established in the Lesser Khingan Mountains through the release of orphaned and conflict tigers after rehabilitation. Our article presents an analysis of the Amur tiger in the southwestern Primorsky Province of Russia, which is part of the Russian-Chinese Eastern Changbaishan population. This population is geographically separated from the main tiger population in the Sikhote-Alin Mountains by a development corridor along the Razdolnaya River to Khanka Lake (Darman and Williams 2003; Miquelle, Rozhnov, et al. 2015). This anthropogenic barrier, which includes highways, railroads,

Summary

Practitioner Points

- The snow track survey in winter 2021/2022 provided the most recent data on the abundance and distribution of the Amur tiger in southwest Primorsky Province of Russia. These results are crucial for assessing the status and dynamics of the entire Eastern Changbaishan population of Amur tigers.
- Analysis of long-term data from the winter track surveys suggests a sixfold increase in this population since 1996. This trend indicates a successful case study in Amur tiger conservation in the region.
- Concurrent camera trap surveys revealed that winter track counts might underestimate the true population size under certain conditions. This discrepancy allows for cross-validation of the results stemmed from different monitoring techniques, enhancing the reliability of population estimates.

agricultural lands, and the water body itself, limits the dispersal of large carnivores and contributed to the genetic distinction of the Eastern Changbaishan tiger population over time (Henry et al. 2009; Sorokin et al. 2016; Jeong et al. 2024).

The objectives of our study were (1) to conduct a comprehensive winter track survey to obtain up-to-date data on the abundance, distribution, sex, and age structure of the Amur tiger population in the southwest Primorsky Province of Russia, (2) to compare the population estimates from winter track surveys to camera trap data, and (3) to analyze the dynamics of the Amur tiger population in the Eastern Changbaishan region since 1996.

2 | Materials and Methods

2.1 | Study Area

Southwest Primorsky Province (SWP) stretches southwestwards for more than 200 km from the Razdolnaya River to the junction of the borders of Russia, China, and North Korea. The wide river valley separates SWP from the Sikhote-Alin mountain range. The region is limited by the Sea of Japan on the east, and the Russia-China border on the west. The main part of the SWP is represented by a mountainous type of relief formed by the spurs of the East Manchurian Mountains, with maximum altitudes reaching 900 meters above sea level. In the north of the region, there is the Borisovskoe plateau (450–600 m above sea level) with numerous canyons and rocky cliffs. The southern and coastal parts are mainly hilly plains dominated by open woodlands and marshlands with low outcrops towering among them.

The total area of the SWP is 7450 km^2, of which 1800 km^2 have been transformed by human economic activities and 250 km^2 are represented by the open plain in the south part of the study area and swampy valleys of the lower reaches of the rivers. The tiger permanently inhabits 5400 km^2. The most important habitats for tiger are forest stands dominated by Korean pine (*Pinus koraiensis*) and Mongolian oak (*Quercus mongolica*) characterized by the high carrying capacity for wild ungulates. They occupy 1223 km^2 and 2471 km^2, respectively. The area of sparse woodlands covered by secondary forests of oak and black birch (*Betula dahurica*) as a result of frequent fires is 1128 km^2. Riverine forests, meadows, and swamps in river valleys (578 km^2) serve as important habitats for ungulates and tiger movement corridors.

About 60% of the tiger's habitat in SWP is within protected areas: Kedrovaya Pad' State Biosphere Nature Reserve (180 km^2), the Land of the Leopard National Park (2688 km^2), and the southern section of the Poltavsky Provincial Wildlife Refuge (292 km^2). Outside protected areas, tiger habitats are represented by hunting leases (2240 km^2), some of which are included in the buffer zone of the National Park.

The Amur tiger relies mainly on three ungulate species – sika deer (*Cervus nippon*), wild boar (*Sus scrofa*), and Siberian roe deer (*Capreolus pygargus*). According to the 2019 aerial survey, the total number of these three species was estimated at 32–34 thousand individuals, with an average population density of 41 animals per 10 km^2 (Darman et al. 2021). Musk deer (*Moschus moschiferus*) and long-tailed goral (*Naemorhedus caudatus*) are rare, as well as water deer (*Hydropotes inermis*), recently discovered in SWP (Darman and Sedash 2020). Asian badger (*Meles leucurus amurensis*), raccoon dog (*Nyctereutes procyonoides*), Manchurian hare (*Lepus mandshuricus*), and Asiatic black bear (*Ursus thibetanus*) are secondary prey species for the Amur tiger.

2.2 | Winter Track Survey Methodology

The winter track survey method has widespread acceptance in Russia, being simple, inexpensive for very large territories, and quick in terms of sampling and analysis. Estimating Amur tiger abundance is particularly challenging due to heavily forested habitat, low tiger densities, and the elusive nature of tigers. In the Russian Far East, the Amur tiger winter track surveys have been conducted since the 1940s by different researchers, but there was no unified methodology. Such methodology was elaborated in 1995 by a group of leading scientists and conservationists of the Russian Far East (Matyushkin et al. 1996). It was improved during the second range-wide survey and officially approved by the Ministry of Natural Resources and Environment of the Russian Federation in 2005. Since that time, the range-wide Amur tiger winter track survey in the Russian Far East (about 200 thousand km^2) has been conducted once a decade following the standard methodology (Pikunov et al. 2005; Miquelle et al. 2005).

Although winter track survey results rely on expert assessment alongside standardized algorithm, they provide no estimates of error or capture probability (Miquelle et al. 2006). Despite this limitation, track-based monitoring remains the most logistically and financially feasible method for assessing Amur tiger populations at large scale. In contrast, camera trapping – while offering statistically robust data – is typically limited to selected sites due to higher costs and operational constraints (Riley et al. 2017).

The last winter track survey of the Amur tiger in its entire range was organized by the Ministry of Natural Resources and

Environment of the Russian Federation in the winter of 2021/2022, the overall coordination being carried out by the ANO Amur Tiger Center. The SWP is one of the special survey zones, which in turn is divided into survey units of 100–150 km^2. On every survey unit co-ordinators defined 1–3 survey routes that should be covered during the "simultaneous" survey. The transect density within survey units should not be less than 15 km per 10 km^2. Two forms of data collection occurred on survey units – seasonal and simultaneous. In the first case, skilled and trained wildlife managers, hunters, or other residents who spend most of the winter in the area collect information from December to February, opportunistically recording tiger tracks, litters, kills, and mortality cases.

Simultaneous survey implies recording tiger tracks along transects during 2–3 days in February, usually 5–7 days after snowfall. The following data were collected: tiger track measurements (the width of the front, rear, or combined pad print based on the measurements of at least 4 tracks of an animal), and time since track formation (number of days since an animal left the tracks). The field teams photographed each tiger track next to the ruler and marked the track location using the GPS navigator. The measurement error is considered to be less than 0.5 cm. Over time, due to the snow melting, the tiger track distorts and increases in size, which is taken into account when identifying individuals.

The three variables – track size, track age, and independent track spacing – are the critical parameters in estimating tiger numbers. To separate the individuals by sex and age, the following gradations of front pad size are used (Table 1). Tracks of tiger cubs vary widely in size depending on the age, but are easily identified as belonging to cubs by the presence of the female's tracks nearby.

The distance between fresh (≤ 24 h) tracks of different individuals are considered to be no less than: 2.5 km for females with cubs; 3.5 km for females without cubs, 5.0 km for male tigers (1/2 of the mean daily distance moved). The distance between tracks of different individuals with tracks of different freshness must be no less than 12 km for females and 21 km for male tigers (the radius of the home range). Fresh tracks belonging to different individuals of unknown sex and age must be no less than 4.5 km; with tracks of different age, must be no less than 16.5 km (Pikunov et al. 2005; Miquelle et al. 2006).

Each unit co-ordinator gathers together and systematizes the information from seasonal and simultaneous surveys, as well as interview information on tiger sightings and broods collected from local residents. By comparing track size and freshness and the distances between the tracks, the co-ordinator derives an estimate of the likely number of tigers in a unit and provides an estimate of their age and sex. Because of the difficulties in differentiating the sex of animals by track size, a considerable percentage of animals are recorded as unknown sex.

2.3 | Camera Trap Monitoring

Following the establishment of LLNP, the large-scale camera trap network was organized in 2013/2014, covering about 70% of the best remaining habitat of the Amur tiger and leopard in SWP, including Kedrovaya Pad Nature Reserve, the Land of the Leopard National Park and its buffer zone (Vitkalova and Shevtsova 2016). The camera trap network was first designed for monitoring the Amur leopard population; that implies at least one camera trap station installed in a grid of 5×5 km (the minimum home range size of female Far Eastern leopard). The network works well for registration of Amur tiger, bears, ungulates, and other wildlife.

We use the following camera trap models for monitoring – ScoutGuard, Seelock, Bushnell, Reconyx, and Browning. For the installation of camera traps, trails developed by animals along the southern edges of plateaued ridges or on blade-like ridges and spurs where animals could not avoid passing by the camera traps were most commonly chosen. The cameras were attached to trees so that the infrared sensors were 45–50 cm above ground and at a distance of 3.5–4 m from the trail.

The identification of individuals was carried out using the "Extract Compare" program (http://conservationresearch.org.uk/), which uses the data contained in a Microsoft Access database. All tigers were divided into two age categories: adults/subadults, and cubs (juvenile animals dependent on their mothers). The main criteria for determining gender were external genitalia or the presence of cubs. If there was insufficient information to define gender, individuals were labelled as "unknown sex" until better photos became available. For methodological details, see the works of Matiukhina et al. (2016) and Vitkalova et al. (2023).

To ensure comparative results, we used camera trap data only for the same period as the winter track survey – December-February. It is assumed that during that period the population remains demographically closed. The number of adult and subadult individuals registered during the survey period was used as an indicator of the minimum population size. Such absolute number of tiger individuals is more comparable with the data of winter track survey than with statistical modeling of the possible population size.

TABLE 1 | Front pad width measurements of wild Amur tigers in cm, from Kerley et al. (2005).

	Female				Male			
Age classes	***n***	**Mean**	**SD**	**Range**	***n***	**Mean**	**SD**	**Range**
Cubs (1–1.5 years)	5	8.5	0.5	8.0–9.0	5	10.3	0.7	9.5–11.0
Subadult (1.5–3 years)	5	9	0.3	8.6–9.5	4	10.6	0.3	10.4–11.0
Adult (> 3 years)	10	9.2	0.4	8.5–10.0	12	11.4	0.6	10.5–12.8

In this article, we use camera trap data only to prove the possibility of using old Amur tiger monitoring data, because winter track surveys have been conducted in Russia since the 1940s. A detailed analysis of the camera trap database of the Land of the Leopard National Park is currently underway, and the results will be published later as a separate article or monograph, as was done for the Far Eastern leopard (Vitkalova et al. 2023).

3 | Results

During December 2021 to February 2022, rangers and researchers of protected areas, wildlife managers of hunting leases, and border guards, recorded tiger tracks and other related information in the seasonal diaries. Then in February 20–22, 2022, the simultaneous survey was carried out after a sufficient snowfall (5–8 cm), which took place on February 16 and covered the old snow footprints. Totally, 86 people participated in the survey, including 41 rangers and researchers of the Land of the Leopard National Park. The border guards provided assistance in collecting information along the Russia-China border. Officers of the Directorate of Wildlife Refuges of Primorsky Province were responsible for surveying Poltavsky Provincial Wildlife Refuge. In the rest of the territory, the survey was carried out by wildlife managers and hunters of hunting leases. Overall, information from 30 seasonal diaries were obtained (172 tiger tracks). During the simultaneous survey, 102 routes with a total length of 1514 km were traveled on foot and by vehicles, and information on 165 tiger tracks was recorded (Figure 1).

In the southernmost part of the SWP, insufficient snow cover made the survey difficult. The main data were obtained as a result of records made by local residents, hunters and border guards, including visual observations, photo and video records, and tracks on mud and dust on the roads. However, given the small number of tigers in this part of the study area and the very narrow strip of suitable habitats, the estimated figure of 6 individuals can be considered close to real. The low density in the northern units also allowed us to easily identify individual tigers from tracks. The central part of the Land of the Leopard National Park turned out to be the most difficult to identify tiger individuals due to high tiger track densities. For instance, up to 12 different tiger tracks were found along one transect, while in one river basin, different-sized tracks were recorded, which could belong to 4–5 individuals.

The analysis of all the data obtained allowed us to estimate the total number of tigers in the SWP territory at 55–58 individuals, including 12 cubs (Table 2). Up to 11 resident males and 20 females were identified (sex ratio 1:1.82). Another 12–15 tigers can be classified as sub-adults, including probably 4 males and 5 females. Therefore, the total number of adult and subadult tigers was 43–46 individuals.

During the simultaneous survey, tracks of only 9 cubs were recorded, in four cases together with a tigress, and the rest of the cubs were not accompanied by the mother. According to the maximum estimate, together with the data from the seasonal survey, 9 tiger litters, totaling 12 cubs, were documented in winter 2021/2022 (3 litters of 2 cubs, and 6 litters of 1 cub). The average litter size was only 1.33, which suggests that the number of cubs was underestimated. The measured pad width for tiger cubs ranged from 4.5 cm to 8.5 cm. A female tiger with two cubs of approximately 6–7-month-old were encountered visually in January.

At the same time, tigers move freely across the border to China, where they use suitable habitats in nearby Hunchun department of Northeast China Tiger and Leopard National Park (Ning et al. 2019). In one case, tracks of a large male were found near the border, which was not registered anywhere else. There are also tracks of a tiger cub near the border, but the tigress was probably around on the Chinese side. The southernmost tiger registration, an adult male, occurred in the basin of the Tesnaya River near the Kraskino-Hunchun international border crossing post. An adult tigress lives here as well, recorded by border guards on surveillance cameras at outposts.

The winter track survey strongly depends on snow conditions, which is very uneven across SWP, especially in the south of the study area. In addition, counting tiger individuals based on track size, freshness, and spacing, more than twice strongly depends on subjective factors. Hence, the criteria do not provide an unambiguous estimate of the number of tigers (Miquelle et al. 2006). Taking into account all of the above, we used for comparison the camera trap surveys which allowed identifying individual tigers by their unique stripe patterns.

We selected Amur tiger camera trap data for the same period as the winter track survey. In December 2021 to February 2022, the camera trap network of 208 stations covered 3619 km^2, including Kedrovaya Pad State Nature Biosphere Reserve, Land of the Leopard National Park and its buffer zone. The sampling effort totaled 8263 camera trap nights. Overall, 1,104 images of Amur tiger were obtained, from which we identified 54 adult/subadult tigers (30 females and 24 males), and 13 cubs. Tigers were registered at 69% of camera trap stations, up to 5 adult/subadult individuals per station in the core zone of Land of the Leopard National Park (Figure 2).

4 | Discussion and Conclusion

According to the results of the first range-wide Amur tiger winter track survey in Russia, 7–9 individuals (including 1 cub) were estimated in SWP in 1996 (Matyushkin et al. 1996). In 2005, there were 11–13 tigers, including 2–4 cubs (Miquelle et al. 2005). The co-ordinators were the same for both surveys, and the total length of the survey routes was similar (1041 and 1191 km). Therefore, it seems unlikely that the interpretation of tiger numbers will vary significantly between these surveys. During an additional, more intensive, winter track survey in SWP in 2000 (1535 km), 9–11 tigers were found, including 1 cub (Pikunov et al. 2000), which generally confirms the ten-year trend. A stable or insignificant increase was estimated for the entire Amur tiger population in the Russian Far East as well: 415–476 individuals in 1996 and 428–502 individuals in 2005 (Matyushkin et al. 1996; Miquelle et al. 2005). The range of values between "relaxed" and "conservative" criteria are intended to represent the likely error in estimating tiger numbers.

During the next range-wide winter track survey in 2014/2015, more than twice the number of tigers were counted in the SWP

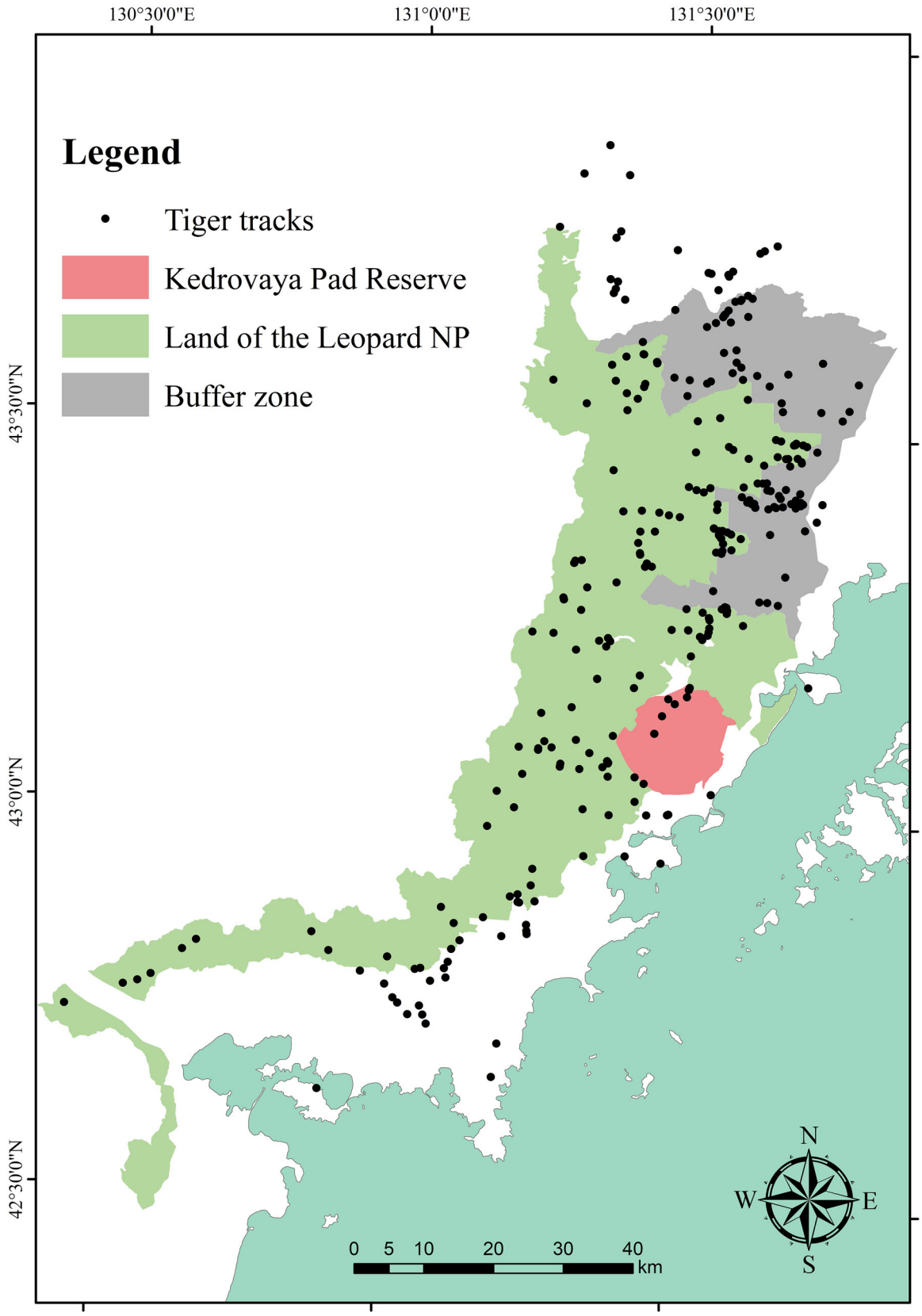

FIGURE 1 | Southwest Primorsky Province, Russia, and Amur tiger tracks recorded during the winter track survey in 2021/2022.

on the same routes as in 2000 (1580 km). According to a "conservative" estimate, it was 21 adults/subadults, with a possible maximum of 25 individuals, plus 6–7 cubs. The total number of Amur tigers in the entire Russian Far East increased by only 15%, to 523–540 individuals, including 98–100 cubs (Aramilev et al. 2016). There have also been more reported cases of the tiger enlarging its range, including in northeastern China. Surprisingly rapid growth was observed in key

TABLE 2 | Expert estimate of the Amur tiger population on the territory of Southwest Primorsky Province, Russia (based on a snow footprint survey in the winter of 2021/2022).

Sex and age	Number	%
Male adult	11	19.0
Female adult	20	34.5
Female with 1 cub	*6*	
Female with 2 cubs	*3*	
Female without cubs	*11*	
Sub-adult of undetermined sex	12–15	25.8
Cubs	12	20.7
Total	55–58	100.0

territories, the core of which are protected areas (1.6 times on average, and 2.5 times in SWP).

Preliminary data obtained during the last range-wide winter track survey in 2021/2022 showed a 1.4-fold increase in the entire Amur tiger population, to 751–787 individuals, including 200-210 cubs (Strategy... 2024). This number includes a new breeding group of 21–24 tigers which was formed in the Lesser Khingan Mountains on the north bank of the Amur River as part of a reintroduction program (Rozhnov et al. 2021). In the SWP, the population growth was even greater; we counted 2 times more tigers than in the previous study conducted in 2014/2015. The high proportion of cubs (21.9% in 2015, and 20.7% in 2022) indicates the reproductive capacity of the Eastern Changbaishan Amur tiger population.

In 2014/2015, data from camera traps from key tiger protected areas in the Russian Far East (Anuisky National Park, Sikhote-Alinsky Nature Reserve, Zov Tigra National Park, and Lazovsky Nature Reserve) were used to verify the results of winter track surveys for the first time. From 13 to 60 camera trap stations (one pair per 28–65 km^2), which operated for 60–180 days (a total of 148 camera stations and about 20,000 camera/days) were functional in the protected areas in the season 2014/2015. According to the results, both methods provided almost the same estimated number of adult/subadult tiger individuals. However, juvenile individuals were better identified by snow tracks because not all tiger litters are captured in camera traps (Aramilev et al. 2016). In December 2014 to February 2015, the territory of the Land of the Leopard National Park and the Kedrovaya Pad Nature Reserve was covered by a network consisting of 154 camera stations, the survey effort and amount of image data were 8,034 and 354, respectively. During the survey period, 23 adult/subadult tigers were recorded (Matiukhina et al. 2016), while according to the results of the winter track survey, the total number in these protected areas was estimated at 21 adult/subadult tigers (Aramilev et al. 2016).

In December 2021 to February 2022, the SWP camera trap network recorded 17.4% more adult/subadult tigers than during the winter track survey (54 and 46 individuals, respectively), while the number of cubs was approximately the same (13 and 12). Thus, with a high density and a large number of young dispersing tigers with a similar size of pad, snow winter track survey data may underestimate the number of tigers due to the peculiarities of collecting and interpreting track data by the coordinators. But both methods demonstrated population growth of 2.0–2.4 times in 7 years (Figure 3A).

Our data demonstrated that, in general, the winter track survey is likely to generate valuable data on demographic trends. In Sikhote-Alin Biosphere Reserve (Soutyrina et al. 2013), the comparisons to estimates based on tiger snow tracks, camera trapping, and radio-collared animals generally support the interpretations of population size and structure. The long-term winter track surveys in this unique protected area allowed to analyze the population dynamics of Amur tiger during 1966–2012 (Miquelle, Smirnov, et al. 2015). Dale Miquelle believed that because the same methodology has been applied throughout the entire period of study, the values accurately reflect trends in population, although error is clearly associated with an unknown level of detectability. Using this, we can plot the changes in the number and structure of the Amur tiger population in the SWP over the past 26 years, based on the same method of winter track survey (Figure 3B).

The results obtained demonstrate an amazing example of the recovery of the Amur tiger population in the SWP - it has increased sixfold since 1995. Our research has provided new data on the abundance and distribution of the Amur tiger in the SWP. The data obtained were used in the preparation of the "Strategy for the Amur Tiger Conservation in the Russian Federation until 2034" (Strategy... 2024), which was approved by the Ministry of Natural Resources and Environment of the Russian Federation on September 19, 2024.

An analysis of the results of long-term monitoring made it possible to assess the effectiveness of environmental protection measures. First of all, this happened because since 1995, the network of protected areas in the SWP has been doubled, from 1532 to 3160 km^2, covering 60% of suitable Amur tiger habitats (Darman et al. 2018). Moreover, 90% of them belong to the federal level (IUCN 1 A and IUCN 1B) with a strict security regime and sufficient staff and funding. Intensive law enforcement has made it possible to stop the direct extermination of tigers and reduce poaching of tiger prey. Antipoaching measures and additional foraging in winter have led to an increase in the number of wild ungulates in the SWP. For example, the sika deer population increased from 20.7 thousand individuals in 2006 (Aramilev et al. 2007) to 24.0 thousand in 2019 and 28.9 thousand in 2023 (Darman et al. 2024).

The growing number of Amur tiger sightings in neighboring Provinces of the People's Republic of China (Qi et al. 2021) supports the crucial role of SWP in the recovery of tigers in Northeast China. At the end of the 20th century, an international research group, by winter track survey, estimated the number of Amur tigers in the entire Eastern Changbaishan at only 20–25 individuals, including cubs. Similar results were obtained during a parallel survey conducted in Russia and China in the winter of 2004–2005 (Miquelle et al. 2005). In calendar year 2015, 35 tigers, including cubs, were identified from a joint database of camera trap images, but only 14% of them were residents of China (Shevtsova et al. 2018). This first

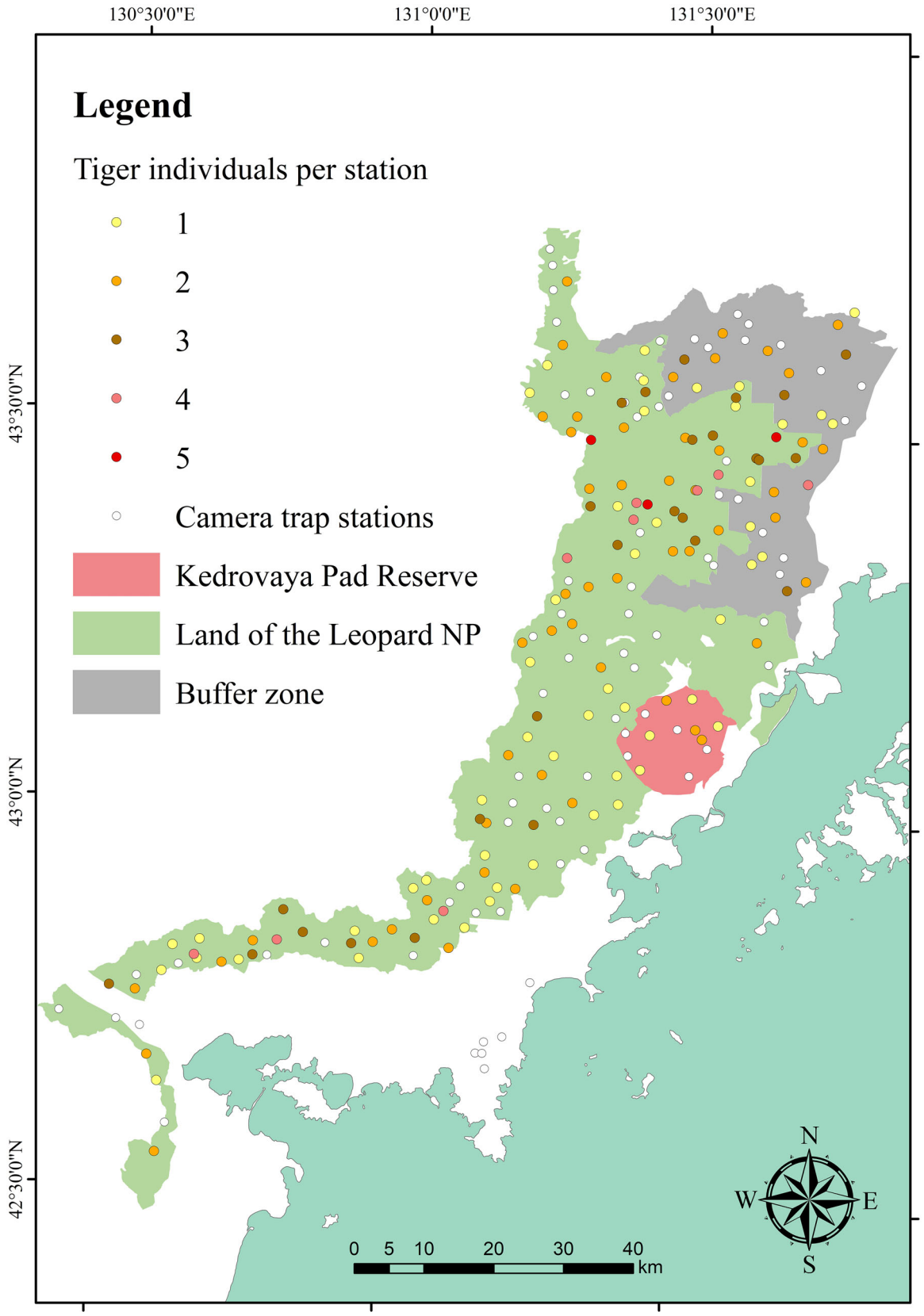

FIGURE 2 | A network of camera traps in the protected areas of the Southwest Primorsky Province, Russia, and the number of individual adult and subadult Amur tigers recorded per camera trap station in the winter of 2021/2022.

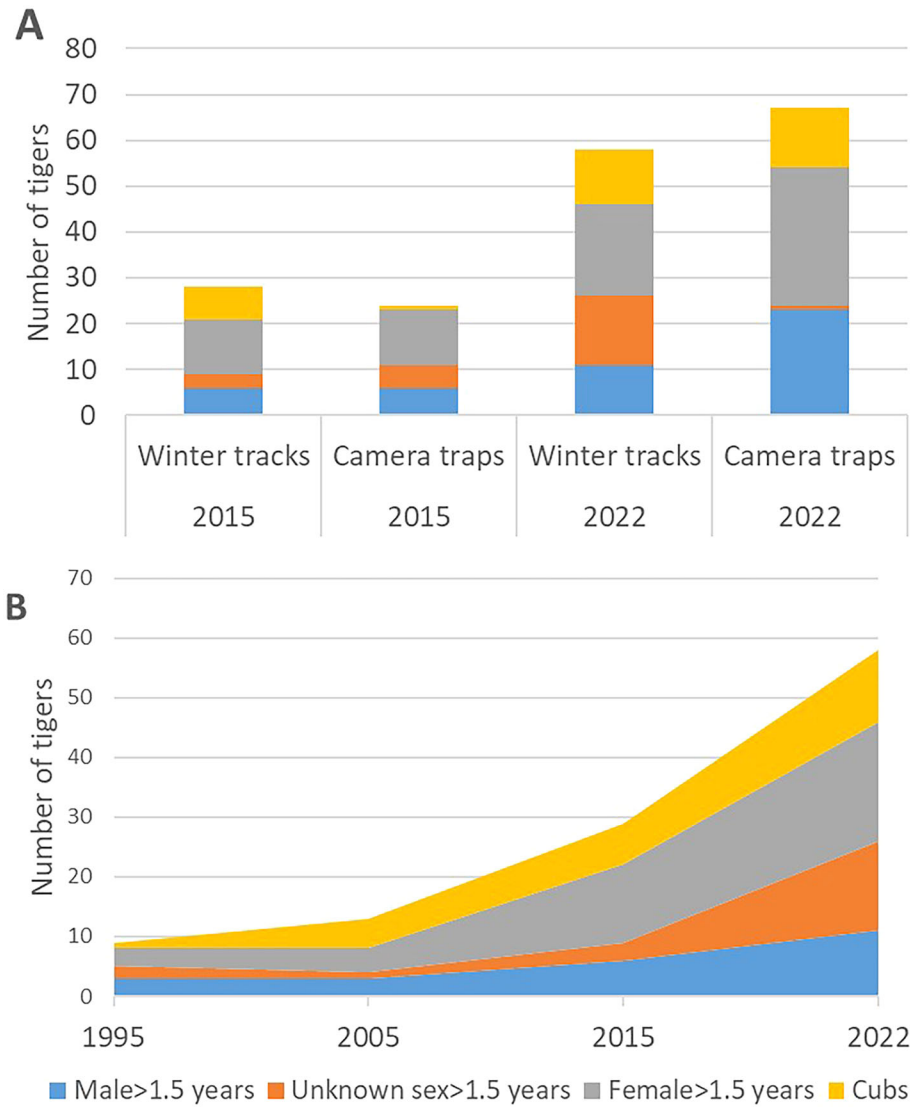

FIGURE 3 | Changes in the Amur tiger population in the southwest of Primorsky Province, Russia: (A) comparison of winter track survey data and camera traps survey; (B) long-term population dynamics based on winter track survey data (based on Matyushkin et al. 1996; Miquelle et al. 2005; Aramilev et al. 2016; with the addition of our data).

joint analysis showed that a simple summation of the results of separate studies in Russia and China, without taking into account the movement of tigers across the border, led to an overestimation of the number compared with the combined analysis of the entire transboundary population by 42.2%.

In 2021, up to 60 tigers (including 10 cubs) were recorded in the Northeast China Tiger Leopard National Park, but it is estimated that only about 14-16 adults mainly live on the Chinese side of the Sino–Russian border in this region (Goodrich et al. 2022). If we combine these Chinese residents with the 54 adult/subadult tigers recorded by SWP camera traps in the winter of 2021/2022, then the total Eastern Changbaishan Amur tiger population may amount to at least 70–75 individuals plus 13–15 cubs.

Unfortunately, since 2016, we have not been able to exchange data from camera trap networks. Without joining forces, we will not be able to determine the actual number, distribution, reproduction and mortality rates, and other population parameters. We hope that in the future we will have opportunities to work together on modeling the multi-year process of restoring the Amur tiger in the Eastern Changbaishan (East Manchurian Mountains). But in any case, the 4.5-fold increase in this isolated population demonstrates the great success of international conservation efforts.

The Russian-Chinese transboundary protected area "Land of Big Cats", declared on May 16, 2024, united the "Land of the Leopard National Park" and the "Northeast China Tiger Leopard National Park", which adjoin each other by a continuous forest corridor 280 km long. It has become one of the largest nature reserves in Northeast Asia, with an area of 18.3 thousand km^2, with the possible carrying capacity of up to 150 Amur tigers and 300 Far Eastern leopards.

Author Contributions

Yury Darman: data curation (equal), formal analysis (equal), investigation (equal), supervision (lead), visualization (equal), writing – original

draft (lead), writing – review and editing (equal). **Dina Matiukhina:** data curation (equal), formal analysis (equal), visualization (equal), writing – review and editing (equal).

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Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

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