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GEOGRAPHICAL RANGE OF SMALL CATS (FELINAE) IN THE KAZAKH PART OF TIEN SHAN

This article provides insight into the distribution, elevational occurrence, and habitat associations of three species in the Kazakh part of the Tien Shan Mountains: the Turkestan lynx (*Lynx lynx isabellinus*), Asiatic wildcat (*Felis lybica ornata*), and Pallas's cat (*Otocolobus manul*). From January 2012 until July 2025, we compiled 221 records based on camera trapping, visual observations, snow tracking, and questionnaire data, classified according to SCALP criteria. Research results revealed the Turkestan lynx to be the most widely distributed species, occurring across all the main river valleys and gorges of the Western and Northern Tien Shan and occupying various altitudinal zones and habitat types, with a predominance of coniferous forests and shrubs. The Asiatic wildcat was primarily associated with foothills, river valleys, riparian forests, and shrublands, but obtained camera-trap records indicate residence and stable population within the forest belt. Pallas's cat was observed mainly in the Northern Tien Shan with isolated records in the Karatau Mountains, and occupied low mountains with smooth slopes, low hills, cliffs and rock outcrops. Maintaining habitat integrity and conducting long-term monitoring will be essential for assessing population dynamics and maintaining species diversity of Felidae under environmental change.

Keywords: Felinae, carnivores, wild cats, distribution, protected area, Central Asia, mountain ecosystems, biodiversity conservation.

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Қазақстан аумағындағы Тянь-Шаньда мекендейтін кіші мысықтылардың (Felinae) географиялық таралуы

Бұл мақалада Қазақстан аумағындағы Тянь-Шаньда мекендейтін үш кіші мысықтылар түрлерінің: Түркістан сілеусінінің (*Lynx lynx isabellinus*), шұбар мысықтың (*Felis lybica ornata*) және сабаншының (*Otocolobus manul*) таралуы, биіктікте таралуы және мекендеу ортасының сипаттамалары туралы деректер келтірілген. 2012 жылдың қаңтарынан 2025 жылдың шілдесіне дейін фотоқақпандар, визуалды бақылаулар, іздерді бақылау және сауалнама жүргізу арқылы жануарлардың кездесулері мен тіршілік әрекетінің іздері туралы 221 тіркеу нүктелері жиналды. Содан кейін деректер SCALP критерийлеріне сәйкес жіктелді. Зерттеу нәтижелері Түркістан сілеусінінің осы түрлердің ішіндегі ең кең таралғаны екенін, Батыс және Солтүстік Тянь-Шаньның барлық ірі өзен аңғарлары мен шатқалдарында кездесетінін және әртүрлі биіктік аймақтары мен биотоптарын алып жатқанын, олардың ішінде қылқан жапырақты ормандар мен бұталардың ерек-

ше қолданатынын көрсетті. Шұбар мысық көбінесе тау бөктерінде, өзен аңғарларында, жағалау ормандарында және бұталы қопаларда мекендеді. Фотоақпандар деректері бұл түрдің орман белдеуінде мекендейтінін және тұрақты популяциясы бар екенін көрсетеді. Сабаншы негізінен Солтүстік Тянь-Шаньда және кейде Қаратау тауларында кездеседі, ол тегіс беткейлері бар аласа тауларда, аласа төбелерде, жартастарда және тасты беткейлері бар шығыңқы жерлерде мекен етеді. Қоршаған ортаның өзгеруі жағдайында тіршілік ету ортасының тұтастығын сақтау және ұзақ мерзімді мониторинг жүргізу мысық тұқымдасы (Felidae) түрлерінің популяция санының динамикасын бағалау және әртүрлілігін сақтау үшін аса маңызды.

Түйін сөздер: кіші мысықтылар, жыртқыш сүтқоректілер, жабайы мысықтар, таралу, ерекше қорғалатын табиғи аумақ, Орта Азия, тау экожүйелері, биоәртүрлілікті сақтау.

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Географическое распределение малых кошек (Felinae) в казахстанской части Тянь-Шаня

В данной статье представлены данные о распространении, высотном распределении и особенностях местообитаний трех видов малых кошек в казахской части Тянь-Шаня: туркестанской рыси (*Lynx lynx isabellinus*), пятнистой кошки (*Felis lybica ornata*) и манула (*Otocolobus manul*). С января 2012 по июль 2025 год собрано 221 точек регистрации о встречах и следах жизнедеятельности животных на основе применения фотоловушек, визуальных наблюдений, тропления следов и опросов, с последующей классификацией данных в соответствии с критериями SCALP. Результаты исследования показали, что туркестанская рысь является наиболее широко распространенным среди них видом, встречающимся во всех основных долинах рек и ущельях Западного и Северного Тянь-Шаня и занимающим различные высотные пояса и биотопы, с преобладанием хвойных лесов и кустарников. Пятнистая кошка в основном держалась предгорий, долин рек, тугайными лесками и зарослей кустарников, при этом, полученные данные фотоловушек указывают на обитание и стабильную популяцию этого вида в лесном поясе. Манул встречался преимущественно в Северном Тянь-Шане и единично в горах Каратау и занимал невысокие горы со сглаженными склонами, мелкосопочники, чинки и останцы с выходами скал. Сохранение целостности местообитаний и проведение длительного мониторинга имеют важное значение для оценки динамики численности популяций и сохранения видового разнообразия представителей семейства Кошачьих (Felidae) в условиях изменения окружающей среды.

Ключевые слова: малые кошки, хищные млекопитающие, дикие кошки, распространение, особо охраняемая природная территория, Центральная Азия, горные экосистемы, сохранение биоразнообразия.

Introduction

The Tien Shan mountain system stretches across Central Asia (South-East Kazakhstan, Kyrgyzstan, Uzbekistan, and Northwest China) and represents one of the most significant biogeographical transition zones in the Palearctic. The part of the Tien Shan Mountains that fall within Kazakhstan territory nowadays is typically divided into two massive mountain ranges: the Northern and Western Tien Shan (Vilesov et al., 2009). Most slopes are highly dissected and difficult to access (Rybin, 1952), and these mountains have an exceptional mosaic of eco-

systems: arid foothill steppes and semi-desert piedmont zones give way to montane meadows, coniferous and broadleaf forests, subalpine shrublands, and glaciated high-altitude plateaus (Severtsov, 1873; Afanasyev, 1960). This ecological complexity sustains a rich vertebrate fauna, including an important felid community.

In the Kazakh part of the Tien Shan Mountains, wild cats are represented by four species: the snow leopard (*Panthera uncia*), the Turkestan lynx (*Lynx lynx isabellinus*), the Asiatic wildcat (*Felis lybica ornata*), and the Pallas's cat (manul, *Otocolobus manul*); until the mid-20th century, the now extinct

Turanian tiger (*Panthera tigris virgata*) inhabited here (Sludskiy, 1973). These species occupy different ecological niches across elevational and habitat gradients ranging from foothill semi-deserts and shrublands to forest and high-altitude alpine ecosystems (Sludskiy & Grachev, 1982; Fedosenko, 1982a, Fedosenko, 1982b; Sludskiy, 1982).

As apex predators and mesopredators (medium and small sized carnivorous mammals), felids play an important role in regulating prey populations, maintaining trophic interactions, and supporting ecosystem resilience (Zhiryakov, 1979; Tossens et al., 2025). Changes in the distribution or abundance of large felids (i.e., snow leopard and Eurasian lynx) may cause cascading effects throughout ecosystems such as “mesopredator release” (Soulé et al., 1988), which may result in declines in mesopredator prey populations (Ripple et al., 2013; Conner & Morris, 2015) and increase of human-wildlife conflicts (Prange et al., 2003). Therefore, understanding the geographical distribution and occurrence patterns of felids is important not only for species conservation, but also for evaluating the ecological integrity of mountain ecosystems in Central Asia.

In recent years, non-invasive monitoring methods have significantly improved the study of elusive felids in mountainous ecosystems (Bizhanova et al., 2022; Grachev et al., 2025). Among these, camera trapping has become an important tool for documenting rare species and assessing species occurrence in remote landscapes (Karanth & Nichols, 1998). However, reliance on a single detection method may underestimate the true distribution of rare or cryptic species, for instance, wildcats – cryptic small felids that hybridize with domestic cats (*Felis catus*) (Gil-Sánchez et al., 2025). Integrating multiple evidence types, including camera trapping, direct observations, tracks, scats, prey remains, and other activity signs, provides a more comprehensive understanding of species occurrence and habitat use. Considering that the study area of Kazakh part of Tien Shan occupies a large scale, standardized verification frameworks such as the SCALP methodology (Status and Conservation of the Alpine Lynx Population) are necessary when classifying records according to their reliability (Molinari-Jobin et al., 2012).

Although considerable attention has been devoted to flagship species such as the snow leopard in Central Asia (Grachev et al., 2024), information regarding the distribution of broader felid assemblage of the Tien Shan remains fragmented, especially for

smaller and medium-sized felid species (Bizhanova et al., 2024). The Northern and Western Tien Shan represent the northern distributional limit for several Central Asian felids, making this region particularly important for understanding patterns of species occurrence, habitat connectivity, and potential responses to environmental change.

In this study, we summarize current occurrence data on three members of the subfamily Felinae – the Turkestan lynx, Asiatic wildcat, and the Pallas’s cat – in the Kazakh part of the Western and Northern Tien Shan using a combination of camera trapping, conventional field mammalogy methods, opportunistic observations, and SCALP-based verification criteria. Among small cats, particular attention is given to the Asiatic wildcat and Pallas’s cat, as the most understudied felids in the region (Bizhanova et al., 2025). We present new confirmed records, including evidence of reproduction, and discuss the geographical distribution of felids in relation to habitat heterogeneity, elevational gradients, protected areas, and conservation significance within the Tien Shan mountain system.

Methodology

Study area

The study area consists of the slopes of Northern Tien Shan – mountain ridges of Ile-Alatau, Kungei Alatau, Terskei Alatau and Uzynkara (Ketmen), and the Western Tien Shan – the ridges of Karzhantau, Ugam (Ugamskiy), Maidantal (Maidantalskiy), Talas Alatau (Talasskiy Alatau), Kyrgyz Alatau, and partially Karatau.

The western slopes of the Northern Tien Shan Mountains are divided by numerous gorges and deep valleys – rocky cliffs are typical here, with numerous rock fragments and stony screes; and the eastern part of the Northern Tien Shan is much steeper (Gvozdetskiy & Mikhaylov, 1963; Ishkov, 2006). The foothills of the Western Tien Shan ridges are covered by semi-steppe vegetation, and from east to west, the ridges gradually become lower, with the ridges more often ending in small hills (Afanasyev, 1960).

We collected the majority of occurrence data in specially protected natural areas (PAs): Ile-Alatau State National Natural Park (SNNP), Almaty State Nature Reserve (SNR), Kolsai Kolderi SNNP, Sharyn SNNP, Aksu-Zhabagly SNR, Sairam-Ugam SNNP, Karatau SNR, and newly founded Merke State Regional Natural Park (SRNP), and in the adjacent territories.

Data collection

The study was conducted from January 2012 until July 2025.

During the study, we conducted literature search for observation records, collected questionnaire data, and employed traditional field mammalogy methods (Novikov, 1953), which included visual observations of felids and the identification of animal activity signs such as tracks, feces, prey remains, and scratch marks on trees and rocks, with all records georeferenced using GPS.

We deployed camera traps on the ridges at altitudes ranging from 700 to 4200 m above sea level, corresponding to the foothill zone, forest zone (mountain forest-meadow-steppe landscape), mountain-meadow zone (high-mountain meadows and meadow steppes) of belt of shrub-forb steppes (up to 1600 m above sea level), belt of spruce-forest (from 1600 to 2500-2700 m above sea level), subalpine belt (from 2700 to 3000 m above sea level), alpine belt (from 3000 to 3500 m above sea level), and nival-glacial belt (from 3400 m above sea level).

We utilized camera traps (models Bushnell, Reconyx, Seelock, and Browning), equipped with motion-sensitive (passive) infrared sensors and photo and video recording in day and night modes. The cameras were programmed in photo, video or hybrid photo and video mode to capture sequences of photographs or video sequences, or, in case of hybrid mode, photographs followed by 10-15-second video sequences. Camera traps were checked every month in accordance with seasonal field patrols. During the checks, SD cards were replaced, batteries inspected, vegetation removed, and the device's angle adjusted when necessary.

Data classification

All felid records collected during the study were classified according to the SCALP (Status and Conservation of the Alpine Lynx Population) method-

ology, which provides a standardized framework for assessing the reliability of occurrence data, best suited for elusive felids, considering most of the data being opportunistic and the study area large (Molinari-Jobin et al., 2003; Molinari-Jobin et al., 2012; Molinari-Jobin et al., 2018).

All signs of felid presence in the Kazakh part of Tien Shan Mountains were classified into three reliability categories: Category 1 – “C1” (hard facts) included unequivocal evidence of species presence, such as camera-trap photographs, videos, carcasses, captured individuals, or genetic confirmation. Category 2 – “C2” (confirmed observations) included indirect signs that were verified by qualified experts, including tracks, scats, scratch marks, prey remains, or direct observations supported by sufficient documentation. Category – “C3” (unconfirmed observations) comprised records lacking adequate documentation or expert verification, including opportunistic sightings and reports from local residents, rangers, hunters, or other observers.

Cartography

The GIS processing was done using ArcGIS Pro 3.4 (Esri, Redlands, CA, USA) (Pucha-Cofrep & Fries, 2025) and Quantum Geographic Information System (QGIS) 3.10 (QGIS Development Team, 2009).

Results and discussion

During the study period from January 2012 until July 2025, we present collected 155 records of *Lynx lynx isabellinus*, 42 records of *Felis lybica ornata*, and 24 records of *Otocolobus manul* in the Kazakh part of Tien Shan (Table 1 and Figure 1).

As shown in Table 1 and Figure 1, the Turkestan lynx and Asiatic wildcat have been recorded throughout the Kazakh part of the Tien Shan, while the Pallas's cat – predominantly in the mountains of the Northern Tien Shan.

Table 1

The observations of members of Felinae in the Western and Northern Tien Shan (according to the SCALP categories)

Region and Range	Occurrences									Methods used*
	Asiatic wildcat			Turkestan lynx			Pallas's cat			
	C1	C2	C3	C1	C2	C3	C1	C2	C3	
Western Tien Shan										
Ranges Karzhantau, Ugamaskiy, Maidantalskiy, Talasskiy	4	2	-	4	-	11	-	-	-	V, Q, S-T, CT
Kyrgyz Alatau	5	1	-	1	1	-	-	-	-	CT, V,
Karatau	7	2	-	-	-	1	1	-	-	V, C-T

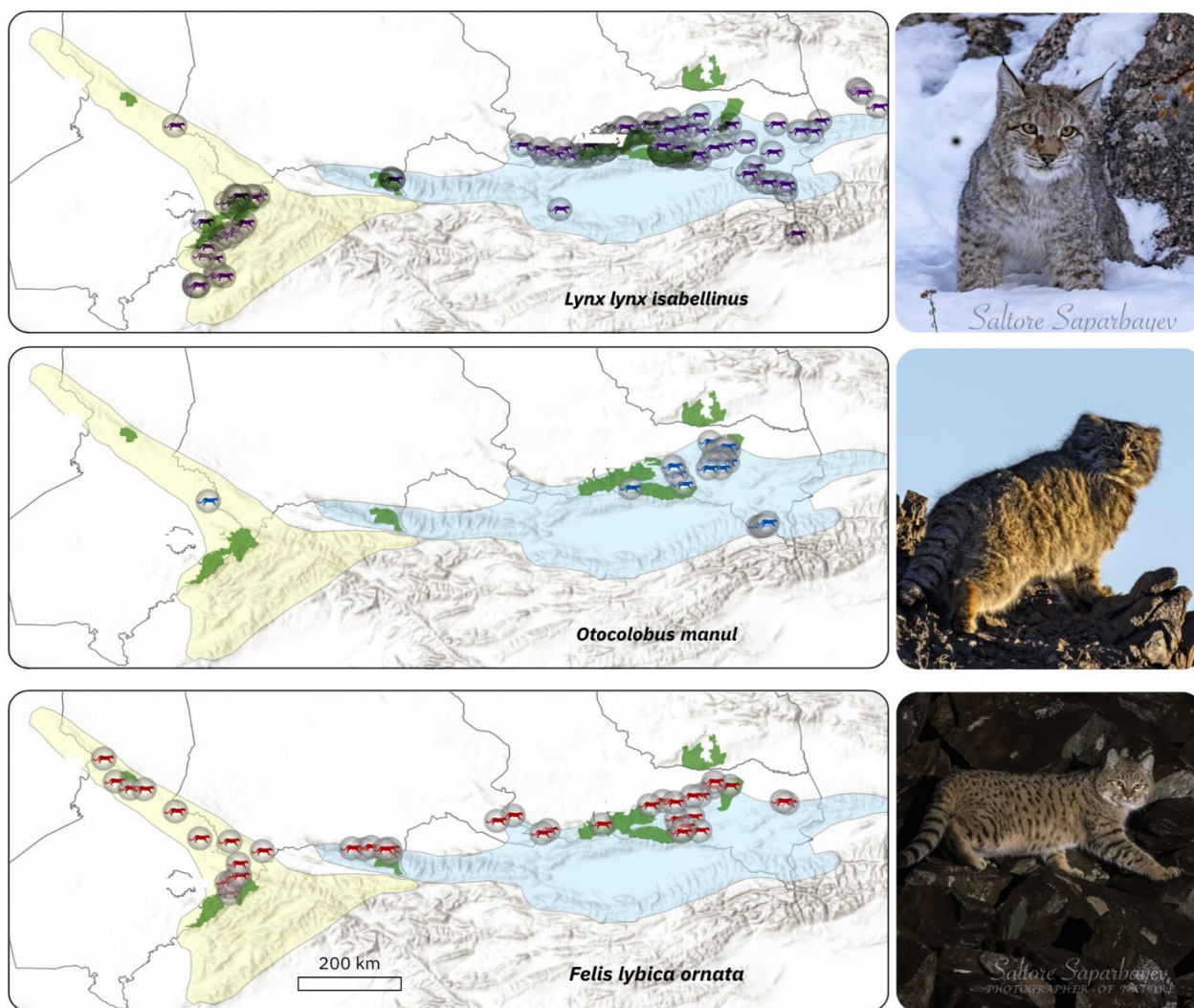
Continuation of the table

Region and Range	Occurrences									Methods used*
	Asiatic wildcat			Turkestan lynx			Pallas's cat			
	C1	C2	C3	C1	C2	C3	C1	C2	C3	
Northern Tien Shan										
Ile Alatau	8	3	5	50	43	11	7	7	3	Q, S-T, C-T, V
Kungey Alatau	3	-	-	29	-	-	-	-	1	Q, S-T, C-T, V
Terskey Alatau	-	-	-	2	-	-	4	1		V, Q, C-T
Uzynkara (Ketmen)	-	2	-	2	-	-	-	-	-	Q, C-T,
Total	27	10	5	88	44	23	12	8	4	

* Note: Q – questionnaire; S-T – snow-tracking; CT – Camera-trapping; V – visual observations

Figure 1

Occurrence map of the members of subfamily Felinae in the Kazakh part of the Tien Shan



Turkestan lynx* *Lynx lynx isabellinus

The Turkestan lynx is a protected, rare, and broadly distributed medium-sized carnivore listed in the Appendix II of CITES and CMS, as well as the Red Data Book of Kazakhstan as a rare subspecies (Category III) (Bizhanova & Grachev, in press) (Figure 2). As a facultative specialist, lynx

in the Tien Shan Mountains predominantly prey on Tolai hares (*Lepus tolai*), followed by Siberian roe deer (*Capreolus pygargus*) (Fedosenko, 1982a; Zhiryakov, 1995), with other species (juvenile and subadult ungulates, lagomorphs, rodents, birds, domestic animals, etc.) serving as alternate prey when hares are limited in their habitat.

Figure 2

Turkestan lynx in Ile-Alatau Mountains, Northern Tien Shan, December 2022. Photo by Saltore Saparbayev



We have observed the lynx throughout the Tien Shan system to the west (Figure 1).

In the Western Tien Shan, lynx occupies Chatkal, Talas, Karzhantau, Pskem, and Ugam ranges, with records concentrated in major river valleys and adjacent habitats (Shakula & Shakula, 2023; our data). Its distribution in Pskem and Chatkal ranges remains poorly studied, with the last records from these ranges dating to the 1970s (Fedosenko, 1982a; Sludskiy, 1978).

In the Northern Tien Shan, the lynx occurs in the Kyrgyz Alatau, Ile-Alatau and its spurs, Kungei Alatau, Uzynkara (Ketmen) Mountains, and Terskei Alatau and its spurs, throughout all their large river valleys and gorges.

There has also been one unconfirmed record (C3 data) of the lynx in the Karatau Mountains, where the lynx was believed to be extinct since the 1940s (Fedosenko, 1982a; Grachev, 2010). More research is needed to determine the occurrence of this felid in this area.

We have confirmed that the lynx's home ranges are located both in protected areas and beyond them. Among them, the most favorable habitats in the Kazakh part of Tien Shan Mountains can be found in the Ile-Alatau State National Park and the Kolsay Kolderi State National Park in the Northern Tien Shan, and the Sairam-Ugam State National Park in the Western Tien Shan. These national parks play a significant role in preserving lynx habitat under future climate change scenarios. Among the nature reserves with the highest level of protection, the Almaty Reserve provides key habitats for lynx populations, despite its territory being much smaller than that of the Tien Shan national parks.

The lowest elevation at which we have recorded the Turkestan lynx habitat is in the mountain-steppe zone of the low, dry Malye and Bolshiye Boguty Mountains and in shrub thickets along the Bes-Agach River, at 800–1000 m above sea level (Zhiryakov, 1995; our data). In the Bolshiye Boguty Mountains, characterized by steppe-like southern

slopes, we recorded the lynx twice in March 2016 at approximately 1,400–1,500 m above sea level.

In the Northern Tien Shan, we encountered lynx tracks and individuals throughout the entire mountain forest–meadow–steppe zone (1,200–2,600 m above sea level). Most lynx passages were recorded by camera traps in deciduous forests within the forest belt (1,200–1,700 m above sea level). During the study period, the main vegetation in these forests was represented by Sievers apple (*Malus sieversii*), common apricot (*Prunus armeniaca*), bird cherry (*Prunus padus*), aspen (*Populus tremula*), Tien Shan birch (*Betula tianschanica*), Talas poplar (*Populus thalassica*), rose hips (*Rosa cinnamomea*), honeysuckle (*Lonicera xylosteum*), barberry (*Berberis vulgaris*), several species of hawthorn (*Crataegus*), and willow (*Salix*). Coniferous forests, dominated by Schrenk spruce (*Picea shrenkiana*), occupy the upper part of this zone (1,700–2,600 m above sea level). Lynxes are common in these forests and were recorded by camera traps throughout the year. In the Ile Alatau, lynxes were most frequently recorded at elevations of 1,700–2,000 m above sea level, whereas in the Kungey Alatau, most records occurred at 2,300–2,600 m above sea level.

In the Western Tien Shan, lynxes inhabit steep slopes with rocky outcrops and scattered juniper shrubs (*Juniperus pseudosabina* and *Juniperus sibirica*). During periods of heavy snow cover, they

descend to the mountains foothill (Fedosenko, 1982a; our data). The lynx also occasionally ascends to the juniper shrubs and alpine meadows, particularly in the Talas Alatau (2,100–2,700 m above sea level).

Deciduous and coniferous forests appear to represent the optimal habitats for lynx, as confirmed by camera-trap data, with most records occurring within the forest belt.

Asiatic wildcat Felis lybica ornata

The Asiatic wildcat is a small-sized cat (Figure 3), which is distributed across much of Africa and parts of West and Central Asia, including Kazakhstan (Sludskiy, 1973). It occupies a wide range of open habitats, from savannas, steppes and scrublands to deserts, semi-deserts and open foothills, while generally avoiding dense forests and high-elevation alpine zones (Heptner & Sludskiy, 1972; Nowell & Jackson, 1996; Sunquist & Sunquist, 2002). In Kazakhstan, the Asiatic wildcat is primarily distributed in the southern and southeastern regions (Sludskiy & Grachev, 1982), in particular, Zhetysu, Almaty, Zhambyl, Turkestan and Kyzylorda regions, but its current range and population status remain poorly documented due to limited targeted surveys and difficulties in distinguishing it from domestic and feral cats (*Felis catus*) (Bizhanova et al., 2025).

Figure 3

Asiatic wildcat in Kungei Alatau Mountains, Northern Tien Shan, December 2022. Photo by Saltore Saparbayev



We have observed this felid in the Talas Alatau (Aksu, Zhabagly, and Baldyrbek Rivers valleys), the Ugam (Sairamsu River valley), and throughout Karatau ranges. On the Kyrgyz Alatau range, – a transitional point between the Western and Northern Tien Shan – the Asiatic wildcat occurred in the mountains from the villages of Mere to Kulan. In the Northern Tien Shan, the species occupies similar habitats. We have observed the wildcat in the Ile-Alatau and its spurs (Turaigyr, Syugatty, and Buguty),

Kungei Alatau, and Uzynkara (Ketmen) ranges; the species has not been observed in the Terskey Alatau (Figure 1).

The Asiatic wildcat mostly occurs in the mountain foothill, yet in 2025, we recorded the felid multiple times using camera traps in Ile-Alatau National Park at an altitude of 1400 m above sea level (Figure 4). In a series of camera trap captures, the female was accompanied by three small kittens, suggesting a stable local population in the forest belt of the Ile-Alatau Mountains.

Figure 4

*An adult Asiatic wildcat *Felis lybica ornata* after a successful hunt (a) and a female with three cubs (b), Zhamanbulak Gorge, Turgen River basin, eastern part of the Ile-Alatau National Park, Ile-Alatau Mountains, July 2025*



a)



b)

The Asiatic cat is common in the desert regions of southern Kazakhstan, but is scarce in the foothills and mountains, occurring below 2000 m above sea level (Sludskiy, 1953, 1973). Within the Western Tien Shan, in the Talas Alatau, the species has occasionally been noted in the lower mountain belt, primarily in forests of wild fruit trees (Sludskiy, 1953). Distributed along the southern slopes of the Karatau ridge, it occurred primarily on the southern slopes, especially in the Bugun River valley (Antipin, 1955, according to Sludskiy, 1973). In the Northern Tien Shan, the Asiatic wildcat typically inhabits gorges with riparian forests of poplar (*Populus*), birch (*Betula*), and willow (*Salix*), with an undergrowth of rosehip (*Rosa*), barberry (*Berberis*), honeysuckle (*Lonicera*), blackberry (*Rubus*), and other shrubs.

The felid prefers areas near water and regularly visits watering sites. In winter, we observed the species in the steppe-like slopes in sunny areas where small rodents, partridges, and other birds are com-

mon. The wildcat does not avoid human proximity and occasionally settles near populated areas. In the Ile-Alatau Mountains, it can occur at elevations up to 1700–1800 m above sea level (Sludskiy & Grachev, 1982). More research needed to understand the northern ecological limits for *F. l. ornata*. As climate change continues to modify habitat structure, temperature regimes, and prey availability (Lenoir et al., 2024), it is possible that the species may gradually expand its elevational range. Comparable patterns have been observed in other small felids across Asia (Abedin et al., 2024; Chiaverini et al., 2025), where highland and montane foothill habitats serve as refugia during periods of climatic fluctuation. Long-term monitoring may reveal whether the Ile-Alatau forest belt population reflects a stable range margin or is in the early stages of climatic niche expansion.

The increase of the occurrences of Asiatic wildcat in the forest belts of the Tien Shan Mountains could

also be related to the process known as “mesopredator release”, – in the habitats with apex predators (larger felids and other carnivores) absent or their abundance decreased, smaller carnivores then are functionally elevated to the position of the top predators in the ecosystem (Tambling et al., 2018: 205-206).

*Pallas’s cat **Otocolobus manul***

Pallas’s cat, also referred to as manul, is a protected, rare, small-sized cryptic felid listed in the Appendix II of CITES and CMS, and in the Red Data Book of Kazakhstan as a rare species (Category III) (Figure 5).

Figure 5

Pallas’s cat in the Ile-Alatau Mountains, Northern Tien Shan, December 2022. Photo by Saltore Saparbayev



Within Kazakhstan, the Pallas’s cat inhabits primarily low mountains (up to 1,500 m above sea level) with smooth terrain, as well as hillocks and residual massifs with xerophytic vegetation and rock outcrops. The species is absent from sandy deserts (Sludskiy, 1953).

Within the Western Tien Shan, N.A. Severtsov (1873) recorded the Pallas’s cat in the Karatau ridge, in particular, in the Ters River valley. This species had not previously been recorded in the Talas Alatau (Sludskiy, 1973). However, in April 2024, we recorded the Pallas’s cat within the Lesser Karatau.

Hysterically, in the Northern Tien Shan, the Pallas’s cat was observed in the Terskei Alatau, in particular, in the area of Lake Sonkul, in the Atbashi River valley (a right tributary of the Naryn River), the Ak-Shyirak Gorge (a right tributary of the Sarydzhaz River), and also in the valleys of the Sarydzhaz, Uchkul, and Kensu Rivers. On the southern slope of the Uzynkara (Ketmen) ridge, the species was observed in the Oikaragai tract at an altitude of approximately 2,200 m above sea level. In the Ile-Alatau and its spurs, the Pallas’s cat was rarely encountered (Sludskiy, 1973).

According to our research conducted in the Northern Tien Shan, Pallas’s cat was recorded primarily in the eastern part of the Ile-Alatau Mountains (being annually observed in the foothills and rocky scree of the Bartogay, Kiikbay, and Belshaddar Gorges) and its spurs (Toraigyr, Syugaty, and Buguty spurs), as well as in the highlands of the Terskei Alatau ridge and in the Ulken Kokpak River valley. The species has been recorded over a wide range of altitudes – from 1,000 m above sea level in the Syugatinskaya Valley in the Kazakh Uplands to 4000 m above sea level on the Terskei Alatau ridge in the Central Tien Shan.

Conclusion

Our study provides a comprehensive synthesis of the current distribution and habitat associations of three wild felids – the Turkestan lynx, Asiatic wildcat, and Pallas’s cat – in the Kazakh part of Tien Shan. Although these members of subfamily Felinae are not threatened globally and are listed as Least Concern species according to the IUCN Red List (Breitenmoser et al., 2015; Ross et al., 2020;

Ghoddousi et al., 2022), in Central Asia, given their scarcity and the difficulty with the accessibility of their natural habitats, they remain understudied.

Based on 221 records collected between 2012 and 2025, we demonstrate that these species occupy markedly different ecological niches and exhibit contrasting distribution patterns across the mountain system. The Turkestan lynx is the most broadly distributed of the three species, occurring throughout the Western and Northern Tien Shan across a wide elevational gradient and utilizing a diverse range of habitats, with forest belt (in particular, coniferous forests and juniper shrubs) appearing to represent particularly important habitats. The Asiatic wildcat is primarily associated with lower-elevation foothills, river valleys, shrublands, and open habitats, sometimes extending farther into montane habitats. The Pallas's cat remains comparatively localized and is concentrated mainly in the Northern Tien Shan, where it occupies rocky, open, and xerophytic habitats across an exceptionally broad elevational range.

Protected areas such as Ile-Alatau SNNP, Sharyn SNNP, Kolsai Kolderi SNNP, Sairam-Ugam SNNP, and the Almaty SNR, Karatau SNR, and Aksu-Zhabagly SNR remain essential for maintaining core habitats and landscape connectivity, particularly in the context of ongoing environmental and climatic change.

The apparent occurrence of the Turkestan lynx in the Karatau Mountains requires confirmation, while the population status of Pallas's cat in these mountains also needs further investigation. The current status of lynx populations in the Pskem and Chatkal ranges remains insufficiently documented. The repeated occurrence of the Asiatic wildcat at relatively high elevations in the Ile-Alatau and Talas Alatau raises questions about the species' northern elevational limits and the potential influence of changing climatic conditions, habitat modification,

and altered predator communities. Similarly, the broad elevational distribution of the Pallas's cat documented in the Tien Shan underscores the need to reassess its ecological range and population connectivity across the region.

Overall, the Kazakh Tien Shan supports a diverse assemblage of wild felids whose persistence depends on the conservation of connected mountain landscapes spanning foothill, steppe, shrub, forest, alpine, and rocky habitats. Continued standardized, long-term monitoring will be essential for distinguishing stable populations from temporary or expanding occurrences and for developing evidence-based conservation priorities.

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