



Khulan GBB © Petra Kaczynsky

Khulan: Mongolian Gobi

Migration Description

About 100,000 Asiatic wild ass or khulan still roam the drylands of Eurasia. The largest remaining interconnected population is found in the Mongolian Gobi, where an estimated 86,000 khulan – constituting over 80% of the global population – are found.

In the Mongolian Gobi, khulan roam across thousands of kilometers and their movements are among the longest reported for terrestrial mammals both globally and nationally. Annual or bi-annual ranges of individual khulan (expressed as minimum convex polygons) vary based on biogeographic region and landscape dynamics, but average 30,000 km² in the South Gobi Region, and can be as large as 60,000 km².

Nomadism in combination with a flexible fission-fusion social system enables khulan to make the most of the scarce resources in the unpredictable Gobi environment, which is prone to extremes. Contrary to range-resident species, khulan can buffer the effect of local or temporary resource-poor seasons by moving to less affected areas. However, this need for large-scale movements also makes them vulnerable to landscape fragmentation and linear barriers such as the Trans-Mongolian Railway built in the 1950s. This railway, stretching from border to border, now constrains the eastern boundary of the species distribution range.

Threats to Migration

The nomadic and unpredictable movements of khulan make conservation challenging since neither critical seasonal ranges nor migration routes are repeatedly used between years and their movements are too far-ranging to be protected within conservation areas. Khulan face numerous threats, including competition for forage and water with an increasing number of livestock, pasture degradation, habitat loss and fragmentation, and disturbance by people, including illegal killings.

Linear infrastructure in the form of railways and high-traffic roads, however, pose the biggest challenge for khulan, especially when they are fenced. Khulan are adapted to open landscapes and are unwilling to jump or crawl under fences or to climb steep road or railway embankments. The impermeability of the international border fence and the fenced Trans-Mongolian Railway are testaments to the harmful impact of fences on khulan movements.

Recent infrastructure development has started to fragment the connectivity between the western and eastern population centers, as well as within the largest population center in the South Gobi Region (Fig. 1, 2), where over 80% of the Mongolian population is found. These new barriers are making it increasingly challenging for khulan to move freely and maintain genetic connectivity over the entire Gobi.

Local Population Facts

Migration

Nomadic



Extra long

150+ km

Threats



Climate change



Energy dev.



Urban sprawl



Linear barriers



Agriculture



Livestock



Illegal killing



Other

Species Facts

Common name: Khulan (subspecies: Mongolian khulan), or Asiatic wild ass

Species name: *Equus hemionus hemionus*

Range: Central Asia

Diet: Grazing herbivore, which can switch to a mixed grass/browse diet when needed

Global population: 100,000. Over 80% of the global population are found in the Mongolian Gobi.

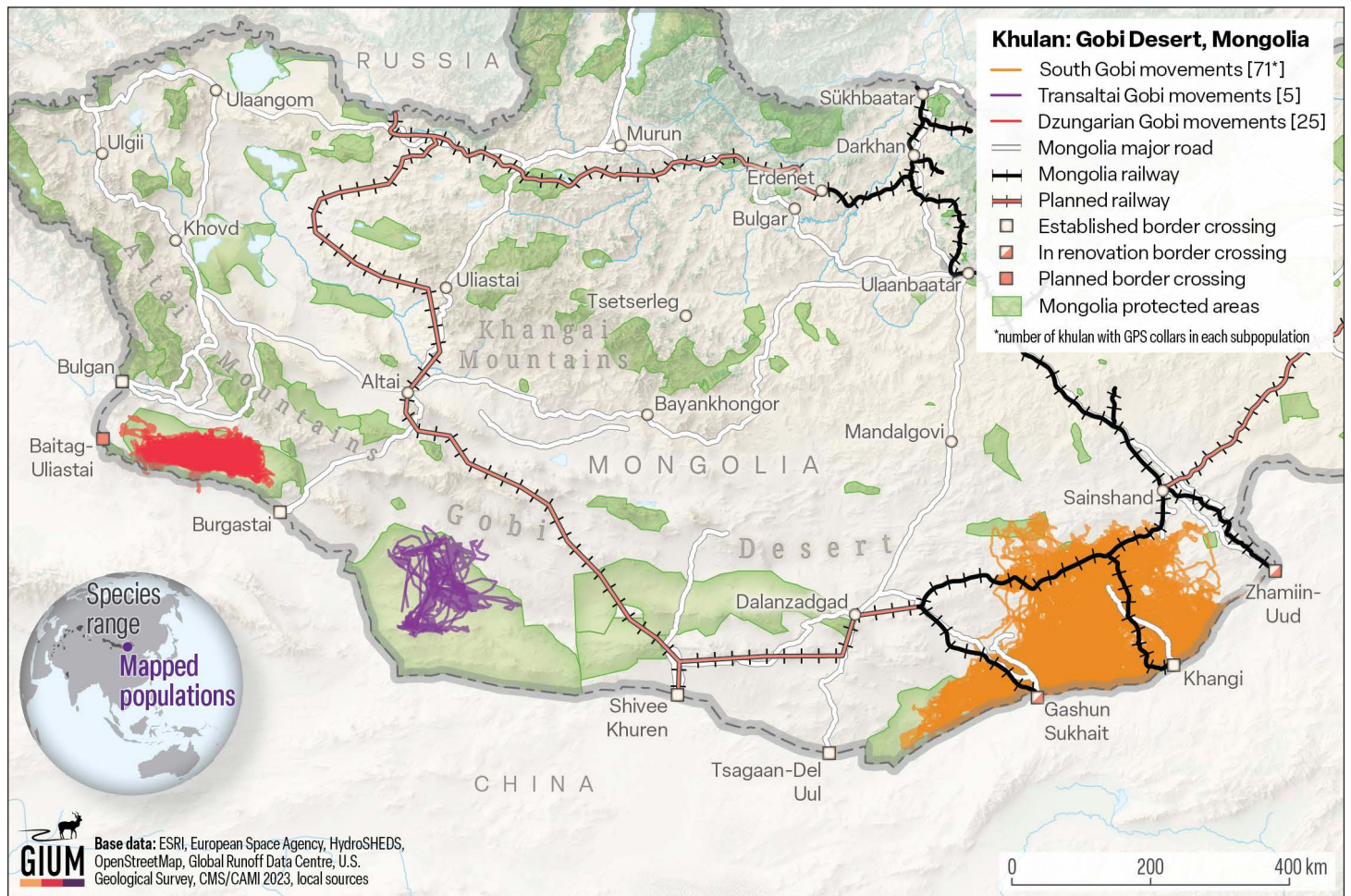
IUCN Conservation Status

NT Near threatened

CMS Status

Appendix I Endangered migratory species

Tracking data from the three best studied subpopulations in the Mongolian Gobi.



Nomadic movement year-round

March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb

Study Information

Sample size

19 individuals, entire Gobi 2002–2007; 71 individuals, South Gobi Region 2013–2020

Relocation frequency

Mostly hourly

Project duration

Currently in MOVEBANK

(1) South Gobi Region: GPS-Iridium collars from Oct 2013 – Aug 2020, 71 individuals

(2) Great Gobi A & B, South Gobi Region: GPS-Argos collars Jun 2002 – Dec 2008, 19 individuals

[(3) Great Gobi B: SOB collars Jul 2007 – Jul 2010, 11 individuals]

Route Summary

The nomadic movement of khulan is a non-seasonal and irregular long-distance movement in which timing, direction and distance are largely unpredictable from year to year. The species requires access to water on a daily basis, causing khulan tracks to converge at water sources.

While the average annual range is about 30,000 km², the lifetime range of an individual khulan likely covers much larger areas. The cumulative annual straight line distance moved within a year, 5,000–6,000 km, is among some of the longest of any migratory ungulate globally.

Data Providers

Data were provided by Petra Kaczensky and Buuveibaatar Bayarbaatar and represents a long-term collaboration between the Inland Norway University, the University of Veterinary Medicine Vienna, WCS Mongolia, Great Gobi B SPA, Senckenberg Nature Research Society, and other organizations.

Projects were funded through various sources, including the Austrian Science Foundation (projects 14992, 18624, 24231) and Oyu Tolgoi LLC Core Biodiversity Monitoring Program, implemented by WCS through a cooperative agreement with Sustainability East Asia LLC.

In partnership with:



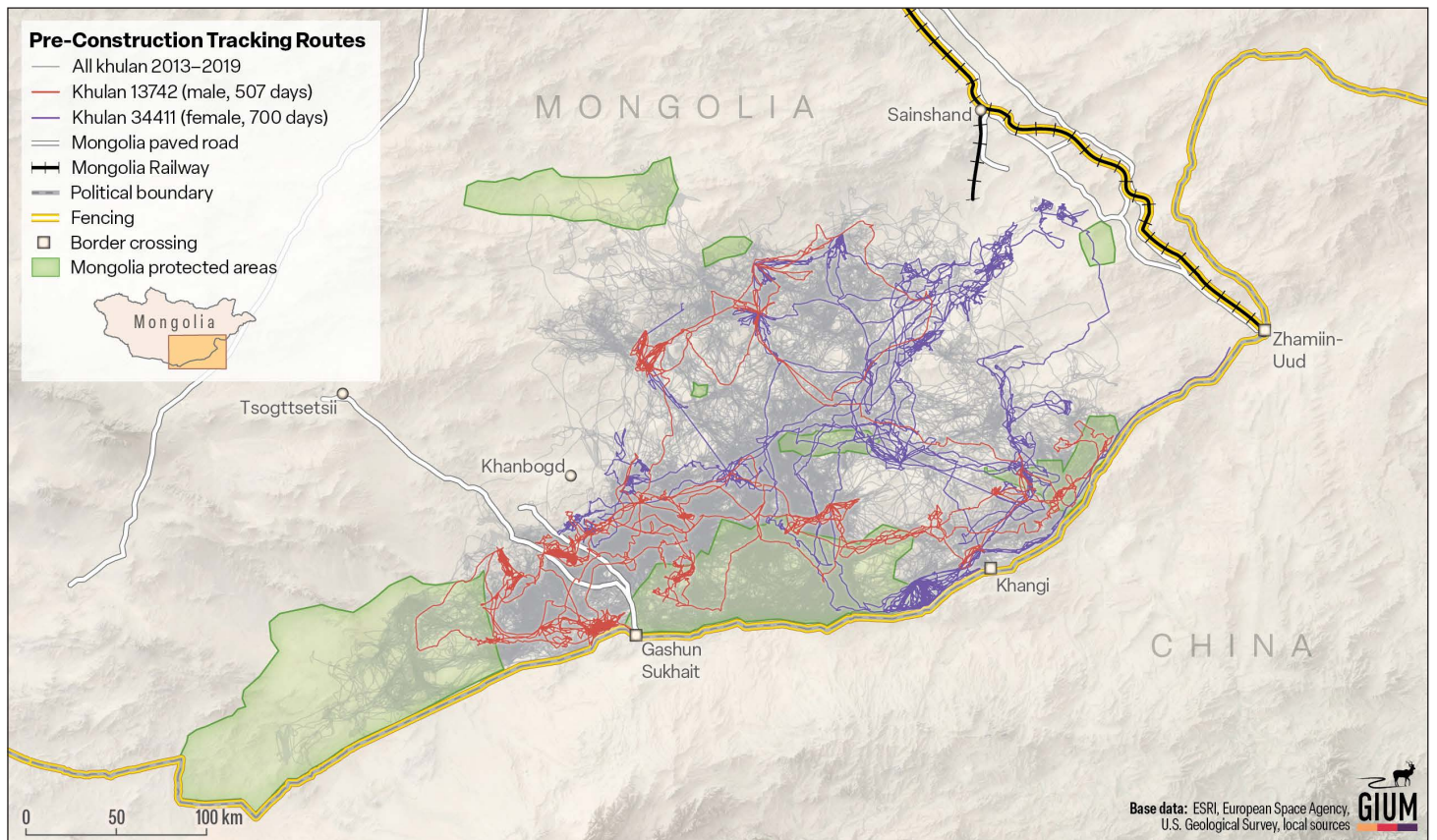


Figure 1: Khulan movements pre-construction of the railways in southeastern Mongolia. Prior to the construction of the new railroads in 2020–2022, khulan moved relatively freely throughout southeastern Mongolia, accessing various protected areas and responding to changing seasonal conditions. The movement lines from khulan 13742 (red) and khulan 34411 (blue) illustrate how wide ranging the animals' movements are in seeking forage, water and shelter from harsh conditions. The main barriers they encountered during this study period were the fenced Trans-Mongolian Railroad (TMR) in the east and the fenced international border in the south, both of which constrain the population's range. Additionally, two big mining roads were built in 2013 to reach Gashun Sukhait. Though traffic volume has been shown to reduce the probability that khulan will cross, the animals are still able to cross, mainly at night when traffic volume is low.



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Khulan travel along the fenced Trans-Mongolian Railway. Fences, built to keep livestock from approaching the train tracks, drastically reduce the ability of khulan and other species to move across the vast seasonal habitats in the region.

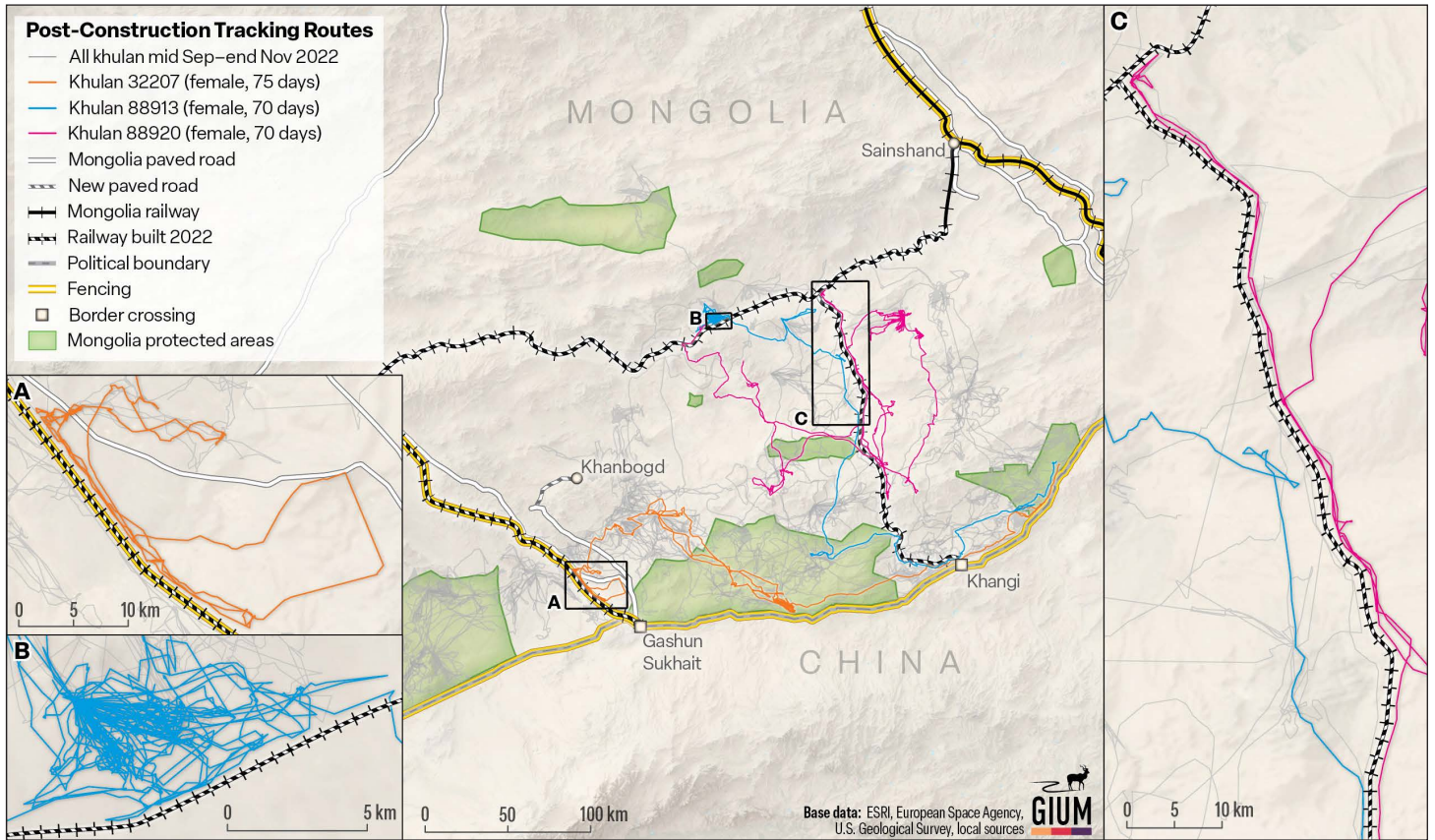


Figure 2: Khulan movements post-construction of the railways in southeastern Mongolia. Since 2022, new linear infrastructure has divided the khulan range. Three newly constructed railroads in the region clearly impact khulan movements. Animals are unable to cross and instead travel along the length of these barriers, which can be energetically costly (A, B, C). Fenced railways (A) exacerbate the problem as they completely prohibit crossing without any crossing structures in place. Bridges and box culverts have been implemented along the new railways and can serve as potential crossing structures for khulan and other wildlife, but it is unclear whether they are used. More data and research are needed to determine their effectiveness.



Khulan travel parallel to the new railway, which often has a steep embankment that khulan are wary to navigate. As linear infrastructure like this railroad continues to rapidly expand in the region, incorporating animal behavior and movement data is critical to design effective crossing structures for wildlife. Without adequate crossing structures, the khulan population in southeastern Mongolia is at risk of becoming fragmented and may experience decline.



The Convention on the Conservation of Migratory Species of Wild Animals (CMS), also known as the Bonn Convention, is an environmental treaty of the United Nations that provides a global platform for the conservation and sustainable use of terrestrial, aquatic and avian migratory animals and their habitats.



The Global Initiative on Ungulate Migration (GIUM) was created in 2020 to work collaboratively to: 1) create a Global Atlas of Ungulate Migration using tracking data and expert knowledge; and 2) stimulate research on drivers, mechanisms, threats and conservation solutions common to ungulate migration worldwide.



View and Download Map Data from the GIUM Migration Atlas

Kaczensky, P., B. Buuveibaatar, and N. Dejid. 2024. Khulan: Mongolian Gobi. Global Initiative on Ungulate Migration, editors. *Atlas of Ungulate Migration*. Convention on the Conservation of Migratory Species of Wild Animals.