

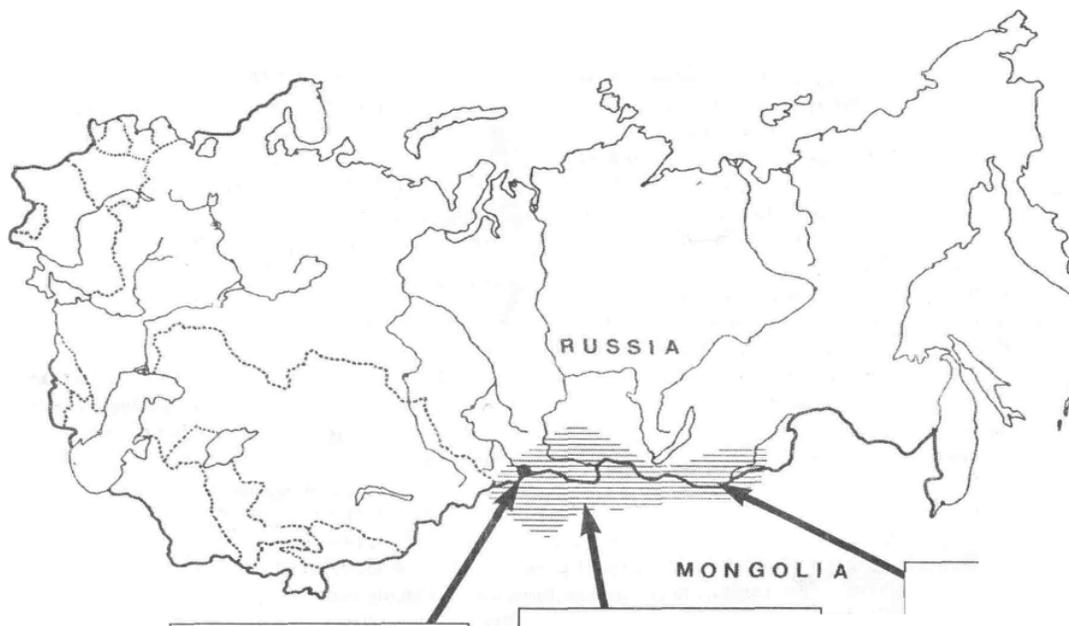


**Koshkarev E.** Critical Ranges as Centers of Biodiversity//

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## Critical Ranges as Centers of Biodiversity

One approach to understanding biodiversity is through examining populations at the margin of their ranges, that is, under the most unfavorable environmental conditions where a species may still persist. These areas may be termed critical in that the population there lives in an almost constant state of crisis, or critical in that the areas, though marginal, are still important for the viability of the whole population throughout its range.



Concentration of remaining argali populations

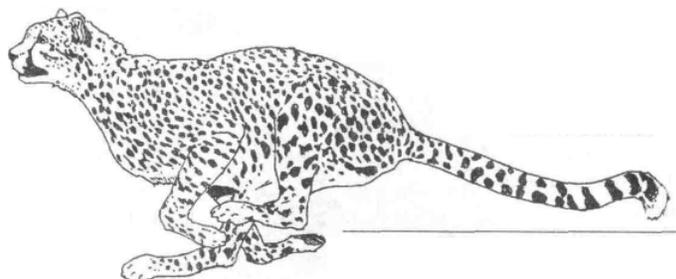
Area of range overlap" and highest biodiversity,

Transbaikal" region where argali, Mongolian gazelle, dhole, Amur tiger and Amur leopard are known to visit from neighboring parts of their ranges. Apparently the dhole (*please see RCN #13*) and snow leopard are represented here by local populations, too. *Map provided by E. Koshkarev*

A high percentage of rare species in Central Asia experience limited conditions for distribution. Geographic centers with higher species diversity are generally constrained in terms of territory: they are formed when ranges overlap. But in Central Asia and along its borders with Russia, centers of biodiversity overlap at the very marginal edges of ranges. Here, Sharply contrasting landscapes intersect — forest and steppe, steppe and desert, desert and mountain. The inhabitants come to the end of the road: located in a strange environment, from this point on, they can only go as far as the remnants of their indigenous landscape extend. The southern edge Kirghizstan and Kazakhstan, the range of most species either does not extend beyond the general borders of the region (narrow-ranged species) or is established of Central Asia lies at the border of desert and mountain. In Turkmenistan, Tadjikistan, Uzbekistan, within northern peripheral sections, where the possibility for survival is lower.

In particularly unfavorable conditions, Central Asian species cross into Russian territory, where desert and steppe are replaced by thick forest. Here the northern borders of their ranges are sharply fragmented and isolated. Typical examples for Central Asia are the ranges of the cheetah (*Acinonyx jubatus*), Asian leopard (*Panthera pardus caucasica*), striped hyena (*Hyaena hyaena*), Bukhara deer (*Cervus elaphus bactrianus*), markhor (*Capra falconeri*), blue sheep (*Pseudois nayauf*) and argali (*Ovis ammon*). In Russia are the Altai subspecies of argali, the Siberian argali (*O.a.ammon*), the mountain goat (*Capra sibirica*), Mongolian gazelle (*Procapra gutturosa*), snow leopard (*Uncia uncia*), Pallas' cat (*Felis manul*), dhole (*Cuon alpinus*), grey marmot (*Marmota baibacina*), Mongolian marmot (*M. sibirica*) and tolai hare (*Lepus tolai*).

The distribution of northern species southward into Central Asia paints a similar picture. The ranges of reindeer (*Rangifer tarandus*), moose (*Alces alces*), brown bear (*Ursus arctos*), wolverine (*Gulo gulo*) and sable (*Martes zibellina*) halt sharply at the border of Russia with Kazakhstan, China and Mongolia. Overall, the ends of the road for fauna of both regions cross along the border between Central Asia and Northern Asia; the furthest end points of various species' ranges thus overlap.



Cheetah (*Acinonyx jubatus*)

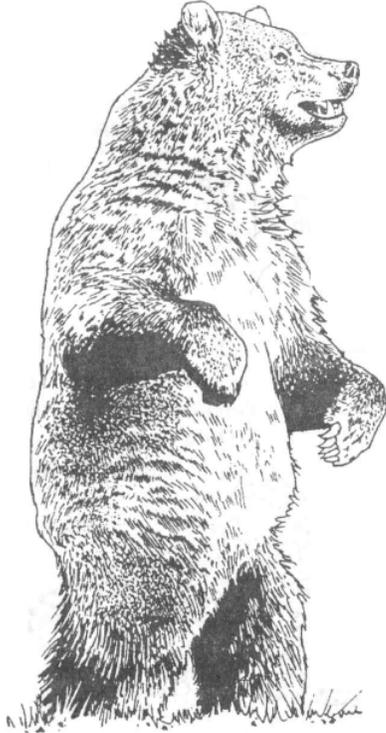
Where the numbers of individuals has fallen to extreme lows, the most effective mechanism for species survival may be supporting the integrity of ranges, in order to preserve population exchanges between neighboring groups. In this case the point is not only to save the territory or the last specimens of rare species conserved in the republics, since the numbers of several of these are sufficiently high in more southerly or northerly parts of their ranges. Rather, the point is to save the most unique sub-group of the species — the population who live at the margin of their range, but still occupy areas important for biological diversity. These populations are an invaluable heritage, and their loss happens earliest. Nothing can replace them, even if the species exists in other regions.



Wolverine (*Gulo gulo*)



Marginal populations play a key role in enlarging species' ranges. As the most mobile section of the population, multi-faceted "tentacles" of the species, they help open and conquer new living space. Further, the marginal populations conserve the broadest genetic code, concentrated at the time the range was established. The edge between life and death is sharpest at the periphery of the range; thus, understanding the species' mechanisms for survival at the margins and their adaptations to extreme conditions provides clues to preserving the whole species when conditions worsen and numbers fall to a critical



Brown bear (*Ursus arctos*)

point. Unfortunately, however, these marginal populations, precisely because of their low numbers, limited area and high vulnerability, may be threatened or annihilated before they can be studied. One example is the argali, with only a single group for Russia preserved in the Altai. In the past ten years, the species has decreased in numbers by one-half and now does not include more than 300 individuals (Sobanski, 1992).

Russia has inherited twelve percent of the rare species that comprise the former wealth of Central Asian fauna. The territory of this 12% is limited to the southern Siberian mountains. Despite the enormous area covering one-tenth of Russia, argali, Mongolian gazelle, and dhole inhabit the narrowest strip along the region's southern edge (See map on page 3 7). The smallest sections of their ranges are literally pressed up against the borders of Kazakhstan, China and Mongolia, and do not occupy even one percent of Southern Siberia.

More widespread are mountain goat, snow leopard and Pallas' cat. Though their ranges also extend to the southern edge, overall the scattered fragments cover a significant portion of territory. For the first two species, this fragmented range encompasses approximately 20% of Southern Siberia, and three-quarters of that is concentrated in the western half of Southern Siberia — Tuva, Krasnoyarski Krai and Altai.

The natural borders of the mountains of Southern Siberia extend into Kazakhstan, China and Mongolia, adjoining neighboring parts of Altai, Hovsogul and Khentei. In the east, the southern Siberian center of biodiversity adjoins the Far Eastern, from which the Amur leopard (*Panthera pardus orientalis*) and Amur tiger (*P. tigris altaica*) migrate at present. The most recent case of three tigers entering this territory was noted in the Krasnochikoiski district of Chita Region in 1994 (personal correspondence with G. Agafonov).

Only three reserves for Central Asian species exist in Southern Siberia: Altai, Katunski and Sayano-Shushenski. In Central Asia, with fewer mountains and rather more favorable conditions, the number of reserves for such species is four times greater.

The geographic location of reserves and other protected territories is vitally important for the survival of Central Asian species, given the acute fragmentation of their ranges. These reserves should include significant, viable centers of population — the most vulnerable, key places. Wherever the creation of permanent protected territories is impossible, a new tactic must be found, such as introducing temporary limitations on the use of land for agriculture and hunting. But all protected territories, whether temporary or permanent, should be connected, forming a core and periphery. The marginal range areas must not be forgotten, if total protection of endangered populations is to be accomplished.