Understanding the movement behavior of Persian leopards *(Panthera Pardus tulliana)* after reintroduction to the Greater Caucasus

The critical role large carnivores occupy for functioning ecosystems is well-known and well-studied. However, declining numbers at alarming rates do not only concern conservationists, but also communities and governments worldwide. When large carnivores are close to extinction in their historic ranges, ensuring the survival of their species by themselves and thus, maintaining ecosystem functioning, often is improbable. Therefore, species reintroduction and rewilding are gaining popularity worldwide, especially during the last two decades. Here, I am analyzing global positioning system (GPS) collar data of reintroduced Persian leopards *(Panthera pardus tulliana)* in the Russian part of the Greater Caucasus between 2016 and 2020, to gain insights into movement behavior of felines post-release. Home range establishments are estimated, and total home ranges of the leopards are measured. Finally, site- and sex-specific peculiarities are discussed. Home range establishment is analyzed by 100% minimum convex polygons (MCPs) in a shifting ten-day window, to ascertain the point of asymptote stability, marking the change from exploratory to ranging behavior. Total home ranges are calculated with 95% and 50% kernel density estimation (KDE) and 100%, 95% and 50% MCPs. By analyzing post-release movement of the reintroduced animals, management options and conservation measures can be adjusted, subsequent reintroductions benefit from the knowledge and the short-term reintroduction success can be assessed. Due to the small number of animals and incomplete data, general statements about leopard reintroductions can not be made. Overall, my findings highlight the high individuality of the reintroduced animals. Home range sizes differ between 33 km² and 657 km², with a mean of 241 km². At which point the animals develop stable home ranges is biased by short transmission periods of data for most collared animals and highly individual behavior. Some leopards seem to have an established home range but begin exploring a second time after several weeks or months. Following my work, analyzing home ranges with a more sophisticated method (e.g., with bearing angles and distances), could enhance or validate my findings. To assess reintroduction success, longer transmission periods of GPS-data is needed. With my work, I contribute to early post-release monitoring. With more reintroductions in the upcoming years, the rewilding project will reveal whether animals spread out, populate their historic range in the Caucasus and remain there as a stable population.

Figure 1 Moment of release of one of the collared leopards in the North Caucasus (Source: https://wwf.ru/en/resources/news/bioraznoobrazie/leopardy-baksan-i-agura-vypushcheny-v-dikuyu-prirodu-osetii/ [last accessed 05.02.2023, 19:00])
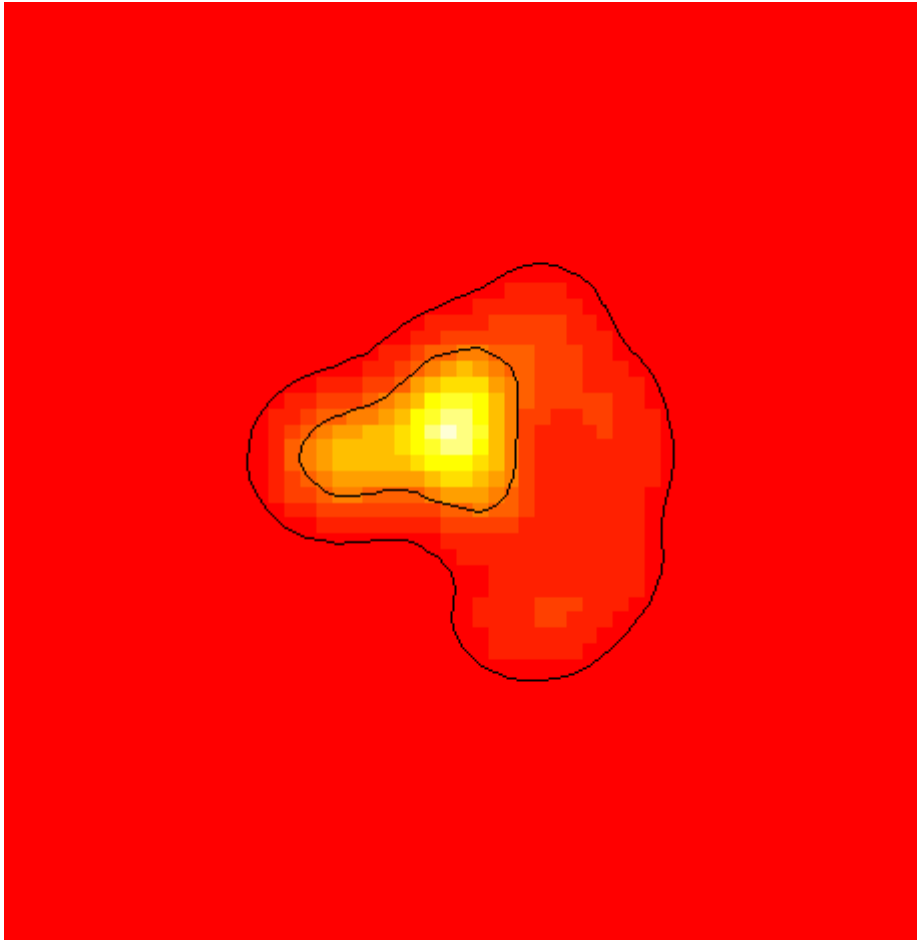
Figure 2 Heat Map of the total home range (kernel density estimation) of one individual, with circled 95% and 50% home ranges