

Wolf and lynx at crossroads – the interactions between large carnivores and transport infrastructure

Transport infrastructure, like roads, seriously threatens animal populations. Roads can block animal movement, causing animals to avoid them and resulting in fatalities. This roadkill can reduce population sizes, leading to a "depletion effect" that decreases genetic diversity over time. Furthermore, limited habitat connectivity makes it harder for animals to disperse or migrate, restricting their access to suitable homes and mates. This situation affects the long-term survival of populations. We still do not completely understand how transport infrastructure impacts large carnivores, as they are hard to study due to low population density, shyness, and mainly nocturnal lifestyles.

Many measures have been suggested to reduce the negative effects of roads on animal populations. These include warning signs, lowering traffic volume, enforcing speed limits, using systems to detect animals, deterring animals with smells, sounds, and sights, managing road edges differently, installing fences, and building crossing structures. However, only some of these measures are truly effective. The best way to prevent wildlife-vehicle collisions is by using fences to keep animals separate from traffic. However, fences can make it harder for animals to move across the landscape. To help wildlife cross roads, we often build crossing structures. These can range from small tunnels to large green bridges, depending on the size and behavior of the targeted species. Despite the popularity of wildlife crossing structures and the money spent to build them, we still do not have a good understanding of how well they work to reduce the negative impacts of roads on animal populations.

This study will use fieldwork and genetic methods to examine how a motorway affects two large carnivores: the social grey wolf (*Canis lupus*), and the solitary Eurasian lynx (*Lynx lynx*). Studying large carnivores is important because they are especially vulnerable to habitat loss due to their low population numbers and large area requirements. It is hard to predict how roads impact large carnivores since their responses often depend on individual factors like age, gender, and social status. Previous research shows that both species may suffer from traffic accidents and that roads limit their movement and use of habitats. However, it is still unclear if roads are significant barriers for large carnivores at the population level.

This research project will be the first to use modern techniques, such as individual genetic fingerprinting and telemetry, to study how roads affect large carnivores in Poland. The results will help with the conservation and management of wild animals and provide important data about how roads influence the genetic diversity of mammals.