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IMPACT OF BARRIERS ON A WOLF (CANIS LUPUS) POPULATION IN AN AGRICULTURAL ENVIRONMENT IN SPAIN

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Abstract

Since the 1970s, the wolf population in northern Spain has been expanding southwards, establishing itself in agricultural areas and reaching the River Duero, where expansion ceased at least for one decade. Over the last 15 years, some 2,000 km² of 4-line, fenced highways have been built within the 90,000 km² northern wolf range, and a lot more is planned. Both the highways and the corridor comprising the River Duero plus the infrastructures built along it are thought to act as a barrier to wolves. Our objectives were to assess whether wolves are able to cross these barriers and, if so, to determine which kind of passages they use, how frequently and when they cross, as well as the influence of social rank in crossing rate. We studied two kinds of barriers:

- 1) One 4-line, fenced highway, without crossing facilities for wildlife or livestock, in open, flat, agricultural land. Connecting Madrid with the Galicia region, it is one of the six major radial Spanish highways.
- 2) The corridor comprising the River Duero (100 m wide), one 2-line, unfenced road, a railway line, two canals, and two 500m-wide unforested strips with dispersed houses on each side of the river.

Lack of snow and high fog density prevented us from assessing passage use by wolves by looking for their tracks. In 1997 and 1998 we radio collared 11 wolves in 5 different packs, but some of them dispersed during the study period. When possible, we radio located them once a day, and followed one wolf for 24 hours once a week. From January 1998 to June 1999 we monitored the wolves near the highway intensively. If we did not locate them in the morning in their usual refuges, we searched by light aircraft in the afternoon. In this flat, almost treeless area of 20-50 inhabitants/km², there are 2.5-3 wolves/100 km² living in packs of 4 to 10 individuals. They prefer to seek refuge and breed in small 15 to 35 km² remnant forests, their staple diet being domestic livestock carrion. Legal hunting is highly restricted, but wolves are illegally persecuted. They are habituated to human activities, but fear people and avoid them by being mainly nocturnal.

From January 1998 to June 1999, the four radio-collared wolves that lived for over a month 15 km from the highway crossed it. The territorial wolves crossed the highway between 4.4 and 8.7 percent of days they were located, while the figures for the two floaters were 22.2 and 23.6 percent. One young territorial female increased her crossing frequency five-fold in the dispersal period. In the eight known cases, the wolves crossed by means of asphalted bridges for vehicles, 8 to 12 m wide and 40-60 long, the only structures available in the area. They crossed six times by night and twice by day. By night, 5 of the 6 wolves crossed by bridges with inhabited buildings less than 500 m away. In the daytime, there were no inhabited buildings less than one kilometre from the passages, but these were in totally treeless areas. One night, two collared wolves that moved around together separated to cross the highway over two bridges with different degrees of humanization, which suggests strong individual variability in tolerance to people. We radio collared 8 wolves less than 5 km from the River Duero. Between March 1997 and March 1999 (with 184 monitoring days) we only detected one crossing. Between May and August 1999, three wolves crossed the river 42.7 percent of the 75 monitoring days. These results indicate the important role of learning and suggest that an accumulation of obstacles may act synergistically and have a barrier effect greater than that of the sum of each one. It also seems clear that the River Duero and the infrastructures alongside it can have delayed the expansion of Spain's wolf population.

Our results suggest that, in our study area, where wolves are used to human activities, simple highways do not appear to be capable of fragmenting healthy wolf populations. However, bearing in mind the complexity of the factors involved in fragmentation and the future increase in infrastructure building in Spain, we believe that it is wise to routinely make permeable all new highways that are important crossing areas for wild mammals.

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