

# Road mortality and barrier effect: Which one is more harmful to population persistence and when does fencing enhance population persistence?

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## Introduction

Roads affect wildlife populations in three adverse ways (Fig. 1): (1) barriers to movement, (2) enhanced mortality (collisions with vehicles), and (3) reduced amount and quality of habitat. Installing fences along roads removes the problem of road mortality but increases the barrier effect. We studied this trade-off through a stochastic, spatially explicit, individual-based model of population dynamics (Fig. 2).

Fig. 1

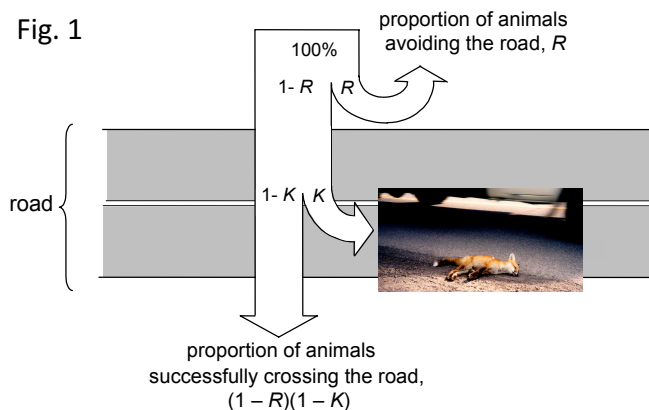


Fig. 2

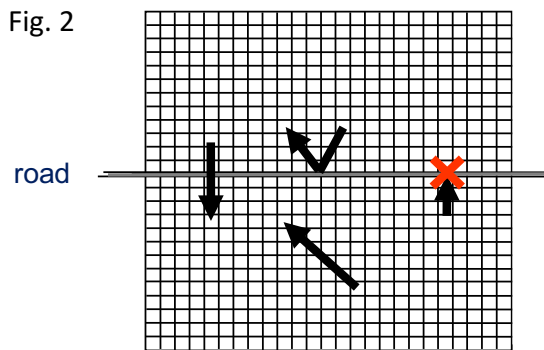


Fig. 3

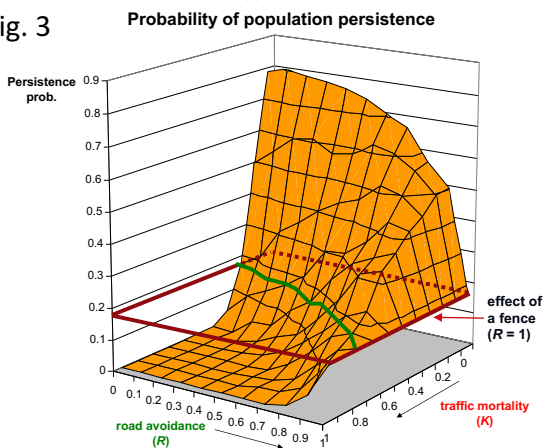
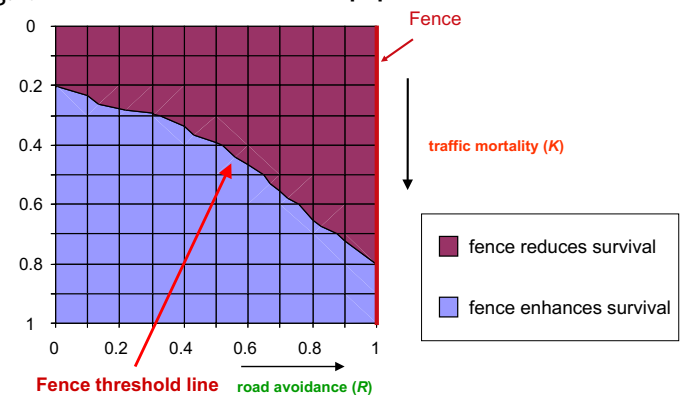


Fig. 4 When do fences enhance population survival?



## Results

(1) Road mortality ( $K$ ) is more detrimental to population persistence than the barrier effect ( $R$ ). (2) A fence may or may not reduce the effect of the road on population persistence, depending on the degree of road avoidance by the animal ( $R$ ) and the probability that an animal that enters the road is killed by a vehicle ( $K$ ) (Fig. 3). Fences are more likely to be beneficial the lower the degree of road avoidance and the higher the probability of being killed on the road (Fig. 4).

## Recommendations

We recommend the use of fences when (1) the populations of the species of concern are declining and road mortality contributes to the decline, or (2) when animals rarely succeed in their attempts to cross the road, or (3) in road sections with high road mortality (hotspots and warmspots) and (4) in areas where a road has already reduced population size (to allow for the recovery of these populations), and (5) when animals use wildlife passages or regular drainage culverts to cross the road.

Reference: Jaeger, J.A.G., L. Fahrig (2004): Effects of road fencing on population persistence. *Conservation Biology* 18(6): 1651-1657.