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Publication Date
2007-05-20

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Abstract

An understanding of the ecological effects of roads and related traffic in highly fragmented landscapes is critical because the viability of wildlife that persist through the adverse impact of habitat loss and fragmentation, due to causes such as agriculture or urban land-uses, may be further impaired by the presence of roads. The potential barrier effect can increase the level of population isolation, especially if traffic volume increases and roads are widened. This is particularly the case in landscapes where a large proportion of the habitat occurs in linear strips, such as in hedgerows or along roadsides or watercourses. Much of eastern Australia has been cleared and many threatened species occur in habitat adjacent to roads. Thus, management must minimise the negative effects of roads while maximising their value for conservation.

Gaps in habitat may result in impeded mobility of wildlife and potentially isolate populations, with subsequent consequences for population persistence. The squirrel glider Petaurus norfolcensis can be considered a model species for investigating the impact of roads on connectivity. A native arboreal marsupial, the squirrel glider has a very efficient way of locomotion which consists of gliding between trees, with very rare ventures on the ground, where the risk of predation is higher. Glider movement within home ranges and during dispersal is expected to occur along continuous vegetation, while cleared areas wider than the maximum gliding distance achievable could act as barriers. In this study we evaluated the filter effect of major roads on the squirrel glider in central Victoria (south-eastern Australia) using a combination of radiotracking and genetic techniques. We asked two important questions. First, does a major road act as a barrier or filter to the movement of gliders and if so, does the presence of tall trees between the carriageways facilitate their crossing.

A total of 58 adult individuals were radiotracked at six sites along the Hume Freeway (central Victoria), and at two control sites (minor roads with low traffic volume and small or non-existent gap in canopy cover) over a period of six months. The six sites consisted of small roads lined with old growth trees and dissected by the freeway. Three of these sites also had tall trees present in the median section of the freeway. The percentage of animals crossing at sites with vegetated median was similar to that at control sites, with 70% and 79% of all animals observed on the opposite side of the road or the centre median at least once, respectively. In contrast, only one male glider (10% of all animals) was observed crossing at sites with non-vegetated median. Overall, females were less inclined to cross roads, even at control sites and the intensity of crossing was also higher for males than females. The presence of trees in the median of the freeway was thus demonstrated to be a very efficient method of improving connectivity for gliders.

Data on dispersal collected via direct methods can be highly informative but also requires intense efforts in field work and usually long term studies. Genetic techniques are a useful alternative to infer dispersal events, through the use of spatial autocorrelation and relatedness/parentage analysis. These methods will be implemented to consolidate the preliminary results and estimate the net effect of observed crossings on gene flow.

Mitigation structures consisting of rope bridges and poles are being constructed to improve mobility of gliders as well as a number of other arboreal species and their effectiveness will be monitored using a combination of techniques. These will include motion-detecting infrared cameras, implantable transponders and radiotracking. Data will be compared on a pre- post-mitigation basis and at treatment and control sites.