National Center for Sustainable Transportation

POLICY BRIEF

Traffic Noise and Light May Affect Wildlife Use of Highway Crossing Structures

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Issue

Roads and highways act as barriers to wildlife. They disrupt movement of wildlife populations and connectivity between communities of interacting species. Transportation organizations and many wildlife agencies see highway crossing structures for wildlife as critical to mitigating highway barrier effects. These structures are optimistically assumed to be effective for most species, most of the time, but are seldom critically investigated.

Wildlife use of highway crossing structures can be highly variable and dependent on structural attributes, human use, and traffic conditions. Studies of animal behavior suggest that wildlife aversion to roadways—and possibly to crossing structures—could be related to traffic noise and light. If transportation organizations and wildlife agencies can confirm this effect they may be able to design more effective wildlife crossing structures and manage existing structures to increase their use by wildlife.

Researchers measured traffic noise levels and placed camera traps at 20 bridges and culverts in California that were known from previous work to pass at least one species (Figure 1). They also measured light levels at eight of these structures. Study highways included: I-5, I-80, I-280, I-680, and SR 65. Camera trap images and data were managed and stored at the Road Ecology Center (http://wildlifeobserver.net).

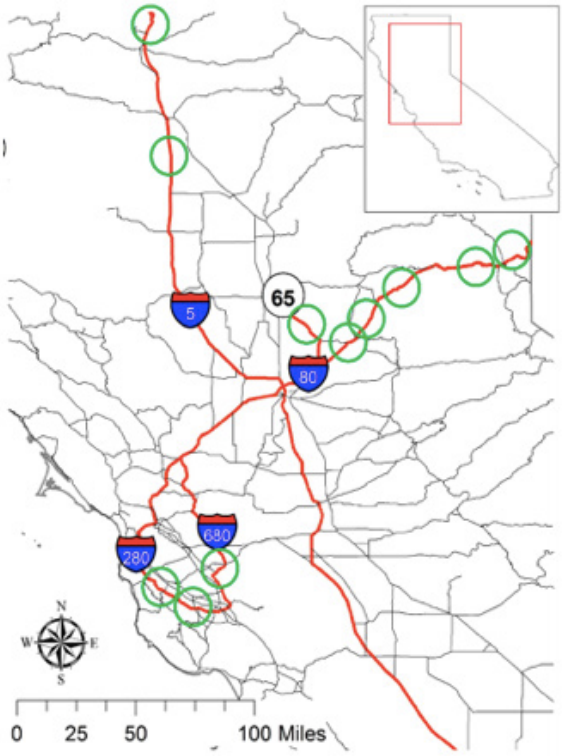

Figure 1: Study area and highway segments.

Research Findings

Species diversity is lower at the opening of crossing structures compared to nearby habitat areas. This lower diversity generally correlates with the traffic noise at the structure, but larger structures experienced greater diversity.

Species diversity across 20 structures was inversely correlated with traffic volume and maximum noise levels. The diversity of species using structures was inversely proportional to traffic noise at the structure openings.

The research team could not detect light effects across a subset of eight sites.

Several structures were railway under-crossings, and rail noise seemed to contribute to the measured impact on species diversity at the structures.

Wildlife crossing structures that were opportunistically used by wildlife to cross highways were partially effective at moving species. There were usually more species in nearby habitat than were using the structures.

Different species approach the structures in different ways. Certain species were cautious. Some were usually repelled prior to crossing; that alert, alarm and repel behavior may be related to traffic disturbance.

Traffic noise and light conditions should be studied prior to construction of wildlife crossing structures and improved for structures where light and noise is excessive and potentially reducing wildlife use. Mitigation retrofits and improvements at structures could include concrete sound and light walls and quiet pavements.

Figure 2: Bobcat contemplating a culvert under I-80.

Next Steps

This research team is interested in discovering whether animal behavior approaching or entering wildlife crossing structures varies with traffic conditions, and if such a finding could provide a mechanistic explanation for the observed species diversity reduction. The number of sites studied may have been too limited to dissect complex interactions between wildlife and highways, given the number of influential variables. This is especially true for measuring illumination; this study was able to measure traffic light conditions at only eight sites. Researchers are also interested in looking in more detail at specific highways that have known wildlife passage issues, or are proposed for mitigation. For example, a wildlife overpass has been proposed across U.S. 101 in the western San Fernando Valley to solve persistent wildlife movement problems. The team would like to deploy methods similar to those used in the current study to assist planning for successful wildlife use of the structure, especially given the $30-$50 million cost of the structure.

Further Reading

This policy brief is drawn from the "Wildlife Crossing Mitigation Effectiveness with Traffic Noise and Light" research report by Fraser Shilling, Amy Collins, Annabelle Louderback-Valenzuela, Parisa Farman, and Mia Guarnieri with the University of California, Davis, and Travis Longcore, Benjamin Banet, and Harrison Knapp with the University of Southern California. To download the report, visit: https://ncst.ucdavis.edu/project/wildlife-crossing-mitigation-effectiveness-with-traffic-noise-and-light/

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