

Bencin, H. L., Prange, S., Rose, C., & Popescu, V. D. (2019). Roadkill and space use data predict vehicle-strike hotspots and mortality rates in a recovering bobcat (*Lynx rufus*) population. *Scientific Reports*, 9(1). <https://doi.org/10.1038/s41598-019-50931-5>

Vehicle strikes are a leading source of mortality for many apex predators, especially in regions with high road density, due to their large home-range requirements, extensive movements, and lack of natural predators. In this study, long-term datasets (1978-2017) were used to determine local predictors of road mortality in recovering bobcat populations. Findings concluded that variables such as landscape and use density were reliable at predicting mortality on lower-traffic roads, particularly on roads that crossed through highly vegetated areas.

Eberhardt, E., Mitchell, S., & Fahrig, L. (2013). Road kill hotspots do not effectively indicate mitigation locations when past road kill has depressed populations. *Journal of Wildlife Management*, 77(7), 1353–1359. <https://doi.org/10.1002/jwmg.592>

Roads are well known to impact wildlife and the natural environment, but effective investment in mitigation strategies first requires a knowledge of where road mortality has already occurred. In this study, an incident survey was used to evaluate differential traffic effects on roadkill by taxonomic group, controlling for effects of habitat. The survey site is a well-known roadway system (60-80km/hr) that supports public recreation as well as conservation corridors for at risk wildlife species. Findings varied between animal types (bird, reptile, mammal), so the authors recommend not solely using incident frequency but also traffic volume and proximity of wildlife habitat to the roadway as criteria for selecting improvement areas.

Huijser, M. P., McGowen, P., Fuller, J., Hardy, A., Kociolek, A., Clevenger, A. P., Smith, D., & Ament, R. (2008). *Wildlife-Vehicle collision reduction study: Report to Congress*. Federal Highway Administration. <https://www.fhwa.dot.gov/publications/research/safety/08034/08034.pdf>

Vehicle collisions present a real danger to human safety as well as wildlife survival. State and local transportation agencies are looking for ways to find a balance among travel needs, human safety, and conserving wildlife. This national study details the causes and impacts of wildlife-vehicle collisions and identifies potential solutions to this growing safety problem. Policymakers who are interested in reducing wildlife-vehicle collisions (WVCs) are encouraged to consider the following actions:

- Incorporate WVC reduction into the early stages of planning and design for transportation projects.

- Develop and implement guidelines and standards for collecting data on and reporting WVCs.
- Develop and implement guidelines for evaluating mitigation methods.
- Evaluate the effectiveness of mitigation methods that have been recommended for further research.
- Implement (or install) proven mitigation measures where appropriate.
- Develop and apply wildlife population models to assist with locating and designing mitigation methods.

Ives-Dewey, D., & Lewandowski, J. P. (2012). Spatial Patterns of Road Mortality: Assessing Turtle Barrier Conservation Strategies. *Middle States Geographer*, 45, 40-47. Retrieved from http://digitalcommons.wcupa.edu/geog_facpub/14

Certain wildlife populations have been shown to be highly impacted by road mortality including turtles, crocodilians, and snakes. Road mortality often results in spatially patterned distributions, rather than an even distribution along a roadway, so the study evaluated datapoints mapped in relation to human and environmental factors and spatially analyzed to determine if there is a systematic relationship between the presence of barriers and clusters of kills in Diamondback terrapins. Authors mentioned two different ways to quantify the mortality events - hot spots (areas where each species is most commonly observed) and hot moments (seasonal occurrences for breeding or migration). While findings indicated that barriers are effective in reducing turtle mortality, additional factors might include measures to change driver behaviors such as alerting them to the presence of wildlife with signage.

Jenkins, D. G., Ohyama, L., López-Borghesi, F., Hart, J. D., Bogotá-Gregory, J. D., Rautsaw, R. M., Roldán, V. C., Guilfoyle, K., Jarvis, A., Loch, J., Mercier, K., Myers, O., Shaw, R., Volk, D., & Bard, A. M. (2021). Biogeography and predictors of wildlife killed on roads at peninsular Florida State Parks. *Ecology and Evolution*, 11(13), 9049-9061. <https://doi.org/10.1002/ece3.7743>

This study looks at wildlife diversity and species richness in peninsular state parks, based on incident data collected by Florida State Park personnel over a period of ten years (2005-2015). Findings show that limiting vehicle speed is one of the most manageable factors to reduce WVC, so traffic calming approaches are recommended in road sections shown to have higher incident frequency. Options for increased road visibility may provide a buffer of extra reaction time but may also encourage counteractive faster speeds, so obstacles (e.g. speed bumps) may be more effective than signage in areas adjacent to preserve lands.

Rasmussen, M. E., Andreu, M. G., & Johnson, S. A. (2023). Impacts of roads on Florida's threatened and endangered wildlife: an overview. *EDIS*, 2023(1). <https://doi.org/10.32473/edis-fr462-2023>

The state of Florida also has one of the largest road networks with approximately 275,376 miles of roads which impact a disproportionately larger area than the land area that they occupy. Often called the road effect zone, it impacts federally listed species in many ways, including habitat loss and fragmentation, road mortality, the barrier effect, and the habituation effect. Each potential impact may require a different strategy depending on the habitat type, species, road density, and size of the road(s). This publication looks at a suite of mitigation strategies - road configuration, signage, speed limits, habitat protection, improved technology, wildlife fencing, and wildlife crossing structures. This can be cost-effective only if engineers, transportation planners, ecologists, and biologists consult with one another and coordinate their efforts.

United States Department of Agriculture Forest Service. (2021). Highway crossing Structures for Wildlife: Opportunities for improving driver and animal safety. [Report]. In R. Ament, S. Jacobson, R. Callahan, & M. Brocki (Eds.), *General Technical Report PSW-GTR-271* (p. 51). Pacific Southwest Research Station.
https://www.fs.usda.gov/psw/publications/documents/psw_gtr271/psw_gtr271.pdf

Roadway travel presents a safety issue for drivers and is a major source of disruption for native wildlife, as evidenced by an estimated 1 to 2 million collisions that occur each year involving motorists and wildlife in the United States. The US Forest Service put together a technical report describing how wildlife crossing infrastructure measures can mitigate the negative effects of wildlife-vehicle collisions that also threaten motorist safety. The authors emphasize the importance of prioritizing conservation improvements as early as possible using data-based planning to more effectively address conservation needs in the short and long term. Findings from the report suggest the most successful projects have resulted from partnerships among agencies, nongovernmental organizations, and other stakeholders using interdisciplinary principles of engineering, ecology, and design. Local, state and federal agencies are therefore encouraged to develop joint programs as they have multiple benefits, including reducing human fatalities and injuries; providing safe passage for wildlife; improving ecological connectivity; leveraging federal investment with state, local, or private funding; encouraging development and research of innovative technologies; and potentially saving taxpayer dollars over the lifetime of the projects.