

Title: Spatiotemporal assessment of wildlife-vehicular collisions in New Hampshire

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Abstract: Wildlife vehicular collisions (WVCs) pose inherent threats to wildlife populations and human safety worldwide. Roads create barriers that range in permeability to wildlife movement. For some wildlife, crossing a road is avoidable. Others cross roads with variable success, from outright failure (mortality) to temporary success (crossing without harm). Humans involved in WVCs experience a similar range of impact, with a lower proportion of collisions resulting in severe human impacts. Although New Hampshire law requires wildlife implications be considered in transportation planning and decision making, the prevalence and patterns of WVCs had yet to be assessed prior to this study and a comprehensive roadkill reporting protocol is not in place. To fill the data gap, NHDOT funded this project to explore existing data, map, summarize, and analyze WVC patterns; identify risk parameters that should be considered during new road construction; recommend locations and strategies for mitigation; and develop decision-support tools. To that end, we analyzed statewide WVC records from 2002-2019 to visualize spatiotemporal patterns and identify potential predictors of WVCs to inform mitigation efforts. More than 27,000 WVCs were reported between 2002-2019, averaging ~1,500 WVCs per year. WVCs occurred on roads of all size and functional class, with 33% on “local” roads and at least 62% on roads with posted speed greater than 40mph. We found positive relationships between WVCs and local road density, which corresponds to population centers within the state. Nearly 25% of the WVCs were not accompanied with reliable spatial data and therefore were removed from spatial and statistical analysis. We identified WVC hotspots (top 5% of road segments by WVCs per mile and total WVCs) and assessed road characteristics within these road segments to make WVC reduction recommendations, including enhancements to existing culvert road crossings. We identified collision-specific, road, and adjacent wildlife habitat attributes that statistically explained observed variability in WVC occurrence. To assist with planning and project decisions, we developed an ArcGIS Online map viewer that included data layers for WVCs (individual collision locations and road-level summaries), wildlife (habitat type, connectivity, and population densities), and human influences (human population density, road density, stream-road crossings). We also developed an ArcGIS Online Storymap to support in-reach within the NHDOT and outreach to local municipalities. Together these tools provide data and resources to help inform future road planning and prioritize infrastructure project for federal funding. The need for higher accuracy and finer resolution data are among the most important conclusions from this first statewide assessment.