

Spatial wildlife-vehicle collision models: A review of current work and recommendations for their application to transportation mitigation projects

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It is well documented that wildlife-vehicle collisions (WVCs) are clustered on roads, prompting road ecologists to link road and landscape characteristics to WVC occurrence. Typically, their objective is to predict the best locations to place wildlife mitigation measures, such as crossing structures, to allow wildlife to cross the road safely avoiding collisions with motorists. We explored and summarized research results that determine the road, e.g. traffic volume and landscape features, e.g. habitat that influence WVCs. We then provide recommendations for model design to better predict where WVCs may occur. Our review shows WVCs commonly occur when road segments bisect favourable wildlife habitat, drainage movement corridors, and flat terrain. Furthermore, road characteristics such as high traffic volumes, and decreased motorist visibility also contribute to more WVCs. These results are intuitive and well documented. Future models need to select variables that provide additional information for the interaction of WVCs and roads at the required mitigation planning scale. At this point, selecting few pertinent variables would outweigh the benefits of including many general variables which often lead to confounding results that are difficult to interpret. Another issue is most WVC modelling designs only encompass a static spatial snapshot of the variables that influence WVCs although previous research has shown that where a WVC occurs is also dependent on when it occurs. Predictive spatial modelling needs to encompass the changing spatial dynamics of the landscape especially when using long-term data sets. In conclusion, prior to WVC modelling analyses research should first perform two-dimensional spatiotemporal analyses, to supplement informed selection of the variables at an appropriate spatial and temporal scale. Modeling output can then be maximized to assist transportation planners and road ecologists at devising the most effective mitigation strategy, i.e. permanent crossing structures with fencing, or more seasonal road traffic control on roads.