

# RESEARCH PROJECT TECHNICAL BRIEF

## RP-291: EVALUATION OF DEER-VEHICLE COLLISION RATES IN WEST VIRGINIA AND A REVIEW OF AVAILABLE MITIGATION TECHNIQUES

### Project Background

Over the last few years, West Virginia has been consistently identified by State Farm Insurance as the state with the highest rate of deer-vehicle collisions (DVCs). The likelihood of a licensed driver in West Virginia hitting a deer in 2012-13 was calculated by State Farm Insurance to be 1 in 41, whereas the probability is only 1 in 174 for the United States. Montana, Iowa, South Dakota, and Pennsylvania complete the top five states with the highest probability for DVCs. Four out of the five neighboring states (Pennsylvania, Virginia, Kentucky, and Maryland) have also been identified by State Farm Insurance as states with a “high risk” for DVCs, while Ohio is classified as having a “medium risk.” In January 2011, an agency review of the West Virginia Division of Natural Resources (WVDNR), as part of the Departmental Review of the Department of Commerce, was conducted by the Performance Evaluation and Research Division of the West Virginia Legislative Auditor’s office. No major wrongdoing with the WVDNR was identified by the audit; however, the legislative auditor recommended that the WVDNR increase efforts to reduce the potential for DVCs in the state. As a partial response to the aforementioned auditor recommendation, the WVDNR initiated this evaluation and review of DVCs in cooperation with the West Virginia Department of Transportation-Division of Highways (WVDOT-DOH). The project was jointly funded by State Farm Insurance, WVDNR, and the WVDOT-DOH and was completed under the direction of the WVDOT-DOH Research and Special Studies (RSS) Section through a contract agreement with Marshall University, where Dr. Andrew Nichols lead the research effort as the Principal Investigator.

### Project Objectives

The primary objectives of the project were to (1) evaluate DVC rates in West Virginia; (2) review the DVC mitigation policies and practices of the surrounding state DOTs; (3) rate the available mitigation technologies, policies, practices etc. that are applicable to West Virginia and should be considered for implementation and/or further study; (4) evaluate DVC data that has been collected in West Virginia and the collection methods used; (5) identify and rank DVC hotspots on Interstate, US, and WV routes; (6) model probable DVC locations across West Virginia to identify roadway, landscape, environmental, and traffic characteristics that contribute to DVCs; and (7) identify possible funding sources at the local, state, and federal level for DVC mitigation implementation.

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## Summary of Key Findings Related to the WVDOT-DOH

1. Although West Virginia has been identified by State Farm as the state with the highest rate of DVCs in the nation over the last few years, West Virginia ranked 17<sup>th</sup> in total number of DVC insurance claims, while Pennsylvania ranked first. The State Farm report bases risk on DVCs per number of licensed drivers in the state. Therefore, the study also evaluated roadway mileage, number of registered vehicles, and vehicle miles traveled as measures for normalization. Furthermore, these metrics were broken down into rural-only components to eliminate bias that occurs in states with large urbanized areas. When removing the large urban areas from all states, West Virginia's DVC ranking drops, but is still in the top 5-11 when normalized by roadway mileage, number of registered vehicles, and vehicle miles traveled.
2. There were 1,642 fatalities on WV roadways from 2008 to 2012. Of the 1,642 fatalities, 12 were from a DVC (0.73% of all fatal crashes). The number of DVC-related fatalities by route type are as follows:
  - 5 fatalities on US routes
  - 4 fatalities on WV state routes
  - 3 fatalities on County routes
3. Vehicular crash types with the highest percentage of overall fatalities in WV from 2008 to 2012 are as follows:
  - Vehicles hitting other vehicles for various reasons (31%)
  - Vehicle rollovers (16%)
  - Vehicles departing road & hitting trees (13%)
  - Vehicles departing road & hitting embankments (7%)
  - Vehicles hitting pedestrians (7%)
  - By comparison, DVCs (0.73%)
4. Currently, the most appropriate and available funding source for DVC mitigation are Highway Safety Improvement Program (HSIP) funds. Qualifying projects are prioritized by their benefit-cost ratios and HSIP funds are primarily allocated to locations that experience a high number of crashes that result in fatalities and injuries. Based on this analysis, the mitigation of DVC hotspots identified in this research would not rise to the top of that list due to the limited number of severe crashes that occur.
5. DVC hotspots were identified on Interstate, US, and WV state routes based on total DVC count along 2-mile segments and were categorized as high, medium, and low, where the categorization was based on the frequency of DVCs. A DVC hot spot map was developed from this data; this map revealed that the DVCs were very dispersed across the state. The 2-mile segments that ranked as "High" ranged from 13-22 reported DVCs over the 5-year analysis period; however, these segments did not have high enough concentrations of DVCs to qualify for HSIP funding for possible mitigation.

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6. Currently there are no cost-effective measures available that have been shown to significantly reduce DVCs.
  - The most potentially effective mitigation measure is wildlife fencing ( $\geq$  8-ft high) in combination with safe crossing opportunities (e.g. jump-outs, underpasses, and/or overpasses). However, the installation cost for wildlife fencing alone is estimated to be \$154,460 per mile (includes both sides of the road) and is most effective when implemented in section lengths  $\geq$ 3 miles.
  - Standard wildlife warning signs (e.g. deer-crossing signs), as well as enhanced and temporal (seasonal) signs have shown little benefit in reducing DVCs.
  - Animal detection systems are expensive and deployments to date have failed due to technical and management problems.
  - The effectiveness of using deer-deterrent seeding in roadway rights-of-way requires more research.
  - (Note: the RSS section is currently evaluating deer-deterrent seed mixtures in the research project *RP 293 - Evaluation and Recommendation to the WVDOH's Seeding and Mulching Processes and Specifications*)
7. Carcass removal data on WVDOT-DOH Daily Work Reports (Form DOT-12) were shown to not be a reliable source to identify hotspots (e.g. location information is not being recorded consistently). Police crash records provided the most reliable location information, but the crash reports significantly underreport DVCs due to the minimum property damage threshold that must be exceeded in order to file a report.
8. More complete and reliable roadway data, in GIS format, from the WVDOT RIL is needed in order to better model DVC locations with respect to roadway and traffic characteristics.
9. A survey of the surrounding state DOTs showed that the implementation DVC mitigation policies and measures by these agencies vary and, in general, are not very robust and still under development.