

COSTS OF DEER-VEHICLE ACCIDENTS IN UTAH

John A. Bissonette, Leader USGS Utah Cooperative Fish and Wildlife Research Unit and his M. S. student Chris Kassar assembled this information regarding costs associated with deer vehicle accidents as part of Ms. Kassar's M.S. Thesis.

The data set came from the Utah Crash Outcome Data Evaluation System (CODES) project. The Utah CODES project is based at the Intermountain Injury Control Research Center, University of Utah School of Medicine and is directed by J. Michael Dean MD, MBA and Larry Cook, M.Stat., who provided the necessary data for our analyses. The data included wildlife-vehicle collision frequencies, associated human injuries and fatalities, and costs for crashes occurring within Utah from 1996 to 2001. The CODES database contains vehicle collisions for Utah from 1992 to 2002. At the time of this analysis, both emergency department and in-patient charges were available and linked for collisions occurring from 1996 to 2001. The CODES project is based on probabilistic record linkage, a method for combining multiple databases to study motor vehicle crashes in conjunction with other healthcare databases. The project relies on the following databases: the Utah Department of Transportation (UDOT) motor vehicle crash records completed by officers at the scene; the Utah Department of Health, Bureau of Emergency Medical Services records on emergency medical services runs; discharge records from emergency departments and hospitals collected from individual hospital organizations; vital statistics databases (i.e., death certificates and birth certificates); and driver license databases (i.e., moving citations and driver medical conditions).

Combining the information in these databases is necessary to create a comprehensive picture of the event and its consequences. For example, the motor vehicle crash database provides a number of variables that are of interest for the analysis of motor vehicle crashes (i.e., weather conditions, type of crash, the number of people and vehicles involved). This database also includes a police-assessed injury score coded on a five point scale ranging from 1 (not injured) to 5 (killed) and assigned to each passenger at the scene of a crash. However, more accurate measures of severity exist in other healthcare databases including the Glasgow Coma Score (GCS) assessed by emergency medical services, and the Abbreviated Injury Score (AIS) and Injury Severity Score (ISS) calculated from emergency department and hospital discharge datasets. While healthcare databases contain more accurate severity rankings and injury mechanisms codes, there are no crash characteristics (as mentioned above) documented within them. Because the information within these databases was collected independently from different sources, researchers developed a probabilistic linkage method to join information from different databases. Comparing numerous common data fields, such as date of birth or gender, in 2 different files leads to the logical conclusion that 2 different records refer to the same patient (or not) and should be linked (or not). Probabilistic record linkage has been used for multiple analyses on a national level; e.g., to assess the effects of seatbelts and motorcycle helmets on medical outcomes.

We used these linked data sets to develop our analysis of the economic costs associated with wildlife-vehicle collisions in Utah. Our analysis excluded large domestic

animal collisions (e.g., livestock). Smaller wild animals-vehicle collisions seldom are reported. The CDC (2003) reported that deer are the most common large animals involved in vehicle collisions. Most reported large animal-vehicle collisions involving wildlife in Utah involved mule deer (*Odocoileus hemionus*), with only a few involving elk or other larger animals. For this reason and given the nature of the Utah CODES data base, we focused on identifying patterns, trends and costs associated with motor vehicle collisions involving almost exclusively mule deer.

An Assessment of Costs Associated with Deer-Vehicle Collisions

Collisions between large vertebrates and vehicles are an increasing concern along roadways not only because of ecological consequences but also because of associated economic and social costs. We used a large scale, long-term data set from Utah to summarize and analyze these costs. The overall cost for 13,020 collisions from 1996-2001 in Utah was ~\$45,175,454, resulting in an estimated average per year cost of ~\$7,529,242 and an overall per crash value of ~\$3,470. Contributions to total costs varied widely: estimated human fatality costs of \$24 million accounted for 53%; vehicle damage costs of \$17,521,970 accounted for 39%; deer loss valued at \$2,651,083 totaled 6%, and human injury costs of \$1,002,401 accounted for 2% of total costs. Cost-benefit analyses have shown that mitigation efforts can have positive net economic gains while also increasing safety. It is clear that mitigation that is prioritized based on road kill data will help to address this issue.

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