IOWA STATE UNIVERSITY
Institute for Transportation

Unreported Deer Crashes on Iowa Highways

tech transfer summary

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Understanding the nature of deer crashes in Iowa and the extent to which they are underreported can help agencies better assess the prevalence of deer crashes and invest in countermeasures. In Iowa, about 40% of vehicle-deer crashes are not reported to law enforcement according to road user survey data.

Background

More than 7,300 crashes involving animals are reported in Iowa each year, the majority of which result from collisions with white-tailed deer. This number represents 13.5% of all reported motor vehicle crashes in the state, with crashes occurring in all of Iowa's counties and on roadways of every classification.

Although about 96% of Iowa deer crashes are property-damage-only, from 2013 through 2022 an average of 3.2 animal-involved fatal crashes occurred in Iowa each year. These animal-involved human fatalities typically occur when the animal is struck by a motorcyclist or when a vehicle operator loses control while trying to avoid hitting an animal.

Problem Statement

Previous research leaves little doubt that law enforcement reports undercount the actual number of deer crashes. Several studies have found wide discrepancies between reported crash counts and the number of deer carcasses removed from roadsides by highway maintenance crews.

Moreover, carcass counts are themselves an undercount of vehicle-deer crashes. Some deer are able to move away from the road after being struck by a vehicle, deer that die by the roadside are sometimes consumed by scavengers before they are discovered, and some carcasses are not identified if traffic is light or the carcass is hidden by weeds or brush.

Understanding the nature of deer crashes in Iowa and the extent to which they are underreported can help transportation agencies more accurately assess the prevalence of deer-vehicle crashes and invest in effective countermeasures.

White-tailed deer crossing a road in Michigan

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Objectives

- Develop a general overview of the spatial patterns of Iowa deer crashes

- Explore the prevalence of unreported deer crashes in Iowa

- Explore field data collection methods that can help agencies document reported and unreported deer crashes

- Estimate the costs public agencies incur as a result of deer crashes and a recommended value for the comprehensive costs of an average deer crash

Research Description

To understand the relationships between deer habitat and deer-vehicle crashes, geospatial analyses were conducted comparing the locations of reported deer crashes with habitat quality data provided by the Iowa Department of Natural Resources (DNR).

To explore the prevalence of unreported deer crashes in Iowa, a public survey was distributed through a market research firm and the Iowa Department of Transportation's (DOT's) social media presence. Participants were asked to confirm that they reside and/or drive in Iowa and report on their involvement in any vehicle-deer collisions between 2010 and 2020. A total of 2,185 relevant responses were obtained.

To identify potential improvements in deer crash data collection, several potential methods were investigated, including roadside deer detection systems, deer crash detection systems, self-reporting methods, and predictive analytics.

To estimate the overall financial costs of deer crashes, comprehensive crash costs published by the National Safety Council (NSC), Centers for Disease Control and Prevention (CDC), and U.S. Department of Transportation (USDOT) were reviewed and a constructive estimate was developed for the Iowa DOT's carcass removal cost.

Key Findings

Crash Crash Characteristics

- Mapping of Iowa vehicle-animal crashes that were reported to law enforcement in 2010–2020 indicates that although crashes occur throughout the state, they are most prevalent in southeast and northeast Iowa, on routes that parallel rivers and other waterways, near river crossings, and in the southwestern suburbs of the Des Moines metropolitan area. Animal crashes are less prevalent in northwest and north-central Iowa, except near river crossings.

- Gradual increases in the annual number of reported vehicle-animal crashes are probably driven by growth in the deer population and changes in land use that increase vehicle-deer conflicts.

- Comparisons of reported deer crash locations with deer habitat quality data confirm that crashes tend to occur where a high-volume roadway is located close to prime deer habitat, particularly where major highways cross or run parallel to rivers and creeks.

- Habitat fragmentation potentially contributes to the deer crash problem in Iowa. If any of the three key elements of deer habitat—food, water, and cover—is separated from the others by a roadway, the frequency of deer crossings is likely to increase.

- Almost half of reported deer crashes occur between October and December. During this period, the annual corn and soy harvests result in abrupt migration of the deer population, the start of deer mating season increases animal activity, and the annual switch to standard time shifts the evening commute to sunset, when deer are most active.

Countermeasures

According to the literature, only a few deer crash countermeasures appear to be effective:

- Previous research indicates that the most comprehensive way to reduce vehicle-deer crashes would be to remain on daylight savings time for the entire year. This would separate the daily peak of deer activity from the daily peak of motorized traffic.

- A cost-effective countermeasure is to display deer warning messages very selectively on existing dynamic message signs (DMS). These messages can be narrowly targeted to locations and times when deer are likely to be near the roadway, such as forested/riverside areas around dusk and dawn from late October through early December.

- Combinations of fencing and underpasses or overpasses appear to be the most effective physical approach to prevent deer crashes. Although costly to retrofit to existing sites, these countermeasures could be implemented incidental to new roadway construction and when bridges over waterways are reconstructed.

Deer crossing overpass in Alberta, Canada

Deer Crash Survey Results

- The responses suggest that about 40% of deer crashes are not reported to law enforcement.

- Crash reporting rates do not appear to differ much based on the severity of the damage resulting from the crash. Iowa's $1,500 threshold for reporting property-damage-only crashes appears to have almost no influence on whether a crash is reported to law enforcement.

- Crashes are more likely to be reported to insurance carriers than to law enforcement.

- The responses suggest that carcass counts substantially undercount deer crashes. Respondents indicated that about 40% of deer run away after the crash, 20% end up on the road shoulder, and 17% end up in the ditch, weeds, woods, etc.

- The responses suggest that around 60% of deer crashes occur on paved two-lane rural highways or unpaved rural roads, about 20% occur on freeways, and around 20% occur on urban, suburban, or small-town streets.

Deer Crash Detection Methods

- Video surveys from drones or maintenance vehicles appear to be the only feasible means of automating the collection of deer crash (carcass) location information.

- Since many carcasses are promptly scavenged by predators, the reliability of the resulting data will be highly dependent on the frequency of the video data collection. The reliability of carcass counts is doubtful in any case, given that the survey respondents indicated that about 40% of injured deer run away after the crash.

- The development of an actuarial model that relates deer crash risk to habitat quality and traffic volume could be considered as an alternative or supplement to direct measurement of deer crashes.

Deer Crash Costs

- The direct agency costs of response and carcass removal are small in relation to those associated with morbidity and mortality, loss of wages and productivity, medical treatment, vehicle repairs, and claims administration.

Implementation Readiness and Benefits

Understanding the nature of deer crashes in Iowa and the extent to which they are underreported can help transportation agencies more accurately assess the prevalence of deer-vehicle crashes and invest in effective countermeasures.

The geospatial analysis of reported deer crash locations versus deer habitat quality resulted in a series of maps, included in the final report for this project, that confirm where deer-vehicle conflicts are likely to occur.

Accurate estimates of the number of vehicle-animal crashes are desirable for making countermeasure investment decisions. Adjustment factors (correlation factors) can potentially be applied to law enforcement data or carcass counts to help account for underreporting.