Executive Summary

Final Report: Causal Factors and Possible Solutions to Reduce Highway Accidents Caused by White-Tailed Deer in South Carolina, Phase I

Deer/vehicle collisions represent a portion of a negative external cost function that results from having a large deer herd in South Carolina. Other parts of this function may include crop damage and ornamental shrub degradation. There are also large positive external and private benefits from the deer population in South Carolina.

Estimates of the number of deer/vehicle accidents occurring annually in the United States fall between 300,000 and 750,000. In the year 1996, South Carolina suffered from 5,904 reported deer/vehicle collisions. The South Carolina Insurance News Service estimated that each of these accidents averaged $1,700 in property damage. The purpose of this research is to determine where most of these accidents are likely to occur, and to suggest mechanisms to reduce the total number of occurrences.

In order to get a feel for the spatial element of the deer/vehicle accident problem, accident locations were plotted in a Geographical Information System (GIS) that included maps for twelve sample counties in South Carolina. This sample was chosen to represent each geographic region of the state (mountains, piedmont, coastal plain, and coastal) and to include both rural and urban areas. Assigned to each accident in the GIS were the following attributes: accident ID number, date of occurrence, fatality (y/n), injury (y/n), property damage only (y/n), road conditions (wet/dry), and light (daylight/dark). Analysis of the county maps revealed areas of high accident occurrence (clusters). Visitation to some of these cluster sites illustrated the importance of man-made and natural funnels for deer movement.

Key variables analyzed in the occurrence of deer/vehicle collisions include time of year, time of day, road conditions, proximity to towns, and proximity to rivers or streams. Analysis of time of year of accident instance shows a very
dramatic increase in the number of deer/vehicle collisions reported in the months of October, November, and December. The hypothesis is that this pattern holds for the entire state, for this time is known to be the breeding season of the white-tailed deer. To test this hypothesis, t-tests were performed to determine if the mean percentage of total accident occurrence by month in the twelve mapped sample counties was equal to that of six other sample counties in South Carolina with the highest frequency of accidents. At the 0.01 level of significance, it was found that there is no difference in the time of year of accident occurrence between the twelve mapped counties and the six non-mapped counties. Thus, the frequency of deer/vehicle collisions can be expected to rise in the last three calendar months of the year across the entire state. In fact, the months of October, November, and December combined account for more than 46% of the annual accidents in the two years studied.

Time of day of accident occurrence was also analyzed. It was originally thought that the majority of accidents would occur during low light conditions, due to an increase in deer movement at these times and a decrease in driver visibility. It was found that most deer/vehicle collisions occur after 6:00 pm and before 6:00 am. The percentage of accidents occurring during this time for the twelve mapped counties ranged from 61% to 82%.

The third variable considered was road condition (wet or dry) at the time of the collision. It was hypothesized that a significant number of accidents would take place when the road was wet due to reduced friction properties of the road surface and possibly reduced driver visibility. The percentage of accidents occurring on wet roads for the twelve mapped counties ranged from 0% to 17%. It was concluded that these percentages were not notable and there is no important relationship between road condition and accident occurrence.

Proximity to towns was the next key variable examined. Accident locations within one mile of a human population center were selected. Due to an increase in the volume of traffic in these areas, it was hypothesized that a significant portion of the accidents would happen within this buffer. The percentage of accidents occurring near towns ranged from 2% to 44%. The importance of this attribute varies between counties and should be considered on a county level.

The most notable finding was the importance of proximity to rivers or streams. Management zones associated with these areas often provide undisturbed travel corridors for deer and other species of wildlife. The percentage of accidents occurring within 0.3 miles of a river or stream ranged from 23% to 60%. The percentage of total road coverage represented by these 0.3 mile buffers was 6% on average. With this high percentage of accidents occurring on this low percentage of total roads, proximity to rivers or streams is a major consideration in the attempted mitigation of deer/vehicle collisions.

Maintenance of larger right-of-ways on the roadside could also reduce the frequency of deer/vehicle accidents by increasing driver visibility and reaction time to a deer being nearby. Roadside vegetation management should discourage the use of fertilized herbaceous plants that are high in palatability and nutritional content for the white-tailed deer. With a statewide effort to reduce deer/vehicle collisions, roadside management should focus on not attracting deer to the roadway.

In conclusion, an aggressive public education program may have some immediate effect to decrease the number of accidents with white-tailed deer. Good basic advice would be to: drive safely in known deer/vehicle accident areas; and where highways cross streams, especially during low light conditions in October through December.

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