A SUMMARY OF REPORTED DEER-RELATED VEHICLE ACCIDENTS IN A VIRGINIA CITY

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ABSTRACT: Data from 548 reported accidents involving white-tailed deer (Odocoileus virginianus) and vehicles in Lynchburg during the years 1987-1991 were summarized. A majority (54.4%) occurred in the months October, November and December with 25.9% occurring in November. While accidents occurred at all hours, most (50%) occurred between 1700 and 0100 hrs.; about 12% occurred between 0600 and 0900 hrs. Accidents occurred on all days of the week (range 12.8% to 17.0%) and were not higher on work days. Adverse weather did not seem to be a factor increasing collisions; 80% of collisions occurred in clear weather. Most (75%) accidents occurred in dark conditions; 50% occurred on lighted highways. Accidents resulted in 9 human injuries and 1 human fatality.

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Deer-vehicle accidents have been long recognized as a source of deer mortality as well as of property damage (Bellis and Graves 1971, Reilly and Green 1974, Allen and McCullough 1976, Bashore et al. 1985). Most previous studies have been concerned with vehicle accidents involving deer of several species in rural conditions and on rural highways. White-tailed deer have become a severe and frustrating problem in urban and suburban areas of the east. Part of the problem has involved collisions between deer and vehicles. Analysis of patterns of these collisions would provide data for educating the motoring public on means to avoid accidents with deer. Instructions given to motorists in states' drivers handbooks seem inadequate in this regard (Scanlon and Muth 1979).

This report presents data on seasonal and daily patterns of deer-vehicle accidents occurring in Lynchburg, Virginia, during the interval 1987 to 1991. The lighting and weather conditions prevailing at the times of these accidents were also considered.

We thank the city of Lynchburg police officers for their diligent efforts and Mrs. Donna Stanek for her interest in solving deer-related problems in Lynchburg.

METHODS

Lynchburg, Virginia, is located in the Piedmont region of Virginia. It is a city of approximately 70,000 residents with an area of 130 km^2 (50 mi^2). Approximately one-third of the area is wooded though much of the wooded area is now residential subdivisions. Some properties within the city limits are farms. Deer population size, though undocumented, seems high within the city and the city adjoins counties with burgeoning deer populations. Limited hunting of deer is conducted on the farms within the city and some deer have been removed to control crop damage.

The city of Lynchburg police officers prepared standard accident reports on collisions involving deer. Not all deer accidents were reported as indicated by dead deer being found on roads while the relevant collisions were not reported. The standard information recorded include date, time of day, weather and lighting conditions, human injuries, and an estimate of property damage. These data were compiled for the years 1987 through 1991. Patterns in the data were determined by simple percentage analyses. More formal analyses were not deemed appropriate as appropriate data on traffic patterns were not available.

RESULTS AND DISCUSSION

A total of 548 deer-related vehicle accidents were reported in the 5-year period. Most accidents (94%) involved collisions with deer. Only 33 (6%) of accidents results from avoiding deer. The accidents resulted in 9 human injuries in 8 accidents (Table 1).

Table 1. Human injuries and property damage resulting from deer vehicle accidents in Lynchburg, VA. 1987-1991.

	1987	1988	1989	1990	1991	All
Total	105	91	94	124	134	548
Human injuries	1	0	3	2	3	9
Human fatalities	1	0	0	0	0	1

There was one fatality.

Time of year had a major effect on frequency of deer-vehicle accidents (Table 2). October, November and December were the months of peak accident numbers with November having 26% of all accidents. Several factors probably combine to produce this pattern including deer behavior prior to, during, and after the rut, light conditions, and the fact that traffic patterns associated with commuting to work coincide with darkness.

Table 2. Monthly districation of deer-vehicle accidents in Lynchburg, VA 1987-1991.

	1987	1988	1989	1990	1991	All	%
J	2	6	14	8	5	35	6.39
F	7	4	4	6	5	26	4.75
M	10	8	6	6	6	36	6.57
A	6	3	6	3	4	22	4.01
M	4	5	6	8	4	27	4.93
J	1	4	6	3	9	23	4.20
J	3	5	2	7	8	25	4.56
A	8	4	3	3	7	25	4.56
S	2	8	5	10	6	31	5.66
O	15	13	15	16	17	76	13.87
N	29	20	21	37	35	142	25.91
D	18	11	6	17	28	80	14.60
Total	105	91	94	124	134	548	

Most of the accidents occurred between 1700 and 0100 hrs. (Table 3). Rather few accidents occurred during the daytime or in the early morning hours when presumably traffic was light. Only a relatively low percentage of accidents (12.1%) occurred between 0600 and 0900 when most people drive to work.

Table 3. Time of day when deer vehicle accidents occurred in Lynchburg, VA, 1987-1991

Hour	1987	1988	1989	1990	1991	All	%
<1 a.m.	3	5	0	7	13	28	5.1
1-2	6	3	4	4	6	23	4.2
2-3	4	4	4	3	1	16	2.9
3-4	5	3	2	3	4	17	3.1
4-5	3	3	4	4	3	17	3.1
5-6	3	4	4	1	6	18	3.3
6-7	6	8	4	5	8	31	5.7
7-8	5	5	1	6	4	21	3.8
8-9	1	4	2	3	4	14	2.6
9-10	3	2	2	1	2	10	1.8
10-11	1	1	2	1	3	8	1.5
11-12	1	2	1	0	2	6	1.1
12-1 p.m.	0	2	3	0	3	8	1.5
1-2	2	0	0	0	2	4	0.7
2-3	0	5	1	2	4	12	2.2
3-4	0	1	0	0	1	2	0.4
4-5	2	0	2	3	1	8	1.5
5-6	10	5	7	10	8	40	7.3
6-7	11	8	8	15	10	52	9.5
7-8	8	6	11	9	14	48	8.8
8-9	9	6	8	14	13	50	9.1
9-10	7	7	6	10	9	39	7.1
10-12	6	3	9	15	5	38	6.9
11-12	9	4	9	8	8	38	6.9
All						548	100

Light conditions vary with time of day throughout the year and may influence the diurnal pattern of accidents. Accidents were relatively evenly distributed across days of the week (Table 4). The patterns of accidents seem less associated with travel to and from work than with traffic during evening hours.

Table 4. Deer-vehicle accidents by day of week in Lynchburg, VA, 1987-1991.

Day	1987	1988	1989	1990	1991	All	%
Su	11	7	17	19	16	70	12.8
Mo	15	15	24	18	12	84	15.3
Tu	12	14	13	16	16	71	13.0
We	17	14	9	13	22	75	13.7
Th	20	15	10	23	25	93	17.0
Fr	15	11	10	13	23	72	13.1
Sa	15	15	11	22	20	83	15.1
All	105	91	94	124	134	548	100

Light conditions were important factors in deer-vehicle collisions (Table 5). Most (75%) accidents took place in darkness and 50% of the total were on lighted highways. Relatively few deer-vehicle accidents took place in dawn and dusk conditions (total of 6.1%) despite the coincidence of dawn and dusk with times of commuting to and from work during months with most accidents.

Table 5. Deer-vehicle accidents in relation to lighting conditions in Lynchburg, VA 1987-1991.

Lighting Conditions	1987	1988	1989	1990	1991	All	%
Dawn	4	2	4	4	4	18	3.3
Daylight	12	29	16	19	30	106	19.3
Dusk	4	1	5	1	3	14	2.6
Dark/Highway Lighted	58	45	48	56	67	274	50.0
Dark/Highway Unlighted	27	14	21	44	30	136	24.8
All	105	91	94	124	134	548	100

Little effect of weather conditions on the pattern of deer accidents was noted (Table 6) as most took place in clear weather conditions. However, this may reflect a propensity of deer to move during good weather conditions.

Table 6. Deer-vehicle accidents in relation to weather conditions in Lynchburg, VA 1987-1992.

Weather Condition	1987	1988	1989	1990	1991	All	%
Clear	84	75	72	100	106	437	79.8
Cloudy	11	12	12	16	17	68	12.4
Fog	0	1	2	0	1	4	0.7
Mist/rain	9	3	7	8	9	36	6.6
Snow/sleet	1	0	1	0	0	2	0.4
Other	0	0	0	0	1	1	0.2
All						548	

CONCLUSIONS

Most deer-vehicle collisions occur under conditions of darkness and the majority occur in the months October through December. Advice to motorists on avoiding collisions with deer could be focused on these main patterns. Further, there are major implications for design of tests to evaluate devices designed to keep deer off roadways such as the work of Schafer and Penland (1985). Such evaluations should allow for differences in diurnal and seasonal behaviors of deer. How lighting conditions coincide with traffic patterns should be considered in designs. In particular, substantial changes in seasonal patterns of accidents dictate that the length of time treatments are applied should be short.

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