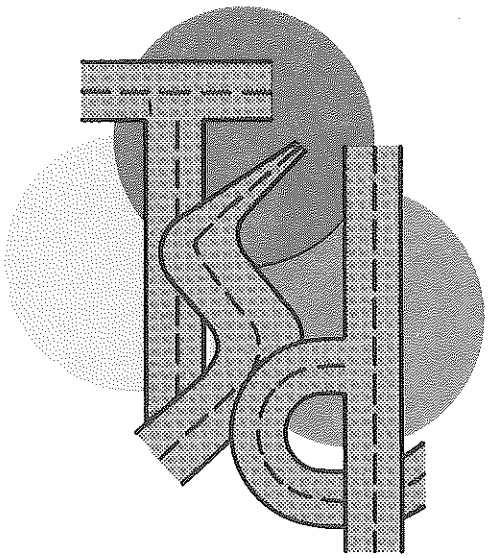
An Evaluation
of Effectiveness of
Deer Crossing Warning Signs
TSD - 550-84



TRAFFIC and SAFETY DIVISION

MICHIGAN DEPARTMENT OF TRANSPORTATION

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An Evaluation of Effectiveness of Deer Crossing Warning Signs

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by
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NOTICE

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Abstract

This study was initiated to evaluate the effectiveness of deer warning signs at the study sites throughout the lower peninsula of Michigan. Deer-motor vehicle collisions for a ten-year period (1973 through 1982) were tabulated by study site and by county in which each site was located. Monthly rates were computed for each site both before and after warning signs were installed and compared with computed rates for the county in which each site was located. When the "paired-sample sign" statistical test was employed, accident rates at the 37 sites in total showed a greater reduction (or lesser increase) than was experienced in the counties in which they were located. It is recommended that deer warning signs continue to be used with special emphasis given to relocating them in a timely fashion to coincide with deer population shifts and accident concentrations.

Conclusions and Recommendations

Statistical analysis of the collision data revealed that deer warning signs have an effect in reducing deer-motor vehicle accidents. Although this type of accident actually increased after signs were installed, the rate of increase at the sites in total was less than in control counties as a group (+86% at sites and +108% in counties). Therfore, it is recommended that signs be used where it can be established that the potential for accident occurrence is high.[1]

Out of the 37 study sites, it was shown that signs were cost-effective at 24 sites (Figure 4, p. 13). At those locations where warning signs were shown not to be cost-effective, it is suspected that certain factors (see p. 7, par.3) influencing accident occurrence may have been overlooked, thereby resulting in signs being ineffective. Therefore, it is recommended that a committee consisting of representatives from the departments of Transportation, Natural Resources, and State Police be formed to review and evaluate all factors

[1]Specific warrants for signs should be based on some combination of accidents, traffic volumes, and deer population densities. Determination of warrants is beyond the scope of this study and should be addressed in a separate investigation.

which may influence accident occurrence and to develop warrants for the use of signs. The committee should also continue to function as an advisory group to report periodically on changing conditions in general and at specific locations where accident potential may have changed. This will permit transportation authorities to make appropriate and timely adjustments in the use of deer warning signs.

Background

For many years, the Michigan Department of Transportation (hereafter termed the "department") has utilized deer warning signs to reduce deer-motor vehicle collisions. The design used is a standard diamond-shaped warning sign with a reflectorized yellow background and black legend and border. Legends used on the signs over the years have evolved through DEER CROSSING and DEER AREA to the symbol of a leaping deer. No studies, however, have been made to evaluate the effectiveness of deer crossing signs used in Michigan.

Highway Research Information Service files revealed very few instances where the effectiveness of deer crossing signs and had been evaluated outside of Michigan. Although somewhat limited in scope, two studies are worthy of note.

1. On State Highway 82 in Colorado, a lighted, animated deer crossing sign was installed in 1972 in a one-mile section experiencing a high frequency of deer-motor vehicle accidents.[2] Vehicle speeds and crossings per kill were measured with and without the sign turned on. Motorists' response in the form of speed reduction and/or increased awareness was not sufficient to affect the crossings per kill ratio (56.9:1 with sign on and 56.5:1 with sign off). Since the sign was not effective in reducing the number of deer-vehicle accidents, it was concluded that conventional (reflectorized only) warning signs were not effective either.

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[2] Pojar, Thomas M. et al, Effectiveness of a Lighted, Animated Deer Crossing Sign, Journal of Wildlife Management, Wildlife Society, Suite S-176, 3900 Wisconsin Avenue, N.W., Washington, D.C. 20016.

2. Another study[3] was conducted on selected highways in southern Illinois during 1982. Data gathered in the study was limited to the change in vehicle speeds after passing deer crossing signs on three highways. It was reasoned that a reduction in speeds would signify increased attentiveness attributable to the signs. The results showed no significant speed reductions at the study locations. It was concluded that even if motorists were aware of the signs, it is doubtful that accidents would be reduced unless speeds were reduced.

Although both of the studies cited conclude that warning signs are ineffective in reducing deer-motor vehicle accidents, it is pointed out in each study that the signs may be of some value in terms of public relations or for liability reasons.

Another area of research dealing with the deer-motor vehicle accident problem involved installing a series of polished metal mirrors oriented to cause intermittent flashes from a vehicle's headlights toward the side of the road. The principle of this form of animation was that deer would "freeze" until the vehicle passed. A study[4] of this system, however, found no evidence that polished metal mirrors were effective in reducing deer-motor vehicle accidents.

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3 Woolf, A., and Woolf, J., Motorist Response to Deer Crossing Highway Warning Signs in Southern Illinois, Southern Illinois University - Carbondale, Illinois 62901.

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4 James R. Gilbert, Evaluation of Deer Mirrors for Reducing Deer-Vehicle Collisions, FHWA/RD-82/061, May 1982, Environmental Division, Office of Research, Federal Highway Administration, Washington, D.C. 20590.

Highway fencing has also been evaluated as a means of keeping deer from highway rights-of-way[5]. Aside from the obviously high cost of such control applied over several miles, fencing was found to be ineffective because of the ease with which deer crossed over or beneath it.

Currently, a research project[6] is underway to evaluate the effectiveness of red wildlife warning reflectors in terms of their impact on deer behavioral patterns. A final report of this research is anticipated in the near future.

Since deer-motor vehicle accidents are increasing at a greater rate than all accidents (Figure 1), traffic engineers have had reservations about the effectiveness of warning signs. Although no specific warrants for sign erection have existed in the past, it has been the practice of department traffic and safety engineers to discuss with local Department of Natural Resources officials those highway locations exhibiting a high potential for deer-motor vehicle accidents. Since no particular warrants in terms of deer-motor vehicle accidents and deer population densities were established, decisions on the use of signs have not necessarily been consistent.

Discussion

Deer warning sign locations on Michigan's state trunkline highway system were recorded from photolog films and encoded for a computerized sign inventory. The locations, sizes, and legend details for these signs were obtained from this inventory. All sign data was then reviewed and updated, where necessary, by district traffic and safety engineers. Some additions and deletions were required because the computerized sign inventory was not current.

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5 E. D. Bellis and H. B. Graves, Highway Fences as Vehicle-Deer Collision Deterrents, June 1976, Institute for Research on Land and Water Resources, the Pennsylvania State University, University Park, Pennsylvania 16802.

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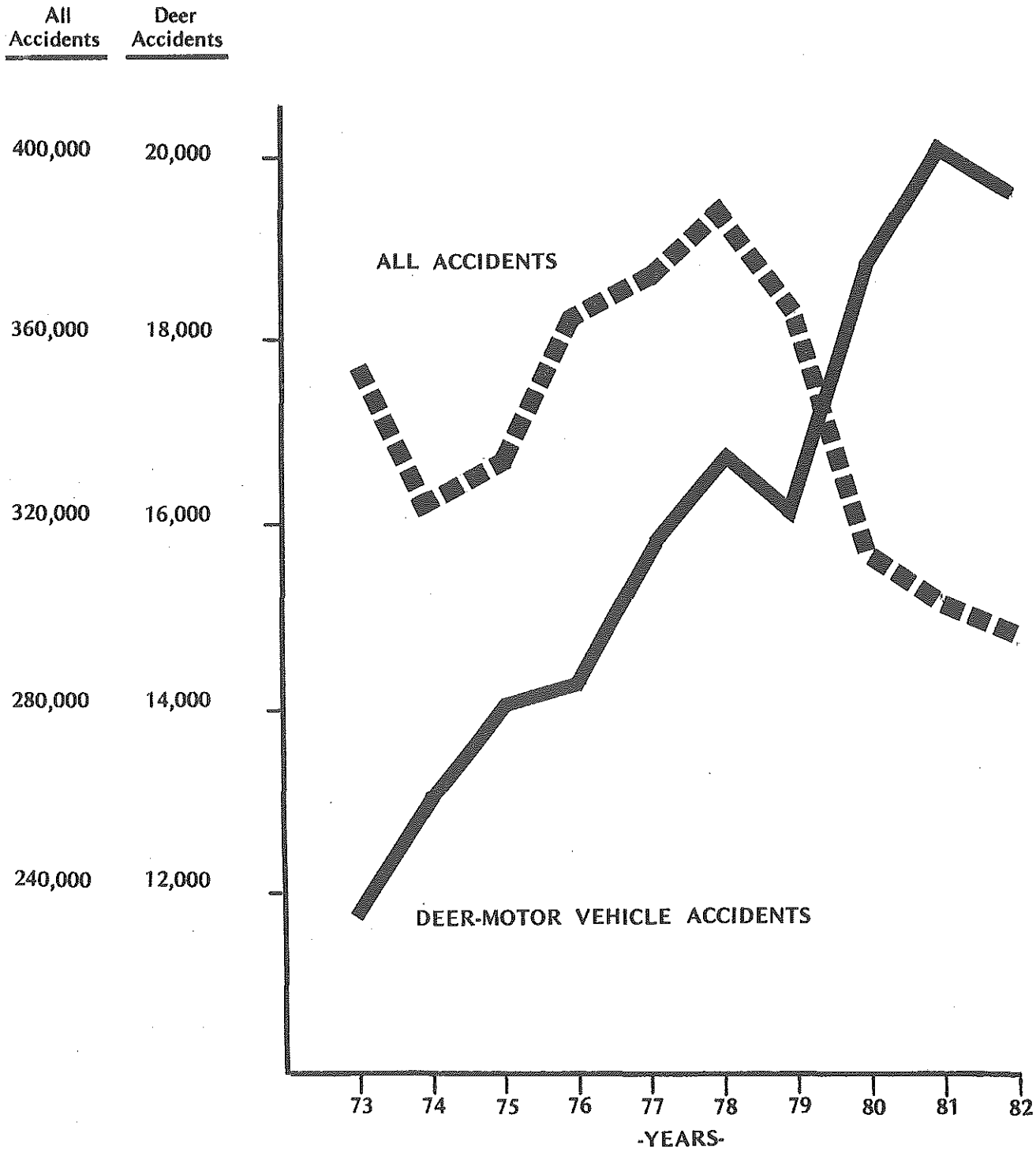
6 James Lee Zacks, An Evaluation of the Effectiveness of Swarflex Wildlife Warning Reflectors in Reducing Deer-Vehicle Collisions, Part II, FY 1983 HPR Work Program, Federal Highway Administration, U.S. Department of Transportation.



SOURCE: Michigan Traffic Accident Facts - 1982, Michigan Department of State Police

Figure 1. Comparison between all motor vehicle accidents and accidents involving deer - statewide.

There were 225 verifiable deer warning signs on the state trunkline highway system in 1982, but installation dates could be confirmed for only 133 sign locations. For study purposes, the 133 locations were grouped into 37 study sites.[7] Site locations are shown on the map in Appendix I. Although the deer population is much more evenly distributed throughout the state than one might conclude from the study site locations, this inconsistency is probably due to the current lack of demonstrated effectiveness of deer warning signs.

Deer warning sign legends were in a period of transition from the message DEER AREA to the symbol of a leaping deer during the ten-year study period; however, no attempt was made to compare the effectiveness of the two legends. Records are insufficient to identify which legend was being used at each of the various study sites or when legend changes occurred.

Accident data was obtained from the department's computerized accident records file covering a ten-year period (January 1973 through December 1982). All accidents shown to involve "animal"[8] occurring one mile downstream from each sign location were tabulated by location before and after each sign was installed. Although a study conducted by Shinar and Drory[9] indicates driver recall of warning signs (200 meters after passing) only ranges from three to six percent during the day and 14 to 18 percent at night, one mile segments were chosen at study sites in order to obtain adequate quantities of reported accidents.

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7 A study site is a grouping of two or more signs installed at the same time in the same deer concentration area to warn motorists approaching from either direction of possible deer crossings.

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8 To simplify analysis, all accidents coded as involving "animal" were assumed to involve deer. Records indicate that at least 96 percent of all accidents coded as "animal" actually do involve deer. Collisions with other animals generally do not result in reportable accidents.

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9 Shinar, D., and Drory, A., Sign Registration in Daytime and Nighttime Driving, Human Factors, 1983, 25 (1), pp 117-122.

Since exact sign installation dates were not always known, accidents occurring within the month of sign installation were considered to have occurred before signs were erected. Appendices II-A and II-B provide listings of study sites, sign locations within each site, month and year signs were installed, and accident occurrence by year before and after the signs were installed.

Since deer warning signs at the various widely-scattered study sites had been installed at different times throughout the ten-year period for which accident information was available, it was decided that the measurement "accidents per month" would be the best method for evaluating sign effectiveness. In order to minimize the effect of unpredictable migratory habits of deer herds and changing motor vehicle traffic volumes, the accidents per month rate was also computed for the county in which each study site was located as a control. Using the county as a control was the most reliable geographical unit for which accident information was available to compare with data at each of the individual study sites.

It is important to point out, however, that there are many factors which are responsible, either singly or in combination, for deer-motor vehicle accidents. Some, but not all, factors which may have a bearing on accident frequency include changes in traffic volumes, type of terrain and vegetational growth along highway rights-of-way, changes in crop farming patterns, and weather conditions that may affect deer herd sizes and browsing habits.

Appendices III-A and III-B list before-and-after accident data including accidents per month for each study site and county in which the site is located. Appendices IV-A and IV-B list the number of deer-motor vehicle accidents in each of the control counties by year (1973 through 1982).

Method of Evaluation

In order to evaluate the effectiveness of the deer warning signs at the study sites, the "paired-sample sign" statistical test was employed. In this test, the change in accidents per month at each study site was compared to the change in accidents per month in the control county (county in which the site was located).

If the study site's accident rate increased more than the control county's rate, the study site was flagged with a "+" sign; if the study site's accident rate increased less than the control county, it was flagged with a "-" sign; (Figures 2 and 3, pp. 9 and 10). At the first site, for example, the monthly rate changed from 0.14 to 0.19 accidents per month (Appendix III-A), a 36 percent increase. The control county rate in this illustration changed from 3.40 to 3.73 accidents per month, a 10 percent increase. Since the study site's increase was larger than the control county's increase, the study site was flagged with a "+" sign.

If the study rate changes are not different from the control county rate changes, half of the study sites would be flagged with a "+", and half would be flagged with a "-". The data are tested at the 95 percent confidence level with the null hypothesis:

H_o: Proportion of study sites with rate increase greater than control county increase = 0.5.

against the alternative hypothesis:

H_1: Proportion of study sites with rate increase greater than control county increase $\neq$ 0.5.

Statistical Test

Of the 37 study sites for all deer accidents, 11 (30 percent) were flagged with "+", and 26 were flagged with "-" (Figure 2). Statistically, this value is significantly different from 50 percent at the 95 percent confidence level. When only those deer accidents occurring during the dusk-dark-dawn period are considered at the 37 study sites, the results are nearly the same: 12 study sites are flagged with a "+" (of which eight were also in the all accident list) and 25 were flagged with a "-" (Figure 3).

From this test, the null hypothesis is rejected and it is concluded that deer warning signs do have the effect of reducing the number of deer accidents.

Figure 2
Percent Change in All Accidents After
Deer Warning Signs were Installed

Site No.	Percent Change Site	Control	* (+) (-)	Site No.	Percent Change Site	Control	* (+) (-)
10-3	+ 36	+ 10	+	51-8	- 63	+ 6	-
23-5	+118	+ 8	+	52-8	- 31	+ 6	-
24-5	+ 78	+ 41	+	53-8	- 14	+ 25	-
25-5	- 32	+ 29	-	54-8	0	+ 25	-
26-5	- 38	+ 8	-	56-8	- 53	+ 23	-
44-5	- 10	+ 26	-	57-8	+ 30	+ 21	+
30-6	- 75	+133	-	58-8	+ 7	+ 22	-
31-6	+ 17	+133	-	59-8	- 8	+ 21	-
32-6	+333	+ 58	+	60-8	+ 22	+ 21	+
33-6	- 5	+133	-	61-8	+ 17	+ 21	-
37-6	- 36	- 11	-	62-8	+ 33	+ 21	+
38-6	+250	+ 38	+	63-8	- 9	+ 34	-
43-7	+ 53	+ 32	+	64-8	- 86	+ 34	-
45-8	- 27	+ 7	-	65-8	+ 25	+ 34	-
46-8	+ 6	+ 8	-	66-8	+ 13	+ 34	-
47-8	- 49	+ 7	-	67-8	- 12	+ 55	-
48-8	+ 19	+ 8	+	69-8	- 63	+ 54	-
49-8	- 46	+ 8	-	70-M	+100	+ 57	+
50-8	- 13	+ 9	-				

TOTALS

Increase greater (+) at study sites = 11 locations
Increase less (-) at study sites = 26 locations

*NOTE: For statistical analysis, the change in accident rates at study sites is compared with the change in rates in each site's control county. A (+) indicates the increase was greater at the site than in its control county and a (-) indicates the reverse.

Figure 3
Percent Change in Dusk-Dark-Dawn
Accidents After Deer Warning Signs Were Installed

Site No.	Percent Change Site	Control	* (+) (-)	Site No.	Percent Change Site	Control	* (+) (-)
10-3	+ 36	+ 11	+	51-8	- 67	+ 6	-
23-5	+139	+ 4	+	52-8	- 32	+ 6	-
24-5	+ 86	+ 37	+	53-8	- 18	+ 27	-
25-5	- 37	+ 25	-	54-8	+ 23	+ 27	-
26-5	- 13	+ 7	-	56-8	- 47	+ 25	-
44-5	- 17	+ 28	-	57-8	+ 47	+ 22	+
30-6	- 75	+118	-	58-8	+ 24	+ 22	+
31-6	+ 8	+118	-	59-8	- 18	+ 22	-
32-6	+133	+ 55	+	60-8	+ 11	+ 22	-
33-6	- 13	+118	-	61-8	+ 9	+ 22	-
37-6	- 37	- 8	-	62-8	+ 43	+ 22	+
38-6	+213	+ 44	+	63-8	+ 4	+ 32	-
43-7	- 6	+ 28	-	64-8	- 80	+ 32	-
45-8	- 36	+ 14	-	65-8	+ 38	+ 32	+
46-8	+ 12	+ 15	-	66-8	+ 44	+ 32	+
47-8	- 48	+ 14	-	67-8	- 10	+ 53	-
48-8	+ 53	+ 15	+	69-8	- 57	+ 66	-
49-8	- 36	+ 15	-	70-M	+300	+ 67	+
50-8	- 4	+ 10	-				

TOTALS

Increase greater (+) at study sites = 12 locations
Increase less (-) at study sites = 25 locations

*NOTE: For statistical analysis, the change in accident rates at study sites is compared with the change in rates in each site's control county. A (+) indicates the increase was greater at the site than in its control county and a (-) indicates the reverse.

The "paired sample sign" statistical test does not, however, indicate the magnitude of the improvement in terms of reduced accidents at each of the sites flagged with a "-" sign. The extent of the improvements is dealt with in the following cost effectiveness analysis.

Cost Effectiveness of Signs

Throughout the state, 225 deer warning signs were in place on the state trunkline highway system in 1982, representing a total investment of $45,000. Normal sign maintenance, installation of new signs, and the removal of others costs approximately $9,200[10] annually.

A cost per sign, per month, for the statewide system in 1982 breaks down to $\left(\frac{\$9,200}{225} \times \frac{1}{12}\right)$ $3.40. Also during 1982, the cost of a single deer-motor vehicle accident on Michigan state trunkline highways was projected to cost $1,277. The accident cost is based on the ratio between personal injury and property damage (there were no fatal) deer-motor vehicle accidents in Michigan and on cost rates published by the National Safety Council for 1982.

Assuming the number of accidents that would have occurred at a given study site had signs not been installed remains proportionate to the number of accidents in that site's control county, the expected accident rate per month for the site can be projected and the savings attributable to signs computed. By comparing the savings, if any, with the cost for signs, cost effectiveness of the signs can be established (Figure 4, p. 13 and Appendix IIIA, p. 28).

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10 Estimate of annual cost for maintenance of 32 signs (one-seventh of all signs), erection of 12 new ones, and removal of 12 others.

EXAMPLE: Study Site No. 44-5

(1) $\left(\frac{\text{County Rate After}}{\text{County Rate Before}}\right)$ X Site Rate Before = Expected Rate per Month

$$\frac{8.51}{6.78} \text{ X } .20 = .25$$

(2) Expected Rate - Actual Rate = Accident Reduction per Month

$$.25 - .18 = .07$$

(3) Accident Reduction X $1,277 = Savings per Month

$$.07 \text{ X } \$1,277 = \$89$$

As can readily be seen on Figure 4, the dollar investment in signs was so minimal that even a small reduction in the anticipated accident rate at a given study site indicates that the signs are cost effective.

Figure 4
Cost Effectiveness of Deer Warning Signs
at Study Sites

Site No	Expected Rate Per Month[a]	Actual Rate Per Month[b]	Accident Reduction Per Month	Savings Per Month[c]	Number of Signs at Site	Cost for Signs Per Month	Signs Cost Effective? Yes	No
10-3	.15	.19	0	0	2	$ 6.80		X
23-5	.36	.72	0	0	2	6.80		X
24-5	.13	.16	0	0	2	6.80		X
25-5	.24	.13	.11	$140	2	6.80	X	
26-5	.17	.10	.07	89	2	6.80	X	
44-5	.25	.18	.07	89	2	6.80	X	
30-6	.09	.01	.08	102	2	6.80	X	
31-6	.70	.35	.35	447	2	6.80	X	
32-6	.05	.13	0	0	2	6.80		X
33-6	.44	.18	.26	332	2	6.80	X	
37-6	1.34	.96	.38	485	3	10.20	X	
38-6	.25	.63	0	0	2	6.80		X
43-7	.42	.49	0	0	2	6.80		X
45-8	.40	.27	.13	166	4	13.60	X	
46-8	.37	.36	.01	13	5	17.00		X
47-8	.38	.18	.20	255	4	13.60	X	
48-8	.23	.25	0	0	2	6.80		X
49-8	.14	.07	.07	89	2	6.80	X	
50-8	.35	.28	.07	89	7	23.80	X	
51-8	.37	.13	.24	306	4	13.60	X	
52-8	.48	.31	.17	217	6	20.40	X	
53-8	.46	.32	.14	179	6	20.40	X	
54-8	.22	.18	.04	51	2	6.80	X	
56-8	.21	.08	.13	166	2	6.80	X	
57-8	.78	.83	0	0	11	37.40		X
58-8	.68	.60	.08	102	6	20.40	X	
59-8	.16	.12	.04	51	2	6.80	X	
60-8	.22	.22	0	0	3	10.20		X
61-8	.80	.77	.03	38	7	23.80	X	
62-8	.80	.88	0	0	8	27.20		X
63-8	.43	.29	.14	179	6	20.40	X	
64-8	.09	.01	.08	102	2	6.80	X	
65-8	.21	.20	.01	13	4	13.60		X
66-8	.32	.27	.05	64	3	10.20	X	
67-8	.53	.30	.23	294	4	13.60	X	
69-8	.37	.09	.28	358	4	13.60	X	
70-M	.13	.16	0	0	2	6.80		X

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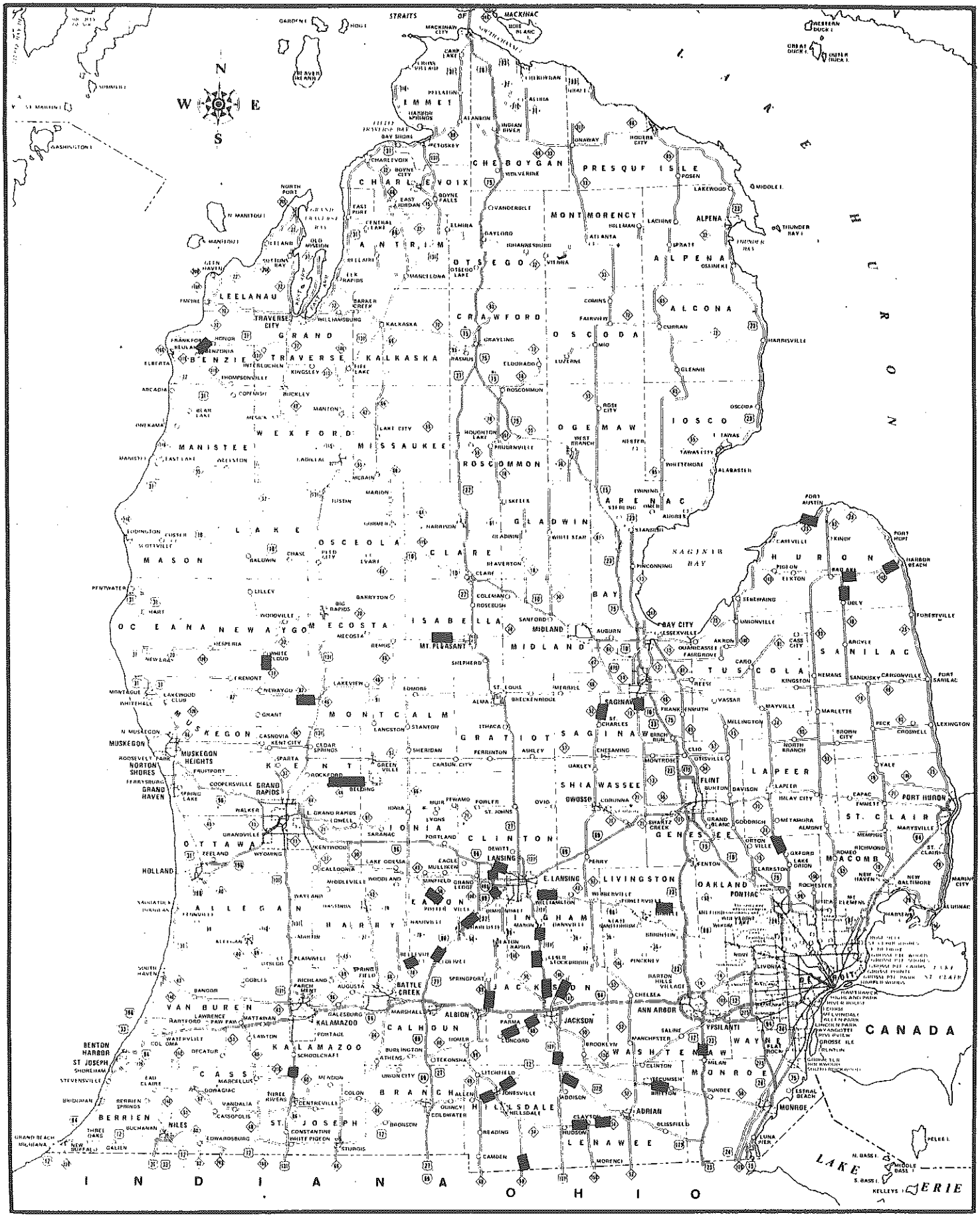
a Expected Rate per Month assumes rate at study site would change proportionately to rate in the site's control county.

b Actual Rate per Month is taken from Appendix III-A.

c Savings per Month is calculated by multiplying the Accident Reduction per Month by cost per accident ($1,277).

APPENDICES



APPENDIX I

DEER WARNING SIGN STUDY SITES

All Deer Crossing Accidents

By Study Site[1] - by Year
(January 1973 through December 1982)

Site No./ District	Location of Sign C.S.	Location of Sign M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	Totals After
10-3	10032	0287+R	nb	2-77	0	3	0	2	0-1	2	3	2	2	1	5	11
	10032	0500-R	sb	2-77	0	0	1	1	0-0	1	0	0	1	0	2	2
23-5	37021	0962+R	eb	12-77	2	2	2	0	3-0	6	3	4	5	9	9	27
	37021	1017-R	wb	12-77	0	2	4	3	2-0	2	2	6	2	4	11	16
24-5	41101	0758+R	eb	8-76	1	1	1	0-0	1	0	2	0	1	0	3	4
	41101	1210-R	wb	8-76	0	0	1	0-0	1	2	1	1	3	0	1	8
25-5	62041	0934+R	eb	3-75	0	0	0-2	0	1	1	0	1	1	0	0	6
	59041	0071-R	wb	3-75	2	3	0-1	0	0	1	0	0	3	1	5	6
26-5	62031	1583+R	nb	1-78	1	0	1	0	3	0-0	1	0	2	0	5	3
	62031	1785-R	sb	1-78	0	0	2	3	0	0-2	0	1	0	0	5	3
44-5	19021	0080+R	eb	7-77	1	0	0	1	0-0	1	1	1	0	1	2	4
	19021	0267-R	wb	7-77	3	0	1	4	1-2	3	2	0	1	0	9	8
30-6	32012	2253+R	nb	3-75	1	0	0-0	0	0	0	0	0	0	0	1	0
	32012	2385-R	sb	3-75	0	0	0-0	0	0	0	0	0	1	0	0	1
31-6	32022	0218+R	eb	3-75	2	2	1-1	1	0	0	2	2	1	1	5	8
	32022	0441-R	wb	3-75	1	0	2-1	2	1	0	7	3	8	3	3	25
32-6	32022	1453+R	eb	9-81	0	0	1	0	0	0	0	0	1-0	1	2	1
	32022	1635-R	wb	9-81	1	0	0	0	0	0	0	0	0-0	1	1	1

1 Accidents are recorded directionally from sign location to one mile downstream from sign.
2 Month sign installed counted in "before" period.
3 For year sign installed, accidents occurring before installation are shown in the "year" column at left, and those occurring after are shown at right.

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
33-6	32051	0438+R	nb	3-75	1	0	0-0	1	2	1	0	0	0	1	1	5
	32051	0690-R	sb	3-75	1	3	0-0	1	2	1	2	1	0	5	4	12
37-6	73031	1315+R	nb	4-74	13	1-11	4	2	5	3	1	11	5	10	14	52
	73031	1521-R	sb	4-74	0	2-0	3	5	1	2	3	1	0	2	2	17
	73031	1544+R	nb	4-74	6	2-4	3	0	3	3	5	3	8	2	8	31
38-6	73051	1297+R	nb	12-80	0	0	0	0	1	1	0	5-0	8	2	7	10
	73051	1373-R	sb	12-80	0	0	1	0	0	2	4	3-0	4	1	10	5
43-7	78013	0693+R	nb	1-80	3	0	1	4	1	0	0	0-3	4	4	9	11
	78013	0831-R	sb	1-80	2	1	3	2	1	4	5	0-0	3	3	18	6
45-8	23011	0015+R	nb	1-77	2	3	1	1	0-0	1	0	3	1	1	7	6
	23011	0090-R	sb	1-77	2	1	1	0	0-1	0	1	0	1	0	4	3
	23011	0157+R	eb	1-77	1	0	0	0	0-0	0	1	0	2	1	1	4
	23011	0202-R	wb	1-77	1	1	2	2	0-1	0	1	2	0	2	6	6
46-8	23012	0315+R	nb	11-76	2	0	1	0-0	0	0	0	0	2	4	3	6
	23012	0395-R	sb	11-76	2	1	1	0-0	0	0	0	0	1	1	4	2
	23012	0478+R	nb	11-76	2	0	0	0-0	0	1	1	2	3	3	2	10
	23012	0497-R	sb	11-76	1	2	0	0-1	0	0	0	2	2	0	3	5
	23012	0578-R	sb	11-76	1	0	3	0-0	1	1	0	0	1	0	4	3
47-8	23052	0821+R	eb	1-77	0	0	2	0	0-0	0	0	0	0	0	2	0
	23052	0905-R	wb	1-77	0	0	0	1	0-0	0	0	0	0	2	1	2
	23052	0933+R	eb	1-77	5	2	2	1	0-1	0	0	2	2	1	10	6
	23052	0997-R	wb	1-77	1	2	1	0	0-2	0	0	2	1	0	4	5
48-8	23061	0251+R	nb	11-76	3	2	1	1-2	1	0	3	2	3	2	7	13
	23061	0494-R	sb	11-76	1	1	0	1-0	2	1	1	0	1	0	3	5

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
49-8	23152	0028+R	eb	11-76	2	1	2	1-0	2	0	0	0	1	0	6	3
	23152	0106-R	wb	11-76	0	0	0	0-1	0	0	0	0	1	0	0	2
50-8	30031	0076+R	nb	8-76	1	0	0	0-0	0	1	0	1	1	0	1	3
	30031	0104-R	sb	8-76	1	0	0	0-0	0	1	0	1	0	0	1	2
	30031	0210+R	nb	8-76	2	1	1	0-1	1	1	0	1	0	0	4	4
	30031	0210-R	sb	8-76	2	0	1	0-0	1	1	0	0	0	1	3	3
	30031	0335-R	sb	8-76	0	0	0	0-0	0	0	1	1	1	0	0	3
	30031	0369+R	nb	8-76	0	0	3	0-0	1	0	1	0	1	1	3	4
	30031	0437-R	sb	8-76	0	0	2	0-0	0	0	0	1	1	0	2	2
51-8	30061	0416+R	eb	4-76	0	2	0	0-0	0	0	0	0	2	0	2	2
	30061	0535+R	eb	4-76	0	0	2	0-0	1	1	0	0	0	0	2	2
	30061	0642-R	wb	4-76	2	2	3	0-1	1	0	1	0	0	1	7	4
	30061	0499-R	wb	4-76	2	1	0	0-0	0	1	0	1	0	0	3	2
52-8	30062	0310+R	eb	4-76	1	2	0	1-0	0	1	2	1	0	0	4	4
	30062	0444+R	eb	4-76	1	0	0	1-1	0	0	0	0	0	1	2	2
	30062	0584+R	eb	4-76	1	0	1	0-1	3	1	0	1	1	0	2	7
	30062	0616-R	wb	4-76	0	2	0	2-0	1	0	0	1	1	1	4	4
	30062	0498-R	wb	4-76	1	1	0	0-0	1	1	1	0	0	2	2	5
	30062	0396-R	wb	4-76	2	1	1	0-0	0	0	0	1	0	2	4	3
53-8	33031	0011+R	nb	2-76	1	1	0	0-0	0	2	2	2	0	1	2	7
	33031	0115+R	nb	2-76	0	2	2	0-1	0	1	0	0	2	0	4	4
	33031	0275+R	nb	2-76	1	0	0	0-1	0	0	1	0	1	0	1	3
	33031	0302-R	sb	2-76	1	1	3	0-2	1	0	0	0	0	1	5	4
	33031	0178-R	sb	2-76	2	0	0	0-1	1	3	1	0	1	1	2	8
	33031	0078-R	sb	2-76	0	0	0	0-0	0	0	0	0	0	0	0	0

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
54-8	33031	0758+R	nb	2-76	3	0	3	0-0	2	0	1	2	0	0	6	5
	33031	0838-R	sb	2-76	0	0	1	0-1	2	3	0	1	2	1	1	10
56-8	33084	0788+R	eb	11-76	2	1	1	1-1	1	0	1	0	0	0	5	3
	33084	0905-R	wb	11-76	0	1	0	2-0	0	1	0	0	2	0	3	3
57-8	38011	0197+R	nb	3-76	0	0	0	0-0	0	0	2	0	1	0	0	3
	38011	0283+R	nb	3-76	1	1	0	0-0	2	0	0	0	0	0	2	2
	38011	0380+R	nb	3-76	0	2	0	0-2	0	1	0	0	0	1	2	4
	38011	0551+R	nb	3-76	2	0	0	1-1	5	3	0	1	1	1	3	12
	38011	0649+R	nb	3-76	0	0	1	0-3	0	2	0	1	1	2	1	9
	38011	0746+R	nb	3-76	1	1	2	0-3	2	3	2	0	1	0	4	11
	38011	0819-R	sb	3-76	3	3	2	0-0	1	1	1	0	1	0	8	4
	38011	0691-R	sb	3-76	0	0	1	0-1	1	1	0	0	1	1	1	5
	38011	0562-R	sb	3-76	0	0	1	0-0	3	0	1	1	2	1	1	8
	38011	0420-R	sb	3-76	1	1	0	0-0	0	0	0	0	2	0	2	2
	38011	0194-R	sb	3-76	1	0	0	0-0	1	3	1	0	1	1	1	7
58-8	38051	0391+R	nb	9-76	1	0	3	0-3	0	1	0	1	2	2	4	9
	38051	0515+R	nb	9-76	0	1	0	2-0	0	0	1	1	1	1	3	4
	38051	0648+R	nb	9-76	1	1	2	0-0	1	0	3	1	0	4	4	9
	38051	0821-R	sb	9-76	0	0	0	0-1	0	3	2	1	0	3	0	10
	38051	0593-R	sb	9-76	1	2	1	1-0	1	0	1	1	0	2	5	5
	38051	0511-R	sb	9-76	1	3	4	1-0	0	2	1	2	2	1	9	8
59-8	38061	0433+R	eb	2-76	0	2	0	0-0	1	0	1	1	0	1	2	4
	38061	0798-R	wb	2-76	1	2	0	0-0	1	3	0	0	0	2	3	6
60-8	38061	1188+R	eb	2-76	0	0	0	0-1	1	1	1	2	1	2	0	9
	38061	1313-R	wb	2-76	0	3	1	0-0	1	0	0	1	1	0	4	3
	38061	1229-R	wb	2-76	1	1	1	0-0	0	1	1	1	3	0	3	6

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
61-8	38111	0112+R	nb	2-76	1	0	1	0-1	0	1	1	1	0	0	2	4
	38111	0212+R	nb	2-76	0	1	0	0-0	1	3	1	6	1	0	1	12
	38111	0341+R	nb	2-76	1	1	3	0-1	1	2	3	1	1	1	5	10
	38111	0490+R	nb	2-76	3	3	0	0-1	0	1	0	1	0	1	6	4
	38111	0492-R	sb	2-76	4	2	0	0-1	6	4	2	2	0	2	6	17
	38111	0340-R	sb	2-76	0	1	2	0-1	4	1	0	2	1	0	3	9
	38111	0138-R	sb	2-76	0	1	1	0-0	0	0	1	3	2	1	2	7
62-8	38131	0224+R	nb	2-76	1	2	0	0-0	0	0	0	0	0	0	3	0
	38131	0346+R	nb	2-76	2	1	2	0-1	1	4	3	0	3	3	5	15
	38131	0462+R	nb	2-76	1	1	1	0-1	2	1	3	1	1	0	3	9
	38131	0565+R	nb	2-76	2	1	1	0-0	3	0	1	2	0	1	4	7
	38131	0612-R	sb	2-76	0	1	1	0-1	2	1	4	2	4	0	2	14
	38131	0509-R	sb	2-76	1	1	0	0-3	1	0	2	1	1	0	2	8
	38131	0412-R	sb	2-76	1	1	2	0-1	1	1	2	1	4	2	4	12
	38131	0304-R	sb	2-76	0	1	1	0-1	1	0	0	3	1	1	2	7
63-8	46041	0281+R	eb	8-76	1	1	3	0-1	1	0	0	0	2	0	5	4
	46041	0388+R	eb	8-76	1	0	0	0-1	2	0	0	1	1	1	1	6
	46041	0519+R	eb	8-76	0	0	1	0-0	2	0	0	0	0	0	1	2
	46041	0609-R	wb	8-76	0	0	1	0-0	0	0	2	0	0	0	1	2
	46041	0461-R	wb	8-76	1	2	0	0-0	0	0	0	0	0	1	3	1
	46041	0387-R	wb	8-76	1	0	1	1-0	1	2	0	1	1	2	3	7
64-8	46041	1219+R	nb	8-76	0	0	0	0-0	0	0	0	0	0	0	0	0
	46041	1403-R	wb	8-76	0	0	2	1-0	0	0	1	0	0	0	3	1

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
65-8	46061	0165+R	eb	2-76	0	1	1	0-1	0	1	1	1	0	1	2	5
	46061	0318+R	eb	2-76	1	0	0	0-0	1	1	0	1	0	1	1	4
	46061	0344-R	wb	2-76	1	1	1	0-1	0	1	0	0	0	0	3	2
	46061	0249-R	wb	2-76	0	0	0	0-0	0	1	0	4	0	0	0	5
66-8	46082	0430+R	eb	2-76	0	0	2	0-0	1	2	1	0	0	0	2	4
	46082	0601-R	wb	2-76	1	0	2	0-2	1	0	2	2	1	0	3	8
	46082	0448-R	wb	2-76	0	0	3	1-0	0	2	2	2	1	3	4	10
67-8	47082	0845+R	eb	2-76	2	1	0	0-2	0	0	1	1	2	4	3	10
	47082	0950+R	eb	2-76	1	0	1	0-0	1	0	0	1	0	0	2	2
	47082	0982-R	wb	2-76	1	0	2	0-0	2	0	0	0	0	0	3	2
	47082	0903-R	wb	2-76	1	2	2	0-0	2	3	0	0	2	4	5	11
69-8	81076	0231+R	nb	2-76	1	1	0	0-1	0	0	0	0	0	0	2	1
	81076	0328+R	nb	2-76	5	0	0	0-0	0	1	0	0	0	0	5	1
	81076	0422-R	sb	2-76	0	0	0	0-0	0	0	1	1	0	0	0	2
	81076	0309-R	sb	2-76	0	2	0	0-0	0	0	0	0	1	2	2	3
70-M	63112	1151+R	nb	4-80	0	1	0	1	0	0	3	0-1	2	1	5	4
	63112	1478-R	sb	4-80	0	0	0	0	1	1	0	0-0	0	1	2	1

Dusk-Dark-Dawn
Deer Crossing Accidents
By Study Site[1] - By Year
(January 1973 through December 1982)

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
10-3	10032	0287+R	nb	2-77	0	2	0	2	0-1	1	3	2	2	1	4	10
	10032	0500-R	sb	2-77	0	0	1	1	0-0	0	0	0	1	0	2	1
23-5	37021	0962+R	eb	12-77	0	2	1	0	3-0	3	3	3	3	8	6	20
	37021	1017-R	wb	12-77	0	0	4	2	2-0	2	1	5	1	4	8	13
24-5	41101	0758+R	eb	8-76	1	1	0	0-0	1	0	2	0	0	0	2	3
	41101	1210-R	wb	8-76	0	0	1	0-0	1	2	1	1	2	0	1	7
25-5	62041	0934+R	eb	3-75	0	0	0-1	0	1	1	0	1	1	0	0	5
	59041	0071-R	wb	3-75	2	3	0-1	0	0	1	0	0	3	1	5	6
26-5	62031	1583+R	nb	1-78	1	0	0	0	2	0-0	0	0	2	0	3	2
	62031	1785-R	sb	1-78	0	0	1	1	0	0-1	0	1	0	0	2	2
44-5	19021	0080+R	eb	7-77	1	0	0	1	0-0	1	1	1	0	1	2	4
	19021	0267-R	wb	7-77	3	0	1	3	1-2	2	2	0	0	0	8	6
30-6	32012	2253+R	nb	3-75	1	0	0-0	0	0	0	0	0	0	0	1	0
	32012	2385-R	sb	3-75	0	0	0-0	0	0	0	0	0	1	0	0	1
31-6	32022	0218+R	eb	3-75	2	1	1-1	1	0	0	2	1	1	1	4	7
	32022	0441-R	wb	3-75	1	0	2-1	1	0	0	6	3	6	2	3	19
32-6	32022	1453+R	eb	9-81	0	0	1	0	0	0	0	0	1-0	1	2	1
	32022	1635-R	wb	9-81	1	0	0	0	0	0	0	0	0-0	0	1	0
33-6	32051	0438+R	nb	3-75	1	0	0-0	1	2	1	0	0	0	1	1	5
	32051	0690-R	sb	3-75	1	2	0-0	1	2	1	2	1	0	4	3	11

1 Accidents are recorded directionally from sign location to one mile downstream from sign.
2 Month sign installed counted in "before" period.
3 For year sign installed, accidents occurring before installation are shown in the "year" column at left, and those occurring after are shown at right.

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
37-6	73031	1315+R	nb	4-74	11	1-9	4	0	4	2	1	11	4	9	12	44
	73031	1521-R	sb	4-74	0	2-0	3	5	1	1	3	0	0	1	2	14
	73031	1544+R	nb	4-74	4	2-4	2	0	2	3	4	3	6	0	6	24
38-6	73051	1297+R	nb	12-80	0	0	0	0	0	1	0	5-0	7	1	6	8
	73051	1373-R	sb	12-80	0	0	1	0	0	2	3	3-0	3	1	9	4
43-7	78013	0693+R	nb	1-80	2	0	1	4	1	0	0	0-2	1	1	8	4
	78013	0831-R	sb	1-80	2	1	3	2	1	4	5	0-0	3	3	18	6
45-8	23011	0015+R	nb	1-77	2	3	1	1	0-0	1	0	3	0	0	7	4
	23011	0090-R	sb	1-77	1	1	1	0	0-1	0	1	0	0	0	3	2
	23011	0157+R	eb	1-77	1	0	0	0	0-0	0	1	0	2	1	1	4
	23011	0202-R	wb	1-77	0	1	2	2	0-1	0	1	2	0	1	5	5
46-8	23012	0315+R	nb	11-76	2	0	1	0-0	0	0	0	0	1	3	3	4
	23012	0395-R	sb	11-76	2	1	1	0-0	0	0	0	0	1	1	4	2
	23012	0478+R	nb	11-76	1	0	0	0-0	0	1	1	2	2	2	1	8
	23012	0497-R	sb	11-76	0	1	0	0-1	0	0	0	2	2	0	1	5
	23012	0578-R	sb	11-76	1	0	2	0-0	1	0	0	0	1	0	3	2
47-8	23052	0821+R	eb	1-77	0	0	2	0	0-0	0	0	0	0	0	2	0
	23052	0905-R	wb	1-77	0	0	0	1	0-0	0	0	0	0	2	1	2
	23052	0933+R	eb	1-77	5	2	1	1	0-1	0	0	2	2	0	9	5
	23052	0997-R	wb	1-77	1	2	1	0	0-2	0	0	2	1	0	4	5
48-8	23061	0251+R	nb	11-76	3	1	0	1-1	1	0	3	2	3	2	5	12
	23061	0494-R	sb	11-76	1	1	0	0-0	2	1	1	0	1	0	2	5
49-8	23152	0028+R	eb	11-76	2	1	2	0-0	2	0	0	0	1	0	5	3
	23152	0106-R	wb	11-76	0	0	0	0-1	0	0	0	0	1	0	0	2
50-8	30031	0076+R	nb	8-76	1	0	0	0-0	0	1	0	1	1	0	1	3
	30031	0104-R	sb	8-76	1	0	0	0-0	0	1	0	1	0	0	1	2
	30031	0210+R	nb	8-76	1	0	1	0-0	1	1	0	1	0	0	2	3

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
	30031	0210-R	sb	8-76	2	0	1	0-0	0	1	0	0	0	1	3	2
	30031	0335-R	sb	8-76	0	0	0	0-0	0	0	1	1	1	0	0	3
	30031	0369+R	nb	8-76	0	0	3	0-0	1	0	1	0	1	1	3	4
	30031	0437-R	sb	8-76	0	0	1	0-0	0	0	0	0	1	0	1	1
51-8	30061	0416+R	eb	4-76	0	2	0	0-0	0	0	0	0	1	0	2	1
	30061	0535+R	eb	4-76	0	0	2	0-0	1	1	0	0	0	0	2	2
	30061	0642-R	wb	4-76	1	2	3	0-1	1	0	1	0	0	1	6	4
	30061	0499-R	wb	4-76	2	1	0	0-0	0	1	0	1	0	0	3	2
52-8	30062	0310+R	eb	4-76	1	2	0	1-0	0	1	2	1	0	0	4	4
	30062	0444+R	eb	4-76	1	0	0	1-1	0	0	0	0	0	0	2	1
	30062	0584+R	eb	4-76	1	0	0	0-1	3	1	0	0	1	0	1	6
	30062	0616-R	wb	4-76	0	1	0	2-0	1	0	0	1	1	0	3	3
	30062	0498-R	wb	4-76	1	1	0	0-0	1	1	1	0	0	2	2	5
	30062	0396-R	wb	4-76	2	0	1	0-0	0	0	0	0	0	2	3	2
53-8	33031	0011+R	nb	2-76	1	1	0	0-0	0	2	2	1	0	1	2	6
	33031	0115+R	nb	2-76	0	2	2	0-1	0	1	0	0	2	0	4	4
	33031	0275+R	nb	2-76	1	0	0	0-1	0	0	1	0	1	0	1	3
	33031	0302-R	sb	2-76	1	1	2	0-1	1	0	0	0	0	0	4	2
	33031	0178-R	sb	2-76	2	0	0	0-1	1	3	1	0	1	1	2	8
	33031	0078-R	sb	2-76	0	0	0	0-0	0	0	0	0	0	0	0	0
54-8	33031	0758+R	nb	2-76	3	0	2	0-0	1	0	1	2	0	0	5	4
	33031	0838-R	sb	2-76	0	0	0	0-1	2	2	0	1	2	1	0	9
56-8	33084	0788+R	eb	11-76	2	1	1	1-1	1	0	1	0	0	0	5	3
	33084	0905-R	wb	11-76	0	1	0	1-0	0	1	0	0	2	0	2	3
57-8	38011	0197+R	nb	3-76	0	0	0	0-0	0	0	2	0	1	0	0	3
	38011	0283+R	nb	3-76	1	1	0	0-0	2	0	0	0	0	0	2	2
	38011	0380+R	nb	3-76	0	2	0	0-2	0	1	0	0	0	1	2	4

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
	38011	0551+R	nb	3-76	1	0	0	1-1	5	2	0	0	1	1	2	10
	38011	0649+R	nb	3-76	0	0	0	0-3	0	2	0	1	1	2	0	9
	38011	0746+R	nb	3-76	0	1	1	0-3	2	3	2	0	1	0	2	11
	38011	0819-R	sb	3-76	2	3	2	0-0	1	1	1	0	1	0	7	4
	38011	0691-R	sb	3-76	0	0	1	0-1	0	1	0	0	1	0	1	3
	38011	0562-R	sb	3-76	0	0	1	0-0	3	0	1	1	1	1	1	7
	38011	0420-R	sb	3-76	1	1	0	0-0	0	0	0	0	1	0	2	1
	38011	0194-R	sb	3-76	1	0	0	0-0	1	3	1	0	1	1	1	7
58-8	38051	0391+R	nb	9-76	1	0	3	0-3	0	1	0	1	2	2	4	9
	38051	0515+R	nb	9-76	0	1	0	0-0	0	0	1	1	1	1	1	4
	38051	0648+R	nb	9-76	0	1	1	0-0	1	0	1	0	0	4	2	6
	38051	0821-R	sb	9-76	0	0	0	0-1	0	3	2	1	0	2	0	9
	38051	0593-R	sb	9-76	1	2	1	1-0	1	0	1	1	0	2	5	5
	38051	0511-R	sb	9-76	0	3	4	0-0	0	2	0	1	2	1	7	6
59-8	38061	0433+R	eb	2-76	0	2	0	0-0	1	0	1	1	0	0	2	3
	38061	0798-R	wb	2-76	1	1	0	0-0	0	2	0	0	0	2	2	4
60-8	38061	1188+R	eb	2-76	0	0	0	0-1	1	1	1	2	1	1	0	8
	38061	1313-R	wb	2-76	0	3	1	0-0	1	0	0	1	1	0	4	3
	38061	1229-R	wb	2-76	1	1	1	0-0	0	1	0	1	3	0	3	5
61-8	38111	0112+R	nb	2-76	1	0	1	0-1	0	1	1	0	0	0	2	3
	38111	0212+R	nb	2-76	0	1	0	0-0	1	2	0	5	1	0	1	9
	38111	0341+R	nb	2-76	1	1	3	0-1	1	2	3	0	1	1	5	9
	38111	0490+R	nb	2-76	3	3	0	0-0	0	1	0	0	0	1	6	2
	38111	0492-R	sb	2-76	4	2	0	0-1	6	4	2	2	0	2	6	17
	38111	0340-R	sb	2-76	0	1	1	0-1	3	1	0	2	0	0	2	7
	38111	0138-R	sb	2-76	0	0	0	0-0	0	0	1	3	1	0	0	5

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
62-8	38131	0224+R	nb	2-76	0	0	1	0-0	0	0	0	0	0	0	1	0
	38131	0346+R	nb	2-76	2	1	2	0-1	1	4	3	0	3	3	5	15
	38131	0462+R	nb	2-76	1	1	0	0-0	2	1	2	1	1	0	2	7
	38131	0565+R	nb	2-76	2	1	1	0-0	3	0	1	2	0	1	4	7
	38131	0612-R	sb	2-76	0	1	1	0-1	1	1	4	2	4	0	2	13
	38131	0509-R	sb	2-76	1	1	0	0-3	1	0	2	1	1	0	2	8
	38131	0412-R	sb	2-76	1	1	2	0-1	1	1	2	1	4	2	4	12
	38131	0304-R	sb	2-76	0	1	1	0-0	1	0	0	3	1	1	2	6
63-8	46041	0281+R	eb	8-76	1	1	2	0-1	1	0	0	0	2	0	4	4
	46041	0388+R	eb	8-76	1	0	0	0-1	2	0	0	1	1	1	1	6
	46041	0519+R	eb	8-76	0	0	1	0-0	2	0	0	0	0	0	1	2
	46041	0609-R	wb	8-76	0	0	1	0-0	0	0	2	0	0	0	1	2
	46041	0461-R	wb	8-76	1	1	0	0-0	0	0	0	0	0	1	2	1
	46041	0387-R	wb	8-76	1	0	1	1-0	1	1	0	1	1	2	3	6
64-8	46041	1219+R	nb	8-76	0	0	0	0-0	0	0	0	0	0	0	0	0
	46041	1403-R	wb	8-76	0	0	1	1-0	0	0	1	0	0	0	2	1
65-8	46061	0165+R	eb	2-76	0	1	0	0-1	0	1	1	1	0	1	1	5
	46061	0318+R	eb	2-76	1	0	0	0-0	1	1	0	0	0	1	1	3
	46061	0344-R	wb	2-76	1	1	1	0-1	0	1	0	0	0	0	3	2
	46061	0249-R	wb	2-76	0	0	0	0-0	0	1	0	4	0	0	0	5
66-8	46082	0430+R	eb	2-76	0	0	1	0-0	1	1	1	0	0	0	1	3
	46082	0601-R	wb	2-76	1	0	1	0-2	0	0	2	2	0	0	2	6
	46082	0448-R	wb	2-76	0	0	2	1-0	0	2	2	2	1	3	3	10
67-8	47082	0845+R	eb	2-76	2	0	0	0-2	0	0	1	0	2	3	2	8
	47082	0950+R	eb	2-76	1	0	1	0-0	1	0	0	1	0	0	2	2
	47082	0982-R	wb	2-76	1	0	2	0-0	2	0	0	0	0	0	3	2
	47082	0903-R	wb	2-76	1	1	2	0-0	2	2	0	0	2	3	4	9

Site No./ District	Location of Sign C.S.	M.P.	Direction of Traffic	Mon/Yr Sign Installed[2]	Accidents by Year[3] 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals Before	After
69-8	81076	0231+R	nb	2-76	0	1	0	0-1	0	0	0	0	0	0	1	1
	81076	0328+R	nb	2-76	5	0	0	0-0	0	1	0	0	0	0	5	1
	81076	0422-R	sb	2-76	0	0	0	0-0	0	0	1	1	0	0	0	2
	81076	0309-R	sb	2-76	0	2	0	0-0	0	0	0	0	1	2	2	3
70-M	63112	1151+R	nb	4-80	0	1	0	1	0	0	1	0-1	2	1	3	4
	63112	1478-R	sb	4-80	0	0	0	0	1	0	0	0-0	0	1	1	1

All Deer Crossing Accidents
Rate/Month at Study Site and Countywide
(January 1973 through December 1982)

Site No./ District	BEFORE SIGNS INSTALLED					AFTER SIGNS INSTALLED				
		Sign Sites		Countywide			Sign Sites		Countywide	
	Months	Accts	Rate/Mo	Accts	Rate/Mo	Months	Accts	Rate/Mo	Accts	Rate/Mo
10-3	50	7	.14	170	3.40	70	13	.19	261	3.73
23-5	60	20	.33	429	7.15	60	43	.72	462	7.70
24-5	44	4	.09	714	16.23	76	12	.16	1734	22.82
25-5	27	5	.19	648	24.00	93	12	.13	2873	30.89
26-5	61	10	.16	666	10.92	59	6	.10	698	11.83
44-5	55	11	.20	373	6.78	65	12	.18	553	8.51
30-6	27	1	.04	127	4.70	93	1	.01	1019	10.96
31-6	27	8	.30	127	4.70	93	33	.35	1019	10.96
32-6	105	3	.03	935	8.90	15	2	.13	211	14.07
33-6	27	5	.19	127	4.70	93	17	.18	1019	10.96
37-6	16	24	1.50	153	9.56	104	100	.96	888	8.54
38-6	96	17	.18	774	8.06	24	15	.63	267	11.13
43-7	85	27	.32	709	8.34	35	17	.49	384	10.97
45-8	49	18	.37	635	12.96	71	19	.27	986	13.89
46-8	47	16	.34	607	12.91	73	26	.36	1014	13.89
47-8	49	17	.35	635	12.96	71	13	.18	986	13.89
48-8	47	10	.21	607	12.91	73	18	.25	1014	13.89
49-8	47	6	.13	607	12.91	73	5	.07	1014	13.89
50-8	44	14	.32	338	7.68	76	21	.28	636	8.37
51-8	40	14	.35	312	7.80	80	10	.13	662	8.28
52-8	40	18	.45	312	7.80	80	25	.31	662	8.28

	BEFORE SIGNS INSTALLED					AFTER SIGNS INSTALLED				
Site No./		Sign Sites		Countywide			Sign Sites		Countywide	
District	Months	Accts	Rate/Mo	Accts	Rate/Mo	Months	Accts	Rate/Mo	Accts	Rate/Mo
53-8	38	14	.37	332	8.74	82	26	.32	895	10.91
54-8	38	7	.18	332	8.74	82	15	.18	895	10.91
56-8	47	8	.17	421	8.96	73	6	.08	806	11.04
57-8	39	25	.64	559	14.33	81	67	.83	1408	17.38
58-8	45	25	.56	648	14.40	75	45	.60	1319	17.59
59-8	38	5	.13	544	14.32	82	10	.12	1423	17.35
60-8	38	7	.18	544	14.32	82	18	.22	1423	17.35
61-8	38	25	.66	544	14.32	82	63	.77	1423	17.35
62-8	38	25	.66	544	14.32	82	72	.88	1423	17.35
63-8	44	14	.32	345	7.84	76	22	.29	801	10.54
64-8	44	3	.07	345	7.84	76	1	.01	801	10.54
65-8	38	6	.16	294	7.74	82	16	.20	852	10.39
66-8	38	9	.24	294	7.74	82	22	.27	852	10.39
67-8	38	13	.34	219	5.76	82	25	.30	730	8.90
69-8	38	9	.24	191	5.03	82	7	.09	637	7.77
70-M	89	7	.08	266	2.99	31	5	.16	145	4.68

Dusk-Dark-Dawn
Deer Crossing Accidents
Rate/Month at Study Site and Countywide
(January 1973 through December 1982)

Site No./ District	BEFORE SIGNS INSTALLED					AFTER SIGNS INSTALLED				
		Sign Sites		Countywide			Sign Sites		Countywide	
	Months	Accts	Rate/Mo	Accts	Rate/Mo	Months	Accts	Rate/Mo	Accts	Rate/Mo
10-3	50	6	.12	135	2.70	70	11	.16	209	2.99
23-5	60	14	.23	348	5.80	60	33	.55	361	6.02
24-5	44	3	.07	579	13.16	76	10	.13	1373	18.07
25-5	27	5	.19	532	19.70	93	11	.12	2296	24.69
26-5	61	5	.08	537	8.80	59	4	.07	555	9.41
44-5	55	10	.18	308	5.60	65	10	.15	465	7.15
30-6	27	1	.04	103	3.81	93	1	.01	774	8.32
31-6	27	7	.26	103	3.81	93	26	.28	774	8.32
32-6	105	3	.03	718	6.84	15	1	.07	159	10.60
33-6	27	4	.15	103	3.81	93	16	.17	774	8.32
37-6	16	20	1.25	122	7.63	104	82	.79	730	7.02
38-6	96	15	.16	627	6.53	24	12	.50	225	9.38
43-7	85	26	.31	593	6.98	35	10	.29	312	8.91
45-8	49	16	.33	504	10.29	71	15	.21	835	11.76
46-8	47	12	.26	481	10.23	73	21	.29	858	11.75
47-8	49	16	.33	504	10.29	71	12	.17	835	11.76
48-8	47	7	.15	481	10.23	73	17	.23	858	11.75
49-8	47	5	.11	481	10.23	73	5	.07	858	11.75
50-8	44	11	.25	273	6.20	76	18	.24	518	6.82
51-8	40	13	.33	253	6.33	80	9	.11	538	6.73
52-8	40	15	.38	253	6.33	80	21	.26	538	6.73

Site No./ District	BEFORE SIGNS INSTALLED Months	Sign Sites Accts	Sign Sites Rate/Mo	Countywide Accts	Countywide Rate/Mo	AFTER SIGNS INSTALLED Months	Sign Sites Accts	Sign Sites Rate/Mo	Countywide Accts	Countywide Rate/Mo
53-8	38	13	.34	274	7.21	82	23	.28	753	9.18
54-8	38	5	.13	274	7.21	82	13	.16	753	9.18
56-8	47	7	.15	349	7.43	73	6	.08	678	9.29
57-8	39	20	.51	456	11.69	81	61	.75	1154	14.25
58-8	45	19	.42	530	11.78	75	39	.52	1080	14.40
59-8	38	4	.11	443	11.66	82	7	.09	1167	14.23
60-8	38	7	.18	443	11.66	82	16	.20	1167	14.23
61-8	38	22	.58	443	11.66	82	52	.63	1167	14.23
62-8	38	22	.58	443	11.66	82	68	.83	1167	14.23
63-8	44	12	.27	288	6.55	76	21	.28	656	8.63
64-8	44	2	.05	288	6.55	76	1	.01	656	8.63
65-8	38	5	.13	245	6.45	82	15	.18	699	8.52
66-8	38	6	.16	245	6.45	82	19	.23	699	8.52
67-8	38	11	.29	175	4.61	82	21	.26	579	7.06
69-8	38	8	.21	148	3.89	82	7	.09	530	6.46
70-M	89	4	.04	195	2.19	31	5	.16	113	3.65

All Deer Crossing Accidents
By County - By Year
(January 1973 through December 1982)

All Accidents

Loc. No.	Date Signs Erect.	Year 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Before Mos.	Before Accs.	After Mos.	After Accs.
						BENZIE									
10-3	2-77	24	39	58	43	6/31	47	44	49	47	43	50	170	70	261
						ISABELLA									
23-5	12-77	72	71	112	86	88	102	67	91	109	93	60	429	60	462
						KENT									
24-5	8-76	196	185	207	126/63	263	255	239	316	334	264	44	714	76	1,734
						MONTCALM AND NEWAYGO									
25-5[1]	3-75	244	318	86/257	316	353	423	355	401	432	336	27	648	93	2,873
						NEWAYGO									
26-5	1-78	100	150	148	109	145	14/156	101	148	173	120	61	666	59	698
						CLINTON									
44-5	7-77	72	71	83	91	56/40	103	97	107	119	87	55	373	65	553

[1]Site overlaps two counties

B/A Before and after for year signs erected.

Loc. No.	Date Signs Erect.	Year 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Before Mos.	Before Accs.	After Mos.	After Accs.
						HURON									
30-6	3-75	60	51	16/50	71	102	130	143	178	179	166	27	127	93	1,019
31-6	3-75	60	51	16/50	71	102	130	143	178	179	166	27	127	93	1,019
32-6	9-81	60	51	66	71	102	130	143	178	134/45	166	105	935	15	211
33-6	3-75	60	51	16/50	71	102	130	143	178	179	166	27	127	93	1,019
						SAGINAW									
37-6	4-74	115	38/75	85	73	93	78	83	134	150	117	16	153	104	888
38-6	12-80	115	113	85	73	93	78	83	134	150	117	96	774	24	267
						ST. JOSEPH									
43-7	1-80	110	91	92	86	97	111	112	10/113	132	139	85	709	35	384
						EATON									
45-8	1-77	156	132	152	182	13/146	114	75	207	233	211	49	635	71	986
46-8	11-76	156	132	152	167/15	159	114	75	207	233	211	47	607	73	1,014
47-8	1-77	156	132	152	182	13/146	114	75	207	233	211	49	635	71	986
48-8	11-76	156	132	152	167/15	159	114	75	207	233	211	47	607	73	1,014
49-8	11-76	156	132	152	167/15	159	114	75	207	233	211	47	607	73	1,014
						HILLSDALE									
50-8	8-76	97	89	99	53/27	95	97	103	112	98	104	44	338	76	636
51-8	4-76	97	89	99	27/53	95	97	103	112	98	104	40	312	80	662
52-8	4-76	97	89	99	27/53	95	97	103	112	98	104	40	312	80	662
						INGHAM									
53-8	2-76	104	91	117	20/99	100	134	116	141	154	151	38	332	82	895
54-8	2-76	104	91	117	20/99	100	134	116	141	154	151	38	332	82	895
56-8	11-76	104	91	117	109/10	100	134	116	141	154	151	47	421	73	806

Loc. No.	Date Signs Erect.	1973	1974	1975	1976	Year 1977	1978	1979	1980	1981	1982	Before Mos.	Before Accs.	After Mos.	After Accs.
						JACKSON									
57-8	3-76	161	167	186	45/134	184	188	216	231	211	244	39	559	81	1,408
58-8	9-76	161	167	186	134/45	184	188	216	231	211	244	45	648	75	1,319
59-8	2-76	161	167	186	30/149	184	188	216	231	211	244	38	544	82	1,423
60-8	2-76	161	167	186	30/149	184	188	216	231	211	244	38	544	82	1,423
61-8	2-76	161	167	186	30/149	184	188	216	231	211	244	38	544	82	1,423
62-8	2-76	161	167	186	30/149	184	188	216	231	211	244	38	544	82	1,423
						LENAWEE									
63-8	8-76	103	78	96	68/34	112	120	125	130	137	143	44	345	76	801
64-8	8-76	103	78	96	68/34	112	120	125	130	137	143	44	345	76	801
65-8	2-76	103	78	96	17/85	112	120	125	130	137	143	38	294	82	852
66-8	2-76	103	78	96	17/85	112	120	125	130	137	143	38	294	82	852
						LIVINGSTON									
67-8	2-76	67	57	82	13/65	75	85	106	142	121	136	38	219	82	730
						WASHTENAW									
69-8	2-76	78	51	53	9/47	76	79	91	103	108	133	38	191	82	637
						OAKLAND									
70-M	4-80	37	26	27	28	34	37	58	19/40	61	44	89	266	31	145

Dusk-Dark-Dawn
Deer Crossing Accidents
By County - by Year
(January 1973 through December 1982)

Loc. No.	Date Signs Erect.	Year 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Before Mos.	Before Accs.	After Mos.	After Accs.
						BENZIE									
10-3	2-77	15	33	50	32	5/26	40	36	39	31	37	50	135	70	209
						ISABELLA									
23-5	12-77	58	59	89	68	74	76	55	72	86	72	60	348	60	361
						KENT									
24-5	8-76	158	152	168	101/51	199	208	187	256	259	213	44	579	76	1,373
						MONTCALM AND NEWAYGO									
25-5[1]	3-75	207	254	71/213	235	282	348	276	318	360	264	27	532	93	2,296
						NEWAYGO									
26-5	1-78	86	123	120	79	117	12/131	74	113	145	92	61	537	59	555
						CLINTON									
44-5	7-77	60	56	71	73	48/35	81	86	91	94	78	55	308	65	465
						HURON									
30-6	3-75	53	36	14/41	52	69	104	110	136	137	125	27	103	93	774
31-6	3-75	53	36	14/41	52	69	104	110	136	137	125	27	103	93	774
32-6	9-81	53	36	55	52	69	104	110	136	103/34	125	105	718	15	159
33-6	3-75	53	36	14/41	52	69	104	110	136	137	125	27	103	93	774

[1]Site overlaps two counties

B.A. Before and after for year signs erected.

Loc. No.	Date Signs Erect.	Year 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Before Mos.	Before Accs.	After Mos.	After Accs.
						SAGINAW									
37-6	4-74	92	30/60	72	49	72	64	70	118	126	99	16	122	104	730
38-6	12-80	92	90	72	49	72	64	70	118	126	99	96	627	24	225
						ST. JOSEPH									
43-7	1-80	88	69	80	73	81	101	92	9/96	100	116	85	593	35	312
						EATON									
45-8	1-77	124	111	115	143	11/128	83	64	177	203	180	49	504	71	835
46-8	11-76	124	111	115	131/12	139	83	64	177	203	180	47	481	73	858
47-8	1-77	124	111	115	143	11/128	83	64	177	203	180	49	504	71	835
48-8	11-76	124	111	115	131/12	139	83	64	177	203	180	47	481	73	858
49-9	11-76	124	111	115	131/12	139	83	64	177	203	180	47	481	73	858
						HILLSDALE									
50-8	8-76	82	69	83	39/19	80	84	86	85	80	84	44	273	76	518
51-8	4-76	82	69	83	19/39	80	84	86	85	80	84	40	253	80	538
52-8	4-76	82	69	83	19/39	80	84	86	85	80	84	40	253	80	538
						INGHAM									
53-8	2-76	93	74	91	16/83	82	112	105	117	129	125	38	274	82	753
54-8	2-76	93	74	91	16/83	82	112	105	117	129	125	38	274	82	753
56-8	11-76	93	74	91	91/8	82	112	105	117	129	125	47	349	73	678
						JACKSON									
57-8	3-76	133	138	147	38/112	155	163	178	180	175	191	39	456	81	1,154
58-8	9-76	133	138	147	112/38	155	163	178	180	175	191	45	530	75	1,080
59-8	2-76	133	138	147	25/125	155	163	178	180	175	191	38	443	82	1,167
60-8	2-76	133	138	147	25/125	155	163	178	180	175	191	38	443	82	1,167
61-8	2-76	133	138	147	25/125	155	163	178	180	175	191	38	443	82	1,167
62-8	2-76	133	138	147	25/125	155	163	178	180	175	191	38	443	82	1,167

Loc. No.	Date Signs Erect.	Year 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Before Mos.	Before Accs.	After Mos.	After Accs.
							LENAWEE								
63-8	8-76	91	63	77	57/28	95	97	99	102	114	121	44	288	76	656
64-8	8-76	91	63	77	57/28	95	97	99	102	114	121	44	288	76	656
65-8	2-76	91	63	77	14/71	95	97	99	102	114	121	38	245	82	699
66-8	2-76	91	63	77	14/71	95	97	99	102	114	121	38	245	82	699
							LIVINGSTON								
67-8	2-76	53	44	68	10/52	51	70	83	114	102	107	38	175	82	579
							WASHTENAW								
69-8	2-76	60	38	43	7/36	62	63	77	86	88	118	38	148	82	530
							OAKLAND								
70-M	4-80	30	19	22	20	25	24	41	14/29	47	37	89	195	31	113