

## Critique of Adverse Reports and Tests

### Swareflex and Strieter-Lite Wild Animal Highway Warning Reflector System

Reports which have occasionally been cited that allege the failure or ineffectiveness of the Strieter-Lite system (and or the Swareflex Reflector system) in reducing deer-car collisions have been found of dubious value.

#### **Apply to different reflector systems**

The most obvious flaw of these citations is the inclusion of reports that were referencing entirely different systems or equipment. None of the following reports, cited in connection with the evaluation of the Strieter-Lite system were in fact studies involving the system; they dealt with an entirely different class of devices:

- 1) Queal, L. M. 1967. Effectiveness of roadside mirrors in controlling deer-car accidents. Michigan Department of Conservation, Research Division Report 103.
- 2) Gordon, D. F. 1969. "Deer mirrors - a clearer picture". Colo. Div. Game of Parks. Game Information Leaflet 77.
- 3) Beauchamp, D. E. 1970. Deer Mirror Evaluation. California Department of Fish and Game.
- 4) T. N. Woodward, and T. D. I. Beck. 1979. Regional deer-vehicle accident research. U. S. Department of Transportation Federal Highway B4:C4Administration Report No. FHWA-RD-79-11. National Technical Information Service, Springfield, Virginia.
- 5) Williamson, L. 1980. Reflectors reduce deer-auto collisions. Outdoor News Bulletin 34:2.
- 6) Gilbert, J. R. 1982. Evaluation of deer mirrors for reducing deer-vehicle collisions. United States Federal Highway Administration report FHWA-RD-82-061.

Similarly, some of the reports cited refer to early versions and test models of the systems that were known to be under development.

- 1) Woodward, T. N., D. F. Reed, and T. M. Pojar. 1973. Effectiveness of Swareflex wildlife warning reflectors in reducing deer-vehicle accidents. Colorado Division of Wildlife

Generally speaking, reports prior to 1982 refer to either entirely different equipment or test versions of the Swareflex Reflector system. The system was not introduced in the United States prior to 1981.

## Flawed testing procedures

The Strieter-Lite system is a carefully designed, tested, and balanced system of reflectors placed at specified distances and angles from each other and the road. It is not simply hardware that is driven into the ground on the shoulders adjoining a highway.

Consultation with Strieter Corporation is required prior and during installation. Furthermore, maintenance is required to properly achieve the intended purpose of the system; a disturbance in the placement of the reflectors, one or several missing reflectors, bent or twisted poles may all render the system inoperable.

If tests are conducted without prior consultation, or if there was an improper installation and maintenance, then failure cannot be attributed to the Strieter-Lite system.

The following reports violate basic principles of sound testing procedures:

- 1) Griffis, J. L.. 1984. Effects of Swareflex Wildlife Highway Warning Reflectors on Behavior and Mortality of White-Tailed Deer
- 2) Reeve, A. F.. 1989. Vehicle-related Mortality of Mule Deer in Nugget Canyon, Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit, Laramie, Wyoming
- 3) Scholten, G., G. Loveland, and J. Spinazola. 1989. The Effectiveness of Swareflex Reflectors. Idaho Department of Fish and Game.
- 4) Dalton, L. B. and M. C. Stanger. 1990. Effectiveness of Swareflex Reflectors at Reducing Mule Deer-vehicle Collisions. Utah Division of Wildlife Resources
- 5) Woodham, D. 1991. Evaluation of Swareflex Wildlife Warning Reflectors. Colorado Department of Transportation. CDOT-DTD-91-11.
- 6) Oregon Highway Division and Dept. of Fish and Wildlife. 1991, Study of the Swareflex Wildlife Warning Highway Reflector System.
- 7) Waring, G. J., J. L. Griffis, and M. E. Vaughn. 1991. White-tailed deer roadside behavior, wildlife warning reflectors, and highway mortality. *Applied Animal Behavioral Science* 29: 2156-223.
- 8) Armstrong, J. J. An Evaluation of the Effectiveness of Swareflex Deer Reflectors. 1992. Ontario Ministry of Transportation. MAT-91-12.
- 9) Ford, S. G., and S. L. Villa. 1993. Reflector Use and the Effect They Have on the Number of Mule Deer Killed on California Highways. Report FHWA/CA/PD-94/01.
- 10) Reeve, A.F., and S. H. Anderson 1993. Ineffectiveness of Swareflex reflectors at reducing deer-vehicle collisions. *Wildlife Society Bulletin* 21:127-132.
- 11) Cottrell, Jr., B. H. 2003. Technical Assistance Report Evaluation of Deer Warning Reflectors in Virginia. Virginia Transportation Research Council. VTRC 03-TAR6 .

## **Flawed assumptions and protocols**

The report cited below concludes that the Strieter-Lites are not effective. However, a close look at their methodology reveals a number of flawed assumptions and protocols. For example, observations were made of docile "campus deer" on a Wildlife Refuge rather than observing "deer in the wild" which are more alert and react to any movement while running. Furthermore, the conclusions of this study contradict an earlier Georgia Department of Transportation (GDOT) 2-year research project involving a half mile stretch with properly installed Strieter-Lites that showed a 100% reduction in deer-vehicle collisions. Please read this [critique](#).

D' Angelo et al, Evaluation of Wildlife Warning Reflectors for Altering White Tailed Deer Behavior Along Roadways, Wildlife Society Bulletin, Vol. 34, No. 4, 2006.

## **No testing was done by the authors**

Some authors allege the inefficacy of Strieter-Lite systems when they never conducted tests themselves but merely cited other studies that had already been shown to be of dubious significance. Reiterating faulty reports doesn't make their claims any better. The following reports fall into this category:

- 1) White Water Associates, Inc 1995. Investigating Methods to Reduce Deer-vehicle Accidents in Michigan. FHWA-MI-RD-96-02.
- 2) Decker, D. J.; Loconti Lee, K. M. and Connelly, N. A. 1990. Deer-related vehicular accidents in Tompkins County, New York: incidence, costs, and implications for deer management. Transactions of the Northeast Section of the Wildlife Society 47: 21-26.
- 3) Romin, L. A., and J. A. Bissonette. 1996. Deer-vehicle collisions: status of state monitoring activities and mitigation efforts. Wildlife Society Bulletin 24:276-283.
- 4) Danielson, B. J. and M. W. Hubbard. 1998. A literature Review for Assessing the Status of Current Methods of Reducing Deer-Vehicle Collisions.
- 5) Ujvari, M., H. J. Baagoe, and A. B. Masen. 1998. Effectiveness of wild life warning reflectors in reducing deer-vehicle collisions: a behavioral study. Journal of Wildlife Management 62: 1094-1099. DVCR Working Group. 2000. Final Report: Deer Vehicle Collision Reduction Working Group Conference. Madison, WI: Sand County Foundation
- 6) Norman, P. C. 2001. Reducing Deer-Vehicle Collisions by the Use of Reflectors- A Summary of Current Research and Literature.
- 7) DeerCrash. 2003. Countermeasures toolbox. Madison, WI: University of Wisconsin, Madison, Deer-Vehicle Crash Information Clearinghouse. Available: <http://www.deercrash.com/toolbox/index.htm>
- 8) Putman, Professor R. J., Dr. J. Langbein and Professor B. W. Staines. 2004. Deer and Road Traffic Accidents: A Review of Mitigation Measures: Costs and Cost-effectiveness. Report for the Deer Commission for Scotland.

- 9) Curtis, Paul D. James H. Hedlund - Reducing Deer-Vehicle Crashes. Wildlife Damage Management Fact Sheet Series published by Cornell University, Cooperative Extension 2005
- 10) Hedlund, J. H., Paul E. Curtis, G. Curtis, and A. F. Williams. 2003. Methods to Reduce Traffic Crashes Involving Deer: What Works and What Does Not. Insurance Institute for Highway Safety

The following factors constitute the major reasons that the above-cited reports are not credible.

Some show methodological errors in testing such as using captive born, pen-raised deer as test subjects.

Zacks, J. L. 1985. An investigation of Swareflex wildlife warning reflectors. Federal Highway Administration Report FHWA-MI-RD-85-04, Washington, D.C.

Obviously, the reaction of pen-raised deer to human actions, equipment and conditions would be different from that of wild animals.

Some case studies cited have no known bearing on the function of the Strieter-Lite system. Such is a citation of

Zacks, J. L. 1986. Do white-tailed deer avoid red? An evaluation of the premise underlying the design of Swareflex wildlife reflectors. Transportation Research Record 1075: 35-43.

The above study investigates the reaction of deer to the color red. The Strieter-Lite system does not depend on any particular color; in fact, green reflectors work just as well.

In a few cases, the cited reports are unavailable so no meaningful comments regarding them can be offered. These include

- 1) Reed, D. F., T.D.I. Beck and T.N. Woodard. 1982. Methods of reducing deer-vehicle accidents: benefit-cost analysis. Wildlife Society Bulletin 10:349-354.
- 2) Andrle, S. J., K. K. Knapp, T. McDonald, and D. E. Smith. Iowa Traffic Control Devices and Pavement Markings: A Manual for Cities and Counties. Iowa Highway Research Board Project TR-441. Iowa State University, Center for Transportation Research and Education, Ames, IA, April 2001.
- 3) Beaupre', V. G. 2002. Pilot project to deter wildlife-vehicle collisions. Press release. Regina, Saskatchewan: Saskatchewan Department of Highways and Transportation. [www.gov.sk.ca/newsrel/releases/200s/05/09-326.html](http://www.gov.sk.ca/newsrel/releases/200s/05/09-326.html).

## **Summary**

The studies most often cited to challenge the efficacy to the Strieter-Lite system seem to be defective in concept and design, and were done prior to the final system that is being used with success today.