

BRIEF REVIEW OF DEER-VEHICLE COLLISION MITIGATION TECHNIQUES¹

REDUCE NUMBER OF DEER ALONG THE ROADWAY

FENCING

- Fencing must be sufficient high and long; must be well-maintained – deer will exploit any hole in the fence.
- Fencing may be accompanied by a one-way gate that allows deer who are trapped on roadway to escape through a fence; the problem is, only 16% of deer that approach a one-way gate will actually use it. Deer trapped in a roadway are associated with higher DVCs.

CROSSWALKS

Built on the road surface; usually designed using fencing to funnel deer to an opening in the fence where the deer are intended to follow a dirt path bordered by cobblestones to the roads' edge, then deer cross the road and exist through an identical setup. Signs alert motorists to crossing deer.

► Studies suggest that, when combined with animal-activated signs, crosswalks work on low-volume, but not high-volume, roads.

OVERPASSES & UNDERPASSES

- Overpass designed to let deer pass over a roadway; usually covered with vegetation; usually rectangular or hourglass in shape.
- Underpass may be one of many designs: box, circular, elliptical, culvert or bridged.
- Both typically used in combination with wildlife fences that keep the animals from entering the roadway and that funnel the animals toward the crossing.
planned with regard to the species and surrounding landscape.
- Deer (and grizzly bears and elk) tend to use wildlife overpasses to a greater extent than wildlife underpasses. (Black bears and mountain lions use underpasses more frequently than overpasses.)
- At present, most literature suggests that the best way to reduce DVCs is to properly install and maintain deer-proof fences with deer overpasses.
- Deer prefer wide overpasses & underpasses
- Costly. In 1997, two wildlife overpasses were built over the Trans Canada Highway. The overpasses each cost \$1,350,799 U.S. dollars (Controlling for CPI -- almost \$1,900,000 in 2011). Colorado is working to raise \$4.5 million in federal funds to build an overpass over I-70, west of Vail. In January 2011, a contract for design of a overpass covered in tress, shrubs and grasses was awarded. The State does not have funds to construct the overpass yet.
- Location – may be sited in area where there are: high numbers of DVCs and/or where wildlife corridors intersect roads.

¹ This summary borrows from Mastro et al. (2008) and Danielson and Hubbard (1998).

CULLING -- DeNicola and Williams (2008) report a one-to-one reduction in deer-vehicle collisions (DVCs) with reductions in deer density. Through use of sharpshooting, deer herd size reductions led to DVC reductions in Iowa City, IA (76% population reduction, 78% DVC reduction), Princeton, NJ (72% and 75%, respectively) and Solon, OH (54% and 49%, respectively).

MODIFY MOTORIST BEHAVIOR

REDUCE SPEED LIMITS

- To date, no studies have demonstrated that a decrease in the posted speed limit translates into reduced DVCs.
- One study looked at reduced speed limit and collisions with big-horned sheep. The study actually found that the number of accidents with the sheep increased when the speed limit was lowered. However, the authors attribute the increase to an increase in volume, not a decrease in speed.

REDUCE TRAFFIC VOLUME

This is an obvious, but challenging one. The community has made many efforts to help residents reduce their reliance on personal automobiles. At the same time, many of the DVCs are located along the SR 46 Bypass. INDOT is currently widening the bypass to accommodate more traffic.

ROAD SIGNS

CONVENTIONAL YELLOW DIAMOND WITH BLACK DEER -- So common as to become unmarked in the eye of the driver. Studies show these signs are not effective.

ENHANCED CONVENTIONAL SIGNS -- Usually enhanced by using neon yellow tubing or by using the words "High Deer Crash Area" – Ineffective at reducing DVCs.

TEMPORARY (SEASON-SPECIFIC) ENHANCED SIGNS – Some form of non-traditional enhanced signage posted for a short period during the fall and spring decreased speeding vehicles from 19%-8%.

▶ Decreased DVCs by 50%.

DYNAMIC MESSAGING SIGNS – Electronic signs with black backgrounds and amber lettering. Signs are either posted permanently or mounted on portable trailers by the roadway. Portable signs more effective than permanent signs. Research using simulated scenarios indicated a reduction in speed, but not DVCs.

ANIMAL ACTIVATED – Detect wildlife on the roadside and then flash warning lights or turn on signs that alert drivers to the animal's presence. Systems activated by a variety of mechanisms, such as detection of seismic ground vibrations, infrared radiation or the breaking of a microwave, laser, or infrared beam as an animal passes through an area

adjacent to the road. Evidence that drivers slow down in response to an activated system and a reduction in speed, along with increased driver alternatives may decrease the number of DVCs.

► No domestic studies; Swiss studies have indicated an 80% reduction in DVCs using animal-activated system.

PUBLIC EDUCATION

Effectiveness unknown; however, one study suggest that campaigns providing specific information (eg. migration times and locations) are more likely to be effective than those that provide general education.

INCREASE MOTORISTS' ABILITY TO SEE DEER

LIGHTING – While 80-95% of DVCs occur between sunset and sunrise, studies do not indicate that enhanced lighting has an effect on DVCs.

REMOVAL OF ROADSIDE VEGETATION - Clearing a 20-m zone on each side of a highway has been shown to reduce DVCs by 20%; removal of vegetation also raises concerns such as erosion and other ecological impacts, maintenance and cost concerns.

IN-VEHICLE DEER DETECTION SYSTEMS using night vision or infrared techniques – efficacy in reducing DVCs has not been tested.

MODIFY DEER BEHAVIOR

PLANT UNPALETABLE VEGETATION ALONG ROADWAY – Has not been evaluated.

INTERCEPT FEEDING TO DIVERT DEER FROM ROADWAY – This is the provisioning of supplemental food to divert deer from feeding along the roadway. One study indicated this reduced DVCs by 50%. Recommended this technique be used in conjunction with fencing and only for a short period of time to minimize costs and to keep deer from being resource-dependent.

DEER WHISTLES– Most outside the range of deer perception; have been found to be ineffective.

DEER REFLECTORS – Placed along roadside to deflect light from an approaching vehicle's headlight; advertised as an effective way to scare deer away from roadside. Studies show that deer cannot see red and that green and blue do not scare them. A number of studies indicate these reflectors are ineffective at reducing DVCs. (One study found that reflectors did reduce DVCs; another found that reflectors decreased DVCs in rural areas, but increased them in urban areas.)

CHEMICAL REPELLANTS – Repellents applied to roadside vegetation have not been demonstrated to be effective in reducing DVCs.

ROADWAY PLANNING – Decisions such as road location, number of lanes and road

curvature may impact DVCs. Data on deer habitat, migration routes, and the locations of DVCs might give planners better guidance. DVCs are spatially correlated to landscape elements that deer likely travel and a road desing that takes this into account may result in fewer DVCs.