

Montana Department of Transportation
Research Programs
March 2016

Experimental Features
Evaluation Report

**EVALUATION OF STRIETER-LITE WILD ANIMAL HIGHWAY WARNING
REFLECTOR SYSTEM™ ON REDUCING VEHICLE-ANIMAL COLLISIONS**

Project Name: Safety Improvement Project
Fencing – East of Whitehall

Project Number: HSIP 69-1(22)2

FHWA Project Number: MT 09-02

Project Location: Highway MT 69, P-69, Jefferson County, Butte District:
Approximate Reference Point 1.72 to 3.1

Description: An experimental trial of a wild animal reflector warning system for reducing the number of vehicle and animal collisions.

Date of Installation: May – October 2010

Principal Investigator: Kris Christensen
Research Programs Project Manager

Objective

Determine the effectiveness of wild animal reflector warning systems for reducing the number of vehicle and animal collisions and the maintenance efforts needed to maintain this type of system. Maintenance costs will be recorded and collected when available.

Experimental Design

Installation of the Strieter-Lite Wild Animal Highway Warning Reflector system, consisting of 700 reflectors along MT Highway 69 between reference points 1.7 (just east of Briggs Lane) and 3.1 for a project length of 1.4 miles. Research will document installation shortly after completion and report on any issues based on visual observation. The evaluation phase of the project will encompass a five-year period, including initial observations during and directly after installation.

Evaluation

2012

The site was visited May and October 2012 by Research staff to observe any visual changes. The reflectors looked clean and well maintained (Figure 1).

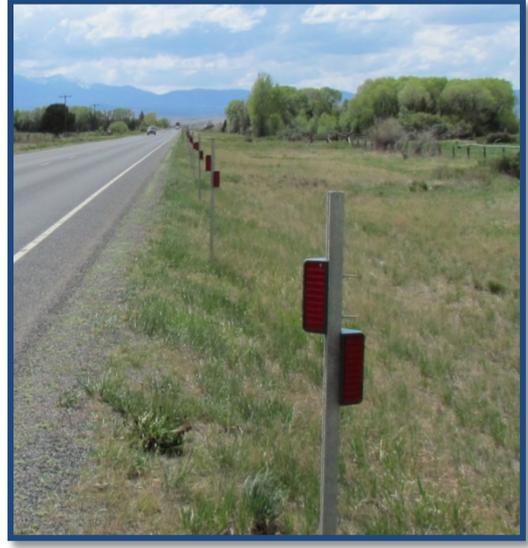
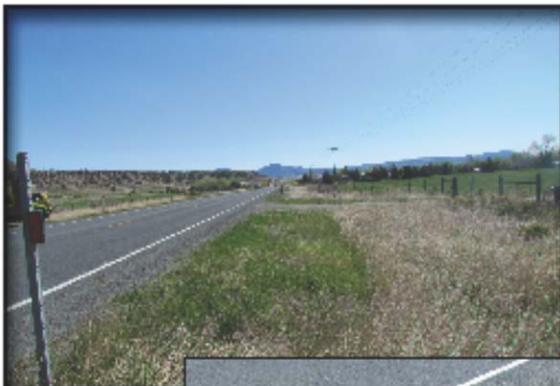


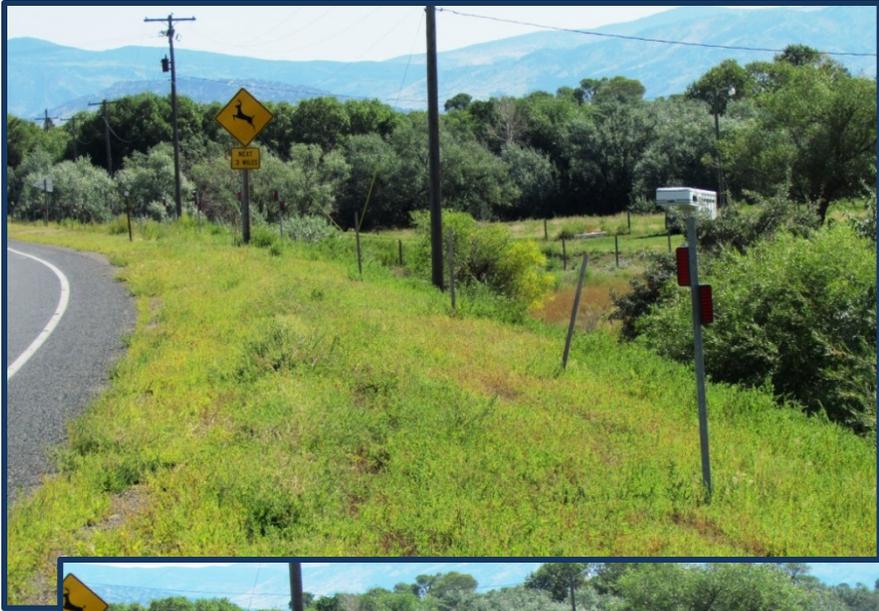
Figure 1- Reflector system 2012 [left], 2013 [right] and 2014 visit [lower right]

It appeared two reflectors were missing on the eastbound side of the road. One location was near a residential driveway and the other was just before mile marker 2. During the May



visit, person jogging along the road, stopped to comment that the reflectors on the eastbound side are too close to the road. It was explained because of utility location the reflectors were placed closer to the road than originally intended.

Figure 2-Missing reflectors (2012)



2013

The site was visited May 2013 by Research staff to observe any visual changes. None of the reflectors appeared to be missing and all were in good repair. Two reflectors were slightly crooked on the eastbound side of the road. Two deer carcasses were spotted on the eastbound side of the road in the ditch near reference point 3.



2014

The site was visited late August 2014 to observe any visual changes. The whole site was mowed and the reflectors appeared clean (see Figure 1). Near Briggs Lane, three posts were missing and some out of alignment (Figure 3). MDT Maintenance confirmed a vehicle accident had occurred in this location. Throughout the project, posts were out of alignment and some were missing. A

Figure 3- Missing reflectors from vehicle accident (2014) MDT Maintenance marked locations with wooden lathes

deer carcass was on the eastbound side of the road near reference point 2.9.

2015

The site was visited mid-September 2015. As in previous years, the whole site was mowed and the reflectors appeared clean. The eastbound side of the site had some posts out of alignment (Figure 4). On the same side of the roadway and further into the site, posts were installed but missing reflectors (Figure 5).



Figure 4- Eastbound side posts out of alignment



Figure 5- Eastbound side posts missing reflectors

Project Maintenance

2012

Mowing schedules in the study area were examined prior to installation of the reflector system. From 2000 to 2009, MDT Maintenance mowed the area two to three times per year. For 2012, no additional maintenance for the reflector system was reported.

2013

Minor upkeep on the reflector system was reported; including replacement of the approximately eight reflectors that were purchased from the Strieter Corporation.

2014

The reflector system had some damage from being knocked out of alignment by MDT Maintenance activities and vehicle accidents. Replacement posts were ordered and will be replaced. Reflector supply is adequate for needed repairs.

2015

As mentioned in the construction report, the eastbound/south side of the highway required installation by hand to prevent hitting fiber optics and other underground utilities, which makes it difficult to keep posts in alignment. Approximately 10 to 12 posts and their reflectors need repair or replacement from damaged by vehicle accidents or maintenance activities. Summer of 2015 was the last purchase of two boxes of reflectors at the cost of \$1020 with 22 reflectors per box for an approximate cost of \$23.00 per reflector.

In general, the maintenance of the reflector system is time consuming and challenging. Summer time they are difficult to run mowers around because of the spacing and have required some hand mowing between them to address visibility issues. Wintertime is a concern since the system tends to be damaged from accidents and maintenance activities and covered by snow and dirt.

Animal Carcass and Wildlife Vehicle Crash Information

The Montana Department of Transportation (MDT) has access to two databases containing information on wild animal vehicle collisions. The MDT Carcass Database contains information on carcasses collected by MDT maintenance personnel; however, not all carcass collection is reported consistently or on a regular schedule. This makes the information provided by the Carcass Database useful for pattern identification over space and time, but not statistically valid. It is difficult to match a carcass report to a crash report to ensure the carcass is not counted twice in a detailed study.

MDT also has access to wild animal vehicle collisions reported by or through the Montana Highway Patrol (MHP). This dataset is limited by the fact that many wild animal vehicle collisions are not reported, or if they are reported, it may be well after the crash occurrence. Additionally, the reporting officer may note in the narrative what type of animal was impacted; however, the crash form does not have a data field for the type of animal, so this information is not provided consistently. For example, an MHP reported crash could have happened on February 1 and the carcass picked up the same day; however, the carcass may not be picked up by MDT until February 20 or not picked up at all if it is beyond the highway right-of-way. Alternatively, a carcass may be recorded near the location of a crash that was not actually involved in that crash at all.

Since there is no clear connection between the two MDT data sets, some of the following data tables could be duplicative or inconclusive.

Animal Carcass Information

Carcass data since completion of installation of the reflector system is listed in Table 1. In addition, carcass information for a control section of the same roadway from reference points 1.0 to 1.6 (Table 2) will be collected for the same five year period. Carcass information five years prior to the installation of the reflector system is reported for both the control and study areas in Tables 3 and 4.

Looking at Tables 1 and 4, reference point 2.9-3.0 seems to be a crossing area. Before installation of the reflector system, 17 carcasses were reported in the area. Since installation of the reflector system, 12 carcasses have been recorded.

Table 1- Carcass Counts in Study Area

Reflector System Area RP 1.7 to 3.1 Carcass Counts		
<u>Date</u>	<u>RP/MP</u>	<u>Animal</u>
1/3/2011	1.7	mule deer
1/20/2011	1.7	mule deer
1/27/2015	1.7	whitetail deer
1/29/2015	1.7	whitetail deer
2/5/2015	1.7	whitetail deer
3/8/2011	1.8	whitetail deer
10/1/2012	1.8	other (wild)
1/5/2015	1.8	whitetail deer
3/18/2011	1.9	whitetail deer
3/14/2012	1.9	whitetail deer
2/18/2011	2.0	whitetail deer
11/30/2012	2.0	mule deer
3/20/2013	2.0	whitetail deer
3/26/2013	2.0	whitetail deer
8/11/2014	2.0	whitetail deer
2/28/2011	2.1	whitetail deer
3/14/2012	2.1	whitetail deer
11/5/2012	2.1	whitetail deer
3/31/2014	2.1	whitetail deer
11/25/2010	2.2	whitetail deer
11/25/2011	2.2	whitetail deer
12/29/2011	2.2	whitetail deer

**Reflector System Area
RP 1.7 to 3.1
Carcass Counts**

<u>Date</u>	<u>RP/MP</u>	<u>Animal</u>
10/16/2012	2.2	other (wild)
12/17/2012	2.2	whitetail deer
2/19/2013	2.2	whitetail deer
7/20/2011	2.3	whitetail deer
3/18/2014	2.3	whitetail deer
9/28/2012	2.4	whitetail deer
11/27/2012	2.4	whitetail deer
12/17/2012	2.4	whitetail deer
10/21/2014	2.4	whitetail deer
1/7/2011	2.5	whitetail deer
6/27/2011	2.5	whitetail deer
1/1/2013	2.5	whitetail deer
8/14/2013	2.5	whitetail deer
3/2/2012	2.6	whitetail deer
1/4/2012	2.7	whitetail deer
12/24/2012	2.7	whitetail deer
2/5/2013	2.7	whitetail deer
2/19/2013	2.7	whitetail deer
10/29/2010	2.8	whitetail deer
12/24/2012	2.8	whitetail deer
1/3/2011	2.8	whitetail deer
2/19/2013	2.8	whitetail deer
1/14/2011	2.9	whitetail deer
3/10/2011	2.9	whitetail deer
3/21/2011	2.9	whitetail deer
11/8/2011	2.9	whitetail deer
3/7/2012	2.9	whitetail deer
11/18/2014	2.9	whitetail deer
11/27/2012	3.0	whitetail deer
2/5/2013	3.0	whitetail deer
3/25/2013	3.0	whitetail deer
8/15/2013	3.0	whitetail deer
3/7/2014	3.0	whitetail deer
3/18/2015	3.0	whitetail deer

Carcass counts from the control area west of the reflector system are listed in Table 2.

Table 2- Carcass Counts from Control Area

Control Area RP 1.0 to 1.6 Carcass Counts		
<u>Date</u>	<u>RP/MP</u>	<u>Animal</u>
11/20/2013	1.0	whitetail deer
1/13/2014	1.0	whitetail deer
2/12/2014	1.0	whitetail deer
12/28/2010	1.1	whitetail deer
12/28/2010	1.1	whitetail deer
12/29/2010	1.1	whitetail deer
1/18/2012	1.1	whitetail deer
12/24/2012	1.1	whitetail deer
12/7/2010	1.2	whitetail deer
12/27/2010	1.2	whitetail deer
1/23/2012	1.2	whitetail deer
2/29/2012	1.2	whitetail deer
10/30/2012	1.2	whitetail deer
12/24/2012	1.2	whitetail deer
3/13/2014	1.2	whitetail deer
2/11/2013	1.3	whitetail deer
12/24/2014	1.3	whitetail deer
3/4/2015	1.3	whitetail deer
3/5/2015	1.3	whitetail deer
11/27/2010	1.4	whitetail deer
11/29/2010	1.4	mule deer
12/2/2010	1.4	whitetail deer
12/31/2010	1.4	whitetail deer
2/29/2012	1.4	whitetail deer
11/28/2012	1.4	whitetail deer
2/27/2013	1.4	whitetail deer
3/10/2014	1.4	whitetail deer
2/17/2014	1.5	whitetail deer
12/13/2013	1.6	whitetail deer
2/17/2014	1.6	whitetail deer

Tables 3 and 4 contain carcass information in both the project area and control area before the installation of the reflector system.

Table 3- Control Area Before Reflector Installation

Control Area RP 1.0 to 1.6 Carcass Counts 2005-2009		
<u>Date</u>	<u>RP/MP</u>	<u>Animal</u>
3/28/2006	1.0	whitetail deer
12/1/2006	1.0	whitetail deer
11/2/2007	1.0	whitetail deer
3/28/2005	1.1	whitetail deer
10/22/2008	1.2	whitetail deer
10/11/2006	1.3	whitetail deer
4/1/2007	1.3	whitetail deer
10/23/2008	1.3	whitetail deer
10/23/2008	1.3	whitetail deer
12/30/2008	1.3	whitetail deer
6/8/2009	1.3	whitetail deer
10/5/2009	1.3	whitetail deer
10/7/2009	1.3	whitetail deer
2/1/2008	1.4	whitetail deer
7/13/2005	1.5	whitetail deer

Table 4- Study Area Before Reflector Installation

Reflector System Area RP 1.7 to 3.1 Carcass Counts 2005-2009		
<u>Date</u>	<u>RP/MP</u>	<u>Animal</u>
5/11/2007	1.7	whitetail deer
12/22/2009	1.8	whitetail deer
2/23/2006	1.9	whitetail deer
11/10/2008	1.9	whitetail deer
2/5/2005	2	whitetail deer
1/10/2006	2	whitetail deer
12/1/2006	2	whitetail deer

12/27/2008	2	whitetail deer
7/18/2009	2	whitetail deer
<u>Date</u>	<u>RP/MP</u>	<u>Animal</u>
10/11/2005	2.1	whitetail deer
5/22/2006	2.1	whitetail deer
2/4/2007	2.1	whitetail deer
3/16/2005	2.2	whitetail deer
12/27/2005	2.2	whitetail deer
7/25/2005	2.3	whitetail deer
8/9/2005	2.3	whitetail deer
8/10/2005	2.3	whitetail deer
9/8/2005	2.3	whitetail deer
11/13/2007	2.3	whitetail deer
12/4/2006	2.4	whitetail deer
4/19/2006	2.5	whitetail deer
12/19/2006	2.5	whitetail deer
12/22/2007	2.5	whitetail deer
3/7/2008	2.5	whitetail deer
8/18/2008	2.5	whitetail deer
1/2/2009	2.5	whitetail deer
1/2/2009	2.5	whitetail deer
1/14/2009	2.5	whitetail deer
2/9/2009	2.5	whitetail deer
4/29/2005	2.6	whitetail deer
5/11/2007	2.7	whitetail deer
2/9/2006	2.8	whitetail deer
9/10/2008	2.8	whitetail deer
12/30/2008	2.8	whitetail deer
12/11/2009	2.8	whitetail deer
7/19/2005	3	whitetail deer
8/5/2005	3	whitetail deer
8/24/2005	3	whitetail deer
9/6/2005	3	whitetail deer
3/16/2006	3	whitetail deer
4/22/2006	3	whitetail deer
7/12/2006	3	whitetail deer
10/17/2006	3	whitetail deer
2/14/2007	3	whitetail deer

1/28/2008	3	whitetail deer
<u>Date</u>	<u>RP/MP</u>	<u>Animal</u>
7/30/2008	3	whitetail deer
9/15/2008	3	whitetail deer
11/5/2008	3	whitetail deer
11/5/2008	3	whitetail deer
11/9/2008	3	mule deer
1/12/2009	3	whitetail deer
11/2/2009	3	whitetail deer

Wildlife Vehicle Crash Information

2013

One wildlife and vehicle crash was reported at reference point 2.03. The crash happened at night in dark driving conditions on a dry road.

2014

Three wildlife and vehicle crashes were reported in the study area. The crashes were reported at reference posts 2.4-2.5. Two of the crashes happened in dark driving conditions and one happened during the day.

2015

Three wildlife and vehicle crashes were reported in the study area. They were at the following reference posts of 1.4, 1.9, and 2.7, all happened in dark or dawn driving conditions.

Conclusion

Deer appear to continue crossing and being hit in the area of reference point 2.9-3.0. Before installation of the reflector system, 17 carcasses were reported in the area. Since installation of the reflector system, 12 carcasses have been recorded and three deer carcasses were observed near the roadway during field visits in this area. With data inconsistencies, unknown deer population fluctuations, and habitat/environmental changes it is impossible to determine the effectiveness of this reflector warning system. It is known that the reflector system does add extra costs in materials, time and maintenance activities.

Disclaimer

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