

*Errata for the following publication:*

*Bozeman Pass Wildlife Channelization ITS Project, by Amanda R. Hardy, MSc., et al. Western Transportation Institute, College of Engineering, Montana State University, prepared for the Montana Department of Transportation. June 2006. Performing Organization Report No. 425539*

*The following change (bold font) applies to the Executive Summary, Wildlife Monitoring section, page xiii.*

- Road-kill data collection and analysis. From 2001-2005, researchers conducted more than 500 road kill surveys and documented more than **1000** AVCs. Most AVCs occurred in June, July, September, October and November during those years. Two regions with higher than average numbers of AVCs across the study area were identified; and

*The following text replaces section 4.2.2, page 60 through the first paragraph of page 65. Data summaries, figures and analyses were corrected. All changes to text appear in bold font. All figures and tables have been corrected.*

#### 4.2.2. Pre-Fencing Animal-Vehicle Collision Data Summary

A total of 526 road kill surveys covering 11,572 miles between mile markers 309 and 331 were conducted by CERI and their volunteers from January 2001 through December 2005. The dataset obtained via opportunistic observations by wildlife biologists on their daily commute between Bozeman and Livingston was not statistically different than data collected by CERI; therefore the two datasets were combined over 2001-2005 for analysis. MDT, MHP and FWP data were also included after eliminating duplicate observations from the dataset.

The 2001 through 2005 dataset of road kill observations in the study area included **1,047** reports involving 37 different species (Table 8). It should be noted, however, that the 2005 data were likely affected by the initiation of construction at the MRL overpass. While CERI monitored the entire Bozeman Pass in 2005, reconstruction of the MRL overpass began April 12, 2005 and the construction work zone rerouted traffic from 4 lanes (2 lanes in each direction separated by a median) to 2 lanes traveling in opposite directions on one side of the median from mile marker 313.5 to 314.4. This change in the configuration of traffic appeared to have an effect on the numbers of road kill observed and reported in this area (see below).

The total number of UVCs reported annually from 2001-2005 appears in Figure 42. Reported UVCs from 2001-2005 are presented by month in Figure 43. Figure 44 plots locations of UVCs to the nearest 1/10 mile using data from 2001 through 2005; however, due to the apparent influence of the construction zone traffic configuration, only data from 2001 to 2004 were used to determine establish the average used as a “benchmark” to define where “hotspots” of UVC occurred. A hotspot was defined as a 1/10 mile stretch where the number of kills was 2 standard deviations higher than the pass-wide average determined with the UVC data from 2001-2004. Using these criteria, **eight 1/10 mile stretches (representing 3.7% of the sample points) were defined as hotspots: 309.9, 310.1, 312.2, 312.8-312.9, 313.2, and 313.8-313.9. This last**

section will be contained by the planned wildlife fencing installed in the fall of 2006 (mileposts 313.5 to 314.4).

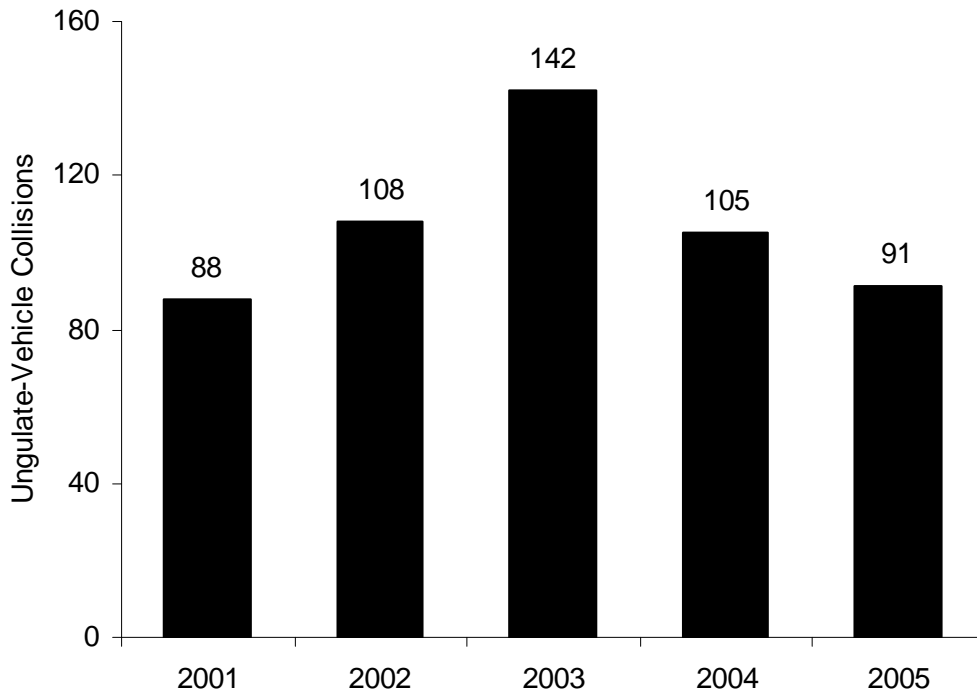
**Table 8. Number and species of AVCs reported from 2001-2005 on Interstate 90 across Bozeman Pass (mile marker 309-330.9), between Bozeman and Livingston, in southwestern Montana.**

<b>SPECIES</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>TOTALS</b>
<b>Badger</b>	-	-	-	4	2	<b>6</b>
<b>Beaver</b>	-	-	2	1	-	<b>3</b>
<b>Bird (Other)<sup>1</sup></b>	-	3	2	4	12	<b>21</b>
<b>Bird (Owl)<sup>2</sup></b>	-	5	3	8	9	<b>25</b>
<b>Bird (Raptor)</b>	2	4	1	1	1	<b>9</b>
<b>Black Bear</b>	1	5	8	3	3	<b>20</b>
<b>Bobcat</b>	-	-	-	1	1	<b>2</b>
<b>Cat (Domestic)</b>	-	-	4	3	4	<b>11</b>
<b>Coyote</b>	5	5	13	7	8	<b>38</b>
<b>Deer (Mule)</b>	28	36	33	32	20	<b>149</b>
<b>Deer (Unk)</b>	30	40	41	31	31	<b>173</b>
<b>Deer (Whitetail)</b>	25	30	44	40	32	<b>171</b>
<b>Dog (Domestic)</b>	-	-	-	3	-	<b>3</b>
<b>Elk</b>	5	2	20	2	7	<b>36</b>
<b>Fox</b>	3	4	2	2	-	<b>11</b>
<b>Marmot</b>	-	2	6	1	2	<b>11</b>
<b>Mink</b>	-	-	1	-	-	<b>1</b>
<b>Moose</b>	-	-	4	-	1	<b>5</b>
<b>Mountain Lion</b>	1	2	1	-	-	<b>4</b>
<b>Pine Marten</b>	-	1	-	-	-	<b>1</b>
<b>Porcupine</b>	2	2	7	11	2	<b>24</b>
<b>Raccoon</b>	14	14	37	18	14	<b>97</b>
<b>Skunk</b>	13	28	41	32	24	<b>138</b>
<b>Small Mammal<sup>3</sup></b>	3	5	10	15	17	<b>50</b>
<b>Snake</b>	-	-	-	1	-	<b>1</b>
<b>Unidentifiable</b>	2	4	5	19	7	<b>37</b>
<b>Wolf</b>	1	-	-	-	-	<b>1</b>
<b>TOTALS</b>	<b>134</b>	<b>192</b>	<b>285</b>	<b>239</b>	<b>197</b>	<b>1047</b>

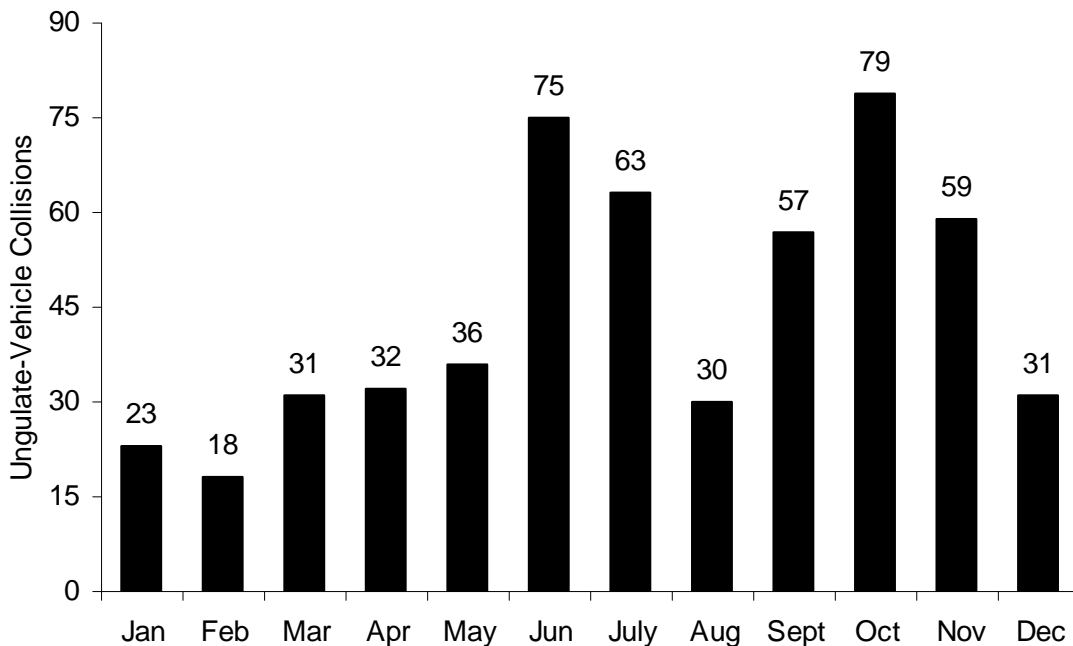
<sup>1.</sup> Includes pheasant, Hungarian partridge, grouse, turkey, duck, raven, magpie, tanager, and unknown bird species.

<sup>2.</sup> Includes great horned and unknown owl species.

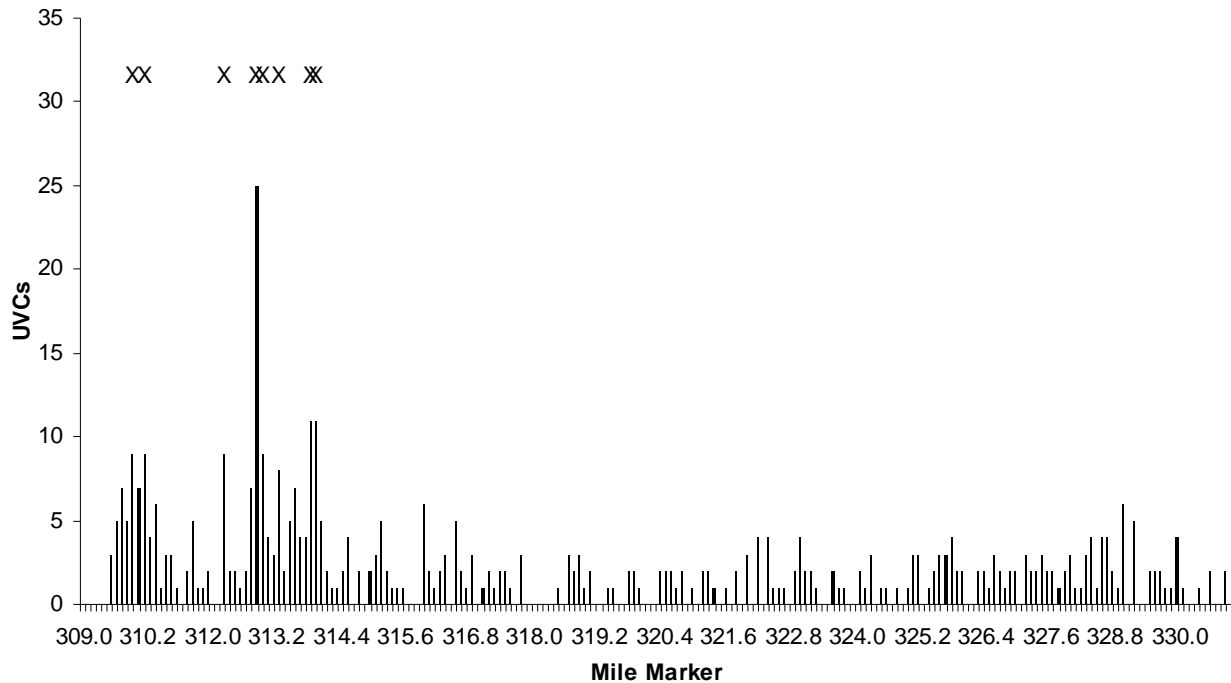
<sup>3.</sup> Includes rabbit, ground squirrels, and gopher.



**Figure 42. Annual number of ungulate-vehicle collisions observed on Interstate 90 across Bozeman Pass (mile marker 309-330.9), between Bozeman and Livingston, in southwestern Montana.**



**Figure 43. Total accumulated monthly observations of ungulate-vehicle collisions reported from 2001-2005 on Interstate 90 across Bozeman Pass (mile marker 309-330.9), between Bozeman and Livingston, in southwestern Montana.**

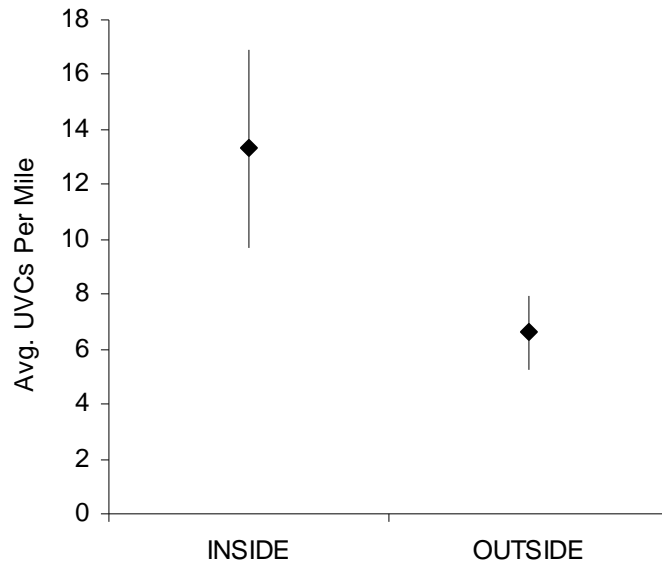


**Figure 44. Ungulate road kill locations by 1/10 mile increments recorded between 2001 and 2005. Note that the actual distance between mile marker 311 and 312 is only 0.4 miles; the x-axis reflects this anomaly. “X” indicates areas where the number of reported UVCs was at least 2 standard deviations above the average number of UVCs across the entire pass (this average excluded the 2005 data due to the influence of the construction zone on reported road kill rates on the west side of the pass).**

Researchers compared the UVC rates observed within the 0.9 mile (1.5 km) stretch of I-90 (mile markers 313.5 to 314.4) that will have wildlife fencing installed in the fall of 2006 to the UVC rates observed from areas that will not receive fencing between mile markers 309.0 and 319.0 (8.5 miles; 13.7 km). The analysis standardized the number of UVCs within the given area of interest by the length of that section to use UVCs per mile as the unit of interest, in order to compare rates in the fenced and unfenced areas after the construction of the fence (Table 9).

**Table 9. The yearly number of ungulate-vehicle collisions per mile in the area where the wildlife fence will be built (mile markers 313.5-314.4) and in the areas outside the planned wildlife fencing installation (mile markers 309-313.5 and 314.4 to 319).**

	Area to be Fenced	Area with no Planned Fencing
<b>2001</b>	15.6	4.9
<b>2002</b>	6.7	6.4
<b>2003</b>	16.7	8.9
<b>2004</b>	14.4	6.0
<b>2005</b>	3.3	5.5



**Figure 45. Mean number of ungulate-vehicle collisions per mile inside and outside the area to be fenced, assessed over 2001-2004. Bars represent 95% confidence intervals around the mean.**

From 2001-2004, the number of reported UVCs per mile inside the area to be fenced were significantly higher than the UVCs/mile outside the area to be fenced ( $P < 0.05$ ; Figure 45). The estimated average UVCs/mile inside the area to be fenced was 13.3 (1 SD = 4.5) and the estimated average yearly UVCs per mile outside the fence was 6.6 (1 SD = 1.7). Because the number of road-killed ungulates reported in 2005 was much lower in the area planned for fencing than in previous years (Table 9), presumably due to the reconfiguration of traffic patterns in the construction zone through this area, the power analyses excluded the year 2005 from power analyses of the pre-fencing UVC data.