Wildlife Vehicle Collision Study

HIGHWAY 3 SCIENCE WORKSHOP
FERNIE, B.C.
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Western Transportation Institute
Wildlife Vehicle Collision Reduction Study
Why this study?

US Congress directed the Secretary of Transportation to conduct a national wildlife vehicle collision (WVC) study.

Section 119 of the Safe Accountable Flexible Efficient Transportation Equity Action: A Legacy for Users (SAFETEA-LU)

*Florida panther crossing area: rumble strip and warning sign*
Goals of the Study

• Advance the understanding of the causes and impacts of wildlife vehicle collisions

• Review methods to reduce collisions between motor vehicles and wildlife

• Describe solutions to this growing safety problem

Sign and flashing lights, part of an animal detection warning system
Components of the Study

- Literature Review
- Annotated Bibliography
- Executive Summary
- PowerPoint Presentation
- Training Course

Bison wandering on roadway
Summary of Findings
“By the Numbers”

• An estimated **one to two million** WVCs with large animals occur annually in the US.
• More than **98%** of WVCs are single vehicle crashes.
• The vast majority (as high as **90%** in some states) of reported WVCs involve deer.
• **89%** of WVCs occur on two-lane roads.
• WVCs occur more frequently in the early morning (**5-9 a.m.**) and evening (**4 p.m. – midnight**), when animals are more active.
• An estimated **200** people die each year from WVCs.
Causes and Factors
Three Data Sources

- Carcass Counts (Road Kill)
- Insurance Industry Accident Claims
- National Crash Databases
  - Fatal Accident Reporting System (FARS)
  - Highway Safety Information System (HSIS)
  - General Estimates System (GES)
Total WVCs and Total Crashes by Year

(Data Source: GES)
Monthly Distribution of WVCs

(Data Source: FARS, HSIS, GES)

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Time-of-Day Distribution

(Data Source: FARS, GES, HSIS)
WVCs by Number of Lanes

(Data Source: GES).

(Data Source: GES).
Crashes by Average Daily Traffic

(Data Source: HSIS)
Accident Distribution by Posted Speed Limit

(Data Source: GES).

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Socio-economic and Wildlife Related Impacts
Age Distribution for All Crashes and WVCs

(Data Source: HSIS).

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# Estimated Costs of WVC
*(Deer, Elk, and Moose)*

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DEER</th>
<th>ELK</th>
<th>MOOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle repair costs per collision</td>
<td>$1,840</td>
<td>$3,000</td>
<td>$4,000</td>
</tr>
<tr>
<td>Human injuries per collision</td>
<td>$2,500</td>
<td>$5,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Human fatalities per collision</td>
<td>$1,500</td>
<td>$6,000</td>
<td>$12,000</td>
</tr>
<tr>
<td>Towing, accident attendance and investigation</td>
<td>$125</td>
<td>$375</td>
<td>$500</td>
</tr>
<tr>
<td>Monetary value animal per collision</td>
<td>$2,000</td>
<td>$3,000</td>
<td>$2,000</td>
</tr>
<tr>
<td>Carcass removal and disposal per collision</td>
<td>$50</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$8,015</strong></td>
<td><strong>$17,475</strong></td>
<td><strong>$28,600</strong></td>
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</tbody>
</table>

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*Drive as if their lives depend on it.*

Drivers for WildLife

Canada’s National Parks

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## WVC ECONOMICS

<table>
<thead>
<tr>
<th>Highway</th>
<th>State/Prov.</th>
<th>Length Miles</th>
<th>WVCs/Mile/Year</th>
<th>Cost/Mile/Year</th>
<th>Cost/Year</th>
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</thead>
<tbody>
<tr>
<td>State Route 260</td>
<td>AZ</td>
<td>17</td>
<td>1.00 deer</td>
<td>$81,259</td>
<td>$1,381,403</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>4.29 elk</td>
<td></td>
<td></td>
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<tr>
<td>I-90 Bozeman Pass</td>
<td>MT</td>
<td>21.9</td>
<td>5.44 deer</td>
<td>$51,118</td>
<td>$1,088,813</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>0.33 elk</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.09 moose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-80/90</td>
<td>IN</td>
<td>20</td>
<td>4.65 deer</td>
<td>$36,689</td>
<td>$733,770</td>
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<tr>
<td>AK Hwy 1</td>
<td>AK</td>
<td>21</td>
<td>0.9 moose</td>
<td>$25,290</td>
<td>$533,900</td>
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<tr>
<td>Highway 1</td>
<td>AB</td>
<td>17.5</td>
<td>0.97 deer</td>
<td>$19,670</td>
<td>$344,230</td>
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<tr>
<td>Phase 3b Segment</td>
<td></td>
<td></td>
<td>0.51 elk</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>0.11 moose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banff National Park</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I-90 Snoqualmie Pass</td>
<td>WA</td>
<td>15</td>
<td>1.13 deer</td>
<td>$15,782</td>
<td>$236,730</td>
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<td></td>
<td></td>
<td></td>
<td>0.4 elk</td>
<td></td>
<td></td>
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<tr>
<td>Route 169</td>
<td>QB</td>
<td>19.9</td>
<td>0.55 moose</td>
<td>$15,611</td>
<td>$309,100</td>
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<tr>
<td>Highway 93 South</td>
<td>BC</td>
<td>21.3</td>
<td>0.66 deer</td>
<td>$6,520</td>
<td>$138,560</td>
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<tr>
<td>Kootenay NP</td>
<td></td>
<td></td>
<td>0.05 moose</td>
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<td></td>
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Rob Ament, unpublished data
U.S. Threatened or Endangered Mammal Species

Direct road mortality is the major threat or among the major threats to survival probability….

- **Bighorn Sheep** (*Ovis canadensis*), peninsular California population
- **Key Deer** (*Odocoileus virginianus clavium*)
- **San Joaquin Kit Fox** (*Vulpes macrotis mutica*)
- **Canada Lynx** (*Lynx canadensis*), lower 48 states
- **Ocelot** (*Leopardus pardalis*)
- **Lower Keys Marsh Rabbitt** (*Sylvilagus palustris hefneri*)
- **Florida Panther** (*Felis concolor coryi*)
- **Red Wolf** (*Canis rufus*)

San Joaquin Kit Fox in California
Solutions or Best Practices to Reduce WVCs
WVC Mitigation Measures

• Three categories of mitigation measures
  – Measures that should be implemented, where appropriate
  – Promising mitigation measures, require further investigation
  – Measures that should not be used

Bighorn sheep using highway underpasses
Mitigation Measures That Should Be Implemented (Where Appropriate)

- Wildlife fencing
- Underpasses and overpasses with fencing
- Public information and education
Wildlife Fencing

- Common measure to separate wildlife from motorists
- Several types of material are used, page-wire or cyclone fence material most common
- Electric fencing also possible
- Maintenance is a major concern, damage and gaps are a recurrent problem
- Reported reductions in WVCs: 80-99%
Wildlife Underpasses and Overpasses with Fencing

- Used extensively by a wide array of species
- Associated fencing
  - Keeps animals off the road
  - Funnels animals towards the overpasses or underpasses
- 87% average reduction in WVCs

New highway underpass with fencing
Public Information and Education

- Parks Canada’s “Drivers for Wildlife” program
  - Located in Jasper National Park
  - Public Education
  - Bumper Stickers
  - Roadway Billboard
  - Digital Signs: Recording/Displaying Driver’s Speed

Roadside billboard along highway in Jasper National Park, Canada
Promising Mitigation Measures, Require Further Investigation

- Reduce traffic volume on road network
- Reduce speed by reducing the posted speed limit
- Reduce speed by traffic calming or reducing the design speed
- Wildlife crossing guards
- Large, non-standard wildlife warning signs
- Seasonal wildlife warning signs
- Animal detection systems
- In-vehicle warnings: roadside animal detection system communicating with on-board computers
- In-vehicle warnings: on-board animal detectors
- Increase visibility through roadway lighting
Promising Mitigation Measures, Require Further Investigation

- Increase visibility through vegetation removal
- Stop the use of road salt or consider alternate deicers
- Influence plant species in the roadside to limit nutritional value
- Reduce population size through wildlife culling
- Reduce population size through habitat alteration
- Boulders forming a barrier
- Long tunnels and long bridges
- Overpasses and underpasses by themselves
- Wider more reflective striping along white line
- Expanded median
Cost Effectiveness: Balance and Remaining Costs for Different Mitigation Measures

- Standard warning signs
- Seasonal warning signs
- Animal detection system (ADS)
- Vegetation removal
- Deer reflectors and mirrors
- Culling
- Relocation
- Fence (incl. Dig barrier)
- Fence, gap, warning signs
- Fence, gap, crosswalk
- Fence, gap, ADS
- Fence, underpasses
- Fence, overpasses
- Fence, under- and overpasses

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Identification of Ineffective Measures or Practices
Measures For Which Research or Construction Resources Should Not Be Used

- Standard wildlife warning signs
- Deer reflectors and mirrors
- Audio signals in the right-of-way or deer whistles on vehicles
- Olfactory repellants
- Deer flagging models
- Hazing
- Intercept feeding
- Wildlife relocation in order to reduce population size
- Anti-fertility treatment in order to reduce population size
- Seasonal road closures
- Reflective collars placed on wildlife
Acknowledgements

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Deer warning sign in Utah