

## POSTER PRESENTATION

### ACCEPTANCE OF LARGE MAMMAL UNDERPASSES BY WHITE-TAILED DEER AND MULE DEER

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#### ABSTRACT

The reconstruction of 90.6 km of U.S. Highway 93 from Evaro to Polson, Montana, USA, includes 41 wildlife crossing structures and 13.4 km of road with wildlife fencing. These measures are aimed at reducing wildlife–vehicle collisions and increasing human safety, while allowing wildlife to traverse the landscape. Most studies that evaluated the suitability of different types and dimensions of wildlife underpasses for large mammals simply measure absolute use of the underpasses. However, absolute use is not only dependent on the type and dimension of the structures; it is also dependent on the population size in the area and the willingness of the animals to approach the road. To eliminate these confounding variables we placed wildlife cameras outside ten wildlife underpasses with similar dimensions (about 7 m wide, about 4 m high, length varied between 18.3-31.9 m depending on road width) and recorded if groups of white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) that approached the wildlife underpasses used them to cross the road (acceptance) or not (rejection, including mixed response). We analyzed the response of deer groups rather than the response of individual deer as the behavior of an individual deer in a group is likely dependent on the behavior of other individuals in that same group. Over two years (2010-2011) we recorded 2,514 white-tailed deer groups and 236 mule deer groups approaching the ten structures. White-tailed deer were more accepting of the underpasses (85.6% (N=2,151)) than mule deer (68.2% (N=161)). While we present the acceptance percentage for one type of structure only, we argue that this type of parameter is more useful in the decision processes for the appropriate type and dimension of wildlife crossing structures for specific target species than absolute use by the target species because it is not confounded by population size or a species' willingness to approach the road. Given certain target species, the acceptance parameter can help make the case for a particular type and dimension of crossing structure. Similarly, if budget, topography or other landscape limitations, do not allow for the recommended structure, the acceptance parameter can help adjust the ambition level for the project. We recognize though that there are many road, traffic and landscape characteristics of a site that may also influence the acceptance by a target species, and that one should be somewhat flexible with a minimum acceptance percentages. In addition, the acceptance of a structure by a target species should not be the only parameter considered when deciding on wildlife mitigation measures for a road section or an area. For example, perhaps the ultimate wildlife conservation parameters to consider are whether the mitigation measures result in viable wildlife populations in an area or if certain ecological processes such as

seasonal migration can continue to occur at the desired scale. In this context the number and location of safe crossing opportunities are critical as well.

### **BIOGRAPHICAL SKETCHES**

**Jeremiah Purdum** has just completed his M.S. (2013) in Environmental Studies at the University of Montana thanks to funding through the Western Transportation Institute at Montana State University. He studied acceptance rates for wildlife crossing structure on US 93 in western Montana.

**Marcel Huijser** received his M.S. in population ecology (1992) and his Ph.D. in road ecology (2000) at Wageningen University in Wageningen, The Netherlands. He studied plant-herbivore interactions in wetlands for the Dutch Ministry of Transport, Public Works and Water Management (1992-1995), hedgehog traffic victims and mitigation strategies in an anthropogenic landscape for the Dutch Society for the Study and Conservation of Mammals (1995-1999), and multifunctional land use issues on agricultural lands for the Research Institute for Animal Husbandry at Wageningen University and Research Centre (1999-2002). For more than a decade now Marcel has worked on wildlife-transportation issues at the Western Transportation Institute at Montana State University (2002-present).



## Acceptance of Large Mammal Underpasses by White-tailed Deer and Mule Deer

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### Introduction

The use of wildlife crossing structures is often investigated through counting the number of animals that pass by or through the structures. Higher use of a structure suggests that it is better suited for the species concerned. However, use is influenced by potential variations in population density of the target species and differences in habitat that may affect if and how animals approach a structure. We suggest basing species specific recommendations for structure type and dimensions on the acceptance of the structure by the target species rather than on its use. Here we report on the acceptance of a particular culvert type with particular dimensions and its acceptance by white-tailed deer and mule deer.



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### Methods

We placed infrared wildlife cameras at the entrance of nine corrugated metal arched culverts (widths (road length): 7.4-7.7 m; height: 5.1 m; lengths (road width): 24-33 m) located along U.S. Highway 93 on the Flathead Indian Reservation, Montana. The cameras (Reconyx™) were angled such that we could observe the behavior of approaching animals. We analyzed the images taken between 1 February 2010 and 31 December 2012 and calculated system acceptance for the two deer species based on the recorded number of successful and abandoned crossing attempts. Groups of animals that approached a structure at the same time were treated as one measurement as the behavior of individuals in a group is unlikely to be independent.

We monitored a subset of the 41 wildlife crossing structures along U.S. Highway 93 on the Flathead Indian Reservation in Montana.



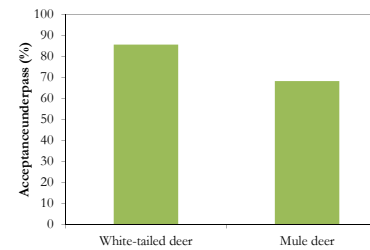
Example of a successful crossing attempt



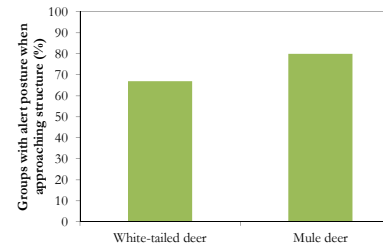
Example of an abandoned crossing attempt

### Results

White-tailed deer had a higher acceptance of the underpasses (85.6%, n=2151) than mule deer (68.2%, n=161).



For both species combined, 58% (n=853) of the groups that successfully passed through the structures showed an alert posture vs. 91% (n=402) for the groups that aborted the attempts. The two deer species showed slightly different levels of alertness with an alert posture for 67% of the white-tailed deer events and 80% of the mule deer events for all crossing attempts combined.



### Discussion

White-tailed deer were more accepting of the underpasses than mule deer. This was consistent with their behavior when approaching the underpasses; mule deer were more alert than white-tailed deer suggesting that mule deer were more likely to turn around and abandon their crossing attempt.



### Recommendations

While we present the acceptance percentage for two species and one crossing structure type only, we argue that this type of parameter is more useful and more consistent when deciding on the appropriate type and dimension of wildlife crossing structures for specific target species than absolute use. Acceptance of a structure is not confounded by population size or a species' willingness to approach the road. Given certain target species, the acceptance parameter can help make the case for a particular type and dimension of crossing structure. Similarly, if budget, topography or factors do not allow for the recommended structure, the acceptance parameter can help adjust the ambition level for the project.

### Acknowledgements

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