

HUMAN INTERACTIONS

ROAD MORTALITY SURVEY IN SOUTHWESTERN SASKATCHEWAN

ASHLEY N. FORTNEY, Department of Biology, University of Regina, Regina, SK, S4S 0A2; E-mail: <fortneya@uregina.ca>

Roads can cause major changes to ecosystems with negative consequences for wildlife and biodiversity,^{1,4,12} and have been implicated as factors in the decline of animal populations in many areas.^{3,9,11} Roads cause habitat loss and fragmentation, present barriers to animal dispersal, and can affect population dynamics and genetics by causing spatial isolation of breeding groups.^{2,6,10} Roads affect the ecology of approximately 20% of the United States; this number is likely less in Canada, but is on the rise.⁸

In addition to landscape effects, roads cause direct mortality of individuals via vehicle-animal collisions. It is estimated that 1 million vertebrates are killed every day on roads in the United States, and at some point during the last three decades of the 20th century, vehicles on roads most likely surpassed hunting as the primary cause of direct vertebrate mortality by humans on land.⁷ My objective for this study was to document road mortalities of wildlife in the area within and immediately surrounding Grasslands National Park in southwestern Saskatchewan (Fig. 1). This survey was part of a larger project focused on road mortality of snakes, which are not considered here.

Methods

Systematic surveys were conducted on the road system surrounding Val Marie, Saskatchewan (49° 14' N, 107° 43' W; Fig. 1). Specific study sites included the west block of Grasslands National

Park (GNP), which is a protected area of native mixed-grass prairie, and the Val Marie Prairie Farm Rehabilitation Administration (PFRA) pasture, which is also federally managed. The major landscape feature of the study site is the Frenchman River Valley. Paved roads run adjacent to these areas connecting them to each other and the town of Val Marie. Both regions are bounded by ranches and other agricultural areas, as well as gravel and paved roads, which are mainly used

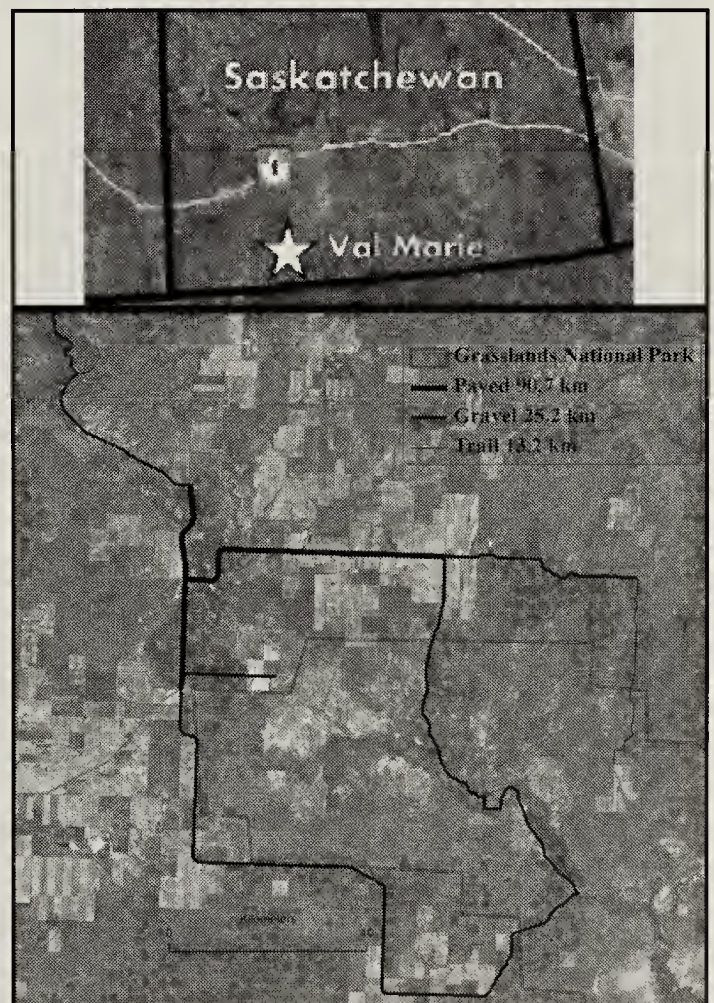


Figure 1. Study site: Val Marie, SK (top), and surrounding area (bottom). Road types and respective kilometres driven during road surveys are indicated.

by local landowners, park employees, and tourists. Not many roads pass directly through GNP or PFRA land, and those that do are either gravel roads or trails. Traffic volumes on these roads tend to be low, but road mortality of animals is still observed.

Surveys were carried out from 6 May to 21 August 2009. Roads were chosen to cover a wide range of contexts, such as varying distances from the Frenchman River Valley, as well as to encompass a large area of GNP and PFRA land. An assortment of road types and adjacent habitats were also considered. All roads chosen were driven once every 2 days. Total kilometres traveled during each survey were: 25.2 km (19.2%) paved roads, 90.7 km (68.9%) gravel roads,

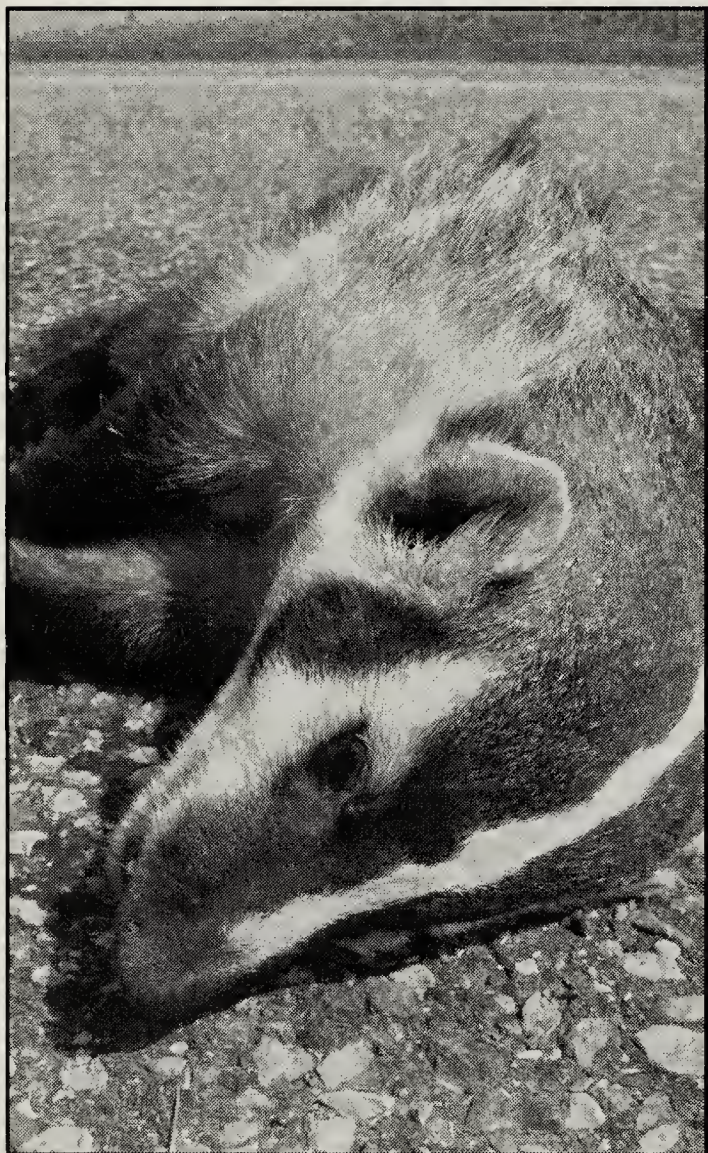


Figure 2. Road-killed juvenile American Badger that was hit by a vehicle on Highway #4 near Val Marie, SK.

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and 15.7 km (11.9%) of trails (Fig. 1). Appropriate driving speed was determined based on the ability to visually detect an animal on the road, and differed based on the road type and distance of visibility.

When a dead animal was encountered, global positioning system (GPS) coordinates were recorded, and the animal was removed from the road so that it would not be counted again on subsequent surveys. Select animals were deposited in the collection of the Royal Saskatchewan Museum.

Results and Discussion

I identified 25 species of road-killed animals during surveys: 1 amphibian, 8 mammals, and 16 birds (Table 1). Five bird specimens were unidentifiable due to their body condition but were most likely Vesper, Savannah, or Baird's Sparrows. Of 372 individual animals found, 0.3% were amphibians, 14.2% were birds, and 85.5% were mammals. The most abundant species found were Richardson's Ground Squirrels, which comprised 82.0% (305) of all individuals found. Figure 2 shows a road-killed American badger found on Highway #4, a few kilometres south of Val Marie.

The only road-killed amphibian I found during surveys (a Northern Leopard Frog) is listed by the Committee on the Status of Endangered Wildlife in Canada as a species of special concern.⁵ Fragmentation, along with increased isolation of populations, has led to the decline and reduced recovery of prairie populations of the Northern Leopard Frog.⁵ I also found dead individuals of three threatened bird species, comprising 15.1% of all road-killed birds: Chestnut-collared Longspur, Common Nighthawk, and Loggerhead Shrike.⁵ Habitat fragmentation due to road construction has been indicated as a factor contributing to the threatened

Table 1. Number of individuals of each species found dead on roads in and around Grasslands National Park and the Val Marie PFRA pasture in southwest Saskatchewan during the summer of 2009.

Amphibians	Birds	Mammals
Northern Leopard Frog 1	Baird's Sparrow 2	American Badger 1
	Brewer's Blackbird 1	Coyote 2
	Chestnut-collared Longspur 4	Deer Mouse 1
	Common Nighthawk 3	House Cat 1
	Eastern Kingbird 3	Richardson's Ground Squirrel 305
	Horned Lark 12	Striped Skunk 1
	Killdeer 2	White-tailed Deer 2
	Loggerhead Shrike 1	White-tailed Jack Rabbit 5
	Meadowlark 7	
	Mourning Dove 4	
	Ring-necked Pheasant 1	
	Sandpiper 1	
	Sharp-tailed Grouse 1	
	Sparrow Species 5	
	Swainson's Hawk 3	
	Tree Swallow 2	
	Vesper Sparrow 1	
1	53	318

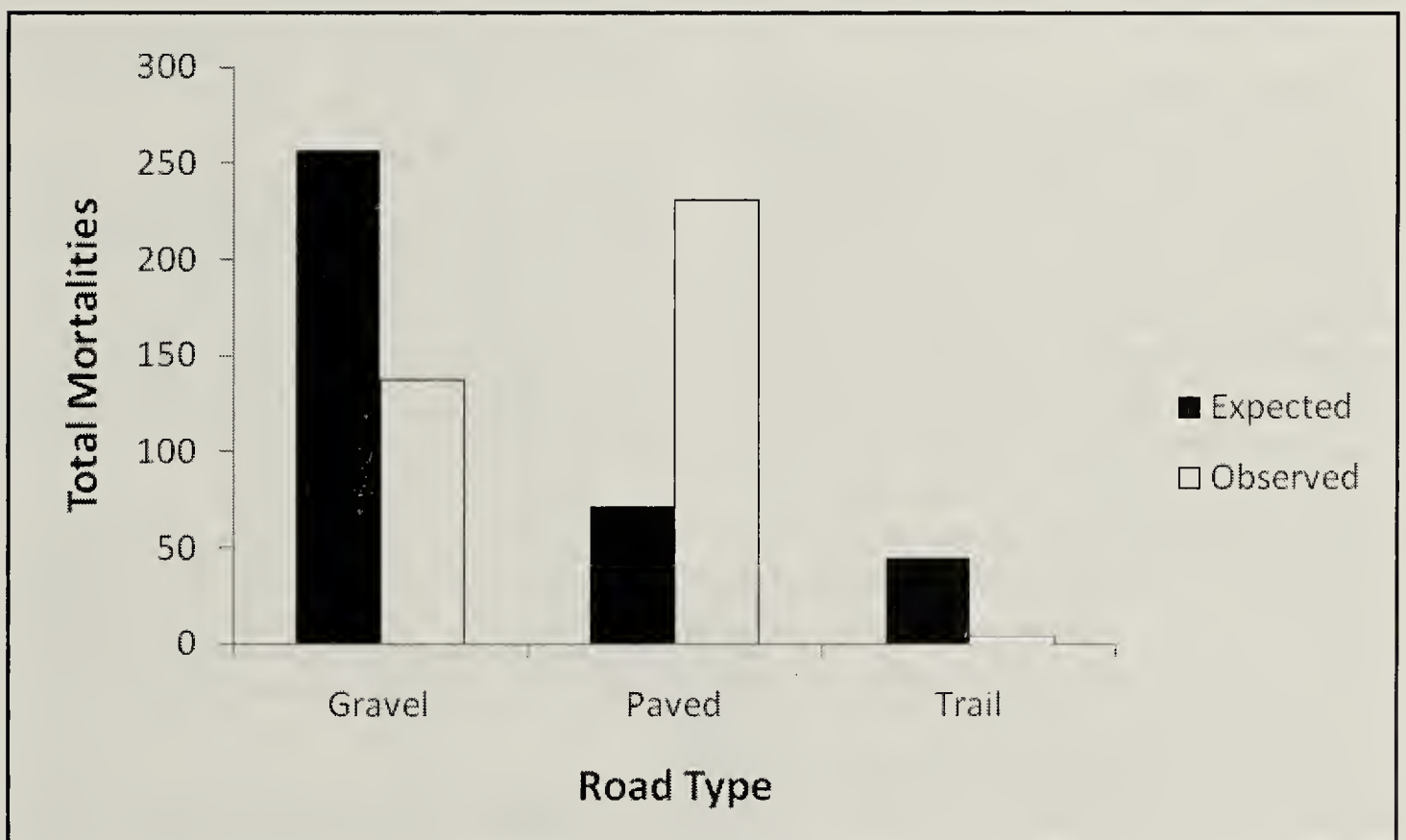


Figure 3. Expected and observed road mortalities for each road type surveyed (gravel, paved, and trail). Expected values are based on kilometres driven on each road type. Road mortalities were observed significantly more on paved roads than on gravel roads or trails (chi-squared test, $\chi^2 = 450.470$, $df = 2$, $p < 0.0001$).

status of the Chestnut-collared Longspur.⁵ In my study area, the significance of road mortality from a conservation perspective is unknown but deserves more attention to assess the degree of its affect on local wildlife.

I found a significantly higher number of road mortalities on paved roads (Highways #4 and #18) than on gravel roads or trails (chi-squared test, $\chi^2 = 450.470$, $df = 2$, $p < 0.0001$; Fig. 3). Paved roads are hotspots for road mortality most likely due to increased traffic density and vehicle speed. Road mortality should be considered when construction of new roads is taking place, especially in areas with species of conservation concern. For ground-dwelling animals, diversion fencing, culverts, and underpasses are effective mitigation strategies. For all species, lower vehicle speed is important in reducing the risk of animals to road mortality. Driver awareness could be extremely beneficial to reduce road mortality in high risk areas.

Documentation of road mortality is important to increase knowledge of when and where road mortality occurs and what species are at risk. Results from road surveys are essential in management strategies aimed at mitigation of road mortality of animals. Learning about how different species are affected by roads, from the behaviour of individuals to the effect they have at the population and community levels, and incorporating this knowledge in planning, will considerably decrease the negative environmental effects that are caused by roads. GNP is a relatively new protected area, and we are just beginning to learn about the importance of road mortality for the animals protected by the park.

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