Wildlife Monitoring: Wildlife Vehicle Collisions

Elk crossing Highway 89/191 in Grand Teton National Park.

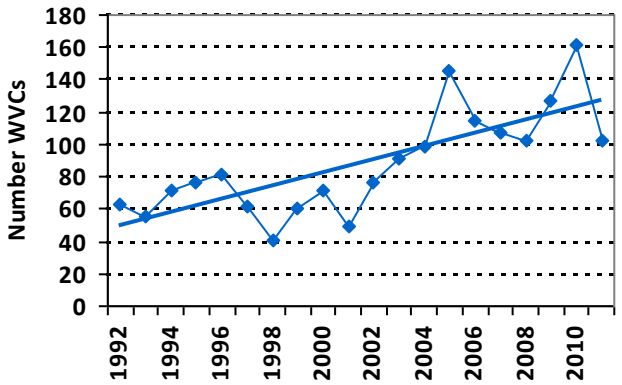

Figure 1. Reported wildlife vehicle collisions and roadkill incidents in Grand Teton National Park, 1991-2011.

BACKGROUND

Wildlife are increasingly common casualties of motor vehicle collisions on Grand Teton National Park (GRTE) roads. These collisions result in property damage, personal injury for humans, and loss of wildlife. The associated wildlife mortality, when combined with other mortality sources, has the potential to negatively affect some wildlife populations. GRTE has an active program designed to identify appropriate mitigation measures for lowering the number of wildlife vehicle collisions (WVCs), which includes collecting WVC data each year. These data, collected in the park since 1991, are used to assess trends and patterns in WVCs, and to inform management actions and strategies aimed at making park roads safer for humans and wildlife.

APPROACH

Reports of roadkills and WVCs collected from park ranger vehicle accident case incident reports and from observations reported by park employees and visitors are compiled into an accident database by park biologists and Teton Interagency Dispatch personnel. Information collected includes date of accident, species, sex and age class, and accident location.

RESULTS

Trends

Over the past 20 years the number of WVCs has increased significantly, with the number of incidents documented in 2011 more than 158% higher than in 1991 (Fig. 1). The long-term increase in WVCs may reflect, in part, greater effort in recent years to document all WVCs. Although, large mammal (15 or more kg) mortality, which is least affected by changes in reporting effort, has increased 205% during the past 2 decades. The number of WVCs documented in 2011 decreased roughly 34% compared to 2010.

Of the total incidents recorded in 2011, 82% resulted in a confirmed animal mortality. In 18% of the incidents a carcass could not be located within a short distance from the road. Some animals in the latter category may have died from injuries sustained in the collision.

Species Composition

We documented 18 mammal and 6 bird species among

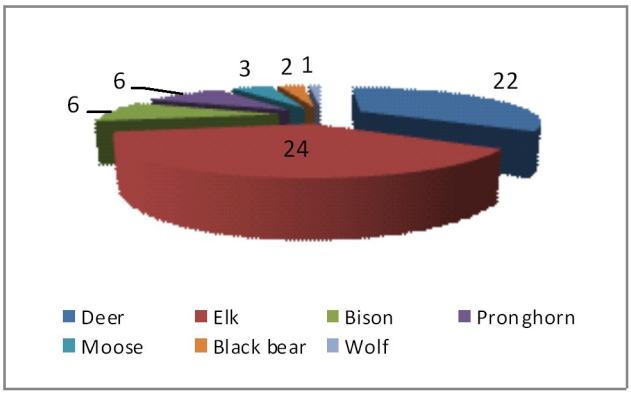

Figure 2. Number of individual large mammals by species involved in wildlife-vehicle collisions in Grand Teton National Park, 2011

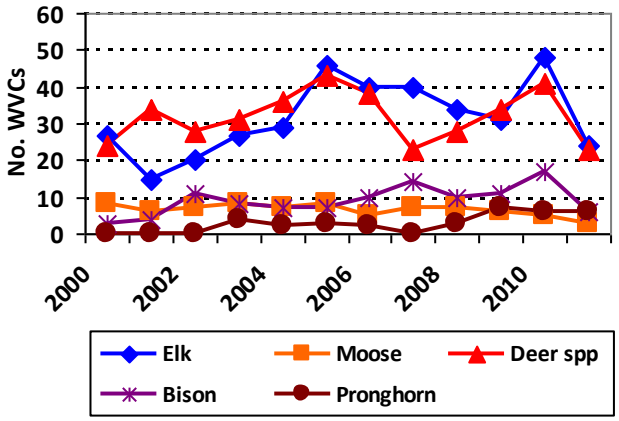

Figure 3. Number of ungulate wildlife vehicle collisions by species in Grand Teton National Park, 2000-2011.

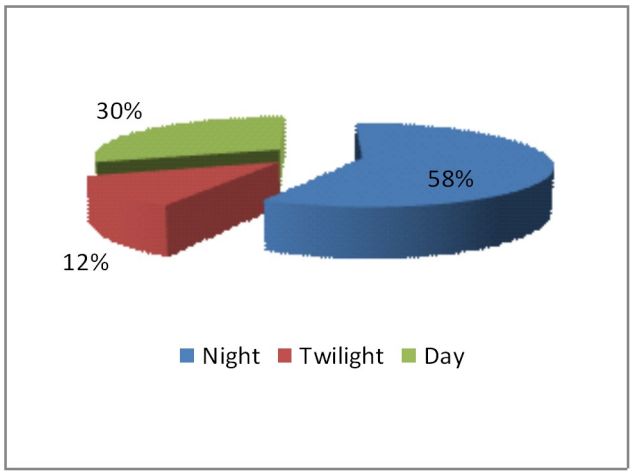

Figure 5. Ungulate wildlife vehicle collisions by time of day in Grand Teton National Park, 2011.

WVCs in 2011. Large mammals were involved in 64 of 101 WVCs (Fig 2). Overall, ungulates compromised roughly 59% of all WVCs with elk making up 24% of the total, deer (mule deer, white-tailed deer and unknown spp. deer) 21%, bison 6%, pronghorn 6%, and moose 3%. Other mammals each represented less than 5% of the total. WVCs involving all ungulates, except pronghorn decreased in 2011 compared to 2010 (Fig. 3).

Birds and small mammals together comprised one third of all WVCs recorded in 2011. Individually, birds represented 10% of individuals involved in WVCs and small mammals 28%. The higher numbers compared to previous years are likely due to increased effort by park wildlife staff in verifying each WVC report. Notwithstanding these efforts, birds and small mammals are still likely underrepresented in our sample because they are smaller in size, cause less property damage, and are less conspicuous.

Temporal Patterns

When the time a WVC occurred was known we assigned each incident to a time of day category. The temporal pattern for WVCs involving ungulates was similar to that observed in 2010, with fifty-eight percent of WVCs occurring at night, 30% during the day, and 12% at twilight (Fig. 5). The majority (70%) of WVCs involving bison, moose, and elk also occurred at night, while those involving deer and pronghorn occurred during the day.

There was a distinct mid-summer peak in WVCs that coincided with a peak in visitation (Fig. 6), suggesting the number of WVCs is a function of traffic density. The majority of collisions (n = 91) occurred during the snow free months (May–October). Patterns of WVCs varied by species. Collisions with elk peaked in June while pronghorn peaked in July, and those involving deer peaked in August.

Spatial Patterns

We documented the highest number of WVCs on Highway 89/191, followed by the North Park road (20), Teton Park road (12), and Kelly-Antelope Flats loop (6; Fig. 7). The number of WVCs on highway 89/191 and the North Park road decreased by 44% and 14% respectively compared to 2010, however, numbers on the Teton Park road and Kelley– Antelope Flats Loop remained the same.

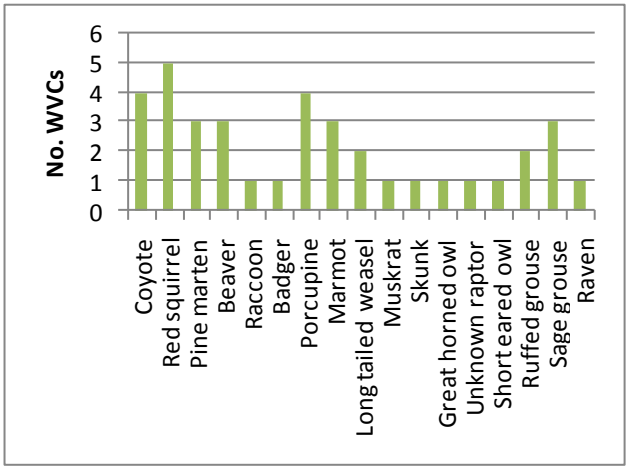

Figure 4. Number of small mammal and bird wildlife-vehicle collisions by species in Grand Teton National Park, 2011.

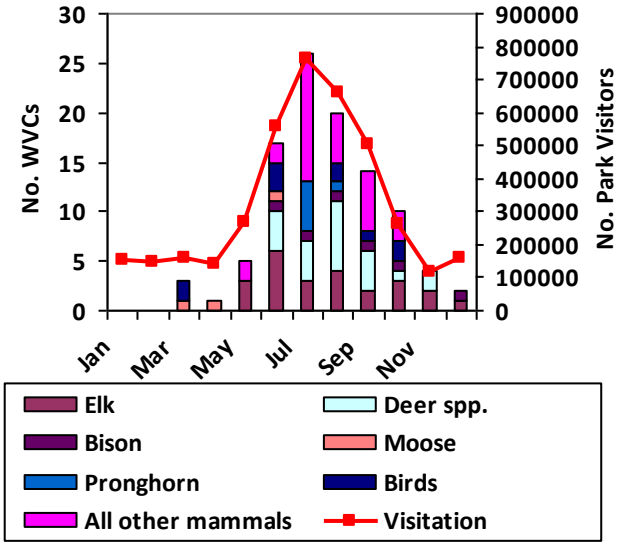

Figure 6. Wildlife-vehicle collisions and visitation by month in Grand Teton National Park, 2011.

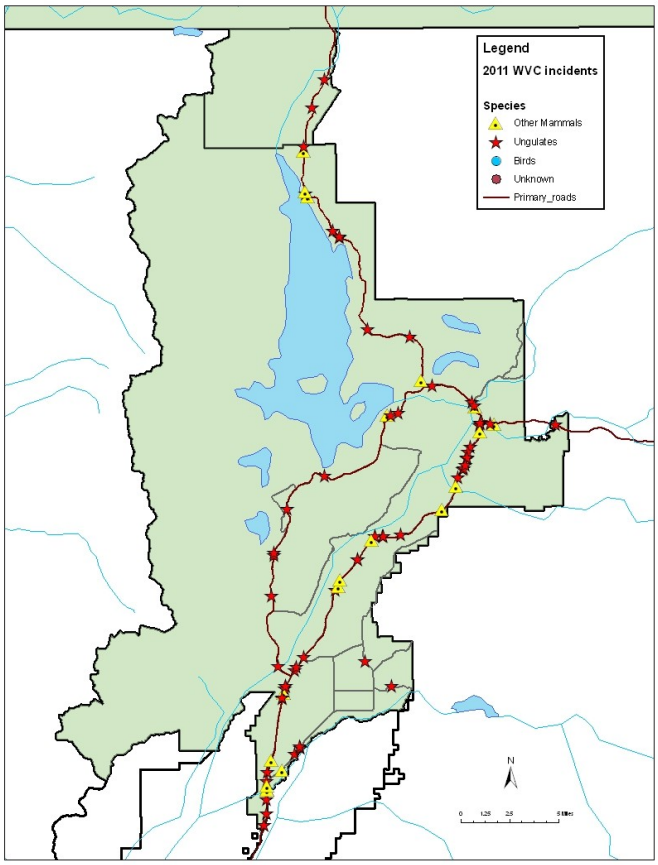

Figure 7. Wildlife- vehicle collision locations in Grand Teton National Park, 2011.

On Highway 89/191, most WVCs and roadkills occurred on the segment between Spread Creek and Moran. Compared to 2010, the number of WVCs and roadkills decreased on all road segments of highway 89/191 except between the south park boundary and Gros Ventre Junction where numbers were higher and between Spread Creek and Moran Junction where numbers were similar to those documented in 2010. The majority of WVCs with bison, moose, and elk occurred on Highway 89/191. While about half of deer collisions occurred on Highway 89/191, 19% occurred on the North Park Road (between Moran and Yellowstone National Park) and 24% on the Teton Park Road. Pronghorn WVCs occurred on the Teton Park Road (50%), highway 89/191 (33%), and the Kelly-Antelope Flats loop (17%).

Occurrence by Residency Status

When possible, we collected information on the type of vehicle involved in WVCs, the residency status of the driver, and whether they were driving a personal vehicle or a rental car. This more detailed information was available for 32% of all WVCs or roadkills. Based on that sample, the majority of WVCs (75%) involved passenger cars, followed by pickup trucks at 19%, and minivans and semi trucks each at 3%. Where residency status of drivers was known, roughly a quarter were from the local area, 63% were out-of-state drivers, and 6% were international drivers. Most collisions (72%) involved personally owned vehicles. Most (88%) WVCs that involved local drivers occurred at night. All collisions involving local drivers and large animals occurred at night. Those involving out of state drivers were also highest at night (53%), but out of state and international drivers were involved in more daytime accidents compared to local drivers. Given the large number of visitors to the park each year, this suggests proportionally more local drivers are involved in WVCs. This type of information may assist park managers in mitigation measures aimed at the local community.

Traffic Volume and Speed

From late June through September we monitored traffic volume and vehicle speed at 6 locations along highway 89/191 and at 3 locations along the North Park Road. Part of the impetus for this effort was to assess driver compliance with the reduced speed limit between the south park boundary and Moose. The speed limit along this portion of the highway 89/191 was lowered from 55 to 45 mph because of pathway construction adjacent to the road corridor. Another aim of this effort was to collect baseline data to assess whether driver behaviors change following implementation of speed mitigations. Results indicate that 80-94% of drivers were exceeding the posted 45 mph speed limit between the south park boundary and Moose Junction. Speed limit compliance was better on highway 89/191between Moose Junction and Moran Junction, where the speed limit remained at 55 mph, and on the North Park road, but the majority of drivers (64%) were still exceeding the posted speed limit. The 85th percentile speed is a measure of the speed at or below which 85% of vehicles are traveling at a particular location. This is the speed at which most drivers feel comfortable traveling given the conditions. An assessment of this metric along the sampled roadways highlights two troublespots where 85% of drivers are exceeding the speed limit by more than 10 mph

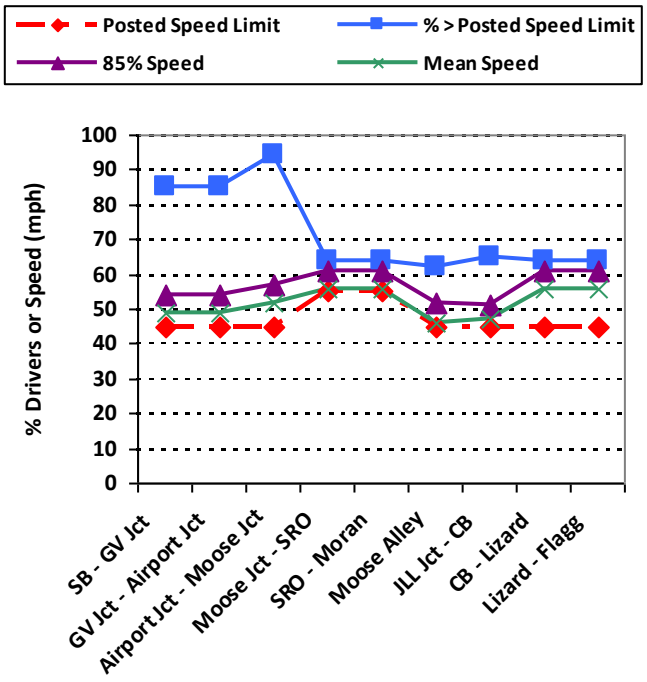

Figure 8. Vehicle speeds in relation to the posted speed limit for select road segments in GRTE, late June-September, 2011.

under free flow conditions; Moose to Airport Junction on highway 89/191 and Colter Bay to Flagg Ranch on the North Park road.

DISCUSSION

In 2011, the park implemented several mitigation measures to address the increasing trend in WVCs. Road surface markings on highway 89/191 were repainted using wider lines to delineate narrower travel lanes, visually narrowing the perceived travel way while maintaining adequate travel lane width for safe vehicle operation. In addition, a permanent reduction in the nighttime speed limit on highway 89/191/26 between the parks south boundary and east boundary to 45 mph was put in place in mid-November. Previous monitoring in the park had revealed that the majority of collisions with large animals occur at night when these animals are active and visibility for motorists is significantly reduced. The speed limit change was made to improve motorists' ability to react to wildlife on and adjacent to the roadway. Two permanent digital speed readers were installed in a zone south of Gros Ventre junction where the speed limit is 45 mph to remind drivers of their speed as they traverse an important wildlife movement corridor. We continued to use variable message signs at strategic locations and times to inform drivers of current wildlife activity near roadways and encourage alertness and reduced speeds.

Although WVCs decreased in 2011, after several years of increase it is too soon to say whether the decline represents a temporary dip in numbers, a leveling off, or the beginning of a downward trend. To continue to address the issue of WVCs on park roads managers can consider the following actions:

- Evaluate compliance with and effectiveness of the nighttime speed limit on Highway 89/191/26 from the south boundary to the east boundary;
- Evaluate effectiveness of traffic calming measures;
- Continue dedicated speed enforcement efforts, especially at night and in early morning hours. This is particularly important as reducing the speed limit alone may not reduce the number of WVCs when the road was designed and built for faster speeds (Beckmann et al. 2010);
- Apply visual friction when striping park roads;
- Make greater use of portable digital speed reader signs and explore ability of these signs to record actual vehicle speeds;
- Continue using variable message signs, move signs regularly, and update message with timely information;
- Continue public education and information campaign to improve awareness; and
- Design, re-design, and build roads that minimize the impacts to wildlife.

LITERATURE CITED

Beckman, J. P., A. P. Clevenger, M. P. Huijser, and J. A. Hilty. 2010. *Safe Passages.* Island Press, Washington, D.C.

ACKNOWLEDGMENTS

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CONTACT

Sarah Dewey, wildlife biologist, Grand Teton National Park, (307) 739-3488, sarah_dewey@nps.gov.

Kate Wilmot, bear management specialist, Grand Teton National Park, (307) 739-3673, katharine_wilmot@nps.gov.