Grizzly Bear Predation of a Neonate Elk Calf

David Paul Stiles II

ABSTRACT

During the morning of 08 May 2007, I observed the predation of a neonate elk calf (*Cervus elaphus*) by a female grizzly bear (*Ursus arctos horribilis*), which involved a twenty-three second chase covering an approximate distance of 200 meters through open terrain, brush and class-one and class-two deadfall timber. During the chase, the route of the elk calf from its hiding place to the kill site was chaotic, due to interference from natural barriers. The predation event took place in the area known as Pleasant Valley, inside the boundaries of Yellowstone National Park.

KEY WORDS

Grizzly, *Ursus arctos horribilis*, Carnivore, Elk, *Cervus elaphus* , Ungulate, Predation

INTRODUCTION

Studies have shown that summer predation by grizzly bears, wolves (*Canis lupus*), cougars (*Felis concolor*), coyotes (*Canis latrans)*, black bears (*Ursus americana*), and golden eagles (*Aquila chrysaetos*) takes an average of 32% of the Northern Range elk calves each year (Yellowstone National Park. 2006). However, there are few, if any, published reports that document and detail direct observations of the predation behavior of grizzly bears in relation to elk calves. It has been estimated that the diet of juvenile grizzly bears of both sexes and adult female grizzly bears in Yellowstone National Park (YNP) consists of 40% meat and 60% vegetation (Robbins, *et. al.* 2006). From late March through early May, when the bears come out of hibernation, until mid May, ungulates, primarily elk and bison, may comprise a substantial

portion of the grizzly bear's diet (Gunther & Renkin, 1990); this includes both winter-killed carrion and predation of neonate ungulates.

In this paper I take advantage of observations of a single predation event to speculate on the effects of forest structural complexity on elk predation by grizzly bears. My observations demonstrate that although forest structural complexity may be hypothesized to slow predation, in fact significant predation events can occur even in the presence of high structural complexity.

METHODS

On 08 May 2007, at 08:49:07 hours, I observed a predation event involving a neonate elk calf and a grizzly sow, which lasted 23 seconds, once the elk calf was detected. The incident occurred within the confines of YNP, between the Grand Loop Road and the Garnet Hill Loop Trail, approximately 1,500 meters north-northwest of the Tower Junction Ranger Station and 1,200 meters west-northwest of the confluence of the Yellowstone and Lamar Rivers, in an area known as Pleasant Valley (Fig. 1). The terrain consisted primarily of a sagebrush-grassland community, with isolated and scattered stands of trees containing pockets of class-one and class-two deadfall timber.

In order to avoid intruding into the area of a fresh kill on the day of its occurrence, I returned to the area the following day (09 May 2007) in order to obtain measurements. The ground at each point the bear had turned while chasing the elk calf was torn up, providing direct evidence and reference points for the delayed documentation of distances covered; measurements of distances during the chase were made using these reference points.

The deadfall timber was classified based on its overall appearance and decomposition rate using Table 1 (*e.g.* Maser and Trappe, 1984). The diameter of a class-one deadfall damaged during the chase was also measured.

PREDATION EVENT

On the morning of the predation event there was no detectable wind, the temperature was 5°C, and there was no cloud cover. I first observed the grizzly sow at approximately 08:30 Mountain Daylight Time (MDT), moving south across a grassy bench (Fig. 2) while grazing, and accompanied by two small cubs. Positive species identification was made using distinguishing features of grizzlies, which include a concave, dished-in face profile; a distinct shoulder hump; and short, rounded ears. The area the three grizzly bears were located in has previously been documented as a high predation area of elk by carnivores, with this research occurring between November 1974 and June 1975 (Houston, 1978). During the time of Houston's study, the main predator species in YNP consisted of grizzly bears, black bears, cougars, and coyotes; wolves had been extirpated in 1926.

The grizzly sow and two cubs continued south-southeast, towards an area of sagebrush and deadfall timber, near which was a small herd of female (cow) elk. As the bears approached closer to the herd, all of the cow elk, except for one, began moving southeast in order to maintain their distance from the bears. The single remaining elk kept staring toward a small area of deadfall timber that was partially obscured from my view. Repositioning to another vantage point, I was able to observe a small elk calf lying near a class-three deadfall and partially hidden by surrounding sagebrush. I was located approximately 300 meters southwest of where the elk calf was bedded down. For several minutes the cow elk kept looking toward the bears, then toward the calf and back to the approaching bears. The grizzly sow and cubs continued to approach the area concealing the elk calf, and at this point the single cow elk started moving toward the bears. After closing the distance to less than 5 meters from the grizzly sow, the cow elk swerved to the east and started running back towards the herd, located to her southeast. The grizzly sow and

both cubs watched the elk, but made no movement towards her. Unfortunately, the diversion behavior of the cow elk had a detrimental effect, as the semi-concealed elk calf shifted its body before lifting its head to watch the cow elks approach, causing movement in the sagebrush immediately surrounding it.

The young elk calf bolted At 08:49:07 MDT when the grizzly sow grazed within 4 meters of it, running southwest from its initial position of concealment. The grizzly sow then initiated pursuit of the elk calf. The elk calf continued for 17 meters along the southern side of a class-one deadfall and then at the tip of the fallen tree it swerved right towards the northwest, traveling for another 74 meters before encountering a class-two deadfall. The bear stayed behind the elk calf, breaking off the top meter of the class-one deadfall as it turned towards the northwest. The diameter of the remaining trunk for this deadfall was 6.3 centimeters (cm) at the break point. When the broken deadfall was measured, I was able to locate multiple hairs that had become lodged in the portion of the branch still attached to the trunk, however there were no traces of blood to indicate any penetrating trauma from breaking the branch during the pursuit. The hairs were a golden brown in color on the main area of the shaft, with white or silver coloration to the tips. Samples of the fur were not obtained for further study, as no permit had been obtained for collecting samples within the national park confines.

Turning west, the elk calf leaped a third, small, class-two deadfall and continued for 67 meters before encountering a class-one deadfall. The grizzly sow also leapt the small deadfall, breaking two 6 cm thick branches. The elk calf then turned to the north, and after 43 meters it tried to leap another class-one deadfall, only to become entangled in the remaining branches during the attempt. At this point the grizzly sow caught up to, and then bit into, the left rear

hindquarter of the elk calf. Using its jaws and front paws, the grizzly sow pulled the elk calf away from the deadfall, out into a clear, grassy area.

The grizzly sow completed the predation event with a final bite to the back of the elk calf's neck at 08:49:30 MDT, breaking the spine with an audible snap and stopping all movement by the elk calf. Once the predated calf stopped struggling, the grizzly sow proceeded to carry the carcass off to the northwest, towards the Black Canyon of the Yellowstone, followed closely by both cubs. The grizzly sow and cubs entered a small stand of trees, located approximately 300 meters northwest of the kill site. As the bears left the area, a single cow elk returned to the site where the elk calf had been bedded, sniffing the area. She then followed the path of pursuit, stopping to sniff the air several times while approaching the final kill site. At the final kill site, the cow elk sniffed the ground in several places, pawed the ground, looked around while stationary and then left the immediate area, returning to her herd.

DISCUSSION

Previous researchers have calculated that the carcass of an elk calf provides somewhere between 81 and 115 kilograms of food (Houston, 1978). Theoretically, this amount would provide sustenance for the sow and cubs for approximately one week, based on a 450 kg bear ingesting 10.5 kg per day (BC Ministry of Environment, 2001). I estimate that the mass of the predated calf was between 20 and 30 kg, based on its neonate status (USFWS, 2006). This amount of meat would provide sustenance for the bears for two to three days at the most, depending on the required daily caloric intake necessary to produce breast milk for the two cubs.

The predation event involved no stalking by the grizzly sow; it was strictly an opportunistic event, where the grizzly sow took advantage of the immediate situation.

What was most interesting was that while the neonate elk calf attempted to use the various windthrow as a natural barrier, it had minimal to no effect on slowing or stopping the grizzly. This was clearly evident when the grizzly sow snapped off the top of a deadfall while taking the most direct route possible in order to stay behind the calf. Further evidence of failure of the natural barriers was provided when the grizzly leapt the third class-two deadfall, breaking several wrist-thick branches in the process.

Further research into how neonate ungulates escape predation, with a focus placed on the animal's age, may provide more information on the success or failure rate for neonates, based on terrain and barrier considerations.

Management Implications

The presence of large quantities of widespread deadfall within a game management area has the potential to decrease neonate elk survival, which has a direct effect on population densities under the control of adaptive harvest management plans. For example, following a harsh winter or a severely cold, dry spring, both of which are likely to have a considerable impact on calf predation and survival, harvest quotas may need to be adjusted downward in order to create the best possible scenario that may result in more calves being born the following year (Raithel, *et al*., 2007).

Acknowledgements

Thank you to the Hume Foundation for providing additional, emergency funding for the Yellowstone Expedition. Special thanks to Dylan Fischer and my fellow TESC Wild Side classmates, who peer reviewed this paper.

LITERATURE CITED

British Columbia Ministry of Environment. 2001. *Animal Weights and Their Food and Water Requirements.* 11 May 2007. <http://www.env.gov.bc.ca/wat/wq/reference/foodandwater.html>.

Gunther, K. A., Renkin, R. A. 1990. "Grizzly bear predation on elk calves and other fauna of Yellowstone National Park." *International Conference on Bear Research and Management* **8**:329–334.

Houston, D. 1978. "Elk as Winter-Spring Food for Carnivores in Northern Yellowstone National Park." *Journal of Applied Ecology* **15**:653-661.

Maser, C., Trappe, J.M. 1984. "The Seen and Unseen World of the Fallen Tree." *General Technical Report PNW-164*. U.S Department of Agriculture Forest Service.

Raithel, J., Kauffman, M., Pletscher, D. 2007. "Impact of Spatial and Temporal Variation in Calf Survival on the Growth of Elk Populations." *The Journal of Wildlife Management* **71**.

Robbins, C., Schwartz, C., Gunther, K., Servheen, C. 2006. "Grizzly Bear Nutrition and Ecology Studies in Yellowstone National Park." *Yellowstone Science* **14**.

US Fish and Wildlife Service (USFWS). 2006. "Neonatal Mortality of Elk in Wyoming: Environmental, Population, and Predator Effects." *Biological Technical Publication BTP-R6007-2006.*

Yellowstone National Park (YNP). 2006. *Yellowstone Elk Information Webpage* 11 May 2007. <http://www.nps.gov/yell/naturescience/elk.htm>.

FIGURE LEGENDS

Figure 1. Map of predation site created using National Geographic Topo Software, Version 3.4.3. Overall area of predation event. Red "x" marks approximate kill location.

Figure 2. Satellite image of predation site location. Satellite imagery courtesy of Google Maps. North is the top of the image. Red "x" marks approximate kill location.

TABLES

Table 1. Deadfall classification by decomposition state; as established by Maser and Trappe.

Log Characteristics	Class One	Class Two	Class Three	Class Four	Class Five
Bark	Intact	Mostly Intact	Trace	Absent	Absent
Twigs < 1.5"	Present	Absent	Absent	Absent	Absent
Texture	Intact	Intact to partly soft	Hard, large pieces	Small, soft blocky pieces	Soft and powdery
Shape	Round	Round	Round	Round to oval	Oval
Color of Wood	Original color	Original color	Original to faded	Light to faded brown	Faded yellow or grey
Portion of log on ground	Elevated on support points	Elevated, but sagging	Entire log in ground contact	< 50% log buried	> 50% of log buried

Figure 1. Topographical map of predation site location.

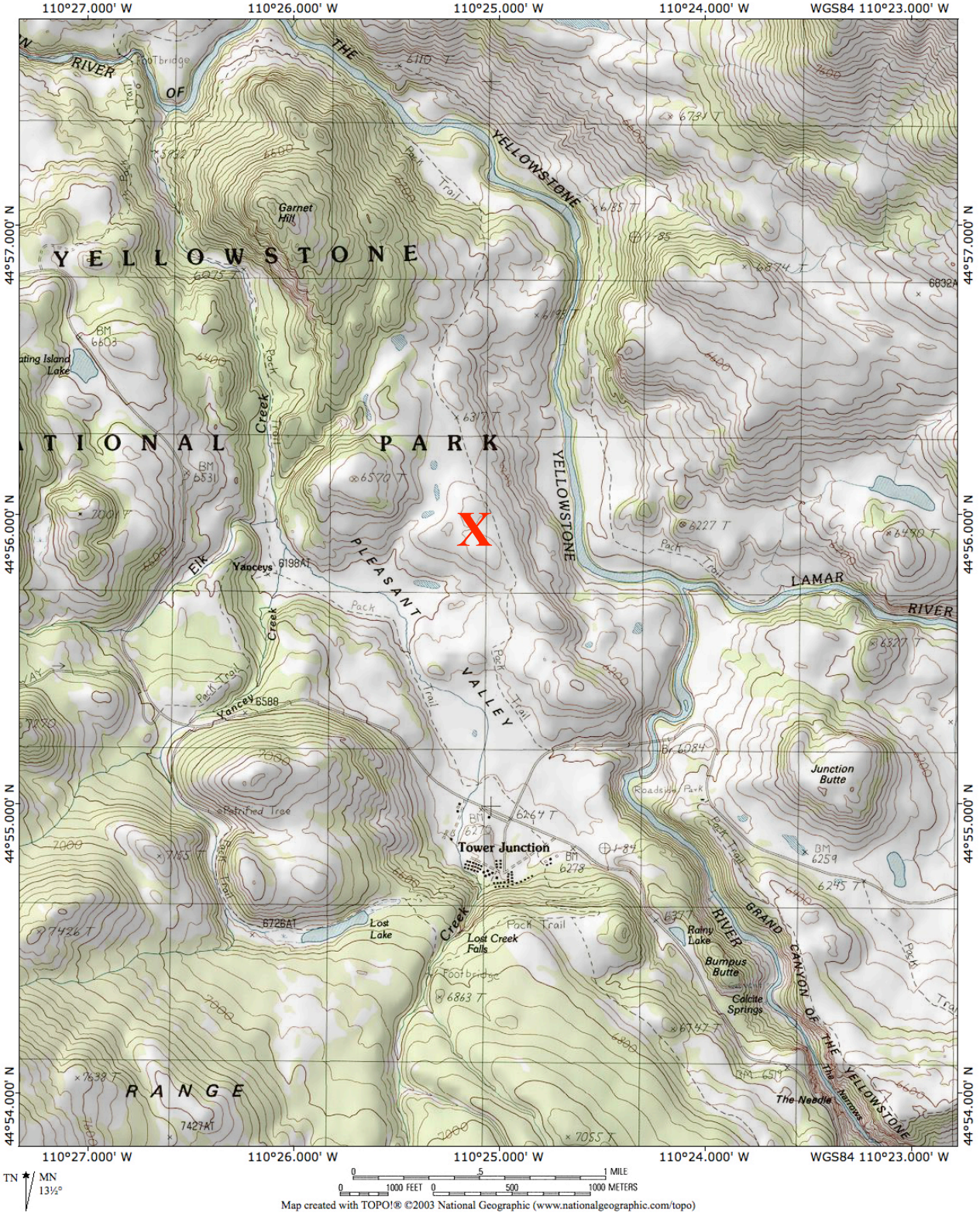

Figure 2. Satellite image of predation site location.