Evaluation of a spike only regulation in southeastern Idaho
by Daniel L Hughbanks

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fish and Wildlife Management
Montana State University

Abstract:
The vulnerability of bull elk (Cervus elaphus) to hunting mortality has increased in many elk herds across the western United States due to reductions in habitat security. Wildlife managers dealing with low habitat security in areas open to general bull hunting have attempted to increase male elk survival with regulations that limit harvest to either some minimum or maximum antler size. This study evaluates the efficacy of restricting harvest to spike antlered yearling bulls while maintaining a general hunting season.

To determine the mortality rates of yearling male elk under the new regulation, 86 male calves were captured and fitted with radio collars in March of 1991-1992. During the general season, the mortality rate of radioed yearling bull elk in areas open to hunting was 28% (14 of 50) in 1991-1992. None of the radio-marked branch antlered yearlings and only 1 radio-collared 2-year-old bull were illegally killed. The mortality rates of bull elk under the spike-only regulation were lower than previously reported levels for the Sand Creek elk herd. The winter composition counts also indicated that the spike-only regulation succeeded in increasing the survival rate of bull elk. I attempted to determine the cause of the increase in bull survival by comparing hunter numbers and yearling bull mortality under the any antlered bull regulation to hunter numbers and yearling bull mortality under the spike-only regulation.

Both hunter numbers and yearling bull elk mortality decreased with the implementation of the spike-only season.

I also compared hunting pressure and habitat use among yearling bulls which survived the general hunting season and yearling bulls which were harvested during the general season. Yearling bull behavior and hunter perceptions appeared to influence vulnerability more than either habitat use or hunting pressure under the spike-only regulation.

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Daniel L. Hughbanks

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

24 January 1994
Date

Lynn R. Lehr
Chairman, Graduate Committee

Approved for the Major Department

21 January 1994
Date

Robert E. Moore
Head, Major Department

Approved for the College of Graduate Studies

1/28/94
Date

R. L. Bacon
Graduate Dean

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ABSTRACT

The vulnerability of bull elk (*Cervus elaphus*) to hunting mortality has increased in many elk herds across the western United States due to reductions in habitat security. Wildlife managers dealing with low habitat security in areas open to general bull hunting have attempted to increase male elk survival with regulations that limit harvest to either some minimum or maximum antler size. This study evaluates the efficacy of restricting harvest to spike antlered yearling bulls while maintaining a general hunting season.

To determine the mortality rates of yearling male elk under the new regulation, 86 male calves were captured and fitted with radio collars in March of 1991-1992. During the general season, the mortality rate of radioed yearling bull elk in areas open to hunting was 28% (14 of 50) in 1991-1992. None of the radio-marked branch antlered yearlings and only 1 radio-collared 2-year-old bull were illegally killed. The mortality rates of bull elk under the spike-only regulation were lower than previously reported levels for the Sand Creek elk herd. The winter composition counts also indicated that the spike-only regulation succeeded in increasing the survival rate of bull elk. I attempted to determine the cause of the increase in bull survival by comparing hunter numbers and yearling bull mortality under the any antlered bull regulation to hunter numbers and yearling bull mortality under the spike-only regulation. Both hunter numbers and yearling bull elk mortality decreased with the implementation of the spike-only season. I also compared hunting pressure and habitat use among yearling bulls which survived the general hunting season and yearling bulls which were harvested during the general season. Yearling bull behavior and hunter perceptions appeared to influence vulnerability more than either habitat use or hunting pressure under the spike-only regulation.

INTRODUCTION

Elk vulnerability to harvest is commonly defined as the probability of an elk being killed during the hunting season (Lyon and Cristensen 1992). One mechanism used by wildlife managers to alter bull elk vulnerability is the institution of hunting regulations which restrict hunters to harvesting only those bull elk with a given antler conformation. Generally, the goal of antler point regulations is to increase the numbers of older age class bulls in the population (Carpenter and Gill 1987).

There are 2 major categories of antler point restrictions, those which attempt to protect young bulls without restricting the harvest of older bulls and those that allow open hunting of young bulls and restrict the harvest of older bulls. Within these categories, a variety of antler point regulations have been implemented in the western United States. Regulations have restricted hunters to, or from, harvesting elk with the following antler conformations: spikes excluded, branched antlers, bulls with brow-tines, antlers with at least 2 points on a side, antlers with at least 3 points on a side, and antlers with at least 4 points on a side (Boyd and Lipscomb 1976, Harper 1985, Wildlife Division 1990, Dave Moody pers. commun. 1992).

None of the antler point restrictions designed to

protect the yearling age class while allowing unlimited harvest of older bulls have been successful in increasing the numbers of bulls in age classes 3 years and older (Carpenter 1991, Harper 1985, Hamlin and Ross 1992). Illegal mortality under all of these regulations appeared to increase (DeSimone and Vore 1992, Harper 1985). Boyd and Lipscomb (1976) reported that in Colorado, regulations restricting elk harvest to antlered bulls with 4 or more points increased the numbers of 2-year-old bulls harvested; however, the total number of bulls harvested decreased, and illegal mortality increased.

In Montana, restricting hunters to harvesting bulls with a brow-tine increased the average age of bulls harvested by approximately 1 year, to 2 years of age (Hamlin and Ross 1992). Although estimates of illegal mortality under the brow tine regulation in Montana are uncertain, 10-14 percent (7-10 of 69-72) of radioed-marked yearling bulls were killed illegally in the Gravelly and Snowcrest Ranges of Montana (Hamlin and Ross 1992). Hamlin and Ross (1992) also found that survival of legal bulls in the Gravelly-Snowcrest area was 3.6% (1 of 28).

In 1978 in Clapstop County, Oregon, hunter numbers were limited by permit, and hunters were restricted to harvesting 3-point or greater antlered bulls (Harper 1985). Under these regulations, 11% (4 of 36) of radio collared yearling bull elk were illegally killed (Hatter and Smith 1987).

This system did not increase the number of mature bulls, and Hatter and Smith (1987) recommended eliminating the antler point restriction in this area because of the increased hunting pressure placed on older bulls.

The other major category of antler point restrictions protects the 2-year-old and older age classes and the more robust yearling bulls with branched antlers by restricting hunters to harvesting yearling bull elk with spike antlers. Harvest of older bulls is limited by permit. Spike-only regulations have been successful in increasing mature bull numbers in Montana and Washington (DeSimone and Vore 1992, W. Meyers pers. commun. 1992). Radio telemetry studies in Montana's Elkhorn Range reported an overall annual mortality rate, including legal and illegal harvest, of 29% for bulls 2 years and older. The illegal mortality rate for bulls 2.5 years and older was 8% (8 of 106)(Desimone and Vore 1992).

Elk vulnerability, and subsequent elk population response to hunting regulations, cannot be isolated from the environment in which they live. Youmans (1992) found that hunter numbers, road density, vegetation, weather, topography, hunter behavior, and elk behavior influenced elk vulnerability in southwestern Montana. Unsworth et al. (1993) demonstrated that road density, hunter density, and topography exhibited a greater influence on elk vulnerability than any other variables in north-central Idaho. Lyon and Canfield (1991) reported that road

densities and habitat fragmentation influenced elk vulnerability in northwestern Montana. Each elk population likely has a different set of circumstances which determine vulnerability, and these factors must be considered in evaluating elk population responses to hunting regulations.

Continued increases in hunter numbers, accessibility of elk habitat, and demand for harvest based recreation will necessitate greater precision in harvest management. Situations where habitat does not provide ample security may be managed for recreational harvest only where carefully crafted hunting management plans have been implemented. The Sand Creek area is an excellent opportunity to test precision harvest management. Bull elk vulnerability is high for the Sand Creek elk herd of southeastern Idaho. A radio telemetry study conducted from 1985 to 1987 found a 95% annual mortality rate (21 of 22) for the radio collared yearling bull elk that summered in areas open to hunting. Furthermore, all bull elk (4) captured and collared as 2-year-olds or older that summered in areas open to hunting were killed the hunting season following their capture (Winstead 1990).

Check station data also indicate that bull elk vulnerability in the Sand Creek elk herd is high. Of the antlered elk that went through the check station , 57 and 61% were shot on opening day in 1989 and 1990, respectively (Figure 1). Because of this high mortality rate and a high

degree of hunter dissatisfaction, a spike-only general season was implemented in 1991 in big game management Units 60, 61, and 62A to improve bull elk survival.

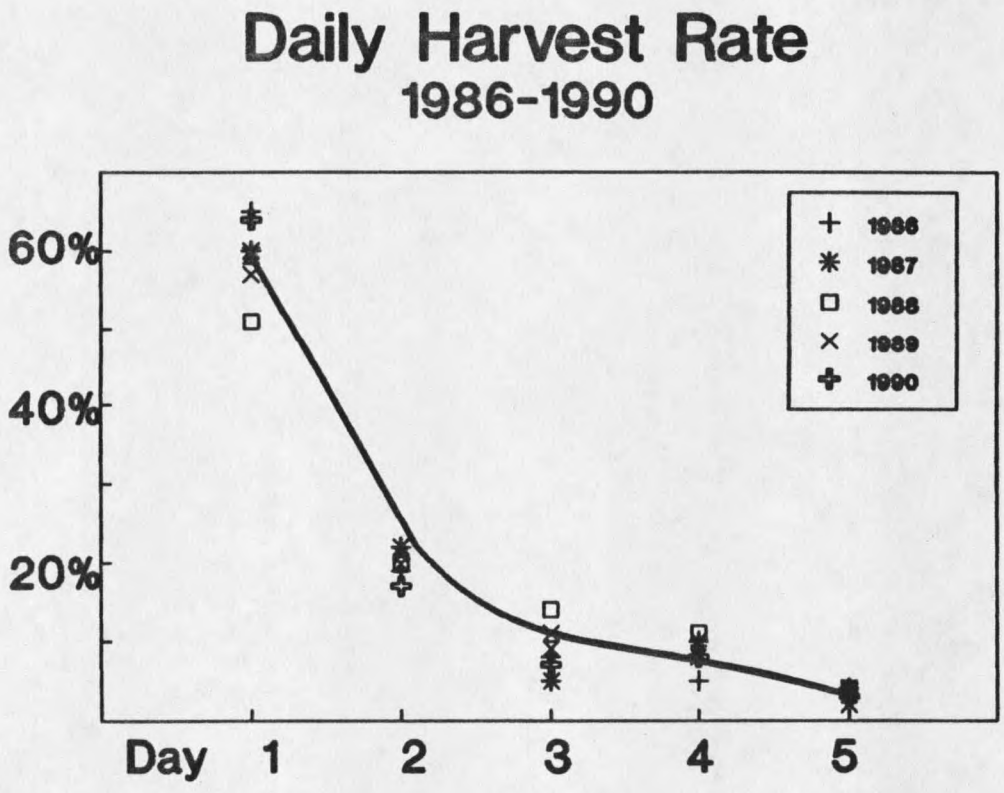

Figure 1. Daily harvest rate of antlered elk for the Sand Creek elk herd, 1986-1990.

This project was initiated to: 1) assess the effects of a spike-only general hunting regulation on bull elk survival, and 2) identify factors which contribute to bull elk vulnerability under this regulation.

STUDY AREA

The study area was in southeastern Idaho and encompassed Idaho Fish and Game big game management Units 60, 61, and 62A in sections of Freemont, Clark, Jefferson, and Madison counties. Adjoining sections of Montana, Wyoming, and Yellowstone National Park were also included in the study area (Figure 2).

The Sand Creek elk winter range was located in the southwest portion of the study area. This winter range is a complex of basalt pressure ridges, active sand dunes with vegetation typical of a high desert shrub steppe, and agricultural croplands (Pauley 1991). Sagebrush (*Artemisia tridentata*) dominates the plant community over most of the area, but bitterbrush (*Purshia tridentata*) and chokecherry (*Prunus virginiana*) are dominant on stabilized dunes (Pauley 1991). Wheatgrasses (*Agropyron* spp.) and needlegrasses (*Stipa* spp.) dominate the herbaceous vegetation.

Summer range for elk associated with Sand Creek is composed of gently sloping plateaus of the Island Park and Huckleberry Ridge Calderas and moderate to steeply sloping formations in the Centennial Range. Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and subalpine-fir (*Abies lasiocarpa*) dominate forest communities (Steele et al. 1983). Shrubs in the foothill community include aspen (*Populus tremuliodes*), bigtooth

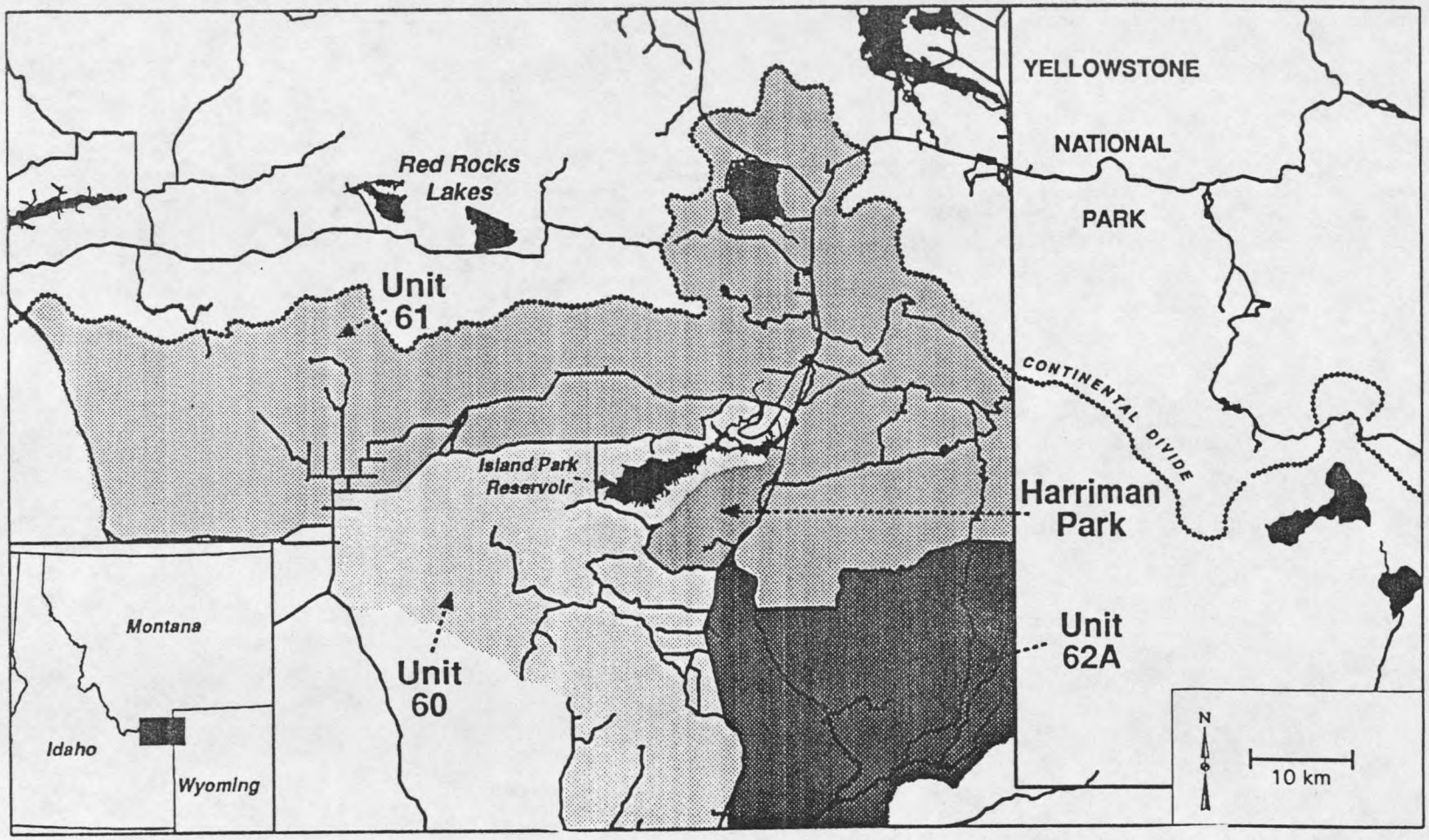

Figure 2. Study area for the Sand Creek elk herd

maple (*Acer grandidentatum*), serviceberry (*Amelanchier* spp.), snowbrush ceanothus (*Ceanothus velutinous*), and snowberry (*Symphoricarpos* spp.).

Climate

The climate in the area occupied by the Sand Creek elk herd is continental with short, cool, dry summers and long, cold winters. Average annual precipitation at the Island Park weather station averaged 66 cm from 1989-1992 with most falling during the winter months (USDA Soil Conservation Service Snow Survey Office, Bozeman, pers. comm.). At Island Park from 1989 to 1992, January daily maximum and minimum temperatures were 6.9 and -36.8 C, respectively. During January, the average daily temperature was -10.9 C. Maximum, minimum, and average daily temperatures during July were 31.1, -0.3, and 14.0 C, respectively, at the Island Park weather station (USDA Soil Conservation Service Snow Survey Office, Bozeman, pers. comm.).

Description of Hunting Units

Unit 60

Land ownership within this 99,401 ha unit is a mix of United States Department of Agriculture (USDA) Forest

Service (41,733 ha), Bureau of Land Management (BLM), Idaho Department of State Lands, Idaho Fish and Game, and private landowners. For this study, Unit 60 was divided into 4 subunits with different topography, hunter distribution, and motorized vehicle regulations. Each of these subunits had unique characteristics which influenced elk vulnerability. These areas are referred to as Antelope Flat (ATF), Big Bend Ridge (BBR), Bishop Mountain (BSH), and Harriman State Park (HSP) (Figure 3).

Neither hunting nor motorized vehicle use was allowed in HSP. Hunting and motorized vehicle use were allowed in the other 3 areas. Both BBR and BSH included portions of the rim of the Island Park Caldera. Douglas-fir communities are common on the rim of the caldera, especially on steep sites. The ATF unit contained portions of the caldera floor. Lodgepole pine communities are dominant on low gradient sites such as the caldera floor.

Densities of roads open to public vehicle use (open roads) in big game management Unit 60 averaged 0.9 km of roads per km^2 in 1991-92. However, roads were not uniformly distributed. Special regulations restricted motorized vehicle travel to designated routes in the BBR area. These regulations reduced the density of roads open to year round travel from 1.3 km/km^2 to a relatively low 0.43 km/km^2 (TIGER data 1991) in the BBR access management area. Higher densities of roads open to year round travel occurred in the