Elk pregnancy, production, and calf survival in the South Fork of the Flathead River, Montana
by Michele Ann Kastler

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 purpose of this study was to determine elk pregnancy rates and calf survival before winter range habitat enhancement took effect. Habitat enhancement was completed in the Firefighter mountain area of the South Fork of the Flathead on elk winter range in the spring of 1996. I followed approximately 25 collared cow elk and their calves per year over a 2-year period to gather baseline data on pregnancy rates and calf survival. Pregnancy was determined mainly through fecal analysis, and calf survival through observations and capture. I hypothesized that pregnancy, production and calf survival rates for elk would be equal between treatment (habitat enhanced sites) and control (non-manipulated sites). 40-year harvest trends show a possible decline in elk populations in the South Fork of the Flathead river around Firefighter mountain, I speculated that there were lower pregnancy rates in the South Fork as compared to other Rocky Mountain ecosystems. I found pregnancy rates ranged from 95% in 1996 to 65% in 1997. This may be because of alternate year breeding, summer or winter habitat quality, and/or weather conditions. Calf survival and production were not significantly different between treatment and control elk between years.

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APPROVAL

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Michele Ann Kastler

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 Apr 98
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Chairperson, Graduate Committee

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Date 4.26.98

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ABSTRACT

The purpose of this study was to determine elk pregnancy rates and calf survival before winter range habitat enhancement took effect. Habitat enhancement was completed in the Firefighter mountain area of the South Fork of the Flathead on elk winter range in the spring of 1996. I followed approximately 25 collared cow elk and their calves per year over a 2-year period to gather baseline data on pregnancy rates and calf survival. Pregnancy was determined mainly through fecal analysis, and calf survival through observations and capture. I hypothesized that pregnancy, production and calf survival rates for elk would be equal between treatment (habitat enhanced sites) and control (non-manipulated sites). 40-year harvest trends show a possible decline in elk populations in the South Fork of the Flathead river around Firefighter mountain. I speculated that there were lower pregnancy rates in the South Fork as compared to other Rocky Mountain ecosystems. I found pregnancy rates ranged from 95% in 1996 to 65% in 1997. This may be because of alternate year breeding, summer or winter habitat quality, and/or weather conditions. Calf survival and production were not significantly different between treatment and control elk between years.

INTRODUCTION

Manipulation of habitat for the benefit of wildlife is a common practice throughout the United States. Millions of dollars are spent each year by federal and state agencies, private wildlife organizations, utility companies, and many other groups to enhance or create suitable wildlife habitat. Often these activities are done to mitigate for habitat loss due to the construction of dams, highways, oil refineries, etc. Burning, logging, brush slashing, fertilization, and seeding are some of the methods used to try to enhance forage production, quality, and habitat (Hobbs and Spowart 1984, Crouch 1986, Canon et al. 1987, Happe et al. 1990, Morgantini and Woodward 1994). While many enhancement projects have shown positive responses by the habitat in terms of increased production, availability, and quality of forage (Leege 1979, Crouch 1986, Stussy 1993), few have determined real benefits to fish or wildlife in terms of increased fecundity or survival (Comer 1982). Without monitoring and evaluation of the habitat and populations after restoration, the goals for actual population improvement often are unknown (Madsen 1981, Hunter 1991, Kondolf et al. 1996).

Enhancement designed to mitigate for wildlife habitat loss following the construction of Hungry Horse Dam in northwestern Montana included habitat manipulation to increase carrying capacity for Rocky Mountain elk (*Cervus elaphus nelsoni*). Hungry Horse Dam was constructed on the South Fork of the Flathead River by the Bureau of Reclamation and is managed and maintained by Bonneville Power Administration (BPA). Subsequent flooding after the construction of the dam created Hungry Horse Reservoir in 1954. This resulted in the loss of 9,700 ha of elk winter range along 61.8 km of the South Fork of the Flathead River (Casey 1990) and decreased carrying capacity in elk by an estimated 175 animals (Vore 1994). Fire suppression and subsequent conifer encroachment in the area caused additional alteration of elk winter range from large open shrub fields and grassy hillsides to dense timber and small isolated shrub fields. The Columbia Basin Fish and Wildlife Program authorized BPA to fund winter range enhancement with the goal of increasing elk numbers by 133 in the South Fork (Casey et al. 1984). The Hungry Horse Mitigation Project, which was initiated in 1988 and completed habitat enhancement in 1997 (Hickle 1996), was designed to enhance forage availability and quality through logging and rejuvenation of existing shrub-dominated openings by prescribed burning and mechanical brush treatment.

A common assumption of winter forage enhancement is that because of increased forage production animal condition will improve, allowing for higher pregnancy rates, heavier birth weights, and higher calf survival rates (Thorne 1976, Leege 1979, Nelson and Leege 1982, Crouch 1986). Forage quality and abundance can influence elk productivity in 2 ways. First, nutrition of cow elk during rut (Clutton-Brock 1982, Trainer 1969, and Willard et al. 1994) and gestation (Banfield 1949, Thorne et al. 1976) can influence pregnancy rates by allowing or preventing elk to become pregnant and successfully carry a calf to term. Extreme weather conditions can cause resorption of fetuses (Banfield 1949), which may occur when elk have poor winter nutrition. Secondly, winter forage can influence viability of offspring (Thorne et al. 1976, Clutton-Brock et al. 1982, Nelson and Leege 1982). Breeding-age female elk, which lost more weight than other pregnant elk during the last half of pregnancy, produced lighter calves with reduced survival to 2 weeks of age (Thorne 1976, Clutton-Brock 1982). If mitigation were successful, winter habitat improvements done in the Hungry Horse area on Firefighter Mountain would be expected to manifest themselves in population increases through higher pregnancy rates, calf production, and/or survival.

This study was initiated to gather baseline data on pregnancy rates, calf production, and survival to help evaluate the long-term effects of habitat enhancement on demographic characteristics of elk in the South Fork of the Flathead. The objectives for this study were to: 1) determine survival and causes of mortality of elk calves in the South Fork of the Flathead River; 2) evaluate methods for the determination of pregnancy, parturition dates and location of calves, and calf survival; and 3) compare elk reproductive success on control and newly mitigated sites on Firefighter Mountain. I tested the null hypothesis that pregnancy rate, calf production, and survival would show no difference for elk occupying habitat-enhanced sites (treatment) and control areas.

STUDY AREA

The study area was located east of Kalispell, Montana in Flathead County (Figure 1). It was bordered by the Great Bear Wilderness to the east; Hungry Horse Reservoir to the west; Hungry Horse Dam to the northwest; Desert Mountain and Martin City to the northeast; and Hoke Creek to the south. Firefighter Mountain is located in the northern portion of the study area and was adjacent to the northeast shore of Hungry Horse Reservoir (Figure 1).

Geographic and elevation changes cause considerable climatic variations in areas surrounding Hungry Horse Reservoir. Average annual precipitation ranges from 76 cm along Hungry Horse Reservoir to ≥ 203 cm along the Continental Divide (Simmons 1974). Average maximum snow accumulation occurs in late March. Most areas are snow free by late May, although snow may persist until late August on north slopes at high elevations. The Western Regional Climate Center (WRCC) has a weather station at Hungry Horse Dam which provided means for monthly temperature (maximum and minimum.), precipitation, and snow depth based on a 50-year date base from 1948 to 1997. Snow depth in the study area was at average in 1996 and much higher than average in 1997 (Table 7, Appendix C). Daily averages were given for the months of January 1996 through September 1997. July and August were the