



Survival and behavior of radio-collared mule deer fawns during summers, 1978-1980, in the Missouri River Breaks, Montana
by Shawn James Riley

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE
in Fish and Wildlife Management
Montana State University
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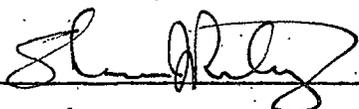
Abstract:

A study to determine the causes and extent of mortality among mule deer fawns and to evaluate how behavior and habitat use affect early fawn survival was conducted in the Missouri River Breaks, north-central Montana, during the summers of 1978, 1979, and 1980. Forty-nine fawns were equipped with radio transmitters: 15 in 1978, 18 in 1979, and 16 in 1980. One-third of the total summer mortality (1 fawn each summer) was attributed to starvation due to abandonment. Known and/or suspected predation by coyotes resulted in fawn mortality rates of 16.7%, 11.8%, and 13.3% in 1978, 1979, and 1980, respectively. The low mortality occurred despite a stable to slightly increasing coyote population. Dense growth of yellow sweetclover during 1978 and 1979, an abundance of alternative prey for coyotes during all years, and changes in habitat use by fawns in 1980, apparently were important in reducing predation and increasing survival during the study period as compared with 1976 and 1977. Movements of fawns between relocations ranged from 0.00 to 3.85 kilometers, with an overall mean of 0.78 kilometers. Monitored fawns made greater movements in 1978 than in 1979 and 1980. Summer home ranges of fawns varied in size from 23 to 350 hectares and averaged 133 hectares through the study period. The average size decreased significantly from 211 hectares in 1978 to 100 hectares and 105 hectares in 1979 and 1980, respectively. Home ranges frequently overlapped, but complete overlap was observed only in 1980. The extent to which fawns utilized cover types differed significantly between early and late summer and between years. Decreased use of the open types occurred each year as summer progressed. Fawns utilized the Pinus-Juniperus and Psuedotsuga-Juniperus cover types earlier and to a greater extent in 1980 than in 1978 or 1979. Marked fawns selected bedsites that provided an average of 69% concealment cover from 3 sides. The amount of cover surrounding fawn bedsites did not differ significantly between years. Results indicated that predation patterns and rates within and between years were not a function of coyote numbers alone, but reflected complex interaction between coyotes, the availability and abundance of alternative prey, and environmental conditions that determine the vulnerability of fawns.

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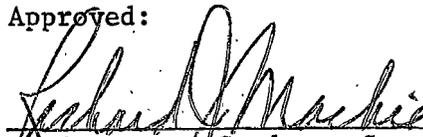
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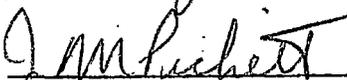
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ABSTRACT

A study to determine the causes and extent of mortality among mule deer fawns and to evaluate how behavior and habitat use affect early fawn survival was conducted in the Missouri River Breaks, north-central Montana, during the summers of 1978, 1979, and 1980. Forty-nine fawns were equipped with radio transmitters: 15 in 1978, 18 in 1979, and 16 in 1980. One-third of the total summer mortality (1 fawn each summer) was attributed to starvation due to abandonment. Known and/or suspected predation by coyotes resulted in fawn mortality rates of 16.7%, 11.8%, and 13.3% in 1978, 1979, and 1980, respectively. The low mortality occurred despite a stable to slightly increasing coyote population. Dense growth of yellow sweetclover during 1978 and 1979, an abundance of alternative prey for coyotes during all years, and changes in habitat use by fawns in 1980, apparently were important in reducing predation and increasing survival during the study period as compared with 1976 and 1977. Movements of fawns between relocations ranged from 0.00 to 3.85 kilometers, with an overall mean of 0.78 kilometers. Monitored fawns made greater movements in 1978 than in 1979 and 1980. Summer home ranges of fawns varied in size from 23 to 350 hectares and averaged 133 hectares through the study period. The average size decreased significantly from 211 hectares in 1978 to 100 hectares and 105 hectares in 1979 and 1980, respectively. Home ranges frequently overlapped, but complete overlap was observed only in 1980. The extent to which fawns utilized cover types differed significantly between early and late summer and between years. Decreased use of the open types occurred each year as summer progressed. Fawns utilized the *Pinus-Juniperus* and *Pseudotsuga-Juniperus* cover types earlier and to a greater extent in 1980 than in 1978 or 1979. Marked fawns selected bedsites that provided an average of 69% concealment cover from 3 sides. The amount of cover surrounding fawn bedsites did not differ significantly between years. Results indicated that predation patterns and rates within and between years were not a function of coyote numbers alone, but reflected complex interaction between coyotes, the availability and abundance of alternative prey, and environmental conditions that determine the vulnerability of fawns.

INTRODUCTION

The mule deer (*Odocoileus hemionus hemionus* Rafinesque) population in the Missouri River Breaks of Montana declined sharply during 1971-1973, apparently as a result of extensive overwinter mortality in 1971-1972 and low fawn production or survival (Mackie 1976). The population remained low through 1977 as a result of low fawn production/survival that persisted despite average to above normal spring-summer precipitation and mild, open winters (Hamlin 1978). A similar sharp decline in mule deer numbers occurred in the Breaks during 1964-1965, but was followed by a population recovery within 1-2 years (Mackie 1976, Hamlin 1978).

Although predation by coyotes (*Canis latrans latrans* Say) was suspected as a possible cause of low fawn:doe ratios observed during early fall and winter population surveys in the area (Knowles 1976, Hamlin 1977), quantitative data were lacking. Thus, in 1976, an intensive study was initiated to determine the extent and causes of summer mortality as a factor in low fawn recruitment. Results of the first 2 years of the investigation were reported by Dood (1978). I continued the studies during the summers of 1978, 1979, and 1980 to further evaluate the extent and causes of summer mortality of fawns as environmental conditions changed and the mule deer population increased and, determine how behavior and habitat use affect early fawn survival.

STUDY AREA

The 30,000 hectare (ha) study area, previously described by Mackie (1970) and Dood (1978), was located approximately 40 kilometers (km) northeast of Roy, in Fergus County, Montana (Fig. 1). Boundaries were the Missouri River on the north, the Musselshell Trail on the south, the Skyline Trail on the east, and U.S. Highway 191 on the west.

The area was a 6-to-11 km wide, dissected plateau along the Missouri River, described locally as "breaks" (Fig. 2). The Breaks consist largely of steep, easily erodable, shale ridges separated by deep, saline coulee bottoms. The coulees blended gradually into rolling prairie along the south edge of the study area. Elevations ranged from 685 meters (m) along the Missouri River to 915 m on the south boundary.

Gieseke (1938) and Gieseke et al. (1953) described the soils in the breaks as primarily Lismas and Pierre clay loams derived from the underlying Bearpaw formation and associated shales of the Cretaceous age. These soils, commonly called "gumbo", are relatively impermeable to water. Runoff is high and flash-flooding is common during heavy rainstorms.

The climate is semi-arid with wide year-to-year fluctuations in both temperature and precipitation. Climatological data were obtained from a United States Department of Commerce weather station (Roy 8NE), located approximately 20 km southwest of the study area. Average

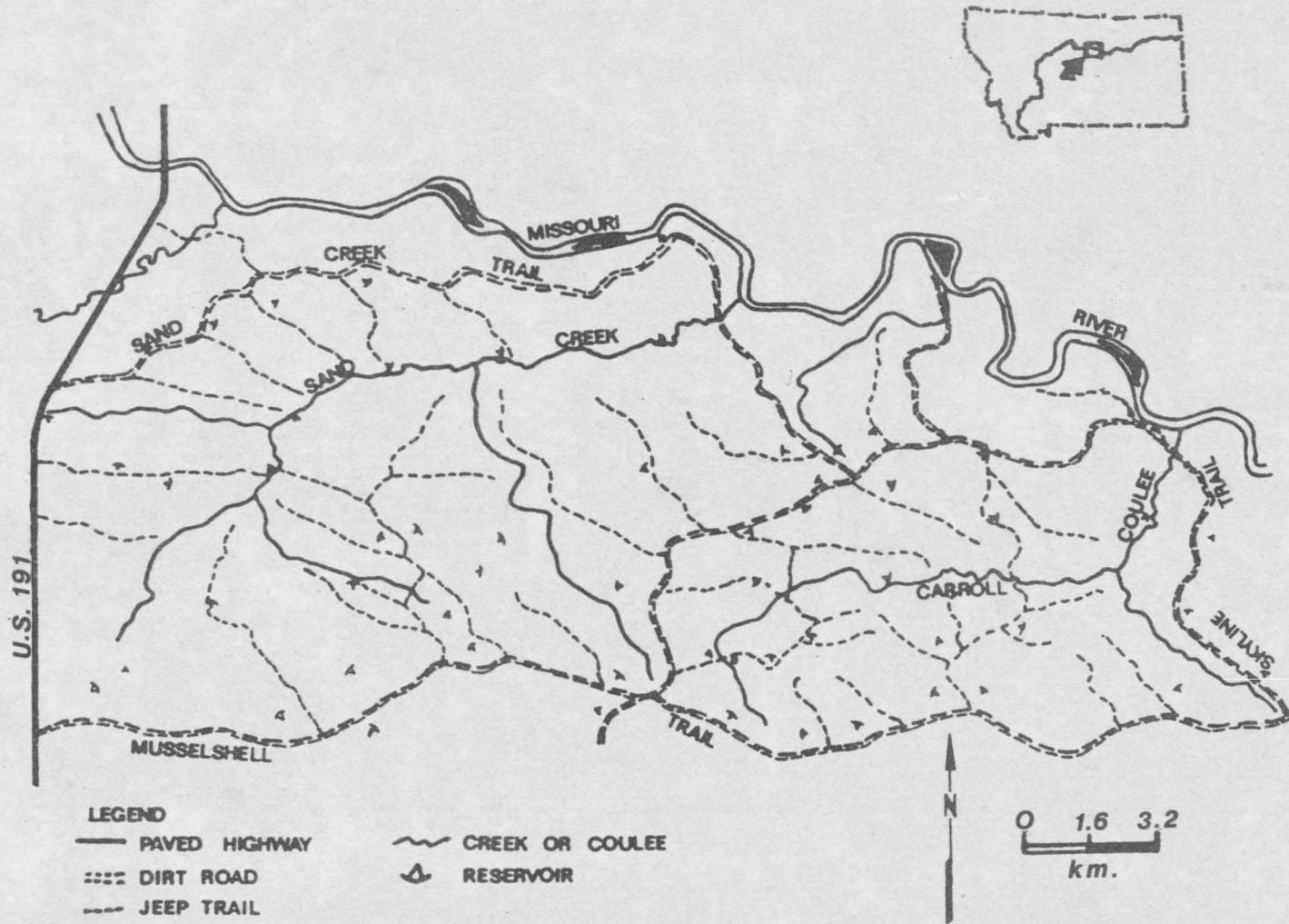


Figure 1. Map of the Missouri River Breaks Study Area.

