Movement, activity, and habitat use of white-tailed deer along the lower Yellowstone River
by James Daniel Herriges, Jr

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:
A study was conducted using radio telemetry to evaluate distribution, movements, activity, and habitat use by white—tailed deer (Odocoileus virginianus) on two areas along the lower Yellowstone River in eastern Montana during summer 1982 and 1983 and winter 1984. Deer distribution centered on river bottomlands, though some deer made daily or seasonal movements to adjacent uplands on the Intake area. Deer movements were short and restricted to riparian cover during the day, but increased and extended to agricultural fields up to 2.5 km from cover at night. Movement to and use of fields increased through summer and from summer to winter and appeared greater on the Intake than Elk Island study area. Well defined peaks in deer activity and movement occurred at sunrise and sunset; lesser peaks occurred near midnight and noon. Peak use of agricultural fields occurred from 1-2 hours after sunset until midnight. Seasonal minimum convex polygon home range sizes for individual deer varied from 0.29 km2 to 10.0 km2. Adult females had the smallest home ranges, averaging 0.87 km2 in summer and 1.8 km2 in winter. Total (24-hour) home range size varied by sex and age of the deer, season, and study area. Home ranges based only on daytime relocations averaged half as large as total home ranges in summer and 28% of the total in winter and did not differ between seasons and study areas. Among riparian cover types, deer selected for mid-to-late serai communities (mature cottonwood, shrub, green ash, and mature willow) with tall dense cover; grasslands were avoided. Among croplands, deer preferred alfalfa in summer and ungrazed alfalfa, sugar beets, and winter wheat in winter. Differences in selection and use of crops between study areas and seasons were related to availability influenced by cropping, harvest, and postharvest grazing and field treatment practices. Overall, natural riparian cover and agricultural croplands were the two major components of deer habitat. These combined with topography and physiography of the river valley, and other land use and operational practices to influence deer distribution movements and home range size, activity, and use of specific cover types.

# MOVEMENT, ACTIVITY, AND HABITAT USE OF WHITE-TAILED DEER ALONG THE LOWER YELLOWSTONE RIVER

by

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A thesis submitted in partial fulfillment
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APPROVAL

of a thesis submitted by

James Daniel Herriges, Jr.

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.

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# ABSTRACT

A study was conducted using radio telemetry to evaluate distribution, movements, activity, and habitat use by white-tailed deer (Odocoileus virginianus) on two areas along the lower Yellowstone River in eastern Montana during summer 1982 and 1983 and winter 1984. Deer distribution centered on river bottomlands, though some deer made daily or seasonal movements to adjacent uplands on the Intake area. Deer movements were short and restricted to riparian cover during the day, but increased and extended to agricultural fields up to 2.5 km from cover at night. Movement to and use of fields increased through summer and from summer to winter and appeared greater on the Intake than Elk Island study area. Well defined peaks in deer activity and movement occurred at sunrise and sunset; lesser peaks occurred near midnight and noon. Peak use of agricultural fields occurred from 1-2 hours after sunset until midnight. Seasonal minimum convex polygon home range sizes for individual deer varied from 0.29 $km^2$ to 10.0 $km^2$. Adult females had the smallest home ranges, averaging 0.87 $km^2$ in summer and 1.8 $km^2$ in winter. Total (24-hour) home range size varied by sex and age of the deer, season, and study area. Home ranges based only on daytime relocations averaged half as large as total home ranges in summer and 28% of the total in winter and did not differ between seasons and study areas. Among riparian cover types, deer selected for mid-to-late seral communities (mature cottonwood, shrub, green ash, and mature willow) with tall dense cover; grasslands were avoided. Among croplands, deer preferred alfalfa in summer and ungrazed alfalfa, sugar beets, and winter wheat in winter. Differences in selection and use of crops between study areas and seasons were related to availability influenced by cropping, harvest, and post-harvest grazing and field treatment practices. Overall, natural riparian cover and agricultural croplands were the two major components of deer habitat. These combined with topography and physiography of the river valley, and other land use and operational practices to influence deer distribution movements and home range size, activity, and use of specific cover types.

# INTRODUCTION

In 1980, the Montana Department of Fish, Wildlife and Parks initiated intensive studies of population ecology and habitat relationships of white-tailed deer on bottomlands of the lower Yellowstone River in eastern Montana. These bottomlands support dense populations of deer (Swenson et al. 1983, Dusek 1985) which provide important recreational hunting in the area, but may also depredate crops on and adjacent to the river bottom.

Detailed information on deer usage of bottomland habitats is required to assess agricultural relationships and develop effective methods to minimize depredations while sustaining deer populations for hunting and other benefits. There is also need for such information to assess the role of riparian vegetation, maintained by Yellowstone River flows (Boggs 1984), in the ecology of white-tails in bottomland habitat. Previous studies in the area (Swenson 1978) provided only general information. Allen's (1968) study of range use and food habits of white-tailed deer on bottomlands of the Missouri River in central Montana involved less agricultural cropland, and analysis of habitat use was limited primarily to open cover types.

My study was initiated in 1982 to obtain detailed information on habitat use over 24-hour periods during summer and winter. Specific objectives were: 1) to determine relative use of natural riparian communities and of agricultural lands and crops by white-tailed deer, 2) to determine distribution, movements, and activity patterns of deer, and 3) to determine how these parameters are affected by the distribution of riparian communities and agricultural lands and crops, environmental variables, and land use practices.

Field studies were conducted primarily during summer 1982 (July-September) and 1983 (June-September) and winter 1984 (January-March).

# DESCRIPTION OF STUDY AREAS

## Location

Field studies were conducted on two areas along the lower Yellowstone River (Fig. 1). The Intake study area was located in Dawson County about 24 kilometers (km) downstream from Glendive. The Elk Island study area was located in Richland County, near Savage, and about 32 km downriver from Intake. It included the Elk Island Wildlife Management and Recreation Area (EIWMA).

## Climate

Winters are cold with average temperatures in January or February dropping below -18 C about once every 9 or 10 years (Pescador and Brockman 1980). Summers are warm and sunny with temperatures reaching 32 C or more on about half the afternoons in July and August. The average length of the growing season is 120-130 days. Annual precipitation is 30-36 centimeters (cm), 80% falling during April-September. Winter snowfall is moderate, averaging 71-81 cm.

Monthly temperatures and precipitation during the study are compared with long-term averages at Savage in Figures 2 and 3 (NOAA 1983-1984). The winter of 1983-1984