



Distribution, movements, and habitat use during spring, summer, and fall by mule deer associated with the Armstrong winter range, Bridger Mountains, Montana
by David Frank Pac

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 was conducted in the Bridger Mountains of southwestern Montana from June through September 1974 and from June through December 1975. Objectives were to obtain data on summer and fall distribution, movements, habitat use and food habits, including 'nutritional relationships, of mule deer associated with the Armstrong winter range. Special emphasis was directed to use of forest habitat types by monitoring five radio-collared adult females. Fourteen habitat types and five phases associated with five major climax series were recognized and described. Deer numbers, productivity, distributions, movements, and range use characteristics were determined from 22 aerial flights and regular ground surveys. Approximately 210 deer occurred on the Armstrong Range in early winter 1975, of which only 139 survived the severe winter and dispersed onto summer ranges in the spring of 1975. Observed fawn:doe ratios declined from 26:100 in early fall 1975 to 9:100 by early winter, with most of the change occurring during a period of severe weather in late November when deer were concentrated on fall "holding" areas. Relocations of individually marked animals showed that 73 percent had summer and/or fall ranges within 6 kilometers of the winter range. The remainder migrated greater distances north and south of these areas as well as along the east slope of the Bridger Range. Most deer appeared to habitually use the same summer and winter home ranges each year. Seasonal migrations followed definite routes which included local "holding" areas where deer aggregated for variable time periods during spring and fall. Normal summer home ranges averaged 52 hectares (128 acres) for the five radio-collared females, while total home ranges averaged 107 hectares (264 acres). Heavy usage of forested habitats, especially the *Pseudotsuga menziesii* series, was observed during late spring, summer, and fall 1975. The DF/Caru, DF/Cage, and DF/Agsp habitat types were most important during spring and fall. The DF/Caru and Krummholz types were most important in summer. Relocations of radioed deer indicated that use of the *Pseudotsuga menziesii* series may have been overestimated by general observations while usage of *Abies lasiocarpa* and *Pinus albicaulis* series were underestimated. Significant shifts in use of habitat types occurred during late summer, apparently in response to shortages of succulent forage caused by desiccation and killing frosts. Food habit studies showed that forbs and browse, in order of importance, were used during late spring (June); while forbs, browse, and grass and browse, forbs, and grass were orders of importance for use during summer and fall, respectively. Protein contents of important forage plants were highest at emergence in spring and declined steadily to fall dormancy.

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DISTRIBUTION, MOVEMENTS, AND HABITAT USE DURING SPRING, SUMMER,
AND FALL BY MULE DEER ASSOCIATED WITH THE ARMSTRONG
WINTER RANGE, BRIDGER MOUNTAINS, MONTANA

by

DAVID FRANK PAC

A thesis submitted in partial fulfillment
of the requirements for the degree

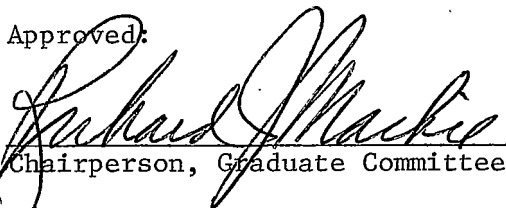
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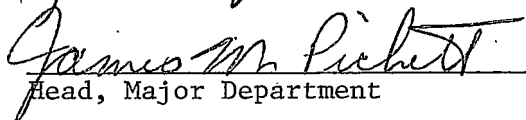
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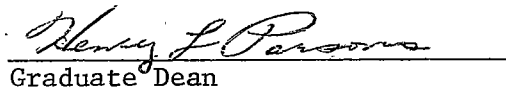
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TABLE OF CONTENTS

	Page
VITA	ii
ACKNOWLEDGMENT	iii
LIST OF TABLES	vii
LIST OF FIGURES	ix
ABSTRACT	xi
INTRODUCTION	1
DESCRIPTION OF STUDY AREA	3
METHODS	10
Habitat Analysis	10
Mule Deer Populations, Range Use, and Movements	11
Food Habits	12
Plant Nutritional Analysis	13
Hunting Season Statistics	14
RESULTS	15
Habitat Series and Types	15
Mule Deer Population Characteristics	47
Population Dynamics	47
Group Size	50
Mule Deer Range Use	52
Distribution, Movements, and Home Ranges	52
Seasonal Use of Habitat Types	65
Seasonal Use of Habitat Types by Five Radio-	
Collared Females	78
Use of Exposures	88
Edge-Effect of Home Ranges	89
Food Habits and Nutritional Relationships	90

TABLE OF CONTENTS
(Continued)

	Page
Spring (June)	91
Summer (July-September)	100
Fall (October-December)	102
Hunting Season and Harvest	105
Elk, Mountain Goat, and Black Bear Observations	106
DISCUSSION AND CONCLUSIONS	108
APPENDIX	115
LITERATURE CITED	117

LIST OF TABLES

Table	Page
1. CLIMATOLOGICAL DATA GATHERED BY THE U. S. DEPARTMENT OF COMMERCE FROM THE BELGRADE FAA AND BOZEMAN 12 NE WEATHER STATIONS	7
2. LIST OF MAJOR HABITAT SERIES, COMPONENT HABITAT TYPES AND PHASES, AND KEY TO ASSOCIATED MAP SYMBOLS USED IN FIGURES 2 AND 3	19
3. MEAN PERCENTAGE CANOPY COVERAGE AND FREQUENCY OF OCCURRENCE OF PLANT TAXA WHICH OBTAINED A MEAN COVERAGE OF .5 PERCENT OR A FREQUENCY OF GREATER THAN 5 PERCENT IN ONE OR MORE HABITAT TYPES	20
4. MEAN PERCENTAGE CANOPY COVERAGE AND FREQUENCY OF OCCURRENCE OF PLANT TAXA WHICH OBTAINED A MEAN COVERAGE OF 0.5 PERCENT OR A FREQUENCY OF GREATER THAN 5 PERCENT IN ONE OR MORE HABITAT TYPES	25
5. SEX AND AGE COMPOSITION OF MULE DEER OBSERVED DURING GROUND AND AERIAL COUNTS ON THE STUDY AREA BY MONTH DURING 1974 AND 1975	49
6. AVERAGE MULE DEER GROUP SIZE OBSERVED BY MONTH AND SEASON DURING 1974 AND 1975 ON THE STUDY AREA	51
7. NORMAL AND TOTAL SUMMER HOME RANGE SIZE IN HECTARES AND ACRES FOR FIVE RADIO-COLLARED FEMALE MULE DEER	61
8. AVERAGE ACTIVITY RADIUS IN METERS, FOR 13 INDIVIDUALLY MARKED MULE DEER	63
9. PERCENT OF GROUND AND AERIAL OBSERVATIONS OF MULE DEER ON THE STUDY AREA BY HABITAT SERIES AND TYPES DURING SUMMER OF 1974	66
10. MONTHLY AND SEASONAL PERCENTAGES OF ALL GROUND AND AERIAL OBSERVATIONS OF MULE DEER ON THE STUDY AREA BY HABITAT SERIES AND TYPES DURING SPRING, SUMMER, AND FALL OF 1975	68

LIST OF TABLES
(Continued)

Table	Page
11. PERCENTAGE USE OF MAJOR HABITAT SERIES INDICATED BY RADIO-TRACKING RELOCATIONS OF FIVE FEMALE MULE DEER DURING SPRING, SUMMER, AND FALL	69
12. PERCENTAGE OF MALE AND FEMALE MULE DEER OBSERVED DURING SUMMER AND EARLY FALL IN THE KRUMMHOLZ AND ALPINE MEADOW HABITAT TYPES DURING GROUND OBSERVATIONS IN NORTH COTTONWOOD AND TOM REESE BASINS FROM 1972-1975	74
13. COMPARISON OF USE OF VARIOUS EXPOSURES FOR ALL MULE DEER OBSERVED, INDIVIDUAL MARKED ANIMALS, AND RADIO-RELOCATIONS. DATA ARE PERCENTAGES OF ALL DEER OBSERVED OR RELOCATED DURING THE PERIOD JUNE 1-DECEMBER 15, 1975	89
14. KILOMETERS OF EDGE BETWEEN HABITAT TYPES FOUND ON THE SUMMER HOME RANGES OF FIVE RADIO-COLLARED FEMALE MULE DEER	90
15. SPRING AND EARLY SUMMER FOOD HABITS OF MULE DEER BY MONTH AND SEASON AS DETERMINED FROM EXAMINATION OF 16 FEEDING SITES DURING THE PERIOD JUNE 1-AUGUST 15, 1975	92
16. LATE SUMMER AND FALL FOOD HABITS OF MULE DEER BY MONTH AND SEASON AS DETERMINED FROM EXAMINATION OF 16 FEEDING SITES DURING THE PERIOD AUGUST 15-DECEMBER 15, 1975	93
17. SUMMER FOOD HABITS OF MULE DEER BY MONTH AND SEASON AS DETERMINED FROM EXAMINATION OF 7 FEEDING SITES IN THE SUBALPINE-ALPINE SERIES DURING THE PERIOD JULY 1-SEPTEMBER 5, 1974	95
18. PERCENT DRY WEIGHT OF PROTEIN IN MULE DEER FORAGE PLANTS USED DURING SPRING, SUMMER, AND FALL OF 1975	96
19. NUMBERS OF MALES, FEMALES, AND FAWNS OBSERVED WITHIN MAJOR HABITAT SERIES ON THE EAST SLOPE OF THE BRIDGER MOUNTAINS DURING SUMMER OF 1974	116

LIST OF FIGURES

Figure	Page
1. Map of the study area, showing major features	4
2. Aerial view of the habitat types and phases occurring on the study area within the Johnson and Mill Creek drainages	17
3. Aerial view of the habitat types and phases occurring on the study area within the North Cottonwood, Bill Smith, and Tom Reese Creek drainages	18
4. Distribution of each deer observation recorded on the study area during spring, summer, and fall of 1975	53
5. Summer and fall distribution during 1972-1975 of mule deer individually marked on the Armstrong winter range	54
6. Migration routes and holding areas used by the Armstrong herd during spring and fall	59
7. Numbers of deer recorded per observation period in the Subalpine-Alpine series of North Cottonwood and Tom Reese Basins by monthly periods during 1972-1975	73
8. Summer home range of radio-marked female (channel 2) showing specific habitat types and relocations by month. See text	79
9. Summer home range of radio-marked female (channel 3) showing specific habitat types and relocations by month. See text	80
10. Summer home range of radio-marked female (channel 6) showing specific habitat types and relocations by month. See text	81

LIST OF FIGURES
(Continued)

Figure	Page
11. Summer home range of radio-marked female (channel 8) showing specific habitat types and relocations by month. See text	82
12. Summer home range of radio-marked female (channel 10) showing specific habitat types and relocations by month. See text	83
13. Changes in percent dry weight protein with successive stages of phenology of four species of herbaceous deer forage	104

ABSTRACT

A study was conducted in the Bridger Mountains of southwestern Montana from June through September 1974 and from June through December 1975. Objectives were to obtain data on summer and fall distribution, movements, habitat use and food habits, including nutritional relationships, of mule deer associated with the Armstrong winter range. Special emphasis was directed to use of forest habitat types by monitoring five radio-collared adult females. Fourteen habitat types and five phases associated with five major climax series were recognized and described. Deer numbers, productivity, distributions, movements, and range use characteristics were determined from 22 aerial flights and regular ground surveys. Approximately 210 deer occurred on the Armstrong Range in early winter 1975, of which only 139 survived the severe winter and dispersed onto summer ranges in the spring of 1975. Observed fawn:doe ratios declined from 26:100 in early fall 1975 to 9:100 by early winter, with most of the change occurring during a period of severe weather in late November when deer were concentrated on fall "holding" areas. Relocations of individually marked animals showed that 73 percent had summer and/or fall ranges within 6 kilometers of the winter range. The remainder migrated greater distances north and south of these areas as well as along the east slope of the Bridger Range. Most deer appeared to habitually use the same summer and winter home ranges each year. Seasonal migrations followed definite routes which included local "holding" areas where deer aggregated for variable time periods during spring and fall. Normal summer home ranges averaged 52 hectares (128 acres) for the five radio-collared females, while total home ranges averaged 107 hectares (264 acres). Heavy usage of forested habitats, especially the *Pseudotsuga menziesii* series, was observed during late spring, summer, and fall 1975. The DF/Caru, DF/Cage, and DF/Agsp habitat types were most important during spring and fall. The DF/Caru and Krummholz types were most important in summer. Relocations of radioed deer indicated that use of the *Pseudotsuga menziesii* series may have been overestimated by general observations while usage of *Abies lasiocarpa* and *Pinus albicaulis* series were underestimated. Significant shifts in use of habitat types occurred during late summer, apparently in response to shortages of succulent forage caused by desiccation and killing frosts. Food habit studies showed that forbs and browse, in order of importance, were used during late spring (June); while forbs, browse, and grass and browse, forbs, and grass were orders of importance for use during summer and fall, respectively. Protein contents of important forage plants were highest at emergence in spring and declined steadily to fall dormancy.

INTRODUCTION

Studies of mule deer in the Bridger mountain range were initiated in 1955-56 when Wilkins (1957) determined range use and food habits of mule deer associated with the Armstrong winter range. Since 1972, continuing intensive investigations have included studies to provide current information on range use and food habits, describe seasonal distributions, movements, and behavioral characteristics, and determine population trends and dynamics of mule deer on that area (Schwarzoph 1973, Hamlin 1974, Mackie *et al.* 1976). Ecological characteristics of the Armstrong winter range, including the distribution, forage production and utilization of key browse plants, were described by Buscis (1974), while Morton (1976) evaluated nutritional values of important winter forage plants.

Results of these studies have provided considerable information on winter habitat requirements and relationships. Although the studies of Wilkins (1957), Schwarzoph (1973), and Hamlin (1974) included observations on summer habits, difficulties in observing deer on rugged, heavily forested spring, summer, and fall range areas precluded precise definition of habitat use and requirements during these seasons. The findings of Schwarzoph (1973) and Hamlin (1974) that fawns and some females enter winter with omental fat reserves close to the critical level indicated that range usage and conditions during

those periods may be important in the ecology of mule deer on the area. Hamlin (1974) also reported that females with fawns appeared to mainly use heavily forested habitat types, while unproductive does and males made greater use of high elevation, mountain meadows during summer.

This study was designed to obtain summer and fall information on the distribution, movements, habitat use, and food habits, including nutritional relationships, of mule deer associated with the Armstrong Range. Special emphasis was given to use of forested areas and types by monitoring five adult females equipped with radio-transmitters during the winter and spring of 1975. Field studies were conducted from June through early September 1974 and from June through December 1975.

DESCRIPTION OF STUDY AREA

The study area (Fig. 1) comprised approximately 50 square kilometers (19.4 square miles) and was located about 32 kilometers (20 miles) north of Bozeman, Montana along the west slope of the Bridger mountain range. The Bridger Range extends from Bridger Canyon northward for 37 kilometers (23 miles) to Blacktail Mountain, in Gallatin County. It is bounded on the east by the Crazy Mountain Basin, on the west by the Gallatin Valley, on the north by the Maudlow Basin, and on the south by a major oblique fault. Geological characteristics of the Bridger Range have been described in detail by McMannis (1955).

Boundaries of the study area were, approximately, Johnson Canyon on the north, Tom Reese Creek on the south, the Bridger divide on the east, and the Gallatin Valley floor on the west. During 1974, observations to relocate marked deer were made periodically over a larger area, extending approximately from Pass Creek on the north to Ross Peak on the south and from the Gallatin Valley floor on the west to the Bridger Canyon-Flathead Pass roads on the east.

Elevations within the study area range from 1600 meters to 2914 meters (5250-9560 feet) with abrupt changes in elevation of 300 meters (985 feet) within one kilometer (0.6 mile) occurring frequently. The main topographic features are numerous east-west ridges which drop off into steep-sided canyons on the north and south. The ridges separate

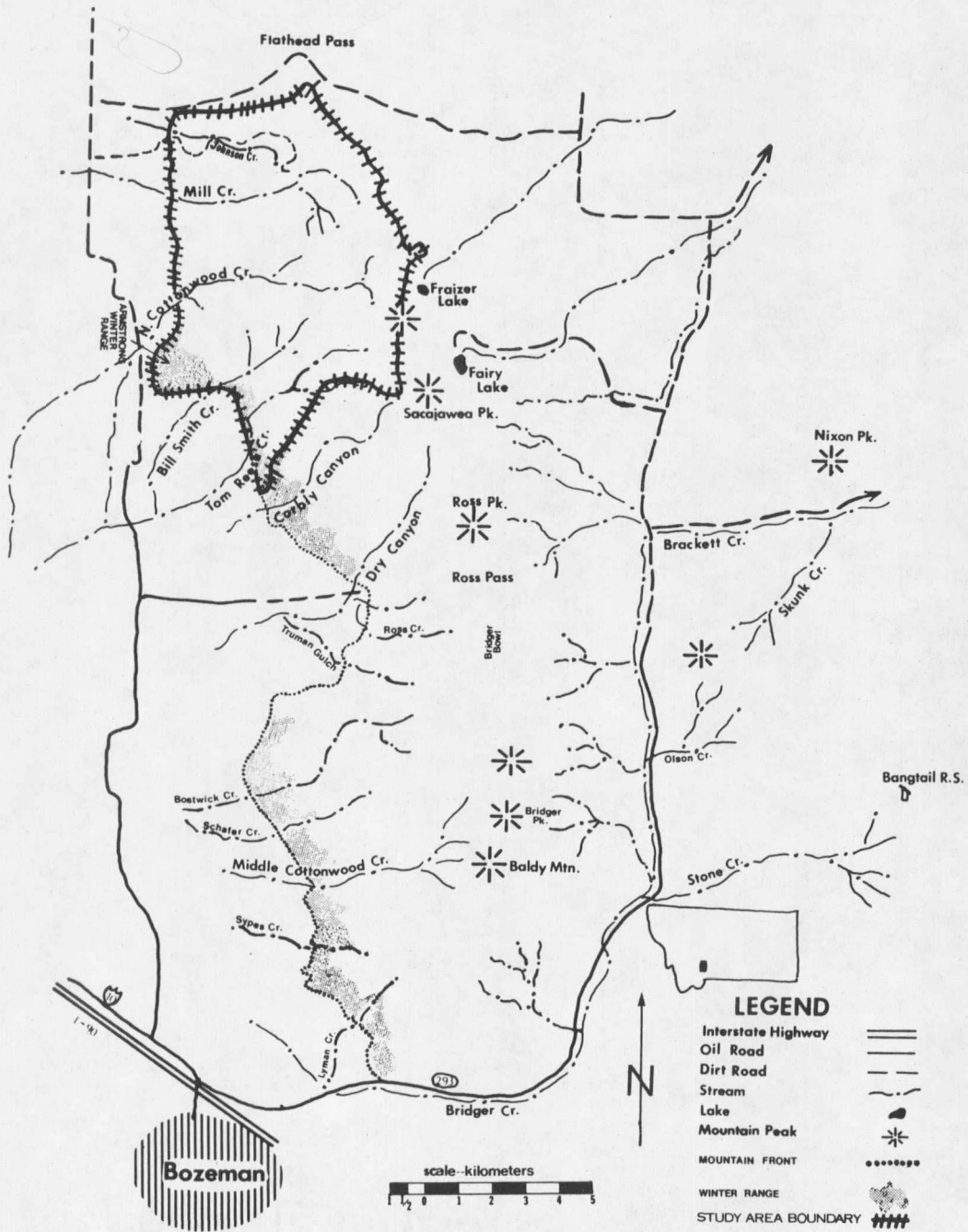


Figure 1. Map of the study area, showing major features.

the study area into five distinct drainages. Tom Reese Creek, North Cottonwood Creek, and Mill Creek originate in high elevation basins along the Bridger divide and flow year round. Bill Smith Creek and Johnson Creek are intermittent streams originating in the Montane forest at lower elevation.

Approximately 90 percent of the study area is federally owned and administered by the U.S.D.A. Forest Service, Gallatin National Forest. The remainder, including most of the footslope area is privately owned. A U. S. Forest Service road into Johnson Canyon provided public access to the north end of the study area. Access into all other canyons was restricted by private ownership and was limited primarily to foot travel.

Vegetation characteristics of portions of the study area were described previously by Wilkins (1957), Schwarzkoph (1973), Hamlin (1974), and Buscis (1974). The recent classifications and descriptions of forest habitat types (Pfister *et al.* 1974) and mountain grassland and shrubland habitat types (Mueggler and Handl 1974) of western Montana also apply to this area, though slight modifications appear necessary to accurately describe certain habitat types.

Four major climax habitat series including twelve habitat types occurred within the forested portion of the study area. These included a *Pseudotsuga menziesii* series occurring from 1645 meters to 2440 meters (5397-8005 feet), a *Pinus flexilis* series occurring between

2135 meters and 2590 meters (7005-8498 feet), an *Abies lasiocarpa* series at elevations from 2075 meters to 2620 meters (6808-8596 feet), and a *Pinus albicaulis* series occurring from 2250 meters to 2695 meters (7382-8842 feet). Both series and component habitat types overlapped elevationally as the temperate forest series extended to higher elevations on southerly exposures and the subalpine forest series extended downward on northerly exposures. Alpine meadows and subalpine (krummholz) habitats occurred at elevations from 2320 meters to 2900 meters (7612-9514 feet). Descriptive characteristics and distributions of these forest series and types, as well as alpine and subalpine habitat types will be discussed under results.

A Winter Range series, comprised of bunchgrass prairie and shrubland habitat types, occurred on slopes, footslopes, and the valley floor below the forest at elevations from 1600 to 2015 (5250-6611 feet) (Buscis, 1974).

Climatological data (U. S. Department of Commerce) for two U. S. Weather Bureau Stations, Belgrade FAA and Bozeman 12 NE, for 1974 and 1975, as well as the 24-year means, are listed in Table 1. Belgrade FAA is located in the Bunchgrass Prairie Zone, 16.1 airline kilometers (10 miles) southwest of the study area at an elevation of 1357 meters (4452 feet). Bozeman 12 NE station is located on the east slope of the Bridger Range, 19.3 airline kilometers (12 miles) northeast of Bozeman at an elevation of 1814 meters (5950 feet) within the

