



Population status, social habits, movements and habitat relationships of the summer resident elk of Jackson Hole Valley, Wyoming  
by Clifford Johnson Martinka

A thesis submitted to the Graduate Faculty 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 from June through September 1963 and from May through November 1964 to obtain quantitative data on the distribution, population status, social habits, movements and habitat relationships of the relatively non-migratory elk of Jackson Hole Valley, Wyoming. The physiography of the area was described. The eight major plant communities, sagebrush-bunchgrass, coniferous forest, aspen, cottonwood-spruce, willow, bunchgrass-shrub, sedge-bluegrass and agricultural were described from measurements of 31 representative stands. A total of 42,237 elk observations was recorded during 302 observation trips. The locations of elk observed indicated resident population segments for the Refuge, Central Valley, Uhl Hill and Moran Meadows. Total population estimates were 1,162 in 1963 and 1,793 in 1964. Classifications of 1,302 elk in 1963 and 1,356 in 1964 indicated different sex and/or age structures for the Refuge and Central Valley segments. A disproportionate occurrence of yearling males and, to a lesser extent, yearling females apparently resulted from numbers of these animals from the herd that migrates from Jackson Hole in summer becoming a part of the resident herd. Proportions of adult males in 1964 did not reflect the high occurrence of yearling males in 1963. Five periods relative to elk social habits were recognized on the basis of grouping and association data: June 1-15, calving; June 16 - August 15, aggregation; August 16 - September 15, dispersal; September 16 - October 15, breeding; October 16-31, reaggregation. Movements were analyzed from 1,240 relocations of 383 marked elk. The percentage of migratory elk that were associated with resident elk declined from a maximum in May to a minimum in early July indicating the period of movement for migratory elk. The movement patterns of resident elk were discussed from the records of representative animals. During early summer the yearling male group showed the most extensive movements. The movements of females with calves and yearling females increased in late summer while those of yearling males decreased. Average home ranges varied from 3.6 square miles for females with calves to 5.7 square miles for yearling males. Fall movements suggested that hunting may have been effective in restraining resident elk within or influencing movements to areas closed to hunting. Sagebrush-bunchgrass was the most important vegetation type used for feeding during all months of the study. Relatively high use of the bunchgrass-shrub type in May was related to the earlier development of green vegetation on south exposures. Food habits were studied from 24,240 instances of plant use at 172 feeding sites. Forbs averaged 50 percent, grasses and grass-like plants 29 percent and browse 21 percent of the diet for the May - October period. Forage-class use varied on the different vegetation types but important seasonal and in-season differences occurred only on the sagebrush-bunchgrass and bunchgrass-shrub types. Rumen analysis for September - October specimens supplemented the data from feeding site examinations.

POPULATION STATUS, SOCIAL HABITS, MOVEMENTS AND HABITAT RELATIONSHIPS  
OF THE SUMMER RESIDENT ELK OF JACKSON HOLE VALLEY, WYOMING

by

CLIFFORD JOHNSON MARTINKA

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of

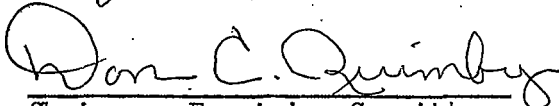
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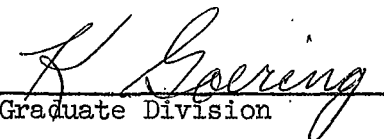
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## ABSTRACT

A study was conducted from June through September 1963 and from May through November 1964 to obtain quantitative data on the distribution, population status, social habits, movements and habitat relationships of the relatively non-migratory elk of Jackson Hole Valley, Wyoming. The physiography of the area was described. The eight major plant communities, sagebrush-bunchgrass, coniferous forest, aspen, cottonwood-spruce, willow, bunchgrass-shrub, sedge-bluegrass and agricultural were described from measurements of 31 representative stands. A total of 42,237 elk observations was recorded during 302 observation trips. The locations of elk observed indicated resident population segments for the Refuge, Central Valley, Uhl Hill and Moran Meadows. Total population estimates were 1,162 in 1963 and 1,793 in 1964. Classifications of 1,302 elk in 1963 and 1,356 in 1964 indicated different sex and/or age structures for the Refuge and Central Valley segments. A disproportionate occurrence of yearling males and, to a lesser extent, yearling females apparently resulted from numbers of these animals from the herd that migrates from Jackson Hole in summer becoming a part of the resident herd. Proportions of adult males in 1964 did not reflect the high occurrence of yearling males in 1963. Five periods relative to elk social habits were recognized on the basis of grouping and association data: June 1-15, calving; June 16 - August 15, aggregation; August 16 - September 15, dispersal; September 16 - October 15, breeding; October 16-31, re-aggregation. Movements were analyzed from 1,240 relocations of 383 marked elk. The percentage of migratory elk that were associated with resident elk declined from a maximum in May to a minimum in early July indicating the period of movement for migratory elk. The movement patterns of resident elk were discussed from the records of representative animals. During early summer the yearling male group showed the most extensive movements. The movements of females with calves and yearling females increased in late summer while those of yearling males decreased. Average home ranges varied from 3.6 square miles for females with calves to 5.7 square miles for yearling males. Fall movements suggested that hunting may have been effective in restraining resident elk within or influencing movements to areas closed to hunting. Sagebrush-bunchgrass was the most important vegetation type used for feeding during all months of the study. Relatively high use of the bunchgrass-shrub type in May was related to the earlier development of green vegetation on south exposures. Food habits were studied from 24,240 instances of plant use at 172 feeding sites. Forbs averaged 50 percent, grasses and grass-like plants 29 percent and browse 21 percent of the diet for the May - October period. Forage-class use varied on the different vegetation types but important seasonal and in-season differences occurred only on the sagebrush-bunchgrass and bunchgrass-shrub types. Rumen analysis for September - October specimens supplemented the data from feeding site examinations.

## INTRODUCTION

Numerous authors have discussed the migration patterns and summer distribution of the elk (Cervus canadensis nelsoni) which winter within the Jackson Hole Valley in northwestern Wyoming. Reports prior to 1963 generally emphasize the elk migration from the valley to summer ranges in mountains to the east and north, a part of which are in southern Yellowstone National Park (Preble, 1911, Graves and Nelson, 1918, Sheldon, 1927, Anderson, 1958 and others). Only a few references to elk summering within the valley are included in these reports. Cole (1963) tentatively established that a portion of the elk that wintered in Jackson Hole during 1961-62 was relatively non-migratory and summered on valley ranges within Grand Teton National Park and the National Elk Refuge. The segment of the population involved and other pertinent factors were not known.

This study was conducted from June through September 1963 and from May through November 1964 to obtain quantitative data on the distribution, population status, social habits, movements and habitat relationships of the elk that summer in Jackson Hole Valley.

## PHYSIOGRAPHY OF STUDY AREA

Jackson Hole, an intermountain basin approximately three to 15 miles wide, extends 48 miles in a southwest direction along the east slopes of the Teton Mountain Range. The Pinyon Peaks, Mount Leidy Highlands and the Gros Ventre Range border the valley to the east.

Topographic features are varied but distinct. Flat glacial outwash plains increase in elevation from 6,200 feet in the southern part of the valley to 6,800 feet in the extreme northern portion. Rolling glacial moraines border the valley on the west. Potholes, formed by the melting of large blocks of ice within the glacial outwash, are prominent in the north-central portion of the valley. The outwash plains and moraines were formed during the Bull Lake and Pinedale glacial stages (Fryxell, 1930). Outwash alluvium consists of unconsolidated and poorly consolidated clay, silt, sand and gravel while the moraines are deposits of sand, gravel and boulders (Love, 1956). Isolated buttes near the north and south ends of the valley extend as high as 1,000 feet above the valley floor. The buttes, which protrude through the outwash plain, are of Tertiary origin and have fine textured, residual soils (Fryxell, 1930 and Love, 1956).

The Snake River, flowing in a southwest direction, drains the valley. The Buffalo Fork and Gros Ventre Rivers join the Snake River from the east in the north and central parts of the valley, respectively. Minor drainage courses are conspicuously absent from the outwash plain.

The study area included approximately 130 square miles of the valley

floor from the north end of the National Elk Refuge through Grand Teton National Park to the Moran Meadows (Figure 1).

Records maintained at Grand Teton National Park Headquarters at Moose from 1936 to 1964 show that about one-third of the average annual precipitation of 25.86 inches fell as rain from May through September. The northern portion of the valley was generally snow covered from November through March. Maximum accumulated snow depths varied from 33 to 70 inches. The mean annual temperature was  $37.3^{\circ}$  F with extremes of  $-44^{\circ}$  F (February 1951 and January 1963) and  $93^{\circ}$  F (August, 1961).

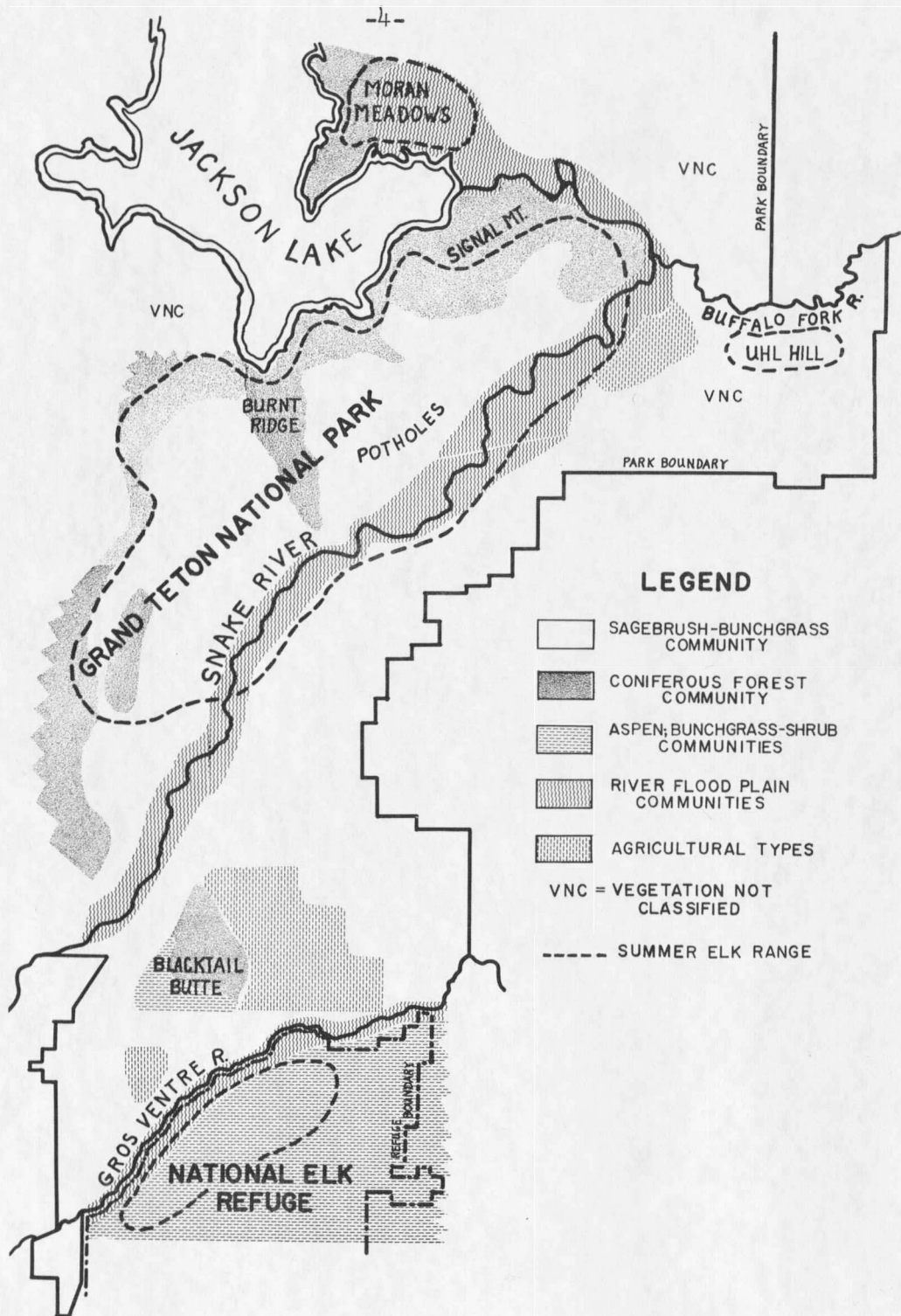


Figure 1. Map of the study area showing vegetation types and summer elk distribution.

## VEGETATION OF STUDY AREA

The vegetation of the study area was sampled by measurements of 31 representative stands supplemented by general observations. Low shrub and herbaceous vegetation was measured by the canopy coverage method (Daubenmire, 1959). For each stand, the projected ground coverage for each taxon was estimated by coverage-classes in each of a series of 20 X 50 centimeter plots. The average canopy coverage per plot and the percent frequency were computed. Since measurements were made after July 15 many of the characteristic plants of the spring aspect were not fully represented within the plots. In the discussion of the tabular data that follows, important species of the spring aspect are mentioned regardless of their occurrence in the plots. Plant nomenclature follows Davis (1951).

In stands where tall shrubs and/or trees were present the center of each canopy coverage plot served as the focus of a random-pair determination (Cottam and Curtis, 1949). The shortest distance between woody plants (greater than three feet tall) occurring on opposite sides of the plot was determined to establish pairs. The number of individuals less than three feet tall for each taxon was recorded for the three foot strip on each side of a wire stretched between each pair. The number of individuals per acre was computed for each species.

The distribution of plant communities (Figure 1) appeared to be influenced by the geologic substrate and/or the physiographic site. Outwash plain, glacial moraine, river flood plain and butte substrates

were present.

Sagebrush - Bunchgrass Community

This community (Figure 2) occurred extensively on outwash plains, river terraces and flood plains. It had limited distribution in open parks of forested areas and on south slopes of glacial moraines.

The dominant species associated with Artemisia tridentata on benches and terraces of the outwash plain were Agropyron spicatum, Festuca idahoensis, Koeleria cristata, and Eriogonum spp. (Table I). On extensive areas south of Burnt Ridge (Figure 1) Artemisia arbuscula equaled Artemisia tridentata in importance and Koeleria cristata became the dominant grass. Selaginella densa attained maximum abundance and formed extensive ground cover on sites east of Signal Mountain. Conspicuous forbs of the spring and early summer aspect included Antennaria spp., Balsamorhiza sagittata, Dodecatheon pauciflorum, Ranunculus glaberrimus, Senecio integerrimus and Viola nutallii. Dessication of the vegetation was evident after mid-July but Arenaria congesta, Erigeron spp., Eriogonum spp. and Lupinus leucophyllus remained in flower through early August.

On the south slopes of potholes, Antennaria spp. increased in importance with a decrease in aerial coverage by grasses.

Artemisia tridentata, Purshia tridentata and Agropyron spicatum dominated river banks and south slopes of moraines with Bromus marginatus also being important on the latter sites. Characteristic forbs were Arabis spp., Hackelia spp., Balsamorhiza sagittata and Lomatium spp. Amelanchier alnifolia occurred as scattered colonies and Berberis repens































































































































