



Range use and food habits of the pronghorn antelope in Central Montana with special reference to alfalfa

by Glen F Cole

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 at Montana State College

Montana State University

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Abstract:

A study of the range use and food habits of the pronghorn antelope was conducted during 1953 and 1954 on an area in Central Montana where the principal land use was stockraising, integrated with alfalfa forage and seed production. Data indicating seasonal and inseason differences in the use of vegetative types were obtained by recording observations of antelope seen on agricultural croplands and rangeland types along routes. Food habits were determined by rumen analyses and the examination of antelope feeding sites. Various characteristics of the alfalfa fields used by antelope and those not used were described and compared. Seasonal differences in the intensities of field use by antelope and the numbers, sex and age classes involved were indicated by regular observations of alfalfa fields. Observations of fawns and yearlings, marked with plastic ear tags, and recognizable adults provided data on movements in relation to fields and some of the factors influencing field use. Measurements of alfalfa plants inside and outside exclosures and pellet group counts along transect lines on fields provided data on the effects and pattern of antelope use on fields.

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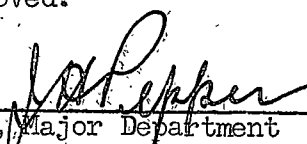
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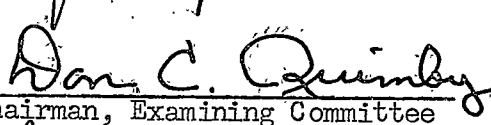
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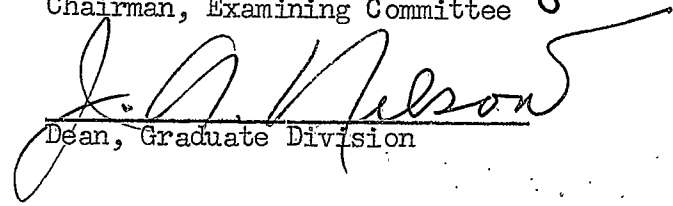
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Approved:


Head, Major Department


Chairman, Examining Committee


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ABSTRACT

A study of the range use and food habits of the pronghorn antelope was conducted during 1953 and 1954 on an area in Central Montana where the principal land use was stockraising, integrated with alfalfa forage and seed production. Data indicating seasonal and inseason differences in the use of vegetative types were obtained by recording observations of antelope seen on agricultural croplands and rangeland types along routes. Food habits were determined by rumen analyses and the examination of antelope feeding sites. Various characteristics of the alfalfa fields used by antelope and those not used were described and compared. Seasonal differences in the intensities of field use by antelope and the numbers, sex and age classes involved were indicated by regular observations of alfalfa fields. Observations of fawns and yearlings, marked with plastic ear tags, and recognizable adults provided data on movements in relation to fields and some of the factors influencing field use. Measurements of alfalfa plants inside and outside exclosures and pellet group counts along transect lines on fields provided data on the effects and pattern of antelope use on fields.

INTRODUCTION

The plains area of Montana is included in the original range of the pronghorn antelope, Antilocarpa americana. Beer (1944) concluded from Seton's early estimates that the "original" population was about 2,500,000. The settling of the plains area by homesteaders in the early 1900s is generally believed to have resulted in conditions that were decidedly adverse to the pronghorn. By 1922-24 the population had dwindled to about 3,000 (Nelson, 1925). During this period of low populations some citizens became actively concerned. Certain ranchers protected small remnant herds. Other remnant herds survived in areas of less intense agriculture and superior escape habitats.

Human depopulation of the plains and the abandonment of dryland farms occurred during the droughts of 1918-21 and 1930-37 (Gieseke et al., 1953). Progressively more efficient law enforcement, predator control, and water developments, in the form of artificial stock reservoirs, probably served to further lessen the environmental resistance of pronghorn habitat. Numbers increased. Biological Survey estimates for 1937, 1938 and 1939 were 10,602, 6,740 and 7,142 respectively. A 1941 ground census estimated the population at 14,233 (Beer, op. cit.). Montana's first aerial census (1943-44) gave an estimated winter population of 14,225 (Bergeson and Thompson, 1946).

To give impetus to the restoration of antelope the Montana Fish and Game Department initiated a trapping and transplanting program in 1946. From 1946 to 1949, 2,383 were transplanted into formerly unoccupied

habitats or historical ranges where the animals were low in numbers. Estimated populations for 1947 and 1951 were 26,000 and 50,600 respectively (Montana Fish & Game Commission 1946-47 and 1950-52). The 1954 population was estimated at 67,600.

In recent years the antelope has become one of the principal huntable big game species in the state. Since 1943, when 750 permits were issued, antelope hunting seasons have occurred annually and have become progressively more liberal; e.g., 2,854, 9,272 and 23,677 antelope permits were issued to the public by the Fish and Game Department for the years 1947, 1951 and 1954 respectively.

Coincident with population buildups, reports of antelope depredation on alfalfa fields, reported as early as 1922-24 for the state by Nelson (op. cit.), increased. Since alfalfa raising is an important economy over much of the antelope range, this conflict has caused much concern. The utilization of alfalfa fields by antelope is well established. The extent of damage, segments of the population involved and other pertinent factors have not been thoroughly investigated. To determine some of these unknown factors an intensive field study was conducted April 6, to September 24, 1953 and May 23, to October 7, 1954. Fall and winter periods in 1952 and 1953 were devoted to the identification of plant collections, analyses of rumen samples and making antelope collections.

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THE STUDY AREA

A 62,160 acre study area in Petroleum County, approximately 45 miles east of the state's geographic center at Lewistown, was selected for study. This area was selected because its antelope populations, land use and vegetation were more or less typical of much of Montana's antelope range and because antelope depredations on alfalfa crops were frequently reported by landowners. Present antelope populations originated from native herds. Census figures of the Montana Fish and Game Department indicated about 4.0 and 4.5 antelope per square mile for 1953 and 1954 respectively. Currently six headquarter ranches are on the area. Abandoned homestead sites are common. The principal economy is stock raising, integrated with alfalfa seed and forage production. Privately owned lands constitute 60.4% (37,590 acres) of the area; publicly owned

39.6% (24,570). Public lands are administered by the U. S. Forest Service, Bureau of Land Management and the State of Montana. Land ownership is shown on Figure 1.

Giesecker et al (op. cit.) describes the climate for the area as semiarid, "... characterized by moderately low rainfall, great extremes in summer and winter temperature, many sunny days and relatively low humidity". The average annual precipitation at Flat Willow (U. S. Department of Commerce weather station) approximately five miles south, is 12.64 inches. The mean average annual temperature is 44.9° F. Temperature extremes in 1953 were 107° F. in July and -7° F. in January.

The characteristic physiographic features are sharply rolling upland plains, shale slopes and bottomlands (Fig. 2A). The latter two occur where erosion has dissected the upland plain. McDonald, Elk and Yellow Water Creeks flow through the area. The soils have developed over Cretaceous shales of the Colorado Formation (Andrews et al, 1944). Upland soils range from heavy clays to shaley clay loams. Shale slopes have soils ranging from fine shale loams to coarse shale gravels. Bottomlands range from silty clays to clay loams. Varying degrees of alkali are present.

Vegetative Types

Rangeland and cropland comprise approximately 95.0% (59,039 acres) and 5.0% (3,121 acres) of the area respectively. Seven rangeland types and two agricultural croplands were recognized as being available to antelope.



Fig. 1. Map showing the interspersion of private and public land on the study area (from U. S. Forest Service land ownership records).

Rangeland types

Sagebrush-grassland

This type occupied the major portion of the study area. Recognition was afforded by the dominant aspect of Big Sagebrush (Artemisia tridentata) (Fig. 2B). Western Wheatgrass (Agropyron smithii), Bluebunch Wheatgrass (Agropyron spicatum) and Blue Grama (Bouteloua gracilis) were the principal grasses. Among these grasses various degrees of association occurred, but the dominance of one species, or another, appeared to characterize important differences in the type. Erosion cuts and depressions in the upland plain favored a Big Sagebrush-Western Wheatgrass association (Fig. 2C). The Big Sagebrush-Bluebunch Wheatgrass association (Fig. 2D) was characteristic of the shaley clay loams on the uplands within the northwest two-thirds of the area. In this area the abundance of Blue Grama appeared to be influenced by livestock grazing; e.g., ridge tops (Fig. 3A) and areas around stock reservoirs had a dense Blue Grama turf. The upland clay loams on the southeastern third of the area favored the Big Sagebrush-Blue Grama association. Bluebunch Wheatgrass occurred as isolated plants within clumps of Big Sagebrush.

Grassland

This type had limited representation. Recognition was afforded by the absence of the Big Sagebrush aspect and the presence of certain grasses. Small patches of native grassland (Western Wheatgrass-Bluegrass, Poa sp.) occurred within swales which were never cultivated (Fig. 3B), but most of the type was confined to abandoned upland fields. Artificial-

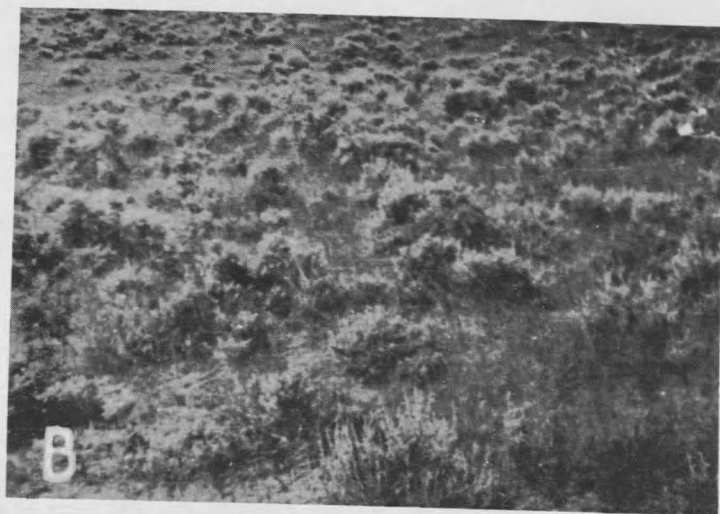


Fig. 2. Photographs illustrating characteristics of the study area. A. Characteristic physiography; upland slopes and bottomlands. B. Big Sagebrush aspect in Sagebrush-grassland type. C. Big Sagebrush-Western Wheatgrass association in an erosion cut. D. Big Sagebrush-Bluebunch Wheatgrass association.

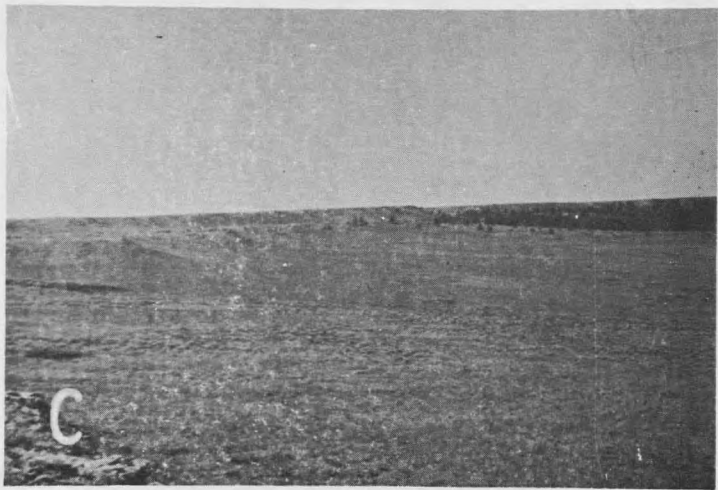
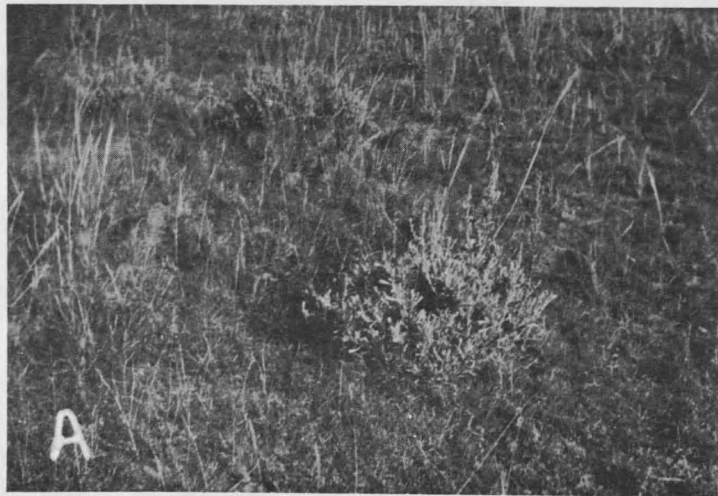


Fig. 3. Photographs illustrating characteristics of the study area. A. Big Sagebrush-Blue Grama association. B. Native grassland (Western Wheatgrass-Bluegrass) in a swale on the upland plain. C. Extensive Shale Slope type grading from a low shale ridge. D. Greasewood type showing luxuriant vegetative growth.

ly seeded Crested Wheatgrass (Agropyron cristatum) occupied the major portion of the abandoned sites. Other sites showed varying degrees of succession toward the Sagebrush-grassland type. On heavy clay soils invasions by Big Sagebrush appeared to be retarded. Here, Western Wheatgrass, Needle-and-thread (Stipa comata) and Green Needlegrass (Stipa viridula) were dominant.

Clay Slope

This was the smallest upland type. Recognition was afforded by the slope location, the absence of the Big Sagebrush aspect and the exposed clay soil. This type was confined to the southeastern third of the area and occurred on isolated west-facing slopes within Sagebrush-grassland. Forbs, especially vernal types, were relatively abundant. Stemless Goldenweed (Haploppapus acaulis), Nuttall Goldenweed (Haploppapus nuttalli) and Lewis' Wild Flax (Linum lewisi) were some of the characteristic forbs.

Shale Slope

This type had limited representation on the northwest two-thirds of the area. Here, it was confined to steep slopes below shale ridges which bordered bottomlands. On the southeastern third of the area the type was more extensive, occupying gentle slopes which graded towards bottomlands from low shale ridges (Fig. 3C). The Sagebrush-grassland type frequently occurred between the Shale Slope and other bottomland types here. Recognition of the type was afforded by the slope location, the absence of the

Big Sagebrush aspect and the coarse shale soils. The position below shale formations and a lower slope transition into other rangeland types suggested pioneer status. False Lupine (Thermopsis rhombifolia) and Big Sandgrass (Calamovilfa longifolia) were the characteristic plants.

Greasewood

In size this was a minor type, occurring only in bottomlands containing the larger streams. Recognition was afforded by the dominant aspect of Greasewood (Sarcobatus vermiculatus). Associations varied from Greasewood-Saltgrass (Distichlis stricta) on limited sites of alkali impregnated silty clays to Greasewood-Western Wheatgrass on clay loams. In close proximity to streams or on sub-irrigated sites the latter association acquired dense and luxuriant growth (Fig. 3D). A varied forb and deciduous shrub flora were present. The type was commonly adjacent to alfalfa fields.

Sagebrush-Greasewood

This type was slightly more extensive than the former. Recognition was afforded by the dominant aspect of the Big Sagebrush-Greasewood association. It was confined to bottomland flats and gentle slopes between the Sagebrush-grassland and Greasewood types. On heavy clay soils, marginal conditions for Big Sagebrush were suggested by its low stature and less vigorous appearance. Western Wheatgrass was the dominant grass. Sparse vegetation and frequent areas of bare soil were characteristic.

