

BIG-GAME ANIMALS OF THE WEST AND THEIR
RELATION TO RANGE MANAGEMENT

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CONTENTS

	Page
Preface-----	I
Introduction -----	I
Odocoileus (Deer)-----	6
Distribution -----	7
Description -----	II
Importance -----	I2
Feeding Habits -----	I3
Conflicting Interests-----	I5
Cervus (Elk) -----	I6
Distribution -----	I6
Description -----	I8
Importance -----	I8
Feeding Habits -----	I9
Conflicting Interests -----	2I
Oreamnos (Mountain Goat)-----	22
Distribution -----	22
Description -----	24
Importance -----	24
Feeding Habits -----	24
Conflicting Interests-----	25
Ovis (Mountain Sheep) -----	25
Distribution -----	25
Description -----	27
Importance -----	27

Feeding Habits -----	27
Conflicting Interests -----	28
Antilocapra (Antelope) -----	28
Distribution -----	28
Description -----	30
Importance -----	31
Feeding Habits -----	31
Conflicting Interests -----	32
Ursus (Bear) -----	33
Summary -----	36
Bibliography -----	37

DISTRIBUTION MAPS

White-tailed Deer (Map 1) -----	8
Mule Deer (Map 2) -----	9
Elk (Map 3) -----	17
Mountain Goat (Map 4) -----	23
Mountain Sheep (Map 5) -----	26
Antelope (Map 6) -----	29

PREFACE

The following library study has been made because material concerning domestic range cattle and wild animal conflicts is rather scattered and in some instances very meager. It is hoped that the bringing together of the material will aid other students and perhaps stimulate other scientific field studies that will lend much needed information.

I have no first-hand knowledge on the subject and therefore have had to depend entirely upon many different authors. In gathering the material I have in all cases tried to take it only from authors whom I consider to be reliable and competent.

The paper is made up quite largely of quotations because the material quoted has been written by people who, directly or indirectly, have written from first-hand knowledge. Because of these quotations I wish to express my appreciation to all the people from whose writings I have quoted.

Especially do I wish to extend my appreciation to Professor Earl O'Roke, University of Michigan, for the many helpful suggestions that I obtained, and have used herein, while attending his lectures in the Range Management course.

Carlton J. Blades.

BIG*GAME ANIMALS OF THE WEST AND THEIR RELATION TO RANGE MANAGEMENT

INTRODUCTION

From the time of Coronado's expedition into the western grazing lands in 1540, grazing has been an important industry in the West. At that time it is believed that the Great Plains were heavily covered with grass, in fact Castenada, historian of Coronado's expedition, relates "Who could believe that 1000 horses and 500 of our cows and more than 5000 rams and ewes and more than 1500 friendly Indians and servants in traveling over these plains would leave no more trace where they had passed than if nothing had been there -----". (a)

At that time this vast area in western United States, uninhabited by white people and inhabited by scattered tribes of Indians, was occupied by game such as the buffalo, elk, deer, antelope, bear, wolves, and many smaller forms of all types and description.

As the population increased in the East and much of the land was tilled for crops there began a steady migration westward. This migration of settlers followed closely the hardy frontier pioneers.

Barnes (1926) (a) states, "In the latter part of the seventies the West awoke to the opportunities offered for raising cattle and sheep upon the open ranges that lay west of the Missouri River from the Mexican to the Canadian line. Great cattle companies were formed in the East and in Europe, the promoters of which went into Texas and bought thousands of longhorned cattle and moved them

(a) Barnes, W.C., 1926. The Story of The Range, U.S.D.A., Forest Service Publication.

north onto the virgin unoccupied ranges. Those were the great years of the Texas trails, during which that huge State disgorged hundreds of thousands of her surplus cattle into the new unstocked ranges to the north. Millions were invested into the enterprise, and for a few years millions were made, principally in speculation, promotion, and on paper.

The stockmen of the West were a prodigal as well as a restless lot. With what seemed an almost unlimited world in front of them they resented the crowding that began to develop, and there was a constant pushing forward farther and farther out into the praires. They disputed with the Indians and the buffalo for the occupancy of the land, with the result that always followed where white man came. The redman and his friend, the buffalo, slowly melted away, and eventually the tide from the West met the advance from the East".

This steady migration and competition for land continued until there was no more open grazing land unstocked. Every rancher increased his herds because he felt that if his cattle did not utilize all the land possible someone else would only take it. As a result we not only find no open range unstocked in the eighties and nineties, but also every range overstocked by great numbers. This treatment of that arid country of course destroyed the grass. The game animals had to either starve, be slaughtered, as was the case with the buffalo, or move back into the more inaccessible areas of the mountains. Thus we find that the natural ranges of the game animals were decidedly reduced and most of the animals

migrated to the higher mountain regions, out of their original natural habitat, in many cases.

Since the ninties there has occurred a gradual readjustment. The public have begun to realize what has happened and have contributed somewhat to the rebuilding of the West by creating national forests, parks, and game refuges to protect what remains of our once large herds of big game animals.

No matter what we of today may think of the early settlement of the West, the damage has been done and we have on our hands a great overgrazed, denuded area which in many cases is almost worthless because of erosion that has taken place. It is up to us to plan for the most complete rejuvenation possible for this area and to construct plans so the land may be used to the greatest advantage. No doubt there is a place for the grazing industry and also plenty of space and areas suitable for big game if the whole situation is studied and worked out on a sound land use policy. We know that at present the recreational industry is no small organization and as game favors the development of this industry we may be able to capitalize on this idea to a greater extent than today and thus obtain use of areas that have been considered worthless heretofore.

No doubt, as will be shown later, there is a real conflict between some of the large game of the West and the cattle industry. However, in many cases it is probable that this conflict is more imagined than real, the idea created by people who for one reason or another may have some objective purpose in mind for thus expressing themselves. In other cases this conflict may seem real

to ranchmen who are perhaps somewhat prejudiced and have just not taken the time to think about the situation.

The following paper deals mostly with the big game animals of the grazing type that may cause conflict with range cattle because of the competition for food that might occur. Not much has been said about other conflicts occurring besides competition for food, but we know there are such although this situation has not received so much attention.

For instance, Frick states (1935)(60), "Few people realize that our wild game is subject to the same infectious, contagious, and parasitic diseases that attack our domestic livestock. Sometimes wildlife spreads disease to farm animals and other times they contract it from domestic stock. You can easily imagine when an outbreak of a disease affecting domestic animals gets into wild animals it causes a tremendous complication in its method of treatment or eradication".

In concluding this introduction the writer believes that it is best to begin laying plans for such future conflicts that are apt to occur. It will tend to produce better results than to rush headlong into some quick thought-up solution when the problem arrives to a danger point.

The writer has not enough experience and has not had the opportunity to study this situation to the extent that he can recommend plans of action. However, all previous work has tended,

more or less to favor the stockman because stock raising is the main industry over much of this vast area, and also because the stockmen are strong enough in organization to exert quite an influence in the nations affairs. It seems that the game problem ought to be given a little consideration for after all it is a business that brings in over six million dollars annually to the United States. Big game contributes its share of this amount and probably under correct management this industry will grow.

ODOCOILEUS
(Deer)

The genus Odocoileus is divided into two main groups of species and subspecies, namely, the Virginia or white-tailed deer and the black-tailed or mule deer.

The black-tailed deer are rather heavier in build and more robust than the white-tailed deers, the ears are larger and the tip of the tail is black instead of white, antlers with tines pronged in contrast to the single individual tines of the white-tailed deer(I).

Species and Subspecies of the Virginia Deer.

Odocoileus virginianus ----- Virginia deer.
 Odocoileus virginianus borealis -----Northern white-tailed deer.
 Odocoileus virginianus clavium -----Key deer.
 Odocoileus virginianus louisianae-----Louisiana white-tailed deer.
 Odocoileus osceola -----Florida white-tailed deer.
 Odocoileus virginianus macrourus -----Plains white-tailed deer.
 Odocoileus texanus -----Texan white-tailed deer.
 Odocoileus couesi -----Sonora white-tailed deer.
 Odocoileus leucurus -----Oregon white-tailed deer.

Of the above group the last four are the ones of main interest to this paper.

Species and Subspecies of The Mule Deer.

Odocoileus hemionus hemionus -----Mule deer.
 Odocoileus hemionus eremicus-----Desert mule deer.

Odocoileus hemionus californicus-----California mule deer.
Odocoileus hemionus canus -----Mexicana mule deer.
Odocoileus crooki -----Crooked black-tailed deer.
Odocoileus columbianus columbianus----Columbian black-tailed deer.
Odocoileus columbianus scaphiotus----Southern black-tailed deer.
Odocoileus columbianus sitkensis-----Sitka black-tailed deer.
Odocoileus columbianus columbianus----Columbian black-tailed deer.
Odocoileus virgultus-----Minnesota black-tailed deer.

It is readily noticed that there are more species of black-tailed or mule deer to deal with in the range country than there are white-tailed species. Of the species of mule deer they are all of interest to the western range except the last two.

Distribution

Deer are of interest, for one reason, because they have sustained themselves well in their natural environment and they still inhabit the entire continent as they did when the first white people arrived. Although somewhat restricted is their range, in certain localities, they have not lost ground or range as most other wild animals have.

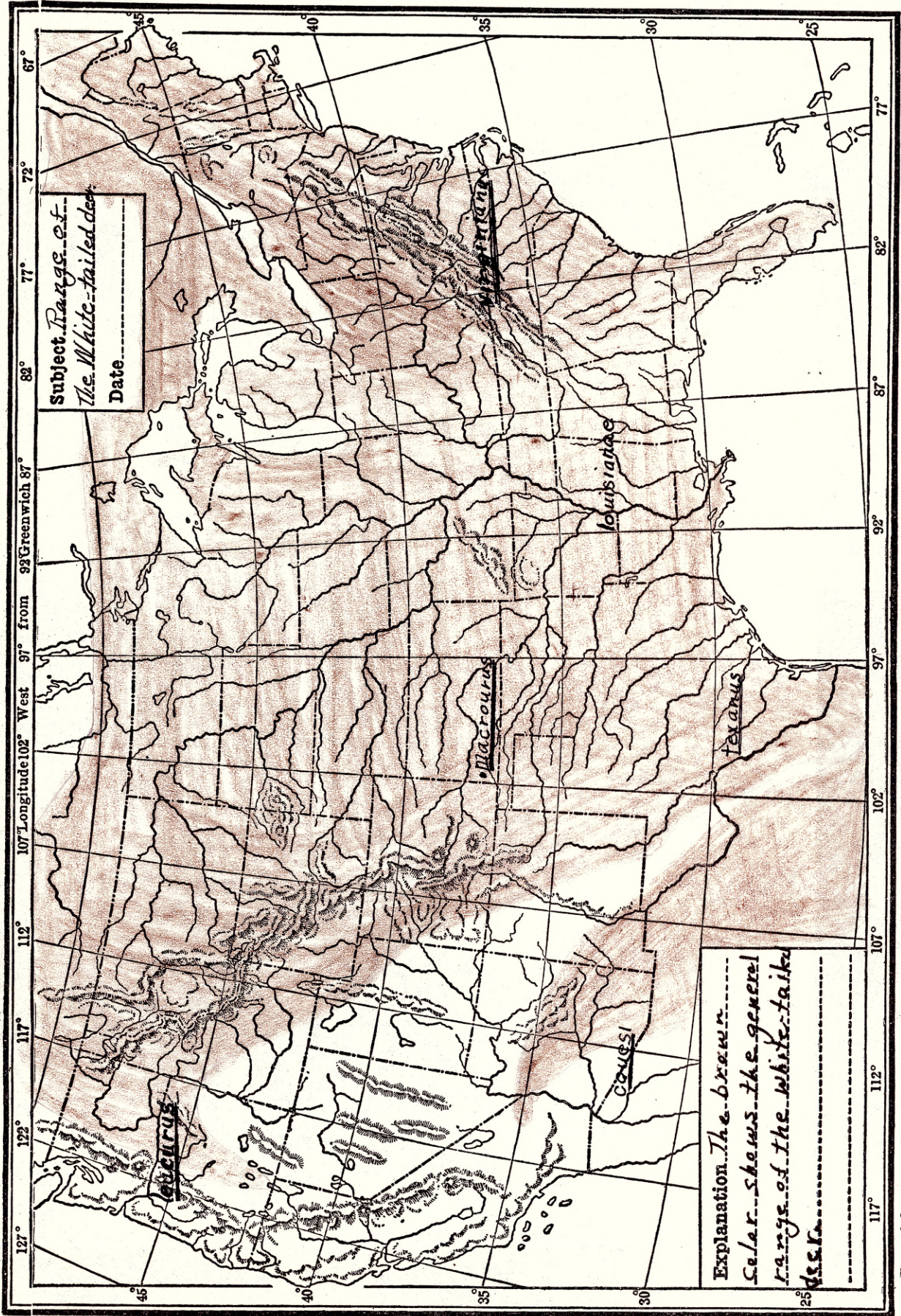
Distribution of The White-Tailed Deer

O. virginianus macrourus--

"Found from the Dakotas, Nebraska, and Kansas west to the Rocky Mountains; from Alberta in the north to northern New Mexico in the south.

O. texanus--

McKinley's Series of Geographical and Historical Outline Maps. No. 175b. United States (physical features and State boundaries).



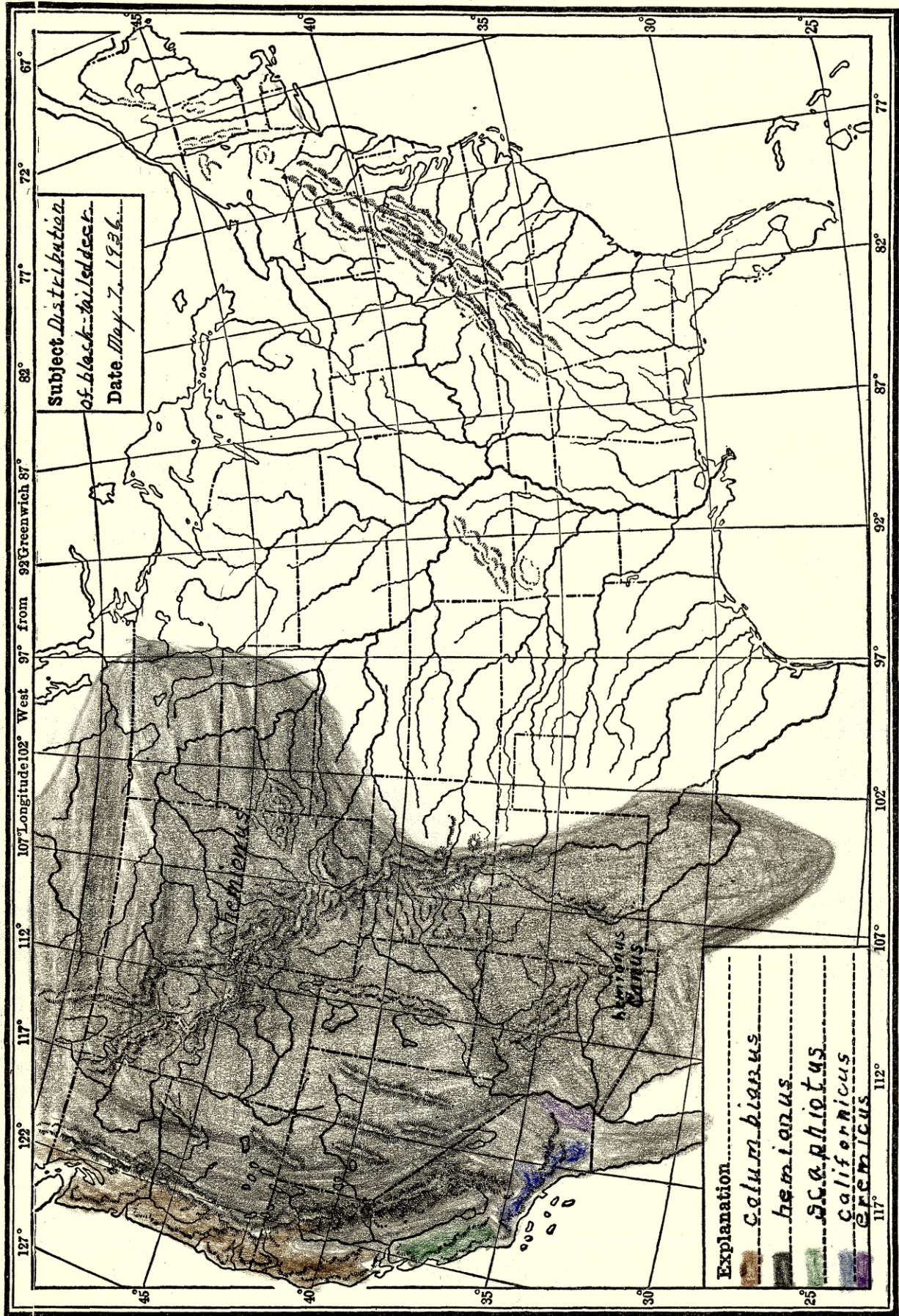
Subject *Rangae. et.*
The White-tailed deer
 Date: _____

Explanation *The Brewer*
Shows the general
ranges of the white-tailed
deer.

Map I.

Distribution of The Blacktails.

McKinley's Series of Geographical and Historical Outline Maps, No. 175b, United States (physical features and State boundaries).



Map II. (2).

Copyright, 1900, The McKinley Publishing Co., Philadelphia, Pa. Renewed 1928.

Copied from - Lives of Game Animals - by Seton. p 378.

Found in the Rio Grande section of Texas.

O. couesi--

Found in southern New Mexico and Arizona.

O. leucurus--

Found along the lower Columbia River, Oregon.

Distribution of The Black-Tailed Deer.

O. hemionus hemionus--

Found from the Dakotas through Nebraska, Kansas and Oklahoma west to eastern British Columbia, Washington, Oregon, and California.

O. hemionus eremicus--

Found in the western desert tract of the U.S., on both sides of the Colorado River and about the head of the Gulf of California.

O. Hemionus californicus--

Found from southern California into northern lower California.

O. hemionus canus--

Southwest Texas, New Mexico, Arizona, and northern Mexico, from Sonoran to Boreal zone.

O. crooki--

Dog Mountains, New Mexico and Bill Williams Mountains, Arizona.

O. columbianus columbianus--

Found in the Pacific Northwest from northern California

to British Columbia and from the Sierra Nevada and Cascade Mountains to the Pacific Ocean.

O. columbianus scaphiotus--

Found in the coast region of California, from San Francisco Bay southward"(I)

Description.

Virginia deer--

"A large, gracefully-formed deer, the male with antlers which are shed in the spring, the female hornless. Tail rather long for a deer, somewhat bushy, conspicuously white on the underside. Antlers of the full grown male of good size, no browtines.

The sexes are alike in color, but the color varies with the season. They are grayish brown, band across the nose, ring about the eye, inside of the ear whitish, tail dusty. The belly, throat, and the inside of the legs whitish, tail conspicuously white. Weight of the males about 150-300 pounds. Does 100 to 150 pounds(I)".

Mule deer--

"Sexes are colored alike. The upperparts are from tawny to yellowish brown, with a large patch of white on the rump and about the tail, a dark patch on the forehead, inner ear grayish white, tail white except for the tip which is black. The underparts are darker than the upperparts. The inner side of legs and throat white, tail naked

on the underside. Weight of the buck, 150 to 200 pounds with unusual weights exceeding 400 pounds.

The black-tailed deer may be distinguished from the white-tailed deer, not only by the difference in color of the tail, but also by the much larger ears of the former, and the bounding gait(I)".

Economic Importance

Lantz (1908) (10) writes, "The members of the deer family (Cervidae) rank next to the cattle and sheep family (Bovidae) in general utility, and are the most important of the big game animals of America.

Wherever obtainable in quantity the flesh of deer of different kinds has always been a staple article of diet, and under present market conditions it is hardly necessary to say that venison is perhaps the most important game, being a favorite with epicures and also having a wide use as a substitute for beef and mutton, which meats it resembles in texture, color, and general characteristics.

The other products of the deer, skins and horns, are of considerable importance, and in countries where deer are abundant and especially where large herds are kept in semidomestication, the commerce in both is extensive".

Hall (1927)(9) writes, "If each person in California should list all animals of the state in order of their interest to him, I doubt not but that deer would top the list when all votes were

cast. Much the same results would be expected in any state and, for that matter, in most countries of the world. This is primarily explained by the many uses man has found it possible to make of deer---".

Carhart (1920)(*) writes, "The aesthetic and recreational value of deer is well known----. Mere knowledge that deer exist in a given tract of woodland at once endows this with added interest to most persons---. There is also a great interest in deer hunting!"

I do not believe that anyone will dispute the statement that deer were a great benefit to the early settlers in this country.

Feeding Habits.

"Mule deer do not prefer grasses. If watched at close range when grazing they can be seen to eat around the grass clumps and sometimes to drop small bunches of grass that they pull up accidentally with the more desirable plants. It is well established from laboratory analysis of stomach contents that deer feeding in meadows utilize the herbaceous plants and not the grasses. Various grasses are, of course found in the stomachs of deer, but the percentage of grass is a small part of the total and most of the grass is taken accidentally.

Dr. H.C. Bryant has supplied the following list of plants that he has seen the mule deer eat in the Yosemite region. These plants are:

Willow -----(Salix)

Aspen -----(Populus tremuloides)

Black Cottonwood -----(*Populus trichocarpus*).
 Oak -----(*Quercus* sp.).
 Serviceberry-----(*Amelanchier alnifolia*).
 Snow Brush -----(*Ceanothus cordulatus*).
 Deer Brush -----(*Ceanothus integerrimus*).
 Evening primrose-----(*Oenothera hookeri*).
 Manzanita -----(*Arctostaphylos* sp.).
 Snowberry -----(*Symphoricarpus albus*).
 Apple -----(*Malus* sp.).
 Mushrooms -----

Of all of these the deer brush apparently is the most preferred. Herbaceous plants in great variety are utilized. The acorns of the oak, as well as the leaves, are sought. Mushrooms furnish an important article of diet at the time they begin to push through the ground. ----- All deer are fond of salt.-----

When browsing, deer not only reach as high as is possible from a position on all four feet, but often reat up on the hind feet to reach the desirable forage." (9)

Dixon (1928) (4) states, "The food of deer varies greatly with season and locality. It is therefore necessary that observations of feeding be carried on during winter, spring, summer, and fall in several regions. In Yosemite, we have observed deer grazing on fifty different kinds of plants in summer, yet we have seen deer brush (*Ceanothus integerrimus*) browsed only once. During winter observations we found that this same brush was

sometimes more desired by deer than any other plant."

Conflicting Range Interests.

"Of the many plants eaten by deer in summer we find that over 60% are taken regularly by sheep and over 50% are grazed regularly by range cattle. Thus there is real competition for forage between deer and sheep, and deer and cattle!" (4)

Nelson, 1930, writes, "While it has been possible on the California National Forest in the past to provide forage for both a limited number of livestock and deer on the same range, the continued competition by the two classes of animals for the same forage plants and browse species has greatly reduced the forage capacity of these ranges. Furthermore, the heavy use made of these ranges by stock during the earlier years has left the inevitable results of overgrazing and depletion." (12)

It has also been found that in many localities the deer graze on the private ranch lands rather than on the National Forest lands.

When grazing, of the same area or pasture, by both cattle and deer take place there is danger of disease being transmitted from one to the other. Deer are susceptible to many of the domestic diseases. Even though they are not infected they might carry the organisms from one part of the range to another.

For example, deer suffered a severe loss in California in 1924 from an attack of foot and mouth disease (*Cytoryctes aphtharum*).

CERVUS

(Wapiti)

The following species and subspecies have been described:

Cervus canadensis canadensis -----American wapiti.
 Cervus canadensis manitobensis -----Manitoba wapiti.
 Cervus canadensis occidentalis -----Roosevelt wapiti.
 Cervus merriami-----Arizona wapiti.(Extinct)
 Cervus nannodes -----Dwarf elk.

Of the above named, Cervus canadensis is the most important in the United States today. However, this paper is concerned somewhat with Cervus canadensis occidentalis and Cervus nannodes. Cervus canadensis manitobensis is found in Canada.

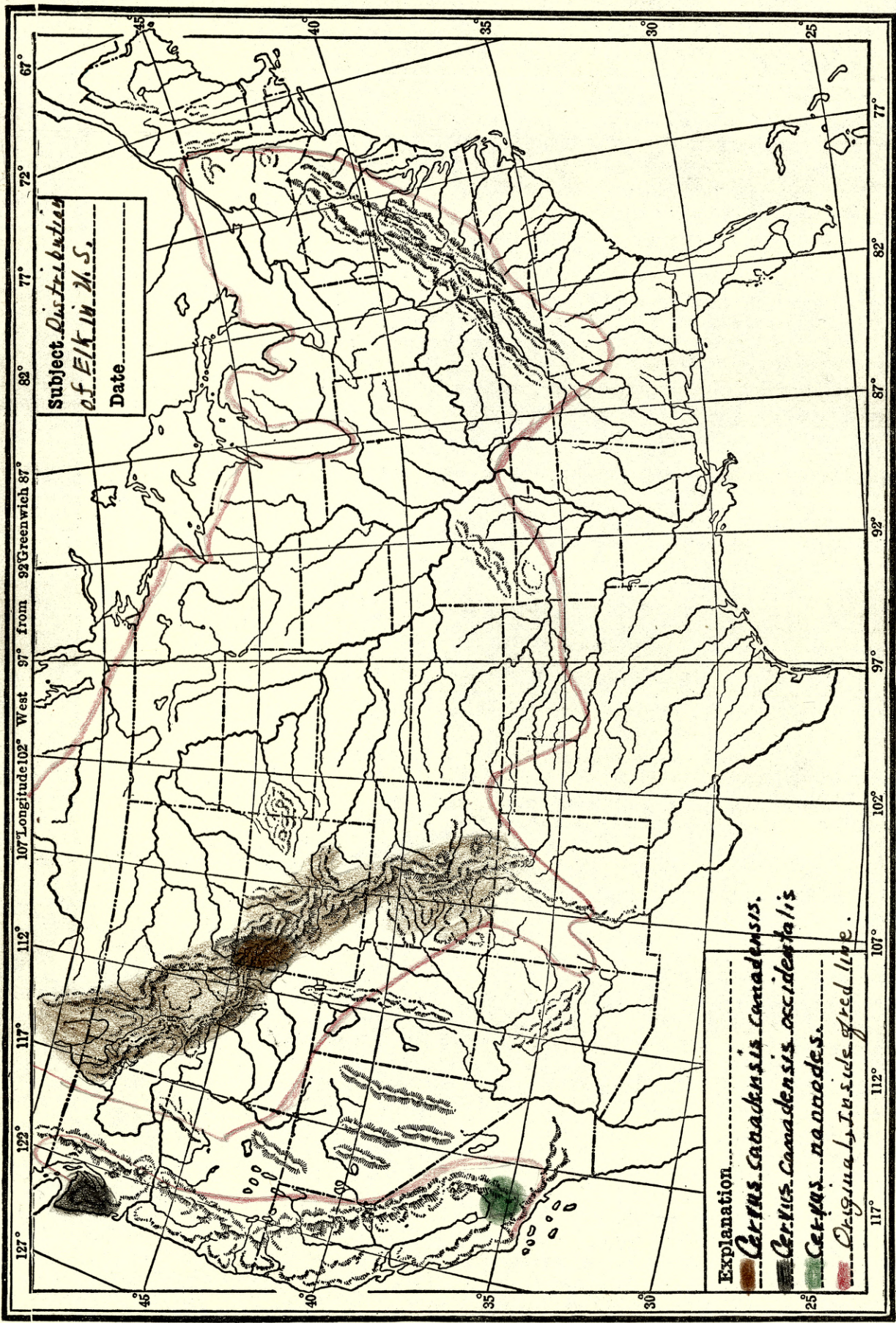
Distribution

The American wapiti is found in the Rocky Mountains from northern New Mexico and Colorado north into Alberta. However, the present distribution is limited mostly to protected zones, such as the Jackson Hole Elk Refuge, Yellowstone National Park, and the National Forests.

The Roosevelt wapiti was originally found on Vancouver Island, in the Olympic Mountains of Washington, and parts of western Oregon and California. At present the distribution is limited to the Olympic Peninsula. (See *Map. 3*)

Distribution of Elk in The U.S.

McKinley's Series of Geographical and Historical Outline Maps. No. 175b. United States (physical features and State boundaries).



Map III (3)

Copyright, 1900, The McKinley Publishing Co., Philadelphia, Pa. Renewed 1928.

From - Lives of Game Animals, Seton p. 10

Description

"A very large deer of typical structure, the males with large, widely-branched antlers, having a well developed brow; muzzle naked and moist; neck maned; tail short; a large light-colored rump patch present.

The color of the male is a chestnut brown over the head and neck, sides and back yellowish gray to brownish gray, the underparts whitish. The females are less strongly marked than the males.

The males weigh from 700 to 1000 pounds and the females from 500 to 600 pounds.

The Roosevelt wapiti are much darker in color!" (22)

Economic Importance

Shoemaker states (33), "It is believed that the recreational value of these animals are more assumed than real. However, the fact that there are elk in this region (Arizona) undoubtedly is more or less of a drawing card to the city dweller and the eastern dude-----

It is difficult to estimate the monetary value that should be placed on these animals. Undoubtly there is such a value since the meat of elk is palatable and since especially the mounted heads have more or less intrinsic value as ornaments and trophies. Also some revenue would accrue to the State when the numbers increase to a point where some hunting can be allowed, since a good many sportsmen would be willing to pay a sizable license fee for

the privilege of killing elk"

"Public sentiment in the State of Washington is strongly in favor of the elk. Any attempt to provide by legislation for legalized reduction in numbers through hunting has been vigorously opposed-----.

Unquestionably from a recreational standpoint the Roosevelt elk adds much to the Olympic Peninsula. There is no question but what there is a large utilitarian or money value to be considered in connection with this animal. Limited annual kill on certain heavily populated watersheds, if provided for would attract big game hunters from all over this country and Europe because of the splendid trophies to be secured (26)"

In 1911 Preble states (28), "Some of the most intelligent residents of Jackson Hole have estimated that the value of the elk to the region is equal to the revenue derived from stock raising. It is evident the region would not support such a large population were it not for the elk"

Feeding Habits

"In the studies carried on by the Forest Service in connection with the Sun River and northern Yellowstone Park herds, it was found that the elk preferred a grassy type of range, and where the better grasses are in sufficient quantity, they confine their diet very largely to such forage. With this particular herd perhaps 85% of the elk's winter diet is composed of grasses when the winter conditions will permit their utilization. It is found, however, that

the diet during the winter months is gauged largely by the severity of the winter and the condition of the snowfall. Elk will obtain feed in $3\frac{1}{2}$ to 4 foot of loose snow.

Aquatic vegetation forms a part of the summer, as well as the winter, diet. Elk have the same habit as moose in obtaining this class of feed. They wade into shallow lakes and marshes shoulder deep, and plunge their heads beneath the surface to bring forth luscious root and stem of some plant growing on the bottom. The warm springs provide green cresses during the winter months and these plants are extensively eaten wherever found.

Forage on the high ranges, to which the drift moves progressively as the summer advances, offers a wide variety of vegetation for the discriminating tastes of these animals. Of the grasses the fine leaved fescue (*Festuca*) is in greatest demand, followed closely by the coarser wheat grasses (*Agropyron*), porcupine grass (*Stipa*), pine grass (*Calamagrostis*), sedge (*Carex*), brome grass (*Bromus*), June grass (*Koeleria*), blue grass (*Poa*), *Melica*, *Cinna*, *Juncus*, *Agrostis*, *Phleum*, *Aira*, and many others occurring in lesser quantities.

Grasses make up the bulk of the spring and summer forage, but these are supplemented by various weeds, among which are dandelion, mountain dandelion, balsam root, dogtooth violet, blue camas, hawkweed, thistle, larkspur, aster, and many others.

Like domestic stock elk require some of the coarser plants to balance their diet. To meet this need they browse lightly during these months on willow (*Salix*), aspen (*Populus*), yellowbush (*Chrysothamnus*), shrubby cinquefoil (*Dasiphora*), snowberry (*Symphoricarpos*), rose (*Rosa*), serviceberry (*Amelanchier*), alder (*Alnus*),

sage (*Artemisia*), and others.

Elk like and need salt and will use the salt put out for range animals (34)!"

Conflicting Range Interests

It will readily be noticed that the elk utilize the same type of feed that domestic range animals use. However, as the elk will usually pasture in very high regions during the summertime most of the conflict occurs in finding winter range for the elk. The cattle and sheep are driven to higher elevations during summers and in the fall are driven down to winter range. It is the winter range of the elk that is grazed by domestic animals in the summer so as winter approaches the elk face a food shortage.

This problem is one that is prevalent in Glacier National Park (36). Within the park a few private ranches still exist and they depend upon existence through the use of grazing lands within the park. These lands are the winter feeding grounds for the elk.

Shoemaker states(33)(1930), "Because of the fact that some of the forage on these ranges is of such character that it is palatable to both cattle and elk, and to a lesser extent to both sheep and elk, there is more or less conflict between the game and domestic animals in the use of the range. To date, this conflict has been reflected primarily in the fact that it has been necessary to insure sufficient forage for the elk on some of the choice summer units by adjustments in cattle grazing.-----"

If the number of elk continue to increase and the area of their range expand, this conflict between game and cattle is going to become more acute and widespread. Probably also conflict will develop between the elk and the sheep. Undoubtedly there is a place on this range for both game and domestic stock. Therefore both will have to receive some management effects."

It is likely that the elk will soon cause conflicts to occur because wherever this species has been protected, the protection usually providing the necessary winter range, it has increased very rapidly. As these protected areas become overstocked the animals will migrate to other areas and conflicts will occur.

OREAMNOS

(Mountain Goat)

The following species and subspecies have been described:

Oreamnos americanus americanus--

Oreamnos americanus columbiae---

Oreamnos americanus missoula----

Oreamnos americanus kennedyi----

Distribution

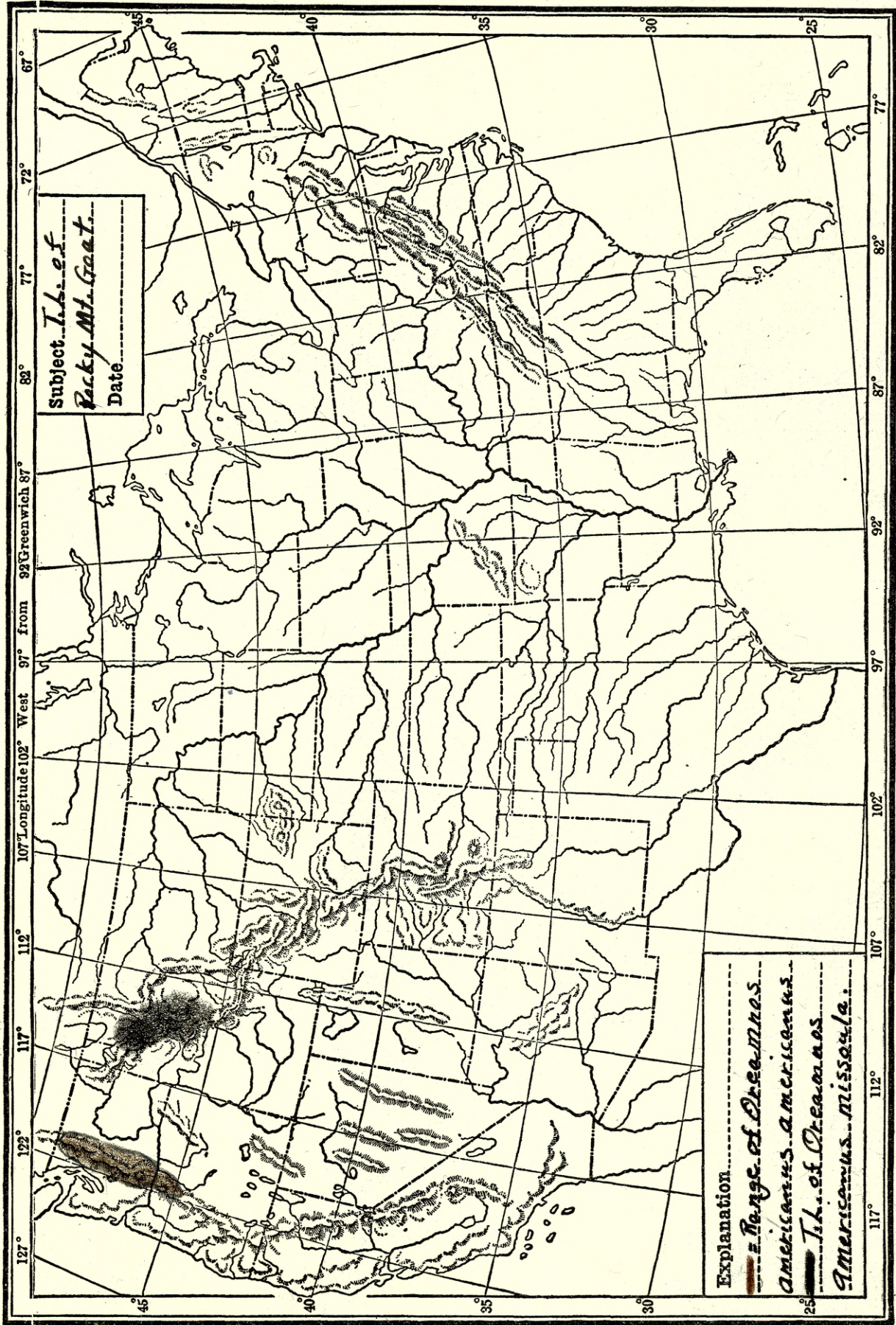
The type locality for *O. americanus americanus* is the Cascade Range, near the Columbia River in Oregon and Washington.

O. americanus columbiae, occurs in northern British Columbia so we are not concerned with the species in range management.

O. americanus kennedyi occurs in Alaska.

O. americanus missoulae is found in the mountains of Montana.

McKinley's Series of Geographical and Historical Outline Maps. No. 175 b. United States (physical features and State boundaries).



Subject *T.L. of*
Rocky Mt. Gaat.
 Date _____

Explanation.....
 — Range of *Oronnois*.
 — *Americus americanus*.
 — *T.L. of Oronnois*.
 — *Americus missoula*.

Map IV (4)

Copyright, 1900, The McKinley Publishing Co., Philadelphia, Pa. Renewed 1928.

The type locality is Missoula, Missoula County, Montana. (See *Map. 4*)

These animals live only in the roughest mountain ranges or in the high latitudes. In the southern part of the range the Rocky Mountain goat is seldom seen below timber line and the wilder and more precipitous the region the more abundant the goats.

Description

"A large white mountain antelope of about the size and general appearance of a very large goat, both sexes are horned. The sexes are colored alike. They are white with more or less pale yellowish tinge. The male will weigh about 100 pounds (49)!"

Economic Importance

Although this species is rather limited as to distribution in the United States yet it is important as a game species.

"However, the fact that *Oreamnos* lives only in the highest, roughest mountain ranges, apparently acts as a protecting factor for an animal that would otherwise have been exterminated before this (49)!"

They are easy to hunt if the hunter is willing to climb to high altitudes. The meat, however, is dry.

Feeding Habits

Foliage of mountain plants, moss, lichens, grass, twigs, and brush.

Conflicting Range Interests

There are no conflicting interests because of the natural habitat that the goat occupies.

OVIS (Mountain Sheep)

Species and subspecies concerning this paper:

- Ovis canadensis canadensis -----Rocky Mt. bighorn
 Ovis canadensis auduboni -----Audubon bighorn (Extinct)
 Ovis canadensis Californiana -----Lava beds bighorn (Extinct)
 Ovis canadensis gaillardi -----Galliard bighorn.
 Ovis canadensis sierrae -----Sierrae Nevada bighorn.
 Ovis canadensis texiana -----Texas bighorn.
 Ovis canadensis nelsoni -----Desert bighorn.

Distribution

O. canadensis canadensis is found from Alberta south through Colorado to New Mexico and central Arizona, through eastern Washington and Arizona.

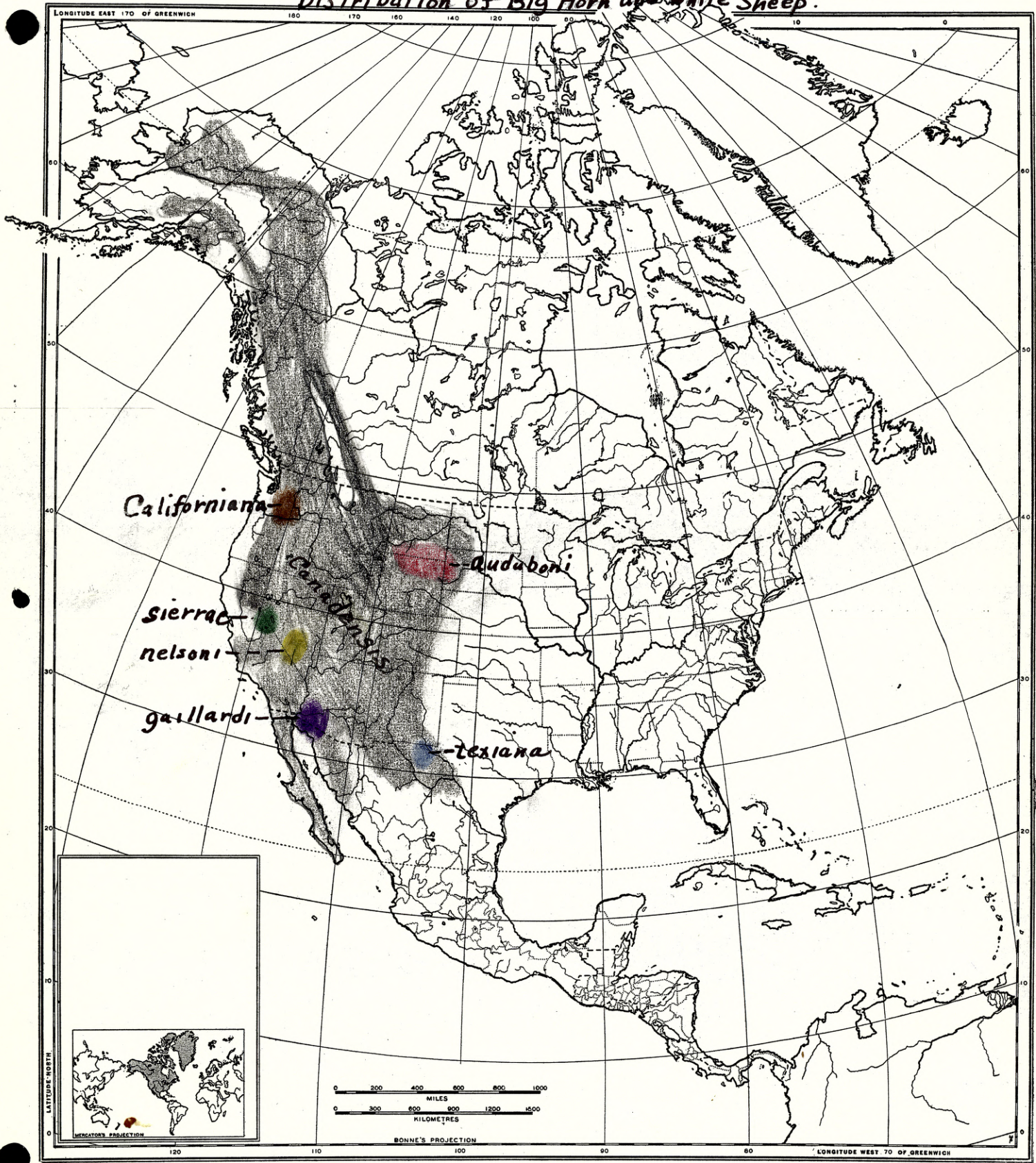
O. canadensis gaillardi is found in the mountains of northwestern Sonora and southern Arizona.

O. canadensis texiana is found in the Guadalupe Mountains of Texas and New Mexico.

O. canadensis nelsoni is found in the Mountains of southern Nevada, southern California, and the northern border of lower California.

O. canadensis sierrae is found in the high Sierras from Mono

NORTH AMERICA—200 C
Distribution of Big Horn and White Sheep.



HALL'S OUTLINE MAPS AND GRAPHS

PUBLISHED BY JOHN WILEY & SONS, Inc., NEW YORK
Copyright, 1935, by Robert B. Hall

Map V (5)

Reprint from - Seton (45) P. 581).

County south to the vicinity of Mount Whitney, California.(See map5)

Description

"A large wild sheep, the males with massive horns which curl back, out and up, females with small horns, chin beardless, tail short and hoofs black. The color of the ewes is similar to the rams but usually less strongly marked, paler. Seasonal variation is from dark shades in fall or late summer to much lighter coats in the spring. The upper parts are brownish to grayish brown while the underparts are yellowish white with broad encroachment of brown from the sides (55)".

Economic Importance

They are highly prized as game animals.

Feeding Habits

"The bighorn is a delicate feeder. It eats nothing but the sweetest and most delicate of hillside or mountain grasses and flowers. This rare combination of niceness with sweetness seems to bear fruit in the delicacy of its flesh.

Grass is the chief food where it is present, but the sheep browse and eat many weeds.

In places where there is plenty of water the sheep drink often, but in the drier regions they get most of their water from plants (59)".

Conflicting Range Interests

This animal inhabits the higher mountain ridges so it is not affected to a great extent by grazing of other animals. However, it moves to lower elevations when heavy snow occurs so if heavy sheep grazing has taken place at these altitudes during the summer the winter feed for the sheep might be scarce. In special instances it needs protection from sheep.

ANTILOCAPRA

(Antelope)

The following species and subspecies have been described:

Antilocapra americana --

Antilocapra americana mexicana--

Antilocapra americana peninsularis--

Of the above *Antilocapra americana* is the most numerous in the United States.

Distribution

Antilocapra americana ranges throughout the West. The type locality is the "plains and highlands of the Missouri" (45).

The type locality of *Antilocapra americana mexicana* is Sierra en Media, Chihuahua, Mexico.

Antilocapra americana peninsularis ranges from middle lower California, south to the head of Ballenas Bay in about 27 degrees north latitude, and north on the west coast to about 29 degrees and

Original and Present Distribution of Antelope.

McKinley's Series of Geographical and Historical Outline Maps, No. 175 b. United States (physical features and State boundaries).



Subject: *Distribution of Antelope.*
 Date: _____

Explanation
 Original (1922-24)
 Present (1922-24)
 Most numerous today

Map VI (6)

Copyright, 1900, The McKinley Publishing Co., Philadelphia, Pa. Renewed 1928.

Reprint from Bulletin 1342, U.S.D.N. (43).

30 minutes; on the Gulf side to beyond 32 degrees, to the southern end of the Colorado Desert (41).

The accompanying map shows the original and the present (1922-1924) distribution. This distribution is still more limited now with the last large herds being located in northern Nevada, around where the Charles Sheldon Antelope Refuge is established.

"Facts have shown that the pronghorn ranged over an enormous area. It occurred over parts of the present Provinces of Manitoba, Saskatchewan, and Alberta in Canada. In the United States it occupied the country from western Minnesota, Iowa, Kansas, Oklahoma, and Texas, reaching the Gulf Coast near the mouth of the Rio Grande, and west to eastern Washington, Oregon, and the Pacific Coast in California. In Mexico it occupied the open plains country of the table land south almost to 20 degrees of latitude, nearly to the valley of Mexico; also the western part of Sonora and most of lower California (43)."

At the present time the antelope are decreasing on the open plains, but they are slowly but steadily increasing in the Parks and Refuges. One of the most notable recent Refuges is the Charles Sheldon Antelope Refuge in northern Nevada. This region probably contains the largest band of antelope left on the open plains and the refuge aims to protect them.

Description

"The color of the adult male antelope is a rich tan, varied

with pure white patches, that is to say, the sides of the face, nape of neck, base of ears, two bars on throat, breast, belly, rump, and inside limbs are white. The upper part of the muzzle, the patch under each ear, the eyes, horns, hoofs, and sometimes the mane, are black.

The color of the female is similar, but the black areas are less. An ordinary buck will weigh about 100 pounds (45)".

Economic Importance

"Of all American big game, there is none so graceful, fleet of foot, or more typically American than the Pronghorn Antelope. It is an exquisite, high caste creature without compare on this continent. But beyond all this, the pronghorn is, as an animal, entirely unique; it occupies, in the division of mammals, a whole family unto itself. Its like is not to be found anywhere else, in any part of the world (34a)".

"The pronghorn, or American antelope is the most beautiful and graceful of America's big game animals and has the distinction of being the only species of antelope existing in the New World at the time of its discovery by Europeans (45)".

The quality of the flesh make it desirable for human consumption and hunters enjoy the sport of hunting these animals.

Feeding Habits

"The antelope is a creature of the dry plains, the land of grass, cactus and sage; and its food is, by long habit, nearly

confined to these species of plants.

Mills says: 'The food of the pronghorn is sage, greasewood, sometimes cactus, and, on the desert broomrape. I do not recall ever seeing him eat grass'.

The antelope like sheep and deer, have greatly varied habits in the amount of water they drink (45)".

Conflicting Range Interests

"The worst enemies of wild antelope today are, first, repeating rifles; next, sheep, which destroy there winter range; and finally deep snow (45)".

Most of the States protect antelope nowadays so that the repeating rifle is not the menace that it once was.

Nelson states(43), "As winter approached the antelope began to gather in bands, sometimes containing thousands of individuals, and to seek favorable feeding grounds for the winter. Bands frequented the broken and open pinion and cedar forests in parts of eastern Arizona. In summer they broke up and scattered over the more open plains in the adjacent parts of New Mexico and northern Arizona. During the eighties the increase in the cattle business was so great in northern Arizona that the antelope learned many new habits. Among others was that of following range cattle through a belt of heavy pine forest up to an elevated grassy plateau of about 8000 feet altitude. During this period antelope became frequenters of the open, grass-grown, yellow pine forests of the

mountains not only in various parts of the United States but also in the Sierra Madre of Chihuahua, Mexico".

So the conflict occurring between range animals and antelope is one dealing mostly with sheep grazing. It is noticed that sheep will utilize the same areas that antelope will and destroy the winter feed for the antelope. Sheep will also utilize rough areas and open up rather inaccessible areas, thus driving the antelope to more restricted grounds and feeding places.

As the antelope are driven to higher lands where snow occurs, many deaths occur as heavy snows are dangerous to antelope. The snow covers the feed and sticks to the antelopes body and chills many to a point where death occurs.

URSUS (Bear)

There are other types of animals, not of the grazing type, that are of considerable importances to range management. Some of these, such as the bear, wolf, bob-cat, and mountain lion have made themselves a pest to the ranchmen because they actually killed the stock. Of the group mentioned above the bear is the one that is considered a big game animal and is hunted.

Ursus--

Euarctos americanus-----Black bear.

"A medium sized bear of dark coloration, black or dark brown in color; claws of forefeet curved, slightly longer than

those of the hindfeet. They are found over most of wooded north America.

Ursus horribilus -----Grizzly bear.

Members of this group are the largest of the North American carnivorous mammals; head massive, body robust and strong; face dished in to give somewhat a concave profile; tail short; claws long. Color usually brownish. They are found throughout the Great Plains and the Rocky Mountain region, north into Alaska (I)".

"Bruin gets more than his share of cussing from the stockman. In New Mexico a Biological Survey hunter killed a grizzly (*Ursus horribilis*) that had killed 32 head of cattle during the previous year.

Although bears are sometimes the cause of losses in sheep and goats, such losses are generally caused by animals becoming frightened and stampeding, piling up, and smothering. Although one bear out of a dozen may become addicted to the mutton or beef-eating habit, it is incorrect to class bears generally with predatory animals. Certainly they are not predaceous to the same extent as other carnivores that prey on domestic stock.

Food of bears consists of both animal and vegetable life, chiefly the latter. Early in the spring they eat large quantities of roots, bulbs, tender flower stalks, the foliage of a great variety of broad-leaved plants, and the tender blades of many grasses.

Later, berries of various kinds and particularly huckleberries furnish food that is much relished" (I6)

"There is no evidence that the bears molest any large game, and the scouts and old hunters say that they do not(Bailey)".

"Late in autumn when vegetable food becomes scarce, they dig out the burrows of hibernating squirrels and these fat little fellows furnish bears with considerable food. Being natural scavengers, black and brown bears consume large portions of carcasses, but, as stated, they seldom kill large foraging animals. The grizzly, of which few remain in the United States sometimes kill livestock (2)".

SUMMARY

Deer, cattle, and sheep tend to graze the same type of forage so there is danger of conflicts occurring between deer and cattle, and deer and sheep. There is also competition for water among these animals.

Elk utilize the same type of forage that domestic range animals use. However, as elk utilize the higher more inaccessible places during the summer the conflict occurs where cattle graze over the lower ranges to the extent that there is no winter feed left on the ranges for the elk.

There is no conflicting interests with the mountain goat and domestic cattle because of the natural habitat that the goat occupies.

Mountain sheep need protection from domestic sheep only in special cases. No competition occurs between mountain sheep and cattle.

The conflict occurring between range animals and antelope is one dealing mostly with sheep grazing. The sheep will utilize much of the same area that the antelope will and this destroys the winter feed of the antelope. For this reason the antelope are driven to more restricted grounds and feeding places. Water competition also occurs and is an important problem.

Bears are sometimes the cause of losses in sheep and goats, but such losses are generally caused by animals becoming frightened and stampeding, piling up, and smothering.

BIBLIOGRAPHY

Deer

1. Anthony, H.E., 1928. Field Book of North American Mammals, G.P. Putnam's Sons, New York, pp. 517-524.
(Descriptions of every mammal known north of the Rio Grande, together with brief accounts of habits, geographical ranges, etc.)
2. Bailey, Vernon, 1918. Wild Animals of The Glacier National Park , Dept. of Interior Publication, p. 95.
(Accounts on the bear).
3. Carhart, A.H., 1920. Live Game and Forest Recreation, American Forestry, Dec. 1920, Vol. 26, pp. 723-727.
(Deals with the drawing attraction provided when game is present).
4. Dixon, J., 1928. What Deer Eat, American Forestry, Mar. 1928, Vol. 34, pp. 143-145.
5. Goldman, E.A., and S.B. Locke, 1923. The Mountain Of Twenty Thousand Deer, American Forestry, Nov. 1923, Vol. 29, pp. 649-653.
(Refers to the Kaibab Plateau at present (1923) and relates the history of the area.).
6. Goldman, E.A., 1926. Game Surpluses Perplex Wildlife Gaurdians, U.S.D.A. Yearbook, 1926, pp. 397-398.
(A very brief article about increase of protected animals to a point of overpopulation).

7. Gray, P.N., 1932. Records of North American Big Game , Published under Auspices of the Nat. Collection of Heads and Horns, New York Zoological Society, New York, pp. 19-35.
(It is based on the same plan as Rowland Ward's Records (No. 23), but contains a better and more complete description of each animal and their characteristics. However, it is valuable mostly for its records and pictures).
8. Grinnel, J., 1933. Review of The Recent Mammal Fauna of California, University of Calif. Pub. in Zool., Vol. 40, No.2, pp. 71-234.
(Includes the latest distribution of mammals within the State).
9. Hall, R.E., 1927. The Deer of California, Calif. Fish and Game, Oct. 1927, Vol.13, No. 4.
(An excellent paper on deer, their distribution and characteristics, in California).
10. Lantz, D.E., 1908. Deer Farming in The U.S., U.S.D.A., Farmers Bulletin 30.
(Habits of the deer family and how to handle the deer under management. Rather old).
11. Nelson, E.W., 1918. Wild Animals of North America, Published by The Nat. Geog. Society, Washington D.C., pp. 453-460.
(A popular account of mammals issued for publication in the Nat. Geographic Magazine).

- I2. Nelson, J.W., 1930. The Columbian Black-tailed Deer of The California National Forest, Jour. of For., May 1930, Vol. 28, pp. 664-667.
(Mr. Nelson, 1930, Assistant Regional Forester, San Francisco, California. It includes the status of the deer and proposed management plans to be used on the Calif. Nat. Forest).
- I3. Pearson, G.T., J.B. Burnham, H. Cutting, and T.W. Tomlinson, 1924. Starvation Threatens Kaibab Deer, Amer. Forestry, Nov. 1924, Vol. 30, pp. 663, 692-693.
(Special committee appointed by the Sec. of Agr. to investigate game conditions in Grand Canyon Game Preserve Reports critical situation and recommends reduction of deer herd by one half).
- I4. Ridsdale, P.S., 1912. Raising Deer on Forest Preserves, Amer. Forestry, May 1912, Vol. 18, pp. 313-319.
(Brief article on proposed plan for raising deer and elk for market on enclosed preserves in the State of Maryland).
- I5. Roosevelt, T., T.S. Van Dyke, D.G. Elliot, and A. J. Stone, 1924. The Deer Family, The Macmillan Company, New York.
(A book of some 300 pages. It is a popular account of the different Genus and species in the Deer family).
- I6. Sampson, A.W., 1928. Livestock Husbandry on Range and Pasture, John Wiley and Sons, Inc., New York, p. 360.
(A brief article about the bear and its relation to range conditions).

17. Seton, E.T., 1929. Lives of Game Animals, Doubleday, Doran and Company, Inc., New York, Vol. 3, pt. 2, pp.
(A semi-popular account but also is quite complete. Mr. Seton uses the earliest writings for many of his descriptions and if the accounts are read with discretion they contain some valuable information).
18. Shiras, G., 1923. The Increase of Game on Limited Refuge, Amer. Forestry, Nov. 1923, Vol. 29, pp. 670-671.
(A short article on how game increases to overpopulation on protected areas. The examples are mostly of deer in Northern Michigan).
19. Walker, E.P., 1931. Wild Life Protection an Urgent Problem, Smithsonian Institute, Washington, D.C., Publication 3089.
(Deals with our need of game management. 19 pages.)
20. Wallace, J.P., 1927. Winter Game Range, Jour. of Forestry, Mar. 1929, Vol. 27, pp. 267-269.
(Author, 1927, Forest Supervisor, Washakie Nat. Forest. An excellent paper on elk winter range. Only a mention of deer).
21. Wright, G.M., J.S. Dixon, and B.H. Thompson, 1933. Faunae of The National Parks of The U.S., Dept. of The Interior Publication.
(Includes a preliminary survey of faunal relations in National Parks. It is good).

Elk

22. Anthony, H.E., 1928. Field Book of North American Mammals, G. P. Putnam's Sons, New York, pp. 514-515.
(See descriptive article under No. I).
23. Dollman, J.G., and J.B. Burlace, 1928. Rowland Ward's Records of Big Game, Rowland Ward, Limited "The Jungle", 167 Piccadilly, W, London, 9th. Ed., pp.29-30.
(Includes records of horn and tusk measurements, size and weights of animals taken, general and brief characteristics of the animal, and a brief word on distribution).
24. Goldman, E.A., 1927. What To Do With The Yellowstone Elk, Amer. For., May 1927, Vol. 33, pp. 279-282.
(The story of the rapid increase in numbers of the elk since protection was initiated and the problem of feeding an overpopulation).
25. Gray, P.N., 1932. Records of North American Big Game, Published under the Auspices of the Nat. Collection of Heads and Horns, New York Zoological Society, New York, pp. 19-35.
(See no. 7).
26. Kavanagh, E.N., 1930. The Roosevelt Elk, Jour. of For., May 1930, Vol. 28, pp. 659-663.
(By the Assistant Regional Forester, Portland Oregon. Historical and present management problems).
27. Nelson, E.D., 1918. Wild Animals of North America, Published by the Nat. Geog. Soc., Washington, D.C., p.453.
(See no. II).

28. Preble, E.A., 1911. Report on Conditions of Elk in Jackson Hole, Wyoming, Biol. Sur. Bulletin No. 40.
29. Roberts, P.H., 1930. The Sitgreaves Elk Herd, Jour. of For., May 1930, Vol. 28, pp. 655-658.
(By the Supervisor of Sitgreaves Nat. Forest, Arizona. Valuable article as to forage habits of the elk in the region).
30. Rush, W.M., 1929. What is to Become of our Northern Elk Herd, Amer. For., Feb. 1929, Vol. 35, pp 93-95.
(Problemm of overpopulation and how to handle them).
31. _____, 1935. Northern Yellowstone Elk Study, Published by Montana Fish and Game Commission.
(There are 128 pages of very useful, up-to-date material included within this bulletin).
32. Seton, E.T., 1929. Lives of Game Animals.
(See no. 17).
33. Shoemaker, D.A., 1930. The Pecos Elk Herd, Jour. of For., May 1930, Vol. 28, pp.648-654.
(Mr. Shoemaker, Inspector of Grazing for U.S. Forest Service, 1930. It includes origin, description of area and feeding habits of elk, value of elk to the areaa, etc.).
34. Smith, G.A., 1930. The Sun River Elk Herd, Jour. of For., May 1930, Vol.28, pp. 644-647.
(Smith, 1930, Assistant Regional Forester, Missoula, Montana. The article includes the origin of the herd with the population, characteristics of the elk forage, etc. A valuable article).

35. Wallace, J.P., 1927. Winter Game Range, Jour. of For., Mar. 1929, Vol. 27, pp. 267-269.
(Author, 1927, Forest Supervisor, Washakie Nat. For. A good paper on elk winter range conditions).
36. Wright, G.M., J.S. Dixon, and B.H. Thompson, 1933. Fauna of The National Parks of The United States.
(See no. 21)
- 37.
- Antelope
37. Anthony, H.E., 1928. Field Book of North American Mammals, G. P. Putnam's Sons, New York, pp. 547-549.
(See no. 1)
38. Dollman, J.G., and J.B. Burlace, 1928. Rowland Ward's Records of Big Game, Rowland Ward, Limited "The Jungle," 167 Piccadilly, W. London, 9th. ed., p. 103.
(See no. 23).
39. Gray, P.N., 1932. Records of North American Big Game, Published under the Auspices of the Nat. Collection of Heads and Horns, New York Zool. Soc., New York, pp. 115-121.
(See no. 7).
40. Merriam, H.C., 1901. Two New Bighorns and a New Antelope From Mexico and The United States, Proc. Biol. Soc., Washington, D.C., Vol. 14, pp. 29-32.
(An early description of *Ovis mexicanus*, *O. canadensis auduboni*, and *Antilocapra americana mexicana*).

41. Nelson, E.W., 1912. A New Subspecies of Pronghorn Antelope From Lower California, Proc. Biol. Soc., Washington, Vol. 25, pp. 107-108.
(Includes a page and a half description of the subspecies *Antilocapra americana peninsularis*).
42. _____, 1918. Wild Animals of North America, Nat. Geog. Soc., Washington, D.C., pp. 452-
(See no. II).
43. _____, 1925. Status of The Pronghorned Antelope, U.S. D.A. Bulletin, No. 1346.
(This bulletin contains some 60 pages of information concerning the antelope).
- 43a. Quinn, D., 1930. The Antelope's S.O.S., Published by the Emergency Conservation Committee, New York.
44. Rhoads, S.N., 1894. A Reprint of The North American Zoology, Published by The Editor, Haddonfield, New Jersey, p. 308.
(The History of the "Second American Edition" of Suthries Geography. It includes short descriptions of most of the North American mammals).
45. Seton, E.T., 1929. Lives of Game Animals, Doubleday, Doran and Company, Inc., New York, pp. 413-467.
(See no. I7).
46. Shufeldt, R.W., 1920. The American Antelope, Amer. For., Vol. 26, Dec, 1920, pp. 747-754.
(A popular description of the antelope and its characteristics).

47. True, F.W., 1884. A Provisional List of The Mammals of North and Central America, and The West Indian Islands, Proc. of U.S. Nat. Mus., Vol. 7, p. 592.
(A provisional taxonomic list intended to include every species of mammal inhabiting the American Continent north of the Isthmus of Panama. It includes the animals general distribution).
48. Woods, S.H., 1925. The Pronghorned Antelope, Amer. For., Nov. 1925, Vol. 31, pp. 649-651.
(A popular account and treats the question of, "Are we going to permit the extermination of this species").

Mountain Goats.

49. Anthony, H.E., 1928. Field Book of North American Mammals, G.P. Putnam's Sons, New York, pp. 547-549.
(See no. I).
50. Dollman, J.G., and J.B. Burlace, 1928. Rowland Ward's Records of Big Game, Rowland Ward, Limited "The Jungle", 167 Piccadilly, W, London, 9th. ed., pp. 328-329.
(See no. 38).
51. Gray, P.N., 1932. Records of North American Big Game, pp. 93-99.
(See no. 7).
52. Nelson, E.W., 1918. Wild Animals of North America, Nat. Geog. Soc., Washington, p.452.
(See no. II).

53. Seton, E.T., 1929. Lives of Game Animals, Doubleday, Doran and Company, Inc., New York , Vol. 3, pt. 2, pp. 470-518.
(See no. I7).
54. True, F.W., 1884. A Provisional List of The Mammals of North and Central America, and The West Indian Islands, Proc. of U.S. Nat. Mus., Vol. 7, p. 592.
(See no. 47).

Mountain Sheep

55. Anthony, H.E., 1928. Field Book of North American Mammals, G.P. Putnam's Sons, New York, pp. 542- 546.
(See no. I).
56. Dollman, J.G., and J.B. Burlace, 1928. Rowland Ward's Records of Big Game, pp. 362-365.
57. Gray, P.N., 1932. Records of North American Gig Game, Published under the Auspices of the Nat. Collection of Heads and Horns, New York Zool. Soc., New York, p.73.
(See no. 7).
58. Nelson, E.W., 1918. Wild Animals of North America, Nat. Geog. Soc., Washington, D.C., pp. 448-449.
(See no. II).
59. Seton, E.T., 1929. Lives of Game Animals, Doubleday, Doran and Company, Inc., New York, Vol. 3, pt. 2, pp. 519-594.
(See no. I7).

General

60. Frick, E.J., 1935. Diseases of Wild Life, Game Breeder and Sportsman, Jan. 1935, p.7.
(Frick is employed under the Division of Veterinary and Medicine, Kansas State College. It is an article demonstrating that domestic animal diseases may be transmitted to wild animals).
61. Laing, H.M., 1930. Taking Stock of Our Big Game, Canadian For. and Outdoors, Vol. 26, May 1930, pp. 253-255.
(Dealing mostly with the fact that game licenses are too cheap in Canada and game management has not received enough attention).
62. Lascelles, T., 1932. Our Diminishing Game, Canadian Forests and Outdoors, Apr. 1932, Vol. 28, pp. 131-132.
(A short article mentioning the big game that seem to be decreasing in numbers).
63. Locke, S.B., 1930. The Study of Big Game Ranges, Ecology, Vol. II, Oct. 1930, p. 770.
(Describes methods of studying shrubby plants in relation to winter game ranges).



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