

AN ABSTRACT OF THE THESIS OF

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OREGON

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This analysis is the study of Oregon's wildlife resources from the period prior to white settlement up to the present time, including critical projections, based on present trends and expected conditions for both human and wildlife populations in the state up to the year 2010.

Prior to white settlement Oregon was apparently part of a well balanced ecosystem. The fertile, moist valley regions were areas where an abundance of wildlife was found. Elk, deer, bear, antelope and their associated predators occupied these favorable sites. The Oregon Indian lived harmoniously within this environment. He conducted himself as a "prudent predator" and generally sought game which was most easily available. These animals were abundant enough to withstand the hunting pressure exerted by the limited Indian population. The only major deliberate control the Indian extended over his environment was burning. Indians ignited large areas to enhance the harvest of wild plants and animals. One of these

areas was the Willamette Valley, parts of which were apparently maintained in a condition of fire climax or disclimax long prior to the arrival of white settlers.

White pioneers arriving in Oregon in the 1840's settled first in locations where the best agricultural land and available moisture was found. These areas coincided with prime game habitat and the immediate effect of settlement was the displacement of wildlife from their traditional ranges to areas of inferior fertility and moisture.

The pattern of development of white civilization had a severe impact on wildlife populations from the late 1800's to the early 1900's. Drainage and reclamation projects coupled with prolonged drought periods drastically reduced waterfowl populations. Excessive killing of game for the meat, hide and feather value further reduced wildlife populations when market hunting reached its peak between 1870 and 1900. Predator and rodent control efforts were directed toward improving agricultural conditions but often resulted in upsetting previous balances among several forms of wildlife.

After 1893 wildlife management evolved through periods of protection, stocking, refuges, and systematic management. The Oregon State Game Commission and the United States Bureau of Biological Survey attempted to work cooperatively with several state and federal agencies in the 1920's and 1930's in an effort to restore depleted wildlife populations. The Taylor Grazing Act helped prevent further mismanagement of rangeland. The Migratory Bird Stamp Act allowed

funds for waterfowl habitat purchases. Other legislation such as the Pittman-Robertson Federal Aid to Wildlife Restoration Act is further testimony of Federal Programs which have provided the means for wildlife restoration since the 1930's. The general development of cooperative wildlife research units in the United States together with the formation of Oregon State University's Department of Fisheries and Wildlife were important steps in the movement toward more scientific wildlife management during the 1930's. Several important wildlife management programs were developed in Oregon and successful wildlife restoration programs have continued up to the present time.

Although wildlife populations have been largely restored through systematic management, they are again being lost. The next losses will be from severe competition with man for living space and resources. Based on demographic projections and current trends, it appears that the burgeoning human population will eventually cause the annihilation of many wildlife species. Upset watersheds, widespread pollution, increased competition for natural resources, and competition for living space between man and wildlife are unpleasant but real prospects for Oregon's future.

A Critical Analysis of Wildlife
Conservation in Oregon

by

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In Memoriam: Mr. Clark Walsh, former Assistant Game Director of the Oregon State Game Commission was most helpful in reading portions of this manuscript and in giving helpful information concerning the historical perspectives herein. His recent death is deeply regretted.

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FOREWORD

. . . the United States at this moment occupies a lamentable position as being perhaps the chief offender among civilized nations in permitting the destruction and pollution of nature. Our whole modern civilization is at fault in the matter. The civilized people of to-day look back with horror at their midaeval ancestors who wantonly destroyed great works of art, or sat slothfully by while they were destroyed. We have passed that stage. We treasure pictures and sculptures. We regard Attic temples and Roman triumphal arches and Gothic cathedrals as of priceless value. But we are, as a whole, still in that low state of civilization where we do not understand that it is also vandalism wantonly to destroy or to permit the destruction of what is beautiful in nature, whether it be a cliff, a forest, or a species of mammal or bird. Here in the United States we turn our rivers and streams into sewers and dumping grounds, we pollute the air, we destroy forests, and exterminate fishes, birds, and mammals--not to speak of vulgarizing charming landscapes with hideous advertisements. But at least it looks as if our people were awakening.

Theodore Roosevelt, 1913 (289)

A CRITICAL ANALYSIS OF WILDLIFE CONSERVATION IN OREGON

Introduction

The relationship between man and wildlife in Oregon began at least 10,000 years ago, for it is known that early man was living in the caves at Fort Rock, Oregon by that time. These first migrants to the New World lived in relative harmony with wildlife populations, but with the advent of explorers, trappers, and early settlers from the East, a trend toward conquest of the land and displacement of much of the wildlife resource began. Immigrants arriving by way of the Oregon Trail and those who followed quickly settled areas coinciding with the best wildlife habitat. The conquest and exploitation of the wildlife resource which took place during the period from the 1840's to the early 1900's was typical of the pattern of white settlement seen earlier in the East.

Although studies have been made of the life histories of most forms of Oregon's wildlife and much has been written concerning the work of state and federal agencies in wildlife management and restoration, no historical overview of man's exploitation and later attempt to protect, stock, and finally manage wildlife populations in Oregon has ever been written. This study analyzes the events which led up to the legal protection, the creation of refuges and the stocking of native and exotic forms of wildlife as means of restoring formerly

depleted populations. It presents a critical examination of the activities of various wildlife agencies and the methods they used in restoration programs. The analysis follows the growth and development of state and federal wildlife management programs in Oregon. These agencies' efforts toward wildlife conservation have evolved from stop-gap measures, often unpopular with the public, to more refined and lasting programs such as habitat improvement or manipulation of the environment for the benefit of wild animals.

Little has been written concerning the future status of wildlife in Oregon. The present exponential growth rate for the human population and the concomitant shrinkage of available habitat for wildlife populations prompted an examination of this problem as a closing note in this study. Trends based on demographic projections and planning-studies for industrial growth indicate that Oregon's wildlife will become depleted unless extensive planning and action programs are initiated at once. Often such programs appear to exceed the limits of available manpower and facilities. Programs for the future are postponed because current problems alone seem to demand more than we can afford. If the historical analysis presented here leads in some small way to a reassessment of values and priorities in Oregon's wildlife management programs, the efforts of the author will have been justified.

CHAPTER I

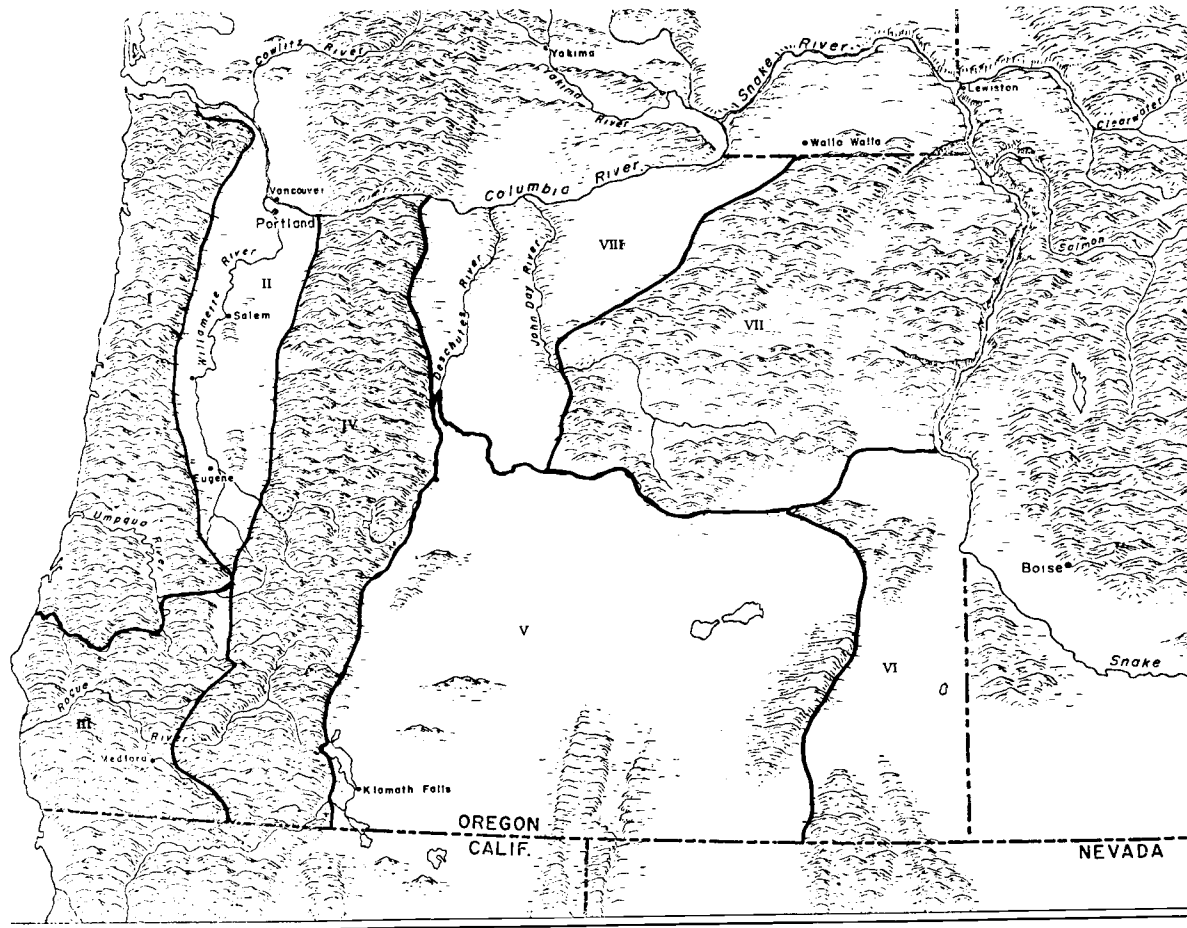
OREGON PRIOR TO WHITE SETTLEMENT

The conditions which existed in Oregon 160 years ago appear to have been such that all forms of life were rather well balanced in an ecological sense. The 96,248 square miles which make up this area had undergone very little change under the influence of the native human inhabitants and all forms of wildlife seem to have been well distributed in accordance with the availability of habitat.

There is very little documentation upon which to base an accurate picture of these early conditions, and therefore one is left to rely mainly on fragmentary evidence found in the journals of early explorers and the records made by pioneer settlers. The major premises presented here, however, are largely supported by knowledge of present conditions and an understanding of ecological possibilities within the state in the past.

General Geography

The state of Oregon can be divided into a number of regions (see Figure 1). These may be separated by various physiographic patterns based on watersheds and major landforms. Each one of the regions is somewhat distinctive with regard to its ecological conditions. The first major division can be made by using the Cascade



- | | |
|--------------------------------|---|
| I. Coast Range Region | V. Great Basin Region |
| II. Willamette Valley Region | VI. Owyhee Region |
| III. Siskiyou Mountains Region | VII. Blue and Wallowa Mountain Range |
| IV. Cascade Range Region | VIII. Columbia and Deschutes Plateau Region |

Figure 1. Geographical Regions of the State

Mountain Range to separate everything lying west of the summit of the Cascades into western Oregon and all the land east of these mountains into eastern Oregon. Western Oregon consists of the coastal land bordering the Pacific Ocean, which can be subdivided into two parts-- the Coast Range region and the Siskiyou Mountains region. The Coast Range region extends from the extreme northwestern boundary of the state south to the Coquille River, the eastern boundary being the eastern slope of the Coast Range. The Siskiyou Mountains region includes an area covering the southwestern corner of the state; the western boundary is the Pacific Ocean, the southern boundary the California border, the eastern boundary the Cascade Mountain Range, the northern boundary the Calapooia mountains and the Coquille River.

The Cascade Mountain region is a belt ranging from fifty to one hundred miles wide and covering both slopes of the Cascades from the California border in the south to the Columbia River in the north. The Willamette Valley region extends from the Calapooia Mountains in the south to the Columbia River in the north. It is bounded on the west by the foothills of the Coast Range and on the east by the foothills of the Cascade Range. The Columbia plateau region is bounded on the south by the northern foothills of the Blue Mountains and extends westward to the foothills of the Cascade Range. The Columbia River forms the northern boundary which meets the eastern boundary at the foothills of the Wallowa Mountains. The Blue and Wallowa Mountains

region make up the northeastern corner of the state. This region contains a group of mountains which are bounded on the west by the Deschutes Valley, on the south by the Great Basin area of Oregon, on the north by the Columbia plateau region and by the Snake River on the east. The mountains included are the Blue Mountains, the Wallowa Mountains, the Strawberry Range, and the Ochoco Mountains. The Owyhee region consists of a long narrow strip along the eastern border of the state extending north as far as the foothills of the Wallowa Mountains; its eastern border is the southeastern lake region or Oregon's Great Basin area. This lake region comprises most of the southeastern part of the state and makes up nearly one-third of the total land area of the state. It lies south of the Blue Mountains and east of the Paulina Mountains. The southern boundary is the Nevada-California state line. The eastern boundary is the escarpment between the Alvord and Jordan valleys.

Native Flora and Fauna of the Regions

Historically, the area which we now call the State of Oregon has undergone a great number of changes in a comparatively short time span. This has been due primarily to the relatively recent period in which white settlement was begun. Only a few decades had passed following the arrival of the pioneers before the era of hand labor was replaced by the machine age. This almost immediate

arrival of the machine age greatly accelerated the effects of civilization. It allowed man to make inroads into the natural resources of Oregon much more quickly than he had been able to do in the first few centuries of settlement in the eastern United States. Thus it is difficult to construct or synthesize a picture of early Oregon after immigration had begun. The picture of Oregon prior to the 1840's is incomplete owing to the geographical limitations of the various early expeditions. The accounts of Lewis and Clark and the earliest explorers and trappers who followed them are available as a source of description for Oregon's pre-settlement native flora and fauna, but their geographical area of coverage was limited mainly to the Columbia plateau, some of the Willamette Valley, part of the Coast Range and very restricted parts of eastern Oregon, mainly in the northeast. This makes it necessary to utilize the descriptions of other explorers and early pioneers as well, including those given as recently as the late 1800's, to complete the picture of early Oregon.

The Willamette Valley Region

Probably the most completely described region was that of the Willamette Valley. One of the first scientifically trained observers to record information concerning the appearance of the Willamette

Valley was David Douglas.¹ David Douglas was trained as a botanist in Scotland for ten years prior to joining the Horticultural Society of London in 1823. He was sent to northwestern America by the Horticultural Society and arrived at the mouth of the Columbia River by ship in April, 1825. He subsequently conducted several botanical expeditions in the Northwest and California from 1825 to 1833 with intermediate voyages to England and the South Pacific. His botanical work in Oregon included areas along the Columbia River and parts of eastern Oregon bordering the Columbia. He also travelled into southwestern Oregon and up the Willamette River (127, p. 1-10). He noted in September, 1826, that the countryside above what is now Oregon City was recently burned and the entire area with the exception of the edges of streams was cleared by fire. Oaks and "pines" were mentioned as being interspersed throughout the undulating country. Near the area where Lafayette now stands the oaks became more abundant and the "pines" more scarce. Nine deer were seen but they stayed in the thicket near a stream bed and could not be shot (65, p. 213).

Douglas mentions burning which took place further up the valley including large areas near the present site of Salem. When he asked the Indians the reason for the burning they said it was to concentrate

¹ Douglas's observations included the local fauna as well as flora, and his observations are referred to at various times in this analysis.

deer to make them easier to hunt and also to help them find honey and grasshoppers, both of which were used for winter food (65, p. 214).

F. X. Matthieu, a pioneer who settled on French Prairie near Champoege in the year 1842, stated that the Indians stopped burning the countryside shortly before he arrived. According to his description the whole country had a "parklike" appearance. Groves of fir and oak were scattered across the valley and "belts" of deciduous timber were found along the water courses and edges of grassy plains² (47).

One early description of the Willamette Valley states,

The fir, pine, oak, ash and maple are abundant in the valleys of the Wallamet [sic] and Cowlitz and on the western slope of the Cascade range of mountains; there is also an abundance of pine, fir, oak and maple on the eastern slope. The Wallamet Valley is from forty to sixty miles wide, and one hundred and eighty long. It has less timber than fine level prairie; through which winds with its tributaries the beautiful Wallamet, skirted all along its banks and level bottoms with cottonwood, ash, alder, oak, fir, yellow pine, yew, and soft maple, with a small amount of cedar (116, p. 612).

The area along the Columbia River was described from a point 60 miles up river from the Pacific ". . . from this up, the timber is interspersed with prairie; till we enter the Cascade Mountains, one hundred and twenty-five miles from the ocean. . ." (116, p. 612).

²One recent investigation gives a rather complete treatment of the conditions in the vegetation of the Willamette Valley during the 1850's. This work appears to agree with the idea that fire has maintained a disclimax condition across large areas of the Willamette Valley (120).

The foothills of both the Coast and Cascade Ranges were probably heavily timbered with Douglas-fir (Pseudotsuga menziesii).³ Douglas-fir were also found in groves or stands and as single trees scattered across the series of prairies up and down the Willamette Valley. They stood regularly along streams, in the river bottoms, and on ridges. Park-like stands of Garry oak (Quercus garryana) stood in varying densities across the prairie which sometimes showed a few bigleaf maples (Acer macrophyllum). Bottomlands and areas bordering streams showed a cover or belt of trees and shrubs defining their course. Red alder (Alnus rubra), dogwood (Cornus spp.), cherry (Prunus spp.), and numerous understory shrubs such as Oregon grape (Berberis aquifolium and B. nervosa), salmonberry (Rubus spectabilis), elderberry (Sambucus spp.), rose (Rosa spp.), hardtack (Spiraea spp.), ninebark (Physocarpus capitatus), cascara (Rhamnus purshiana), and numerous "ferns" plus herbaceous flora or "weeds" not mentioned by name were described. The wetter areas or swampy locations along stream banks were covered with black cottonwood (Populus trichocarpa), ash (Fraxinus latifolia), willows (Salix spp.), cedar (Thuja plicata), and hemlock (Tsuga heterophylla)

³The present distribution of trees 150 years of age and older gives some testimony to the forest conditions prior to white settlement. This description and those below have been synthesized from early journals, newspapers and "guides" for immigrants.

(120).

Several shrub species such as the hazel (Corylus cornuta californica), Oregon grape, rose and others were scattered across the grassland prairie. Fifty-one grass species⁴ are thought to have been native to the prairies of the Willamette Valley (218).

At this time no logging was done and many trees reached maturity, becoming very large. Unless fire, windthrow or insect damage occurred before maturity, large stands of old age class timber stood not only in areas of the Willamette Valley but in other regions of the state.⁵

The Coast Range Region

The Coast Range region as described here varies in topography from sea level to coastal headlands. It includes mountains which average 1200 to 1800 feet in elevation with Mary's Peak, 4,097 feet,

⁴On drier sites or gravelly prairies were Agrostis halli, Agropyron pauciflorum (Agropyron trachycaulum), Bromus carinatus, B. vulgaris, Elymus galucus, Festuca octoflora, Panicum scribnerianum, P. pacificum, Poa scabrella, Sitanion jubatum, Stipa lemmoni and Trisetum canescens. On wetter habitats some characteristic native grasses were Agrostis exarata, Alopecurus aequalis, Beckmannia syzigachne, Eragrostis hypnoides, Glyceria leptostachya, G. occidentalis, G. pauciflora, Poa triflora (Poa palustris) and Trisetum cernuum (218).

⁵Based on the sizes of larger trees which have been found standing in Oregon the trees of the earlier period can be estimated.

and Grass Mountain, 3,612 feet, being the highest elevations along the range. The precipitation now varies from sixty to one hundred inches annually.⁶ When white man first described the area he was impressed by the size of the trees and their density particularly along the coast. Alexander Ross, a fur trader who arrived in Oregon with Astor's Pacific Fur Company, noted that the timber was very large and thick on both sides of the Columbia River above Oak Point in 1811 and that it was mainly cedar (291, p. 113). The Astoria area was still heavily timbered in 1845, with very tall hemlock and spruce standing about one mile inland and beyond the prairie which extended from Clatsop Point up the Columbia River for about twenty miles (261, p. 193-194).

This same prairie was described in 1841 and approximately the same description was given. The forests in the vicinity of Astoria contained extremely large trees. The largest tree measured at that time was 39 feet 6 inches in circumference when measured eight feet above the ground. It stood 250 feet high and had bark eleven inches thick (358, Vol. 5, p. 115). Trees of this size were probably the ones commonly referred to by early explorers and settlers as "forest

⁶ On the basis of tree ring studies it appears that this precipitation is comparable to that of the pre-settlement period. See section on water in the last chapter.

giants."⁷ The Coast Range forest then consisted largely of the species and size of trees mentioned above. Near the highest elevations the Noble Fir (Abies nobilis), perhaps as large as six feet in diameter and over 200 feet high, stood in association with Douglas-fir and hemlock (79).

Along the coast Alexander McLeod, a Hudson's Bay trapper, in 1826 described the region around the mouth of the Nestucca River and southward as being covered with "dwarf trees" along the banks. He stated that the "woods" near Cascade Head and the Salmon River, both in Tillamook County, were too dense and difficult to take a horse through and therefore he decided to travel by canoe along the coast (58, p. 153-154). Lewis and Clark's journals describe the Clatsop County region in 1805 and 1806. The higher ground around Point George was thickly timbered. Where the bay began, the land became more open and appeared as a prairie (332, Vol. 3, p. 255). On the

⁷Douglas-fir trees in recent times have been recorded as 12 feet in diameter measured six feet from the ground with a record claimed to be 17 feet in diameter and over 300 feet high (79, p. 162). The largest standing trees known personally to the writer are two Douglas-firs in Polk County which are 10 to 11 feet in diameter, and a western red cedar on the Salmon River which is approximately 14 feet in diameter. Details of the cutting of a large Sitka spruce were given to the writer by a logger in Willamina, Oregon, who cut it on Schooner Creek, in Lincoln County, in January 1968. It measured 13 feet 7 inches diameter at breast height (371). For other records of large trees in Oregon see (293, p. 88-92).

point, the land was open. Marshy ground bordered the bay for a width of three miles, continuing along the coast. The fauna of the area included large buzzards,⁸ red tailed hawks, ravens, crows, and the "blue magpie"⁹ (332, Vol. 3, p. 257). They had moved their camp to the south bank of the Columbia River, or the Clatsop Point area, in the fall of 1805 because the Indians who lived north of the river told them of a large number of elk in that area (332, Vol. 3, p. 256).

On November 30, 1805, three men were sent out from Fort Clatsop to examine the country to the southwest where they found a woods which was thick and obstructed by morasses and lakes. They returned in two hours to report that they could hear the ocean waves but could not reach the shoreline. Lewis reported a great abundance of birds in the area including "brant," "large geese," "white brant," "sandhill cranes," "common blue crains," a variety of ducks including canvasback, "duckinmallard," and others¹⁰ (332, Vol. 3, p. 258). On the same day Clark stated the condition of the higher elevations

⁸ Probably the California condor (Gymnogyps californianus).

⁹ Scrubjay (Aphelocoma coerulescens).

¹⁰ These birds are considered to have been: "brant" (Branta bernicla nigricans), "large geese" (Branta canadensis), "white brant" (Chen hyperborea), "sandhill cranes" (Grus canadensis), common blue crains [sic] (Ardea herodias), "canvasback" (Aythya valisineria), and "duckinmallard" (Anas platyrhynchos).

around the coastal area:

The hills on this coast rise high and are thickly covered with lofty pine maney [sic] of which are 10 & 12 feet through and more than 200 feet high (332, Vol. 3, p. 260).

Lewis and Clark accounted for the shrubby growth in the area which consisted of salmonberry up to ten feet high, ash, ninebark, blue elderberry (Sambucus glauca),¹¹ "low cranburry" (Vaccinium oxycoccus intermedium), and a wild crab apple (Pyrus diversifolia), which they said the natives ate (332, Vol. 3, p. 261). Lewis described a tree, which he said constituted about one-half of the timber in the region, which was 160 to 180 feet tall with a diameter of four to six feet; this appears to have been the Sitka spruce (332, Vol. 4, p. 43). Other trees found by them in the area seem to have been grand fir (Abies grandis), Douglas-fir, and western hemlock (332, Vol. 4, p. 45-48). They described the Oregon side of the Columbia River below Deer Island as follows:

Saw Cottonwood, sweet willow, w[hite] oake, ash and the broad leafed ash the growth which resembles the bark & c. these form the groth [sic] of the bottom lands, whilst the Hills are almost exclusively covered with the various species of fir heretofore described. The black alder appears on maney [sic] parts of the hills as on the bottoms (332, Vol. 4, p. 209).

¹¹ The scientific nomenclature has been assigned by the writer on the basis of the common names given by Lewis and Clark and the geographical locations where the plants were found.

They mention having killed seven deer on the morning of March 28, 1806, before 10 A. M. , and hundreds of deer¹² were seen on the island. They also mention an abundance of waterfowl, mallards, canvasbacks, geese, "large swans," and sandhill cranes (332, Vol. 4, p. 209-210).

Coastal Mountains

The coastal area was almost inaccessible by land. McLeod's¹³ route across the Coast Range in May, 1826, led him to the Little Nestucca River and he found his way to the coast by following its course. He mentioned the "underwood" as being "very thick" and said that it was necessary to cross frequently from one side of the river to the other in order to make progress. His party found that the Indians near the mouth of the Nestucca seldom tasted fresh meat but McLeod's party succeeded in killing one elk and a small deer (58, p. 152).

To the south, he said,

Country as far as we can see in the direction we are going is hilly and except a short distance covered with thick woods to the Beach. . . (58, p. 153).

¹² These were whitetail deer (Odocoileus virginianus leucurus).

¹³ Alexander McLeod was chief trader for the Hudson's Bay Company. He was in charge of building Fort Umpqua in 1832 and was largely responsible for opening up the fur trade with the Coastal Indians (58, p. 5).

As their party continued down the coast they found some country to be so heavily grown over that they had to cut their way through. Another account of this thickly forested area was given by John Frost, a settler on the Clatsop Plain in 1840, who crossed the Coast Range to the Willamette Valley in August, 1841, to procure cattle and horses. Frost's trip to the Willamette was a difficult one which took fourteen days to make. Very thick brush up to 10 and 12 feet high stood along the coast in the vicinity of Tillamook Head. On the steeper hillsides there was little brush but whenever possible his party travelled along the beach. Frost crossed the Coast Range by following McLeod's route near the Little Nestucca River. The forest in the area was very thick and the party often had to wade the creek bed to make progress. Following the South Yamhill River they entered the Willamette near Grand Ronde, Polk County (271).

An article in The Oregon Spectator in 1849 mentions that the Clatsop Plains were the only place along the coast where whites had settled at that time. In describing the country the article mentioned several prairies occurring in the area from the Clatsop Plains to Yaquina Bay. One was a rather large prairie two miles back from Tillamook Bay. Here ". . . a prairie commences, varying from one and a half to three miles in width, and eight miles long. . . ." Several small "rich" prairies were found near the mouth of the Siletz River and there was ". . . a considerable prairie in the immediate

vicinity of the Yacquina [sic] bay" (252).

Further to the south the conditions were nearly the same with dense forests in the Coastal mountain areas and open land or prairies found near the mouth of each river. Deer and elk were found mainly near these river mouths and Indians inhabited these areas as well. North of the Umpqua River, McLeod's party killed six elk and had killed deer near the mouth of the Siuslaw River (58, p. 165-166). McLeod's description of the lower Umpqua toward the Coquille River indicates an abundance of waterfowl in the area and stated, "The mainland is lofty and covered with impenetrable wood, if we can judge from appearances" (58, p. 186).

The Coos Bay area was generally forested with fir, cedar, hemlock, cascara (Rhamnus purshiana), and sparsely covered with Port Orford cedar (Chamaecyparis lawsoniana). In the lowlands around the bay, down the coast and upstream along the Coquille River thousands of acres of Oregon myrtle (Umbellularia californica) averaging about 60 feet in height formed dense clumps and small patches, often with closed canopies. These trees as well as big-leaf maple stood out as the major broad-leaved trees of this area (351, p. 484-498).

The Indian population of the coast from the Umpqua River to Port Orford numbered about 2000. Wildlife was abundant with waterfowl inhabiting the rivers, sloughs and marshlands and elk ranging over open areas and prairies. Douglas-fir as tall as 300 feet and 12

feet in diameter stood in the higher hills while western red cedar over 12 feet in diameter grew along the banks of the south fork of the Coquille River (64, p. 5-13).

The Siskiyou Mountains Region

The Siskiyou Mountains region was difficult to traverse for both the Indian and white man. Indian settlements were located mainly along river courses. White man later used these areas for his own homesteads when he began to settle this region in the 1850's. The Rogue River valley was one of the first to be settled. Overton Johnson, an early pioneer, published an account of the valley in 1846. He states that,

Its general character is much like that of the Umpqua, but it is more level, has a soil of a rather better quality, and is also covered with good grass. On the North side, where the California trail crosses the valley, it is principally wooded; on the South, Prairie. Immediately above, the proportion of prairie and timber is very good. Here, as in the Umpqua valley, the timber is on the streams, and the prairies are between them (154, p. 169).

The northern boundary of the Siskiyou Mountains region was covered with thick timber and brush and early journeys by white man through this area were difficult (154, p. 204). The prairies found throughout this region had been maintained by Indian burning in the valley areas. A history of fire in the Rogue River valley was described as,

The hill tops, now [1884] mainly covered by dense thickets of manzanita, madrone and evergreen brush, were then [1840's] devoid of bushes and trees because of the Indian habit of burning over the surface in order to remove obstructions to their seed and acorn gathering (351, p. 334).

The forested areas were made up of Douglas-fir, grand fir, Shasta red fir (Abies magnifica shastensis), western white pine (Pinus monticola), western hemlock, sugar pine (Pinus lambertiana), incense cedar (Libocedrus decurrens), and ponderosa pine. On the serpentine soils along the southern foothills oak woodlands were found. This southern portion also had redwoods (Sequoia sempervirens) along the Chetco and Winchuck Rivers near the California border.

The grizzly bear (Ursus klamathensis) was abundant in this region as were the black bear (Euarctos americanus), cougar (Felis concolor), timber wolf (Canis lycaon gigas), Roosevelt elk (Cervus canadensis rooseveltis), deer and numerous other smaller mammals (347, 65). Antelope (Antilocapra americana) were also found as scattered herds in the Rogue River valley. Wilkes, an explorer for the U. S. Government in 1841, reported antelope as inhabiting the prairies but "seldom" seen in wooded country. He also gave an account of the Indians burning the country over by setting fire to grass and bushes (358, Vol. 5, p. 235-236). "The fires were by no means violent, the flames passing but slowly over the ground, and being only a few inches high" (358, Vol. 5, p. 229).

Wilkes described the vegetation near the California border as

including sugar pine, oaks, Arbutus, Prunus, Cornus, yews, dogwood, hazel, Spirea and "Castanea"¹⁴ which he said had prickery burs (358, Vol. 5, p. 231).

The Cascade Range Region

The Cascade Range region covers a rather wide range in latitude from approximately 42° to nearly 46° North. Few explorations into this mountain range were made prior to settlement and the majority of the early information concerning past conditions is found in journals which record mainly descriptions of mountain passes. The Klamath Lakes area was first settled by white man in the 1850's and reports of conditions there at the time of settlement can be considered to be fairly representative of conditions prior to white settlement.

Lindsay Applegate¹⁵ described the area from Lower Klamath Lake eastward toward the desert of southeastern Oregon during the exploration for a southern route into Oregon in 1846. He mentioned an abundance of grass around the lakes and in the valleys. Stands of

¹⁴This was probably golden chinquapin (Castanopsis chrysophylla).

¹⁵Lindsay Applegate (1808-1892) was one of three Applegate brothers who entered Oregon by covered wagon in 1843. The Applegates first settled in western Polk County. In 1846 Lindsay, his brother Jesse, and thirteen other men opened a southern road into western Oregon (52, p. 10). This road was a short route from Fort Hall, Idaho, via the Humboldt River and across the Klamath Basin into southwestern Oregon (52, p. 218).

yellow pine were extensive, willows bordered stream banks and game was abundant. Mountain sheep (Ovis canadensis californiana) were seen in the lava fields. Peter Skene Ogden's¹⁶ party had previously been in this area and had killed mountain sheep there in 1827 (83). The Langell valley and hilly country near Clear Lake were described as being scattered with juniper (Juniperus occidentalis). Game was "plentiful" in the Goose Lake area and mountain-mahogany (Cercocarpus ledifolius), 15 to 20 feet high, stood in groves (8).

Lieutenant Henry L. Abbot¹⁷ gave accounts of Oregon in the 1855 survey of a railroad route from the Sacramento valley in California to the Columbia River. Much of this exploration took his party through the Cascades. The description given of the eastern slope of the Cascades Range from the California border to the Deschutes valley mentioned grass of "good quality" found along the banks of streams. The general aspect of the country was one of pine forests and sage plains. The Deschutes River flowed through a

¹⁶Peter Skene Ogden (1794-1854) was a chief trader and explorer for the Hudson's Bay Company. Ogden explored and trapped much of Oregon's then unexplored territory in the 1820's and 1830's. His accounts have been useful for their descriptions of conditions affecting wildlife during that period.

¹⁷Henry Larcom Abbot (1831-1927) was an Army engineer and explorer who graduated from West Point in 1854. He was an assistant to Lieutenant R. S. Williamson who conducted surveys for the Pacific Railroad in Oregon during the 1850's. This survey is often referred to hereafter as the railroad survey (347).

narrow prairie near its source and was bordered with forest. As it entered the basaltic plain, latitude 44°, the aspect of the country became one of thinly scattered bunch grass, sage, and a few stunted junipers (347, Vol. 6, p. 27-30).

Abbot described the Cascade Range as well timbered throughout its length with the exception of a few small prairies which were covered with bunchgrass and surrounded by a kind of whortleberry (Vaccinium sp.) called "Oo-lol-le" by the Indians. Examination of the mountains was very difficult due to the thick underbrush which was so "interlaced" with fallen timber that much of it was impassable. The forest was mainly fir and spruce with yew included on the west slopes (347, Vol. 6, p. 28).

The railroad survey described the area near the Lost River as a dusty sage plain almost "destitute of grass." To the northwest toward Klamath Lake the bunch grass became more abundant and the sagebrush diminished. Bushes and small trees were found along the stream banks. The countryside around Upper Klamath Lake consisted of timbered ridges and a narrow belt of tules (Scirpus spp.); bunchgrass, bushes and small trees were found in the grassy meadow on the east side of the lake. The water of the lake was dark in color and contained decayed tules. Elder (Sambucus spp.), and serviceberry (Amelanchier spp.) were "abundant." In the hills to the east open stands of pine with an understory of bushes and grass were found.

Pine formed a sparse cover on the hills some distance from the lake but in the wetter areas surrounding the lake, brush formed a dense growth. The country surrounding the west side of the lake had been recently burned over and grass was lacking. Near the banks of the Klamath River, a grassy area was found and a few "clumps" of willow marked the river bottom (347, Vol. 6, p. 66-68).

Particular attention was paid to vegetation along the route by the 1855 railroad survey, and species were mentioned which delineate distributions in the Cascade Range region and elsewhere. Along the shores of the Klamath lakes tules and cat-tails (Typha latifolia) were found. Serviceberry, and several species of Ribes were found on the hillsides. A few cottonwoods and willows grew in wet areas especially along the Klamath River where dense stands of small lodgepole pine (Pinus contorta) also grew. Nearly half of Klamath marsh was covered with the yellow pond lily (Nuphar polysepalum). In the Cascade Mountains lodgepole pine made up a large part of the forests in the lower valleys, where they were found in dense or close stands.¹⁸ Some of the ponderosa pines in the vicinity of Mount Jefferson were seven feet in diameter, measured three feet off the ground. At higher elevations Noble fir, white fir (Abies concolor), silver fir (Abies

¹⁸ The writer believes that these stands indicate a history of fire in the area.

amabilis), Engelmann spruce (Picea engelmannii), associated stands of mountain hemlock (Tsuga mertensiana), and grand fir were quite common. Douglas-fir covered most of the western slope of the Cascades, and was the most abundant species there together with balsam firs, western red cedar, big-leaf maple and an understory of golden chinquapin, manzanita (Arctostaphylos spp.), Spirea (Spiraea spp.), salal (Gaultheria shallon), Oregon grape, and ferns (347, Vol. 6, p. 9-64).

The reports by Dr. James G. Cooper, J. S. Newberry, W. G. Binney and S. F. Baird¹⁹ comprise the zoology section of this railroad survey and contribute the first scientific information concerning the animals of the Cascade Range region. Several predators were mentioned. The cougar was common as tracks were seen practically every day. Bobcats (Lynx rufus) were common from Klamath Lake to the Columbia River. The timber wolf was numerous in wooded country, while the coyote (Canis latrans) was "exceedingly common" in all open country but not in wooded areas. The red fox (Vulpes fulvus) was seen in all phases from red to black and silver. This fox was relatively common in the Klamath lakes area and near the Deschutes basin. The gray fox (Urocyon cinereoargenteus) was common in most

¹⁹ These men were medical officers of the U. S. Army and were also trained in geology, botany and zoology. For further details on their lives see (139) and (52).

wooded areas. Pine martens (Martes americana) were observed near the headwaters of the Deschutes River, but the fisher (martes pennanti) was considered rare. The mink (Mustela vison) was found in Klamath Lakes area and throughout the Cascades. The otter (Lutra canadensis) was also quite common in the Klamath Lakes area and in the Cascades but it was not hunted very extensively in the Cascades. Grizzly bears were common in the Klamath Lakes area and surrounding mountain slopes, but the black bear was not found south of the headwaters of the Deschutes River. In areas where the black bear was abundant, no further grizzly bear "sign was seen" (347, Vol. 6, p. 36-49).

Among big game animals the party recorded were elk, whose tracks were seen in the Cascades. The white-tailed deer (Odocoileus virginianus ochroura) was seen in the vicinity of the Deschutes River. Mule deer (Odocoileus hemionus hemona) were first seen on the upper Deschutes River, while the black-tailed deer (Odocoileus hemionus columbiana) was mainly seen near the Klamath Lakes area and along the western slopes of the Cascades. The prong-horned antelope was found near Klamath marsh where bunch grass and "clover" was abundant and along the eastern foothills of the Cascades. Bighorn sheep were seen near the California border often in areas which had been recently burned (347, Vol. 6, p. 66-72).

The railroad survey's report also included the birds found in

Oregon in the 1850's. A few California condors (Gymnogyps californianus) were seen in the Klamath basin. The turkey vulture (Cathartes aura) was common near human habitation, but was very "scarce" on the Deschutes River. The bald eagle (Haliaeetus leucocephalus) was very common near The Dalles and on the western side of the Cascade Range toward the Willamette River. They were "abundant" in the Klamath basin. The osprey (Pandion haliaetus) was common in the Klamath basin and throughout the Cascades (347, Vol. 6, p. 73-76).

Game birds were also mentioned. The dusky grouse (Dendragapus obscurus obscurus) was found in the Cascades northward to the Columbia River. Ruffed grouse (Bonsa umbellus) were very abundant in the heavily wooded areas of the Cascades, especially along the foothills of the western slopes. Sharp-tailed grouse (Pedioecetes phasianellus) were seen near Klamath lakes and the lower Deschutes. Sage grouse (Centrocercus urophasianus) were seen along the eastern foothills of the Cascades, wherever "sage plains" were crossed, from the California border to the Columbia River. Mountain quail (Oreortyx picta) were found mainly along the western foothills of the Cascades bordering the Willamette valley and they extended "almost uninterruptedly" to the Columbia River

(347, Vol. 6, p. 92-96).²⁰

Near The Dalles, coyotes were very numerous, apparently because of the dead salmon and offal which the Indians left on the banks. Foxes were also very abundant in that area and they were all apparently the Cascade fox (Vulpes fulvus cascadenis), a red fox native to the Cascades. Skunks (Mephitis spp.) were also extremely abundant near The Dalles where they fed on salmon offal and carrion (347, Vol. 6, p. 112-117).

The Great Basin Region

Most of the Great Basin region was unsettled until relatively late in the history of settlement in Oregon. The accounts of early conditions and the status of wildlife populations of this region are therefore widely scattered in both area and time. Some of the earliest accounts of this region are those of trappers such as Peter Skene Ogden. In October and November, 1826, Ogden reported in his journal that the conditions of the country near Malheur Lake were "marshy" but "the country is destitute of animals and we may prepare to starve altho' wild fowl seem to abound" (83, p. 207). The Silvies River discharged into a "salt lake" (Malheur Lake) and the two lakes

²⁰ The waterfowl, waders and other migratory birds are also mentioned in the railroad survey but they are treated separately in this paper.

Harney and Malheur were divided by a "small ridge" of land. He said that the two lakes had no "intercourse." Wood was scarce and the country was ". . . low and bare of wood except worm wood and brush" (83, p. 207). Concerning animals he said, "Buffalo have been here and heads are to be seen. Fowl in abundance but very shy" (83, p. 207). (Above was Nov. 1, 1826.) Harney Lake was estimated to have been ten miles in length (83). Two herds of antelope were seen on Nov. 12, 1826, toward Paulina and East Lake. Pines and hemlocks were the only trees mentioned as growing there and bear tracks were found in the area. Near the upper Deschutes River they killed seven white-tailed deer. During late May and early June of 1827 Ogden's party crossed the lake basin region of Oregon again, this time from west to east. Their course took them near the lakes of southeastern Oregon. The area near Lake Abert was covered with sagebrush where game was scarce and the country was described as "barren." Near the Warner Lakes area close to Hart Mountain, a bighorn sheep was killed and a lamb was taken alive. The party found the country to the southeast very dry and covered with sagebrush. The available water was muddy and often "stagnant." By June eighth, they had returned to an area near Harney Lake and camped at their camp of the previous November. Game was still scarce in that area and fresh water from the Silvies River emptying into Malheur Lake caused the lake to be very high. Ogden described the "stench" of the lake as "terrible" (83).

John C. Fremont's exploration of this region in the winter of 1843 correlates fairly well with the accounts given by Ogden. Fremont's party found "very little grass" and little water in the country surrounding Lake Abert and in the Warner Valley area. His general description of the country was that of an extensive sage or open plain with very little game except for rabbits. The Indians of the area had recently burned the grass and were subsisting primarily on seeds, roots and rabbits (107, p. 292-297). Lindsay Applegate's account of the country, on the south of the Great Basin region, in 1846, gives a description much like Fremont's. Applegate's party found very dry sage plains with a scarcity of game. He mentions that the Indians subsisted "chiefly" on grasshoppers (8).

The survey party which explored a course for the Oregon Central Military Road²¹ in 1865 reported conditions along the route through the Great Basin Region. The margins of streams in the Sprague River area were well wooded with quaking aspen (Populus tremuloides). The surrounding hills and valleys were covered with grass. Northward toward Summer Lake, and across the rocky tableland, timber and grassy glades were found interspersed but water was very scarce.

²¹ A military wagon road was approved by an act of the U. S. Congress on July 2, 1864. The road was to be built from Eugene via Diamond Peak to the eastern boundary of the State. For a further discussion of this project see (14, Vol. 2, p. 651-653).

The Sycan Marsh area was very dry when the party arrived there in August. They found that most of the grass had been eaten by grasshoppers. Winter Ridge near Summer Lake was timbered and the area above the lake appeared grassy. Thimbleberries (Rubus parviflorus) and wild plums (Prunus subcordata) were found; little indication of game was given. The hills were covered with bunchgrass, "prairie hens" were found along the lake and a "luxuriant grass" grew along the lake and streams flowing into it. The Chewaucan River was "fringed with cottonwood and willow" and trout were abundant. Near the present site of Lakeview, the grass was found to be "good" but the water was mostly alkaline. Across Abert Rim grass was "quite good" and junipers were growing. Antelope were hunted in Goose Lake valley.

Eastward toward Warner Valley they found a very dry sage plain. The lakes of Warner Valley were described as alkaline and the bordering grass was termed as "poorly." East of Hart Mountain an extensive sage plain was noted, with grass being found only along the sides of creeks and near springs. Along the eastern base of the Warner Mountains grass was found to be quite green in the valleys and small groves of pine were found. Along the western base of the mountains, near the Warner Valley lakes, a tule marsh and alkaline deposits were found. Willows and rose bushes grew along Honey Creek and some grassy "glades" were found scattered among the

rocky lands to the west. With the exception of valley streams, lake margins, and springs, where bunchgrass was found, most of the country was a very dry sage plain and offered very little grazing (196).

Only a few accounts of early conditions in this very large region are available. One reason for this is that settlement did not take place until the late 1800's. Even with settlement, the relative lack of development in the last one hundred years has allowed much of this region to remain as it was. Therefore the above accounts, when supplemented with a knowledge of the present terrain, may give a fair representation of former conditions.

The Owyhee Region

Historical information concerning early ecological conditions in the Owyhee Region is conspicuously lacking. The Owyhee River rises in Nevada and flows north and northwest through the extreme southwestern corner of Idaho and into Oregon where it then flows north to a confluence with the Snake River. The river and its tributaries have cut extensive canyons into the plateau area of this region. With the exception of the Steens Mountain on the western boundary the general aspect of the country is one of an elevated plateau approximately 3,500 to 4,500 feet above sea level, scattered with small groups of hills.

One of the earliest accounts of the Owyhee River and canyon

area was recorded by John Work, chief trader for the Hudson's Bay Company, in 1831. His trapping expedition followed much the same route as Ogden's party. Work's party travelled through the Owyhee country in the month of May and again in June of that year. The party did not find game to be plentiful but Indians were apparently numerous. Concerning game he said: "Some of the people are out hunting but without success. A chance antelope is the only animal to be seen, and these are so shy that it is very difficult to approach them" (82, p. 303). In some areas the country was entirely devoid of game. They did not find beaver in any abundance but managed to kill a "few" waterfowl. Willows were found along the stream banks and sage covered much of the surrounding countryside. Big-horn sheep and antelope seem to have been the only big game animals in this area and they provided very little in the way of food for the party which often had to resort to killing and eating their horses (82).

The Malheur River valley was a sandy plain covered with artemisia. The river was found to be about sixty feet wide and two to three feet deep in the month of July. The banks were "fringed" with willow and cottonwoods. Grass was very thin in this area especially on the ridge between the Malheur and Owyhee rivers. The soil was sandy and covered with artemisia. The only game seen was "sagecocks" which were in "great abundance."

The Owyhee country was described as a plain or plateau broken

up by deep canyons and ". . . perfectly bare with the exception of artemisia; not a tree can be seen as far as the eye can reach" (344, p. 248). The bottomlands of the Snake River were mainly "sterile," except for "a rough grass of an alkaline quality," a thin cover of "saline shrub" and a few stunted juniper on the slopes. The islands in the Snake River were covered with "tall rough grass" and "thickets of willow bushes" (344, p. 247-252).

Further details are added to the description of the Owyhee region by reports from geological reconnaissance conducted in 1881 and 1882. Part of the region had not been previously explored by white man. These locations included the valley areas on the lower Malheur River which were covered with a "luxuriant growth of rye grass" (294, p. 20). Much of the rest of the region was reported as covered with sagebrush, bunchgrass, alkaline flats and scattered juniper (294, p. 20-24).

Reports for the Department of the Interior in 1909 gave a description of the area east of Steens Mountain. These reports mentioned a "rank growth of sagebrush" on the gravel near Wildhorse Creek. Grass was found along Trout Creek and some small meadows were found near Mann and Juniper lakes. Much of the land was alkaline and near Tumtum Lake there was a band of greasewood "a couple of miles wide" (352, p. 78). In the Whitehorse basin about 3000 acres of "wild-hay land" occupied the meadow sector of the valley, but the

surrounding vegetation consisted of sagebrush and a "scanty growth" of greasewood (352, p. 71).

The Blue and Wallowa Mountains Region

The Blue Mountains region of northeastern Oregon was described in part by several white men after the exploration of Lewis and Clark. Lewis and Clark's journey through the Blue Mountains was unfortunately north of the Columbia River and not through what is now Oregon. Among the first white men to pass through the Blue Mountain Region in Oregon were members of Ogden's Snake River expedition which crossed the central part of the region in 1825. Ogden's party found grass up to seven feet tall along the creek bottoms in the Ochoco Mountains. Generally the stream banks of the region were lined with aspen, willow and shrubs. Game was not abundant and only a few deer and antelope were killed. In many areas neither game nor the sign of game was found. The furbearers included beaver, the object of the expedition, plus otter and raccoon. The Elkhorn Mountains were well wooded with pines but near the Burnt River only "barren hills" could be seen. The party succeeded in killing four mountain sheep somewhere in the foothills of the Blue Mountains (282, p. 106-128).

John Townsend found conditions about the same as those found by Ogden's party, when he passed through this region as a naturalist

with Nathaniel Wyeth's party in 1834. On August 28, 1834, Townsend camped near the Powder River where the hunters killed a fawn deer and an antelope. He previously stated:

Game has been exceedingly scarce, with the exception of a few grouse, pigeons, &c. We have not seen a deer, antelope, or any other quadruped larger than a hare, since we left the confines of the buffalo country (334, p. 269).

Townsend found that the Grande Ronde Valley had "good" water and pasture. The Cayuse Indians used this area as a campground and dug camas (Camassia quamash)²² which grew there. The Blue Mountains to the north were well timbered with tall pines and the understory consisted of serviceberry and "other shrubs." The Indians had recently burned the area and nearly all of the grass with the exception of small patches near the stream beds had been "consumed" by fire (334, p. 271-273).

The pioneers who followed the same general route that Wyeth's party had taken gave similar accounts of this region. They found the best grass in the valleys near streams where willow, aspen, cottonwood and various shrubs also grew. Game was most abundant in these areas and scarce or exceedingly rare in the sagebrush or drier country. Jesse Applegate was one of these first pioneers to arrive in

²²The onion-like bulbs of camas, a genus of the lily family, were important as a food source for most Pacific Northwest Indian tribes. They were prepared by boiling or pit roasting and were also dried and stored for winter food.

Oregon by wagon train in 1843. He found conditions similar to those which Townsend had described nine years earlier (7, p. 30-35).

Orange Jacobs, a pioneer in 1852, described the Burnt River country as "treeless plains" with "bald ridges" and the stream banks being "fringed" with stunted cottonwoods and poplar. High treeless hills made up of red earth and rocks surrounded the river. West of the river was an extensive sagebrush plateau and the only green areas were near the Powder and Grande Ronde Rivers (145, p. 51-55).

Joel Palmer, another pioneer, described this region in September 1845. He called a great portion of the country "barren" and mentioned a few "scrubby cedars" (juniper) scattered across the landscape. Vegetation was abundant along the creek bottoms. Pine timber was "abundant" on the slopes surrounding the Powder River and the base of the mountain was covered with grass. The Grande Ronde Valley had "good grass," camas, "wild flax," "red clover," and groves of yellow pine extended from the mountains down into the valley. The Blue Mountains were forested with yellow pine (Pinus ponderosa), spruce (Picea sp.), "balsam fir," (Abies sp.), and hemlock (Tsuga mertensiana). The stream banks were lined with cottonwood, chokecherry (Prunus virginiana), and other shrubs. Bear, deer and elk were apparently plentiful in the mountains and most of the Indians of the area were in the mountains hunting at that time (September) (261, p. 100-106).

A survey was conducted for a military road from Fort Dalles to Salt Lake City in 1859. The subsequent report described the region. On the high table land east of the Deschutes River bunch grass covered the entire expanse with the exception of a few scattered junipers. Eastward and north of the Crooked River a "broken range of low mountains" led to a "sandplain" where the first sagebrush was seen. More bunch grass and scattered groves of juniper were found near what is now called Summit Prairie, northeast of the Maury Mountains. The banks of the streams in this area were generally lined with "willow, cottonwood and alder." The mountains dividing the headwaters of the John Day and Crooked Rivers (Strawberry Mountains) were covered with a dense growth of "fir and pine." They found very little grass but mainly sagebrush and a shrub they called "fremontia." Groves of alder and dense thickets of willow grew along the river bottom.

From the south fork of the Crooked River a "destitute plain" existed with the exception of artemisia which formed an uninterrupted dense field from Buck Creek to Lake Valley, a distance of about 45 miles. Its growth was so dense in places that it was difficult to pass through. In a valley or basin 80 miles long and 50 miles wide, several alkaline lakes were found forming a chain. The soil was thin and stony and the vegetation consisted of mainly "fremontia" and saline shrubs. Near the center of the valley they found a large lake

18 miles long and ten miles wide. This party named it Lake Harney²³ and mapped it at latitude 43°12'25" N. and longitude 118°41'40" W. Westward from Lake Harney toward the western base of the Blue Mountains the land was "extremely level" and sandy. From Harney Lake to Stillwater Slough (about 14 miles) the country was partially covered with artemisia and "freemontia" but from Stillwater slough to the base of the mountains (about 18 miles) the country was a level valley ". . . covered with bunchgrass, wild pea vines and red clover interspersed with camass patches." A grassy meadow was bounded on the north and east by the Blue Mountains with numerous streams forming a large marsh in the area. The streams were lined with willow and cottonwoods with pine, fir, and juniper covering the slopes. They found game abundant and mentioned antelope, deer, several species of "grouse," as well as "prairie chickens," ducks and geese (344, p. 240-247).

The eastern spur of the Blue Mountains was covered with good grass over the "rolling country" and the higher elevations were timbered with pine and juniper. Generally bunch grass covered much of these areas and when juniper was mentioned it was termed as scattered and few, or "stunted" (340, p. 242).

²³Now called Harney Lake.

The Columbia and Deschutes Plateau Region

The Columbia and Deschutes Plateau region was first described along its northern border by Lewis and Clark in the spring of 1806. East of The Dalles they found "open plain" country with no timber growing. Wood was so scarce that they had to buy it from the Indians in order to cook their meals. Game was also scarce forcing them to purchase dogs from the Indians, as they had done many times before, to keep from starving. Further up the Columbia toward Walla Walla, they found travel near the river to be difficult. Rocks and sand were the most apparent features of the landscape. The only vegetation was extremely sparse grass except for willows, which were found along stream banks. "Curlews" were abundant and were laying their eggs on the plains near the river. Killdeer (Charadrius vociferus), "the brown lizard," and marmots were found in the area. In the vicinity of the Umatilla River and on toward the Blue Mountains the soil became more fertile and low grass²⁴ plains were found. The Indians of the area grazed their horses here and the horses were found to be in "very good condition." Several shoveler ducks (Spatula clypeata) were killed and many lizards and rattlesnakes were seen. They mentioned seeing only one antelope and one coyote along the entire

²⁴This bunchgrass was probably mainly Agropyron spicatum.

trip from The Dalles to Walla Walla (332, Vol. 4, p. 314-326).

Robert Stuart, a fur trading partner of John Jacob Astor, described the Deschutes River area many years earlier, in July of 1812, when he wrote:

. . . two days march up this stream [Deschutes], it is well wooded & its banks are the asylum of a great many Bear, Deer, and Beaver. . . (317, p. 63).

Further up the Columbia toward the mouth of the Umatilla River, he said, ". . . the country is without a stick of wood, and the soil is an entire desert of sand, even on the top of the bluffs" (317, p. 64).

Other accounts of travels through this region up until the time of the overland immigrations in the 1840's, '50's and '60's indicate that generally unfavorable conditions existed for travel from the Umatilla River westward down the Columbia River to The Dalles. Jesse Applegate described the countryside west of the Umatilla River as having little grass which was scattered across a sandy, rocky soil interspersed with "sagebrush," "greasewood" and occasional willow trees along streams. Nearer the Columbia River he noted sandy areas and "drifts" or "hummocks of dry sand" with occasional sagebrush. His general impression of the area was that ". . . everything was dry, dusty and dreary" (7, p. 35).

Joel Palmer, following the same route in 1845, two years after Applegate, found the road from the mouth of the Umatilla River to The Dalles sandy and very difficult to traverse. There was no

firewood available along the Columbia River. The whole country east of The Dalles and above the bluffs bordering the river was covered with very dry bunchgrass. An extensive grassy plain was also found to extend southward from the area near the mouth of the Deschutes River and upstream for a great distance (261, p. 117-126).

The 1859 military road survey party reported conditions and descriptions of the Columbia and Deschutes Plateau region south of the Columbia River. They noted fertile bottom land near Three Mile Creek. In the Tygh Valley near the White River, they found undulating country to the north which was scattered with groves of pine. The hills were covered with bunchgrass. The banks of the Tygh River were "fringed" with "willow, alder and cottonwood." The Tygh Valley had a "luxuriant growth of good grass" covering an area one to two miles wide. From the White River south to the Mutton Mountains a bunchgrass prairie extended for a distance of about fifteen miles. A few juniper were scattered across this "prairie." Oak trees covered the creek bottoms in this area. A good cover of bunchgrass was found interspersed with volcanic rock and scattered junipers, north of the Warm Springs River. The banks of the Deschutes River were fringed with willows and "cottonwoods" (344, p. 239-240).

A composite view of the Columbia-Deschutes plateau region prior to white settlement seems to agree with that given by the

Oregon pioneer and historian, W. H. Gray, in 1870.

A large portion of this plain, lying along the river, is of coarse gravel and sand, dry, and comparatively barren; yet producing artemisia, sage, and a luxurious growth of wild mustard in the early spring; but little grass, and abundance of the low sunflower. The lands back from the river are high rolling prairie, covered with rich bunch-grass. . . (116, p. 613).

The area further up the Columbia River beyond the mouth of the Umatilla River was ". . . destitute of all kinds of timber, except at the foot of the mountains, and small patches of willow and cottonwood, in some little nook or corner, near some spring or stream" (116, p. 613).

In general the routes of early overland explorers appear to have followed Indian trails, which no doubt previously were started by following trails made by game animals. The immigration routes of early settlers usually followed these approaches from east to west. The valleys, stream courses and more open areas through timbered regions were those most often observed. These travel routes were ones along which the Indians lived, or migrated to hunt and fish. Wildlife naturally chose such areas because of the relative ease of travel and availability of food and water. Although the Indian made use of these more favorable sites, he did not compete excessively with wildlife for the land as did his successor, the white man.

The closed canopy or heavily shaded areas of some forests in Oregon did not provide a suitable environment for deer and elk.

Heavily forested areas such as those along the coast, with their mature stands of timber and closed canopy, did not offer a favorable habitat for either man or the game animals upon which he depended. East of the Cascade Mountains the most favorable wildlife areas were those along the streams, near lakes and in areas which were generally more moist.

Prior to the arrival of white man both the Indian and wildlife occupied the most fertile land areas. Such areas contained rich soil and available moisture. The settler quickly recognized these areas as sites of potential agricultural gain. His farming and homesteading took place in these fertile areas where wildlife was concentrated. The abundance of wildlife in these locations led the white man to believe that game was equally plentiful throughout the rest of the State.

This was probably far from the truth. Once the pioneer had displaced wildlife from its prime habitat, it was forced to live in less favorable areas. The Indian was also largely displaced from his traditional hunting and fishing areas by pioneer settlement. Numerous changes took place very rapidly after the arrival of white man and these changes have continued up to the present time.

Many developments have taken place over the past 160 years and new activities have replaced former ones. The Coast Range forests have been opened up by logging and the logging has created

large new areas of deer and elk habitat. Prior to settlement the only natural forces for opening forests were fire, wind, disease, and the activity of beavers.

In the Willamette Valley region forests have been held back by the development of agriculture, housing, and industry. This region was once kept in a state of disclimax by Indian burning. The same thing is true of nearly every valley or fertile area in Oregon.

In the Columbia River-Deschutes plateau region, native grasses have been replaced by grain farming. Such farming has merely replaced one form of grass with another but the results have not benefitted all forms of wildlife. Today waterfowl and introduced exotic game birds find an abundant food supply in the grain fields, but several native game birds no longer find a favorable habitat in these areas.

Disturbance of the ecosystem has followed man nearly everywhere in Oregon. At times this disturbance has benefitted wildlife and at other times it has proved to be destructive to the point of their extinction. Logging, ranging livestock, dam building, industrialization and merely human occupancy have been the forces which have shaped Oregon wildlife populations as we know them today. Each one of these areas is treated in succeeding sections of this study as a part of the transition away from the conditions described above.

CHAPTER II

EARLY HUMAN POPULATION

The Indian Population

Recent archeological evidence shows that the Indian has been a resident of Oregon for a period of at 10,000 years (366, p. 186). Radiocarbon dating of sagebrush sandals found in the Fort Rock Valley produced an age of $9,053 \pm 350$ years (182, p. 119). In contrast to this, less than two hundred years of recorded information is available concerning conditions in the Pacific Northwest. This points out the extremely recent origin and incomplete condition of our ecological, archeological, and anthropological records. Human remains have been found associated with the remains of extinct Pleistocene fauna such as Equus, camels, Bison taylori, sloths, wolves, mammoths and others. Early man, or the "Paleo-Indian" must have lived through long range changes in climatic conditions throughout his years of habitation.²⁵ The many large pluvial lakes once found in eastern Oregon, following glacial recession 18,000

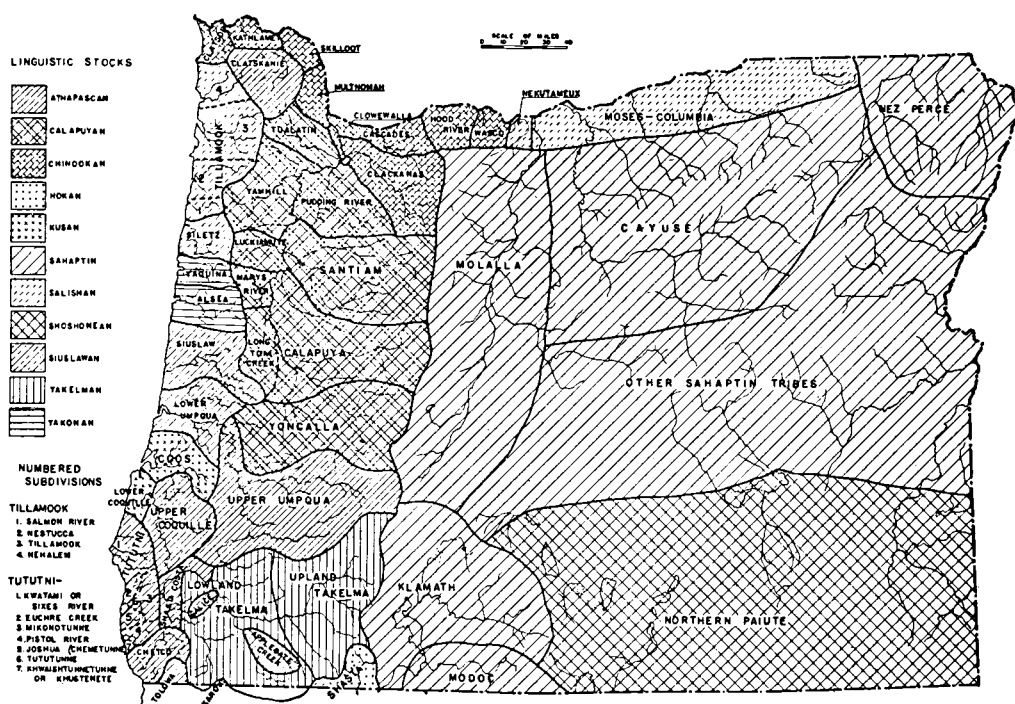
²⁵ L. S. Cressman of the Department of Anthropology, University of Oregon, Henry P. Hansen of the Department of Botany, Oregon State University, and Ira A. Allison of the Department of Geology, Oregon State University, conducted field work in their respective areas in investigating the subject of early man in Oregon. Their work was presented at a symposium in Portland, Oregon on 1-13-45 (54, 123, 4).

years ago, must have provided him with a favorable environment for a long period of time before they dried up (4).

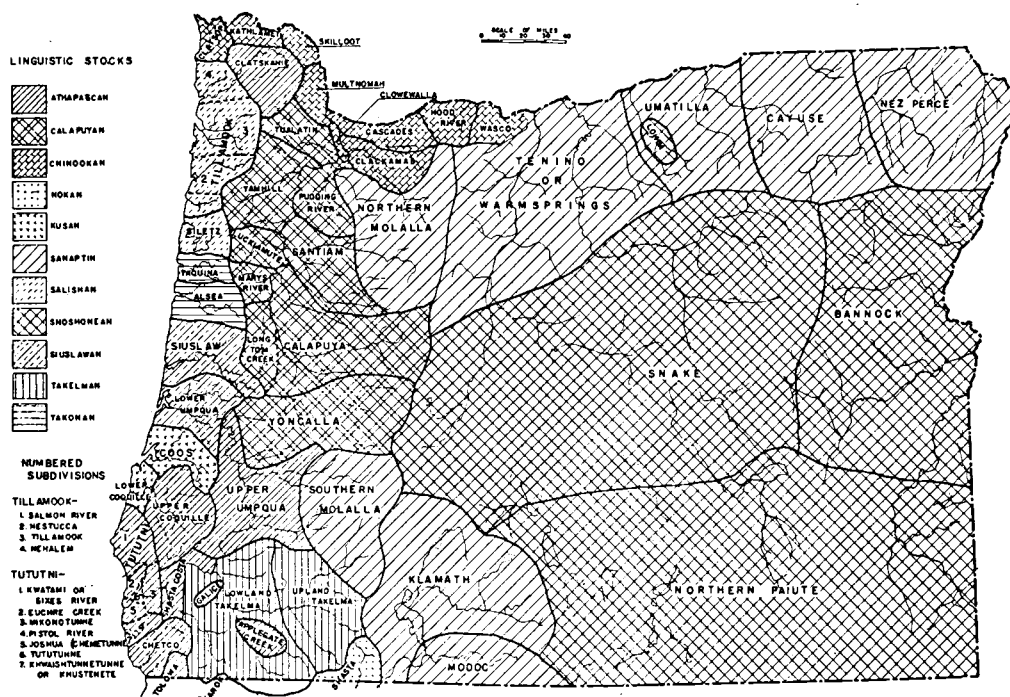
The tribal distribution of Oregon Indians is shown in Figure 2. One striking feature of this distribution is that the tribal groups along the Coast Range region were centered around the mouths and lower drainages of rivers emptying into the Pacific. Rivers and mountain ridges fairly well divided the western Oregon tribes. The tribes of the Coast Range region were the Clatsop, Tillamook, Siletz, Yaquina, Alsea, Siuslaw, Lower Umpqua and Coos. All of these tribes found the Coast Range to be an effective eastern boundary. Geographical features like the Willamette Valley presented a natural unit. It in turn was subdivided by rivers and smaller streams draining into the Willamette River. Tribes such as the Luckiamute, Yamhill, Long Tom, Calipooia, and others inhabited areas along these streams.

East of the Cascade Mountains environmental conditions for the Indians living there were more harsh than those in western Oregon. Determination of the distribution of tribes in eastern Oregon is difficult. One of the reasons for this is that these Indians had migratory habits. Another is that epidemics swept the area in early 1800's and devastated entire tribes before white man arrived to record tribal locations (26, p. 7).

In the Willamette Valley Region the Indians were more resident. The Tualitin tribe had twenty-two villages established around Wapato



Tribal Distribution 1750



Tribal Distribution 1840-1850

Figure 2. Tribal Distribution of Oregon Indians (26)

Lake on the Tualitin plains.²⁶ Other bands or villages were semi-permanent and were established near the edge or confluence of rivers. Although the coastal tribes, with the exception of the Clatskanie who lived in the Nehalem Mountains, were primarily fisherman as were other Chinookan tribes, the hunting territories which most tribes maintained usually extended into the headwaters of the coastal streams on which they lived. Tribal size varied and a number of villages were temporary or seasonal headquarters depending upon the time of year. The Yaquinas, for example, had fifty-six villages (26, p. 37). The Klamaths had forty-three villages near Klamath Marsh, the Lower Willamson and Sprague rivers, with a total of about seventy or seventy-five villages in the Klamath Basin. The Modocs, who were directly south of the Klamaths, had winter settlements on Tule Lake, Lower Klamath Lake and Lost River. The Snakes and the Bannocks occupied the central portion of Oregon from the Cascades to the Snake River. The southeastern corner of the state was inhabited by the Northern Paiutes. Those living in the Warner Valley were called Gidutikadu (groundhog-eaters), the Summer and Silver Lake Indians were Duhutcyantikadu (deer-eaters), the Burns and Malheur tribes were Wadatikadu (seed-eaters) and those living near the Steens Mountain, Tubuiuitikadu (berry-eaters) (26, p. 52).

²⁶ This area is near the present site of Gaston, Oregon.

Estimates of the populations of Indians making up the different tribes vary over the first few decades of white habitation. Estimates of Farnham²⁷ in 1839 and Schoolcraft²⁸ in 1851 (85, p. 98-99; 330, Vol. 1, p. 521) are shown in Table 1.

The total numbers of Indians in Oregon prior to contact with white man might have been from 30,000 to 35,000. This number was reduced exceedingly by disease in the first fifty years of contact with white man. Lewis and Clark's population estimates were the first to be made for Oregon's Indians. The 1806 population estimates made by them included, within what is now the State of Oregon, about 2800 living from The Dalles to the Willamette River. In the vicinity of Sauvie Island and down to the mouth of the Columbia another 5500. The Clatsops numbered 200 and the Tillamooks 1000. An additional 4300 or so were estimated to have lived south of the Tillamooks. With 6000 living up the Willamette, a total of 19,800 is derived from these figures, but this does not include the tribes of the interior valleys and all of eastern Oregon south and east of The Dalles (332, Vol. 6, p. 116-117). The most rapid reduction in Indian populations

²⁷ Thomas Jefferson Farnham (1804-1848), was a western traveler and writer from Peoria, Illinois. He arrived in Oregon in 1838 and spent much of his time travelling and studying the Indian tribes.

²⁸ Henry R. Schoolcraft (1793-1864), was a geologist and ethnologist who made pioneer studies of North American Indians.

Table 1. Oregon Indian Population estimates in 1839 and 1851.

Farnham 1839 ^a		Schoolcraft 1851 ^b	
Walla Walla and Nez			
Perce	1,100	Cayuse	800
Clatsop	220	Clatsop	50
Tillamooks		Killamuck	
(N. of Umpqua R.)	400	(Tillamook)	200
Cascades	105	Mole Alleg (Mollala)	100
Dalles	250	Wascopam	200
Deschutes	125	Deschutes	300
Umpquas	400	Umpqua	200
Rogue River	500	-----	
Clamets (Klamaths)	300	-----	
		Clackamas	60
		Willamette	20
		Calipooia	60
		Yamhill	90
		Catelamet	
		(Cathlamet)	58

^aThese figures have been adapted from Farnham's population estimates made in 1839. Farnham felt that they were as nearly correct as possible. If they were off at all it was because they were too high (85, p. 98-99).

^bSchoolcraft did not use the same tribal names as Farnham. It is also possible that migration may have changed tribal distribution between 1839 and 1851. The writer has attempted to match those tribes which he feels represent the same Indians (303, Vol. 5, p. 492-493).

took place in the first three decades of the nineteenth century.

Farnham noted an epidemic fever which started in the Columbia valley in 1829 and became severe by 1832. This fever was thought to have been scarlet fever or malaria but conflicting accounts of the symptoms do not support this entirely (86, p. 68).²⁹

It has been estimated that eighty percent of the native peoples of Oregon died from white man's diseases. The mortality rate in the Chinookan tribes of the lower Columbia River was estimated at ninety-five percent and epidemics are thought to have preceded the Lewis and Clark expedition. Lewis and Clark found the tribes along the Columbia River to be recovering from an epidemic which the Indians estimated as having ravaged their population about twenty-five to thirty years earlier (332, Vol. 4, p. 51).³⁰ John Minto, an early pioneer and important historian of early white settlement, mentioned

²⁹ The disease or diseases which took so many Indian lives apparently disappeared as the Indians died or were relocated away from white man (14, Vol. 2, p. 39). Cholera was known to have been widespread among some of the immigrants but not until the late 1840's and early 1850's (52, p. 53). The sickness or plague as it has been called resisted all medical treatment known to the pioneers (108, Vol. 1, p. 45). One account states that an epidemic of measles started in the Indian tribes after the arrival of the ship Owyhee in 1827 (47, Vol. 1, p. 131). Another account indicates that the same ship brought a fever similar to malaria (304).

³⁰ It is possible that this disease was cholera or malaria. The diseases which decimated the Indians of Oregon were smallpox, venereal disease, and a fever which has not been identified.

the "cold sick" which spread along the Columbia from 1832 until 1844. He says it did not respond to quinine and other malarial treatment of the period (200). Smallpox is thought to have spread from the Missouri Valley via French or American trappers, and the first epidemic is thought to have reached the Pacific about 1781 or 1782. Numerous accounts of venereal disease are recorded in the journals of early explorers who visited Oregon. It probably did not result in a high rate of mortality, but may have seriously affected fertility among the tribes. Early white sea traders dealing with the Indians along the Oregon coast are thought to have contributed to the introduction of diseases to which the Indians had no resistance. One of the important trade items was clothing which the white men were wearing, and this is believed to have been an important agent in the transmission of disease (47, Vol. 1, p. 131).

By 1845, of the 5500 Indians estimated by Lewis and Clark, less than 200 Indians were left between the Willamette River and Clatsop Point on the Columbia River. The entire population had disappeared from the east end of Sauvie Island and a total of less than 1300 could be found between the Cascades and the Pacific Ocean (200). Tribes in the eastern portion of the state and those to the south did not come into such close contact with white men and were not as seriously affected. Later the eastern Oregon Indian became the most warlike and troublesome to the pioneer, while the Indian of western

Oregon was generally peaceful, quickly controlled, and greatly reduced in numbers.

Indian Hunting and Fishing

The attitude of the Indian toward hunting was ambivalent. An example of this attitude is that of the Klamaths.

While game is varied and plentiful in the Klamath country, the Klamath are not much given to hunting. As one informant phrased it, "We know very little about hunting deer." Their attitude is betrayed by the exaggerated value put on elk hides, although elk were plentiful. And while fish can be taken by anyone, success in hunting is assured only to one who has spirit power. In a word, the Klamath prefer the easier exploitation of stream, marsh and prairie to invasion of the forest-clad mountains which invite only the solitary seeker after power (319, p. 155).

The Klamath tribes did do some hunting, however, and their hunting parties ranged westward as far as the Rogue River system. They also hunted antelope and mountain sheep south of Modoc territory in the lava beds. They hunted mule deer on the border of Northern Paiute territory to the east (329). A list of the animals eaten and not eaten by the Klamath Indians is given in Table 2.

Most land animals were taken with a bow and arrow and occasional deadfall traps were also used. The Great Basin Indians drove deer and antelope into enclosures and over cliffs and probably used nets in taking rabbits. The Modocs used deer skin disguises to cover their bodies when stalking deer. The Mollalas used dogs quite

Table 2. Animals eaten and not eaten by Klamath Indians.^aEaten

Black-tailed deer	Ground squirrel (occasionally eaten)
Small red deer	Tree squirrel
Mule deer	Larger tree squirrel
Elk	Pelican
Antelope (taken in Klamath Marsh)	Goose
Mountain Sheep	Swan
Black Bear	Brant
Grizzly bear (paws and flesh)	China brant
Porcupine	White brant
Beaver	Sandhill crane (scarce)
Groundhog ^b	Blue crane
Mink	Loon
Otter (eaten by some)	Small loon
Raccoon	Gull
Jack rabbit	Smallest gull
Cotton-tail rabbit	Mudhen
Small duck (little duck, big head and neck)	Teal
Blackjack duck	Mallard
Fishduck (redhead)	Pintail
Blackbird (occasionally eaten)	Canvasback
Redwing blackbird	Butterball
	Wood duck

Not eaten

Wolf	Badger
Coyote	Chipmunk
Red fox (found west of Klamath Lake)	Larger chipmunk
Black fox	Woodrat
Fisher	Mouse
Bob-cat	Small mouse (very small, white, long tail, live in ground)
Ringtailed cat ^c (<u>Bassariscus astutus</u>)	Shrew
Cougar	Small gull (swallowtail tern?)
Marten	Beaver cubs
Weasel	Skunk

^aTable 2 adapted from Spier (319, p. 156-157).^bMarmot not positively identified.^cNot positively identified.

extensively to track deer and drive game to the hunters. Deadfalls were used primarily in the Cascades or along the foothills to take furbearers such as marten, fisher, fox and coyote. Waterfowl were shot with floating arrows and also caught in nets. These nets were fifty or sixty feet long and set in water which was about three feet in depth. Birds were also taken by attracting them at night with a pitchfire built in the prow of a canoe. When they were close enough they scooped them up with dip nets (319, p. 158-159).

A list of the plant foods used by Indians of the Klamath region includes seeds of rye-grass (Elymus condensatus), tarweed (Madia glomerata) seeds, sugar pine seeds and pitch, several herbs, roots, nuts, fruits, lichens, and gums (319, p. 166-167).

Salmon runs in the spring and fall plus chubs (Siphateles spp.), lamprey (Lamperta spp.), suckers (Catostomus spp.) and trout (Salmo spp.) were important parts of the Indians' food supply (319, p. 148-152).

The Alsea Indians can probably be considered typical of the coastal tribes. They were primarily fishermen and gatherers rather than hunters. They made great use of the fisheries resource by taking fish and shellfish from the bays and estuaries and salmon from the rivers and tributaries. They used weirs, traps, harpoons and clubs to take salmon. They did not fish offshore and neither did other Indians of the Oregon coast to any extent (68, p. 82-84).

The hunting which the Alsea engaged in did not constitute a major part of their food-producing efforts. They hunted elk and deer with the help of dogs, by using pitfalls, and by shooting with the bow and arrow. Upland birds were caught in basket traps and some waterfowl were shot. Sea mammals such as sea lions were occasionally hunted on the offshore rocks (68, p. 83-84).

The Indians of southwestern Oregon hunted primarily with the help of dogs due to the densely forested nature of the inland areas. Brush was burned from hillsides near valleys to allow a growth of grass and create clearings where deer could be more easily shot. Small game was caught with snares or nooses and pitfalls were dug for big game animals. Deer and elk were often driven into the water by men with dogs where they were shot or clubbed. Sea lions, seals and sea otters were clubbed or harpooned when they were asleep on the beach. As with their northern neighbors, salmon and other fish along with shellfish were a primary part of the diet of these Indians. The tribes of the upper Coquille River depended more on game than fish because of their inland location but salmon was still a basic part of their food. Camas and other vegetable foods became more important inland among the tribes of the upper Rogue, Sixes, Chetco and other rivers as well as Galice Creek and the surrounding area (68).

The Northern Paiutes of southeastern Oregon present an

example of the desert Indian's use of the wildlife resource. They hunted game all year around but spent a great deal of their time digging roots and gathering seeds, berries and whatever vegetable food was available. During the winter they moved from one root and seed cache to another. They fished the creeks and streams of the region in the spring. They continued wandering from one food source to another all year but they did have some seasonal pattern in hunting sage grouse in the spring, and marmots and ground squirrels in early summer. During mid-summer they gathered insects and in late summer and early fall they spent more time hunting deer, antelope, waterfowl and making communal rabbit drives. The area near Warner Valley and Hart Mountain was an important hunting ground. In August, deer were hunted with the use of fire. When deer were sighted on a hill the Indians encircled them and set fire to the hill surrounding them. They then closed the circle until the deer could be shot near the crest of the hill. Antelope were hunted in the winter by driving herds into sage brush corrals, which were up to two miles in circumference with an opening at each end. Men lined up forming long wings toward the entrance. The antelope were driven into the corral and then harassed until they tired and could be shot easily. Other animals taken by the Northern Paiutes were bears, bob-cats, marmots, and ground squirrels. The latter were taken in large numbers by the use of traps. Rabbits were taken with nets about two

feet high and four hundred feet long with a mesh just large enough for a rabbit's head. Sage grouse were easily taken in the spring on their dancing grounds. The Northern Paiutes fished mainly for chubs, probably (Richardonius spp.), (Rhinichys spp.), and (Acrocheilus spp.) were the most important. These were taken by scooping them from creeks with basets (163, p. 77-95).

An Analysis of the Indian's Influence in Wildlife Conservation

When we examine the Indian's way of life and consider his natural philosophy, it is more apparent why he behaved the way he did in regard to his natural resources. The native of the Northwest, much the same as other Indians of North America, was much more in harmony with his environment than was the white man who replaced him. He conducted himself as though he were a part of the whole scheme of nature and not the master and molder of it. For the most part he could satisfy his basic needs without causing detrimental changes in the ecological balance. The most significant of the changes he did bring about in the natural community was caused by his use of fire. These fires which he caused were sometimes set intentionally and escaped his planned control or were a result of accidental settings from campfires. The purpose behind his intentional burning was that of clearing land, management of game herds, or the harvest of insects.

Dogs were the only domestic animal of the Western Oregon Indian and east of the Cascade Mountains the horse was included after 1720 (121).³¹ For this reason he had no cause to destroy predators to protect his stock. Not having any field crops he had no reason to kill animals which would damage them. His entire subsistence was obtained from fishing, gathering and supplemental hunting. Although he probably did not realize it, his own welfare was most dependent on his harmony with the natural balance of systems which provided him with his needs.

He may not have consciously known the long range effects of his efforts, yet the application of his empirical methods were very helpful to him over a long time span. These methods included burning for the immediate gains of gathering. Yet this same burning provided him with the long range benefits of open areas which attracted wildlife. Although his immediate actions indicate that he was mainly aware of short term results, several activities of the Indians brought about beneficial side effects. In considering the seasonal balance which he followed it is possible to see how he probably reacted to the varying conditions of abundance of different food sources. During the summer months, wild berries, roots, nuts, and other vegetable products were available and these in addition to the large salmon runs

³¹ See section on Oregon's bison for details of Indian horses.

made food most easily obtainable from those sources. The Indian, being an opportunist, sought the most easily obtainable food source. This, then, took the pressure off the game animals during their period of reproduction and raising of the young.

During the fall and following the peak of the salmon runs and wild fruit season, he turned his attention to game animals in an effort to obtain a winter supply of meat for preservation. This period correlates with our own fall hunting seasons which are based on harvesting the annual "biological surplus." This is always present in nature, as a surplus which guards against winter and predation losses by means of a higher level of fecundity than would actually be needed for mere replacement of individuals. The Indians then harvested many animals which would not have survived winter mortality and thus would have been lost as a food source.

He reacted in an expected way to conditions of abundance and to the effort which he had to put forth to obtain his food. When the effort exceeded the reward, he turned to a source which required less effort. For example, streams teeming with salmon indicate an abundance which we would call a biological surplus, but to the Indian, such abundantly stocked streams merely meant that food was easy to obtain. Such a situation would not induce an Indian to spend long hours in pursuit of elk or deer, which required much more effort, when salmon were so readily available. Indian hunting also had a natural control.

He would hunt the animals which were most easily obtainable or required the least amount of effort for the most return of food. This meant that the species in abundance received the greatest pressure, and being abundant they could stand more hunting pressure. Those which were scarce probably escaped pursuit. The Indian had neither the motivation nor the means of seeking out the last representatives of a wild species to destroy it for his own ends.

Many of today's most progressive wildlife conservationists have formulated views which if carried out result in the same system as that of the Indian. For example, they see no reason for closing a season on upland birds when these birds reach a low in the population cycle, because they believe hunters will not continue to pursue a bird which gives so little return for the effort required. This premise is based on the assumption that a suitable alternate will be in abundance, and that that alternate will relieve the pressure on the declining population.

Today, protection is given to birds such as eagles, hawks, gulls, and many non-game birds by both Federal and State Law. It is interesting to note that the Indian also protected these birds. Although the Indian's reasons may have been spiritual in effect the same ends were achieved (6, p. 135).

Fire

Fire has been mentioned as a widely used means of habitat control employed by the Indians of Oregon. Numerous accounts have been given in pioneer journals and older literature concerning the Indian's use of fire. This burning apparently had kept the Willamette Valley in the same condition in which the white man found it for a period long prior to his arrival. David Douglas' descriptions of the country indicates a history of fire. He described the landscape as undulating, with rich soil and scattered stands of oak and pine (65, p. 213). An article in The Oregon Spectator (a newspaper published at Oregon City in 1846), described the Willamette River as having fir, pine, and cedar growing along its banks. The Willamette Valley was described as ". . . bounded with beautiful and luxuriant meadows, encircled with lofty fir, and interspersed with beautiful groves of oak" (359). One account of the use of fire in the Willamette Valley was given by David Douglas in 1826. John Work, an early trapper in this area, gave another account when he spoke of the Indians burning near Corvallis in 1834.

July 2. Fine. Continued our course 6 1/2 hours across the plain to the River Lauries (Marys River) where we camped. The Indians set fire to the dry grass on the neighboring hill, but none of them came near us. The plain is also on fire on the opposite side of the Willamette [sic] (82, p. 264).

John Minto, who was one of the early pioneers in the Willamette

Valley, and an important historian of the pioneer period, mentions that the Calipooia tribes burned large areas to maintain their camas grounds and berry patches, and to provide grass for the millions of waterfowl which wintered in western Oregon each year (199). This burning was not limited to western Oregon, and accounts of the tribes along the Snake River tell of the Indians burning grass in that region for the purpose of collecting scorched grasshoppers (108, Vol. 1, p. 49).

Whatever the initial reason was in any area of Indian fire use, its net result was that of keeping an area in a fire climax or a state of disturbance in which a constant new growth of vegetation appeared year after year. In western Oregon no climax condition could occur where burning was practiced. The conditions were thus ideal for the white-tail deer population which inhabited the Willamette Valley prior to white settlement and it provided the Indian with a constant and controlled food supply.

Areas along the Coast Range were also burned, but as the Indian habitation mostly centered around the mouths of rivers emptying into the Pacific, the Coast Range proper was left relatively untouched. The Coast Range itself contained very dense stands of old age class timber and was thickly covered with fallen trees. Alexander McLeod's trapping party, which crossed the mountains to the coast in the summer of 1826, had considerable difficulty in making

their way through the dense cover along the Big Nestucca River (58, p. 151-152). John M. Murphy, who visited the coast in this area in the 1870's, described the Coast Range as still being so dense that travel across it was largely done by horseback or on foot, due to the lack of wagon roads (213, p. 8).

Prior to white settlement, the Indians lived near the mouths of the Trask, Nestucca, Salmon, Siletz, Yaquina, Alsea, Yachats, Siuslaw, Umpqua, Coos, Coquille, Sixes, Elk, and Rogue Rivers (58, p. 152-215). Except for these areas, this coastal region had been relatively uninhabited for as long as man had occupied Oregon. John Meares noted in July of 1788, when he was sailing southward along the Oregon Coast near Seaside, that open green areas appeared along the coast, but no human beings were apparently occupying that area (81). An article in The Oregon Spectator dated February 22, 1849, described the coast at that time. A probable indication of previous fires along the coast was the presence of prairies found there at this time. The article mentions that a prairie one-and-a-half miles to three miles wide and eight miles long was found two miles back from Tillamook Bay, and that another large prairie was found in the vicinity of Yaquina Bay (252).

Several accounts of Indians fishing up the streams along the coast during the seasonal salmon runs indicate that they camped along these streams during those months in semi-permanent camps while

they fished and dried salmon for winter (58, p. 185-196). These areas also correlate with the locations where more deer and elk were killed by hunting parties. The most important association that can be made here is that the intentional or accidental fires caused by Indian habitation in these regions kept enough habitat open to allow game populations such as deer and elk, which require open areas of brush and grass, to succeed. Although some of the fires could have had an initially detrimental effect on wildlife populations, the general overall effect seems to have been beneficial. The Clatsop Indians who lived in an area south of Tillamook Head are reported to have maintained "parks" within open areas to encourage deer to concentrate. Such areas were probably maintained by burning selected sites and leaving cover into which they could drive game. The hunters could then wait in the parks or cover to select the animals they wished to kill (47, Vol. 1, p. 87).

Because of the rather resident nature of the Roosevelt elk, these animals would probably remain in an area of favorable habitat, such as that cleared by fire, if the hunting pressure was not too heavy. It is probable that today's distribution of Roosevelt elk along the Oregon coast is directly associated with the habitat conditions established by Indians living there and burning practices dating far back into antiquity.

The importance of burning to the Indian can be seen in the

history of the Willamette Valley in the 1840's. The Calapooia Indians living there at that time used fire for driving game. In the fall, they would gather for the purpose of hunting game for a winter meat supply. In one instance for example they surrounded an area, which is approximately defined by Marion County today, and at a given signal lit fires to drive the deer into a central area. As the deer and other game were concentrated in the center of the circle, the Indians went inside and shot what they needed, leaving the rest for reproduction (47, Vol. 1, p. 89). This method of driving deer into a central area, or a "circle hunt," was also related to John Minto in 1878 by an Indian, Joseph Hudson, whose native name was Pa-pe-a, and who was a lineal chief of the Calipooia tribe (200). Others, including an old settler in the Calapooia Valley, told of the Indians burning the hills each year, but after the white man settled the valley the timber returned to the hills (113). The area near Champoeg was open land and prairie bordered by heavily timbered country along the lower Willamette. Fire had caused the countryside to have a parklike appearance with groves of fir and oak and belts of deciduous timber along water courses. The practice of burning by the Indians was discontinued in much of the Willamette Valley about 1842 (188).

Undoubtedly the Indians used fire with a purpose. The Calipooia Indians of the Willamette Valley were concerned with controlling the distribution of the Columbian white-tailed deer (Odocoileus leucurus).

Their concern with the white-tailed deer can be established by the descriptions of the common deer in the valley given by Douglas, who gave very accurate details of the animal, and said, ". . . great numbers killed on Multnomah or Willamette River" (65, p. 155). Because of the habits of these animals, the Indian method of managing them for hunting was quite effective. They were deer of the lowlands and did not extend their range into the higher foothills as the black-tail deer did. They were easily manipulated by the methods mentioned above. The white-tailed deer were described as not being a deer of the forest like the black-tail, but of the "glades" and "coppices." When it was pursued it would not head for the hills as the black-tail would, but, rather, it would always run for cover along the rivers. When it was routed from cover it would circle back to the same area so hunting them with dogs was quite simple (213, p. 330). The Indian method was effective.

Summary of the Pre-White Era

The Indians of each part of Oregon relied on the perpetuation of the natural resources which supported their way of life. In areas of depleted food sources, they often moved on to country which could provide them with an easier living. The method of concentrating on food sources in greatest abundance had exactly the right effect in many locations. By not killing the predators to any degree, the

Indian did not interfere with the natural forces of disease and predator-prey relationships which maintained a balance in the land's capacity to support wildlife. In today's terminology, we call this capacity of the land to support wildlife "carrying capacity." In his fishing, the Indian did take large quantities of salmon, but he apparently had some limit to this also, through both his method and his beliefs. The coastal Indians, at least, had a superstitious reason for not taking over a certain number of salmon at one time (58, p. 173). Another reason for them not to take too many salmon in a season was their manner of fishing. In method, they were limited to the equipment which they could manufacture, and their spears, nets, and traps were not of the type which would allow them to be so efficient that they would endanger any species (69, p. 10-17). Not all of the Indians fished, however, and even at the prime fishing points, only a small percentage of each tribe engaged in fishing. The others were occupied preparing the fish or eating them. Alexander Ross, in the year 1811, said that approximately three thousand Indians would gather near The Dalles to engage in fishing and trading, during which time they would also gamble and steal. As he described it,

For every fisherman there are fifty idlers, and all the fish caught are generally devoured on the spot; so that the natives of the place can seldom lay up their winter stock until the gambling season is over, and their troublesome visitor gone (291, p. 129).

The "troublesome visitor" he was referring to were the Indians of the

interior who did not fish for themselves (291, p. 130). The superstitions, self-regulations, and a certain degree of indolence, were forms of insurance against the Indian's excessive or damaging use of the wildlife resource.

The Indian appears to have lacked any concept that he was far superior to all other forms of life and unlike the white man did not place himself within an inner circle with God as a directive force to exert his influence and impose his will on all other forms of life. Acting as a part of the outer circle and conducting himself as a "prudent predator," his place in the "web of life" was that of another interlocking piece of a complex system. His numbers and technology were so limited that he was generally incapable of conducting himself in a manner which could have upset a naturally balanced system. Although certain of his practices might appear to be associated with some type of conscious effort toward management or even conservation it is unlikely that they were any more than attempts toward achieving maximum harvests for a minimum effort. He was not concerned unduly about the exhaustibility of natural resources and fortunately the system in which he lived spared him, to a large extent, that contingency.

In summary, it may only be necessary to state that the Indian population of Oregon and perhaps the entire Northwest, for a period long before the arrival of white man, lived as an integral unit in a

large and complex ecosystem. He influenced the system to some degree, and it might even be said that he practiced a form of wildlife management over parts of the area. By not greatly disturbing the natural system, he inadvertently obviated the problem of having to play the role of a major programmer for an insurmountable number of inter-related and compounding problems which his white successor was to eventually create for himself. A great deal of the Indian's success in making this system workable in western Oregon was due to the abundance of salmon. By catching and preserving large quantities of salmon, he was partly freed from hunting and was spared the hardship of winter starvation. The tribes east of the Cascades, although partly benefiting from the salmon runs, were less fortunate due to scarcity of a dependable food source. Their hardships were so great during the winter months that they were sometimes forced to resort to cannibalism (83).³²

Immediately following the Indian's dominance, a period of rapid

³² Peter Skene Ogden reported in his journal on November 3, 1826, that an "incredible" number of Indians were camped in grass huts near Malheur Lake at that time. He said that food was very scarce in that area during the winter and the Indians resorted to cannibalism during periods of extreme hardship. Ogden stated,

An old woman camped with us the other night; and her information I have found most correct. From the severe weather last year, her people were reduced for want of food to subsist on the bodies of relations and children. She herself had not killed anyone but had fed on two of her own children who died thro' [sic] weakness (83, p. 208).

development and exploitation of natural resources took place at the hands of white settlers. This period lasted for approximately fifty years before the white man realized that his methods would require conservation practices if he was to continue to depend on these resources for a sustained yield.

CHAPTER III

THE WHITE MAN'S INFLUENCE

Maritime Fur Trade

Just prior to the pioneer period the fur traders of the Pacific Northwest had made their presence felt in Oregon. Their fifty years of influence had greatly affected some forms of wildlife such as the sea otter (Enhydra lutris). Years of maritime fur trade had preceded the continental fur trade and the sea otter was nearly extinct by the late 1800's.

John Kendrick and Robert Gray, American sea captains, sailed from Boston on the ships Columbia and Lady Washington in September 1787 for the Pacific Northwest to establish fur trade with the Indians. In 1791 Haswell, chief mate of the Columbia, wrote in his log that the ship had collected as many as 700 sea otter skins and 15 thousand skins of various other species. In the period 1801-1802 fifteen ships trading in the North Pacific took at least 15,000 sea otter pelts (136). A Russian sea captain, Golovnin, following an inspection of the waters off California in 1817-1819, estimated that his company might be able to take 20,000 sea otters yearly from that area (225, p. 63). During the period between 1794 and 1810 an estimated 2,500,000 furs were sold in the maritime fur trade (153,

p. 72-73). Among these were beaver, marten, seal and sea otter.

John Meares, a British sea captain, arrived in the waters of the North Pacific in 1788. His expedition desired the fur trade in this area because they were not under the jurisdiction of British monopolies of the East India Company and the South Sea Company (135, p. 1-4). Meares gave a description of how sea otters were taken.

. . . two very small canoes are prepared, in each of which are two expert hunters. The instruments they employ on this occasion are bows and arrows, and a small harpoon. . . . Thus equipped, the hunters proceed among the rocks in search of their prey. Sometimes they surprise him sleeping on his back, on the surface of the water; and, if they can get near the animal without awakening him, which requires infinite precaution, he is easily harpooned and dragged to the boat, when a fierce battle very often ensues between the otter and the hunters, who are frequently wounded by his teeth and claws (193, p. 260).

Meares also said that the otters were often pursued for hours until the canoes could be maneuvered into position surrounding them as they were just below the surface of the water. When they were forced to surface they were shot or harpooned (193, p. 260-261).³³

Continental Fur Trade

In 1809 the American fur trader Nathan Winship sailed the

³³ For a full coverage of the maritime fur trade surrounding the sea otter and further details on sea otter hunting see (225).

Albatross from Boston for the Columbia River. Prior to 1810 the only white men to extensively explore the Columbia had been Lewis and Clark, although Gray, an American sailing the ship Columbia, and Broughton, an English naval officer sailing the ship Chatham, had gone several miles up the river in 1792. Winship intended to set up a fort and conduct fur trade with the natives in the summer of 1810 but he failed, largely due to Indian hostility (15, Vol. 2, p. 131-135). In 1811 John Jacob Astor's ship the Tonquin reached the Columbia and a fort was constructed at what is now known as Astoria. By 1812 the fort was well established but under the threat of British seizure Astor's Pacific Fur Company was sold to the British backed North West Company in 1813 (15, Vol. 2, p. 214).

British interest in the land fur trade continued and by the early 1820's the Hudson's Bay Company was established on the Columbia River. The company was primarily interested in making a profit. The formula for profit in the Columbia Department in 1826 was cost plus seventy percent markup. In the years 1833-1834 their costs were 3,000 pounds sterling and the return for furs was 11,000 pounds (153, p. 147). The Hudson's Bay Company employed a great number of French Canadians to work in this region. Most of them were very familiar with the wilderness and had Indian wives.

The Company used the "fort system" of trade and was very successful in its systematic effort to make the Indians indebted to

them by becoming dependent upon them for trade goods (133, p. 57-65). Governor George Simpson of the Company from 1821 to 1860, recorded in his journal that the Hudson's Bay traders gave the Indians liquor in exchange for furs and that this practice made the Indians dependent upon the company for their alcohol. He thought, however, that this practice would in the long run be deleterious to the Indian's better judgment in obtaining furs and recommended that the practice be stopped. He thought that it would be much better to encourage them to want woolens and other British trade goods instead of rum (194, p. 109-110). Simpson's study of the Indians led him to say that: ". . . I am convinced they must be ruled with a rod of iron, to bring, and keep them in a proper state of subordination, and the most certain way to effect this is by letting them feel their dependence upon us" (153, p. 179).

In addition to the fur trade the Hudson's Bay Company was the first agency to engage in the commercial lumber business in the Northwest. In October 1828, Simpson sent a letter to Captain Aemelius Simpson, superintendent of the Company's Pacific Coast Marine Department, saying that the demand for timber in the Sandwich Islands and the Spanish missions of California should bring a market price of sixty dollars per thousand feet. The company's sawmill was located near Fort Vancouver. Simpson estimated that they could turn out 200,000 (board?) feet annually and thought they

would be able to "realize handsome profits" especially if the highest quotation of 200 dollars per thousand feet could be obtained (194, p. 298). Simpson wrote to John McLoughlin, Chief Factor of the Hudson's Bay Company, in March 1829 that "The timber trade promises to become a valuable branch of business combined with the Fur Trade of the Coast" He continued by saying ". . . I expect that fully as much advantage will be derived from the Timber as from the Coasting Fur Trade. . . ." He also said that as demands for timber increased it would be necessary to move the operation to the "Falls of the Willhamet" [Oregon City] so the people³⁴ there could work in the sawmill (194, p. 309).

The fur companies³⁵ which engaged in trade with the Indians did have an effect on the status of wildlife populations in Oregon. For example, they were largely responsible for the depletion of the sea otter. These animals were hunted very heavily and by the late 1800's they were nearing the point of extinction, but it was not until 1911 that they were protected by international treaty. In the 1920's they were

³⁴ John McLoughlin took possession of land near the falls in 1829. At this time a number of trappers and other Hudson's Bay Company employees lived in the area (15, Vol. 2, p. 504-505).

³⁵ For a detailed discussion of the fur trade on the Columbia River see (194). A complete history of the Hudson's Bay Company was done by Bryce, who has covered the philosophy and development of the Company's interests in North America (40). The journals of Alexander Henry in 1813 and 1814 give good insight into the operations of the Northwest Company at that time (53).

so rare that single pelts were sold for \$2, 500. Prior to the maritime fur trade the sea otters had lived off the rocky Pacific Coast for thousands of years without a serious threat to their existence. The limited number taken by the Indians prior to the arrival of white traders hardly appears to have affected them.

Fur trapping activities in the interior actually reduced the numbers of furbearers to such a degree that they were nearly trapped out in many areas. The exploitation of the timber reserves, however, was very slight. The trappers or mountain men and their families, who lived in what is now the State of Oregon, lived largely off the land and practiced very limited agriculture. They did introduce the first domestic livestock to the area, however, primarily sheep and cattle. Although theirs was a somewhat agricultural society they did not make any serious efforts toward real colonization and generally did little to cause any permanent change in the conditions of the wildlife resources of Oregon, except for trapping.

Pioneer Settlement

Following the fur traders, the missionaries were the next white men to make their presence felt in Oregon. The zealous efforts of Jason Lee and other early missionaries were the beginning of an era of saving the souls of the "poor savages" and introducing them to the importance of agriculture and settlement. Lee described the Indians

along the Willamette River as being ". . . as naked as they were born, a filthy, miserable looking company. . . . They subsist mostly on cammas" (178, p. 399). The efforts of the missionaries might be considered successful to the extent that they did Christianize a great number of Indians. They also managed to get them to work for wages as well as settle near white man's villages. The question of whether or not they elevated the Indian by changing his way of life is debatable. The white man's contribution of disease may have changed the Indian's way of life more than all of these efforts.

Joseph William, another Methodist missionary, recorded the condition of the Indians in 1841, seven years after Lee's arrival, as being degraded and less than admirable as a result of their association with the white man. Crops of wheat, oats, barley, onions, potatoes, carrots, peas, and beans were being raised by pioneers in the Willamette Valley. Stock animals were grazing the year around on the prairies and fishing was termed "excellent." The Indians, however, were forced to steal from the white man because they were not able to farm successfully and white men had killed off much of their game and settled on their campgrounds. For this they were punished and thought of as inferior beings. For example, as William relates,

There came a company of poor, starved Indians through the mud, and finding an old horse of Jason Lee's which had died, they cut him up, and carried him off with joyful looks

and glad hearts, although the carcass was so stinking that we could hardly come near it, and the hogs and dogs had been eating it (361, p. 60).

And he added that, "Those Callapooyans [sic] , on the Willamette River, appear to be lazy and degraded people" (361, p. 66). Actually this degradation began when the Indians began their association with trappers and explorers. White man's disease and alcohol exceeded the Indian's resistance.³⁶ When the overland migration to Oregon started in earnest many of the native fishing and hunting areas became the first locations for settlement, especially in the Willamette Valley. In 1843 when Jesse Applegate arrived at Champoeg, on French Prairie north of Salem, he found only a few French trappers and their Indian wives and children living there. He said that the Calapooia Indians living in the vicinity lived in "miserable hovels." They lived in small villages along the Willamette River, were very poor, and had a few "miserable ponies." The Molallas were a hostile neighboring tribe and they often raided the Calapooias for horses. During the winter of 1843 many of the Indians became sick and died (7, p. 62-65).

In his account of the countryside he describes Indian burning which was soon stopped by the pioneers (7, p. 68).³⁷

³⁶See section on Indian population and continental fur trade above.

³⁷See section on Indian population above.

It was a custom of those Indians, late in the autumn, after the wild wheat, Lamoro sappolil,³⁸ was fairly ripe, to burn off the whole country. The grass would burn away and leave the sappolil standing, with the pods well dried and bursting. Then the sqaws, both young and old, would go with their baskets and bats and gather in the grain (7, p. 68).³⁹

White man chose to settle throughout Oregon in the areas of the greatest available water and on land with the most fertility. These were again the same lands where centers of big game and waterfowl populations were found. They were also traditional hunting grounds used by Indians. The river drainages and valleys became the first and most extensively settled areas. Thus the impact on the native human inhabitants was immediate.

In 1908 pioneer John Minto reflected on the great changes which had taken place in western Oregon due to the agricultural practices started by the pioneers. He felt that a great deal of the burden for the loss of wildlife habitat came from poor farming practices. The vast quantities of waterfowl, cranes and shorebirds which wintered on the damp areas, sloughs, ponds and streams were dependent upon the moisture in the soil together with the grasses and roots which were perpetuated by fire. By 1908 the number of waterfowl wintering

³⁸ Lemolo sappolil was Chinook jargon for "wild wheat."

³⁹ George W. Riddle, an Oregon pioneer, described a similar Indian method of harvesting tarweed by burning over the countryside (285).

in this area had been greatly reduced. Deer were not plentiful on the plains of the Willamette Valley and elk were termed "occasional." Wolves, cougars, bears, and coyotes, however, were considered plentiful. Hogs which were introduced by the Hudson's Bay Company and later those kept by pioneers, ranged mainly on grasses, camas and oak mast. This largely destroyed the root supply which the Indians had depended upon for food. The Molalla Indians were unable to maintain their game ranges and berry patches when the pioneers prevented them from burning. The clearing of land to make fields caused the rapid run-off of rainfall. Draining the wet bottomlands for farming caused the disappearance of much of the habitat for wintering waterfowl. Minto felt that agricultural practices had lowered the general level of moisture in the soil from two to ten feet from 1848 to 1908 (199).

The pioneer was troubled with the degraded Indian who became dependent upon white man for support. Cases of degradation of the Indians in Oregon are numerous although much of this may have occurred through association with trappers and explorers before the pioneers arrived. John Frost, one of the first settlers on the coast, found that the Indians of Clatsop Plains, in the winter of 1842, would not hunt if they could steal. After the fall salmon runs ended the period of winter hardship would usually come. The Indians had to subsist on dried salmon or were forced to hunt elk in the hills until

"salmon time" came again around the last of April. Whenever they had the opportunity, they stole whatever they could from the settlers. They begged and annoyed the white population continually throughout the winter. This behavior indicates that after the arrival of white man the Indian, aside from fishing, practiced very few of his old ways of living off the land and utilizing the native game resources (271).

Hall J. Kelly, a Boston schoolteacher and promoter of Oregon's opportunities for settlement, was called the "Prophet of Oregon." He arrived in Oregon in 1834 and in 1839 he wrote an account of the white man and his relationship with the Indian tribes of the lower Columbia.

The Multnomahs, who formerly occupied the Wappatoo islands, and the country around the mouth of the Willamette, and who numbered 3,000 souls, are all dead, and their villages reduced to desolation. The once numerous Clatsops have lost their national existence. . . . All the remaining Indians below Vancouver live in the most brutal, sordid and degraded manner, addicted to the grossest intemperance, and associating with the whites in such a manner that there can scarcely be found among them a full-blooded Indian child. Rum and other intoxicating liquors are used as the besom of destruction among the miserable victims of the white man's cruelty. While I was on board one of the company's [Hudson's Bay] vessels, at the mouth of the Columbia, I saw a captain dealing out rum by the bucket to the chief of the Chenooks, in return for wild game (162, p. 294).

In addition to their effects on the Indian, the pioneers affected wildlife directly by starting a predator experimentation program.

Wolves, cougars, black bears, wildcats and coyotes were very

numerous in the 1830's (7, p. 86).⁴⁰ Their chief domestic prey was chickens, sheep, pigs, calves and colts. Domestic dogs were fairly efficient in keeping cougars away from stock animals, but coyotes often succeeded in getting to the sheep. Of all these enemies of sheep, Minto considered the coyote to have been the worst (199).

The early settlers were most concerned with attempting to exterminate wolves and other predators to prevent loss of their livestock. A bounty was to be paid for predators and a system of taxation was set up by the provisional government to pay the bounty fees. These bounty systems were decided upon at a meeting of the pioneers at Champoege in the spring of 1843. The new laws provided that bounties would be paid on wolves, bears, cougars and wildcats, which were allegedly destroying the cattle of the Willamette Valley settlers. The bounty fees set in March, 1843 were: small wolf (coyote) 50¢, large wolf \$3.00, lynx \$1.50, bear \$2.00 and panther (cougar) \$5.00. Indians were to get half of the above amounts (44, Vol. 1, p. 328). The second discussion of the predator problem was called the "second wolf meeting" and it involved a great deal more than merely controlling predators. It was in fact the beginning of the Willamette Valley pioneers' efforts to subjugate the Indian population and break away

⁴⁰ Grizzly bears were still common in 1841 (358, Vol. 4, p. 438) and cattle had to be guarded from wolves (358, Vol. 4, p. 361; 174, p. 517).

from the Hudson's Bay Company and British influence.⁴¹

During this early period of settlement game was taken for table use and was shot near the homestead or on the land surrounding the pioneer's property. These areas were the first to become hunted out as a result of this localized pressure. The effects on wildlife were noted from the very first. Lieutenant Howison of the United States Navy had been ordered to investigate the Columbia River and territory of Oregon. In his examination of the situation in Oregon during 1846 he found the conditions concerning game populations not very favorable.

I am surprised to find so great a scarcity of game in this country. I lugged a heavy gun more than a hundred and fifty miles through the Wilhammette [sic] Valley, and in all that ride saw but three deer. Wolves are numerous, and prey upon other animals, so that the plains are entirely in their possession. The little venison I saw in Oregon was poor and insipid; a fat buck is a great rarity. Elk are still numerous, but very wild, living in the depths of the forests, or near those openings which the white man has not yet approached. . . . Black bears are very common, and destructive to the farmers' pigs; the grizzly bear is more rarely seen. . . . Wild fowl, from the swan to the blue-wing, are very abundant during the winter. The wild geese move over the country in clouds, and do great injury to the wheat fields upon which they determine to alight (137, p. 49).

Several accounts of wildlife in Oregon during the pioneer period were promotional in nature and gave glowing appraisals of the conditions found by settlers (117, 360, 162). Small, a writer with

⁴¹ A discussion of the history of this period from a contemporary viewpoint is given by Greenhow (Greenhow, Robert. The History of Oregon and California, 1845) (117).

promotional talent in the 1870's, credits the beaver with producing the rich bottomlands which he said were formed by decomposition of deposits left in old beaver dams. His accounts of the potential for agriculture on these "beaver lands" seem to be quite exaggerated. His estimate of rich soil at thirty feet in depth seems to be a bit deep. Concerning the Indians he felt that they had been "roving savages" and after settlement they were allowed to live on reservations where they "enjoyed the protection of the government" (315, p. 56). He called Oregon an "attractive place for sportsmen" and says that the Willamette Valley had an abundance of upland birds, waterfowl, deer, elk, and large grizzly bears weighing from 500 to 800 pounds each. Swans were numerous in southeastern Oregon and were considered valuable for the sale of their skins (315, p. 109). By the 1860's the valley, river bottom and prairie areas were becoming fairly well settled. Eastern Oregon valleys and rangelands had some settlement and much of what had been the best game habitat in Oregon was by that time becoming the white man's domain. Areas surrounding lakes, marshes and other wetlands were settled first and many of the waterfowl and associated forms of wildlife began to suffer from man's presence.

Although Oregon east of the Cascades made up two-thirds of the area of the state, it was the last part to be settled, and it has remained the least populated up to the present time. Pioneer

settlement did not really start in eastern Oregon until the 1860's.

When the settlers arrived, they naturally chose the most productive land and that which offered the best water supply. The main areas of settlement were along rivers including the Umatilla, John Day and Deschutes, in the fertile valleys of the Grande Ronde, Tygh, and the Columbia River, and near wet lands such as the Klamath Lakes area and the Malheur and Harney Lakes area. These areas also provided the best game habitat and were the first to become heavily hunted.

In the bunchgrass country, near the present site of the town of Antelope, settlers had moved into antelope range. "In early days bands of hundreds of antelope could be counted on the hillsides any day and in any direction from the town" (141, p. 166); by 1905 they had disappeared and it was "many miles" to the nearest antelope range (141, p. 166-167). The nearby Hood River valley was a natural wintering area for big game because of its grasses, fertility and mild winter season. Because it was also an excellent place for the fruit orchards settlement was started there in 1853. Settlement here probably started direct conflicts between the fruit farmers and wintering big game.

The growth of bunchgrass in parts of eastern Oregon was often

exaggerated. Pioneers noted bunchgrass⁴² growing in areas such as Grass Valley in Sherman County. These "exceptionally luxuriant" growths were stated to have been so dense that it was possible for a man on horseback to ride through them only a "short way" (141, p. 449). Nevertheless, such areas were agriculturally productive and attracted the first settlers. The Bridge Creek area in Grant County was first settled in 1863 and became an important grazing area for cattle and sheep (141, p. 690-693). The Trout Creek vicinity, in Crook County, was also settled that year. By 1870 settlers were farming and ranching near the present site of Prineville (140, p. 695-697). Winter ranges, for mule deer and other big game, were affected almost immediately following settlement by man's occupation of the best wintering areas. By this time most Indians of the Wasco, Paiute, Teninos and Warm Springs tribes, who had previously occupied land where white men wished to settle, were put on the Warm Springs Reservation by act of treaty in 1855 (52, p. 157-158). The creek bottoms of this reservation were once said to have been "swarming with mule deer" in the winters. But the approximately one thousand Indians who moved into that area had to hunt it more

⁴²This grass is not the true bunchgrass such as Festuca idahoensis but may have been interpreted as such. Stories have been repeated concerning the vast quantities and heights of bunchgrass in eastern Oregon during pioneer days. These are probably based on accounts of giant wild rye, Elymus condensatus.

intensely than it had ever been hunted previously (141, p. 690-704).

White settlement of the Klamath Basin area was held back by the hostility of the local Indians. But it also got started in the 1860's. Here, too, the locations where the greatest concentration of game animals was found provided the best opportunities for white man's agriculture and settlement. Settlers arrived at Goose Lake around 1868 and began to utilize the natural grasses of the area for grazing. Game was killed with ease because most animals did not appear to be very wary. M. T. Walters, a settler in Lakeview, said in 1872 that "Wild birds and animals looked at me in shy surprise, but could hardly be said to be afraid of one" (141, p. 844).

After the Modoc uprising in 1872-73 the United States Army placed the Indians of southern Oregon on the Klamath Reservation (52, p. 136, 168). Even at the time they were put there it does not appear that some settlers intended for the Indian to keep the land permanently. No actual official plans were made for their eventual removal from parts of the reservation but apparently this was thought of or planned.

Sprague River is very extensive, most of it being in the Klamath Reservation, and therefore of interest to the homesteader when the reservation is opened for settlement. It [Sycaan Marsh] is devoted at present to stock raising by Indians, but some day⁴³ will be a great and

⁴³ Italics are the writer's.

wealthy stock raising section (141, p. 987).

The first land claims in the Powder River Valley were filed in June of 1862. The discovery of gold in the 1860's brought settlers into the John Day valley. The Grande Ronde valley had become populated by 1864 (140, p. 144-154). This population brought with it an increased number of hunters. Game was a common supply of meat for mining camps, in the John Day area.

A few of the more wealthy stockmen and ranchers "monopolized" the valleys and attempted to discourage homesteaders. Up until the 1880's they mainly ranged cattle and horses in Grant County but the range began to decline and the native bunchgrasses, failed, causing many ranchers to drive cattle east to Harney and Malheur Counties. Following the decline of the bunchgrass and general range conditions some cattlemen sold their cattle and bought sheep while others sold out to sheepmen (140, p. 394-399).

The winter range for deer and elk along the eastern base of the Steens Mountain offered suitable land for cattle grazing, especially in the meadow areas or along streams. Nearly every area where moisture and the best winter range for deer, antelope and elk were found became occupied by ranchers with large numbers of cattle.

indicates the relatively recent nature of settlement in much of eastern Oregon. By that time most of the valleys in Harney County such as Diamond, Catlow, Donner und Blitzen, Sage Hen, Happy, and Warm Springs were being taken over by homesteaders as well as ranchers (140, p. 652, 739).

By the late 1800's man had become firmly established in many areas of former game concentrations throughout Oregon. Thus the pattern of settlement was much the same in both eastern and western Oregon. Following pioneer settlement in prime game habitat homesteaders quickly hunted or hazed much of the game out of these areas. The advent of sport and market hunting added to the depletion of wildlife taken by homesteaders. Yet in spite of all this, game was still relatively abundant and hunting in Oregon was considered to have been excellent in the late 1870's (212). One example of wildlife reduction, however, was the combination of agriculture and abusive killing which caused a severe depletion of the Columbian white-tailed deer population. This deer was not a deer of the forests like the black-tailed deer. They were found mainly near agricultural areas along the bottom lands of the Willamette and lower Columbia Rivers and their tributaries. The white-tailed deer were apparently abundant enough in some farming areas to be considered agricultural "pests." One pioneer said he would poison them all if he had an opportunity (213, p. 332). They were shot in the mornings and evenings when they

came out of the brushy cover to visit mineral springs. Another favorite method of hunting them was with dogs. Farmers also used dogs to drive them away from their crops and made intensive efforts through shooting and poisoning to eliminate them from the cover near their farms. It was simple to hunt them because they would not leave a general area. When they were chased, they would seek cover in the thickets along prairies or the brushy river bottom areas. They were easy to relocate in these areas and they could again be driven out by hounds and systematically hunted in this manner. White-tailed deer had the

most extensive habitat of any of its congeners . . . its favourite haunts are the small coppices that skirt the borders of prairies. . . . Unlike the black-tailed deer, instead of doubling and keeping to the mountains, hills and ravines, when started by hounds, it makes a straight line for the nearest river (212, p. 315-316).

The black-tailed deer was not valued as highly as the white-tailed deer in western Oregon because its flesh was "fibry" and it was apparently not in as good a condition as the white-tail living near agricultural land. Nevertheless they too were hunted extensively and a great deal more for hides. Some methods which were used were: hunting with buckshot; driving them with dogs, including Indian dogs; hunting at night using moonlight; hunting during the rut, and shooting them over mineral springs (212, p. 213).

John M. Murphy, a sportsman and writer in the late 1800's,

described conditions concerning wildlife in Oregon during 1879 and 1880. He considered open areas of the Coast Range to be very good deer country and he referred to elk herds ranging from fifty to 500 in size. They were apparently unmolested and easily approached, so that it was not difficult to shoot five or more out of a herd of twenty-five before the others got out of range. Even after they got out of range it was relatively easy to relocate them (213, p. 273).

Near the Klamath Lakes and in the Klamath Basin Murphy found big horned sheep "quite numerous." Antelope were also fairly abundant in the Klamath Basin. He was "large" herds of antelope in eastern Oregon where they were sometimes hunted with greyhound-like dogs. Some disease among the antelope herds caused a great many to die out from time to time and the last case of disease which he knew of was in 1873 and 1874. Mule deer were not too numerous in the desert areas. There were apparently some large herds near the Blue Mountains and especially in the unsettled Wallowa Valley in the 1870's. The Wallowa Valley area consisted of an open park-like stand of timber and good forage.

Very little hunting was done for black bears. Those which were hunted were usually sought for their fur or bounty value. It was a relatively easy matter (to be able) to shoot two black bears in one day. The grizzly bear was still fairly well distributed down the Willamette Valley and in southwestern Oregon where they fed to a

large extent on manzanita berries. Murphy felt that they had to be hunted with at least a .45 caliber rifle. Wolves, cougars, and bobcats were common throughout western Oregon. In eastern Oregon, especially along the Columbia River and tributaries, coyotes concentrated during the salmon runs and fed on dead salmon which washed ashore.

Waterfowl were extremely abundant and Murphy mentions great numbers of shore birds and upland birds as well. The mouth of the Columbia River was apparently an area for huge flocks in late autumn. The Klamath Marsh was an extensive nesting area and Murphy said it was "one mass of eggs and young birds, scarcely a foot of it being unoccupied" (212, p. 91). Sandhill cranes, trumpeter swans, snipe, plovers, tattlers, sanderlings, godwits, avocets, phalaropes, bittern, curlews and a great number of other birds were "very abundant" in the Klamath area.

Some idea of the number of waterfowl on Klamath Lake can be estimated from Murphy's account of their morning flight from the lake to the feeding grounds.

It took at least three hours for this cloud of feathers to pass beyond sight, and tedious as it became to stare at it, yet I was sorry to see it disappear, as it was probably one of the grandest ornithological scenes to be found on earth (212, p. 93).

Sage grouse were apparently not shot much by sportsmen supposedly because of the strong taste of the meat when they were cooked.

The ruffed grouse was common in all wooded areas and the blue grouse was "exceedingly common." Valley quail extended as far north as the Washington territory and stayed near cultivated areas (211, p. 200).

By 1896 the "railroad hunter" had arrived in Oregon. These "sportsmen" like Murphy had come to Oregon in search of game which had largely been depleted elsewhere. An account of hunters who arrived in Ashland from California on the California and Oregon Railroad in 1896 mentions game in "unlimited abundance." This description may have been largely relative. Much of the West at this time was considered hunted out by professional white and Indian hide hunters and it was difficult to find an area where a hunter could shoot more than one deer per day. This party of three "amateur sportsmen" from California who hunted in southern Oregon during the summer of 1896, killed 76 deer, three bears, "innumerable" grouse, squirrels, mallards and other ducks, and geese. On Klamath Lake, they shot waterfowl with a .22 caliber rifle because they had no shotguns with them. Their Indian guide clubbed about forty mallards to death with a stick while riding horseback through the tules. They also took a great number of fish, mostly at night when they speared them by using a pine torch in the bow of a boat. Forty-two were taken in one night in this way; the largest "steelhead" measured four feet in length (24).

Market Hunting

During the late 1800's, just prior to the advent of laws which would establish bag limits and restrict the sale of hides, market was reaching its zenith. See Table 3. Oregon did not suffer from market hunting as badly as some eastern states because of the limited potential for sales and the absence of large centers of population. The San Francisco market was very large but shipping was a problem, and local markets such as Ashland, Roseburg, Salem and Portland were comparatively small. Hides could be shipped more easily than fresh meat and when meat was prepared for the market from big game animals it was usually dried (24). Less perishable "loot" such as plumage from shorebirds and waterfowl could be shipped from even remote areas. Such shipments were made of shorebird skins during Oregon's market hunting period. Federal legislation would, in 1900, make the interstate shipment of game killed in violation of state laws a federal offense, and it was this legislation more than anything else that helped end this kind of market hunting on both the state and national level.⁴⁴

Market hunting actually began in Oregon when white man offered the Indians trade items in return for wild game. Peter

⁴⁴For details on this Federal legislation see Chapter 4 below.

Table 3. Statement of market sales of game for the season of 1896.^a

Kind of game	Number sold	Price received
Chinese ring-necked pheasants	10,000	\$2. 50 per doz.
Native pheasants (Ruffed Grouse)	4,050	2. 50 per doz.
Other grouse	1,000	2. 50 per doz.
Quail	5,100	1.00 per doz.
Mallards	4,060	2. 50 per doz.
Widgeons	3,075	1. 75 per doz.
Pintails	1,000	. 75 per doz.
Teal	2,000	1.00 per doz.
Canvasbacks	100	5.00 per doz.
Geese (Canada?)	502	3.00 per doz.
Other varieties (geese?)	1,000	1. 50 per doz.
Jacksipe (Wilson snipe)	200	1.00 per doz.
Deer	1,000 (approx)	3 ¢ per lb. (avg.)
Elk	15	8 ¢ per lb.
Bear	10	5 ¢ per lb.

^aThis information was adapted from Table XXV in the Report of the Fish and Game Protector, 1895-1896 (229, Vol. 3, p. 89). The writer believes that these figures were largely taken from market records kept by Portland merchants and that they represent only a small percentage of the total market sales in 1896. The prices quoted above vary significantly from other market prices of this period and the writer believes that the above prices cannot be used as a standard.

Burnett of Linnton, which is now a part of Portland, wrote in 1844 that

At this point we purchase of the Indians ducks, geese, swans, salmon, potatoes,⁴⁵ feathers and venison, for little or nothing (42, p. 182).

Payment for game was calculated in terms of so many loads of powder and shot per animal. For example, ducks, four loads; geese, eight; swans, ten; and salmon, four. Feathers were worth 12 1/2¢ per pound. The Indians also often traded game for discarded clothes from the settlers (42, p. 182).

The accounts of market hunting for deer are scattered. G. E. Williams, a professional hunter from Oregon City, hunted the Molalla River between the north and south forks in 1889. At that time venison brought eight cents per pound in Oregon City and it was possible for him to make thirty dollars per day by making several trips.

It was more like killing domestic stock than real hunting. . . . We did not see what harm there was in selling venison or killing deer, as we preached the old doctrine of merely pursuing a God-given right (362, p. 16).

At first the deer were abundant in that area but he soon discovered that they became depleted rapidly with such hunting pressure (362, p. 16).

⁴⁵These could have been potatoes the seed for which might have been obtained from Hudson's Bay Company employees or other settlers. They might have also been a misnomer for Wapato (Sagittaria latifolia).

Hide hunters took as many as 600 deer in a six-month period from January to July along the Illinois River (24). They were not hunting for sport during the late 1800's; it was an occupation. They did not always use the meat and often merely left the carcasses and took the hides. When they did prepare venison for the market they usually dried it and packed the jerky out along with the hides on pack horses. The meat was dried on wire netting suspended over small fires and after it was dried several hundred pounds of meat could be transported to market (24). Murphy, writing in 1800, said that market hunters in southern Oregon often took 500 to 600 deer per season. Retailers charged ten to twelve cents per pound for fresh venison and paid the hunters about four cents per pound for meat and fifty cents apiece for hides. His party hunted using horses and wagons and five hunters killed forty deer in less than four days of hunting in the foothills of the Coast Range (213, p. 469).

One out-of-state party took 400 pounds of meat and 100 hides to Ashland in 1896 where the dried meat was sold for twenty cents per pound and the hides brought one dollar apiece (24). The same party attempted to sell the antlers but found no market for them before returning to California by train.

In another case of hide hunting, a hunting partner wrote to a Portland engineer in 1884 advising him that they had better hunt early that year because the hide hunters were killing off the deer near

Grants Pass "very fast." These hide hunters were operating along a railroad canyon south of Grants Pass and they had killed 130 deer in ten days and left the venison behind. When the hides were sold they got a total of ninety-eight dollars for them (326).

Frank B. Wire, Oregon State Game Supervisor from 1932 to 1947, was an expert sportsman and ardent conservationist, but he also market-hunted game animals in his youth. In the 1890's Wire took orders for deer and then went out and killed two or three at a time to fill the orders. These deer brought him ten dollars apiece. Most of his deer hunting was done in the vicinity of McKenzie Pass. Shooting deer in that area was not difficult and most of the shooting was done in the autumn near frequently used trails.

Wire moved to Portland with his family in 1901 and in the following years he market-hunted waterfowl in the Portland area. It was not unusual for him to shoot wagon loads of ducks, geese and swans in the Willamette Slough. He frequently went to Gaston in Yamhill County to shoot canvasbacks on Wapato Lake. It was possible for him to take the morning train to Gaston, shoot twenty-five or thirty canvasbacks and then return to Portland on the afternoon train. The only limitation to the number he could take was the weight of ducks he could carry. He also hunted Chinese ring-necked pheasants (Phasianus colchicus torquatus) near Lebanon from 1896

to 1898. Although some legislation had been passed⁴⁶ limiting seasons, there were no bag limits. By using two or three dogs he killed fifty to sixty pheasants per day and shipped them to Mace and Company on Fourth Street in Portland for a price of fifty cents each. Snipe (Capella delicata) brought \$2. 50 per dozen and Wire shot a great number of them in the wet bottom lands between Halsey and Brownsville. The greatest number of snipe he shot in one day was 208 birds. He said, "We didn't think that the bird supply would ever give out and it wouldn't have done so except for other factors than shooting" (364). Geese were not hunted very much for the market because they brought the same price as mallards and canvasbacks, fifty cents apiece, and they were harder to carry (364).⁴⁷

J. R. Metzger, a farmer living near Salem, wrote in 1915 the details of changing game conditions in the Willamette Valley since 1864. According to Metzger, hunters waited along regular migration trails in the fall of the year when large numbers of deer were

⁴⁶ A discussion of legislation is given in Chapter 4.

⁴⁷ The above information was abstracted from Frank Wire's memoirs which were loaned to the writer by Mrs. Frank B. Wire of Portland. The narrative nature of the accounts of Wire's hunting experiences is extensive and gives an excellent picture of Oregon during the market hunting period from a personal, yet professional, viewpoint. All of the market hunting which Wire did was legal and the numbers of game animals which he took were not thought to have been excessive.

leaving the summer ranges to come down the western slopes of the Cascade Mountains. He saw "great numbers" of deer carcasses left along the North Fork of the South Santiam River with only the "hams" and hides removed. The hides were sold in Lebanon, Oregon, for forty to fifty cents apiece. He also accounts for a great waste of elk in the area, having seen one hunter kill five elk and pack only one out of the mountain (197).

Louis Barzee, a pioneer educator and attorney, mentioned market hunting in the same area during the 1860's and '70's. He says that most of the hunting by the non-professionals was done during "inclement weather" when no farming could be done. Muzzle loading shotguns and rifles were used to take game such as deer and bear which were fairly easy to kill when they were driven out of the mountains by winter snowfall. Quail and blue and ruffed grouse were trapped for the market using a box type trap made of logs. Barzee trapped more than seven hundred upland birds in one winter. Grouse brought three fifty to four dollars per dozen and quail were sold for three dollars per dozen on the Salem market. Barzee said that by the year 1882 these game birds had become so "decimated" that it was no longer profitable to trap them (17, p. 76-78).

In 1893 O. G. Dalaba, a market hunter from Corvallis, netted band-tailed pigeons (Columba fasciata fasciata) by the hundreds in foothills of the Coast Range near Eddyville. They were extremely

plentiful in the Willamette Valley at that time and he shipped live birds, up to eighty dozen at once, to the market in Portland and to San Francisco via ocean steamer from Yaquina Bay (56).

In Camas Valley (Douglas County), William Murray, a professional market hunter, killed deer and elk for the market and predators for bounty for a period of fifteen years. His estimated kill during his hunting career was 1500 deer, 250 bears, hundreds of elk⁴⁸ and fifty cougars. In individual one-day periods, he killed as many as thirteen elk, ten deer, five bears and three cougars. He took the deer and elk to Roseburg where he sold them to hotels (226, p. 48).

Market hunting was not limited to western Oregon. In 1878 one hunter from Camp Polk, located about three miles northeast of Sisters, Oregon, during a single winter took 150 deer for skins at the market price of one dollar each (207, p. 36). Two other hunters during this period killed 120 deer during one winter on the Crooked River near Prineville (165, p. 121). Settlers on the high desert winter range near Paisley and Silver Lake found mule deer herds "common" in the 1870's. During the fall a group of ten to fifteen wagons went out into the desert near Fort Rock, where they located

⁴⁸ A very large elk shot by Murray in 1898 is still at the Elks Lodge in Roseburg. The bear and cougar which Murray shot are thought to have been killed for the bounty value.

mule deer herds ranging up to 500 to 600 in size. They followed the herds for several days and shot enough deer to fill the wagons which were used to return them to the settlements for personal use or sale as food (41). The game which was shot for the market in the Klamath Lakes area was mostly sent to markets in San Francisco and to Sacramento where the settlers of the Klamath Lakes area sold their game (203, p. 13).

Ronald Huff, a former employee of the U. S. Forest Service and in the 1890's a resident of Kamela, Oregon, in the Blue Mountains, noted in his memoirs written in 1953, the activities of his father as a hunter for the railroad and as a market hunter in the 1870's. According to Huff, many former buffalo hunters moved west in the late 1800's to kill deer for hides. Some hides brought a price as high as \$2.50 to \$3.00 each at a time when day laborers were receiving only \$1.00 per twelve hour work day. Huff's father and another hunter took 354 hides during a two-and-a-half month period in the summer of 1877 between Sumpter in Baker County and Prairie City in Grant County. Later Huff's father mentioned that he regretted having market hunted earlier when in the 1890's deer and elk in eastern Oregon "were almost extinct" (138).

The practice of market hunting led to conditions which generated gradually increasing opposition to this means of taking game animals.

The decline in elk herds and the serious threat to deer herds by hide hunters or "deer skimmers" is well documented in the annual reports made by Oregon's early fish and game protectors (229). These same men⁴⁹ were largely responsible for arousing public indignation over game violations. Game conditions had definitely deteriorated in Oregon by the late 1890's. Even the market hunters were beginning to see that their type of hunting could not continue indefinitely.

The results of market hunting in the East must have been witnessed by many of the people who lived in Oregon during the 1890's. The vast destruction of the bison on the Great Plains and the decimation of passenger pigeons in the Midwest were shocking examples of man's ability to destroy game habitat and over-kill animal populations which the pioneer had thought of as indestructible. Once people saw that these forms of wildlife could become nearly extinct, in a relatively few years, Oregonians began to believe that Oregon too could lose its wildlife just as quickly.

Public indignation was being aroused by articles in newspapers, sportsmen's magazines and other periodicals. An appeal for a halt to market hunting was being made as people began to realize that the

⁴⁹ Further details on these men are given in the section on early legislation below.

wildlife resource, at least, was not inexhaustible. One article of this nature was written for West Shore Magazine in 1890. In describing the deer skinner, the article said:

He is the man--multiplied many times in Oregon, Washington and California--who is rapidly exterminating the best game of the mountains--the beautiful deer. He is not a sportsman, who spends a week or two in the mountains hunting, but a man who makes it a business to hunt deer for the value of their hides. Old and young, male and female, fall equally before his deadly rifle, and breeding season is no more sacred to this ruthless destroyer than any other. A few years ago the mountains were full of deer, and the huntsman could find them within a few miles of any settlement, but chiefly through the operations of these men who slaughter them for their hides they are rapidly disappearing, and if a check be not put to it they will become but a memory, as has the buffalo. Efforts have been made to put a stop to this work of destruction. Strong penal laws have been passed by the three states named, but the difficulty of enforcing them is very great. The Oregon Alpine Club has been very energetic in this work and has, doubtless, diminished the number of deer skinners very materially.

By arrangement with the railroad and express companies it has now become almost impossible to ship deer skins to market, and this is the severest blow yet struck, for as long as a market could be found unscrupulous merchants would deal in the contraband article. It was only a few weeks ago that a prominent merchant in an Oregon city endeavored to ship a bundle of skins under the name of some other article and lost the entire shipment, as well as the respect of his townsmen (326).⁵⁰

Other articles appeared in national publications and appeals were made to the State Fish and Game Protector to stop market

⁵⁰ The practice of false labeling is mentioned in the next section below. L. B. W. Quimby, the Game and Forestry warden, felt that it was quite common in 1900 (229, Vol. 3, p. 19-20).

hunters and demanded a stop to the sale of game on the California market (229). Public opinion and pressure on the U. S. Congress was great enough by the turn of the century to have an effect on market hunting all over the United States, and by 1898 the legislature in Oregon was also moving to protect elk and prohibit the sale of deer on the market. Yet the effects of the legislation were not immediate. A considerable gap existed between the law and its enforcement.⁵¹ Initially the first State Fish and Game Protector in 1893 had felt that it was impossible for him, with the limited means at his disposal, to cover the whole state by himself as well as fulfill his administrative duties. It seems fairly well justified that a request was made to a special session of the legislature for the appointment of game wardens in the various counties. As was reported in 1893, "There is no disguising the fact that at the present time scant protection is afforded wild game in Oregon. . ." (229, Vol. 1, p. 102).

The question of whether or not market hunting would have continued after the point of diminishing returns had been reached is a moot one but there seems to be no denying that this type of hunting did arouse public awareness of the problem of a limited resource. Prior to this period the pioneers had taken what they needed in the way of wildlife--as a right rather than a privilege.

⁵¹This is explained in detail in the section on early legislation and protection below.

Summary

The theory of inexhaustibility of natural resources was easily conceived by early white settlers coming into Oregon. The same general principles applied here as they did elsewhere in America when the pioneer arrived. He saw a great abundance of wildlife because he travelled through and settled in areas where most of the wildlife lived. The river valleys, fertile plains, and open areas presented themselves as opportune for agriculture. These areas also were regions in which the major concentration of game was found. It was therefore easy for him to extrapolate from the abundance of game where he located that the entire state would have a multiple of that number. Thus, exaggerated estimates of game abundance could have been made during the early period. The animals which inhabited the regions where the pioneer first settled were the first to be killed or displaced. Much of the country which was inaccessible to the pioneer was not a vast continuation of the abundance he first saw. Generally it was far less populated with game than he thought. Large herbivores such as deer and elk which could provide him with considerable quantities of meat did live in forested regions, but not in the denser older stands of timber which could not provide wildlife the needed food sources of grass and browse. Browse grows best and is of the greatest nutritional value

in semi-open areas such as those which follow fire or other disturbance.

The Indian had previously been able to draw on the wildlife resources of Oregon for thousands of years. He resorted to game which was in the greatest abundance and most readily accessible. When game or fish were scarce, he supplemented them with native forms of vegetation. His population was limited perhaps by wars, but more certainly by disease and starvation and he therefore did not overcrowd his environment. He also demonstrated no apparent ambition to change, mold or conquer the ecological system in any permanent way. The Indian's use of fire, as stated, was one of the most significant changes which he brought about. This was probably helpful because it opened up densely forested areas to use by many forms of wildlife. Fire is itself an integral part of many ecosystems and the controlled use of fire by the Indian merely gave a pattern to its effects rather than a random distribution.

White man, in contrast with the Indian, in less than sixty years of utilization of the same wildlife resource had depleted most of what he had found. His agrarian culture and burgeoning population had seriously threatened the future of natural resources. His actions were such that he had to conquer and modify much of the native ecosystem to support his way of life.

From this position of mastering the environment, "with the

help of God, " white man proceeded to pursue his efforts with a great deal of confidence and enthusiasm almost as if he held a master plan exhibiting the outcome. In reality if he was merely pursuing his own selfish and economically motivated objectives with no regard for the future. The exploitation of natural resources was fruitful in the relatively short lifetimes of a great number of individuals but the debts for many of these benefits were left to future generations. The white man's economic motivations, technological skills, and self centered attitudes contributed to the creation of manifold problems in the area of conservation. All of the changes which he undertook were done in the name of "progress." The incongruous and somewhat paradoxical consequences of earlier "progress" now require costly scientific solutions to the problems which man has created for himself. If man's best scientific efforts are put forth today to apply sound ecological principles in conservation practices, he might be able to partially imitate the system in which he found the "uneducated" and "unenlightened" Indian.

CHAPTER IV

EARLY LEGISLATION AND WILDLIFE PROTECTION

The first general state wildlife conservation law was "An act for the protection of game and fish" and was to become effective on January 21, 1873. This law was to prevent the killing and sale of deer and elk during the period from February through June. It also made the killing of deer and elk solely for the purpose of obtaining hides an unlawful act. Closed seasons were set to extend from April through July for taking and selling swans and certain species of ducks. Closed seasons also applied to upland birds. Grouse and sage grouse were protected from April through June 15th. Prairie chickens were protected from March through June. Quail and partridge season was closed from April through July. The fines for violation of these laws were \$5.00 for a first offense and double that amount for the second offense (231, p. 25-28). Unfortunately these laws never really became effective as the legislature adjourned in 1872 prior to allocating funds or means for law enforcement.

Early Wildlife Protectors

By 1883 it had become a misdemeanor to collect bird nests and eggs. In 1887 the State Board of Fish Commissioners was set up to enforce fish and game laws but no funds were available to hire

enforcement personnel (246, p. 37-38). The year 1891 brought with it the first season on Chinese ringneck pheasants (245, p. 142), which were making a tremendous success as an introduced species.⁵² There were 30,000 of these birds killed in one county (312, p. 16)⁵³ in 1893 which was the same year that Hollister McGuire took office. McGuire was Oregon's first wildlife Protector and was appointed by Governor Sylvester Pennoyer. He was solely responsible for all the game species in the state plus the commercial fisheries. He was allotted \$500 per year to accomplish his duties and took office at a time when the elk were nearly extinct, deer were being rapidly depleted, the Chinook salmon were declining and many formerly productive trout streams had been fished out. Through his efforts many of the basic laws concerning wildlife conservation in Oregon were initiated.

The season was closed on beavers in Malheur and Baker counties in 1895, and a limit of twenty birds per hunter was set on the sale of upland birds that same year. An additional regulation during 1895 stated that no birds could be sold after the fifth day following the close of the upland bird season (234, p. 92-100). The

⁵² See further details under Oregon's Wildlife -- introduced game birds.

⁵³ This was presumably Linn County.

commercial sale of pheasants continued under the new regulation and in 1896, 10,000 were sold on the Portland markets during the period from October 15th to November 15th (229, Vol. 3, p. 24). (See Table 3.) The sale of all game became illegal in 1899. During the same year a complete closure on beaver was instituted, and was extended for twenty years (235, p. 133). The Hungarian partridge (Perdix perdix), an introduced game bird,⁵⁴ also came under complete protection at that time (235, p. 134).

1899 also brought about a change in administration, and the duties of the Fish and Game Protector were turned over to the first game and forestry warden (235, p. 137). Mr. L. B. Quimby, the new warden, published 5000 copies of the game laws of the state at his own expense because no other funds were available for this purpose. He also saw to it that copies of these laws were distributed to sportsmen. In his first annual report to the governor he stated that,

Upon assuming the duties of this office, a general ignorance and disregard of the game laws was found to exist, and through the failure to make many convictions under the former ambiguous laws, violations were numerous (230, Vol. 1, p. 2).

Quimby felt that a law passed in 1898 prohibiting the killing of all elk (233, p. 23-24) was working well and no elk meat was thought to

⁵⁴The introduction of the Hungarian partridge and other exotic game birds is treated further in Chapter 7.

have been sold in 1899 and 1900. The sale of deer hides was rapidly decreasing and many of the so-called "mountain tanneries"⁵⁵ were closed. Upland birds, in some areas, were increasing toward a figure equaling past abundance. Quimby attributed this to protection. This protection consisted of prohibition of the sale of upland birds for a period of three years, and the reduction of the number of pheasants that could be legally taken to fifteen birds per day. The season was closed on Hungarian partridges for a period of five years following their introduction in 1898. The sale of snipe was practically stopped by a ban on out-of-state shipments in 1900. There was no bag limit on waterfowl and a large number were still being shot in southern Oregon for the California markets (230, Vol. 1, p. 8).

One of the factors which helped Quimby considerably was that of the cooperation he received from local rod and gun clubs. Those of Linn and Benton counties were particularly active and even employed wardens at their own expense (230, Vol. 1, p. 9). Those wardens, however, were relatively few and violations continued on a rather large scale. Hunters in eastern Oregon continued to track the once plentiful "prairie chickens,"⁵⁶ in the snow until they were

⁵⁵These were sites in the mountains where deer and elk hides were crudely tanned or dressed prior to shipment for the market.

⁵⁶These were sharp-tailed grouse (Pediacetes phasianellus columbianus).

killing them off (230, Vol. 1, p. 8). Quimby suggested that the killing of all "prairie chickens" be stopped until 1903 (230, Vol. 1, p. 16). Farmers of the same area were also killing a "large number" of "hooter grouse"⁵⁷ out of season. These violations were not as troubling to the game warden as those which he called "depredations by Indians." Indians apparently with the consent of the Indian agents, left their reservations to hunt out of season. Attempts to arrest them were "blocked" by all the Indian agents with the exception of Colonel Oliver C. Applegate of the Klamath reservation who cooperated with Quimby (230, Vol. 1, p. 6).

State and Federal Interaction

The first Federal law to affect Oregon was the Lacey Act. John F. Lacey was a Congressman from Iowa and it was he who was responsible for much of the action taken to protect Yellowstone Park in 1894. The Lacey Act, 31st Congress, Statute 187, made it a federal offense to ship game interstate when it was killed in violation of state laws. The administration and enforcement of these proposed laws became the responsibility of the Biological Survey which in turn became a much more powerful agency and eventually grew into the U. S. Fish and Wildlife Service. By the time the Lacey Act had been

⁵⁷These were sooty grouse (Dendragapus obscurus).

passed by Congress on May 25, 1900, the restrictions placed on the sale of game had a national impact on market hunting. Quimby felt that one of the problems with the new law was that information concerning such new laws was not being disseminated to enough people. Another problem was that he had insufficient means to enforce any law effectively (230, Vol. 2, p. 41-44).

A state law was passed in 1900 making it necessary to tag all deer hides which were to be sold. This law was designed to control the hunters who were hunting solely for hides. The tags were to be obtained from the Game and Forestry warden or county clerks. Only 250 of the 500 tags issued were used the first year, indicating that either a great reduction in the market sale of hides had taken place or little regard was given the new law (230, Vol. 2, p. 8-9). This law together with a bag limit of five deer per hunter and the prohibition of the use of hounds for hunting deer had finally almost "abolished" the legal sale of hides on the market. The Indians continued to kill deer out of season and apparently the enforcement problem as far as they were concerned had not changed by 1900 (230, Vol. 1, p. 6).

Due to an increase in upland bird populations, the sale of upland birds became legal again during the last fifteen days of the season in 1901. Hunters from Linn and Lane counties alone shipped "nearly" 5,000 birds to the markets during that period (230, Vol. 2, p. 6).

Quimby based his figures on reports from farmers and the cooperation of market operators. The "market kill" information was used as a measure of the relative abundance of various upland game birds and apparently no actual field work was done. In southern Oregon the waterfowl situation was improving and much of the killing of waterfowl on the breeding grounds and their transport out of the state had been stopped by deputy game warden Oliver Applegate, Indian agent at Fort Klamath. At this time (1901) a new law set a limit on ducks, allowing a daily bag of fifty (230, Vol. 2, p. 7-8).

Upland game birds were still being marketed in Portland and elsewhere in 1902 with between 5,000 and 6,000 sold, mainly from Linn and Lane counties. One reason for the continuance of the sale of these birds was pressure from hotel and club owners, who evidently depended upon this supply (230, Vol. 2, p. 9). Some other businessmen also prevented the achievement of better conservation practices by continuing to ship a certain number of deer hides under false labels (230, Vol. 1, p. 19). Quimby recommended that a penalty of from \$100 to \$200 be imposed for false marking of game. He said that false marking was one of "the most common subterfuges" used in game smuggling. Packages of game sent to hotels, clubs, and restaurants were often labeled "fish," "butter" or some other form of produce (230, Vol. 1, p. 20).

During 1902, Quimby's last year in office, he suggested to the

legislature a number of changes in the game laws. First he wanted enforcement of the restrictions on the sale of upland game birds and the season on them shortened by fifteen days. He wanted spring shooting stopped and the bag limit on ducks reduced from fifty to twenty-five per day, but he wanted all restraints removed from killing geese (230, Vol. 2, p. 19). One possible reason for this could have been the number of depredation complaints he received from grain farmers and the relatively low value placed on geese by hunters.

Bounties on crows were suggested by Quimby and an increase in the bounty on cougars and wildcats from two to five dollars.⁵⁸ Sage grouse season was to be closed for a number of years because their population had seriously declined. This decline was blamed on the rapid settlement of eastern Oregon, which brought with it more hunters and dogs (230, Vol. 2, p. 26). The open season on deer would begin on August 15th, instead of July 15th. Perhaps his most important suggestions were those which stated a need for a non-resident hunting license and a gun license for residents of the state. If this came about he felt that there might be funds with which some of his recommendations could be implemented (230, Vol. 2, p. 18-21).

Although the above suggestions were made and the Lacey Act

⁵⁸The bounty system on predators had existed in some form since the "wolf meeting" in 1843. (See section on the White Man's Influence.)

was in effect, market hunting was not completely suppressed due to the lack of enforcement personnel. Geese were "plentiful" along the Columbia River and no apparent decline was seen in the duck population. In fact, in the Klamath Lake area market hunters continued to violate the law by smuggling their kills across the border to California. Quimby's office had such limited funds in 1902 that he could not hire a deputy to patrol the Klamath area and consequently a large number of ducks were taken.

Several lots of ducks, one consisting of four tons, shot on the Oregon side of the line, and shipped to San Francisco, were this year seized by the California game authorities and confiscated. Many ducks have also been shot this year in Malheur and Harney lakes, two other Oregon breeding resorts, but owing to the distance from market there has been little incentive in this locality to illegal shipping (230, Vol. 2, p. 29).

The remoteness of large city markets from areas in Oregon where a great deal of market hunting could be done probably prevented many people from engaging in this business. If Oregon had been as close to such major markets as the San Francisco and Chesapeake Bay areas, market hunting could have been a much more serious threat to game populations. The sale of ring-necked pheasants continued and the regulation stating that "purchasers" of all upland birds were to keep records of these purchases was not observed with much regularity (230, Vol. 2, p. 9). Two Oregon towns, Halsey and Shedd, shipped between 5,000 and 6,000 pheasants to the market in 1901 (230, Vol. 2, p. 34). Yet of the thirty-four

arrests and convictions made for violations of game laws from January to November, 1902, the majority were for illegally killing deer and upland birds rather than for the illegal sale of game (230, Vol. 2, p. 46). This indicates that in spite of improved law enforcement for some game, waterfowl laws went largely unenforced.

J. W. Baker took over as game and forestry warden in 1903. He found that the condition of game animals was something less than desirable. Elk were not abundant and he recommended ten more years of protection after the current law expired on September 15, 1904. Restrictions on deer had further cut down on what he termed their "slaughter," but dogs were still "running deer" from April through July and he felt that deer should be run with dogs only during October. Cougars and timber wolves were mentioned as being very destructive to deer in some areas and higher bounties were encouraged. At this point the first recommendation for a buck only law was made when Baker said that female deer should be protected "at all times" (230, Vol. 3, p. 46).

Stocking and Enforcement

In 1904 the upland bird situation was again variable. Ring-necked pheasant were abundant in some areas and over-hunted in other locations. Ruffed grouse, commonly referred to as the native

pheasant,⁵⁹ were on the decline and Baker said they were "fast fading away." He suggested that they be protected for another five years due to the serious fall in their population over the previous fifteen years. Quail at the same time were increasing in Josephine and Jackson counties, probably due to increased favorable habitat provided by agricultural development (230, Vol. 3, p. 6).

One of the most important changes which took place during Baker's administration was probably that of the establishment of the State Game Fund in 1905. Money for this fund was to be obtained from license fees including a one-dollar annual hunting license for residents of the state and a ten-dollar non-resident fee. In addition to these sources, the money collected in fines for game violation would be added to the fund. Baker's philosophy was that the people who hunted should also pay for the privilege of enjoying their sport and they should not make the taxpayer pay taxes for game protection. The county clerks were responsible for issuing licenses and they were to be allowed a "small fee" for issuing each license (230, Vol. 4, p. 14).

This method of obtaining funds providing the necessary money

⁵⁹The ruffed grouse, (Bonasa umbellus) was often referred to by pioneers as the pheasant or "native pheasant" and this has resulted in its confusion with the ring-necked pheasant (Phasianus colchicus torquatus), introduced into Oregon in 1881. (See section on upland game birds.)

for the enforcing of laws, distributing of information and hiring of employees and it appears to have been effective from the start. The dependence upon this source of revenue has continued from Baker's period up to the present day. In essence, no effective law enforcement or education of the public could have been achieved under the conditions which existed prior to the sale of licenses and the return of enough revenue to accomplish the objectives of the early game protectors. No one suggested an alternative means to accomplish these objectives, such as a general tax fund. It was not felt that such a suggestion would have met with much public support if it had been made. Even with the cooperation of sportsmen's organizations and local authorities, laws were ineffective without a stronger central enforcement agency. The farmers of the time were generally opposed to game laws and law enforcement. One reason for this was damage caused to their crops, especially by waterfowl. A great deal of the opposition to such regulations apparently came from grain farmers (230, Vol. 2, p. 27).

Robert O. Stevenson became the State Game and Forestry warden in 1908 replacing Baker, and he, too, had a number of recommendations which reflect the condition of game resources of the state at that time. He felt that the open season on deer should be limited to the period from August 15th to October 15th and that the limit should be only three per season. Dogs were not to be used in

running deer and complete protection should be given to elk, mountain sheep and antelope by instituting a closed season for "at least ten years." The open season on upland birds ought to be set for a period from October 15th to November 15th with a six-bird daily bag and a limit of twelve in one week. The restrictions on the sale of ring-necked pheasant should be enforced. A duck season was to be fixed from October 15th to March 1st and a limit set at six per day and twenty-five per week (230, Vol. 8, p. 11-12).

Stevenson made an appeal for more severe penalties and strongly urged that money be added to the game protection fund. In the conclusion of this report he said that

While this may seem harsh and drastic, it is but proper to reflect, that at the present rate of game destruction, and the rapid reduction of its preserves, due to the setting up of the state, some effective means must be had for its protection or else no distant day will witness the great State of Oregon barren of one native resource that to all of us is now a matter of pride (230, Vol. 8, p. 13).

In his final reports of 1909-1910, Stevenson was continually concerned with finances which were a very real problem to be overcome if he was to be able to accomplish his objectives. The recommendations he offered to the legislature were similar to those of 1908 but a few important ones were added (230, Vol. 8, p. 13).

Beaver, which had been protected since 1895, were now becoming so numerous that they were causing serious depredations in "many" localities and it was suggested that restrictions be lifted for one year

to relieve the problem. It was also recommended that it be made legal to sell ducks in the open market at any time during the open season (230, Vol. 10, p. 26). These requests are the first to be seen which indicate that previous restrictions had been effective enough to allow a more liberal application of regulations. This might be termed management by regulations and at best such a method can only result in an uneven fluctuation between periods of over- and under-abundance. The lag time between passing legislation and the enactment of regulations, even today, almost always exceeds the time in which effective biological programs should be undertaken.

With more money available after the formation of the game fund in 1905, Stevenson was able to hire more deputies and he demonstrated that enforcement could be effective when 286 violators were cited in 1910. The total amount of fines imposed from prosecutions of these violators amounted to \$10,035, which in itself exceeded by almost five times the entire budget for the year 1899. The number of arrests was almost twenty times that of 1899 and the fines imposed ranged from \$25 to \$300 for each violation. Six people served prison sentences in 1910 and it appears that by that time law enforcement was a resolute undertaking (230, Vol. 10, p. 22).

The year 1911 was a trenchant one in the chronicle of Oregon's wildlife conservation, and general conservation, as it marked the end of the early period of mere game legislation. A State Board of Fish

and Game Commissioners was established that year and a reorganization of Oregon's fish and game affairs took place under the direction of Governor Oswald West, who was very interested in conservation matters.

William L. Finley⁶⁰ became the first man to hold the title of State Game Warden and was appointed under the new commission established in 1911. Finley had been active in wildlife affairs in Oregon from the turn of the century and had a broadly based knowledge of wildlife biology.

Conservation and Federal Influence

At this juncture other agencies, both state and federal, were beginning to affect the wildlife resources of Oregon. The first two decades of the 1900's were periods when general conservation movements got under way on a national scale, largely through the ascendancy of Theodore Roosevelt and Gifford Pinchot, Roosevelt's Chief Forester. The United States Forest Service, the Geological Survey and the Reclamation Service all began to exert their influence to some degree in Oregon during this period. Many Oregonians did not take lightly the federal intervention into the conservation affairs

⁶⁰ Finley's appointment as game warden appears to have been one of the greatest forward steps in Oregon's wildlife conservation history. See the detailed discussion in the section of William L. Finley below.

of Oregon. Governor Jay Bowerman, who held office from 1910 to 1911, attacked federal policy in January, 1911, indicating his feelings that federal employees were trying to destroy the livestock industry and ruin the timber business through their control of national forests. The Portland Oregonian praised Bowerman and supported his attack on the Oregon Conservation Commission⁶¹ (132). Dispute between private interests and the federal government had existed in Oregon from the time the federal government began to threaten private industry's control of timber resources.

John Minto, the pioneer⁶² and conservationist, wrote in opposition to federal policies with the encouragement of Governor William P. Lord. Minto was also supported by Harvey Scott, the editor of the Oregonian. Minto's report to the State Board of Horticulture denounced the American Forestry Association's⁶³ surveys of Oregon mainly on the grounds that the federal government would gain control and administer the use of valuable sheep grazing lands. The controversy grew into a question of who could sustain the cost of forest

⁶¹ See a further discussion of this organization below in this chapter.

⁶² See Chapter 3.

⁶³ The American Forestry Association was organized in 1875 for the promotion of forestry and timber culture. The governors of various states and private organizations were stimulated by this group (48, p. 3).

protection and yet administer fairly the use of forest reserves. The Portland Chamber of Commerce opposed Minto, Lord, and others, and united in the effort with the newly organized State Forestry Association to support federal policies. Controversy continued until even the celebrated naturalist John Muir came to Oregon to censure the sheepmen,⁶⁴ but Minto's viewpoint was a popular one and continued to receive support from newspapers and state officials for several more years.

In support of those who fought against the U. S. Forest Service, William E. Borah, who was elected to the United States Senate from Idaho in 1906, was noted for damning the federal policy makers, especially the Forest Service. In April, 1911, U. S. Representative Abraham W. Lafferty of Oregon proposed a bill which would divide the responsibility for the forest reserves between state and federal governments. The bill failed and the federal government won eventual control. The death in 1910 of Harvey Scott, the editor of the Oregonian who had been a vocal critic of federal intervention, and the inauguration in 1911 of Governor Oswald West, a progressive

⁶⁴ A complete discussion of Minto's controversy with Muir can be found in Lawrence Rakestraw, "Sheep Grazing in the Cascade Range: John Minto vs. John Muir," Pacific Historical Review (278). The control of sheep grazing on forest reserves was a necessary step to prevent serious damage to vegetation and destruction of watersheds valuable to wildlife.

supporter of federal policies, combined with general conservation movements to do much to change events leading up to vast federal control over much of Oregon.

The bill creating Crater Lake National Park was signed by President Roosevelt on May 22, 1902 (S. 5261). But because of its limited size and high elevation the park did not affect the status of wildlife within the state to any significant degree. This step, however, was just a prelude to the federal control which came between 1905 and 1907, when over thirteen million acres of forest land in Oregon were removed from the public domain and placed in forest reserves (266, 268). This put nearly one-fourth of Oregon's standing timber in what would later become national forests.

Today Oregon's national forests comprise a total of approximately 14.8 million acres. These forests perhaps have been one of the greatest factors in saving natural resources that the state has ever had. Without the benefit of controlled grazing on this land and the other federally controlled lands which make up approximately one-third of the land area of the state, much of the wildlife habitat which we have today might have disappeared. Private interests in timber, mineral and other reserves could have completely exploited these lands in the early 1900's if it had not been for federal intervention. The period of this intervention was one of controversy over federal versus private interests, with the latter for the main part

being entirely selfish and short sighted⁶⁵ (316, p. 66-70).

The national concern over a declining forest reserve (153, p. 416; 205, p. 264) led to an act in 1891⁶⁶ which authorized the President of the United States to withdraw land from the public domain⁶⁷ for forest reserves. This act may have been the most important of all for the conservation of the natural resources in Oregon and other western states. This act repealed the timber culture act,⁶⁸ amended the homestead act⁶⁹ and abrogated the sale of government lands by public auction. President Harrison had set aside 2,437,000 acres of forest reserves in 1891, followed by another 17,500,000 set aside on

⁶⁵ People at this time wished to continue the exploitation of the land under the existing Timber Culture Act, Timber Cutting Act, and Timber and Stone Act (205, p. 439).

⁶⁶ This was the act signed by President Benjamin Harrison as a direct move to halt speculation in government land (316, p. 67).

⁶⁷ The public domain is the lands which are owned by the United States as a whole and are subject to sale or other disposition by the federal government.

⁶⁸ The timber culture act or "timber and stone act" was put into effect in 1878 to encourage settlers to use timber and prevent it from "going to waste." This encouragement gave entrepreneurs their chance to secure large areas of timber for sale to logging companies (52, p. 245).

⁶⁹ The first federal homestead act was passed May 20, 1862. By 1883 homesteaders had taken final entries for 638,843 acres of homestead land in Oregon. Any eligible citizen over 21 years of age could homestead 160 acres of unoccupied land after paying a fee of \$34. After six months he could buy the land for from \$1.25 to \$1.50 per acre or merely live on the land for five years and claim it free of charge. By 1910 nearly one-half of Oregon's "farmlands" had been taken by homestead entries (52, p. 117).

February 22, 1897, by Grover Cleveland, who at the same time set aside three million acres of national parks. These acts in 1891 and 1897 assured a continuous supply of timber and aroused dissatisfaction among those who had timber and grazing interests on areas included in the reserves (269, p. 2).

Without doubt, Theodore Roosevelt and Gifford Pinchot did more to save Oregon's natural resources from going the way of those in the East than did any other individuals in the state's history. Neither of them was extremely popular with big business, especially with individuals who wanted very badly to continue to exploit the state's and nation's reserves of timber, minerals and wildlife for as long as they lasted. One of these individuals might have been E. H. Harriman, the famous railroad tycoon of the late 1800's. Roosevelt, however, did a great deal to break up Harriman's railroad monopoly in Oregon in 1907 (164, Vol. 2, p. 174). Although many of Oregon's citizens desired more railroads, they still resented Harriman because of his vast wealth and power (209, p. 27). A cartoon on the front page of the Oregonian August 8, 1908, represented the welcome of many Oregonians to Harriman when he visited his lodge at Klamath Lake. (See Figure 3.) Here, too, Roosevelt's power is suggested.⁷⁰

⁷⁰ For a complete discussion of the Roosevelt-Harriman conflict see (164, Vol. 2).



Figure 3. Caricature of E. H. Harriman

Roosevelt said in his autobiography:

The conservation movement was a direct outgrowth of the forest movement. It was nothing more than the application to our other natural resources of the principles which had been worked out in connection with the forests. Without the basis of public sentiment which had been built up for the protection of forests, and without the example of public foresight in the protection of this, one of the great natural resources, the conservation movement would have been impossible (286, p. 422).

Through the expediency of Roosevelt and Pinchot the federal forest reserves grew at a rapid pace for several years. In February, 1905, Oregon's federal forests consisted of the Bull Run, Cascade Range, Ashland, and Baker City reserves which totaled 4,637,560 acres (269, p. 2). In September of the same year they had grown to include 6,072,550 acres with the addition of the Wallowa, Wenaha, Chesnimnus, and Maury Mountain reserves, which by that time had become National Forests (268, p. 3). By January 1, 1907, with the further addition of the Fremont, Blue Mountains, Goose Lake, Heppner and Siskiyou National Forests, the total acreage was 11,569,848 (267, p. 3). The maximum size attained was in 1907, when the Coquille, Tillamook and Umpqua forests had been added for a new total of 16,463,535 acres (265, p. 3). Two years later on March 10, 1909, the total was slightly reduced to 16,221,368 acres when some land was returned to the public domain. The size of individual forests was also changed by subdivision into new forests within the old boundaries. By that year the Malheur, Deschutes,

Crater, Oregon, Siuslaw, Umatilla and Whitman National Forests had been established (265, p. 3). The addition of further timber reserves might have taken place but in 1907 Congress passed an act which prohibited the transfer of further public domain into national forests. In his symbolic and determined manner Roosevelt set aside twenty-one new areas containing forty million additional acres of forest land in the United States, just two days before the act took effect (106, p. 9-18).

As a result of the efforts of J. N. Teal,⁷¹ a Portland lawyer who converted state officials to the side of the national forests, and Governor Chamberlain (1903-09), who created the State Conservation Commission⁷² in 1908, much of the former resentment over the federal government's new role in the state subsided (283, p. 45).

The resistance to the federal reserves was still apparently

⁷¹ Joseph Nathan Teal was a cattle and sheep rancher in eastern Oregon, from 1877 to 1900, who later became a lawyer in Portland. He was a promoter of waterways development on the Columbia River and was active in political circles. He served as chairman of the Oregon Conservation Commission from 1908 to 1912 (52, p. 239).

⁷² The Oregon Conservation Commission was formed as a result of the meeting on conservation of natural resources. President Theodore Roosevelt called this meeting of the governors of all the states and territories in Washington, D. C., in May, 1908. The objectives of the Conservation Commission were to develop water resources, reclamation and forest activities. They were also concerned with minerals, fish, and game resource development and conservation (228).

coming from "timber barons" and people who had not given up hope that a great deal of money could be made by acquiring public domain for private enterprise.⁷³ The cases of the Weyerhaeuser Company's "tainted timber wealth," Thomas B. Walker's "500,000-acre grab of the public domain," and C. A. Smith's 100,000-acre land fraud, all testify to the efforts which had been made prior to the establishment of federal timber reserves (276, p. 9).

In addition to the control of excessive timber cutting and mining activities on Oregon's forest land, grazing was placed in the hands of the Forest Service. Perhaps three-fourths of Oregon's summer range for livestock and big game animals is now inside the national forests.

Theodore Roosevelt's Secretary of Agriculture, James Wilson of Iowa, mentioned in his report for 1905 that since February 1, 1905, when the national forest reserves were turned over to the Department of Agriculture from the Department of the Interior, a change in both personnel and policy had taken place. The "multiple use principal," although not stated as such, was implied. Wilson outlined a definite program for sustained yield and more effective

⁷³ A complete account of the "land frauds" in Oregon prior to the establishment of federal forest reserves was written by S. A. D. Puter, a Portland businessman, while he was serving a sentence in the Multnomah County jail in 1907 for conspiracy to defraud the government of its public lands (276).

utilization of the forests (363, p. 51-57). He suggested reforestation programs which would take into account the comparative adaptability of various species to regional climates. His report also stressed the importance of well managed forests to watersheds.

The Forest Service had the authority under the Secretary of Agriculture to regulate the class of stock and the number of head which could be put on national lands under their jurisdiction. The issuance of grazing permits allowed them to control the number. First priorities were given to ranchers who had been grazing stock in the area prior to 1905 and who had established permanent residences in the area. Permits were needed to drive cattle across the forests and a "protective limit" was established for each grazing area. The yearly grazing fee for cattle ranged from sixty cents to \$1.50 per head (31, p. 205-216).

In some respects, although it was not stated categorically, sheep were discriminated against by the Forest Service (346, Vol. 3, p. 22). This in itself was a great benefit to big game herds in Oregon as elsewhere because sheep compete with big game much more than cattle do and often do more serious damage to watersheds. An effort was made to eliminate the "tramp stockman" who had previously used the best areas for his cattle and sheep and then moved on. In many areas throughout the West sheep grazing was entirely eliminated because of the destruction they had caused to the range.

With this new control over forest lands erosion on watersheds could be lessened through limited grazing. Such control on watersheds was a direct benefit to wildlife (16, p. 208-225).

In general, over-use by livestock, particularly sheep, was damaging to Oregon's big game ranges in the late 1800's and early 1900's. Over-grazing was the result of selfish individuals' interests in obtaining as much economic gain as possible by ranging excessive numbers of livestock on unregulated public lands. Competition by wandering sheepherders to get their sheep on the first spring growth caused excessive grazing pressure in higher elevations and did a considerable amount of damage to areas like the Steens Mountain. If it had not been for federal regulations, these public lands would probably have been subjected to continuous over-use until they became very deteriorated and of little value to either livestock or game.

Finley and Federal Refuges

The advent of federal wildlife refuges, which were also lands removed from the public domain, further extended federal influence over Oregon's wildlife. President Theodore Roosevelt, by Executive Order, established four reservations in Oregon between 1907 and 1909. The first was Three Arch Rocks reservation near Ocean-side, established on October 14, 1907. It was for protection of native

birds and animals.⁷⁴ The Klamath Lake reservation was established on August 8, 1908, to protect native birds. See Figure 4. Ten days later Lake Malheur reservation was established for the same purpose. See Figure 5. Cold Springs reservation, near McNary, was established on February 25, 1909 (63).

Roosevelt's attitude toward these refuges is expressed in his autobiography when he says that his Executive Orders have protected

. . . the extensive marshes bordering Klamath and Malheur Lakes in Oregon, formerly the scene of slaughter of ducks for market and ruthless destruction of plume birds⁷⁵ for the millinery trade. . . (286, p. 436).

These actions were none too soon and Roosevelt's opinion on the subject and selection of particular areas for refuges was probably greatly influenced by the Audubon Society's efforts in Oregon. One of the most active members of this organization and an active writer on the subject of bird conservation was William L. Finley. Finley and a photographer who frequently accompanied him on field trips, Herman T. Bohlman, contributed articles to Bird-Lore, the official publication of the Audubon Society. One of the articles was a description of the Klamath Lake region as it was in 1905. Finley

⁷⁴Theodore Roosevelt was probably influenced by the efforts of William L. Finley and the National Association of Audubon Societies (101, 89). See the section on William L. Finley below.

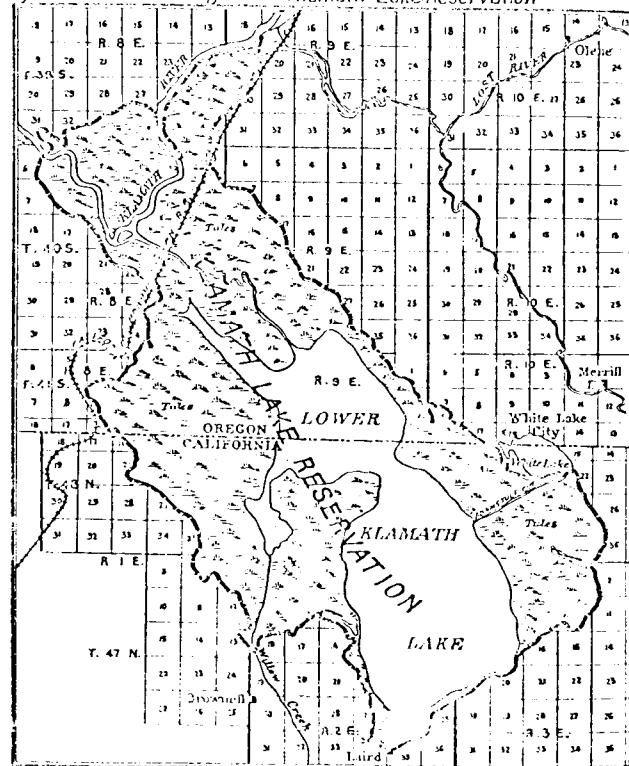
⁷⁵A further discussion of the millinery trade is given in Chapter 5.

KLAMATH LAKE RESERVATION

For Protection of Native Birds

OREGON AND CALIFORNIA

Embracing all islands in Lower Klamath Lake and all Marsh and Swamp Lands in Tps. 39, 40 and 41 S. Rgs. 8 and 9, and Tp. 41 S. R. 10 all East of Willamette Mer. Ore. and in Tps. 47 and 48 N. Rgs. 1, 2 and 3 East of Mt Diablo Mer. Cal. segregated by broken line and designated "Klamath Lake Reservation"



Executive Order

It is hereby ordered that all islands situated in Lower Klamath Lake, and the marsh and swamp lands unsuitable for agricultural purposes in townships thirty-nine, forty, and forty-one south, ranges eight and nine, and township forty-one south, range ten, all east of the Willamette Meridian, Oregon, and in townships forty-seven and forty eight north, ranges one, two and three east of Mount Diablo Meridian, California, and situated within the area segregated by a broken line, as shown upon the diagram hereto attached and made a part of this order, are hereby reserved and set aside for the use of the Department of Agriculture as a preserve and breeding-ground for native birds. The taking or the destruction of birds' eggs and nests, and the taking or killing of any species of native bird for any purpose whatever is prohibited, and warning is expressly given to all persons not to commit within the reserved territory any of the acts hereby enjoined. This order is made subject to and is not intended to interfere with the use of any part of the reserved area by the Reclamation Service acting under the provisions of the act approved June 17, 1902, or any subsequent legislation. This reserve to be known as Klamath Lake Reservation.

THEODORE ROOSEVELT.

The White House, August 8, 1908.

[No. 924]

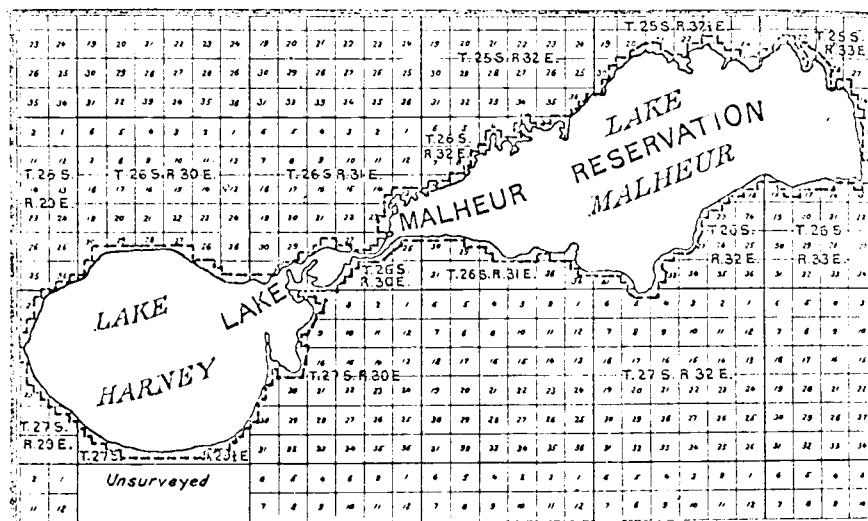
Figure 4. Lower Klamath Lake Executive Order

LAKE MALHEUR RESERVATION

For Protection of Native Birds

OREGON

Embracing all least subdivisions touching the shore lines of Lakes Malheur and Harney and their connecting waters in Tps. 25 S. Rgs. 32, 32½ and 33, Tps. 26 S. Rgs. 29, 30, 31, 32 and 33, and Tps. 27 S. Rgs. 29, 29½, 30 and 32 all east of Willamette Meridian, Oregon, segregated by broken line and designated "Lake Malheur Reservation"



DEPARTMENT OF THE INTERIOR
GENERAL LAND OFFICE

Fred Dennett, Commissioner

Executive Order

It is hereby ordered that all smallest legal subdivisions which touch the shore-line of Lakes Malheur and Harney and the streams and waters connecting these lakes in township twenty-five south, ranges thirty-two, thirty-two and one-half and thirty-three; township twenty-six south, ranges twenty-nine, thirty, thirty-one, thirty-two and thirty-three; township twenty-seven south, ranges twenty-nine, twenty-nine and one-half, thirty and thirty-two, all east of the Willamette Meridian, Oregon, together with all islands and unsurveyed lands situated within the meander lines of said lakes and connecting waters, as segregated by the broken line shown upon the diagram hereto attached and made a part of this Order, are hereby reserved, subject to valid existing rights, and set aside for the use of the Department of Agriculture as a preserve and breeding-ground for native birds. The taking or destruction of birds' eggs and nests, and the taking or killing of any species of native bird for any purpose whatsoever, except under such rules and regulations as may be prescribed by the Secretary of Agriculture, is prohibited, and warning is expressly given to all persons not to commit within the reserved territory any of the acts hereby enjoined. This reserve to be known as Lake Malheur Reservation.

[No. 929]

THEODORE ROOSEVELT.

The White House, August 18, 1908.

Figure 5. Malheur Lake Executive Order

and Bohlman found a great number of waterfowl on Upper Klamath Lake at that time and mentioned that many nested in the tules surrounding the lake. Cinnamon teal (Anas cyanoptera) and pintails (Anas acuta) were among common nesters there.

Lower Klamath Lake was of primary concern to Finley and he appealed to his readers for support in protection efforts for this area because it was an extensive nesting ground for a large number of birds.⁷⁶

Frank Chapman,⁷⁷ curator of ornithology for the American Museum of Natural History, described Lower Klamath Lake in 1908 as being twelve miles long and about six miles wide. The lake was completely surrounded by tules, and no shoreline was visible from the surface of the lake. During his visit there he found reasons to justify the Audubon Association's support of law enforcement in the area. He met an old market hunter who was shooting western grebes

⁷⁶ The white pelican (Pelecanus erythrorhynchos), Farallon cormorant (Phalacrocorax auritus albociliatus), California gull (Larus californicus), ring-billed gull (Larus delawarensis), great blue heron (Ardea herodias hyperonca), eared grebe (Colymbus nigricollis californicus), western grebe (Aechmophorus occidentalis), and Caspian tern (Hydroprogne caspia imperator), were abundant breeders on the islands of Lower Klamath Lake. These islands consisted of several types--rock, sand and gravel, and floating vegetation (tules) (100).

⁷⁷ Chapman was also editor of Bird-Lore, the official publication of the National Association of Audubon Societies.

on the "rookery" and stripping their breasts for sale on the feather market. The hunter lived in a house boat, concealed in the tules. Chapman discovered for himself that hunters shipped feathers to the New York market and that they received an average price of fifty cents for each grebe breast (45, p. 294).

Finley accounts for market hunting in the area of Lower Klamath Lake were published in national magazines. These accounts must have aroused the ire of bird lovers. In 1903 one hunter witnessed a shipment which went out of Merrill, Oregon, that totaled \$30,000 worth of grebe skins. Market hunting had reached such a proportion in a few years that it caused the market hunters themselves to organize to protect birds during the breeding season (100). Some farmers in the area, however, did not cooperate in the effort and continued to hunt during the breeding season. Through the efforts of the Audubon Society, pressure was applied on the Milliner's Association to stop purchasing native birds and the market price dropped in 1903 from a high of seventy-five to twenty-five cents per breast (100).

Support to help stop market hunting of waterfowl in southern Oregon was apparently the purpose of Finley's accounts. Finley related that professional hunters usually occupied twenty to thirty camps along the border of Lower Klamath and the north end of Tule Lake every winter and that during the duck migration, each hunter averaged 100 to 150 ducks per day. The ducks were loaded on wagons

and sent to Montague, California, where they were transferred to express trains for San Francisco. During the winter of 1903, 120 tons of ducks were shipped out of Montague in this manner. The hunters were paid the following prices per dozen ducks: teal, \$2 to \$3; mallards, \$3 to \$5; pintails, \$5 to \$7; and canvasbacks \$8 to \$9.50 (100). Other birds such as Forster's terns (Sterna forsteri) were sold for twenty cents for wings and twenty cents for tails, bringing a total of forty cents per bird (100). The plumage of white pelicans at this time brought one dollar per bird on the New York market. Information of this type certainly appealed to the conscience of conservation minded people such as Theodore Roosevelt and no doubt did much to win their support for Finley's cause. Theodore Roosevelt stated in his autobiography, ". . . I hope that the efforts of the Audubon societies and kindred organizations will gradually make themselves felt until it becomes a point. . . to shield and protect all forms of harmless wild life" (286, p. 335).

Difficulty in enforcing the newly established laws, which were designed to control the sale of these birds, was caused by a combination of the lack of wardens, due to insufficient funds, and different laws in California and Oregon. California allowed fifty ducks per day and Oregon fifty per week. When a warden did arrive on the scene, the hunters moved across the border in their "scows" and shipped their kills to market at night (101).

Market Hunting at Malheur

The history of birds on Malheur's marshes shows justification for protection of birds there, when the periods of the 1870's and early 1900's are compared. Captain C. H. Bendire, a doctor with the U. S. Army Medical Corps and an excellent ornithologist, made observations of birds found in the vicinity of Camp Harney from November, 1874, to January, 1877. During this time he observed an abundance of shore birds, waders and waterfowl on and near Malheur Lake.⁷⁸

⁷⁸ Whistling swans were "very common" during migration, but only a single trumpeter swan was noted, when hunters shot one on March 24, 1877, suggesting the scarcity of trumpeters even at this time. The snow goose (Chen hyperborea hyperborea) and white-fronted goose (Anser albifrons albifrons) were "very common" during migration. Mallards were common and resident, while the pintail was "common" only during migration and none bred in the region. Among the teal, the green-winged (Anas carolinensis) was "common," the blue-winged (A. discors) was "not so common," and the cinnamon teal (A. cyanoptera) was most common and "many" bred on the marshes. The gadwall (A. strepera) was a "rather common" summer resident. Other common ducks included the red-head (Aythya americana), canvasback (A. valisineria), goldeneye (Bucephala clangula americana), bufflehead (B. albeola), American merganser (Mergus serrator). The hooded merganser (Lophodytes cucullatus) was "more common" than the other mergansers and was considered "abundant" during migration. Both the greater scaup (Aythya marila nearctica) and the lesser scaup (A. affinis) were "common" to "abundant" migrants. The shoveller (Spatula clypeata) was "not common" and the wood duck (Aix sponsa) was considered to be "very rare." A very common summer resident was the white pelican which arrived early in the spring before the ice had left the lake and during the summer it nested in large numbers on the lake. Bendire found the American egret (Casmerodius albus egretta) and Brewsters egret (Egretta thula brewsteri) to be "moderately common" and these nested in Harney valley (23, p. 109-149).

A comparison of the conditions at Malheur between 1877 and 1908 can be found in the report of William L. Finley and H. T. Bohlman who visited the Malheur Lake region in May, 1908. Their report shows that some changes had occurred from the time of Bendire's observations of the same area thirty years earlier. Finley and Bohlman found Malheur Lake to be twelve to fifteen miles long and completely surrounded by tules in 1908. White pelicans were still numerous as were eared grebes, gulls and shorebirds. They also found 500 white-faced glossy ibises (Plegadis chihi) on the marsh. Canada geese were abundant enough for a count of 1500 to be made in one hour's passage. Most of these nested along the southwestern portion of the lake. One striking change in the bird population by this time was in the number of egrets. Bendire had described them as being "moderately common," yet Finley saw only two in a one-month period and no nests were discovered (98).

Finley attributed the absence of egrets to "plume hunting" and supported his case with an account given to him by a plume hunter. This hunter said that in 1898 he had made ". . . hundreds of dollars in a day and a half, shooting white herons on Lake Malheur" (98, p. 293). Hunters frequently earned \$400 to \$500 per day⁷⁹ shooting

⁷⁹This was at a time when laborers were being paid one or two dollars per day.

egrets during the period of their abundance (98). Indictments were filed at the District Attorney's office in Burns during 1908 against one hunter for killing 400 grebes at Malheur and against another hunter for killing 1,000 (98). The skins were either shipped out of the express office at Burns, or sent from Lawen to the New York market.

Parties of sport and market hunters went to Malheur Lake in the fall to shoot swans, snow geese and other waterfowl in the early 1900's. Often these birds were shot for the feathers alone which were sold by the pound. Wagon loads of ducks were taken also, and ducks were so plentiful that they were given away. Pioneer residents of the area told Finley that although migratory birds were still abundant in 1908, their numbers had definitely decreased, particularly in the years since 1900 (98). The problem here was the same as that of Lower Klamath Lake, mainly one of little or no law enforcement. Ducks were not market hunted to any extent at Malheur, the reason for this being that relatively few hunters lived in the Malheur area and the area was too remote from major markets to allow the shipment of ducks for sale as meat (98).

Killing at Three Arch Rocks

Finley's reports made a case for the needed wildlife protection in another national reservation, which Theodore Roosevelt set aside

during this period. The conditions at Three Arch Rocks in 1904 were pointed out by Finley to have been very serious in regard to the near annihilation of sea birds and mammals by coastal residents.

These rocks, located south of Cape Meares, are the nesting areas for thousands of sea birds and a resting place for the Steller sea lion (Eumetopias jubata). In 1904 Finley estimated a count of 75,000 California murres (Uria aalge californica) nesting among these rocks. Other birds nesting there included Brandt's cormorant (Phalacrocorax penicillatus), pigeon guillemots (Cepphus columba), and tufted puffins (Lunda cirrhata). Local residents and people from Tillamook regularly took small boats out to the rocks and shot these birds by the thousands for sport alone. The worse "menace" to both the bird and sea lion populations according to Finley was the sea-going tug "Vosberg," which on its Sunday excursions carried parties of armed men from Tillamook out to the rocks to shoot sea lions and birds. Finley witnessed a great number of these being shot and witnessed that numerous cormorants and murres had been washed ashore (101).

The ideals and motivation for establishing Three Arch Rocks Reservation were both deserving and well founded, but in practice, state and federal aims began to conflict almost immediately. During 1907, the year the reservation was established, the state Fish Commissioner was paying a one-dollar bounty on "common seals,"

\$2.50 for sea lions, and five cents apiece for cormorants. All of these forms were considered harmful to the salmon industry (174, p. 564). With bounties as an incentive for killing and relatively little law enforcement to protect the marine animals on the new federal reservation, it is not likely that much immediate good was done by the establishment of the reservation.

Conflicting Interests

An example of a much greater conflict of interests between state and federal governments can be found in the differences of policy among the federal agencies themselves. This policy conflict brought about the unpardonable and complete destruction of Lower Klamath Lake. The Reclamation Act of June 17, 1902, provided for drainage and irrigation projects which preceded the presidential move in August, 1908, that set Lower Klamath Lake aside as a refuge. The Bureau of Reclamation's purpose as stated in the Reclamation Act was to engage in the investigation, construction and operation of irrigation projects in the seventeen arid and semi-arid states of the west (U. S. Stat. 388, 1902). The total accretions from the federal government to the reclamation fund in Oregon for the fiscal years 1901 to 1907 amounted to \$6,780,408.44. The Klamath Project in Oregon-California accounted for a large portion of the total allocation. This plan called for the reclamation of 190,000 acres of land

located in Klamath County, Oregon, and Modoc and Siskiyou counties in California (228). Lower Klamath Lake which was considered swamp or bottom land, was a part of the project. After drainage had been completed, the land was to be subdivided into tracts "not to exceed 160 acres" to be homesteaded by individual owners and irrigated with water from Upper Klamath Lake. The construction of the first nine miles of main canal and laterals was begun in March, 1906, and completed in 1907. The crops which were expected to grow in the area were alfalfa, wheat, oats, barley, rye, vegetables, fruit and sugar beets (228, p. 95-98).

The water supply for the lake had been the southern bend of the Klamath River, which led into the lake and which originally kept the lake six to eight feet deep. A dike was built across the channel blocking the flow of water between the lake and the river.

After the Klamath Drainage District took over in 1917, the lake was completely dried up by drainage and evaporation (92). After the lake bed was dry fires were started in the tules. The dry peat which was six to eight feet deep burned "for years" (86). When attempts were made to farm the newly created "agricultural lands," the farmers and experts from the Department of Agriculture found the soil to be too alkaline for most crops and they also discovered that killing frosts occurred almost every month of the year. The United States had paid \$281,000 for the Lower Klamath Lake area

when they purchased it from California and Oregon. This is the same amount they sold it for to "promoters" after they found that the land was not suitable for agriculture. Finley's correspondence with the Secretary of Interior in 1923 testified to the failure of agriculture on this land (92).

In 1922 after the lake was gone and no birds were nesting in the marsh area, a serious outbreak of grasshoppers overtook the surrounding country. Finley said that this was due to the "annihilation" of the marsh and the disappearance of insect-eating birds (92, 86). Another description of Lower Klamath Lake in 1925 attests to how little had been gained by attempts to convert a productive waterfowl area into farmland. The land on the lake bottom was considered to have been "worthless" and was grazed only by sheep, which could have been raised elsewhere. The account mentions a grasshopper plague on which thousands of dollars were spent for control. The total loss of crops which grasshoppers caused in the area finally made it necessary for farmers to resort to the use of World War I type flame-throwers to hold them in check. Harold Bryant, a wildlife conservationist from California, said that the disturbance of the balance of nature at Lower Klamath Lake "might have been prophesied" by a biologist. As he described the region,

The only water was a sheet of brown alkali water but a few inches in depth. Marsh vegetation had disappeared. Bleak, white alkali met the eye in every direction.

Here indeed was Famine, so far as waterfowl were concerned (39, p. 380).

In 1925, William L. Finley spoke of Lower Klamath Lake as being "but a memory." He described it then as being a ". . . great dry alkali waste," with burned-over peat which left ashes one to three feet deep. He said further that it was ". . . a crime against our children" (92, p. 3).

In a period of twenty years the Lower Klamath Lake region had been transformed from a productive breeding and resting area for wild bird populations into a virtual wasteland. The lake, which had once covered 29,400 acres, combined with marginal marshland brought the total acreage to 88,330. In a region where only ten to twelve inches of precipitation occurs annually this was a considerable wetland to be lost. The entire project took place under the auspices of the Department of the Interior's Reclamation Service which had been encouraged to undertake the project by resident farmers, ranchers and businessmen at a meeting in November, 1904 (146, p. 289). After the lake bed was diked, drained, and burned, agricultural experiments were conducted on the newly created land by the Department of Agriculture's Bureau of Plant Industry. The total result was a recognized failure. It seems that only the federal government was able to experiment on this large area on a grand scale and then evaluate the disastrous results as being due to a

mere miscalculation.

Ira Gabrielson,⁸⁰ an employe of the Bureau of Biological Survey for over thirty years, rationalized the action of the agencies involved, indicating that all rancor which developed out of the criticism by Finley, Bryant and others was due to their memories of the days when Lower Klamath Lake was a great nesting and resting area for migratory birds. Gabrielson attributed the failures to extremist viewpoints and a lack of cooperation between the newly formed U. S. Biological Survey and the U. S. Reclamation Service.⁸¹ The Biological Survey wanted the entire project for birds and the Reclamation Service apparently had no regard at all for them. The Reclamation Service needed to fill the reservoirs of Upper Klamath and Clear Lake during winter precipitation and spring snow melt to assure the farmers on their projects the irrigation water needed for the growing season. This type of water regulation has always caused periodic diversions of flow which sometimes leave a marsh nesting area too dry and at other times flood out nesting birds (109, p. 184).

The Bureau of Biological Survey placed special emphasis on the

⁸⁰ Ira N. Gabrielson was with the Biological Survey from 1915-1946. He was chief of the Bureau from 1935-1940. From 1940-1946 he acted as president of the Wildlife Management Institute. He has been president of the World Wildlife Fund since that time.

⁸¹ See further details of this in the next chapter.

problems surrounding Oregon's waterfowl refuges in the 1917 report.

At the Malheur and Klamath reservations, Oregon, deplorable conditions exist on account of uncertainty concerning the status of certain lands embraced within these reservations. These conditions are under investigation and it is confidently expected that both these reservations which are of world-wide fame as natural breeding places for birds and which should be unique and valuable assets not only for the immediate locality but also for the nation will be permanently preserved for the public benefit, and not be sacrificed for the temporary advantage of a few interested persons (341, Vol. 14, p. 18).

The Biological Survey continued to search for an answer to their difficulties with the Reclamation Service over Lower Klamath Lake and stated in the 1920 report that

The water table on the lake has been lowered several feet by closing the gates which control the inflow from the Klamath River. This action, made under agreement with the water users' association, has uncovered large areas of alkali flats without thus far benefiting the settlers adjoining the lake or opening up additional land suitable for agriculture. A soil survey made during the summer of 1919 has shown that the lands thus uncovered have little, if any, agricultural value. The act authorizing the elimination of certain agricultural lands from the reservation recently approved should result in determining the permanent boundaries of the reservation. If an agreement can be made for raising the water level slightly, Klamath Lake can still be made one of the most important bird reservations in the west; otherwise its future as a refuge is seriously jeopardized (341, Vol. 15, p. 29).

As was noted in the descriptions by Finley, Bryant and others, the concern of the Biological Survey was warranted but yet their influence in events which preceded the severe drought conditions on the reservation was nil.

The impending loss of Malheur Lake in the 1920's was also

becoming more of a reality; drainage and irrigation activities drew water from the Silvies River year after year until none reached the lake. The Blitzen River which rises out of the Steens Mountain and also feeds Malheur was increasingly being diverted to irrigation. But the actual drying up of the lake did not occur until more than a decade after that of Lower Klamath. Again the Biological Survey lacked authority to do anything about the drying up of another valuable waterfowl area. Although this federal agency was represented in Oregon and although the United States government had control over the great land areas surrounding these refuges in the first three decades of the twentieth century, a lack of cooperation and absence of unified authority among the inter-governmental agencies allowed these events to take place.

Summary of the Period

The passage of early game protection laws by the Oregon Legislature, beginning in the 1870's, was a step in the direction of game regulation and restoration. These early laws had little effect until proper law enforcement could be undertaken. The appointment of a state Fish and Game Protector in 1893 was an attempt to achieve better game protection and law enforcement. This man and his immediate successors, however, were unable to cover the entire state without the help of deputies or assistants.

The market sale of wildlife for food, feathers and hides reached a peak in the late 1800's. Federal intervention, through the Lacey Act in 1900, began a trend toward the eventual end of market sales of waterfowl and plume birds. Local rod and gun clubs and the Oregon Audubon Society worked energetically to enforce the new federal laws and greatly assisted the state deputy game wardens.

The establishment of the State Game Commission in 1911 gave an organizational status to wildlife conservation and gave new powers to early wildlife protectors. The advent of federal control over forests and public rangelands strengthened the position of those interested in wildlife protection and restoration by providing large areas where government jurisdiction could be imposed.

Federal game reservations or refuges were set aside as further attempts to protect migratory birds and endangered wildlife but inter-agency conflicts between the Bureau of Biological Survey and the Reclamation Service largely negated the value of these areas during the first two decades of the 1900's.

CHAPTER V

WILLIAM L. FINLEY AND GOVERNMENT AGENCIES

The influence of William L. Finley on the progress of wildlife conservation was so extensive that it may never be entirely known. Thus far Finley has been mentioned as an active writer and a pioneer crusader in the cause of arousing public support for conservation issues. Prior to 1911 when he became State Game Warden in Oregon, he had already done a great deal to prevent the extermination of many forms of Oregon's wildlife. After completing his tenure as State Game Warden he became the state's first game biologist,⁸² and eventually held the position of State Game Commissioner. Finley's direct influence on the State Game Commission was felt for more than twenty years following his appointment in 1911.

One of his most astounding traits was his indefatigable writing efforts. His appeals constantly solicited support for the establishment of wildlife reservations and game protection. His articles appeared in The Condor, Bird-Lore, Nature Magazine, Atlantic Monthly, The

⁸² This position was created in 1899. Finley was the first man who met the qualifications by his "scientific attainments" to investigate the animal resources of the state and report his findings to the government (235, p. 3).

Outlook,⁸³ and numerous other periodicals and newspapers. In addition to this he published the Oregon Sportsman,⁸⁴ a monthly magazine which included the official business of the Game Commission and reports from local game wardens. As president of the Oregon Audubon Society and representative of the National Audubon Association's Western Region he directed national attention toward Oregon's wildlife conservation efforts. He was directly responsible for much of the movement toward establishing national wildlife refuges and his influence was felt by United States Presidents from Theodore Roosevelt through Franklin D. Roosevelt. His earliest published work in Oregon was done with the assistance of Herman T. Bohlman, a photographer and Secretary of the Oregon Audubon Society, when they spent two weeks at Three Arch Rocks in June, 1901.⁸⁵ (96). He and

⁸³Finley's articles appeared in periodicals which were circulated on a national scale. The Condor was first published in 1899 and was the official bulletin of the Cooper Ornithological Club of Santa Clara, California, Bird-Lore was the official publication of the Audubon Societies of America and it was first published in New York in 1899. Nature Magazine began as the Nature-Study Review in New York in 1905 and was a publication of the American Nature Association. The Outlook began as the Christian Union, a family weekly which began publication in the 1800's.

⁸⁴Finley started publication of the Oregon Sportsman in 1913 as a magazine dedicated to hunting and fishing in Oregon. The aims of this publication were to educate the sportsman in the areas of wildlife propagation and protection.

⁸⁵See section on early legislation and wildlife protection above.

Bohlman returned to this area from 1901 to 1907 and did extensive field surveys and photography of sea birds, herons, and waterfowl (87, 88, 94, 90, 95).

Finley was violently opposed to the sale of plumes and feathers taken from wild birds in the state and, under the auspices of the Oregon Audubon Society, sent notices to all milliners in the state warning them about the sale of plumes. The Oregon Legislature had passed laws protecting these birds in 1903 (244, p. 183), which were designed to stop the sale of plumes, but little had been done to enforce these laws until Finley became active. On April 2, 1909, acting with authority as President of the Oregon Audubon Society, he assisted in the arrest of nine proprietors of millinery establishments in Portland including Lipman, Wolfe and Co., and Meier and Frank department stores (96).⁸⁶ Finley's positive action did not stop merely with the sale of plumes but extended to the marsh areas where the plume hunting was done. The Oregon Audubon Society in cooperation with the National Audubon Association raised funds to employ wardens to patrol Lower Klamath Lake and Malheur Reservations

⁸⁶ Finley, H. T. Bohlman, Secretary of the Audubon Society, and Finley's wife Irene visited the millinery establishments within the company of two constables. When Mrs. Finley offered to purchase egret plumes Finley and the constables seized feathers as evidence and made the arrests. One lady dealer actually fought the constables as they tried to leave her shop (10).

(96). Finley reported in 1911 that wardens were on duty at Malheur Lake, Three Arch Rocks and Klamath Lake (99).

The wardens' reports indicate that these efforts were not completely successful. Although the Audubon Society certainly did initiate protection it was later carried on by the Bureau of Biological Survey (167, 168, 181).

There is no doubt that Theodore Roosevelt was greatly influenced by the Audubon Society in his decision to establish these three wildlife reservations in Oregon in 1907 and 1908. He had corresponded with Frank M. Chapman of the National Audubon Association on March 23, 1899, to give his feelings backing their work, and supporting bird protection (288). Roosevelt further praised the Association's work and mentioned the need for an educated public to become more aware of the importance of wildlife in America (290).

Roosevelt was exactly the kind of person who could be aroused to action by efforts such as Finley's. Roosevelt felt that no conservation laws could be enacted or enforced until they were backed by public opinion, ". . . and associations like the Audubon Societies do work of incalculable good in stirring, arousing and giving effect to this opinion. . ." (287, p. 160).

Finley's work and that of his wife Irene exerted an influence on decision-making both at the state and federal level from the time Finley's arrival in Portland from California in 1887. For more than

forty years thereafter he was actively interested in the conservation of Oregon's wildlife resources. During his active career, he took 200,000 feet of moving picture film and 50,000 still pictures⁸⁷ which serve as a record of wildlife conditions in Oregon from the early 1900's (222). His persistence and that of the Audubon Society, Biological Survey and State Game Commission, led to the formation of several wildlife refuges including Hart Mountain National Wildlife Refuge which was established in 1936⁸⁸ for the protection of antelope.

Early Activity of the Bureau of Biological Survey

From the early 1900's on, the federal government was becoming more deeply involved with the responsibility for Oregon's many natural resources. The Bureau of Biological Survey started to make inroads into the state's wildlife affairs even before 1900. The Survey became a Bureau in 1905; prior to that it had acted as a scientific fact finding organization for the Department of Agriculture, mainly dedicated to field work on birds and mammals. It was practically

⁸⁷ The writer has looked at a great many of the originals in the office of the Oregon State Game Commission. Those pictures which are of a personal nature have been ordered by Finley's family not to be released.

⁸⁸ See section on Hart Mountain Refuge below.

powerless prior to the Migratory Bird Treaty of 1916. After the passage of an enabling act in 1918 it was permitted to exercise authority under the provisions of migratory bird protection laws. T. S.

Palmer and other members of the Biological Survey carried on work in Oregon as early as 1888 as a part of the Bureau's studies in surrounding states (13, p. 3).

In 1905-06 the Bureau was requested by the Forest Service to perform its first task of economic importance by undertaking an investigation of the problem of predation by wolves on livestock grazing areas in forest reserves. This was the beginning of the Bureau's predator and rodent control function. This work progressed from merely instructing ranchers and others on how to destroy predators to Bureau personnel actually doing this work. In 1914 there was a large increase in the frequency of rabies among wildlife populations in southeastern Oregon, northern California, southern Idaho and northern Nevada. As this epizootic spread, the Secretary of Agriculture was given an appropriation of \$75,000 and later on an additional \$125,000, to combat rabies by killing diseased animals on the public domain (43, p. 45-48). This provided an opportunity for the Bureau to expand its predator control activities in Oregon.

The federal government, primarily through the Bureau, continued to augment its authority and importance in managing Oregon's wildlife resources through the years from 1915 up to the present time.

From the foothold gained by controlling predators and rodents on lands under federal jurisdiction, the Bureau further expanded its influence in the state's wildlife affairs through its activities in protecting migratory birds.

The Bureau developed its activities through cooperation with state government, livestock interests, state agricultural extension service, and other federal agencies. The Bureau's activity on public lands was in cooperation with the Forest Service, Bureau of Animal Industry, Office of Indian Affairs and the National Park Service. Although much of the predatory animal control work was assertedly for the benefit of wildlife populations, it appears that the major economic incentive was that of preventing livestock losses. For example, in 1929 an assessment of the success of the work of the Biological Survey was given mainly in terms of,

The best gauge of the success of the work is its measure of accomplishment. Predatory animals in the great stock-raising areas of the West have not been exterminated. They still exact a not inconsiderable yearly toll from the herds. But that toll is no longer the twenty to thirty million dollars that it used to be, and it is constantly being reduced with the passage of time and with the tightening-up of the co-operative control system, which year by year strengthens its grip on the situation, through riper experience and progressive improvement in method (43, p. 50-51).

Prior to the Bureau's organized efforts against predators in 1915, its work in Oregon consisted mainly of cooperation with the State Game Commission in wildlife matters and the U. S. Forest

Service in predator problems by means of correspondence and field representation. The Bureau was interested in the "coyote-proof" pasture⁸⁹ experiment at Billy Meadows on the Wallowa National Forest (147). C. Hart Merriam, Chief of the Bureau, felt that this was a success and that fencing might be an answer to some of the predation problems. Merriam was also concerned with Oregon's antelope problem, and predator control in that area. He was much in favor of the proposal for closing the season on antelope. Oregon had already requested federal cooperation in regard to general game protection prior to 1909 (341, Vol. 4, p. 18).

In 1908 the Forest Service had requested predator and rodent control assistance from the Bureau of Biological Survey but limited funds did not allow the Bureau to institute actual control measures. The same lack of funds also prevented the Bureau from accomplishing the needed maintenance and protection of the newly formed bird reservations in Oregon. Merriam mentioned the important assistance which was given in bird protection on wildlife refuges by the National Association of Audubon Societies and stated that ". . . it is only

⁸⁹In 1907 the U. S. Forest Service set up a wire fence sheep enclosure to protect sheep on National Forest land. The plans for this experiment were cooperatively worked out between the Bureau of Biological Survey and the U. S. Forest Service. The Bureau considered the experiment a "complete success" (341, Vol. 4, p. 18-20).

proper that the expense of all Federal establishments should be borne by the Government" (341, Vol. 3, p. 21).

Field work was planned specifically for Oregon as early as 1906. Communications and cooperation with state agencies continued with regard to enforcement of the laws under the Lacey Act, rodent control problems concerning ground squirrels, and plans for the elimination of wolf and coyote depredation. These were all scheduled for a time when funds would become available (341, Vol. 1, p. 7; 341, Vol. 2, p. 23).

By 1915 there was a notable increase in the activities of the Bureau. Requests from state, federal and private interests for control of rabies in southeastern Oregon were met with action. Through cooperation with state authorities, the Bureau of Biological Survey employed hunters to destroy coyotes in that area. The Bureau also had new funds to conduct experiments on pocket gophers (Thomomys baileyi) which were infesting the Ochoco National Forest and to continue the work of destroying jack-rabbits (Lepus sp.) on agricultural lands in eastern Oregon (341, Vol. 10, p. 3).

Steps were taken in 1916 to organize, on a permanent basis, eight districts, including the National Forests and the public domain, in which wolves, coyotes, and other predators were to be destroyed. One of these districts consisted of Oregon-Washington. During that year the rabies situation continued to cause losses in livestock on the

ranges of eastern Oregon. The Bureau still sought to exterminate coyotes there by shooting, trapping and poisoning. The Bureau also continued its efforts against jack-rabbits and pocket gophers. Funds were available for predator and rodent control because farmers and ranchers demanded that the Government do something to stop the economic losses caused by predators and rodents on agriculture. The same economic incentives did not apply to bird reservations in 1916; although concerned, the Bureau had no funds available for the development of these reservations. The Bureau was disturbed over plans to drain Lower Klamath Lake and at the proposal by settlers in the vicinity of Malheur Lake to drain the lake and open the lake bed to settlement (341, Vol. 11, p. 11).

During the years from 1917 to 1919 an organized program for the destruction of predators by government hunters took place in eastern Oregon. The number of predators taken by government hunters during that period does not appear in bounty records because these hunters were not permitted to claim bounties on their kills. They apparently took enough of the rabies carriers to reduce the disease in Oregon, but by that time rabies had spread into neighboring states. The Bureau felt that this rabies epizootic could not have been suppressed without federal intervention (341, Vol. 14, p. 3).

Efforts against the pocket gophers in the Ochoco National Forest had resulted in a ninety-five percent kill, and the poisoning of

jack-rabbits accounted for 75,000 in one county during 1917. At the same time that these efforts were being undertaken the Bureau was also cooperating with agricultural extension personnel at Oregon State Agricultural College in an attempt to enlist the cooperation of farmers in predator and rodent extermination (341, Vol. 12, p. 1-5).

The report given by the Chief of the Bureau of Biological Survey in 1920 documents the unsatisfactory condition of Lower Klamath Lake. The fires which were started in the tules during the spring of 1919 continued to burn until they were extinguished by rains in early autumn. The Bureau considered the area to be unfit for either agriculture or birds in 1920. The Bureau hoped that an agreement could be made to raise the water level there.

By 1921 Lower Klamath was considered to be a loss and no further mention of it follows the brief statement that "The exclusion of water from this reservation has greatly decreased its importance as a wild-fowl breeding place" (341, Vol. 16, p. 24).

There were additional problems at Malheur, where an unusually severe drought in 1919 had greatly lowered the water level and reduced the breeding grounds. The Bureau felt that action was needed to maintain a "satisfactory" water level with water from the Blitzen and Silvies Rivers. Poor agricultural prospects for the lake area were found when the Bureau of Soils, at the request of the Secretary of Agriculture, conducted a survey of the soils in 1919 and

found them too alkaline for crops. The Bureau's main contribution toward saving Malheur at this time appears to have been its attempts to educate sportsmen and state authorities on the subject of unwise drainage (341, Vol. 15, p. 35).

The Survey's interest in Malheur during the years 1921 to 1925, centered around the amount of precipitation and the seriousness of drainage proposals by local agricultural interests. The question of ownership and jurisdiction over the land, which was originally set aside by Executive Order in 1908, remained unsettled despite consultation meetings among the Biological Survey, the governor, state attorney general, state engineer and other representatives from Oregon concerning the ultimate disposition of the land.

In 1922 revenue became increasingly more available for projects involving predator and rodent control measures. One hundred coyotes were poisoned on the Ochoco National Forest during that year. A new outbreak of rabies also took place in 1922, which was considered to be the worst since 1915-1966. New rodent control work mainly centered about killing jack-rabbits.⁹⁰ A total of 350,000 were killed in four counties, with 58,300 killed in the vicinity of Fort Rock alone.

⁹⁰ The method used in poisoning jack-rabbits was that of baiting them with sliced apples which had been dusted with four ounces of strychnine alkaloid per thirty gallons of apples (341, Vol. 17, p. 11)

Poisoning was becoming a more important means of killing all undesirable animals in the state. Whole carcasses were poisoned and staked out for coyote bait throughout much of the range land (341, Vol. 17, p. 4).

These seven or eight years of intensive predator eradication happened to coincide with an unprecedented irruption of jack-rabbits, gophers, mice, kangaroo rats and other rodents. The situation in Harney County became so serious that the county court paid a five-cent bounty on each of 1,029,182 jack-rabbits in one year (143, p. 196). During 1924 a spring drought caused jack-rabbits to concentrate on cultivated land where they caused extensive agricultural losses. Over 50,000 were poisoned in Morrow County alone. In 1925 over 200,000 were counted following a poisoning campaign in Morrow and Umatilla Counties (341, Vol. 20, p. 7-8).

Another important move during the 1920's toward the establishment of federal control over Oregon's wildlife was the effort to preserve the dwindling antelope herds. The Chief of the Bureau of Biological Survey called for a conference on antelope, which met at the National Museum in Washington, D. C. on December 14, 1923. A great deal of the impetus for this movement was supplied by the work of the American Bison Society in cooperation with the Audubon Societies. A major topic of the conference was that of establishing a national antelope refuge in Lake County. William L. Finley, as

previously mentioned, was instrumental in these efforts. E. W. Nelson, of the Bureau of Biological Survey, reports that the predator control men from the Bureau were in a favorable location to gather information on the status of herds in southern Oregon.

L. Alva Lewis, an agent of the Bureau, had suggested an antelope refuge in Lake County as early as 1913 (217). Harry Tilford of the Oregon State Game Commission made a similar recommendation the same year (217), and the reports of the Biological Survey in 1917 and 1918 were made with the view that such a refuge might be established (217). The Secretary of the American Bison Society visited the area with a member of the Bureau in 1919 and recommended that a refuge be established near the Warner Mountains. Finley's contribution consisted of arousing public sentiment for the refuge through his articles in magazines and organizational publications such as the Audubon Society's Bird-Lore. His activity continued in a meeting in 1923 with stockmen who grazed animals on the site of the proposed refuge. These ranchers were amenable to the idea of the refuge, with the provision that they could continue to graze cattle there. Through Finley's encouragement, representatives of the livestock interests accompanied him to Washington, D. C., later that year, to attend the conference on antelope. The conference was also attended by representatives from several government agencies, members of the Boone and Crockett Club, and the Izaak

Walton League.

These representatives discussed the question of the feasibility and financing of such a refuge. The basis for much of their discussion was earlier field work conducted by Stanley Jewett, leader of the predatory animal work conducted by the Biological Survey. Jewett, in cooperation with State Game Commission personnel, had conducted a study of the range and had made a census of the antelope in most of southeastern Oregon. The results of the conference were plans to limit the number of livestock on the range and to stop all antelope hunting in the area (217). No effective action could be taken, however, until the federal government could gain control over the surrounding range lands.⁹¹

Predators had become so depleted in parts of Oregon by 1925 that the Biological Survey felt that there was probably less than one coyote in areas where ten were found at the start of the predator control program in 1915. During 1926 only one wolf and seven cougars were taken by government hunters (341, Vol. 20, p. 4; 341, Vol. 21, p. 3-4).

Just as predation on livestock was coming under control the

⁹¹The Hart Mountain National Antelope Refuge was not established until December 22, 1936, when it was set aside by Executive Order of President Franklin D. Roosevelt. This was largely the result of the provisions in the Taylor Grazing Act of 1934. For further details see Chapter 6.

Bureau was confronted with a new problem, that of waterfowl disease, which initiated a new role for federal authorities in Oregon's wildlife programs. During the fall of 1925 an extensive mortality occurred in the waterfowl populations at Malheur Lake, and also at Tule Lake in northern California. An estimate of 50,000 dead ducks was made at one time on Tule Lake (341, Vol. 21, p. 18). A study was begun to determine the cause of the disease but the investigations which continued for the next four years were inconclusive. In 1929 experimental pens were set up at Klamath Falls to continue the investigation. Chemical analyses were directed at determining the cause. The disease broke out again in 1934 at Upper Klamath Lake and in 1937 at Malheur (156). The experimentation continued until 1930, with the cooperation of Oregon State Agricultural College, the Bureau of Animal Industry, and the Food, Drug and Insecticide Administration, with no positive cause identified. The actual cause, the micro-organism Clostridium botulinum, type C, was not determined with any degree of certainty until 1931 (157, 275). The result of the study was an understanding that water levels on refuges and all other waterfowl areas had to be maintained at satisfactory levels if such outbreaks were to be prevented. Programs for rescue operations, better sanitary conditions, antitoxins and other measures were the direct result of the work of the Biological Survey and the cooperation by state and other federal agencies.

In 1927 the need for water regulating dikes to control "duck sickness" at Malheur and Lower Klamath Lakes, was stated by the Bureau of Biological Survey but no funds were available. Even though no funds were available for development, the Bureau continued to gain control of more waterfowl areas and in 1927 the McKay Creek Bird Refuge was established near Pendleton. The main purpose of the reservoir on this new refuge was one of irrigation storage, but it served secondarily as a resting area for geese (341, Vol. 22, p. 17). The Bureau had some funds available, however, to study bird migration patterns and they initiated a bird banding program which has continued to the present time.

The Bureau's development continued with a Predatory Animal Control meeting in April, 1928. Personnel from Oregon met at a conference held in Ogden, Utah, to determine regional policy concerning the methods for controlling predatory animals and rodents. Ira N. Gabrielson, the leader of Rodent Control, and Stanley G. Jewett, the leader of Predatory Animal Control, represented the Bureau for Oregon. Jewett felt that field men in his branch should be given the authority to assist the state in law enforcement programs. Gabrielson stressed the importance of educating the public in order to get their cooperation in rodent control work.

The issue of bounty laws was openly discussed and it was agreed that fraudulent practices and misdirected efforts contributed to the

ineffectiveness of the bounty system. Bounty laws were not directed at individual killer animals on the range and therefore did not serve the purposes of control. The outcome of the meeting was a change in emphasis which definitely shifted policy from the older concept of exterminating all predators and rodents to one of control over specific problems as they related to limited areas (341, Vol. 15, p. 3-6; 279). This type of control has been the policy of the Bureau of Biological Survey and its successor, the U. S. Fish and Wildlife Service's Bureau of Sports Fisheries and Wildlife, ever since.

One of the most significant pieces of federal legislation following the Migratory Bird Treaty Act of 1918⁹² was the Norbeck-Andersen Migratory Bird Conservation Act (45 Stat. 1222), signed by President Coolidge on February 18, 1929. This Act set up a ten-year program for acquisition of a system of federal bird refuges. This plan was placed under the direction of the Secretary of Agriculture, and to implement it, the Division of Land Acquisition was formed by the Biological Survey the same year. This Division sought advice from state agencies and conservation groups with regard to the suitability of refuge sites. They were responsible for surveys,

⁹²This enabled the Federal government to gain full jurisdiction over waterfowl regulations throughout the United States. For details on this and other acts for the protection of migratory birds see (337, p. 160-178; 185).

selection of sites, and the work of setting up refuges on the proposed areas (50, p. 102-105). One difficulty they encountered in Oregon, however, was that of the still unsettled question of land ownership at Malheur Lake.⁹³ Two bills were introduced in the United States Congress to permit the State of Oregon to sue the federal government in an attempt to determine who held the legal title to the lake beds and surrounding areas. Bills to resolve the issue remained pending in Congress until 1935 during which time no action was taken to improve conditions at Malheur (341, Vol. 24, p. 25; Vol. 25, p. 40-41).

During 1931, an extremely dry year, local farmers at Malheur experienced an entire failure of their hay crops. As a result of this, they were permitted to sow seed over six to eight thousand acres of the lake bed. Water was held back from the refuge in both the Silvies and Blitzen Rivers (341, Vol. 26, p. 44). Finley blamed the Bureau of Biological Survey for allowing the land, which had been protected for years at Malheur, to be taken over by agricultural interests. Even though he realized that there was a very complicated land ownership problem involved, he said that the fault rested with the Bureau for their "utterly spineless policy" which had continued over the

⁹³ For background information on Malheur Lake and the Harney basin see (270, p. 13-23).

preceding twenty years (86, p. 69).

Gabrielson's summary of conditions at Malheur during this time states that

After 1920, the effects of drought, additional irrigation, and deliberate diversion of water played havoc with this biological wonderland, until from 1930 to 1935 it was either dry or contained so little water that by midsummer it became only a stinking remnant of its former grandeur (109, p. 42-43).

Although the Bureau of Biological Survey did not act to seek water control at Malheur prior to 1934, they were aware of their powerless position long before the crisis developed. Thomas H. Beck, the president of Collier's Publications, called the refuge system in 1932 a "fallacy" and pointed out that none of the federal refuges were any good without management (21, p. 208-214), and he should have added without authority.

During the period 1915 to 1934, other federal agencies were extending their control over Oregon's wildlife resources. One of these agencies was the United States Forest Service. The high prices for meat products brought about by World War I led to an increased demand by livestock raisers in Oregon for more grazing on National Forest lands. The grazing permits issued in Oregon by the Forest Service in fiscal year 1915 allowed 108,777 cattle, 10,745 horses, and 769,323 sheep to be grazed on the national forest lands (346, Vol. 1, p. 13). At the same time protection was allowing

game to increase in several of these areas (223). The Forest Service enlisted the assistance of the Biological Survey to reduce predatory animals and rodents to further increase the yield of and carrying capacity for livestock and game. The protection of deer and the increased growth of browse plants due to logging operations coupled with the reduction of predators added to the upward trend in total animal use on the available growth in National Forests during the war period (346, Vol. 4, p. 19-22).

The Forest Service recognized problems in its role of game managing from the beginning of its organization. The Forester's report for 1916 mentioned that,

The continuance of wildlife is very largely dependent on the manner in which the National Forests are administered. This is particularly the case where grazing animals such as deer and elk are concerned, and where there is a problem of correlating the support of the game, with the use of Forest ranges for domestic stock. The Federal Government furnishes the forage for the game, which is under the control of the States (346, Vol. 2, p. 18-19).

The report added that the Forest Service cooperated with the state game agencies to carry out protective laws by providing forest rangers, but the report also mentions that mere protection is not enough (346, Vol. 2, p. 18-19).

One of the solutions to the problem of wildlife conflicts with grazing interests was suggested by the Forest Service when they presented the idea of establishing federal game sanctuaries within

national forests. The Forest Service would then administer them in such a manner that they would not conflict with grazing interests (346, Vol. 2, p. 18). Such suggestions for cooperation between the state and federal authorities continued through the early 1900's (230, 250, 341, 346).

The Forest Service's Increasing Responsibility

In 1920 the U. S. Forest Service became more cognizant of the recreational potential of lands under its jurisdiction (341, Vol. 15, p. 19). The coming of automobiles had changed forest use and people demanded that more roads be built. Oregon's national forests as well as those of other western states were subjected to more pressure for timber cutting during the "teens" as the timber shortage in the eastern states forced the forest industries westward. The figures for the 1915 timber cut on Oregon's National Forests was 47,179,000 board feet. By 1920 it had risen to 121,242,000 board feet (346, Vol. 1, Vol. 6).

With the exception of the depression years from 1930 to 1939 there has been a continuous upward trend in the amount of timber cut from the national forests of Oregon. In addition to the newly cleared forest areas, forest road construction added hundreds of miles of new access to the national forests each year for the purposes of logging, fire patrol and recreation (346, Vol. 6, Vol. 15).

The continuing pattern of opening new browse areas by increased cutting coupled with more restrictive game laws was a positive means of rapidly increasing the size of Oregon's deer and elk herds in the national forests. The control of predators and rodents gave further impetus to this increase. The timber cut on the national forests continued to increase together with general lumber production over the years (see Table 14).

By 1924, the Forest Service had become very aware of the upward trend in deer herds brought about by protection. They, as well as the Biological Survey, recognized for example, that the situation on the Kaibab plateau in northern Arizona had become critical (341, Vol. 19, p. 26). These conditions on the Kaibab plateau led to the realization that overprotection and underharvest could result in serious damage to any forested area including Oregon.

The steady increase in the deer has more than counterbalanced the reduced grazing by cattle, and the lack of forage has become yearly more noticeable. If all domestic animals were removed from the range, the crisis would be merely postponed until the deer through further increase again exceeded the carrying capacity of the area. A winter of deep snows following a dry summer like that just experienced can hardly fail to cause heavy losses from starvation (341, Vol. 19, p. 28).

Paralleling the work of the Federal Government, during the period 1911 to 1934, the State Game Commission was actively working to eliminate predators and protect game herds. When Governor Oswald West appointed the State Board of Fish and Game

Commissioners in May, 1911, he gave them full authority in all matters pertaining to the protection and propagation of fish and game in the state through the exclusive use of funds provided by the game protection fund and the hatcheries fund. These funds consisted of the money collected from the sale of hunting and fishing licenses. The function of selling licenses was removed from the hands of the county clerks and taken over by the Game Commission. Prior to the year 1912 it appears that much of the revenue which was collected for the state game fund never reached the Game Commission but remained in the hands (or pockets) of the county clerks (93, p. 3-4). The total sale of licenses in 1912 was 83,162 of which 43,433 were angling; 39,167 were hunting. Non-resident hunting totaled 152 and non-resident angling consisted of 310. The grand total for these license sales brought \$85,770 into the game protection fund (93, p. 21).

The Game Commissions Restoration Efforts

With funds finally available the Game Commission was able to act positively on projects which would bring the sportsman more game in return for his license fee. One of these projects had been the employment in 1911 of Gene M. Simpson and the lease of his pheasant raising farm near Corvallis where Simpson had been raising pheasants since 1901 (93). The year 1911 was the official beginning

of state game bird propagation in Oregon and the beginning of an era of raising game birds in captivity for stocking to meet the demands of an increasing number of upland bird hunters. Prior to this time game birds had been purchased and released by individuals such as O. N. Denny in 1881. Stocking of game birds was influenced by sportsmen's groups⁹⁴ over the years (312, p. 1-20; 250, Vol. 1, p. 36-38). In addition to pheasants, the game farm raised or attempted to raise, the bob white quail, a variety of partridges, grouse, wild turkeys, and even waterfowl over a period from 1911 to the 1930's (311).

In 1911 the 2560 acre area known as Billy Meadows in Wallowa County was turned over to the Fish and Game Commission for an elk refuge. This area had been used by the U. S. Forest Service as an experimental sheep grazing area since 1907. It was stocked with the first elk in March, 1912. The initial herd was made of two old bulls, seven cows and six yearlings which were donated to the Game Commission by the Biological Survey and shipped by rail to Oregon from Jackson Hole, Wyoming. It was necessary to capture these elk on the winter range and transport them from the railway site at Joseph,

⁹⁴The Oregon Game Protective Association, the Portland Gun Club and the Commercial Club were also interested in stocking game birds and in game legislation (257). The Oregon Sportsmen's League was organized in 1914 and was dedicated to game stocking and influencing game legislation (328).

Oregon, to the pasture 46 miles away. This necessitated a great deal of effort which included crating them for transport on horse-drawn wagons and finally improvising crude sleds for the last part of the trip. During the spring of that year one bull and four cows died, but the birth of one calf in the summer brought the total breeding stock up to eleven (93). This was the first state stocking of big game animals and a vital part of the efforts to restore Oregon's elk herds.

Aside from the beginning of game propagation by the state, the Legislature provided means for the Governor to set aside lands surrounding state institutions for use as game refuges. The State Game Warden was also permitted to enter into agreements with property owners who wished to declare their property as a game refuge for periods ranging from one to ten years. Starting in 1911, thirty-five to forty regular game wardens were employed throughout the state and district deputies were assigned. This increased law enforcement was a further attempt to restore the game animals to former levels of abundance by protecting breeding stock.

A law was passed in the 1915 session of the Legislature which abolished the State Fish and Game Commission set up in 1911 and replaced it with a new one (250, Vol. 1, p. 3-7).⁹⁵ This new

⁹⁵It might also be noted that 1915 was the year that James Withycombe, a Republican, replaced Oswald West, a Democrat, as Governor. The problems with the Commission set up in 1911 appear to have been mainly a matter of financial difficulties (250, Vol. 1, p. 3).

commission lasted until 1921 and during that period it acted to increase protection and propagation of game. An open season on antlered deer was recommended for a period from August 15 to October 15 with the bag limit reduced from three to two deer (250, Vol. 1, p. 10). Migratory bird laws were enacted to coincide with Federal laws, and antelope were given protection. Bounties were paid for wolves, cougars, and bobcats. An emphasis was placed on the cougar as it was estimated that a cougar would consume 150 to 175 deer per year (250, Vol. 1, p. 43).

During a period when sportsmen and the Game Commission were trying to build up herds the ideas of refuges, predator control and buck only laws were easily made popular (250, Vol. 1, p. 47). In fact, these ideas became so firmly ingrained in the minds of sportsmen that years later when it became necessary to re-educate them to the need for killing either sex deer and adjusting the bag limits, they were very hard to convince that the game biologists knew what they were doing (250, Vol. 12, p. 9-10).

A. E. Burghduff became the State Game Warden⁹⁶ in 1920 and he served under a reorganized system which the legislature set up in 1921. The reorganization established two separate commissions, the

⁹⁶This title was changed to that of State Game Supervisor in 1931 and then to Director in 1949 and has remained the same up to the present time (250, Vol. 8, p. 2; 241, p. 35).

Oregon Fish Commission and the Oregon Game Commission (250, Vol. 4, p. 3). The Fish Commission was primarily in charge of commercial fishing and the regulations regarding commercial fish and shellfish. The Game Commission was charged with the responsibility for game fish, game animals and other wild animals of the state. The two Commissions have remained separate up to the present time but have been the subject of periodic controversy over questions dealing mainly with anadromous fish which are of interest to both sportsmen and commercial fishermen.

The period from 1921 to 1931 was one of continuing protection and stocking of game animals. It was also a period of several changes in the position of State Game Warden, starting with Burghduff in 1920 who was succeeded by Edward Averill in 1926, followed by Harold Clifford in 1927, Harvey Moreland in 1930 and finally Frank Wire in 1931. During this period of a relatively rapid turnover in administrative personnel it was difficult to establish long range policies (256, 321).

The "buck law" was in effect and deer herds, especially black-tail deer, increased spectacularly. With the season closed on elk and antelope, they too increased in significant numbers (250, Vol. 4, p. 4-5). By 1922 even the moose was considered one of Oregon's game animals. During the summer of that year, three pairs of moose calves were secured from the Kenai Peninsula of Alaska by the

Game Commission. After being displayed in Portland for ten days, they were transferred to Lake Tahkenitch in western Douglas County and released. The twenty to thirty miles of marshland in that area were considered to be "suitable moose range" at that time (250, Vol. 4, p. 6). Today nearly any game biologist would consider an attempt of this nature ill advised,⁹⁷ but apparently in light of the success in stocking elk and with the efforts for new introductions in full swing, this introduction was deemed feasible.

Game birds were a subject of popular interest during the early 1900's and by 1924, 13,000 ring-necked pheasants were being reared annually at the Commission's two farms, one at Corvallis and the other at Eugene, which were purchased in 1921 (250, Vol. 3, p. 7). A third farm was under construction in Umatilla County and upon its completion in 1925, the annual production was expected to rise to over 20,000 per year (250, Vol. 5, p. 15). Migratory bird laws were mentioned in the 1925 biennial report of the Oregon State Game Commission as being unfair to the Oregon hunter who was limited to thirty ducks in any seven consecutive days. It was felt that Oregon's limit was inconsistent with the federal limits in the

⁹⁷The reason for this judgment is that moose are large animals which require very extensive wetland habitat usually remote from civilization. Oregon has not had such suitable habitat since white settlement began.

Southern and Gulf States where over 140 birds per day could be taken throughout the entire season (250, Vol. 5, p. 16). This inconsistency gave rise to resistance by the Game Commission to reduce Oregon's bag on ducks when waterfowl were being taken in such large numbers on the wintering areas (250, Vol. 5, p. 17).

Another problem which began to confront the Game Commission in the 1920's was that of the automobile. In 1921 the State Game Warden described it as a "serious menace" to the state's wildlife (250, Vol. 3, p. 3). By 1926 new roads and more automobiles had opened the state to a great number of visitors in pursuit of recreation. In that year, 107,000 automobiles brought between 350,000 and 400,000 tourists to Oregon, an increase of more than ten percent over the previous year (250, Vol. 5, p. 7). With the Forest Service roads providing increased access to hunting and fishing areas, an added demand was placed on the Game Commission to insure an adequate wildlife resource.

The Commission's answer to the problem remained the same--predatory animal control, restricted hunting, introduction of new species, and the propagation of more game birds on the game farms. In 1926 it was announced that wild turkeys were liberated in Oregon

for the first time.⁹⁸ Their success was predicted and more were being raised on the game farm at Pendleton (250, Vol. 5, p. 12). Turkeys were released again in 1927 and 1928, with the stocking program covering areas in Curry, Jackson, Josephine, Clackamas, Polk, Umatilla, Wallowa and Wasco counties (250, Vol. 6, p. 29). Other endeavors to introduce new game birds ranged as far as attempts to stock quinea fowl. Nearly all of these efforts⁹⁹ were failures, but the enthusiasm to try anything continued (250, Vol. 6, p. 15; 250, Vol. 7, p. 24-27).

Public education concerning wildlife conservation matters received a great impetus from William L. Finley. His monthly Oregon Sportsman began in 1913 and did much to carry the ideas of game management to the public. Beginning in 1921, the Game Commission also provided lecturers who would appear at meetings for sportsmen's, civic, and conservation groups (250, Vol. 3, p. 18). In 1916 the Commission set up an exhibit at the Oregon State Fair in Salem (74). It later began exhibits at the Pacific International Live-stock Expositions in Portland (250, Vol. 7, p. 26).

⁹⁸ L. B. W. Quimby's Third and Fourth Annual reports 1901-1902 show that the wild turkey was released several years before 1902. These birds subsequently disappeared (230, Vol. 2, p. 6-7).

⁹⁹ See details of attempted introductions of exotic game birds in Chapter 7 below.

Antelope were reported to have recovered from a serious depletion in herd size which took place in the earlier 1900's. An estimated 20,000 were supposed to have existed in Oregon by 1929. Although efforts to establish a federal refuge in the state began around 1921,¹⁰⁰ there appears to have been some opposition to federal administration of the large area of range land included in the proposed refuge boundaries and therefore nothing was done (250, Vol. 5, p. 20). In 1925 the state took matters into its own hands and established an antelope refuge in Lake County. The Biennial Report of the Game Commission for 1927-1928, stated that since the creation of the state antelope refuge in Lake and Harney counties in 1925, the downward trend in the antelope population had reversed.

Instead of fear that they would be exterminated, there is now danger that they will overstock the area. It is conservatively estimated that 20,000 antelope are now to be found in the refuge. Investigations made by the state and federal authorities, as well as stockmen and sportsmen, tend to indicate that there is a possibility of many antelope dying off in case of a hard winter. Bands of antelope now wander outside of the reserve in places they have not been seen for 20 years (250, Vol. 6, p. 12).

The report went so far as to state that the situation could worsen if the antelope continued to increase. It compared Oregon's antelope population with that of the deer in the Kaibab National Forest

¹⁰⁰ See earlier discussion of antelope refuge problems in this chapter.

and with the winter feeding program at Jackson Hole. It was suggested that the solution to this situation was to issue special licenses or permits which would allow the killing of a certain number of surplus animals each year (250, Vol. 6, p. 12). The 1929-30 Biennial Report estimated Oregon's total number of antelope to be between 20,000 and 30,000 (250, Vol. 7, p. 12).¹⁰¹

During the 1920's a build-up in Oregon's elk population took place. Increases in herd size were noted in Umatilla, Baker, Union, Grant, Wallowa, Clatsop and Tillamook counties in 1921, and as a result it was considered possible to re-establish the elk as a hunted form of game (250, Vol. 3, p. 5). From the late 1920's to 1933, periodic concentrations of elk on range lands indicated that hunting would become a necessary means of controlling herd size. In 1923 and 1924 there were complaints from northeastern Umatilla County that large herds of elk were competing with domestic stock (250, Vol. 5, p. 19). The area for which a short open season was suggested in 1926 was the Grande Ronde watershed comprising southern Union, southeastern Umatilla, western Baker and northern Grant counties. Rapid increases in herd size were also noted for Coos, Curry and Klamath counties (250, Vol. 5, p. 14-15).

¹⁰¹ This number may have been a gross overestimation; see further details in the section on Oregon's big game.

Sportsmen continued to advocate an open season on elk for certain sections of eastern Oregon in 1927 and 1928, but the Game Commission decided to wait a few years while they studied the results of a limited open season on elk in the state of Washington (250, Vol. 6, p. 14). Complaints continued to be filed by farmers and ranchers concerning the damage done to their agricultural interests by elk, especially in eastern Umatilla County, where they complained that elk were damaging fences and eating stacked hay in the winter as well as competing with livestock on the range. The elk population estimate for 1910 had been 2,000, this number increased to between 12,000 and 15,000 by 1931 (80).

A bill to authorize a limited elk season was introduced in the 1931 session of the legislature and was defeated. However, a similar bill was passed in 1933 and granted a limited open season for one year (251, 1933-1934; 80). The last time that elk were legally hunted in Oregon prior to 1933 was the 1907 hunting season when the bag limit was one bull elk.

Predatory animal control was an important feature of the Game Commission's activities as part of the game restoration program. Bounties were paid for wolves, cougars, bobcats, and lynx. This effort was paralleled by the bounties paid by the county offices and

the predator control work of the Bureau of Biological Survey.¹⁰² The Game Commission paid bounties on 156 wolves, 1035 cougars and 5460 bobcats including lynx for the period from 1913 to 1921. From 1921 to 1933 they paid bounties on 181 wolves, 2366 cougars and 4576 bobcats and lynx. The bounty payments amounted to over fifty-six thousand dollars paid by the Game Commission alone from 1913 to 1933 (see Table 7).

The Game Commission openly opposed the bounty system in 1923 by stating,

The bounty system, which has been in effect for many years in Oregon, does not control the predatory animal situation, and is theoretically wrong. It develops the professional bounty hunter, whose livelihood depends on keeping up the annual supply of animals upon which a bounty is paid and results in no trapping for such animals being done during the spring season when the greatest number of predatory animals could be taken. Trapping by bounty hunters is done only during the season when the skins are in prime condition and of most value. Much better results would be obtained were the funds now paid through the bounty system used for hiring paid trappers, who would devote their entire time to the work of trapping and poisoning predatory animals (250, Vol. 4, p. 16-17).

It is noteworthy that the Game Commission, in spite of its doubts about this biologically unsound practice, continued bounty payments until 1961 (249, Vol. 14, p. 142).

¹⁰² See details of the predator control work of the Bureau of Biological Survey given above.

The waterfowl situation was one which the Oregon State Game Commission viewed as critical in the drought period of the late 1920's and early 1930's. They recognized that drainage and agriculture had seriously depleted nesting, feeding and resting areas within the state over the previous years. The Commission was largely responsible for interesting the Bureau of Biological Survey in the possibility of establishing Malheur reservation as a managed refuge which would be operated on a permanent basis (250, Vol. 7, p. 17). Through the Commission's efforts, a bill was sent to the 1931 session of the Oregon Legislature to seek settlement of the land title question. The Game Commission also conducted an educational campaign to win public support for the Malheur Refuge program through press releases. Their cooperation with the Bureau of Biological Survey may have been very important in accomplishing the development of Malheur. In 1931 the Game Commission felt that it was receiving "splendid" cooperation from the Biological Survey, Forest Service, Oregon State Agricultural College, sportsmen, and the press (250, Vol. 7, p. 18).

A steady decrease in migratory game birds, although apparent to the Game Commission from the 1920's on, could not have been stopped without cooperation between state and federal agencies, not only in Oregon, but throughout the western flyways. The attitude of the Commission was that most of the drainage and irrigation

projects had reached a limit within the state and that waterfowl could maintain a status quo if factors did not worsen elsewhere. This reasoning is justifiable and points out the limitations faced by any state when attempting to manage migratory birds. The only possible solution to the waterfowl crisis faced in the 1920's and '30's was that of federal intervention and financial support, such as that found in the Migratory Bird Conservation Act of 1929.

CHAPTER VI

THE EMERGENCE OF MODERN MANAGEMENT TECHNIQUES

A significant change in wildlife management practices took place in the 1930's, on both the state and federal levels. On the federal level, in 1934 the recently reorganized Bureau of Biological Survey consisted of new divisions which were brought about by combining older ones. The Division of Game and Bird Control was combined with the Division of Predatory Animal and Rodent Control to form a new Division of Game Management. A new division was formed to deal specifically with waterfowl. Migratory bird studies got under way in an urgent and serious attempt to determine migratory flight patterns. Banding was done on an increased scale and scientific studies of mammals became a major interest (341, Vol. 29).

Land Acquisition Through New Funds

One of the important divisions in the Bureau which affected Oregon was the Division of Land Acquisition. Acting under the authority of the Migratory Bird Conservation Act of 1929, the Division initiated a ten-year plan to acquire large areas of land for refuges which would serve the Pacific flyway. This system of land acquisition was far more extensive than anything previously designed and the 1929 Act gave the Biological Survey new authority to use its

discretion in land acquisition matters (50, p. 102-105).

J. Clark Salyer II, who was the Bureau's Chief of the Division of Wildlife Refuges for twenty-eight years, commented on these efforts during the 1930's as "great achievements." He implied that President Franklin D. Roosevelt could not have chosen a better waterfowl committee for the Bureau¹⁰³ than that comprised of Jay N. "Ding" Darling, cartoonist and later chief of the Bureau of Biological Survey, Thomas Beck, a publisher and Aldo Leopold, the pioneer conservationist and professor from the University of Wisconsin (295).

This committee recommended an expenditure of fifty million dollars for the restoration and purchase of waterfowl marshes. Through the efforts spearheaded by Darling's enthusiasm and public relations talent, eight and one-half million dollars from the Emergency Acts Appropriations plus a special one million dollar fund were allocated for waterfowl restoration in 1934. In the same year, these emergency funds were augmented by the Federal Migratory Bird Hunting Stamp Act which required all duck hunters over sixteen years of age to purchase a one dollar duck stamp through the Postal Service (185, p. 503). The reasoning behind this form of taxation was that all hunters who relied on waterfowl for sport should also

¹⁰³ A detailed discussion of the background and difficulties of this committee is given by J. B. Trefethen in Crusade for Wildlife (337, p. 264-272).

help to pay the cost of restoring marshland and purchasing refuges.

An additional Act that helped to restore wildlife and enlarge the refuge system in 1934 was the Fish and Wildlife Coordination Act (185, p. 503). This Act extended the Biological Survey's authority in Federal water development projects directed by other government agencies by allowing development of the wildlife and recreational assets of these areas. Through the persistent efforts of Senator Peter Norbeck of South Dakota, Congressman August H. Andersen of Minnesota and other legislators, and the cooperation of Franklin D. Roosevelt, the depression years became years of great progress in wildlife administration (185, p. 499-504).

The Malheur Purchase

With the emergency funds allocated in 1934, the Division of Land Acquisition was able to schedule the purchase of land for the Malheur reservation that year. The land was to include the lake beds and surrounding marsh boundaries of Malheur, Mud, and Harney Lakes, an area which totaled about 80,000 acres. An emergency existed on the marsh at this time as the entire lake bed was dry by late spring and the only available water came from a large (Sod House) spring. The extreme drought from 1929 to 1934¹⁰⁴ had

¹⁰⁴See Chapter 5, William L. Finley and Government Agencies.

caused ranchers in the vicinity to graze their cattle on the marshes and to cut the native grass for hay, thus almost eliminating the waterfowl nesting capacity.

In February, 1935, the Federal Government purchased the "P" Ranch from Swift and Company's cattle interests for \$675,000. This gave the Bureau of Biological Survey control over the water rights on the Blitzen River which had been owned by ranch interests since the land was first controlled by the celebrated "Pete" French (313). Although the lake beds, the surrounding marches, and the land on the adjoining "P" Ranch had been acquired by February, the land suit of the "U. S. v. the State of Oregon" involving the title to these areas was not settled until April, 1935 when the Federal Government was given immediate possession of the land (173).¹⁰⁵

Through the constructive efforts of Civilian Conservation Corps workers, dikes, water control ditches, telephone lines, habitat improvement work and the building of a refuge headquarters were accomplished during the 1930's. The Federal Government then not only owned a waterfowl refuge but a rather large cattle ranch as well. They subsequently became involved in selling permits to ranchers for grazing privileges on the refuge and the livestock business became a

¹⁰⁵ An examination of the land conflicts between the Federal Government and the State of Oregon is given by Brimlow's work on Harney County (37, p. 244-252).

means of partial financial support for the operation of the refuge. During the 1936-1937 season, 30,000 animal-months of grazing took place on the refuge. In addition to this, permittees paid to harvest 6,000 tons of hay, and 6,000 bushels of grain (341, Vol. 32).

The importance of managing livestock as well as waterfowl influenced Stanley Jewett, the first refuge manager, in his choice of a successor in November, 1936. Jewett had served as manager since May 1935 and was involved with a number of other administrative responsibilities. Through consultation with J. Clark Salyer, Chief of the Division of Wildlife Refuges, Jewett chose John Scharff to become the new refuge superintendent. Scharff had been an employee of the U. S. Forest Service since 1923 and had gained administrative experience as Assistant Forest Supervisor on the Fremont National Forest in 1932. He was familiar with the ways of the C. C. C. and he understood range management. Scharff was an excellent choice for the position. He has effectively managed the Refuge for over thirty years, maintaining favorable relationships with ranchers in the area (297).

The ranging of livestock on waterfowl refuges is not harmful and may even be of benefit to some nesting waterfowl if it is properly managed. One key point concerning this practice, however, is that the Federal Government agencies do plan on an economic use of nearly all refuges. The Bureau of Biological Survey has made use

of the agricultural lands under its jurisdiction just as the Forest Service has done. The funds obtained from the lease of agricultural land have helped to support refuge operations by supplementing Congressional allotments. The policy has been to allow as much agricultural or range use as possible on the land as long as this use does not interfere with wildlife interests (341, Vol. 33).

Multiple Use

Federally managed wildlife refuges in Oregon, as elsewhere in the United States, have not been merely operated as sanctuaries. Strict altruistic motivation would not have been practical in the operation of large refuges. Much of the enthusiasm for establishing these refuges, such as that expressed by Finley and the Audubon Association,¹⁰⁶ arose from the desire to set aside areas specifically dedicated to the use of wildlife. The Federal Government, however, acted somewhat more pragmatically in their management practices. They developed the concept of multiple use to include erosion and flood control, agriculture, fur trapping, and a variety of recreational uses including hunting and fishing (109, p. 24-31). With all of these factors involved, the refuge management system became in need of biologists and the contributions which they could make toward

¹⁰⁶ See section on William L. Finley above.

effective management. The management of wildlife, livestock, and water supplies required the employment of research and scientifically trained personnel rather than merely game protectors. The demand for such individuals exceeded the supply in the 1930's.

In 1935 the Bureau of Biological Survey established a cooperative biological research unit in Oregon (144). This was one of nine cooperative research units established in the United States. It was administered by the Biological Survey in cooperation with Oregon State College and the Oregon State Game Commission. It was also partly supported by the American Wildlife Institute.¹⁰⁷ "Ding" Darling's efforts led to Congressional support for the cooperative research program and further support from the American Wildlife Institute. The purposes of the Units as expressed in 1935 were to: train men to staff State game and fish agencies, carry out research to provide information of immediate use, provide technical assistance to States in solving their wildlife problems, and conduct conservation education through demonstrations, lectures and publications (367, p. 1).

¹⁰⁷ This organization evolved from the American Game Protective and Propagation Association, which was established in 1911. The Association assumed the name American Wildlife Institute in 1935. They were supported by public-spirited citizens and leading arms and ammunition manufacturers. The Institute actively supported the wildlife restoration movement in the 1930's (337, p. 122-123).

Biological Research and New Problems

Arthur S. Einarsen, an associate biologist of the Survey, was appointed to direct the work in Oregon. The objectives of the program instituted by the research unit were to systematically deal with the problems involving wildlife. Such problems had been brought about by an increased human population and the consequent additional pressure on the wildlife resources of the state.

As part of its major objectives, the research unit attacked two specific problems. One of these was to determine the pheasant population of the state and investigate the cause of a yearly decline in population, which occurred despite increased liberations of birds raised in captivity. The other problem was to determine the buck-to-doe ratio in the deer population and establish the relationship of this ratio to reproduction (250, Vol. 10). The ultimate outcome of these studies was the determination that merely stocking pheasants or any other game bird would not increase their numbers if they lacked suitable habitat. The deer study led to the discovery that killing buck deer only was an insufficient means to control deer herd size. They discovered that a surplus of does existed in the state herds, and that these does were not being harvested effectively under the buck only law.

The Deer Crisis

The overpopulation of deer herds in Oregon first became acute in the 1930's when the herds in areas of Grant County and parts of Lake and Baker counties reached numbers which exceeded the carrying capacity of the winter ranges. The result was a depletion of forage, deer starvation, and complaints by ranchers of agricultural damage. The Game Commission attributed this increase to a continuation of overprotection and control of predatory animals which had practically eliminated predators in those areas after 1920. Through the Game Commission's appeal to the Legislature a localized season was announced for shooting antlerless deer in 1937. The area where doe hunting was permitted was known as Murderer's Creek, in Grant County. This area was one where the winter range was most seriously depleted. The hunting season on the Murderer's Creek watershed extended from November 20 to December 10, 1938. Hunting was also opened for antlered deer on the Ochoco, Canyon Creek and Myrtle Park game reserves in an additional attempt to reduce overpopulations. The protection of antelope had also resulted in an increase in their population. Complaints of antelope depredations were received by the Game Commission from farmers in Malheur, Harney and Lake counties in the early 1930's. In an effort to deal with these complaints, a limited antelope hunting season was

authorized to extend from October 28 to November 1, 1938. During this season a total of 275 special licenses were requested and 175 antelope were shot (250, Vol. 11, p. 7).

The Game Commission's stated objectives (250, Vol. 11, p. 8) in hunts such as these were to achieve a limited kill and to disperse or haze a portion of the overpopulation into adjacent territory. Actually the antlerless deer hunt on the Murderer's Creek watershed was the beginning of antlerless deer hunting as a regular management means for controlling Oregon's herd size. The problem at that time was to convince the public that shooting does was a biological necessity for the welfare of deer herds and not an atrocity against motherhood or a despicable act done by only "blood-thirsty" sportsmen. Although the 1939 legislative session provided for a continued antlerless deer hunt in the upcoming season on the Murderer's Creek watershed, the Game Commission declined to open it in 1940. Public pressure exerted at a Game Commission hearing held in John Day during May, 1940 was apparently the reason for not opening the season (250, Vol. 12, p. 9-10).

The critical situation on the winter range as obvious to field biologists and anyone else who cared to investigate the area. Herd size had increased on the winter ranges near the John Day River at a steady rate from 1916 to 1935. The winter of 1936-37 was severe and accounted for losses possibly in the thousands (25). The 1938

winter deer survey estimated the population of wintering deer to be 38,000. Forest Service employees in the area believed that the deer population had reached the carrying capacity of the range about ten years earlier, and was still growing, possibly as much as twenty percent a year. All of the indicators of over-use of the winter range were present on the Murderer's Creek watershed: "high-skirted" juniper, overcropped bitterbrush, heavily-used curl-leaf mountain mahogany (Cercocarpus ledifolius), and a thin ground cover of cheat-grass (Bromus tectorum) and wheat grass (Agropyron spicatum). Ranchers in the area complained not only about deer eating newly sprouted grasses in February and March but of additional damage by trampling new growth (25).

In addition to the removal of most of the predators, the increased population of deer was also apparently due to the over-protection given to the deer by the establishment of game refuges¹⁰⁸ at Canyon Creek, Ochoco, Myrtle Park and on the Murderer's Creek drainage itself in the 1920's. A study by Dana Berguis, a graduate student at Oregon State College, of the winter range problems on the John Day watershed recommended an increased annual kill, including

¹⁰⁸ These refuges were set up in two ways. Most of the refuge areas were created by the legislature but others came about through private agreements between the State Game Warden and landowners. By 1928 there were nearly three million acres set aside in these kinds of refuges (250, Vol. 6, p. 14).

open season on does, abolishment of big game refuges, hunting seasons set later in the year, and an increased kill of elk (25, 201).

The 1939-40 controversy over deer herds in the Murderer's Creek drainage and John Day area made the Game Commission defensive about its new management policies. The idea of harvesting antlerless deer had to be sold to the public. The 1943-44 Biennial Report of the Game Commission stated that

Recently considerable criticism has arisen over the issuance of permits to kill doe deer. While at times permits have been issued in limited numbers for restricted areas, this has been done only when, based on the best information obtainable, it has appeared necessary to hold the herds at a level corresponding with the available winter feed (250, Vol. 14, p. 6).

Even though this defensive or apologetic attitude was expressed, the biologists knew the "facts of life" and understood the need for antlerless hunts as the only practical means of managing deer herds. Attempts to feed hay to the deer in the winter failed and would have only forestalled the problem had they succeeded. Other means of relieving deer damage on agricultural lands were attempted such as fencing, hazings, trying to lure deer outside of damage areas with salt blocks, and live trapping and transplanting. All of these resulted in failure (250, Vol. 17, p. 28; 250, Vol. 18, p. 39).

Through continuous efforts by public information personnel and the work of regional biologists, Oregon's hunters and most of

the public now accept antlerless hunting.¹⁰⁹ This type of hunting has allowed a harvest of approximately twenty percent of the annual deer herd as opposed to eight to ten percent taken under the "buck only" system. During the years that this type of hunting has been done, the total harvest has increased (see Table 4), and local land use conflicts have been reduced.

This case history of managing deer is just one of the many biological problems which was investigated by game biologists beginning in the late 1930's. Prior to that time, most game management was done through the employment of techniques such as protection, stocking, and predator control. These methods were empirically devised to increase a depleted wildlife resource and when that goal was achieved, as in the case of deer, the next logical step in the evolution of wildlife management was developing techniques which would maintain game herds at a level commensurate with the carrying capacity of their range. In order to undertake such new management practices utilizing biological regulation and research, trained biologists were needed. Wildlife biology itself was a relatively new subject with very few principles upon which to base a

¹⁰⁹ A limited number of antlerless deer have been taken every year since 1938 with the exception of 1940. Since 1952 antlerless deer have been hunted during some part of the general deer season. For further details see the section on Oregon's wildlife: "Big Game and Predators" below.

Table 4. Deer and Elk Harvest Data 1933-1967 (249,250)

Summary Total Deer Harvest 1952-1967															
Year	Deer Tags Issued	Total Deer Harvested	Percent Hunter Success	Mule Deer						Black-Tailed Deer					
				Hunters	Number Harvested	Percent Hunter Success	Percent of Total	Antlerless Harvest	Percent Antlerless	Hunters	Number Harvested	Percent Hunter Success	Percent of Total	Antlerless Harvest	Percent Antlerless
1952	188,250	77,897	41	126,719	53,030	61	68	20,570	39	61,531	24,867	40	32	5,210	21
1953	204,808	105,275	51	121,356	64,607	53	61	24,652	38	83,552	40,668	49	39	13,045	32
1954	215,047	112,622	52	134,617	76,877	57	68	22,410	29	80,430	35,745	44	32	8,043	22
1955	230,585	133,834	58	148,566	90,126	61	67	37,752	42	81,919	43,708	53	33	13,446	31
1956	233,842	146,568	54	146,568	85,394	58	68	37,978	44	87,274	40,277	46	32	13,340	33
1957	221,960	116,409	52	140,627	81,873	58	70	26,853	33	81,333	34,626	43	30	8,877	26
1958	233,885	116,251	50	139,183	71,250	51	61	19,308	27	94,702	45,001	47	39	15,251	34
1959	248,701	145,823	59	138,856	88,261	64	61	23,686	27	104,750	56,670	54	39	20,108	35
1960	259,739	157,504	61	141,102	96,122	68	61	28,254	29	110,725	61,382	55	39	20,133	33
1961	265,326	163,939	62	147,597	97,951	66	60	30,538	31	101,971	65,988	65	40	24,529	37
1962	263,838	139,712	53	143,580	76,776	53	55	24,977	32	108,343	62,936	58	45	21,932	35
1963	258,375	117,619	45	136,676	64,678	47	55	15,403	24	105,603	52,941	50	45	16,754	32
1964	271,339	143,023	53	148,215	84,665	57	59	19,931	23	110,555	58,358	53	41	18,807	32
1965	277,857	119,369	43	143,618	71,637	50	60	19,242	27	108,281	47,732	44	40	13,348	27
1966	285,961	147,975	52	156,720	88,516	56	60	22,821	26	114,049	59,459	52	40	14,687	25
1967	287,600	142,000	52	153,950	87,180	57	61	29,518	34	109,250	54,820	50	39	15,089	27

Elk Hunting Trends - 1933-1967

Year	State Total					Rocky Mountain Elk					Roosevelt Elk				
	Hunters	Bulls	Cows	Total	Success	Hunters	Bulls	Cows	Total	Success	Hunters	Bulls	Cows	Total	Success
1933	2,523	579	0	579	23%	2,523	579	0	579	23%	No Open Season				
1940	6,152	1,340	1,179	2,529	41%	4,809	1,152	1,179	2,331	48%	1,343	198	0	198	15%
1945	12,625	7,270	2,243	2,465	20%	7,270	2,175	67	2,243	30%	1,327	222	0	222	17%
1950	24,713	3,157	2,234	5,391	22%	16,726	2,210	1,234	3,444	21%	6,076	947	1,000	1,947	32%
1955	29,309	4,228	1,855	6,083	21%	21,504	3,361	1,749	5,110	24%	6,205	867	106	973	16%
1961	51,349	9,707	2,384	12,091	23%	36,514	7,098	1,863	8,934	24%	14,835	2,609	521	3,130	22%
1963	54,724	10,082	3,606	13,688	25%	41,216	6,959	3,606	10,565	26%	13,508	3,123		3,123	23%
1964	62,898	11,846	5,311	17,157	27%	41,010	7,576	4,879	12,455	30%	21,888	4,270	432	4,702	21%
1965	67,387	8,066	4,200	12,266	18%	47,651	5,768	3,594	9,362	20%	19,736	2,298	606	2,904	15%
1966	68,178	8,030	3,372	11,402	17%	49,504	5,529	3,189	8,718	18%	18,674	2,501	183	2,684	14%
1967	64,200	7,660	2,870	10,530	16%	46,100	5,220	2,690	7,910	17%	18,100	2,440	180	2,620	14%

management program. Aldo Leopold's¹¹⁰ work was the best source of information at the time. His classic book, Game Management (179), published in 1933, was the "Bible" for wildlife biologists.

Aldo Leopold's basic premise for managing wildlife was expressed by Theodore Roosevelt as "conservation through wise use." Roosevelt also conceived the idea of renewable organic resources which could be harvested scientifically at a rate not to exceed their production. Leopold credits Roosevelt with the doctrine recognizing all outdoor resources as an integral system which was to be used wisely under private ownership and public trust. The mechanism proposed to carry out this "wise use" was the application of scientific principles to conservation (179, p. 17-18).

Leopold's book, Game Management (179), covers a variety of management techniques as well as principles. A major principle adopted by Oregon's wildlife managers was that of the "biological surplus." It was recognized that all animal populations produce offspring in excess of the number needed for mere replacement. If this excess does not die through environmental conditions, the population will grow. It was also known that the removal of predators

¹¹⁰ Aldo Leopold was a former forester who became a pioneer wildlife manager in the United States in the 1920's. He was a professor of wildlife management at the University of Wisconsin from 1933 until his death in 1948.

and the effects of overprotection had caused such a surplus in Oregon.

Oregon State University and Wildlife Management

Trained management personnel were needed to meet the problems of this 1930's. Leopold stated the need for wildlife biologists in 1930 when he wrote: "Train men for skillful game administration, management, and fact-finding. Make game a profession like forestry, agriculture, and other forms of applied biology" (180, p. 288). Because of the recognition of principles such as these, the administrative staff and faculty of the School of Agriculture at Oregon State Agricultural College, in cooperation with federal officials, proposed a department to train technicians and biologists in wildlife management.

The idea to form the Department of Fish and Game was a synthesis of thought which originated with three men, Ira Gabrielson, then with the Bureau of Biological Survey, the Dean of Agriculture William A. Schoenfeld, and Roland E. Dimick,¹¹¹ an alumnus of Oregon State Agricultural College. Oregon State University, then

¹¹¹ Professor Dimick received a Bachelor Science degree from Oregon State in 1926 with a major in zoology. He completed graduate work in entomology and marine biology in 1931 and was awarded a Master of Science degree from the same institution. Prior to his appointment as professor of fish and game management, he was employed by the Oregon Agricultural Experiment Station as an assistant entomologist.

Oregon State Agricultural College, initiated a four year curriculum in Fish, Game and Fur Animal Management under the Animal Industries Division of the School of Agriculture in the fall term of the 1935-36 school year. This program was designed to train students for work with state and federal services. It was also thought that they would be trained to assume positions with land-use industries, private wildlife interests, fur raisers, and game farms. Course work included courses taught in veterinary medicine such as anatomy and physiology of domestic animals, courses in field crops, poultry husbandry, and zoology. The fish and game courses were: Fish and Game Conservation, Preservation and Mounting of Specimens, Fish and Game Management, and a seminar. All of the fish and game courses were taught by Professor R. E. Dimick (62). The departmental history shows that the first graduating class consisted of seven students in 1936. The first Master's degree was awarded in 1938 but it was not until 1961 that the first Ph.D. was awarded by the department.

Professor Dimick's active teaching and research career extended from his appointment as Professor of Fish and Game Management in 1935 until his retirement in 1964. During that time he developed one of the country's leading fisheries and wildlife departments and taught many of the wildlife biologists who are now

working throughout the nation.¹¹²

Oregon State Agricultural College was well suited to the needs of the new department. Being a Land Grant School, it was well established in areas which gave support to wildlife conservation and management studies. Subjects were being taught in field crops, animal disease, zoology, entomology, soils, animal husbandry, and many other allied areas. It is also fortunate that, although the study of wildlife borrowed many principles from the study of forestry, the department was formed under the School of Agriculture and not the School of Forestry. By remaining apart from forestry, the study of fisheries and wildlife followed a pattern similar to that of the Bureau of Biological Survey under the U. S. Department of Agriculture. Under the School of Agriculture the Department of Fisheries and Wildlife developed a policy which was concerned with the management of wildlife itself and did not allow wildlife management to become subordinate to forestry interests (75).

Much of the early work at Oregon State College was aimed toward practical management and applied biology. Fur raising was given a good deal of attention and agricultural problems were always

¹¹²Two of these graduates became heads of State Game Commissions: Phillip W. Schneider in Oregon, and Francis Groves in Nevada. A number of other graduates have gone into state and federal fish and wildlife work, many of whom now hold administrative positions.

important with regard to wildlife (60). Cooperative work with the U. S. Department of Agriculture's extension service programs, the U. S. Soil Conservation Service and other related agricultural agencies contributed to the support and education of wildlife biologists. The major part of the early research, however, was accomplished through the U. S. Bureau of Biological Survey's Wildlife Research Unit program.

The Cooperative Wildlife Research Unit

Oregon's Cooperative Wildlife Research Unit was the second to become effective in the United States. The unit was activated on September 21, 1935, and was followed by a similar unit in Iowa on September 24, 1935.¹¹³ The Research Unit program came about largely through the efforts of Jay N. "Ding" Darling, then Chief of the Bureau of Biological Survey. Prior to his work in Washington, D. C., Darling had been a member of the Iowa State Fish and Game Commission. He had been responsible for much of the planning and training of wildlife technicians there and had supported the training program with personal funds (144, 367). Darling's objectives have continued up to the present time and many of them have been carried out

¹¹³ The first Cooperative Wildlife Research Unit was established at Virginia Polytechnic Institute on September 9, 1935. For dates and details of establishment of the nine early units, see (144).

successfully in Oregon. P. W. Schneider, former Director of the Oregon State Game Commission (1950-1969), has acknowledged the creation of both the Cooperative Wildlife Research Unit and the School of Fish and Game Management at Oregon State Agricultural College in 1935 as turning points in the state's management program. Up to that time, hunting seasons, bag limits, and major phases of regulation had been determined by the Legislature on the advice of the Game Commission. The entire program of game management centered around protection through law enforcement and refuges, game propagation, and predator control. The important feature about the Cooperative Wildlife Research Unit at Oregon State was that it gave the Game Commission the biological information needed for better management as well as the public relations assistance which gained support from sportsmen and the State Legislature. The Legislature granted partial regulatory authority to the Commission in 1938 and authorized it to conduct biological investigations. Full regulatory authority was granted to the Commission in 1941 and at that time a program of extensive game surveys and biological investigations was initiated (302).

The man most responsible for the success and progress of the Cooperative Unit's program in Oregon was its sole leader, Arthur

S. Einarsen.¹¹⁴ When Einarsen began his work as Leader of the Cooperative Wildlife Research Unit at Oregon State in 1935 he stated that his responsibility was

To train and discipline suitable student candidates in both general and specialized fields of wildlife management science, research, conservation and education policies, while working with national natural resources (78).

More specifically this included,

1. Research on critical game problems
2. The guidance and advice to state game and fisheries agencies in management
3. Detailed training of students in all phases of research, management, and conservation principles
4. Release of research findings and related facts for use of the general public through demonstrations, radio, and publications (78).

Einarsen's early investigations of game problems led to his

¹¹⁴ Einarsen was a 1923 graduate of the University of Washington, where he had studied zoology, natural sciences and fisheries. He was employed by the State of Washington in the Department of Game from 1932 to 1934. During this time, acting as a field biologist, he conducted a game survey of the state, worked with big game and upland bird populations and helped establish long range management programs. In 1934 he was employed by the Bureau of Biological Survey as a "Wildlife Management Biologist Supervisor General." During that year he prepared a manual on natural resources management and visited national forests giving instruction to foresters on improvement of wildlife resources in timbered areas. The Cooperative Wildlife Research Unit was discontinued at Oregon State in August 1961 when Einarsen retired (78).

recognition that wildlife management required a continuous evaluation of population trends, a constant appraisal of limiting factors, and an ever increasing need for educating the public. In 1939, he initiated the quadrat method of upland game inventory, which was adopted by the State Game Commission and was used state-wide after 1946 (250, Vol. 15, p. 15). This method provided the first reliable means for upland species management and brought about a substantially increased yield. He was also responsible for designing the big game inventory system which went into effect in 1944 (302).

New Training and New Technique

Perhaps one of the most important programs in the history of game management in Oregon was that of regional management, which evolved from the field work initiated by big game survey teams in 1943. The biennial report for 1943-1944 describes the work and purposes of the big game survey.

In order to better secure this information, the Commission has improved upon and extended its plan of big game survey. Under this improved organization, trained observers operating under a supervisor are in the field the entire year systematically making and reporting their observations. This information is then all edited and made available for the use of the Commission at its June meeting. Four regular crews have been working in the field since January, 1943. The work thus far has been confined principally to eastern Oregon, and for the most part in the Lake Klamath area, Grant county and the northeastern Oregon elk territory. One biologist has been working in the coastal area (250, Vol. 14, p. 6).

Out of this kind of field work a system developed whereby field supervisors and employees remained in one area the year around. The 1947-1948 biennium brought about changes which led toward a permanent regional system. During that period thirteen game districts were established. Each of these districts had a resident district agent and headquarters. The district agent was responsible for field research and all game operations in his district. This responsibility gave the agent and his staff a foundation for resident game management and public relations in each district (250, Vol. 16, p. 14-15).

During the same biennium a group of specialists was organized at the Portland office to be responsible on a state-wide basis for each division of game management. The divisions were: big game, upland game, furbearers and predatory animal control, waterfowl and federal aid, and habitat improvement. The responsibilities of these divisions were to assemble data which was reported to them by the district agents (250, Vol. 16, p. 14-21).

The 1949-1950 biennium brought about a major administrative change which encompassed the thirteen game districts by dividing the State into five regions. Each region had a regional headquarters and a regional supervisor. This plan decentralized the Game Commission by placing representatives throughout the state. The five-region program has remained in effect up to the present time. This regional approach and today's division of the state into big game

management units both appear to have evolved from the first big game inventory practices. The person responsible for much of the implementation of this system of management was P. W. Schneider, the former Director of the Oregon State Game Commission. Schneider was the Director of Game for the Commission during the period of transition to a regional organization and saw the importance of specialized knowledge on the local level. Through the cooperative efforts of Theodore R. Conn, the Game Commission from Lakeview, and others, Schneider was able to promote this most significant program (60).

Politics and Legislation

Few if any of these changes could have been accomplished if the Game Commission had not been almost entirely free of political influences and had the freedom to make policy decisions. No Legislature has been known to have been efficient in the operation of any state's game management. If anything is true concerning effective game management and political influences, it must be principally that the two are incompatible. The period of rapid turnover in Game Commission personnel during the 1920's is indicative of political influence (256).¹¹⁵ A certain amount of political patronage can also

¹¹⁵ See section on Finley and government agencies.

be detected in the action of the governors in the 1920's. Governor Isaac Lee Patterson, Oregon's governor from 1927 until his death in December, 1929, sent letters requesting the immediate resignation of four Game Commissioners when he assumed office in March, 1927. Prior to that, Governor Benjamin Olcott had appointed new members to the Commission during his administration in 1921 and his successor, Governor Walter Pierce, had replaced members of the Commission in 1923. Governor Patterson summarized the political situation in regard to the Game Commission in the first meeting of the new organization at Portland in 1927. "In my campaign I pledged the people of Oregon that I would take the fish and game commissions out of politics and put them on a business basis" (256, p. 4).

According to Charles Sprague, Oregon Governor from 1939-1943, game matters, although newsworthy and the subject of personal controversy in the 1930's, were not major political issues. Sprague credits Governor Julius L. Meier who held office from 1931 to 1935 with being primarily interested in public power regulation and highway building rather than in matters pertaining to fish and game. Governor Charles Martin, however, did take a considerable interest in game matters when he assumed office in 1935. Martin relied a great deal on Edward E. Wilson, a banker, lawyer, and active conservationist from Corvallis, for advice concerning game matters. Wilson was a state Game Commissioner at that time and he apparently

influenced a number of the "right people" with respect to getting wildlife matters handled effectively. When Sprague took office in 1939, E. E. Wilson was Chairman of the State Game Commission. Sprague continued to rely mainly on Wilson and George K. Aiken, a Game Commissioner from Ontario, Oregon, for advice pertaining to fish and game management and wildlife policy throughout his term. Sprague made no reference to politics when he stated that he considered Frank B. Wire, the State Game Supervisor from 1931-47, to have been "a good, able, and effective administrator" (321).

Between 1935 and 1939 political influence was gradually eliminated from the major activities of the Game Commission (321). Compared with other states (3, p. 289-303), Oregon's game biologists and administrators have been largely free of political interference since the 1930's.

Following the reduction of political influence, Game Commission administrators took a number of important steps toward a new organization of personnel. The first ten year program outlined in 1931 brought about the subsequent shift toward more systematic management and the employment of professionally trained men (250, Vol. 8, p. 3). Another sign of change from enforcement to biological management was the assignment of game law enforcement to the State

Police in 1931.¹¹⁶ This unique system relieved the Commission of its former enforcement duties and permitted employees to concentrate on the biological aspects of game management. By allowing the State Police to do the law enforcement rather than state game wardens, the stigma that game management personnel were "enemies" of the sportsman was removed. In general this system has allowed game biologists to act effectively in gaining public support for game management issues.

Notable contributions to Oregon's wildlife conservation arose from acts and organizations initiated in the 1930's.

1. 1934 - The Taylor Grazing Act. This Act established grazing districts on the public domain, prevented further deterioration to overgrazed areas, and eventually led to provisions for wildlife as well as livestock.
2. 1935 - The U. S. Soil Conservation Service. The establishment of this Service included biological work which helped in studies of wildlife food and cover requirements.

¹¹⁶ During 1932, the first year that the Oregon State Police had full responsibility for game law enforcement, the number of convictions for game law violations nearly doubled (250, Vol. 8, p. 5). In 1925 the Game Commission admitted that game wardens had not been too popular with the residents of the state but they felt that conditions were improving (250, Vol. 5, p. 28). Art Fish, Chief of Law Enforcement for the Game Commission in 1930, blamed poorly written and ambiguous laws as the cause of failure in the warden system (250, Vol. 7, p. 9).

3. 1935 - The Bureau of Biological Survey's Wildlife Research Unit at Oregon State College.
4. 1936 - The North American Wildlife Conference. The initiation of these conferences provided an opportunity for Oregon's wildlife technicians and administrators to exchange ideas related to wildlife matters on a continental basis.
5. 1937 - The Pittman-Robertson Act. By providing financial aid to the State on a fund matching basis, this Federal Act has aided in wildlife restoration efforts and stimulated game management and research programs.
6. 1937 - The Wildlife Society. As a professional organization the Society established professional standards and an official journal for wildlife biologists.

Of this list the Taylor Grazing Act probably had the most immediate effect in Oregon. It established grazing districts on the public domain and placed them under the direction of the Secretary of Interior. The title of the Grazing Act lists as its purposes

To stop injury to public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement, and development; to stabilize the livestock industry dependent upon the public range; and for other purposes (349, p. 1269).

Although this Act did make grazing on the public domain a privilege and thereby prevented continued over-use of Oregon's rangeland, it lacked adequate provisions for the conservation of other resources,

such as wildlife, and recreation (202). The Taylor Grazing Act gave local stockmen a primary influence in the supervision of grazing. These men were primarily interested in livestock and not recreational and wildlife interests on the controlled districts.

The general position of the federal government in this program was a sound one in regard to wildlife. They felt that the key to development of wildlife was the maintenance of a basically natural environment. By doing this it was felt that wildlife could be handled as a crop and its management could be coordinated with the other resources of the land. The means and degree of management, however, were left up to the state government which was to control such things as seasons and bag limits on lands under federal control. By allowing the state to maintain sovereignty over wildlife on federal lands, the federal government also avoided the responsibility for much of the wildlife management on those lands. It was suggested that when proposed programs were "biologically sound," state and federal governments should cooperate in them for constructive wildlife management on federal properties (345, p. 544).

The Taylor Grazing Act and Hart Mountain National Antelope Refuge

An example of a state and federal cooperative project grew out of the Taylor Grazing Act. After the passage of this Act the

federal government gained new control over grazing on the public domain. This control over grazing allowed the establishment of the Hart Mountain National Antelope Refuge. President Franklin D. Roosevelt created the refuge by Executive Order on December 21, 1936. This Order was the follow-up on an Executive Order on September 6, 1935 which had already set aside 609,000 acres of public domain in the same area as a big game refuge (150).

Jewett, a biologist with the Biological Survey from 1912, maintained that Basque sheepherders had greatly over-used public range-land prior to the Taylor Grazing Act. The public expressed a desire to have antelope protected and urged that a national game preserve be established (150). Finley and others had been urging the Federal Government to establish a refuge at Hart Mountain for sixteen years prior to its establishment in 1936.¹¹⁷ Private individuals supporting the program became known as "The Order of the Antelope" and their efforts were instrumental in bringing about the establishment of the refuge. The 240,000 acres which make up Hart Mountain Refuge and the adjacent Charles Sheldon National Antelope Refuge in Nevada are the only major areas in the United States devoted specifically to antelope (109, p. 91-96).

¹¹⁷ See section on William L. Finley and government agencies above.

Finley called the Taylor Grazing Act "a wonderful law" and credited it with doing a great deal to preserve the public domain. Finley complained, however, that all of the land use could go to the stockmen. He felt that unless water holes were provided specifically for antelope, cattle and sheep would crowd them out by grazing entire areas surrounding existing water holes. He was also disturbed because the federal government had planned to limit the number of antelope on the Hart Mountain Antelope Range to 4,000 animals (86, p. 73-75).

In a letter to President Franklin D. Roosevelt dated December 14, 1935, Finley attacked the misuse of the public domain and appealed for an equitable solution to regulating game on federal lands.

May I call your attention to another matter of great importance in the West relating to the Public Domain. In one respect, the Taylor Grazing Act was a marked advance. Regulating grazing was a necessity. But if the Public Domain is to be turned over and governed by regional stockmen, under the present set-up the rights of these vast areas will fall into the hands of private interests. The livestock owners of the country do not deserve this donation from the public. The men who have ruined the Public Domain are not likely to bring it back. We may as well say good-bye to the wildlife on these hereditary game refuges. . . . In my presence Mr. Ickes [then Secretary of the Interior] told Mr. Darling to go ahead with the Hart Mountain Antelope Refuge. It was our understanding that this would be controlled by the Biological Survey. . . . I think investigation will show that some one in the Interior Department has wrecked the Hart Mountain Antelope Refuge. I have read your Executive Order of September 6, 1935, establishing Hart Mountain Game Range. This provides that the maximum number of antelope is to be 4,000. If this is put into effect, it means that several thousand will have to

be killed off. The State of Oregon will object to this. Our state law prohibits an open season. These animals range on a State Game Refuge and are protected by special statute. Instead of establishing an antelope refuge administered by the Biological Survey, a sheep and cattle range has been created for the private benefit of stockmen (221, Vol. 1, p. 457-459).

The frustration which Finley expressed in this letter was by no means unique. Similar misgivings caused by federal "red tape" led to the resignation of Darling as Chief of the Bureau of Biological Survey on November 15, 1935. Roosevelt was concerned over Darling's resignation and press conferences in 1935 indicated that Darling had become increasingly discontent over the Administration's wildlife conservation program. He felt that Congress had failed to include wildlife restoration activities in the work relief bill, Darling also felt that other federal agencies had failed to act on the recommendations of the Biological Survey and insufficient wildlife legislation had been passed by Congress (221, Vol. 1, p. 462). By the time Finley's letter was written to Roosevelt, Ira N. Gabrielson had succeeded to the position of Chief of the Bureau.

Roosevelt's reply to Finley dated January 7, 1936, defended the Taylor Grazing Act as a cooperative policy between the Departments of Agriculture and Interior. Although the letter was signed by Roosevelt, it was drafted jointly by the Agriculture and Interior Departments and presented an impersonal answer.

. . . the Hart Mountain region shall be under joint jurisdiction of the two Departments and shall be utilized for the primary purpose of satisfying the range needs of 4,000 antelope. Any surplus shall be available for domestic livestock, subject to the limitation that the number of domestic livestock shall be at no time in excess of the carrying capacity of the surplus forage resources (221, Vol. 1, p. 465).

It was fortunate for Oregon that Gabrielson became Chief of the Bureau of Biological Survey at this time. His familiarity with conditions in Oregon and personal relationships with the Bureau's field personnel helped a great deal in putting the management of Oregon's wildlife resources on a systematic basis. He was also responsible for providing the Civilian Conservation Corps to work in camps at Malheur and Hart Mountain refuges where headquarters, roads, water control structures and other construction was accomplished (341, Vol. 33).

Gabrielson's action in the removal of domestic sheep from Hart Mountain was viewed favorably by cattle ranchers in the area. These ranchers approved of the Taylor Grazing Act because it favored permanent residents of eastern Oregon's rangelands. Cattle ranchers had established ranches or home headquarters which under the Grazing Act permitted them grazing priorities over the itinerant sheepmen. Reub Long, a rancher and writer from Fort Rock, feels that the removal of wild horses and domestic sheep from eastern Oregon's rangelands under the Taylor Grazing Act accomplished a most dramatic decrease in range deterioration. According to Long,

the itinerant sheepherders had moved their flocks from area to area, following the newest growth of forage and grazing it before competing sheepherders or cattle ranchers arrived. This practice took much of the spring growth and did not permit the forage to reestablish itself from year to year. Poor grazing practices, over-use by bands of wild horses (some up to 500 in size),¹¹⁸ a period of prolonged drought, and a serious rodent irruption in the 1920's, had left eastern Oregon's range in a very depleted condition by 1934 (186).

Federal Aid and New Projects

Another important piece of Federal legislation which has led to more effective management of Oregon's wildlife resources since the 1930's was the passage of the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act) in 1937 (250, Vol. 11, p. 10). This significantly enhanced financing for wildlife projects and was termed "of inestimable value" by the State Game Commission (250, Vol. 11, p. 10). The Pittman-Robertson program has been supported by an 11 percent manufacturer's tax on sporting arms and ammunition. This money is held in the U. S. Treasury and distributed to the States by Congressional appropriations. The states receive their

¹¹⁸ These horses eventually were rounded up and removed from the range. For further details on the removal of horses from eastern Oregon's public lands see (143, p. 61-94).

apportionment of funds under this program on the basis of land area and the number of hunting licenses sold. To qualify for this federal support, states are required to match funds on a ratio of 25 percent state to 75 percent federal (324, p. 3).

The first allocation to the State of Oregon under this Act totaled \$18,000 for the fiscal year of 1938-39. During this biennium, the Pittman-Robertson funds were employed in beaver transplanting and stream-side willow planting as beaver habitat improvement, water development for sage grouse, reseeding the Tillamook Burn, development of the South Slough, Coos Bay, for waterfowl, and for wildlife resources survey projects (250, Vol. 12, p. 10). The amount has continued to increase annually since that time until today it exceeds \$600,000 per year (356). These funds have allowed Oregon to purchase a total of 18,970 acres of waterfowl land during the fiscal years 1938 to 1966 with the Federal Government contributing \$1,486,153 to the cost. Pittman-Robertson funds also contributed to the \$2,444,082 which became available for development of waterfowl areas and the \$7,069 allotted for waterfowl research during the same period. The 1938-1966 total for other wildlife lands acquired under the system of federal aid was 58,995 acres at a cost of \$2,788,084 (357, Vol. 22, p. 96).

The federal aid in wildlife restoration (Pittman-Robertson) was a prominent factor in assisting the Game Commission to achieve

the goals of a ten-year program initiated in 1931. The ten-year program included the following relative to wildlife:

1. Annually increasing production of game birds at game farms and development of additional species.
2. More effective stocking of lands and waters on basis of practical fact finding.
3. Supply of natural food for fish, birds and mammals in the wild state.
4. Fair allocation on a statewide basis of fish and mammals in the wild state.
5. Scientific study of all conditions affecting wildlife to determine production, stocking and regulation of seasons and bag limits.
6. Effective administration of game refuges.
7. Improvement of predatory animal control.
8. Better game law enforcement.
9. Broad educational program on conservation, and information service.
10. Reorganization of game department, fixing responsibilities and reducing overhead.
11. Sound financial budget and itemized expense control.
12. Cooperation with governmental and civic agencies on all phases of the program (250, Vol. 8, p. 3).

This program has received support from the Oregon public and is considered to have been an outstanding point in the history of Oregon's wildlife affairs. Without federal funds, however, the budget cutting programs on the state level during the 1930's would probably have prevented the undertaking of many of these activities.

The fully efficient use of Pittman-Robertson funds had not yet been made when World War II occurred. The war brought about general budget and manpower cuts. During the 1941-1942 biennium a significant drop in Game Commission revenue took place due to the decrease in license sales. This caused strict budgetary curtailments

and the shortage of gasoline, tires and vehicles reduced the amount of field work which could be accomplished (250, Vol. 13, p. 3-6).

During the 1943-1944 biennium, Pittman-Robertson funds were used in the purchase of lands surrounding the northern end of Summer Lake. This area was well known for waterfowl hunting and provided the Game Commission with an opportunity to establish a wildlife reserve and public hunting ground under its authority to establish, maintain, operate and administer public hunting grounds (250, Vol. 14, p. 7). The construction of headquarters, roads, fences, ditches, dikes and habitat improvement was also funded with 75 percent federal aid. In addition to Summer Lake, Pittman-Robertson funds allowed the purchase of 5,000 acres of public waterfowl hunting ground at Camas Swale in Lane County. Both programs were initiated under a Game Commission policy of acquiring suitable lands for sportsmen's recreation use which might otherwise be lost to the general public (250, Vol. 14, p. 7).

In 1948 the Sauvies Island Waterfowl Refuge and Game Management Area was inaugurated. The federal funds obligated for this project under the Pittman-Robertson Act amounted to \$141,098. An additional \$32,236 were obligated for other wildlife development and investigation in the state during that year (357, Vol. 3, p. 37).

From the time of its initiation to the present, the Pittman-Robertson Act has aided Oregon's wildlife biologists by giving

financial support to projects in many areas of field research. Big game restoration projects, including trapping and transplanting deer, elk, bighorn sheep and mountain goats, have been aided by this program.¹¹⁹ The purchase of big game ranges, waterfowl areas and the maintenance and development of these was permitted with Pittman-Robertson funds. Upland and migratory bird studies were also undertaken with federal aid. Federal aid projects have permitted the introduction of many exotic game birds to Oregon, including the successful introduction of the chukar partridge¹²⁰ in eastern Oregon (357, Vol. 1, p. 20).

An example of the effects of increased federal funding and the employment of professionally trained biologists can be seen in the Game Commission progress since the 1940's. By the late 1940's new investigations and the addition of professional biologists to the staff of the Game Commission led biologists to the realization that programs such as the mere stocking of upland birds from game farms and the protection of game by regulations was not enough to fully utilize Oregon's wildlife resources (364). Programs were needed which would more effectively use the capacity of the land to support wildlife populations. It became apparent that improvements could be

¹¹⁹ See section on big game below.

¹²⁰ See section on introduced game birds below.

made on natural food, water and shelter for wildlife. The improvements included establishing cover plants, installing watering devices and planting grain as winter food for game birds. Through cooperation with the Soil Conservation Service, U. S. Fish and Wildlife Service, U. S. Forest Service, Bureau of Land Management, and liaison with the State Extension Service, a habitat improvement program was begun in May, 1948. Prior to that time very little had been done in the way of habitat improvement with the exception of reseeding on the Tillamook Burn and some willow plantings for beaver, both actions begun in 1939 (250, Vol. 12, p. 11). With only 1.1 percent of the Game Commission's budget being allocated for the program, the results were significant and demonstrated an increasing concern for ecological factors in the management program (250, Vol. 17).

The 1951-1952 biennial report briefly reviews the game and fishery conservation history in Oregon. These reviews give some of the research activities conducted over the years from 1935 to 1952. Research at Oregon State College made up practically all of the research conducted during this period. Graduate students under the direction of college faculty members and the leader of the Oregon Cooperative Wildlife Research Unit conducted field studies mainly on upland game birds and black-tailed deer. Research conducted with an experimental population of ring-necked pheasants on

Protection and Eliza Islands (Puget Sound), Washington, was important for comparative studies between wild and artificially-reared adult ring-neck pheasants in Oregon. Research on black-tailed deer was conducted mainly in coastal areas and in the Tillamook Burn. Various successional stages of vegetation were studied on old burns and these were compared with succession on more recent burns. The effects of logging and the influence of marginal habitat also constituted a part of the cooperative research program. Other research was conducted through waterfowl studies and salt block distribution programs for big game (250, Vol. 18).

More than fifty research assignments were completed by the Oregon Cooperative Wildlife Research Unit by 1958. One of the problems studied extensively was that of the static antelope population. Upon completion of a study in 1958, it was determined that disease was not limiting the population but rather a wide variety of factors prevented growth in herd size. A spotlight technique was developed for censusing black-tailed deer. Studies were undertaken to establish the relationship between the effects of logging and wildlife habitat. Several short ranged research projects were also undertaken in attempts to solve critical problems (250, Vol. 21).

As a result of damage, for example, that arose from black-tailed deer browsing on hand-planted conifer seedlings on the Tillamook Burn from 1948 to 1958, the Game Commission in

cooperation with the Oregon State Board of Forestry initiated a research project in the area in April, 1958. The initial research in the Cedar Creek drainage indicated that deer densities were higher than previous estimates. This ten year study was completed in April, 1968. The results of the study show that practically all of the browsing on Douglas-fir occurs during winter months. This use of Douglas-fir depends on the number of deer present and the severity of winter weather (250, Vol. 22; 336).

Another study undertaken in 1958 was the Silver Lake mule deer study. The Game Commission undertook this research project in cooperation with the U. S. Forest Service's Northwest Forest and Range Experiment Station to determine the relationship between mule deer and livestock on a typical central Oregon range. The major efforts of the program were directed toward assessing use on browse species and testing various methods for censusing deer. In conjunction with these methods several experimental hunting seasons were devised to evaluate the effect of the size of the deer population on the range. Deer enclosures were constructed and deer and livestock food preferences were determined. A deer live-trapping and tagging program was initiated in the Silver Lake study area to determine the seasonal range and distribution of the wintering deer herd. Investigations of the nutritional properties of sagebrush in the deer diet and the effects of sagebrush eradication were also conducted

(250, Vol. 22; 250, Vol 23; 250, Vol. 24).

Some of the most recent research activities are merely continuations of earlier projects in the above-mentioned areas. Big game research is also being done on the Roosevelt elk on the Millacoma Forest in Coos County. In this area elk have been found to browse and forage most heavily on clear-cut areas for a period of four to nine years. Logged areas, where slash burning has been conducted, were found to be the most favorable sites for the growth of vegetation which is preferred by elk for winter forage. These areas in turn are found to be the most difficult on which to establish a regeneration of Douglas-fir seedlings. This is caused by both the competition from other plants and elk browsing (250, Vol. 24).

Summary of Modern Management Techniques

The emergence of modern management techniques in Oregon follows a pattern similar to that of other states. Certainly the establishment of a Cooperative Wildlife Research Unit combined with the efforts of the U. S. Fish and Wildlife Service and Oregon State College's Department of Fisheries and Wildlife gave the needed impetus to new management programs which began to evolve in the late 1930's. The cooperative nature of state and federal agencies in undertaking research projects has greatly aided wildlife restoration programs in the past 35 years. Much of the research, land

acquisition and habitat improvement could not have been accomplished without federal funds and cooperation. Although at present only 17.2 percent of the Oregon State Game Commission's annual revenue is procured directly from the U. S. Government, the fringe benefits from federally owned land in Oregon accrue for a much greater total benefit than the monetary contributions would indicate. Over half of Oregon's land is under federal control, and state and federal cooperation is relatively good. This presents a situation much more conducive to wildlife conservation than in state systems operating under conditions of more extensive private ownership.

CHAPTER VII

OREGON'S WILDLIFE: BIG GAME AND PREDATORS

Oregon has always been comparatively well stocked with wildlife. The period prior to white settlement appears to have been one of a balanced ecological system with natural controls regulating population size and distribution. After white settlement the balance was rapidly changed and wildlife populations have essentially never returned to their former status. The periods of exploitation, restoration, and systematic management have caused wide fluctuations in both animal numbers and distribution. This section is an attempt to treat wildlife by groups in such a way that the historical evolution to their present day status can be evaluated.

Big Game

The big game animals found in Oregon today are the pronghorned antelope, Roosevelt elk, Rocky Mountain elk, mule deer, Columbian black-tailed deer, white-tailed deer, black bear, lava big horned sheep, Rocky Mountain goat, and cougar. The bison was also once a part of Oregon's big game but has been extinct in the state since the early 1800's.

Oregon Bison

Bison bison oregonus (Bailey)¹²¹ inhabited southeastern Oregon prior to the 1800's. Remains of Oregon's bison have been collected over several parts of eastern Oregon. Some were found on Flag Mountain in Grant County, near Joseph in Wallowa County, on the Crooked River and in the vicinity of Malheur and Harney Lakes.¹²²

Vernon Bailey, who conducted survey work for the U. S. Biological Survey in Oregon during the early 1900's, found bison remains in eastern Oregon during a drought in the 1930's. Most of these were skulls and a few other bones which were found at Malheur Lake in 1931 when large areas of the lake bed were dry. Bison remains were also located on Willow Creek near Vale, the Jordan

¹²¹ Vernon Bailey (1864-1942) was a field naturalist with the Bureau of Biological Survey from 1887 to 1933. He conducted biological surveys in many states including Oregon. His publication, The Mammals and Life Zones of Oregon (13), is referred to frequently in this manuscript. Notes on the personal and professional lives of Bailey, Stanley G. Jewett, Ira N. Gabrielson, William L. Finley and other early wildlife conservations were given to the writer by Alex Walker, Curator of the Tillamook Pioneer Museum and former associate of these men (350).

¹²² A note attached to the bison remains found by Ambrose Beddington states,

"Paiute Chief Po-To-Si of Harney Valley said that according to his father, buffalo were plentiful near there as late as 1812, when they were exterminated suddenly by a disease similar to smallpox" (Horner Museum, Oregon State University).

Crater, Owyhee River, Hart Mountain, near Steens Mountain and on the Double-O Ranch west of Harney Lake. Southwestern Idaho still had bison as late as the 1840's and records by C. Hart Merriam, former Chief of the Biological Survey, established that the bison also inhabited northeastern California and neighboring Nevada (13, p. 57-60; 195).

Bailey's estimate that eastern Oregon was once inhabited by a "considerable abundance" (13, p. 57) of bison is debatable. It seems much more likely that Oregon's herds were on the extreme western margin of their natural range. The ecological conditions which produced the native bunch grass prairies of Festuca spp., Agropyron spp. and Poa spp. in eastern Oregon were not the type which could support continuous grazing by bison over a period of years. The short grass or buffalo grass prairies of Bouteloua sp. mixed with the taller Stipa sp., of the Great Plains region, were much better suited for this purpose (3, p. 4-11).

The former distribution of the bison in Oregon is given by Bailey and has been supplemented by the work of Jewett and others (13, p. 57; 148). Some criticism might be given to the information regarding the distribution of the bison in Oregon on the basis that little distinction has been made between permanent and temporary ranges. It is felt that the bison crossed the Snake River near the mouth of the Boise River and then found their way into Oregon by

working up the Malheur River (122). It is reasonable on the basis of known range and climatic conditions to conclude that eastern Oregon and northeastern California were the western limits of the bison range and that these areas provided only marginal habitat for wandering herds. Extreme weather conditions and hunting by Indians may have also contributed to the bison's disappearance in the early 1800's. The exact time of the bison's extinction is unknown. It has been suggested that they may have disappeared in Oregon after the Indians obtained horses (13, p. 59).¹²³ The general acquisition of the horse¹²⁴ by the mid 1700's makes it likely that Indian hunting from horseback contributed as a strong factor in terminating the existence of Oregon's bison population.

¹²³The ancient bison, possibly Bison occidentalis, is thought to have occupied the Willamette Valley much earlier in geological history. A skull of this bison was excavated from the Willamette River on October 13, 1923 above Oregon City by W. E. Burns and others and is now in the Horner Museum at Oregon State University.

¹²⁴The Nez Perce of Cayuse Indians are thought to have obtained horses about 1720. They improved their stock by gelding and developed an extremely good breed of horses in a relatively few years. By trading with neighboring Indians the horse was distributed among the Shoshonean tribes in the 1700's. The Yakimas obtained horses in the country of eastern Washington. Although their westward distribution was slow, the Wasco Pams or Indians at The Dalles also received horses in about 1730 (121).

Bighorn Sheep

Oregon's two species of bighorn sheep were apparently Ovis canadensis canadensis, the Rocky Mountain bighorn, and Ovis canadensis californiana (Douglas), the lava-bed bighorn. The Rocky Mountain bighorn persisted much longer than the lava-bed sheep in the face of white settlement. The Bureau of Biological Survey continued to report a band of Rocky Mountain bighorns in the Wallowa Mountains until 1946 (28). A band of approximately twenty-five of these sheep were reported in the mountains at the head of Wallowa Lake in 1926. The Oregon State Game Commission suggested that an investigation of these sheep be made and efforts to save them or introduce more from Glacier Park be undertaken. Nothing came of either of these suggestions (250, Vol. 5, p. 17). These reports were mainly based on the Forest Service sightings in the Wallowa National Forest. Bailey noted in 1936 that the last remaining sheep were wintering in the Snake River and Imnaha Canyons, and stated that

With proper management this last remnant of one of Oregon's most valuable and interesting forms of big game could be increased and extended to other suitable areas in the State. Left alone to take their chances the end will soon be, as in the rimrock sheep [lava-bed bighorn], complete disappearance (13, p. 64).

In this case the latter came about and these sheep disappeared possibly in 1946. Bailey believed that scabies or sheep scab was

responsible for the disappearance of the lava-bed bighorn. He also felt that it would also wipe out the Rocky Mountain subspecies (13, p. 64).

The lava-bed bighorn which vanished much earlier, was sighted by Peter Skene Ogden in 1825 near the Warm Springs Creek in the Deschutes River Canyon (83). A few of the lava-bed bighorns might have survived until as late as 1911 or 1912 in the Steens Mountain.¹²⁵ According to stories told by Captain Louis, an old Paiute Indian from Burns, these sheep were common in most of the rimrock and plains country of eastern Oregon prior to the arrival of white man. He told Bailey that they commonly migrated from the Steens in the winter. They moved both westward to the Warner Valley and eastward to the Alvord Playa. Sheldon and Bailey attempted to locate the last of these living bighorns in 1916, without success (13, p. 65-68).

Opinions vary concerning the disappearance of the bighorn, but there is some agreement that disease and competition from domestic livestock, in addition to hunting, probably had a great deal to do with it. Bailey attributed the die-off of bighorns in the Klamath area in the winter of 1879-80 to competition from livestock (13, p. 68).

In a demonstration of his far-sightedness and appreciation for

¹²⁵ Clifford Grosbeck of Narrows (a site between Malheur and Harney lakes), supposedly killed one of the last bighorn sheep on the Steens Mountain in 1911 (13, p. 67).

lava-bed bighorn sheep in the rimrock areas, Bailey suggested in 1936 that they be restored as one of Oregon's game animals by importing live trapped animals and holding them in an enclosure until there were enough for restocking (13, p. 69). Such a restocking operation did take place successfully, but not until November 8, 1954, when twenty big horned sheep were released into an enclosure on the west side of Hart Mountain. Through cooperation with the British Columbia Game Commission, and with funds provided by the Federal Aid to Wildlife Restoration Act, these sheep were trapped near William Lake, British Columbia, and transported to Oregon by truck (29). By June, 1957, breeding stock had built up to about fifty animals within the enclosure and eighteen were released on Hart Mountain (331). Since that time subsequent releases have been made on the south slope of Steens Mountain, a part of this sheep's original range (249, Vol. 13, p. 31; 249, Vol. 15, p. 35).¹²⁶

In September, 1965, the first bighorn sheep hunt was conducted. Six tags were issued for the harvest of rams with not less than a three-fourths curled horn. Five hunters successfully bagged a trophy ram. The second hunt was held in 1966 when three tags were issued and three rams were taken. No bighorn hunt was held in 1967 but

¹²⁶The writer made field observations of these sheep in the spring of 1965 and 1966.

they were hunted again in September 1968. Future trophy hunts of this type will continue as surplus older rams appear. These animals will probably always be hunted on a very limited scale and a general season is never likely to be held because of the limited supply expected and the great number of sportsmen who desire to hunt them.

Antelope

Early accounts of Oregon's pronghorn antelope are mainly those of occasional sightings and records of animals shot for meat. Peter Skene Ogden killed antelope along the lower Deschutes River in 1825 and 1826, and took others along the John Day River (83). It has been estimated that 35,000,000 antelope were present in North America at the time of the Lewis and Clark expedition (217, p. 4). Oregon's part of this number can never be established. One of the reasons why so little is known about the early status of Oregon's pronghorn herds is that few expeditions entered the Great Basin Region which is now the antelope's major range and is assumed to have been in the early 1800's. Most of the sightings which were made in other areas of the state were along the settlers' immigration routes or near areas of white settlement. The first extensive antelope census was conducted from 1922 to 1924 at which time Oregon's population was determined to have been 2,040 (217, p. 3). Prior to the estimates made in 1924, Oregon's antelope population was thought to have

been about 10,000 (314). In recent years population estimates based on aerial surveys indicate a number fluctuating around 9,000 (323).

The original range of the antelope in Oregon included nearly all of eastern Oregon and the Rogue River Valley in western Oregon (13, p. 71). They were found in the Klamath Basin area by the railroad survey party in 1855 but not in great numbers. In this area they apparently preferred more moist sites where clover and a good growth of bunchgrass was present (347, Vol. 6, p. 71). Near the northern limits of their range antelope also appear to have chosen areas of fertile soil and abundant water. In the 1860's antelope were abundant near the town of Antelope but as settlement spread, it took over their original habitat and they had disappeared from the area by 1905 (141, p. 116). The antelope found in the southeastern or Great Basin Region of the state also appear to have favored locations where better grass and water were available. Areas surrounding the present site of Lakeview, the Guano Valley and numerous other favorable soil and water environments were sought by antelope (314). "Dry-farming" homesteaders, ranchers and other settlers took over much of the antelope's prime habitat in southeastern Oregon in the early 1900's. By 1924 many of the homesteaders were leaving their unsuccessful farms and it was felt that the antelope were returning to their former range (6). The departure of the homesteaders provided only temporary relief as man eventually settled all prime

antelope habitat in eastern Oregon.

The antelope census work conducted by Einarsen and the Cooperative Wildlife Research Unit from 1937 through 1945 gives the following estimates:

<u>Year</u>	<u>Number</u>
1937	17,000
1938	18,115
1939	19,205
1940	18,240
1942	16,900
1943	14,210
1944	12,900
1945	9,670 (77, p. 11).

The figures prior to 1945 are debatable on the grounds that census techniques and the interpretation of sample data were not reliable. Since 1944 aerial observations of antelope herds have been conducted with periodic refinements in methods and sampling techniques. After that time, population estimates have never been as high as the levels indicated for the late 1930's and early 1940's. These aerial surveys and more sophisticated sampling techniques lend an air of skepticism to the "popular" estimates of 20,000 to 25,000 antelope given for 1935 (77, p. 10).

It has been suggested that a long range continental climatic change involving a gradual drying condition over much of the antelopes' former range has accounted for the decline or static

condition in herd size (59). This theory does not seem to be supportable at least on the basis of data which shows that antelope populations in the United States as a whole have increased from 26,600 in 1924 to 365,000 in 1964 (368). It has been stated that local drought conditions and "possibly" predation are the chief limiting factors affecting the production and survival of Oregon's antelope (187).

A survey of the annual precipitation data for eastern Oregon and precipitation records from Burns, Oregon, show the following annual average totals:

<u>Less than ten inches</u> (all eastern Oregon)		<u>Over fifteen inches</u> (all eastern Oregon)	
1898	9.72	1899	15.23
1908	9.32	1906	16.49
	(at Burns)	1907	17.89
1938	9.55	1909	17.00
1939	5.95	1912	17.81
1943	7.28	1913	16.61
1949	5.28	1916	15.17
1954	7.51	1927	17.59
1959	9.64		(at Burns)
1966	9.76	1940	16.89
		1964	16.03
			(348).

These data do not correlate with antelope population estimates in any manner which could be interpreted to mean that precipitation is a sole limiting factor on antelope herd size. Neither total nor

seasonal rainfall patterns appear to be limiting factors.

Protection has of course been an important factor in increasing herd size. In 1901 an enactment by the Legislature (Bellenger and Cotton, L. 1901, p. 217, Sec. 3), established an antelope season from July 15 to November 1 each year with the exception of Grant, Harney, Malheur and Baker counties where the season extended from October 1 to October 15 inclusive. At this time there was no bag limit and practically no enforcement. In 1913 the Legislature gave complete year around protection to the antelope (Sec. 4, Chap. 232, Laws of 1913) (76). From that time until 1938 no antelope were legally killed in Oregon. The 1938 harvest was the lowest on record with 175 antelope taken. The 1941 harvest of 1,378 is the largest recorded in the state. Since 1949 the harvest has ranged from 181 to over 600 per year while averaging around 300 or 400 per year (249, Vol. 1; 249, Vol. 19). With a limited number of tags available each year hunting has yielded only two to three percent of the state herd and can hardly be considered a major limiting factor.

If predation is indeed an important limiting factor, a strong case for predatory animal control could be made on the basis of herd growth during the period of extensive predator control work during the late 1920's and throughout the 1930's. During this period regular Federal trappers, state, local, W. P. A., C. C. C., plus bounty trappers and hunters were extremely active in eastern Oregon

and took a great number of coyotes and bobcats from antelope ranges especially during the kidding periods (340). Predator control methods are still being used against these animals in the same area and more sophisticated poisons such as "1080" and cyanide explosive devices are now being employed. Experiments with the fertility control drug stilbestrol are being conducted and the net effect may equal the efforts of the 1920's and 1930's. It has not been conclusively proven that predator control has affected antelope populations to a significant degree (369, p. 54-65).¹²⁷

This conclusion is supported by the acting refuge manager of the Sheldon-Hart Mountain National Antelope Refuges who states that the limiting factor in herd growth of Oregon's antelope is not known. He feels that any suppositions made on the basis of present information would be "pure conjecture" (284).

By a process of elimination and through an extensive review of the available literature, no apparent limiting factor can be determined for the failure of Oregon's antelope to increase on their extensive "theoretical range" in eastern Oregon. Size of herds do not correlate with precipitation, predation or food supply. The ecological

¹²⁷ John D. Hill, assistant refuge manager of Hart Mountain National Antelope Refuge, stated that he did not believe that predation on antelope kids was the limiting factor (Personal communication with the writer in April, 1965).

conditions, however, strongly suggest that Oregon may represent marginal habitat for the antelope in the same manner that it did for the bison.¹²⁸ The most suitable antelope range could have been that of the buffalo grass prairies of the Great Plains where grammas and other grasses formed an association with forbs and where antelope filled a niche not presently found in Oregon.

According to the 1967 game division report,

Antelope populations have not shown an increase from the protection given the herds through regulations. A definite need for an extensive study to determine the cause for lack of production is needed (249, Vol. 19, p. 33).

Mountain Goat

At a meeting of the Washington State Game Commission in April, 1948, it was decided that attempts would be made to live trap twenty-five adult goats for transplanting to Oregon (208). Several attempts to capture the goats for this operation failed in 1948 and 1949. During March, 1950, six goats were trapped on Chopaka Mountain in northern Washington and transported to Enterprise, Oregon. They were transferred from there to the head of Wallowa Lake and released on the east slope of Chief Joseph Mountain. One of the goats, an older

¹²⁸ An extensive coverage of the literature on Oregon's pronghorned antelope and those in other states can be found in Yoakum's Literature of the American Pronghorn Antelope (370).

female, died within a day of the release, but the other five goats survived (249, Vol. 2, p. 13-26).

Prior to this introduction there is no record of the mountain goat ever having existed in Oregon. It is possible, however, that they once did live in Oregon as they did in California and do in Washington. But it would appear that unless they had arrived during the Pleistocene period the natural barriers consisting of lowlands to the south, the Snake River Canyon to the east and the Columbia River on the north would have prevented them from migrating into the state.

By the summer of 1964 these introduced goats had multiplied and thirty-nine were counted in one day's aerial census (249, Vol. 18, p. 37). In 1965 big game biologists of the Oregon State Game Commission judged that there was a sufficient number of goats to permit a limited hunt (249, Vol. 18, p. 37). This first "trophy hunt" was held from August 28 through September 6, 1965, and all five tag holders were successful, bagging one female goat and four males. A similar special season was held in 1966 and again in 1967 with 100 percent success each year for a total harvest of fifteen trophy animals. The season established during 1968 allowed eight hunters to pursue mountain goats, indicating favorable herd growth. It appears that as long as a surplus remains available, this limited trophy hunting will continue. It does not appear that Oregon will ever have goat hunting on a scale with neighboring and more

mountainous Washington.

Rocky Mountain Elk

The original range of the Rocky Mountain elk in Oregon is thought to have been throughout the entire Blue Mountains Region. They were distributed as far south as the Malheur Lake area and apparently extended their range westward into the Ochoco Mountains (13, p. 78, 81).

The depletion of Rocky Mountain elk herds in the late 1800's and early 1900's has been previously documented.¹²⁹ Following the closing of all elk hunting in 1905 and the re-establishment of elk at Billy Meadows after 1912,¹³⁰ eastern Oregon's herds have returned to a level which may exceed that of the pioneer period. Agricultural damage complaints were largely responsible for the opening of the Rocky Mountain elk season in 1933 (88, p. 6) and conflicts with agricultural interests in eastern Oregon have determined to a great degree the management of Rocky Mountain elk since that time. The estimates of Rocky Mountain elk populations made in March and April of each year are used primarily to determine herd size in relationship to the estimated carrying capacity of elk winter range. The special

¹²⁹See Early Legislation and Wildlife Protection.

¹³⁰See William L. Finley and Government Agencies.

antlerless hunts, which are very popular with some Oregon hunters, are utilized as a means of controlling elk in specific areas where they conflict with agriculture.¹³¹

The Game Commission has chosen a method of random selection or a drawing system as the fairest means of distributing the limited number of antlerless permits among applicants. Each year the number of applications for these permits increases. Oregon's elk hunters have become somewhat conditioned to this method of selection.¹³² However, as the number of applicants increases, the chances for individual success will naturally decrease. In recent years more restrictive clauses have been added to this system of selection and logically more will be added in the future.¹³³ As the number of elk hunters increases it is likely that the Game Commission will have to eventually resort to a drawing or random selection system for all elk hunting tags. It does not seem reasonable to

¹³¹ Although the Game Commission does provide free wooden panels on a loan basis to ranchers for the purpose of protecting haystacks from damage by wintering elk, the restriction of wintering herd size through hunting regulations is considered to be the most practical solution to agricultural complaints (249, Vol. 19, p. 43).

¹³² The writer's experience with elk hunters while he was in the employment of the Oregon State Game Commission during the summers from 1965 through 1967 is the basis of this belief.

¹³³ The waiting period for reapplication for cow elk tags was changed from three to five years in 1964 (251).

assume that the availability of general elk tags will continue to be unrestricted in the event of a doubling or tripling of the number of elk hunters in the future. The maximum number of hunters allowed to pursue elk will be determined by herd size. Winter range and conflicts between elk and agriculture will largely decide that management, no matter how intensive, can not proportionally increase the size of elk wintering areas.

Roosevelt Elk

The Roosevelt elk was originally distributed throughout western Oregon from the crest of the Cascade Mountains to the Pacific Ocean. Lewis and Clark's records of the elk in western Oregon indicate that they were found near The Dalles and in relative abundance near the mouth of the Columbia River (332, Vol. 3, p. 256). Franchere, a fur trader for Astor's Company, gave accounts of numerous elk found in the Willamette Valley in the years 1811-1814 (105, Vol. 6, p. 247, 314, 323). Wilkes, the explorer for the U. S. Government, found an abundance of elk in the vicinity of Willamette Falls in 1841 (358, Vol. 4, p. 348, 386). Peale, the naturalist and explorer, found elk in southern Oregon. His diary shows that extremely large specimens were taken by his party in 1841 (71, p. 32).

A number of accounts¹³⁴ document that the Roosevelt elk inhabited open valley regions, coastal prairie areas and forested country primarily near stream courses. In the Coast Range Region the most favored habitats were the prairie areas near the mouths of coastal rivers and areas opened by fire (114). As white man settled the coastal region he usually settled first on the same areas used by elk for grazing; the elk were then driven into the brushy foothills or more remote locations in the mountains.

Elk were badly overhunted in the late 1800's and the double effect from market hide and meat hunting reduced their numbers to a very low point by 1910. U. S. Forest Service reports and the Oregon Sportsman show that only a few small herds were to be found in the early 1900's (67, 262). Protection was begun in 1898, but the elk herds in western Oregon did not increase significantly until law enforcement became effective. Enforcement from 1910 to 1938 brought about increases in herd size. By 1938 an open season was possible and these elk have been harvested on an annual basis since that time. See Table 4. By 1948 conditions were such that an antlerless hunt was allowable on the Roosevelt elk population. Subsequent antlerless hunts have been allowed on a controlled basis for nearly

¹³⁴Accounts of elk in western Oregon are found in the railroad surveys, Murphy's works, and numerous pioneer records. See especially (212, p. 309; 213, p. 266; 347; 358, Vol. 5, p. 224).

every year since 1953 (249, Vol. 18, p. 60).

Comparatively little has been done in the way of reintroduction of Roosevelt elk into much of their former range. In 1917 a herd of seventeen Olympic elk was introduced in the upper Clackamas River drainage. These elk were surplus animals from the Portland Zoo and probably did little to affect change in the elk herds in the Clackamas area, other than possibly introducing new factors into the gene pool (309).

One of the primary management problems with the Roosevelt elk has been their tendency to remain in rather confined areas. This so-called "homesteading" trait has made it difficult for the Game Commission to distribute hunting pressure and has also resulted in damage to tree farms. Both of these problems have become complex in recent years. Suggestions were made by the Game Commission for transplanting problem elk to newly logged or burned over areas shortly after World War II (250, Vol. 16, p. 18). Conflicts with agriculture, especially in Coos County, increased as the herds built up. The heaviest concentrations have remained in Clatsop, Douglas, Tillamook and Coos counties. Elk were transplanted in the 1950's from areas where the greatest tree and agricultural damage occurred (249, Vol. 6, p. 13).

In 1963 a new project was begun on the Millacoma Tree Farm, Coos County. The Oregon State Game Commission in cooperation

with Weyerhaeuser Timber Company instituted a study to determine the relationship between Roosevelt elk and Douglas-fir regeneration. James Harper, of the Oregon State Game Commission, has been principally engaged in this study of problems caused by resident elk. Through the use of tranquilizer immobilization and tagging, a considerable amount of new information concerning the range, reproduction and food habits of the Roosevelt elk has been obtained. Studies of this nature will probably continue and they may determine the future of the Roosevelt elk in the Coast Range Region (125).

White-tailed Deer

There are thought to be two subspecies of white-tailed deer in Oregon, Odocoileus virginianus lecurus (Douglas), the Columbian whitetail, and Odocoileus virginianus ochrourus (Bailey), the Idaho whitetail or yellow-tailed deer (13, p. 89-91). Lewis and Clark found the Columbian whitetail to be very abundant along the Columbia River westward from The Dalles (332, Vol. 4, p. 87). Almost all of the explorer and pioneer records¹³⁵ document the fact that the whitetail was abundant in the Willamette Valley and the Columbia River west of The Dalles.

¹³⁵ Douglas, Peale, Ogden, McLeod, Palmer, Murphy and many others give accounts of the whitetailed deer.

The conditions found along the Willamette and Lower Columbia rivers were extremely favorable for these deer. Burning by the Indians maintained areas of open park-like vegetation with groves of trees and borders of brush and cover along the stream courses.¹³⁶ H. G. Davis, an early settler, remarked that whitetails were very common in the foothills near Beaverton, from 1860 to 1875. Henry Thompson, a resident of Sweet Home, stated that a few persisted along the river bottom of the South Santiam River as late as the early 1900's (151). J. W. Puyear, an early resident of Ione, Morrow County, Oregon, said that in 1917 both mule deer and white-tailed deer were abundant there (277). Jewett also accounts for a few white-tailed deer in the Davis Lake region of Crook County and also along the North Umpqua River in Douglas County in 1914 (151).

In 1939 small herds of white-tailed deer were still located on the low brushy islands and tidelands along the Columbia River in Columbia County. Perhaps as many as 100 to 200 of these deer ranged across the small islands and riverbottom in the vicinity of Mayger. They were found along the margins of local "prairies" and in brushy habitat. A continuous problem for these deer has been that much of their original range is also valuable agricultural land. Brush clearance and cattle, sheep and goat raising along these riverbottom regions

¹³⁶ See section on the Indian's use of fire.

have done much to reduce these animals to a point of near extinction (55, 299).

Today's distribution of white-tailed deer consists of perhaps as many as several hundred in the same region of the lower Columbia River, nearly all of which are located within the Washington state boundary and another small herd exists near Roseburg. These white-tailed deer were formerly afforded refuge by the Oregon State Legislature in 1927 (232, p. 547). At that time approximately 19,500 acres of land was set aside for white-tailed deer northeast of Roseburg, Oregon. Subsequent boundary changes were made in 1929, 1931 and 1933 (240, p. 761; 242, p. 616; 243, p. 257). A permanent closed season on the deer within this refuge was put into effect as a final effort to re-establish these animals in that part of the state. Such efforts were of little consequence chiefly because refuge boundaries and hunting restrictions were ignored by hunters (55, 260). In eastern Oregon small isolated populations are found, mainly in the Blue and Wallowa Mountains region (260). Management practices designed specifically for these deer are not presently practical without more information on their habits and distribution. Such management is necessary if they are to survive.

Presently the white-tailed deer in this state is a rare and endangered species and its prospects for survival are discouraging. An investigation of the range and habits of this deer in Oregon was

underway in 1968 (260). The results of this investigation may give further insight into the necessary steps to be taken if the white-tail is to be saved.

Mule Deer

The mule deer occupied all of eastern Oregon prior to white settlement. The extreme limit of their western range appears to have been much the same as the present one, that of the crest of the Cascade Mountain Range. The prime wintering areas were those in the valleys of river drainage systems at lower elevations. They first became depleted in valley areas where pioneers chose to settle and as settlement increased these deer were gradually forced to winter in foothill locations along a line dividing their summer range and former winter ranges. With extreme hunting pressure and a loss of winter ranges the mule deer populations had become greatly reduced by around 1910. With increased protection during the 1920's, including the establishment of big game refuges and a buck-only law, the mule deer population recovered. By the late 1930's several mule deer winter ranges were seriously over-populated.

Since the first population estimates were made census methods

have changed from deer per section to deer per mile.¹³⁷ Table 5 shows the Game Commission's estimates of deer per mile from 1946 to 1967. Biological studies of mule deer winter range problems mainly centered around key browse species in critical areas. These browse study programs were initiated by the cooperative wildlife research unit in 1936 (250, Vol. 10, p. 11-12). Browse studies have continued under the direction of the Oregon State Game Commission up to the present time. The principal management practice for mule deer in Oregon since 1938 has been the utilization of harvestable surplus. That year marked the beginning of special seasons which permitted the taking of antlerless deer (see Table 6). From 1948 to 1951 only bucks were taken during the general hunting season (249, Vol. 5, p. 1-3). During that period the average annual deer kill for both mule deer and black-tailed deer was 51,860 animals. Since 1952 (249, Vol. 4, p. 26), antlerless deer have been legal at some time accompanying every general season and the average annual deer kill has risen to approximately 132,000 animals per year. See Table 4. This increase of over two-and-one-half times in the annual deer harvest has been largely due to the harvesting of antlerless deer

¹³⁷ This consists of travelling the same route each year at the same time and counting all deer seen within a prescribed distance from the travel route and over a prescribed number of miles.

Table 5. Deer population trends.^a

Year	<u>Mule deer</u>			<u>Black-tailed deer</u>		
	Per mile	Harvest	% antlerless	Per mile	Harvest	% antlerless
1946	12.3	-----	---	0.7	-----	---
1947	9.9	-----	---	1.1	-----	---
1948	11.6	23,141	---	1.9	16,644	---
1949	11.2	36,865	---	2.0	20,395	---
1950	12.2	26,471	---	2.6	17,580	---
1951	12	37,850	---	2.2	19,312	---
1952	11.7	53,030	39	2.5	24,867	21
1953	11.1	64,607	38	2.9	40,668	32
1954	12.5	76,877	29	3.1	35,745	22
1955	14.5	90,126	42	3.6	43,708	31
1956	13.2	85,394	44	3.4	40,277	33
1957	12.7	81,873	33	3.3	34,626	26
1958	12.7	71,250	27	4.0	45,001	34
1959	12.4	88,261	27	NA ^b	56,670	35
1960	12.6	96,122	29	4.2	61,382	33
1961	12.2	97,951	31	4.0	65,988	37
1962	11.9	76,776	32	4.8	62,936	35
1963	11.1	64,678	24	5.0	52,941	32
1964	12.7	84,665	23	5.9	58,358	32
1965	12.3	71,637	27	4.4	47,732	27
1966	12.4	88,516	26	5.2	59,459	25
1967	13.8	87,180	34	4.6	54,820	27

^aRegular deer harvest information did not become available until 1948 (249).

^b(Not applicable) In 1959 the count was made during the summer months and these figures are not comparable to the others which were made during periods of winter concentrations.

Table 6. Summary of special deer seasons (249, Vol. 5, p. 34).

Year	Area	Deer Harvested
1938	Murderers creek	270
1939	Grant county	7,318
	Lake county	355
1941	Grant county	2,100
	Lake county	534
1942	Grant county	1,620
1943	Grant county	924
	Lake-Klamath counties	3,886
	Steens mountain	424
	Hart mountain	179
1944	North Grant county	510
	Hart mountain	151
1945	North Lake county	584
1946	Burnt river	26
	Summer Lake	182
	Crooked creek	321
	Devils Garden	397
	Cove	136
1948	Crooked creek	176
	North Lake county	430
1949	North Grant county	750
1950	Interstate	688
	Burnt river	136
	Silverton hills	199
	White river	251
1951	Interstate	2,343
	Silver Lake	3,357
	White river	599
1952	Newbridge	202
Totals	29	29,048

and things go well providing no further loss of winter range accrues.

The future of mule deer hunting in Oregon will depend largely on the number of hunters and will be directly affected by the general rise in human population. A decrease in suitable winter ranges will probably take place as man demands more of these lands for other purposes. Research programs may be undertaken by the Game Commission to develop artificial winter rations to be fed to deer during critical periods on winter ranges.¹³⁸ Attempts might even be made to develop genetically improved browse species (189). But such efforts would only be stop-gap measures and at best might appease legislative pressure to do something about deer on the winter range to satisfy public opinion. It seems probable that mule deer hunting will eventually be based on a system of drawing for a limited number of tags as is currently practiced with antelope, bighorn sheep, Rocky Mountain goats, and other special big game animals. As the human population and the concomitant number of hunters increases, the result will be increased pressure on game management agencies to provide mule deer hunting opportunities for more people. These game management agencies will ultimately have to resort to some system of programmed hunting in which preselected hunting areas

¹³⁸ This program was discussed by the writer and Oregon State Game Commission research personnel. The reference to stop-gap measures and appeasement are strictly those of the writer.

will be assigned to selected hunters.

Columbian Black-tailed Deer

Accounts of this deer show that it was not abundant in western Oregon prior to the arrival of pioneers.¹³⁹ In the valley areas, especially in the Willamette Valley, it was not an important deer. The black-tailed deer apparently found its niche in foothill locations and in burned over areas along the Coast and Cascade Mountain regions. Population estimates of this species have been difficult to obtain in the past and are difficult to determine at the present time. Indications are, however, that the present black-tailed deer population is far in excess of all former populations (250, Vol. 21, p. 26).

The outstanding population increase in this species has been the direct result of logging, fires, and the drastic reduction of predators in the black-tail's native habitat. As discussed earlier, Alexander McLeod, the Hudson's Bay trapper, found the Coast Range region to have been extremely dense and heavily wooded in 1826. Deer were scarce in that region and he noted that the Coast Indians did not often taste fresh venison (58, p. 152-157). Market, hide, and pot hunting

¹³⁹ Details of these accounts are given in earlier sections on pre-settlement and human population. Lewis and Clark, Franchere, Douglas, Wilkes, Peale, Townsend and others did not find the black-tail abundant.

for black-tailed deer during the late 1800's and early 1900's did much to reduce the black-tail populations.¹⁴⁰ No systematic effort was made to determine the population of black-tailed deer until 1940. Prior to that time black-tailed deer population estimates by the U. S. Forest Service, for the seven national forest areas in western Oregon during the period from 1926 to 1933, ranged from approximately 35,000 to 45,000 black-tails (13, p. 88). The harvest alone of black-tailed deer in western Oregon has ranged from approximately 45,000 to 66,000 animals per year for the past ten years (249, Vol. 19, p. 56). Based on a twenty-five percent kill estimate, the total population could be approximately 200,000 black-tailed deer at the present time. The decline of black-tailed deer populations prior to 1940 led to the one-buck limitation that year (251). Research sponsored by the Cooperative Wildlife Research Unit in the early 1940's led to investigations of the cause of deer mortality in the coastal region at that time. Disease and parasite infestation were largely discounted as limiting factors on well fed deer and legal hunting was not considered to be excessive. Illegal hunting, however, was stressed as a possible reason for poor herd growth (170, p. 34-44). In retrospect it appears that the continuous practice of clear-cut logging in western Oregon,

¹⁴⁰ Accounts of this are given in the earlier section under Early Legislation and Wildlife Protection.

which has increased from the late 1940's to the present time (333), has made extensive new areas available for black-tailed deer and therefore brought about the enormous increase in their population.

In recent years more intensive hunting pressure has been directed toward the black-tailed deer. Part of the precedence for more hunting pressure on the black-tail was established by a co-operative study conducted on the McDonald Forest-Adair tract north of Corvallis. Black-tailed deer multiplied in this area from an estimated seven or eight animals in 1935-36 to a population which was over-browsing and severely damaging Douglas-fir seedlings in the early 1950's (171). In 1953 a controlled deer hunt was conducted on the area with only buck hunting permitted (249, Vol. 6, p. 27). Either-sex hunting has been conducted every year since 1954 with an average of approximately 300 deer taken from the area each year and the population has shown no ill effects (142).

The future of black-tailed deer hunting will be similar to that of the mule deer. It is expected that the number of hunters will eventually increase until the supply of black-tailed deer becomes inadequate to meet demands. The black-tail does not, however, experience the same winter range problem as the mule deer. It is likely that the black-tail populations will continue to grow as long as logging creates new habitat in the forests of western Oregon. But an end point in this creation of new habitat must be reached. As

second growth stands of timber replace browse on clear-cut areas an ultimate in carrying capacity will come. The continuously growing human population will cause a hunter demand which will soon far exceed the capacity of the land to provide adequate black-tailed deer hunting.

Moose

In the summer of 1922, the Oregon State Game Commission secured three pairs of Alaska moose (Alces americana gigas) on the Kenai Peninsula, Alaska. They were shipped to Portland on a salmon steamer bound for San Francisco. One male broke a leg in transit and was destroyed aboard ship (250, Vol. 4, p. 5-6; 155). The young moose were displayed for ten days in Portland's Brooklyn Park and then re-crated and shipped to Lake Tahkenitch in western Douglas County. These animals had been hand fed and raised in close proximity to man and therefore after their release in the Lake Tahkenitch area they became semi-domesticated nuisances, and frequently appeared in the yards and gardens of local farmers (102).

The moose grew well and were apparently easily approached. When a large bull broke his leg it was set twice by a veterinarian (102). By 1925 there were high hopes for the newly established moose population and one writer remarked, ". . . from all reports to date there is no doubt in the minds of the most skeptical as to the success

of the venture" (102, p. 17). In the summer of 1926 two cow moose were seen with calves and this gave rise to the statement

It may never be possible to establish the moose as a game animal in Oregon, but there are undoubtedly thousands of acres of land along the coast country which are adapted as a habitat for moose (339, p. 19).

The moose, however, seemed not to prefer the "thousands of acres of land" but rather the dooryards, gardens and haystacks of local residents. Of the total 1926 population of seven animals one was killed by a railroad train, one died of gunshot wounds, four were either shot or died of natural causes and the last one was shot in 1931 by a state deputy game warden after it had been wounded and blinded with birdshot by a local resident (13, p. 76).

Predators

Wolf

Lewis and Clark recorded wolves in the Cascades during the winter of 1805-06. They stated that the wolf was found only in wooded country near the mountains (332, Vol. 4, p. 94). Wolves were recorded as inhabiting the Clatsop plains as late as the 1850's (347, Vol. 12, p. 111). Other accounts are given throughout the early literature and the distribution and classification of Oregon's wolves have been documented by Bailey (13, p. 272-279).

Extensive efforts were made to exterminate the wolf from all

areas near agricultural lands early in the period of white settlement.¹⁴¹ The wolf was quickly removed from these areas but managed to persist in the more remote mountainous region for more than one hundred years after the arrival of white settlers. Intense efforts to remove wolves from national forest lands began in 1907 and continued until the 1940's (12). In 1915 a large male was shot in Logan Valley, Grant County, and was at that time the only known occurrence of the wolf east of the Cascade Mountains (149). In 1927 another wolf was taken east of the Cascades, a large male taken in the Sycan Marsh (13, p. 275). They remained in the Cascades especially near the vicinity of the upper Clackamas River drainage and southward into Jackson County longer than anywhere else. In the winter of 1915-16 wolves ranged through the foothills of the Cascades only twenty miles east of Eugene (310). By preying on deer and livestock they earned titles of "savage monsters," "ruthless, tearing, savage demons" and "snarling, retreating brutes" (310).

The last wolf bounty paid by the Oregon State Game Commission was on a wolf taken in Lane County in 1946 (249, Vol. 1, p. 56) and all state bounty payments ended in 1961 (249, Vol. 15, p. 152).

¹⁴¹ A statement made in 1865 indicates the feeling at that time toward wolves.

The wolves now exist in places as an impediment, to [sic] much attention being given the subject, but travel and settlement soon destroy them (210, p. 37).

Since 1946 no authentic records of the wolf in Oregon have been made.¹⁴² The wolf is gregarious and "packs up" during the winter. If wolves were present in numbers sufficient to permit reproduction, these packs would probably make themselves known.

Black Bear

Oregon has two subspecies of black bears. Eurarctos americanus altifrontalis (Elliot) inhabits the Cascade Mountain region and all areas westward, and Eurarctos americanus cinnamomum (Audubon and Bachman) inhabits eastern Oregon. Bailey stated in 1936 that although black bears still inhabited much of their original range, they had become greatly reduced in numbers (13, p. 319). This is perhaps true, but circumstances involving bear habitat following white settlement led some to believe that the bear population was once great. Although bear populations have probably been reduced, a large part of their apparent reduction is due to man's settlement in regions of favorable bear habitat. The extirpation of bears from areas of human activity has reduced the frequency of man's contact with bears. Presently most bears in Oregon inhabit

¹⁴² Reverend Laurence Loftus of Sweet Home claims to have thought he saw a wolf following him as he walked out from his snow-stalled car in the Cascade Mountain range east of Sweet Home in November, 1959 (365).

the more remote locations where they are difficult to census.

Black bears were found occupying many of the valley and low-land regions at the time of pioneer settlement. They, like so many other forms of wildlife, had benefitted from the same favorable conditions which attracted men to these areas. The fertile soil, abundant water and relatively mild climate of these areas were excellent for the production of food. As the human population grew in these areas and agricultural practices expanded, the black bear was hunted and hazed out of much of this former habitat. By retreating to higher elevations and more remote areas they escaped extermination. The black bear's existence in Oregon today is largely due to the presence of sufficient uninhabited regions which provide refuge.

The Bureau of Biological Survey census records show population trends for all big game animals within the state from 1939 to 1961. Much of this information was based on reports of the U. S. Forest Service and rather rough estimates by the State Game Commission. It seems unlikely that any black bear population would remain at a constant figure of 10,000 for a fifteen year period, yet this is what the official figures indicate (28). Presently the black bear is considered a game animal only inside national forest areas of Oregon. Elsewhere in the state they may be hunted year around and remain an unprotected animal. Other than hunting regulations

in the national forests nothing is done in Oregon to manage bears.

Grizzly Bears

Bailey classified the grizzly bears of Oregon into three species: Ursus klamathensis (Merriam), the Klamath grizzly; Ursus idahoensis (Merriam), the Idaho grizzly, and Ursus mirus (Merriam), the small Yellowstone Park grizzly (13, p. 323-330). The distribution and identification of these bears, however, is highly speculative.¹⁴³ Although the grizzly bear of the Willamette Valley region and the Klamath Mountains region was most likely the Klamath grizzly described by Merriam, no remains have been located in Oregon to document this assertion (13, p. 324).

The presence of grizzly bears in the Willamette Valley is well documented by Franchere (105), Farnham (85), Douglas (65), Henry (53), and many others, dating from 1814. It is possible that the grizzly persisted in Oregon until the mid 1930's (13, p. 327). Although the last known grizzly bear was killed on September 14, 1931, on Chesnimnus Creek, Wallowa County (346, Vol. 17), there were several questionable reports of grizzly bears in Oregon after

¹⁴³ The type specimen of the Klamath grizzly was based on a skull found near Beswick, California, and was described by C. Hart Merriam in 1914. No skull of this bear has been positively identified in Oregon. Definite evidence of its presence in Oregon is nonexistent (13, p. 323).

1900; the grizzly, however, had been rapidly reduced during the period of pioneer settlement in the valley regions (13, p. 326). The grizzly bear, as with the wolf, is not compatible with civilization and was quickly reduced in the early campaign against predators. The pioneers and early homesteaders showed no regrets for the passing of the grizzly bear. This animal, like so many other parts of the natural system found by white man, had to be rapidly overcome so that "development" or "progress" might be made more quickly.

Cougar

The cougar became a game animal on September 25, 1967. This animal is the most recent addition to the protected list. The cougar has been one of the most sought after predators in Oregon's wildlife history. As a predator on deer and livestock it was natural that the pioneers wanted to exterminate it. Even though it has recently become protected, its future is still uncertain.

The cougar was bountied in Oregon beginning in 1843 when the Territorial Government started bounty payments (52, p. 33). The state continued to pay bounties until the bounty law was repealed by the legislature in 1961 (249, Vol. 14, p. 142). The bounty system had long been deemed an ineffective means of controlling predators and a program of cooperative government-hunting was used as the

primary control means. This government hunting program began on July 1, 1915, and was originally designed to reduce or eliminate all predatory animals within the state. The program has evolved into the present system of directed control of specific problem or nuisance animals (250, Vol. 1, p. 43).

The cougar has been reduced on its original range which extended over most of the state. Cougars were once commonly found in valley areas such as the Willamette Valley and throughout the mountainous regions of the Coast, Cascade and Blue and Wallowa Mountain Regions. They also inhabited the rimrock areas throughout eastern Oregon (13, p. 261). Now they are a very rare occurrence in any of these areas. Although 6,718 cougars were submitted for bounties between July 1, 1915 and August 6, 1961 (see Table 7), bounty hunting was probably not the major reason for their decline. A more biologically sound explanation is simply that the cougar, being inherently shy of man, has retreated in advance of civilization. Continuous hunting, especially with hounds, trapping, poisoning, and hazing have pushed the remaining cougars into the most remote areas of the state. Now even those areas are being penetrated by new logging and forest access roads. Each year less and less suitable year-around wild habitat exists for the cougar. Presently, even though the cougar is a completely protected game animal, practically nothing is known of its range, food habits, and population

Table 7. Numbers of bounties paid by Oregon State Game Commission (1913-1961).

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Year	W ^a	C ^b	B ^c	Year	W	C	B
1913	31	269	5425	1939-40		222	
1914-16	50	323	35	1940-41	2	166	
1917-18	30	213		1941-42	2	101	
1919	29	70		1942-43		77	1201
1920	16	76		1943-44		98	1579
1921	23	84		1944-45	1	123	1366
1922	21	108		1945-46		130	1407
1923	16	70		1946-47	1	145	1377
1924	13	99	66	1947-48		187	1741
1925	17	140	4510	1948-49		201	1579
1926	20	112		1949-50		177	1544
1927	2	159		1950-51		143	1357
1928	16	254		1951-52		153	1681
1929	8	288		1952-53		123	1464
1930	17	337		1953-54		148	1887
1931	22	243		1954-55		116	2786
1932	4	295		1955-56		80	2861
1932-33	2	177		1956-57		103	2809
1933-34	28	139		1957-58		56	2819
1934-35	5	149		1958-59		48	3128
1935-36	12	167		1959-60		36	2263
1937	3	163	373	1960-61		27	2213
1938-39	187	2	194	1961 ^d		12	220

^aW = wolf

^bC = cougar

^cB = bobcat or lynx

^dThe bounty law was repealed on August 8, 1961 (250, Vol. 13, p. 142). At this time the Game Commission paid bounties of \$50 for each cougar, \$30 for each wolf, and \$2.50 for each bobcat. An example of earlier payments is 1924 when bobcats bountied for \$3, wolves \$25, and the cougar bounty was raised from \$15 to \$25 (250, Vol. 5, p. 33). Even magpies were bountied by the state in 1929 and 1930 for two cents each (250, Vol. 7, p. 34). In addition to state bounties, nearly all of the counties once offered payment for killing predators and fifteen of Oregon's thirty-six counties continue payments of this kind at the present time. Payments range from \$25 for each coyote taken in Curry County down to \$3 in several other counties. Various counties also pay bounties on the bobcat, wolf, fox, bear, seal, porcupine, gopher, and mole (249, Vol. 19, p. 155).

size in Oregon.

Bobcat and Lynx

Oregon's two other members of the cat family include the bobcat and Canadian lynx (Lynx canadensis). Three forms of bobcat are listed by Bailey (13, p. 267) and although they may not be as numerous as they were formerly, they presently range over the entire state and are still classified by some as undesirable predators. The bobcat has never been considered a game animal and county, territorial or state bounties have been paid on it throughout most of Oregon's history (13, p. 267-270). The lynx by contrast was apparently never very numerous and very few authentic sightings have been made since the 1930's. Specimens have been taken from the Klamath area, Bend, John Day area, Grant County and in the Kiger Gorge on the Steens Mountain (13, p. 271). The only lynx taken recently was a female shot near Fence Creek in Wallowa County in March, 1953. This was the first authentic record of the lynx in Oregon since 1935.¹⁴⁴

¹⁴⁴This information was furnished to the Portland office of the Game Commission by Victor Coggins, a Game Commission employee from Enterprise and came to the writer's attention on an inter-office memo.

Coyote

The coyote has adapted better perhaps to white civilization than all other large predators. Despite continuous efforts to exterminate it, the coyote has persisted and even today its distribution is nearly statewide. The same type of anthropomorphisms have been used to describe the coyote as have been applied to the wolf. The coyote, however, has taken on an ever greater contemptuous character in popular descriptions. Terms such as cunning, disciple of the devil, cowardly, sly, and thieving have been applied in descriptions of the coyote (143, p. 176-191; 172, p. 23-24). On the contrary, the Indians of Oregon as elsewhere in the United States considered the coyote to have been very wise and nearly godlike in nature (172, p. 23-24).

White settlement naturally brought on warfare between man and the coyote. Livestock interests simply would not tolerate predation by coyotes on sheep and calves, no matter on what level it might have occurred. Some authors still attempt to make a case for coyote control as a means of increasing the deer population (143, p. 189). Federal coyote trappers or hunters have been known to state unequivocally that coyotes destroy a great number of deer and kid

antelope in southeastern Oregon.¹⁴⁵ Yet little if any proof has been given to demonstrate that all of the kid antelope eaten by coyotes (usually evidenced by remains near coyote dens) were healthy or even alive when found. Most deer taken by coyotes are more often than not malnourished adults or very young animals.

A study of the food habits of the coyote in Oregon shows that deer made up less than one percent of the coyote's diet in August and averaged only as high as nine percent in July. The July peak is thought to consist mainly of fawns. The seasonal food of the coyote in a livestock area consists of the following percentages of combined rabbits, carrion, and rodents: spring, 80%; summer 86%; fall, 74%; and winter, 82% (318, p. 6, 35).

An annual average breakdown of the coyote diet in a livestock area is as follows: (318, p. 6)

Rabbits	33%
Carrion	25%
Rodents	18%
Livestock	13.5%
Deer	3.5%
Birds	3%
Vegetable Matter	2%
Other Animal Matter	1%
Insects	1%

¹⁴⁵ Discussions between federal trappers and the writer in Warner Valley, Lake County, in April, 1965.

The livestock shown consisted primarily of sheep and goats which made up 12.92 percent of the 13.5 percent total of domestic livestock taken. The remaining 0.67 percent was made up of calves, colts and pig remains (318, p. 30-32). The vulnerability of sheep to coyotes is nearly legendary. The above percentages would probably be adjusted to a considerably lower level of domestic livestock if coyotes were studied on a range where sheep were absent. Likewise, the other percentages would be altered more heavily toward one of the other categories. Evidence of the coyotes' food habits based on stomach contents and remains near dens is insufficient to determine whether the animals eaten were killed or carrion.

Presently coyote management in Oregon consists of control only. "Coyote-getters" (spring-loaded devices containing cyanide poison), bait stations using "1080" poison, traps, hunting, and possibly a new program with the anti-fertility drug "stilbestrol" are primary means of control.¹⁴⁶ There is a need, however, for much more study of the coyote's ecological relationship to other forms of wildlife.

¹⁴⁶These methods were demonstrated to and discussed with the writer by U. S. Government trappers in Warner Valley in the spring of 1965.

Foxes

Oregon's native foxes are the Cascade red fox (Vulpes fulva cascadensis (Merriam), the gray fox (Urocyon cinereoargenteus), and the kit fox (Vulpes macrotis). The eastern red fox (Vulpes fulva fulva) has been introduced in the Willamette Valley. The eastern red fox is thought to have been first introduced in Yamhill County in 1929 by private individuals for the purpose of sport hunting (250, Vol. 16, p. 17). The northern plains fox (F. f. regalis) is also thought to have been brought into the state for that purpose (356). Prior to the introduction of the eastern red fox and the northern plains red fox, the common fox of the Willamette Valley region was the gray fox. The Cascade red fox apparently remained in the mountainous or foothill areas and did not invade the flatter or tilled areas of the valley. The eastern subspecies of red fox did not become numerous or attract much attention until 1945. Following that time a gradual build-up of this fox and an increased distribution began to cause complaints from poultry farmers and individuals concerned with pheasant management. Pheasants released from game farms appear to be susceptible to predation by the red fox, particularly in the spring (356, p. 4-16). Trapping reports for both foxes are shown in Table 8.

The kit fox is the most limited of Oregon's foxes in both population size and distribution. The few which remain are located

Table 8. Trapping Reports, 1946-1967. (249) (250)

	46-47	47-48	48-49	49-50	50-51	51-52	52-53	53-54	54-55	55-56	56-57	57-58	58-59	59-60	60-61	61-62	62-63	63-64	64-65	65-66	66-67
Beaver	3542	4584	3954	5749	6008	15257	8225	11103	13373	11533	12210	12865	9786	10906	12987	8491	7383	9446	7153	8788	9878
Otter	183	196	156	136	182	215	201	162	269	188	241	292	254	313	350	358	272	335	236	361	369
Mink	5127	5215	3843	4565	4319	3665	3002	3038	3621	2890	3834	2812	2762	2772	2576	2210	2185	2262	1640	1538	1300
Muskrat	69945	66516	51020	66855	52289	64809	69096	63052	47276	36240	34114	45879	53767	37108	37492	24758	32785	36036	25946	30644	32740
Raccoon	3483	2592	2956	1806	1905	1879	1119	1113	1270	1477	1365	1545	1499	2264	2166	1978	1923	1934	1200	1855	1808
Marten	1107	NS	NS	NS	373	184	75	109	30	17	35	23	95	109	90	62	59	85	40	22	32
Skunk	1052	438	289	154	259	224	113	97	109	57	33	73	179	111	120	93	129	130	111	140	151
Civet Cat	984	452	397	185	230	203	109	60	163	125	126	198	191	192	178	109	114	99	167	225	280
Weasel	410	1043	423	412	598	350	139	133	198	163	94	89	96	67	69	41	38	41	31	46	65
Opossum	34	61	119	22	22	65	8	9	16	10	33	-	31	18	110	132	246	235	108	237	435
Badger	61	24	6	11	11	16	12	6	13	2	3	14	85	83	49	20	6	19	24	61	57
Gray Fox	424	269	327	166	197	152	90	96	81	114	114	106	124	153	78	86	83	93	46	132	177
Red Fox		84	72	43	22	17	6	15	12	15	30	28	38	44	13	46	53	47	39	75	101
Wildcat	810	710	584	401	456	533	366	399	492	458	543	570	1188	945	1143	314	324	481	481	1063	801
Coyote	1760	1163	496	276	286	239	265	352	334	245	194	207	271	425	539	149	145	199	162	513	827
Nutria				9	31	7	7	-	-	-	-	29	38	108	547	492	1196	1954	1749	2760	2878
Bear	33	21	39	22	25	77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cougar	21	23	23	9	6	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

in the Owyhee region and in the Alvord and surrounding basins. They apparently exist primarily on desert rodents and have become endangered as a wildlife species in the state due to the advancement of civilization and concomitant predator control methods. In general, very little is presently being done to manage fox populations in Oregon. The dictates of the fur market and predator control efforts have at times been principal factors controlling foxes and other predators in the past. Their total economic value is unknown but studies have shown that their principal diet of rodents may more than counterbalance the predation they cause on gamebirds and poultry (356, p. 16).

Steller's Sea Lion

The Steller's sea lion was once fairly well distributed along the Oregon coast and ranged up into the Columbia River. In 1814, Alexander Henry, a fur trader for the Northwest Company, recorded them as being found near Oak Point, an area nearly fifty miles above the mouth of the Columbia River (53, Vol. 2, p. 857). They were hunted at times by the Indians, both in the Columbia River and along the rocky coast lands. The Indians speared them at night from canoes which were lashed together. The sea lions then dove and dragged the canoes until they died from loss of blood. Henry said that the Indians valued the sea lion highly and established a price of

one slave plus other trade articles for each sea lion. In addition to the meat, he mentioned that they drank the oil rendered from these animals (53, Vol. 2, p. 858).

The story of sea lion conservation is one of several examples of inter-agency mismanagement found in Oregon's wildlife history. In 1900, the Oregon Legislature passed a bill which authorized a bounty of \$2.50 for each sea lion or seal killed along the Oregon Coast (238, p. 156). This bill was passed under pressure from the commercial fishermen who alleged that these animals did a great deal of damage to the salmon runs. A tax was instituted on fishing gear to pay for the bounties. Bounties fluctuated, reaching a maximum of \$10 per animal in 1926 (238, p. 158; 298).

The most amazing part of this story is that bounties were paid by the State Fish Commission after Three-Arch Rocks Reservation was established by a Federal Act in 1907 to protect these animals. State records show that 8,965 sea lions and seals were bountied in the period from 1921 to 1926 (298). Stomach samples of these animals taken in the 1920's documented that salmon made up a very small part of the sea lion's diet and that their net effect on the salmon industry was negligible (33).

Early state game wardens did not feel any urge to protect the sea lion even after the Three-Arch Rocks Reservation had been in existence for ten years. Game warden John Larson and three other

men found a herd of over 1,000 sea lions resting on the Ecola Rocks, Clatsop County, in June, 1917. At seven A.M., at low tide, they started to shoot these animals and continued to kill them for three hours. Larson remarks that their shooting caused ". . . the ugly monsters to fall off the rocks dead" (177, p. 205). Not everyone shared Larson's view of sea lions and the aesthetic value of these animals at Three-Arch Rocks was expressed by one writer who felt that the few salmon the sea lions might take were not worth the price of their destruction. He wrote, "Yet, as sure as the sun shines, and the moon, there are some things [sea lions] utterly without an equivalent in canned salmon" (307). Bounties were continued on the sea lion until 1935, although studies since the 1920's had shown that they did very little harm to the salmon industry (227, p. 125).

Harbor Seal

Lewis and Clark sighted the harbor or hair seal (Phoco vitulina richardii) at The Dalles in 1805 and 1806 (332, Vol. 4, p. 101). They were apparently quite common at that location and in the Willamette River up to the falls at Oregon City (317, p. 48). McLeod found them to be very numerous on the rocks below Willamette Falls and in the river in the summer of 1826 (48, p. 48). From very early in Oregon's history, this seal has been hunted as a "salmon killer."

The Oregon State Fish Commission no longer pays bounty on sea lions but still pays a bounty on seals of not less than five nor more than twenty-five dollars per scalp. The funds for this payment are maintained by a tax on commercial fishing gear.¹⁴⁷

There is little information to support the accusation that pelagic seals take many salmon. A 1961 study by the U. S. Fish and Wildlife Service shows that over 60% of the stomach contents of seals off Oregon's coast was made up of northern anchovies (Endgraulis mordax) and over 32% consisted of rockfishes (Sebastes spp.). A little over one-half of one percent was salmon (Oncorhynchus spp.) (342, p. 85). With from 50,000 to 200,000 harbor seals left in the world it does not seem that they are threatened with extinction but the bounty law does seem ridiculous (299, p. 4). This system merely taxes the commercial fisherman on his fishing gear and does not accomplish its original objective of preventing appreciable salmon losses. Perhaps this indicates that when it comes to managing mammals the State Fish Commission is operating on a 1900 level.

¹⁴⁷ The State Fish Commission revised the seal bounty in 1935 so it was only applicable on seals taken in the Columbia River (248).

CHAPTER VIII

OREGON'S WILDLIFE: BIRDS, FURBEARERS AND
NON GAME ANIMALSNative Upland Game Birds

Among Oregon's upland game birds the following native species are found: the blue, ruffed and sage grouse and the mountain and valley quail. A fragmentary population of Franklin's grouse (Canachites franklini) (249, Vol. 11, p. 77) and the sharp-tailed grouse (Pediocetes phasianellus columbianus), often referred to in older Oregon literature (230, Vol. 1, p. 16) as the "prairie chicken," may also persist in very limited numbers. The blue grouse are divided into three subspecies, the ruffed grouse into two, and the mountain quail into two subspecies.

In 1951, less than five percent of Oregon's licensed hunters participated in grouse hunting (192). Little interest in grouse hunting has resulted in a lack of management and only limited funds have been spent on studying these native upland birds. As the human population increases, and the hunter success on presently popular game species declines, more emphasis will have to be placed on grouse hunting and management.

Sage Grouse

It has been reported that high density sage grouse populations were found in eastern Oregon prior to 1920. Large populations apparently existed on the slopes of Hart Mountain and in many parts of eastern Oregon. The reasons given for the decline in their population have been, over-grazing by livestock, excessive hunting pressure, and disease (110, p. 217-219). They were completely protected from hunting from 1932 to 1949 (251). The 1949 season extended from October first to the fifth with a bag limit of two birds for the season. Hunting pressure was light and the success was low (249, Vol. 2).

A decline in sage grouse populations from 1941 to 1946 was broken by a slight increase from 1946 to 1949, but another decline began in 1950 and has continued up to the present time (249, 192). A record number of sage grouse were taken in 1958 (see Table 9). Since that time, the kill has decreased severely and no season was held in 1967.

Research activities have been undertaken on several occasions in attempts to determine the cause of low sage grouse populations. A three year study in the 1940's (18) and a later study in 1955 (219) did not positively identify the factors which are limiting sage grouse production. With approximately one-half million acres of potential sage grouse habitat and only a fraction of that area presently

Table 9. Summary of Upland Game Seasons 1951-1967 (249, 250)

Year	Pheasants		Quail		Chukar Partridge		Hungarian Partridge		Forest Grouse		Sage Grouse		Mourning Doves		Band-Tailed Pigeons	
	Hunters	Kill	Hunters	Kill	Hunters	Kill	Hunters	Kill	Hunters	Kill	Hunters	Kill	Hunters	Kill	Hunters	Kill
1951	83,920	237,037	12,777	75,373												
1952	82,145	244,791	21,903	107,105					24,400	40,504		18,788				
1953	90,441	274,940	28,340	147,651					22,812	36,043		11,406				
1954	94,699	292,527	29,950	149,352			24,858	19,120	32,886							
1955	92,741	278,223	25,545	149,740			12,006	19,536	31,923							
1956	83,206	226,320	25,472	115,643		3,820	12,226	21,636	36,780							
1957	88,691	310,096	21,930	124,431	5,321	10,319	5,321	11,609	18,813	38,916			13,169	117,875	14,621	93,853
1958	102,789	477,075	38,470	280,345	15,809	91,558	11,172	45,190	27,315	73,510	7,374	21,284	16,870	158,474	20,278	122,226
1959	97,474	375,641	32,588	224,123	11,373	36,326	6,016	16,818	15,332	32,770	7,127	17,304	17,557	194,189	13,143	86,019
1960	94,599	351,656	30,670	190,873	9,442	37,683	5,543	16,765	17,208	36,586			14,893	173,108	13,096	86,956
1961	91,117	375,755	35,088	242,040	15,033	75,268	5,205	15,581	17,819	45,180	2,725	6,659	18,340	202,082	15,003	121,032
1962	82,430	329,481	29,037	129,894	19,029	124,727	5,604	16,552	14,380	29,194	3,541	10,571	16,566	164,116	14,133	121,446
1963	84,024	374,243	31,460	265,491	28,299	295,243	8,885	36,535	13,944	34,553	1,913	4,117	16,542	184,030	11,997	90,505
1964	81,722	336,846	31,213	230,875	25,572	194,530	7,744	26,334	12,351	27,313	3,718	8,669	17,320	208,513	12,460	103,885
1965	75,373	254,575	26,383	168,274	19,653	130,132	6,021	17,288					16,205	163,064	12,597	105,173
1966	72,133	243,436	26,171	158,585	16,554	115,151	5,122	15,907	7,725	16,836	2,234	3,731	16,370	196,797	12,415	121,069
1967	72,135	263,316	34,512	250,988	16,483	81,766	4,339	10,365	12,746	37,412			16,617	172,429	9,862	82,212

occupied by these birds, it appears that a great deal more research is called for. Presently nothing is being done to solve the sage grouse problem.

Columbian Sharp-tailed Grouse

Early explorers and pioneers recorded the presence of the sharp-tailed grouse on the plains of the Columbia River (110, p. 216). Apparently it was once abundant on and distributed throughout the open areas in eastern Oregon (110, p. 216-217). The development of wheat farming in the 1890's across the Umatilla plateau, along the plains of the Columbia and in other areas of former suitable sharp-tail habitat probably did much to reduce their population. The factors mentioned above affecting the general decline of sage grouse are also applicable to this species.

By 1923 the Game Commission had decided that the sharp-tailed grouse should be protected at all times and the season was closed that year (251). But they also decided that the sharp-tail would not be a part of Oregon's wildlife much longer.

The western prairie chicken or sharp-tailed grouse and sage hen, more particularly the latter, are threatened with extinction. It is not believed that these two birds can long hold out, and in the course of a few years will probably go the way of the passenger pigeon (250, Vol. 4, p. 8).

The sharp-tailed grouse had been reduced to very few flocks by the 1950's. One bird was seen by Game Commission personnel in Baker

County in September, 1952, and four were seen in the same area in March, 1954 (249, Vol. 6, p. 56). In 1955 they were described as Oregon's "rarest native game bird" (249, Vol. 7, p. 73). A few remaining sharp-tails were occasionally sighted as late as 1961.¹⁴⁸ Little was done to manage or save them and perhaps little could have been done due to the major changes in their habitat brought about by agricultural crop and range developments. None have been reported since 1961 and nothing is being done as an effort to restock their native habitat with sharp-tails from other states.

Valley Quail

The valley quail was originally distributed in the valley areas of the Klamath Mountains region bordering California. It was also mentioned as being found in the Willamette Valley "near the Columbia" by the railroad survey party in 1857 (347, Vol. 6, p. 92-93). Beginning in the late nineteenth century numerous trapping and transplanting operations by sportsmen and the Game Commission have distributed this bird over most of the valley regions in western Oregon and into much of eastern Oregon. From 1914 to 1916, 2745 quail were trapped in Jackson County, and transplanted to twelve counties in western

¹⁴⁸ These were seen on the Starkey range in the summer of 1961. This information came to the writer on inter-office memoranda of the Oregon State Game Commission.

Oregon and to eight counties east of the Cascades (311, p. 14-15). Following those introduction many others have taken place (250, Vol. 7-Vol. 10; 250, Vol. 19, p. 75). Various means of habitat improvement, such as watering devices and artificial roosting platforms (249, Vol. 5, p. 120) have allowed the valley quail to remain well distributed and it has held a relatively stable population on both sides of the Cascades. The valley quail has been hunted each year and hunting has been regulated in accordance with abundance (251).

Mountain Quail

David Douglas reported seeing flocks of mountain quail in the vicinity of what is now Roseburg on October 12, 1826 (65, p. 218). This was the earliest record of the mountain quail in Oregon. It has been distributed most commonly throughout the foothill and mountain regions of both western and eastern Oregon (249, Vol. 3, p. 62). Two subspecies of this quail have been recognized, Oreortyx picta palmeri (Oberholser), of the Coast Range region, and O. p. picta (Douglas), of Cascades Mountain Region and eastern Oregon. These quail were relatively trusting of man in the early days of market hunting, and were easily trapped and hunted until the population was severely reduced (311, p. 11-12). The mountain quail should have returned to levels of former abundance after protection was given to upland game birds in the early 1900's, but they apparently did not do so. The

reason for this may be due to habitat changes brought about by logging practices in foothill areas on their former range. Other factors contributing to the failure of mountain quail to increase significantly after protection could be agricultural practices in areas of their most favorable habitat and competition for their former niche by newly introduced valley quail.

Presently very little is done in the way of managing mountain quail other than through hunting regulations. They, like the forest grouse, make up a relatively small percentage of the upland game bag of Oregon hunters. One of the reasons for this is that they are difficult to hunt. In recent years they have inhabited rough terrain which is more remote from civilization than the habitat of the valley quail.

Forest Grouse

The ruffed grouse has often been referred to as the "native pheasant" (230, Vol. 1, p. 15). It has been divided into three subspecies, Bonasa umbellus castanea of the Coast Range region, B. u. sabini of the Willamette Valley and Klamath Mountains region, and B. u. phia, found east of the Cascades. Douglas recorded the ruffed grouse in 1826 and numerous reports of its distribution are found in ornithological accounts in Oregon's history (65, p. 153; 110, p. 216). It was one of the popular species trapped by market hunters in the

1860's and 1870's (17, p. 75-78).

There are three subspecies of blue grouse found in Oregon. One, the sooty grouse (Dendragapus obscurus fuliginosus), is found from the crest of the Cascades and westward through the Coast Range Region. It was found in the Willamette Valley when white man first settled there. The sooty grouse was apparently very abundant in the foothills and across the prairie regions (110, p. 210-212). Their population decline in the Willamette Valley was probably due to the removal of the many fir groves which formed islands of food and cover for these grouse prior to more extensive clearing for agricultural practices (330).

The other two subspecies are the Sierra grouse (D. o. sierrae), found along the east slope of the Cascade Mountains, the Klamath Basin, and the southwestern corner of Lake County, and D. o. pallidus, Swarths grouse, found in the Blue and Wallowa Mountains Region.

All grouse have undergone periodic fluctuations or "cycles" in their populations. Hunting pressure has little or no effect on these cycles in forest grouse populations. If their numbers are substantially reduced or at a low in a cycle, such as the sharp decline in blue grouse which began in 1966, hunting success diminishes and hunters divert their attention to more productive alternatives. It is thus probable that closing seasons to protect forest grouse during

lows in population cycles is an unnecessary management practice.

Very little has been done to manage forest grouse in Oregon aside from inventories or samples taken incidental to annual big game surveys and cursory production estimates. Presently grouse do not appear to be in any danger (249, Vol. 19, p. 70) and they will probably persist as long as forests provide them with adequate cover.

Pigeons and Doves

The harvest of pigeons and doves is shown for the years from 1957¹⁴⁹ to 1967 in Table 9. But these figures cannot be used as a true measure of relative abundance because in years when unusually cold weather precedes hunting season many birds move southward earlier and hunter success is reduced.

Doves have not been adversely affected by white settlement in Oregon. They have probably been benefitted greatly here, as elsewhere, by the development of agriculture. Oregon has allowed a rather liberal daily bag limit on doves in recent years and has applied the management principle of immediately harvesting an animal with a very rapid turnover rate.¹⁵⁰ Both pigeons and doves, and upland game birds as well, can experience great fluctuations in their

¹⁴⁹ No estimates of total kill were made prior to this date.

¹⁵⁰ For a further discussion of this subject see Durward Allen (3, p. 28-43).

populations under conditions of natural reproduction and mortality. This turnover rate in populations is often of immense proportions and often appears to be independent of hunting pressure. Failing to shoot doves one year will not necessarily guarantee an increased crop the next year, as the annual natural mortality rate may far exceed that caused by hunting.

The band-tailed pigeon was abundant in Oregon during the pioneer period (56). Unrestricted hunting, especially near mineral spring areas, during the market hunting period and years following, reduced pigeon numbers to an extremely low level (110, p. 325). Following the reopening of pigeon season in 1937 (251) and mourning dove season in 1941 (251) the seasons and bag limits have been regulated in accordance with relative abundance. One of the most frustrating problems in recent years for the pigeon hunter is the lack of public shooting areas. Many of the most favorable sites, usually near mineral springs, are situated on private land and the owners have required hunters to pay for the privilege of hunting. This system of paying to hunt pigeons is indicative of a coming trend for much upland game hunting on private land in western Oregon. An increased demand for hunting opportunities by a growing number of hunters has caused competition for favorable hunting areas and has established a monetary value on hunting access.

Introduced Game Birds

Turkeys

Many attempts have been made to introduce the wild turkey in Oregon. Wild turkeys were liberated in southern Oregon prior to 1899 and in 1900 they were reported to be increasing (230, Vol. 1, p. 8). From 1926 to 1933 wild turkeys were propagated on Oregon's game farms and releases were made in many parts of the state (311, p. 21-22). Gene Simpson, a bird breeder from Corvallis, was responsible for much of the success in raising the brood stock during this period. Simpson had considerable experience in raising wild turkeys and had first purchased stock from Virginia in 1908. By the 1929-30 biennium, 773 adult birds had been liberated (311, p. 22). In spite of these releases wild turkeys failed to establish themselves in sufficient numbers to allow hunting in Oregon.

Further efforts by the Game Commission to establish the wild turkey as a game bird were unsuccessful until 1961. During that year the Game Commission obtained fifty-eight "wild trapped" birds from Arizona, Colorado and New Mexico. They were flown to Oregon and released in four locations. Thirteen were released on Garrison Butte, Jefferson County, eighteen on Rock Creek Reservoir, Wasco County, twenty near Three Mile Creek, Wasco County and seven on Eden Bench, Wallowa County (250, Vol. 23, p. 24-25). These

turkeys, the Merriam turkey (Meleagris gallopavo merriami), had come from areas which had a climate and environment similar to Oregon's potential turkey habitat. They were much better suited to Oregon than the eastern varieties (Meleagris gallapavo silvestrus) which were introduced in earlier trials.¹⁵¹ In addition to their suitability, they were live trapped in the wild, transported, and released before any changes in their habits could develop. This method of introducing exotic species successfully into the state may be a key to future success in other introductions.

Due to the difficulty in observing the turkeys now present in the state, insufficient information is available to arrive at an effective population estimate. No adequate census technique has yet been developed and no management practices other than regulated hunting and transplanting have been seriously undertaken. Periodic sightings indicate that they have increased in all areas where releases have taken place (249, Vol. 19, p. 70). The most significant buildup, however, is on the east slope of Mount Hood where they are apparently well established at the present time (249, Vol. 19, p. 70).

¹⁵¹ Although most of the wild turkeys released between 1926 and 1933 were from Virginia a few were also from Arizona. A total of 1,504 turkeys from these two states were released during this eight year period (249, Vol. 7, p. 74). Four adult and six young wild turkeys were seen near Roseburg in 1953, indicating that reproduction had taken place for several generations (249, Vol. 6, p. 57).

Oregon's first turkey season was held as a split season with the first part extending from November 20 through November 28, 1965, and the second part, limited to toms, held in May, 1966. A total of forty-five birds were bagged in this first hunt (249, Vol. 18, p. 103). Turkey hunting was allowed again during the 1967 hunting season and it is expected that, if upward trends in the population continue, hunting will continue on an annual basis.

Hungarian Partridge

Early introductions of the Hungarian partridge (Perdix perdix) were made in western Oregon in 1900 (230, Vol. 1, p. 17) but the bird did not do well consistently in western Oregon. Releases made in Gilliam, Wallowa and Umatilla counties after 1912 (224, 327) were much more successful and they increased enough to permit hunting by the 1920's (250, Vol. 5, p. 18). Presently, practically the entire population of Hungarian partridge in Oregon is found east of the Cascades. The annual kill figures for these birds are based on those shot in areas near the Deschutes, Columbia basin, Blue Mountains, Malheur and the Great Basin region (see Table 9).

Ring-necked Pheasant

The ring-necked pheasant (Phasianus colchicus torquatus) has been the most successful of all game birds introduced in Oregon.

Varying versions of the famed "Denny pheasant" are given in the many literary accounts of Judge Owen Nickerson Denny's first shipments of these birds to Oregon. Denny became interested in various breeds of pheasants while he was acting as United States consul to China in the late 1870's. In 1880 when he became consul-general at Shanghai, he made his first shipment of birds to Oregon (229, Vol. 3, p. 85). Unfortunately the first pheasants died in Portland before they were released (308, p. 12). According to A. B. Averill, a writer who interviewed Denny in the late 1800's, fifteen pheasants arrived safely in Portland in the spring of 1881 and were released near the mouth of the Willamette River. The hens produced broods during that season and they crossed the Willamette River and the Columbia into Washington. The next shipment was made in 1882, and was mainly made up of hens. These birds were released at the foot of Washington, later called Peterson's Butte, on the Denny homestead in Linn County. When Denny returned from China in 1884 he brought ninety birds with him including silver, copper and golden pheasants (111), which were later liberated on Protection Island in Puget Sound (11). The popular name Mongolian pheasant^{1 52} was given to the

^{1 52} The Portland Oregonian carried a story about them on March 22, 1881, in which they were called "Mongolian pheasants" (131). The true Mongolian pheasant (Phasianus colchicus mongolicus), were not obtained until January, 1924, when the Oregon State Game Commission imported these birds directly from China.

ring-necks brought to Oregon.

Pheasant propagation or farming was actually under way in 1911 when Gene Simpson was selected to operate the first state game farm. The addition of other farms at Eugene, Pendleton, Ontario and Hermiston made possible an increased annual production of pheasants for release (250, Vol. 3-21). During the history of these operations, a total of over one-and-a-half million pheasants have been released.¹⁵³

In 1885 an act was passed by the legislature making it a misdemeanor to take or kill ring-necked pheasants. This act was to remain in effect for a period of six years (229, Vol. 2, p. 85-88). Pheasants increased at a phenomenal rate during this period and quickly became established throughout the Willamette Valley and in other parts of the state to which they were transported (131).¹⁵⁴ These pheasants were the first to be successfully introduced into North America. The climate and agricultural conditions of western Oregon were apparently ideal for these newly introduced birds. The success of the ring-necked pheasant in Oregon encouraged other states to request birds from game breeders in the state, and thousands of pheasants were shipped as parent stock for twenty-eight states from

¹⁵³ For a history of O. N. Denny's pheasant introductions see Virginia C. Holmgren's "Chinese Pheasants, Oregon Pioneers" (131).

¹⁵⁴ These figures have been compiled from Game Commission records.

coast to coast (229, Vol. 3, p. 105-107).

Oregon's first open season on ring-necked pheasants was in 1891 and hunter success was apparently high (229, Vol. 1, p. 19). Grain harvesting by horse-drawn equipment and abundant cover found along rail or "worm" fences were apparently the best combination for providing food and cover. Frank Wire, former State Game Supervisor, hunted pheasants for the market for several years after 1900 and was able to shoot up to seventy-five per day in Linn County. He stated that the important feature in the habitat which contributed to the large pheasant population was the cover provided by weeds and brush along rail fences and the amount of stubble left behind by early farming methods (364). The advent of mechanized farming using tractors and power equipment destroyed much of the former cover. In addition to mechanization, drainage, burning and wire fences have contributed to the further removal of pheasant cover. The use of automobiles increased hunter access and the pheasant populations had undergone a continual decline (364).

After nearly thirty years of continuous pheasant stocking with birds from game farms, it was realized that merely raising and releasing birds was not enough. The 1938-1940 biennial report cites a case for improved habitat as a necessary adjunct to stocking (250, Vol. 12, p. 5-6). Since that time considerable efforts have been made to improve many types of upland bird habitat in both western

and eastern Oregon (250, Vol. 13, p. 66; 249, Vol. 1, p. 67) but the conditions caused by wide-spread field burning and clean fence rows presently combined to almost eliminate suitable cover for pheasant populations in many areas. The daily bag limit on ring-necked pheasants has varied from ten in 1902 (230, Vol. 2, p. 24) to five by 1921 and four by 1925 (251). Since 1965 the bag limit has been reduced from three to two cocks in western Oregon and Klamath County although three cocks per day are still allowed in eastern Oregon. Previous lows were reached in western Oregon's pheasant population in 1946 and 1947 when a completely closed season was in effect (249, Vol. 2, p. 51). The future population trends for pheasants throughout Oregon will probably be largely dependent upon the availability of suitable cover. If present trends of clearing land and building continue, the increased removal of cover and competition for space by man will substantially reduce pheasant populations in future years.

Bobwhite Quail

The bobwhite (Colinus virginianus) was introduced in Oregon as early as 1875 by A. R. Burbank, a resident of Lafayette. He released two pairs of these birds in Yamhill County that year. Subsequent releases were made by private individuals throughout the Willamette Valley in the following years (134). Hervey Hoskins, a writer for the

Oregon Naturalist, in 1896 stated that the first wild birds he saw were "several" located in fields about seven miles south of Dayton in the spring of 1890 (134).

In spite of numerous early introductions, the bobwhite failed to establish themselves in the numbers expected. Efforts were made to educate the public in matters emphasizing the economic importance of the bobwhite quail to agricultural interests. The explanation for little or no increases in quail population over the years was generally attributed to natural enemies (129).

The bobwhite was introduced into eastern Oregon as early as 1893, when J. H. Raley of Pendleton liberated sixty birds near McKay Creek. The bobwhite is also thought to have entered eastern Oregon on its own by spreading into the vicinity of Vale and Ontario from stock introduced to the Boise Valley, Idaho in the late 1800's. These early introductions appear to have survived best near stream courses, where they could seek shelter under willows and cottonwoods (91).

The Oregon State Game Farm at Corvallis raised bobwhites in captivity for release and 522 were produced for this purpose in 1933 (311, p. 13). The present status of the bobwhite is that it has been protected for many years and yet has never increased to sufficient numbers to allow regular hunting seasons. The ground roosting habits of these birds have always made them extremely susceptible

to predators, especially the house cat. Predation itself, however, rarely limits a population to such a degree. More likely explanations may lie in unfavorable weather conditions during nesting periods and interspecific competition for niche requirements from the valley quail. Presently the bobwhite is protected by a closed season but this is all that is being done in the way of bobwhite management in Oregon.

Chukar Partridge

Early attempts to raise the chukar partridge (Alectoris spp.) took place on Oregon's game farms in the 1930's, when domestic setting hens were used to brood the eggs (250, Vol. 8, p. 11). Early attempts to raise and successfully liberate chukars in Oregon failed and no further attempts were made until 1950. At that time the Hermiston game farm obtained breeding stock from the State of Washington's Department of Game, and through the use of an electric brooder system, successfully reared enough birds for stocking (46). A trial planting of 280 chukars was liberated on the Hart Mountain Antelope Refuge in September, 1951 (249, Vol. 4, p. 52).

The first large scale releases of the chukar took place during June and July of 1952. This release consisted of approximately 5,000 birds. Subsequent releases were made in August and September of the same year for a total in that year of 8,904 birds. The areas chosen for the releases were along the John Day River and

tributaries, the Crooked and Deschutes Rivers, Warner Valley, Blitzen Valley, Malheur River, Owyhee Canyon and Steens Mountain areas (249, Vol. 15, p. 52). By 1955 it appeared that chukars were achieving a large degree of success in adapting to many of the areas where they had been released. Natural reproduction was taking place and populations were increasing (249, Vol. 7, p. 69). The first open season was held from October 20 through November 12, 1956. During this first open season a total of 3,820 chukars were reported to have been taken by 25,472 quail and partridge hunters. The reason for this relatively low success was attributed mainly to the lack of chukar hunting experience by Oregon's hunters (249, Vol. 9, p. 66). By 1959 a total of 66,000 chukars had been released and releases were decreased as natural reproduction increased (249, Vol. 11, p. 73). The chukar population continued to increase until about 1960 when a decline in population was noted (249, Vol. 12, p. 62). The population increased again from 1961 to 1965 when another decline took place (249, Vol. 17, p. 63). During 1966 and 1967 the number of chukars observed again declined, falling to one-eighth of the 1964 level (249, Vol. 19, p. 85). Since 1964 the number of chukars released from game farms has been reduced and the population has depended upon natural reproduction (249, Vol. 17, p. 70). Perhaps research should now be conducted in an attempt to study the limiting factors in the chukars' newly adapted habitat.

Other Exotic Game Birds

The Oregon State Game Commission has unsuccessfully attempted to establish various exotic game birds in the state throughout the years. The reasoning behind so many attempted introductions apparently stemmed from the success of ring-necked pheasants (250, Vol. 8, p. 9). In September, 1930, 100 Reeves pheasants (Syrnaticus reevesi) were released in Josephine County (250, Vol. 7, p. 24). During the same period, golden (Chrysolophus pictus), Amherst (C. amherstiae), and silver pheasants (Gennaeus nycthemerus) were also released in the southwestern portion of Oregon (250, Vol. 7, p. 24). The various state game farms have experimented with a number of birds, breeding them for experimental releases and attempting to hybridize some birds. One such hybridization was made in 1933 at the Eugene game farm when valley quail were crossed with Gambel's quail (Lophortyx gambelii) (311). The Asiatic quail (Coturnix coturnix japonica) was raised and released from game farms in the 1930's without apparent success. The bamboo partridge (Bambusicola thoracica) and Manchurian eared pheasant (Crossoptilon mantchuricum) were raised on game farms in the early 1930's (250, Vol. 8, p. 9). Other species included the Arizona scaled quail (Callipepla squamata) and the hill partridge (Arborophila sp.) from India which were raised in 1933 (312, 250).

One imaginative attempt was that of trying to establish guinea fowl (Numida meleagris) on cleared areas of coastal counties and even counties in eastern Oregon during the late 1920's (250, Vol. 6, p. 16; 250, Vol. 7, p. 36). This example demonstrates the optimism for introductions at this time. This period was truly one of trial and error biology (250, Vol. 6, p. 16).

More recently white tailed ptarmigans (Lagopus leucurus) were released twice in the fall of 1967, once near Bonney Lakes in the Wallowa Mountains when fifteen birds were brought in from Colorado and again when twenty-one birds were brought to the Lostine River area, in the Wallowas, from the North Cascades Primitive Area of Washington (274). It is still too early to evaluate the outcome of this latest introduction of an exotic game bird.

Presently efforts are being made at the Oregon State Game Commission's game farm on the E. E. Wilson Management Area north of Corvallis to rear some form of exotic game bird to fill a niche in the logged over areas of western Oregon. Surplus brood stock of bamboo partridge have been released each year since 1962 on the Coast Range near the Coquille Valley. In the spring of 1966 the first release of one year-old birds was made in the same area. In the spring of 1967, 250 more young birds were released along the coast and in the spring of 1968, 500 birds were released. The success of these releases is presently unknown and more will

apparently be released each year until the program either succeeds or fails (166; 249, Vol. 19, p. 74).

Experimental releases of the Kalij pheasant (Lophura leucomelana), obtained by the Game Commission in 1962, have taken place mainly on the Adair tract of McDonald Forest since 1966. A recent release, comprising fifty-three, was made in the spring of 1968. The Chilean bushland tinamou (Nothopracta pentlandii) has been reared at the game farm and prospects for its release appear to be good at the present time (166). If any of these exotic birds is successful in western Oregon they will provide a great asset to upland bird hunting in areas which are presently of very little value for that purpose. Logged over and beach areas of the Coast Range region could provide new habitat for upland bird hunting if well suited exotic birds can be found and successfully stocked in those areas.

Waterfowl

Migratory waterfowl are affected by conditions outside of the state as well as those within Oregon. Several forms are somewhat resident and others are merely migrants. The waterfowl which have been found in Oregon are given in Table 10. Lewis and Clark's observations of waterfowl were fairly well limited to the Columbia River and its tributaries (332, Vol. 3, p. 199-250). Explorers and trappers, such as Peter Skene Ogden (83), John Work (82) and others

Table 10. Waterfowl found in Oregon.

Mallard	<u>Anas platyrhynchos</u>
Gadwall	<u>Anas strepera</u>
American widgeon	<u>Mareca americana</u>
European widgeon	<u>Mareca penelope</u>
Green-winged teal	<u>Anas carolinensis</u>
Blue-winged teal	<u>Anas discors</u>
Cinnamon teal	<u>Anas cyanoptera</u>
Shoveler	<u>Spatula clypeata</u>
Pintail	<u>Anas acuta</u>
Wood duck	<u>Aix sponsa</u>
Redhead	<u>Aythya americana</u>
Canvasback	<u>Aythya valisineria</u>
Greater scaup	<u>Aythya marlina</u>
Lesser scaup	<u>Aythya affinis</u>
Ring-necked duck	<u>Aythya collaris</u>
Harlequin	<u>Histrionicus histrionicus</u>
American goldeneye	<u>Bucephala clangula</u>
Barrow's goldeneye	<u>Bucephala islandica</u>
Bufflehead	<u>Bucephala albeola</u>
Ruddy duck	<u>Oxyura jamaicensis</u>
American merganser	<u>Mergus merganser</u>
Red breasted merganser	<u>Mergus serrator</u>
Hooded merganser	<u>Lophodytes cucullatus</u>
Surf scoter	<u>Melanitta perspicillata</u>
White-winged scoter	<u>Melanitta deglandi</u>
Oldsquaw	<u>Clangula hyemalis</u>
Coot	<u>Fulica americana</u>
Whistling swan	<u>Olor columbianus</u>
Trumpeter swan	<u>Olor buccinator</u>
Canada geese	<u>Branta canadensis</u>
Western	<u>B. c. moffitti</u>
Lesser	<u>B. c. parvipes</u>
Queen Charlotte	<u>B. c. fulva</u>
Dusky	<u>B. c. occidentalis</u>
Cackling	<u>B. c. minima</u>
Black brant	<u>Branta nigricans</u>
White-fronted goose	<u>Anser albifrons</u>
Snow goose	<u>Chen hyperborea</u>
Ross' goose	<u>Chen rossii</u>

(105, 334), made observations of waterfowl throughout the state but left little useful information with regard to accurate identification and abundance. Actually very little was done toward establishing trends and migratory patterns in Oregon's waterfowl population until the late 1930's. Accurate and more detailed information did not become available until the 1940's (183; 184, p. 1-10).

Four principal fall migration routes cross Oregon from north to south. One follows the coastline, another the Willamette Valley, the third follows a line east of and paralleling the Cascade Mountains, and a fourth crosses the southeastern part of the state entering from a northeasterly direction. These migration routes appear to have remained unchanged for many years and were in all probability the same as those used at the time of white man's first explorations in Oregon. The changes that have occurred in the size and habits of the waterfowl populations along these routes have been mainly due to fluctuations in precipitation patterns and man's activity centering about his settlement, agricultural practices and industrialization.

Trends in waterfowl populations have been affected by changes in the nesting areas of the "prairie pothole region" in Canada. Much of this land has been drained and put into agricultural use, resulting in a loss of brooding sites for reproducing waterfowl (185, p. 39-50). Oregon's waterfowl populations have also been affected by the extremely drastic changes which have taken place in California, the

traditional and most important wintering area on the Pacific flyway. The extensive marsh areas of the Sacramento-San Joaquin River delta region have been diked, drained, and put into intensive agricultural use since the early 1900's. Reclamation of much of California's land suitable for wintering waterfowl began around 1912 (169, p. 3). The rice fields which replaced the native marshlands in California provided a new source of winter food for waterfowl. This type of agriculture has also tended to concentrate waterfowl in areas where they cause serious depredation on the rice crops.¹⁵⁵ Another area of critical crop depredation has been vegetatble growing area near the Salton Sea. This inland body of water was formed by an overflow from the Colorado River in 1905-06 and presently encourages a concentration of waterfowl which contribute to a high degree of crop depredation¹⁵⁶ in the irrigated lands surrounding it (169, p. 5).

Waterfowl have traditionally concentrated in certain areas along the Pacific flyway during migration. On November 5, 1805, Lewis and Clark recorded the number of waterfowl in the vicinity of Sauvie Island to be so great that their noise kept the explorers awake

¹⁵⁵ Waterfowl caused an estimated loss of \$905,000 to the rice crop in 1942. Their value in sport hunting, however, was estimated at \$30 million in 1949 (353, p. 176).

¹⁵⁶ Waterfowl damage to lettuce and irrigated pasture in the Imperial Valley exceeded \$5 million during the 1943 to 1944 winter season (353, p. 176).

during the night. They noted swans, "white and black brant," ducks an immense number of sandhill cranes (332, Vol. 3, p. 199). Lewis and Clark also mention "great numbers" of swans, geese, brant, and ducks near the mouth of the Columbia River during the same month and throughout the winter (332, Vol. 3, p. 250; 332, Vol. 4, p. 149-153). Waterfowl remained abundant on both the lower and upper Columbia River into the late 1800's. John M. Murphy, a writer who visited Oregon in the 1800's, recorded both whistling and trumpeter swans as having been so abundant near the mouth of the Columbia River that they appeared as "cumulus clouds" in late autumn (211, p. 223). Murphy also mentions both whistling and trumpeter swans as being "exceedingly common" around the Klamath lakes and the Willamette, Columbia, and Snake Rivers (212, p. 331). Nash, a pioneer writer, stated that "large flocks of waterfowl, mainly made up of Canada Geese and a few snow geese, arrived in the Willamette Valley around the last part of October in the 1800's." He said that mallards, teal, pintails, gadwalls, redheads, lesser scaups and wood ducks remained in the area all winter (215, p. 93). In 1870 ten thousand ducks and hundreds of geese were seen in a twenty acre field near Hillsboro, Oregon. At that time it was common to see steady migrations of geese, swans and sandhill cranes, lasting for weeks at a time (359, p. 41). Conditions had changed drastically by 1908 and John Minto, a pioneer in the Willamette Valley in the 1840's,

stated that in 1908 the Willamette Valley had largely "ceased to be" the home of waterfowl, wading and shorebirds. He mentioned that waterfowl were so abundant in the Willamette Valley in the 1840's that accounts of such abundance seemed "unbelievable" to people who first came into the area in 1908 (199).

The population of waterfowl along the coastal bays was also very large in the mid and late 1800's (354). The marshes and extensive wetlands bordering the Coquille River and areas near the mouths of other coastal rivers provided exceptionally good waterfowl habitat. One of these areas was a marsh which has since become the center of the City of Coquille (263, p. 187).

A great deal has already been said concerning the subject of market hunting at the turn of the twentieth century.¹⁵⁷ That information indicates that a profusion of waterfowl and associated waterbirds existed in the Klamath and Malheur areas in the late 1800's. The first scientific accounts of waterfowl in eastern Oregon were given by Captain Charles Bendire when he was stationed at Camp Harney from 1874 to 1877. Included among the waterbirds at Malheur was the sandhill crane which was "very common" and bred in the area. He noted that no whooping cranes were found. The swans which were present were mainly whistling swans, which were found in large

¹⁵⁷ See the section on market hunting and William L. Finley.

flocks. Bendire's account of the relative abundance of various species of waterfowl has been helpful as a comparison with later periods at Malheur¹⁵⁸ (338).

Wildlife protection and increased precipitation following the market hunting period at Malheur helped in the recovery of losses experienced earlier. A period of "wet years," or relatively high precipitation, occurred in eastern Oregon from 1906 to 1916 (348). During January 1916 approximately 15,000 swans were present on Malheur Lake (338). A drought began, however, in eastern Oregon in 1917 and continued until precipitation reached a low in 1924 and a second low in 1931. During these years, a serious decline in waterfowl took place across the entire North American continent (185, p. 500).

In general, developments in Oregon during the early 1900's had an adverse effect on waterfowl. As stated earlier,¹⁵⁹ Lower Klamath Lake was drained, and Malheur Lake was drying up. Only a small flow of water was entering Malheur from the Blitzen River on the south and in 1924 the Silves River from the north went dry.¹⁶⁰ By

¹⁵⁸ See section on William L. Finley and government agencies.

¹⁵⁹ See section on early legislation and protection.

¹⁶⁰ In 1914 the Geological Survey indicated that Silver Creek, flowing into Harney Lake, was issuing enough water to irrigate 30,000 acres of land. This, too, was dry in 1924 (264, p. 112).

1925 Boca Lake, Swan Lake, the lakes in the Warner Valley such as Flagstaff, Bluejoint and a series of other smaller lakes were all dry. Goose Lake was reduced to less than half its size from the earlier 1900's, Silver Lake went dry in 1918 and the situation was generally critical. In the fall of 1925, western duck sickness (botulism) broke out at Malheur and killed a large number of waterfowl. This disease also took a great many waterfowl at Tule Lake and in the Sacramento marshes of California during the same year (216).

The general problems for waterfowl during this period were the same as those of other wildlife populations. White man's occupation of many former wintering areas caused waterfowl to change their wintering habits or relocate in less favorable sites. Reclamation and the competition for water to irrigate crops reduced nesting, feeding and resting areas for a great many waterfowl and associated waterbirds. This activity continued up into the 1930's when an intensive restoration program in conjunction with protective legislation and beginning systematic management stemmed the tide which was rapidly depleting the waterfowl resources.¹⁶¹

The waterfowl situation from the 1930's to the present time has been one of improvement in the areas of waterfowl habitat management and the accumulation of scientific data concerning life histories and

¹⁶¹ See the section on William L. Finley and government agencies.

migratory patterns. The cooperative efforts of the U. S. Fish and Wildlife Service and the Oregon State Game Commission have contributed to increased refuge areas (see Table 11) and have provided a scientific basis for setting harvest and season regulations. However, the inimical factors of adverse dry conditions and an ever-increasing demand to convert habitat for man's other needs continue to grow at a rate which may be exceeding beneficial effects of waterfowl management.

Table 11. Waterfowl kill by years 1950-1967.^a

Year	Hunters	Total waterfowl harvest
1950	68,130	639,488
1951	75,589	903,847
1952	77,257	961,246
1953	73,661	731,821
1954	71,507	870,707
1955	67,577	901,523
1956	64,642	754,006
1957	67,674	871,591
1958	67,819	890,579
1959	59,496	694,524
1960	54,673	532,926
1961	49,361	462,156
1962	47,185	408,578
1963	46,498	425,795
1964	46,121	433,948
1965	44,470	392,651
1966	49,790	490,610
1967	50,825	587,867

^aThese kill figures hunter numbers were made available by the Oregon State Game Commission. Figures prior to 1950 give birds per day in a random sample of hunters' bags but do not indicate estimated total waterfowl kill in the same manner as the figures given here.

The number of waterfowl hunters in Oregon increased from less than 10,000 in 1935 to a peak of 77,257 in 1952 (249, Vol. 5, p. 82). The recent trend in numbers of waterfowl hunters and total kill is shown in Table 12.

Condor

Although songbirds, birds of prey, scavengers and other miscellaneous birds have not been treated in this analysis, the condor was chosen as a representative of the sudden influence of white settlement upon the native bird populations of Oregon. The original range of the California condor apparently extended from areas in Lower California and along the Pacific Coast to parts of Washington. Although the general eastern boundary of the condor's range appears to have been the Cascade Mountain Range and the foothills of the Sierras, it also extended eastward up the Columbia River Valley (126).

Lewis and Clark found condors feeding on the meat of a beached whale near the mouth of the Columbia River on November 18, 1805. Condors remained in that area throughout the winter and were commonly seen (332, Vol. 4, p. 328). David Douglas found that the condor was abundant between Celilo Falls and the mouth of the Columbia River. The largest group mentioned was that of nine condors in one flock seen near the present site of Harrisburg on October 3, 1826 (65, p. 216). Douglas shot specimens near Estacada,

Table 12. The National and State Wildlife refuges in Oregon which benefit waterfowl. 318

Refuge	Established	Acres ^a	Purpose
Malheur	1908	180,851	waterfowl nesting, migration rest area, and waterfowl hunting
William L. Finley	1964	5,334 ^b	Dusky Canada geese and other waterfowl, limited hunting
Upper Klamath	1928	12,533	Nesting and resting area for water fowl, waterbirds, and shore birds. Limited hunting
Cold Springs	1909	3,117	Resting and feeding an area for Canada geese and ducks in the late fall. Waterfowl hunting
McKay Creek	1927	1,837	Resting and feeding area for Canada geese and ducks during the fall. Waterfowl hunting
Klamath Forest	1958	15,226	Nesting and resting area for migrating waterfowl. Waterfowl hunting
Camas Swale	1942	2,700	Resting and wintering area for waterfowl and managed hunting
Government Island	1949	2,565	Waterfowl wintering and hunting
Klamath	1949	7,656	Migratory and waterfowl resting and feeding area. Wintering
Sauvie Island	1947	12,129	Wintering area and managed hunting
Summer Lake	1944	17,400	Waterfowl nesting, resting and managed hunting

^a Approximate size in 1968

^b Additional areas associated with this refuge are located in the Willamette Valley.

which were sent back to England (66). The railroad survey party of 1853-1855 sighted the condor along the Columbia River in January, 1854. They noted that the condor visited the Columbia River in the fall when a great number of dead salmon lined the shores (347, Vol. 12, p. 141). The condor remained common in the Umpqua Valley until at least 1852 (124). Among the last observations made of the condor in Oregon were sightings made near Drain in March, 1904 (97).

The condor was not harmful to the white man in Oregon but apparently due to its conspicuous nature and "repulsive" appearance it was an obvious target for hunters (97). Their habit of frequent bathing along water courses may also have made them vulnerable. The ultimate disappearance of the condor from Oregon appears to have been one more case of a wild population's incompatibility with white civilization, mainly because man's presence in greater numbers quickly hazed the inherently shy condor from its former range.

Native Furbearers

Sea Otter

Oregon's sea otter was probably the southern sea otter (Enhydra lutris nereis). Prior to the "seal treaty" which was signed in 1911 to protect fur seals and sea otters, the sea otter was

unprotected on the Pacific Coast. Following up the 1911 treaty, an enabling act was signed in 1912 which made it illegal to sell sea otter pelts in the United States and Canada (20, p. 72).

The maritime fur trade which was carried on in the late 1700's was the beginning of the decline of Oregon's sea otter population. Sea otters were still more abundant off the coast of Oregon in the late 1870's than they were farther north because they had been hunted less. The coastal Indians at that time employed several methods of hunting sea otters. One method was to surround them with canoes and shoot them when they were forced to surface for air. A second method was hunting them during heavy storms when they sought shelter among the rocks. The storm covered the noise of the Indian's approach and the sea otters could be clubbed to death before they could return to the water. It was possible for an Indian to earn from 200 to 1,100 dollars per season by hunting sea otters (212, p. 16).

The methods used by commercial white traders for sea otter hunting were: clubbing, netting, pedestal hunting, schooner and "bidarka" hunting. Of these methods pedestal and schooner hunting were apparently the most popular in Oregon and Washington. Pedestal hunting consisted of erecting a scaffold twenty to thirty feet high and then shooting the otters from a platform with a "long range rifle." It is estimated that in the 1870's fifty schooners were employed in Oregon and Washington for the exclusive purpose of sea

otter hunting. They ranged from ten-ton ships with Indian crews to very large clippers. The hunting was done during the winter months and small boats were put over the side when a herd of otters was located. They were then quickly surrounded and the circle closed until the otters were trapped in the center. The hunters then used bows and arrows, rifles and shotguns to kill the otters as they surfaced for air (36).

The exact date of the disappearance of the sea otter from the Oregon Coast is unknown but it probably took place well before 1900 (13, p. 304). Since that time no attempt has been made to restock these animals in their original habitat along the Oregon coast. It is possible that if such attempts were made, shellfishermen and others with commercial fishing interests would resist on the grounds that these animals could cause excessive depredation on the shellfish harvest.¹⁶² It would seem unlikely that sea otters would take many shellfish, based on the study of the food habits of the southern sea otter which re-appeared off the coast of Monterey County, California in 1938. In that location, their diet has consisted mainly of abalone (Haliotis spp.) and sea urchins (Strongylocentrotus spp. (32, 103).

¹⁶² These views are based on discussion between the writer and Oregon commercial shellfishermen, in 1965 and 1966, concerning the possibility of such a restocking program.

Beaver

The fact that the Hudson's Bay Company and other fur companies established themselves in Oregon testifies to the abundance of beaver in the past. Records since those of Lewis and Clark's account for a tremendous number of these animals in Oregon's lakes and streams in the early 1800's (82, 83, 85, p. 51). The Hudson's Bay Company's operations in the Northwest were based primarily on the harvest of beaver pelts. White trappers, aided by Indians, trapped practically every lake and stream in the state from 1811 to the 1840's in an intensive effort to obtain every possible skin.¹⁶³ Governor Simpson of the Hudson's Bay Company told H. V. Addington, Commissioner of the Northwest Coast, in a letter dated January 5, 1826, that much of the fur trapping was exhausted in the valley areas at that time but the "back country" was still considered to be productive (194, p. 262). These trapping efforts declined as American settlement offered other employment and the yield of pelts decreased. Trapping did continue, however, until 1895 when official protection was given to the beaver in Malheur and Baker Counties (234, p. 98). In 1899 the beaver season was entirely closed for a period of twenty years (235, p. 133).

¹⁶³ The total value of pelts taken by the Hudson's Bay Company in Oregon in one year (1839) was about 140,000 pounds sterling. At this time one beaver pelt brought an average price of one pound, five shillings (85, p. 55, 60).

Statements have been made to support the idea that much of the fertile land and efficient water sheds found by white man upon his arrival in Oregon were due to the activity of beavers. They indicate that much of the rich bottom land in western Oregon was formed by the eutrophication of beaver ponds. Certainly many of the meadow areas found in mountainous regions and in eastern Oregon's drier areas are the direct result of former beaver habitation (19, p. 764; 35; 38, p. 1097). Reportedly these beaver dam deposit areas such as those in the Willamette Valley have yielded rich harvests.¹⁶⁴ In addition to leaving these rich land deposits the beaver exerted a major water conservation force in nearly every watershed. This was upset very early in the history of white man's settlement when most of the beaver were trapped out. Early agricultural practices between 1848 and 1908 further depleted these watersheds through drainage and the removal of cover (199).

It has not been practical from an economic point of view to allow the beaver to return to its former abundance. The period of protection extending from 1895 (234, p. 98) to the present time has been marked by control measures set up to regulate the beaver whenever it came in conflict with man's interests. A period of live

¹⁶⁴The harvest reported from these lands in the 1870's were 1200 bushels of onions, 70 to 80 bushels of wheat, or 700 to 900 bushels of potatoes per acre (315, p. 30).

trapping and transplanting beaver took place in various parts of the state from the 1930's to the 1940's through the cooperative efforts of the State Game Commission and the U. S. Bureau of Biological Survey (250). This action was an attempt to remove beaver from complaint areas and to transplant them to more remote regions to replenish depleted stock.

From 1941 through 1947, 3,542 beaver were trapped by state trappers on lands where they caused damage (249, Vol. 1, p. 58). In the past twenty years trapping by licensed trappers has decreased steadily from a record high of 2,681 in 1946-47 to only 787 for the 1965-66 trapping season (249, Vol. 18, p. 135).

Presently Oregon's beaver are being managed by control or containment. The Oregon State Game Commission receives over 200 complaints per year concerning beaver damage (249, Vol. 19, p. 150). Game Commission personnel are assigned to remove these "complaint animals" by means of live or dead trapping, issuing kill permits to land owners, or supplying repellants to individuals who have suffered crop loss from beaver damage. It appears that Oregon's beaver management program will continue in this way for some time to come.

Mink

The general downward trend in the fur catch in recent years

has been primarily a result of relatively low fur prices rather than changes in the abundance of furbearers. The average pelt price for mink in 1966-67 was \$5.62. The mink catch reported for that season was only 1,300 animals (249, Vol. 19, p. 151). By contrast the 1928-29 harvest price per pelt was \$7.78 and the harvest of mink was 7,342 animals (118, Vol. 2, p. 249; 250, Vol. 21, p. 33). The mink is now well distributed throughout most streams, lakes and the coastal areas of the state and is presently in little danger of being overtrapped.

Muskrat

The muskrat was originally distributed throughout the major river drainages along the coast and in eastern Oregon (13, p. 217). Introductions by private individuals have subsequently extended its range to practically every suitable habitat within the state (249, Vol. 1, p. 36). During periods of high fur prices the muskrat exceeded all other furbearers in number taken throughout the state (250, Vol. 21, p. 33). In the past fifteen years lower fur prices have brought about a general decline in the number trapped. The 1953-54 catch was 63,052 compared with 32,740 taken during the 1966-67 trapping season (249, Vol. 19, p. 151; 250, Vol. 21, p. 33). The average price per pelt has declined from \$2.08 in the 1945-46 season, when 69,945 were taken, to a present level of eighty-five cents.

Muskrat are generally beneficial to waterfowl populations because they thin out emergent vegetation and their houses provide nesting sites for waterfowl. Their population has been kept in check at Summer Lake through a program of trapping on a regulated basis. Fluctuating water levels at Summer Lake in recent years have caused a sharp decline in the muskrat population there and none have been trapped since 1965 (249, Vol. 19, p. 154). Aside from general trapping regulations and the management of muskrats on waterfowl areas such as Summer Lake, little is being done to manage the muskrat in Oregon.

Otter

The otter has been subjected to relatively steady trapping pressure throughout Oregon's history. They were taken along with beaver by the early trappers and their relatively high market value has accounted for a continuous trapping effort. Lewis and Clark found otters to be plentiful in the small streams and rivers joining the coast and along the Columbia River up to Celilo Falls (332, Vol. 3, p. 308). The total catch of these animals has remained somewhat steady in recent years perhaps because the average price per pelt has remained relatively high. Lane, Coos and Tillamook counties in western Oregon, and Malheur, Baker and Klamath counties east of the Cascade Mountains are presently producing the highest annual harvest

of otters. The otter population remains fairly steady and does not appear to be in danger of depletion by trapping (249, Vol. 19, p. 153). Currently trapping regulations are the only means of management used to control otter populations in Oregon.

Fisher

Lewis and Clark state that the fisher was found "in the woody country" of the Oregon coast (332, Vol. 4, p. 93). The solitary nature and relatively remote habitat of the fisher have been reasons why very few of these animals have been reported in the literature since the period of white settlement. Their original distribution included the Cascade and Blue Mountains. Bailey's 1936 map of their distribution is broad and covers much territory where suitable habitat has long been absent (13, p. 299).

Trapping records for 1913-14 show that fishers were taken in Lane, Curry, Douglas, Josephine, Marion, and Umatilla counties (280). Several of these animals were taken each year in the state up until the 1936-37 season, after which time they were completely protected by legislation.¹⁶⁵ Sporadic sightings were made of fishers throughout the state from 1937 until 1961 with the last reliable sightings made in the Cascade Range during 1949.

¹⁶⁵ The last year that the fisher was legally trapped was 1937 (251).

The fisher was re-introduced in 1961 by the Oregon State Game Commission in an attempt to control porcupine populations which were causing damage to the state's forests. In cooperation with the British Columbia Fish and Game Branch, the U. S. Forest Service, U. S. Air Force, and private agencies, the Game Commission obtained twenty-four fishers from the Kamloops area of British Columbia and brought them to Oregon. In mid-January, 1961, eleven animals were released by helicopter near Buck Lake in Klamath County. In mid-March of the same year six were released at the mouth of the Little Minam River and seven on the Big Burn area in Wallowa County (159). Since these releases were made occasional sightings have been made and protection has continued. Management of these animals, however, is presently limited to protection alone.¹⁶⁶

Marten

The range of the marten is essentially the same as that of the original range of the fisher. Although they both occupy the same habitat, they are believed to be different enough in niche requirements to be able to coexist. Lewis and Clark found martens near the mouth of the Sandy River in April, 1806 (332, Vol. 4, p. 246). Martens

¹⁶⁶Information on the size of the present population and the effect of the fisher on the porcupine population in areas where they were released is lacking.

have been taken by trapping in Oregon since the beginning of the continental fur trade, but they have been most heavily trapped during periods of high fur prices. During the 1913-14 trapping season, 518 martens were taken with the largest numbers coming from Klamath, Union, Grant, Baker and Curry counties (280). The average market price of nearly thirty-four dollars each in 1945 and 1946 gave incentive for trappers to go into more remote areas in pursuit of martens (249, Vol. 1, p. 138), but today's market value of around six dollars per pelt (249, Vol. 19, p. 153) does not appear to threaten the widely scattered marten population. There was no open season on martens from 1937 to 1945 and they were again completely protected from 1947 to 1950 (249, Vol. 1, p. 64; 249, Vol. 5, p. 101).

Wolverine

The wolverine (Gulo luscus) has been mentioned very little in Oregon's historical records. Its solitary habits and remote range have apparently permitted it to go unnoticed for a great many years. Reports were made of wolverines in the Mount Hood area in 1896 and a record is given of one caught west of the Three Sisters area in 1912 (13, p. 300). No verified accounts of the wolverine in Oregon were made for nearly fifty years until several reports of sightings were made in the early 1960's. On September 11, 1965, a large male, weighing twenty-eight pounds and measuring forty-two inches

in total length, was shot by a deer hunter on the north slope of Three-Fingered Jack in eastern Linn County (160). Since that time wolverines have been sighted elsewhere in the central part of the Cascade Mountain Range. Sightings by Game Commission employees include the Waldo Lake area which is very near the location where the wolverine was caught in 1912 (204).

These recent verifications of the wolverine in Oregon indicate that sufficient numbers may exist for reproduction to take place and thereby make the wolverine a significant part of the state's wildlife population. The sudden reappearance of the wolverine has given rise to some speculation concerning their origin. The question which has developed is whether they are a part of a native population, migrants from neighboring states, or illegally introduced animals brought in by an unknown "benefactor." The wolverine was classified as a furbearer in 1967 (249, Vol. 19, p. 149) and has been given complete protection from hunting and trapping since that time.

Introduced Furbearers

Opossum

The Virginia opossum (Didelphis virginiana virginiana) is thought to have been first released in Oregon between 1910 and 1921. This introduction was made by private individuals in the McKay Creek

area of Umatilla County. Trappers in this area took more than fifty of these animals in the late 1920's and early 1930's (152). Perhaps mainly due to the wide temperature range and semi-arid conditions in this area the opossum has never become abundant, but it has persisted in relatively small numbers.

During the late 1930's a significant introduction of the opossum into the state did take place, however, at the Civilian Conservation Corps camp near Warrenton, in Clatsop County. Members of the camp brought a number of opossums with them from the southeastern United States and these animals were released when the camp disbanded early in the 1940's. By 1946 these opossums had extended their range well up the lower Columbia River and as far south as the Nehalem River (158, 255).

The opossum has continued to extend its range from Clatsop County, with animals being trapped in Columbia County in 1951, Multnomah County in 1952 and Clackamas County in 1953 (249, Vol. 3-5). At the present time they have spread southward up the Willamette Valley and will probably very shortly fill all available niches in western Oregon.¹⁶⁷ One of the particular "nuisance areas"

¹⁶⁷ Personal sightings of the opossum have been made by the writer in the area south of Eugene and trapping records (249, Vol. 17) indicate that they may now extend as far south as Josephine and Jackson County.

for the opossum is the City of Portland. Most of the metropolitan area is set aside as a refuge and no hunting or taking of wildlife is allowed within its boundaries. The U. S. Fish and Wildlife Service personnel in the Portland area are on continuous call to remove "complaint animals" from the city limits.¹⁶⁸ Bailey remarked in 1936, "Fortunately the opossums have sufficient value for food, fur and sport to preclude any danger of their becoming a pest" (13, p. 393). Unfortunately the present value of the opossum is nil and they have become merely pests. Presently the opossum is considered to be a non-game animal.. They are unprotected and their removal is encouraged by state and federal agencies. Even if a concerted eradication campaign were to be undertaken, it does not appear that the opossum could be entirely removed from the state. In all likelihood it will remain in Oregon as an unwelcome addition to the state's fauna.

Nutria

Oregon's first feral nutria (Myocaster coypus) were introduced by fur farmers. In 1937 a number of nutria were released by a fur farmer in Tillamook County (176). No authentic records exist to show

¹⁶⁸The writer has personally answered many telephone complaints from citizens concerning opossums within this area.

the exact time and place of all early escapes into the wild, but by 1946 enough animals had escaped to establish wild populations in several areas. These first wild or feral populations were established in the Portland area and between Toledo and Elk City in Lincoln County (158). In the 1950's¹⁶⁹ the "Oregon Purebred Nutria Associates Inc.," promoted the sale of nutria to prospective "fur farmers" throughout most of western Oregon. Magazine and newspaper articles extolled the "riches" to be gained by the sale of nutria pelts on the world fur markets. In 1955 when much of the promotion was being done, wild nutria furs were selling for three to four dollars each on the world market. Nevertheless, Oregonians were convinced by promoters' demonstrations, like the one at the "Home Show" in Portland during the fall of 1954, to buy breeding animals. Associate offices in Portland, Salem and Grants Pass handled the sale and registration of "purebred" nutria to gullible buyers. At that time a breeding pair was priced at \$950 and a "trio," two females and one male, listed for \$1550 (301).

By the late 1950's and early 1960's, the nutria market had become so depressed that furs were worth as little as fifty cents to one dollar. During that period most of the nutria farmers gave up

¹⁶⁹ This information is based on the accounts given in the Oregonian (301) and discussions by the writer with former nutria raisers.

their operations and many nutria were either released or escaped captivity through poorly constructed pens or swimming troughs. The feral nutria, which has extended its range over nearly all of the river drainages in western Oregon and which has recently appeared in eastern Oregon, has become an increasing liability to the state's agriculture and watersheds by burrowing in stream banks and causing erosion. The numbers taken by trappers in the state have increased from seven per year in 1951-52 trapping season to 2878 in the 1966-67 trapping season (see Table 8). The nutria is presently an unprotected non-game animal and it is expected that it will retain its nuisance status for a long period into the future.

A Summary of Furbearers

Furs have been an important source of income for trappers and bounty hunters within the state at various times up until recent years. Changing markets for furs have made various species of furbearers important at different times. The high prices paid for furs during the 1920 era caused a great many furbearers to be taken at that time. Suggestions were made in 1921 for the establishment of extensive refuge systems in "remote mountainous sections of the state" for the protection of fur-bearing animals (250, Vol 3, p. 9). Programs were established, as early as 1923 and 1924, to improve the catch of principal fur-bearing animals (250, Vol. 5, p. 22). The opening

dates for trapping furbearers were changed for example from November 1 to December 1 in 1929 to allow catches of more prime animals (250, Vol. 7, p. 14). Throughout the 1930's and 1940's fur trapping constituted an important part of the income of farmers, school boys and professional trappers. Following World War II the market value for long-haired fur animals such as coyote, bobcat, skunk, raccoon, fox and badger declined. This resulted in a reduction in trapping pressure on these animals. Marten, mink and otter, however, continued to bring relatively high prices and were still sought after.

Since the post-World War II peak of 2,581 trappers (249, Vol. 1, p. 62), a steady decline in trappers and the prices of raw furs has taken place. Only 879 resident trapping licenses were sold for the 1966-67 trapping season (249, Vol. 19, p. 149). These trappers were allowed to take all animals classified as furbearers except two, the wolverine and the fisher, which are given complete year-around protection (see Table 8).

Non-Game Mammals

Among the hunted but not protected mammals of Oregon are the rabbits. The black-tailed jack rabbit (Lepus californicus) inhabits open areas or brush habitat east of the Cascade Mountains and has invaded parts of western Oregon, particularly in the lower Willamette

Valley and southwestern Oregon. The white-tailed jack rabbit (Lepus townsendi) is primarily an animal of the sagebrush regions of eastern Oregon. The third member of the hare family, the varying hare or snowshoe rabbit (Lepus americanus) is distributed throughout most of the timbered country in Oregon, particularly at higher elevations. Four members of the cottontail family are residents of Oregon. The eastern cottontail (Sylvilagus floridanus) has been successfully introduced in the Willamette Valley. The Oregon or Rocky Mountain cottontail (S. nuttalli) is found in the sagebrush and range lands throughout eastern Oregon. The pigmy rabbit (S. idahoensis) is also found in eastern Oregon, primarily in the denser sagebrush regions of the southeast. The fourth cottontail, the brush rabbit (S. bachmani) is a resident of heavy brushy cover on the west side of the Cascade Mountains.

Rabbits have not been hunted heavily for food but rather as varmints or non-game "sport animals" by white man since his arrival in Oregon.¹⁷⁰ Fluctuating rabbit populations, which often appear to be cyclic, have resulted in relatively large periodic build-ups of jack rabbits which have caused serious depredation to

¹⁷⁰ The Snake Indians or northern Paiutes and other eastern Oregon tribes made use of rabbits as a source of food and clothing prior to white settlement, and rabbits in this area were "scarce" in 1832 (303, Vol. 1, p. 206).

agricultural crops in eastern Oregon in past periods. Livestock interests brought about the removal of predators in parts of eastern Oregon following the turn of the twentieth century. New methods of irrigated farming resulted in the creation of attractive green vegetation in the middle of otherwise arid regions. These green areas encouraged large jack rabbit populations to concentrate there where they caused extensive agricultural damage during the early 1920's (13, p. 99-107).

The badger (Taxidea taxus) is a resident of the mountainous, range, and desert regions of eastern Oregon. The badger causes a certain amount of damage as it burrows for rodents in fields and along irrigation ditches in eastern Oregon. Its economic importance as a furbearer in the past and its value as a control on rodents has also been significant. Another burrowing mammal of eastern Oregon, the yellow-bellied marmot (Marmota flaviventris) has been destructive to crops and it is presently hunted as a varmint. The porcupine (Erithizon dorsatum) is widely distributed throughout the forested portions of eastern Oregon, in the Cascades and occasionally west of the Cascades. Extensive control programs have been initiated, mainly with the use of poison bait stations. These measures have been taken to prevent porcupine damage to second growth timber. A recent attempt at biological control was the re-introduction of the fisher to Oregon in 1961.

The raccoon (Procyon lotor) is common throughout Oregon particularly along streams and oceanside areas. Its principal value was once that of a furbearer but in recent years the low market value for long-haired fur has decreased trapping pressure and it is no longer considered a protected animal. Raccoons have brought about a great many damage complaints in local areas, particularly in fruit and vegetable growing locations. One of the most intensive complaint areas is the Portland metropolitan area. There both the raccoon and opossum inhabit niches within the limits of the city game refuge where they cannot be hunted. The Oregon State Game Commission and the U. S. Fish and Wildlife Service, Bureau of Sports Fisheries and Wildlife's Predator and Rodent Control personnel are continuously plagued by complaints from Portland residents for the removal of these animals.¹⁷¹

The ring-tailed cat (Bassariscus astutus) is found only in the southwestern and the south central portion of Oregon. It is protected by a closed season, and apparently does a great deal to help control rodent populations. In contrast to the raccoon, the ring-tailed cat generally inhabits areas remote from human habitation and therefore has not caused man much discomfort.

¹⁷¹ The writer received many of these complaint calls during service with the Oregon State Game Commission in 1967.

Summary of Management Techniques

The earliest effort made toward wildlife management in Oregon was controlled burning by Indians. Bounty laws were the next deliberately employed method as predator extermination movements began in the 1840's. A period of legislation and protection began in the late 1800's and law enforcement remained the major form of wildlife management until the 1920's. At that time the emphasis was put on the establishment of wildlife refuges or inviolate areas where it was hoped game animals would reproduce and return to former abundance levels.

The refuge system became inadequate by the mid and late 1930's and had even caused new problems, this time in areas of local overabundance rather than depletion. The protective legislation passed in the 1920's had to be liberalized to allow the harvest of certain overabundant big game animals. The late 1920's and early 1930's were also periods of vast new introduction programs for exotic game birds. The idea of stocking game birds which were propagated on game farms seemed to be the hope for meeting the demands of a growing number of hunters.

These acts of legislation, law enforcement, and stocking were not sufficient to meet the needs of an increasing number of hunters in the late 1930's and early 1940's. Biological investigations by federal

and state agencies led to the realization that habitat had to be improved if game animals were to increase. It was determined at that time that unless the habitat was suitable, the game animals stocked would soon disappear. In the late 1940's and the 1950's, habitat improvement and biological investigations largely supplemented the older methods of stocking, protection, and predator annihilation. From the 1950's to the present time wildlife investigations have chiefly consisted of big game winter range investigations and attempts to solve problems between big game herds and economic interests, such as agriculture and forestry. Waterfowl banding studies and studies on upland game species have taken place on a comparatively limited scale. Non-game animals have essentially gone unmanaged in Oregon as they have nearly everywhere else. Since World War II, decreased fur prices and more rewarding employment outside of the area of fur trapping have led to little interest in fur bearers and their management.

The change in management from a system of regulated put-and-take to one of studying habitat limitations for the support of wildlife was a major one for wildlife in Oregon. The habitat improvement program which started in the late 1940's was the first concerted effort in Oregon to actually improve environmental conditions for wildlife on a large scale. The planting of cover vegetation for upland game, waterfowl, and big game, were forward steps in wildlife

management. The installation of watering devices for upland game birds and water holes for big game were also progressive attempts to improve on nature. The erection of wood duck nest boxes and goose nesting platforms was also a part of this program.

This habitat improvement program has continued up to the present time. The outlook for the program is not as optimistic as it was in the 1950's and many of the plantings which were tried at that time have since proved to be failures. There is reason, however, why this program should continue, and constant efforts in the area of habitat improvement are important if the environment is to be managed more effectively for given species.

The management of Oregon's wildlife has been largely dependent on the support of sportsmen. No appropriations are obtained by the Game Commission from the general fund or taxes. Approximately 77% of the Game Commission revenue comes from the sale of licenses and tags, 18% from federal sources and the remaining 5% from leases, land assets and fines (324, p. 3).

Oregon's sportsmen have been used to conditions of quality hunting and fishing. They have always expected a high success in both hunting and fishing and have expected the Game Commission to keep up the supply of the most popular forms of game animals for these purposes. With this type of demand the Game Commission has necessarily had to exert the major portion of its management efforts

in areas of big game, upland game (mostly pheasant) and waterfowl management. Non-game species and those game animals which are of little interest to license holders have therefore been largely ignored.

This type of management, perpetuated by necessity, may be creating a liability in the area of unstudied and poorly understood life habits of animals which will some day have to be added to the list of managed wildlife. The growing number of hunters will require more and diversified forms of wildlife as objects of sport hunting. As this new demand occurs, the absence of knowledge concerning the management of newly designated game animals will become apparent.

Changes in management techniques, such as the allowance of more either-sex deer and elk hunting from the 1950's on, have temporarily satisfied the demands of the increased hunting opportunities, and new methods to meet the demands of hunters will have to be found. These opportunities may have to be based on creating an interest in hunting what are currently thought of as non-game animals or those forms which are not now popular with hunters.

CHAPTER IX

TRENDS AND ANALYSIS

Human Population

In 1940 after one hundred years of white settlement, Oregon's population had reached a figure of one million. Since that time this figure has more than doubled. See Figure 6. The upward trend in population in recent years has been largely concentrated in the Portland metropolitan area.¹⁷² During the years between 1940 and 1960, Multnomah, Clackamas, and Washington counties (the Portland Metropolitan Area), had a combined population increase of 276,665 persons or a 61 percent growth over a period of twenty years. Increasing suburbanization in Washington County brought about a 136 percent growth there. Outside the Metropolitan area other western Oregon counties have grown at significant rates. Lane County's 100,000 growth represents a 136 percent increase. Jackson and Benton counties each grew at a rate exceeding 100 percent and Douglas County surpassed all others with a gain of 166 percent. During this twenty year period eleven western Oregon counties accounted for

¹⁷²The population data for the Portland Metropolitan Area and counties given is based on a planning study conducted by Pacific Northwest Bell (273).

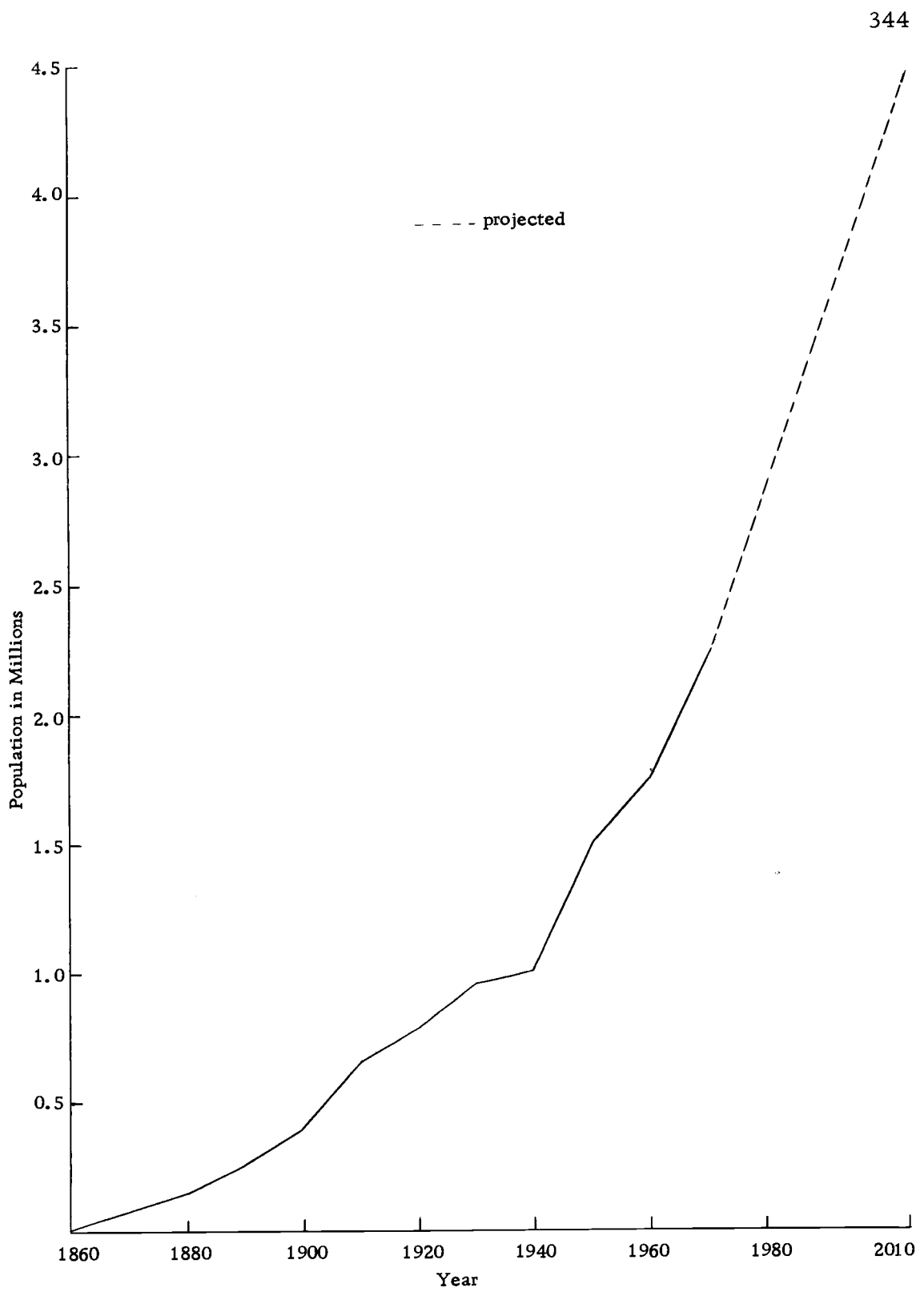


Figure 6. Oregon's Population Growth Rate and Projections - 1860 to 2010.

557,785 of the state's 678,613 population increase.

In the period from 1960 to 1965 the growth rate was approximately 10 percent. This will mean a 20 percent increase between 1960 and 1970 if the same rate continues. The total growth of the state's population for the period 1950 to 1960 was 16.3 percent. Part of the slower growth rate between 1950 and 1960 was due to a readjustment in the forest products industry which resulted from a decline following the building boom of the early 1950's. The immigration of people during the late 1950's was slowed partly because of the elimination of 20,000 jobs following the shut-down of smaller manufacturing mills (273, p. 19-20).

Improved economic conditions during the 1960's are expected to bring about a returned high rate of population increase in this decade. Between 1960 and 1970 the growth rate is expected to be 19.5 percent. The heaviest increase is anticipated for the counties extending southward from the Portland area to the California border. The 1970 to 1975 period is projected to be one of slightly increased population growth mainly in the urban centers outside the Multnomah County. A rate of growth of 10 to 12 percent for each five year period is predicted until the year 1985 (273, p. 22).

Oregon's population is expected to grow in the following

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manner:¹⁷³

1960	1,768,687
1965	1,948,400
1970	2,249,000
1975	2,502,000
1980	2,783,000
1985	3,096,000
2010	4,448,000

This total population increase may seem insignificant when compared with California's projected 66.5 percent increase in the period 1955-1975 (220, p. 26). California's growth may also appear to be unrelated to Oregon's future problem of providing a wildlife resource and other forms of outdoor activity to satisfy the increased demands of the future. But as California's population approaches thirty million in the next few decades, the residents of that state will show an increasing demand for Oregon's natural resources in all forms as their own natural resources fail to meet demands. The state park system and other agencies within Oregon are currently experiencing increasing pressure from out-of-state residents to provide adequate facilities for outdoor recreation during the peak seasons. This pressure can only increase in the future.

The rapid urban, suburban, and industrial growth projected

¹⁷³Population estimates based on Bonneville Power Administration estimates (30, p. 215).

for Oregon will occur mainly in the most fertile agricultural lands of the Willamette Valley. As the population increases in this area, the demands for outdoor recreation will call for more intensive management on all available lands suited for recreation. This is a two-fold problem. Demand for increased outdoor recreational areas will grow and at the same time decreases in land suitable for this purpose will take place.

The problems related to wildlife arising from human population growth are both real and urgent. In 1965 there were more than 330,000 licensed hunters in Oregon. By 1975 this number is expected to be at least 435,000 (324, p. 17-18). Provisions for this increase in number of hunters alone will call for more access to privately owned land and more extensive development of all state and federal hunting areas. An expansion of activities by all agencies related to conservation will be called upon to meet the increased demands. Damage complaints by private land owners can be expected to increase due to the activities of both wildlife and hunters. The most serious challenge facing the Oregon State Game Commission and other conservation agencies in the state is that of attempting to meet the demands of licensed sportsmen. The present trend of demand-to-yield ratio is already downward. It does not appear that even with the introduction of new game animals and the most intensive management program, a hunter success level comparable with that of the

late 1950's and early 1960's can ever be reached again (324, p. 17-19).

Private ownership of land is a crucial problem for wildlife management particularly with respect to upland gamebirds and waterfowl. Although Oregon is fortunate in this respect in having over half of its land area under public ownership, part of this land is relatively unproductive as wildlife habitat, and vast areas of it are inaccessible to the majority of hunters. From other points of view, the pattern of land ownership is unfortunate because federal ownership limits the tax base. Of the approximately 48 percent of the state that is privately owned, over 9,700,000 acres are commercial forest lands and nearly 2,500,000 acres are farmlands (324, p. 22). Access to hunting on the farmlands alone is controlled by more than 42,000 individual owners (324, p. 22). In recent years private land owners have become increasingly restrictive in the admission of both big game and upland hunters on their properties. Damage caused by abusive hunters and an increased competition for favorable hunting areas has led to denial of access or a charge for access in many cases (324, p. 22).

Forests

Prior to the time of the pioneers' arrival, the only forest clearing which was done was that which resulted from burning by the Indians or which beavers accomplished. Many older age class stands

of timber were found at the time of white settlement. Aside from land clearing and a very limited amount of logging, most of Oregon's forest reserves remained virgin until the 1870's.¹ Sawmills were in operation both at Newberg and Salem in 1837 but on a very minor scale. In 1849 thirty sawmills were in operation on the lower Willamette River and an estimated one million board feet of timber was shipped on schooners to California. Increased logging activity has taken place since that period. One of the most significant increases in lumbering activity took place in the Pacific Northwest in 1900 when companies like Weyerhaeuser Company organized. At that time Weyerhaeuser alone bought 900,000 acres of timberland in Washington from the Northern Pacific Railroad (84, p. 69-71).

Weyerhaeuser's first significant holdings in Oregon were ponderosa pine timberlands which they acquired in the Klamath Basin in 1906. The company has continued to acquire land in Oregon since that time and presently owns approximately 2,000,000 acres (335, p. 6).

The extensive logging practices which began at the turn of the twentieth century can only be described as irresponsible. The timber was available for the cutting and little thought was given to a possible exhaustion of such a vast supply. Extensive logging operations got under way in eastern Oregon also in the early 1900's. Excessive logging practices in Baker, Union, and Wallowa counties in the

period from 1915 to 1920 brought about almost entire removal and deforestation of vast stands of original timber (104, p. 13).

Abusive logging practices continued well into the 1930's. By the mid 1930's, the situation had developed into one in which, although Oregon still had one-fifth of all the timber in the United States, it had reduced its original 35,000,000 acres of forest to approximately 20,000,000 acres of "merchantable" timber (2, p. 205). At that time nearly 6,000,000 acres of burned or cut over area stood on the landscape. Logging practices were such that only approximately one-third of the tree came out as usable lumber. Natural reproduction was minimal and most of the cut-over land had no living trees on it. It was estimated that 60 percent of reforesting was unsatisfactory. The U. S. Forest Service reported that it had planted new trees on only 1,718 acres during 1929. Forest reproduction seems to have taken place despite man's efforts rather than as a result of them (2, p. 205-206).

Apparently nothing had been learned from the mistakes which had taken place in logging practices in the eastern and midwestern states. The mispractices in the timber cutting in Maine and Michigan apparently did not deter Oregon's loggers from utilizing similar techniques (2, p. 206). The natural functions of any watershed, especially those which contain steep slopes and receive hard rainfall, can be destroyed unless timber is removed in a conservative manner.

The extensive clear cutting, careless slash burning, and poor fire protection in the 1920's and 1930's could not be classified as either conservative or responsible. As one indignant writer described it,

The big lumbermen, small in number in each timbered state, keep in touch with all civic movements, including forestry associations and forest schools, employ foresters, and are ever ready to head off any movements inimical to their interests. Their sway in each timbered state apparently is great while virgin timber lasts. They confine their conservation activities largely to words, a few friendly gestures towards conservationists, and legislation that interferes but little with destructive woods operation (2, p. 210).

Of course all of Oregon was not exploited for timber and present day conditions indicate that state and federal regulating agencies have brought about improvement by fire control and regulation of the amount of timber cut on public lands. Much of western Oregon is heavily forested, especially the eight million acres in southwestern Oregon. Five counties, Douglas, Josephine, Jackson, Coos and Curry consist of 89 percent forest land.

Forest interests, even the conservation of forests, had both beneficial and inimical effects on wildlife and hunting. For example, fire protection has made some areas less valuable for deer hunting than they were in the past. Prior to fire protection in southwestern Oregon, numerous intentional and accidental fires were set by Indians and white man. The history of the use of fire by the Indians

has been well established¹⁷⁴ and their burning activities created excellent deer habitat.

Prehistoric fires cannot, however, be traced with much certainty from annual growth ring scars because few of the larger old age class trees remain. When fire scars are found the year of the fire can sometimes be obtained but the total area which it covered usually remains unknown. The extensive clearing capacity of fire can be seen by comparing the total cut of timber for several years in Oregon with the amount removed by the Tillamook fire of 1933. From 1925 to 1929 4.5 billion board feet were cut and from 1930 to 1932, 1.5 billion board feet. The Tillamook fire of 1933, alone, destroyed or killed 10 billion board feet of timber (104, p. 24-25).

The major forest fires in Oregon's history are shown in Table 13. The exact extent of these fires prior to 1900 are approximations and the effect of many smaller, unrecorded fires may exceed the major ones in total acreage burned. A great many fires burned over western Oregon in 1855.¹⁷⁵ Large fires of an undetermined size burned in the Coast Range west of Yamhill County and in the Cascades during 1857. From 1864 to 1867 large fires covered extensive areas

¹⁷⁴ See section on Indian population.

¹⁷⁵ The extent and location of the fires given here are documented in a study by Morris (206).

Table 13. Major forest fires in Oregon's history.

Area	Year	Extent in acres
Nestucca	1845	380,000
Yaquina	1846	450,000
Siuslaw and Siletz	1849	80,000
Yaquina	1853	480,000
Nestucca	1860	320,000
Silverton	1865	1,000,000
Coos Bay	1868	300,000
St. Helens	1868	300,000 ^a
Columbia River	1902	604,000 (170,000 in the Mount Hood area)
Tillamook	1933	367,000
Tillamook	1939	189,000
Tillamook	1945	173,000
Oxbow Ridge ^b	1966	42,875

(84, p. 84; 104; 130; 206; 258; 325)

^aIn Washington and Oregon^bCost of fighting Oxbow fire - \$958,413 (258).

of southwestern Oregon. Fires covered portions of the Rogue River Valley and Siskiyou Mountains in 1864 and vast areas of Jackson and Josephine counties including the Coast Range were burned over in 1867. Low rainfall caused further fire damage to southwestern Oregon, particularly in the Roseburg area in 1883 (206).

The change in the history of fire in western Oregon began about 1842 when the Indians were prevented by white settlers from burning the fertile valley areas. The settlers in turn were responsible for many of the large forest fires started in the mountains, or heavily forested areas, particularly during the first decade of pioneer settlement. For the peak migration period from 1845 to 1855 it is estimated that seven times as much land was deforested, mainly by fire, as in any of the three previous decades (206).

Logging operations, forest camps, and land clearing fires were started by early settlers during the mid and late 1800's. Many large forest fires were thought to have been maliciously set during this period. The Oregon City Enterprise printed an editorial call to action on October 5, 1867.

Save the Timber. The Mountaineer protests against the wanton waste of timber in the Coast Range and says: "It may be considered a good joke to start a roaring fire in the mountains; come down into the plains and look back at it and as the mighty cloud of smoke curls upward and say 'We did it!' or 'That is our fire!' but no thinking man will be guilty of crediting any such suicidal pleasures, particularly such a one as will destroy, in a few hours, miles of timber which requires a lapse of a century to

grow. . . The day is not far distant when every green bough north and south of us along the slope of the mighty mountains will have its particular claimant and we believe it would only be justice for future generations, for the government to establish posts of Wood Rangers at intervals through the grand old forests to control the American appetite for rousing fires of a destructive tendency." (296, p. 2).

Shortly after 1900 it became illegal to maliciously set fires but there were no restrictions on slash burning and much of this took place during dry periods in August and September, and frequently got out of control. Serious efforts toward forest fire control did not begin until 1910. Prior to that time, fires usually burned until they were extinguished by late fall and winter rains or until they burned themselves out (119). The prevention of forest fires in western Oregon during the second and third decades of the 1900's changed deer habitat considerably. But much of this was counteracted by logging clear-cuts which provided black-tailed deer and Roosevelt elk with new favorable habitat. Succession on both burned and clear-cut areas, however, probably provided only six or seven years of extremely good forage before the brushy cover was replaced by larger trees. In the years following, populations would naturally decline unless other browse and grazing vegetation became available on newly cleared areas. For example, deer hunting had been good in southwestern Oregon from the period of the pioneer up to the market or

hide-hunting era.¹⁷⁶ The practice of fire protection brought with it extensive stands of high brush or chapparal mixed with young timber. This growth has severely restricted access into much of the area and limited visibility so that deer hunters in that area now largely confine their hunting to clear cuts (115; 128, p. 29).

The historical development of the timber industry from the earliest period in Oregon shows a progressive upward trend in timber cut. In 1869 the state was producing seventy-five million board feet of timber annually. This amount has grown to four billion board feet by 1925 and in recent years has exceeded nine billion board feet (112; 322, p. 11). Most of this increase was due to a large demand for western timber and to technological advances in harvesting timber as eastern supplies failed. The growing demand brought about by a burgeoning United States population provides a market which far exceeds the regulated supply.

The technological advances following the 1800's allowed a greater cut of timber in all areas of western Oregon. Up until that time mainly the axe was used to fell trees and cut them into logs. During the 1880's the cross cut saw came into use. Prior to 1900 chiefly oxen were used to drag logs to nearby streams where they could be floated to saw mills. This brought about a large cut of

¹⁷⁶ See section on Indian population.

timber along the border of most larger water courses and the timber was soon exhausted in those areas. After 1900 steam donkeys replaced oxen and logs were skidded to yards or landings and then transported to mills or log ponds (104, p. 30-34). The subsequent development of railroads and later, motor vehicles, allowed an even greater timber harvest.

Oregon became the leading producer of lumber in the United States in 1938, when it replaced Washington which had held that position since 1905 (104, p. 7) (See Table 14). Oregon is still the nation's leading timber producer and over thirty million acres, or nearly half of the state's total area, is covered with forests. Oregon contains approximately 434 billion board feet of standing sawtimber or more than one-fifth of the supply in the contiguous United States. This amounts to enough sawtimber to rebuild every dwelling in the United States (254, p. 3).

The above figures are impressive and even give the impression that Oregon's timber reserves are inexhaustible. The projections for the future, however, indicate the contrary. The trend in sawtimber inventories show a sufficient supply of western timber species to meet demands until 1975 (333, p. 489). After that time, sharp declines in this supply are predicted. The projected inventory for western species of live sawtimber in 1975 is 1,144 billion board feet which when compared with the projected need of 691 billion board

Table 14. Oregon lumber production (112; 247; 322, p. 11).

In millions of board feet		In millions of board feet	
1869	75	1952	9,037
1879	175	1953	8,423
1889	462	1954	8,851
1910	2,084	1955	9,181
1920	3,317	1956	8,361
1930	3,654	1957	6,895
1940	5,202	1958	7,545
1944	6,322	1959	8,222
1945	5,004	1960	7,549
1946	6,328	1961	7,366
1947	7,102	1962	7,712
1948	7,415	1963	7,818
1949	7,185	1964	8,476
1950	8,239	1965	8,247
1951	8,219	1966	7,865

feet gives a surplus of 66 percent. The projected growing stock for the same year is 261 billion cubic feet with a needed 178 billion cubic feet, giving a surplus factor of 47 percent.

The figures for the year 2000, however, indicate an exhaustion of the western sawtimber surplus by that time. In 2000 the projected live sawtimber available will be only 968 billion board feet but the needed inventory will be 2,796 billion board feet or a shortage of 65 percent of the needed amount. At the same time the growing stock of 203 billion cubic feet will fall short of the needed 260 billion cubic feet by 22 percent (333, p. 491-493).

The actual cut of timber on national forests of the Pacific Northwest is projected to increase by 20 percent by 1985.¹⁷⁷ This will mean a change in cutting of live sawtimber on national forest land from approximately 6.3 billion board feet per year to 7.6 billion board feet. The harvest on other public lands is also expected to grow. The cut on these lands in western Oregon of 1,470 million board feet in 1963 to 1,860 million board feet in 1985, will constitute a 26 percent increase. A 13 percent increase is expected on other public lands in eastern Oregon for the same period. While these changes are taking place it is anticipated that depletion of sawtimber

¹⁷⁷The information for projected cutting on National Forests is part of the information gathered in a study for the Bonneville Power Administration (112).

will cause a decrease of 8 percent in the timber cut on private lands in western Oregon (112, p. 38-42).

Projections of failure in the timber supply by the year 2000 are just one of many indicators signaling the consequences of our rapidly growing human population. Steadily increasing industrial demands for forest products will cause increased pressure on the Bureau of Land Management and U. S. Forest Service to allow an increased cut on these areas. Terms such as "upward adjustment of the allowable cut" and other euphemisms are now used and will probably be used even more in coming decades to justify excessive cutting. It does not seem possible that a future deforestation of America's timberlands could take place in a manner similar to China's deforestation over the past 3000 years (372, p. 370-383), but little has been done to show how this will be prevented in the face of logarithmic increases in the human population.

Increasing demands on public lands for recreational use to satisfy the needs of Oregon's residents and tourists will necessarily have to be coordinated with increased lumbering activities. Each year, the pressures increase for more access to forest recreation areas (333, p. 126). The building of more roads into forest areas will provide for timber sales which will not have to be accounted for on a sustained yield basis because these areas will also be taken out of permanent production. Powerline right-of-ways will and do have

the same effect. Increased cutting in some areas may benefit forms of wildlife such as the black-tailed deer and elk but the overall effect may be devastating in the long run. The deer and elk damage to Douglas-fir seedlings can cause a serious conflict between timber and wildlife interests (125; 336, p. 7-8) and as timber becomes more valuable the conflict will no doubt intensify. In turn the silting caused by erosion from logging on steep slopes has caused cases of failure in the spawning of anadromous fish (250, Vol. 25, p. 10). The total effect of logging and its impact on the future of Oregon's watershed has not been satisfactorily appraised.

Another outcome of the projected increase in timber cutting on public lands will be the trend toward cutting younger trees. The total amount of old-growth timber will be substantially reduced. The amount of timber cut from fifty inch and larger diameter trees in the national forests will decline from 8 percent to 6 percent between 1963 and 2000. On all other lands the drop will be from 15 to 4 percent for the same period (112, p. 43). The decreased supply of larger trees on private and other public lands will place a greater demand on national forests as a future supply of big trees (112, p. 43-44). The outcome of this trend will no doubt destroy much of the recreational and aesthetic value of many forested public and private lands in Oregon. A single age class of "pole-like" timber leaves much to be desired and destroys the ecological diversity now seen in these

areas.

If present trends in forest industries in western Oregon continue, a 17 percent decrease will occur in employment in those industries by 1985. Eastern Oregon is also expected to experience a decline amounting to 14 percent between 1962 and 1985 (112, p. 75). The people no longer employed by forest industries will seek employment and probably encourage various new forms of industry to enter the state. This in itself will cause changes in the use of Oregon's natural resources. A more industrial economy will compound the conflicts between conservation agencies and the industrial complex. Pollution, diversion of water supplies and simple competition for space will adversely affect wildlife populations. In addition to upsetting natural soil and water balances the intensive forest management necessary to meet future demands for timber will allow little competition from wildlife. Ultimately an intensive management program for forest resources could come about which would result in methods of rapid harvest and short turnover rates for most stands of timber. Such management methods would leave little of what we now recognize as a system of forests and watersheds which provide the habitat needed for many forms of wildlife.

Water

In general the majority of Oregon's water supply arrives in the

form of precipitation from air masses flowing eastward from the Pacific Ocean. Most of the precipitation falls on the western part of the state where these air masses are intercepted by mountain ranges. A great deal of the moisture which flows to lower elevations in the summer is stored each winter at higher elevations, in both western and eastern Oregon, in the form of snow pack and ice. With the exception of the interior basin regions of southeastern Oregon all of the water is ultimately returned to the Pacific Ocean in a completion of the cycle.

The amount of annual precipitation and streamflow for the state varies radically from one period to another and also differs greatly from region to region during the same period. East of the Cascade Mountain range, the runoff takes place mainly in the spring months as a result of snowmelt. West of the Cascades a pattern of winter precipitation prevails and summer water levels are mainly the result of flows from ground water discharges supplemented by snowmelt from higher elevations.

The predictions for future water supplies are mainly based on past hydrologic conditions. A study of tree-ring growth in juniper trees in the Harney Basin shows periods of severe drought in that area at intervals of every seventy to ninety years (270, p. 10-13). Another study showing fluctuations in past precipitation patterns was based on tree-ring growth of ponderosa pine in twenty-eight localities

in eastern Oregon (161). Although these studies show significant variations in climate or precipitation for much of eastern Oregon, no cyclic or rhythmic pattern could be predicted with any certainty on the basis of tree rings.

For the period extending from 1287 to 1937, no general trend was shown toward either a wetter or drier climate in eastern Oregon. The worst drought years appear to have been 1798, 1849, 1890, and 1931. Periods of below normal precipitation appear to have been 1795-99, 1839-53, 1870-93, and 1917-36.¹⁷⁸ The periods of above normal precipitation are indicated for the years 1800-38, 1854-69, and 1894-1916. Among those periods the best years, as indicated by tree rings, were 1791, 1814, 1861, and 1894 (161).

During the drought period from 1917 to 1940 two low points were reached in precipitation, the first in 1924 and a second in 1931. All of the above information was determined by tree ring studies and some indication of the validity of this method of precipitation analysis is found in the fact that during the year 1925, wagon tracks were exposed on the dry lake bed of Goose Lake indicating that pioneers had crossed that area in the 1840's during their westward migration. Tree ring records for the period 1839 to 1854 show that

¹⁷⁸ This latter period actually extended until 1940 and recent dry periods have taken place in eastern Oregon since that time including the extremely dry year 1968.

an extreme drought existed at that time (161).

Oregon is not expected to run out of water in the foreseeable future although the Pacific Northwest will double its water consumption in the next fifty years. The total water consumption for the Pacific Northwest will grow from 8,395 to 16,287 million gallons per day in the period from 1960 to 2010. Ninety-one percent of the total expected consumption in 2010 will be for agriculture only (30, p. 156-157). Water consumption alone is not the entire key to water utilization. The flows which must be maintained to prevent pollution exceed the amount of water which is consumed. In 1960 the amount of water needed to dilute wastes in the Pacific Northwest was 21,000 million gallons per day. That amount is expected to increase 13 percent by 2010 (30, p. 1).

The water requirements of wildlife use are also expected to increase significantly in the next fifty years. Water needed to maintain wetland and aquatic environments alone will account for much of this increase. Based on the assumption that water requirements needed to meet the demands for waterfowl hunting in the future will increase at the present rate, the water needs for this sport will increase 75 percent between 1954 and 1980, and double by the year 2000 (30, p. 67). The Bonneville Power Administration's water studies indicate future problems.

The increase in human population, together with the expanded demands of a larger economy, results in tremendous competition for land and water resources essential to the maintenance of fish and wildlife. Diversions of stream water profoundly change the fish and wildlife habitat downstream and also the habitat of the land and water areas to which the water is diverted. One of the primary concerns is to assure that adequate downstream flows are maintained to preserve fish and other aquatic life (30, p. 67).

Thus, insufficient runoff may cause water levels in streams to fall below the level needed to counter pollution. The competition for water for agricultural and industrial purposes may cause the value of water to exceed the limit which makes it practical for the support of waterfowl and other forms of wildlife. Water itself, although it is not expected to be in short supply, will become more costly and certainly more of a concern to wildlife conservationists in the future.

Industry

Industry is continuously being wooed into Oregon by local Chambers of Commerce, banks and other financial interests and most certainly by the State of Oregon. Nearly everyone concerned with enhancing corporate and personal wealth is in favor of a growing population and an expanding economy for the state. Grow With Oregon, the official monthly publication of the state's Department of Commerce (Economic Development Division), continuously applauds and encourages industrial growth. In the past two years they have proudly announced the beginnings and development of dozens of major

industrial undertakings. Pulp mills, natural gas plants, food processing industries, cement plants, petroleum product refineries, steel and aluminum mills and a vast array of other industries are listed by Grow as significant marks of progress (247).

These new forms of industry will become necessary to fulfill the requirements for more employment as forest industries decline. The end point of an expanding program of industrial growth is rarely, if ever projected. Such growth is always thought of as "progress" or "development" which apparently to many can continue to expand without regard for finite space and natural resource limitations. Unfortunately for fish and wildlife populations this "progress" usually takes place near streams and other water sources where much of the wildlife and all of the fish populations must live. Harmful rises in water temperature due to increased hydroelectric storage and industrial cooling are usually natural consequences of industrial growth. Solutions to water and air pollution abatement problems never keep pace with industrial growth and this lag causes damage to wild animal populations which is often irreversible. It appears that the major questions to be asked of industry are: what is the ultimate gain of so much industrialization, and what is being compromised in achieving that gain?

Agriculture

Agriculture has changed considerably in Oregon over the past one hundred years. For example, in 1869¹⁷⁹ most of the state's population was employed in agricultural pursuits. Clatsop County produced lumber for ship building and most of its 1500 people were employed in fruit and dairy farming. Improved farm land in Columbia County sold for eight to ten dollars per acre and its population of 700 was also mainly employed in dairy and fruit farming. Tillamook County with a population of 500 had two lumber mills and supported a limited amount of farming. Saw mills and grist mills employed some of Washington County's 4,500 people. Multnomah County had the largest population (10,000). Grain and stock farming occupied most of the fertile meadowlands found there. Marion County was the center of western Oregon's wheat growing region. Flour mills and oak wood sold for fuel or wagon building constituted some of the county's enterprises. Clackamas County's industry depended on water power from the falls at Oregon City. The river steamer enterprises and salmon fishing also brought income to its people. Polk and Benton Counties had populations of 5,000 and 3,500 respectively. The other central counties in western Oregon, Yamhill,

¹⁷⁹Information for 1869 has been abstracted from statistics compiled at that time (73).

Linn and Lane, all engaged in wheat, barley, fruit and dairy farming and utilized water power for saw and grist mills.

The southwestern Oregon counties of Douglas, Jackson, Josephine, Coos, and Curry were not heavily populated in 1869 with the exception of Jackson County which had perhaps as many as 6,000 people, many of whom were attracted by gold, silver and copper mining. Pack trails and wagon roads were few and provided the only access to the coast. Logging may have been equally important with agriculture in this area but markets were remote for either product and depended upon coastal shipping.

In eastern Oregon stock raising and grain farming were the principal sources of income. Umatilla County still had sufficient bunch grass to enable ranchers to raise large herds of cattle and horses. Union County had a population of 3,000 and was noted for raising wheat, barley and oats. Grant County (which then included Harney and Malheur counties) was primarily a stock raising area but agricultural crops were raised in valleys such as the John Day. Baker County was also a stock raising region but it produced a limited amount of timber. Finally, Wasco County and the surrounding areas raised mainly livestock, including a considerable number of sheep (73).

Vast changes have taken place in Oregon's agriculture since 1869 and changes are still taking place in the agricultural practices today. Although the total acreage of farm land has not changed

significantly in the past eighteen years, the number of farms has dropped rather sharply. The trend is away from small farms (those less than fifty acres), and toward larger holdings of from 180 to 1,000 acres (1, p. 11). The number of farms declined steadily from 62,600 in 1950 to an estimated 41,500 in 1968 (253, p. 68). This trend is expected to continue until 1985 when it is estimated the number of farms will be 25,169 (1, p. 11). Accompanying this change in organization of Oregon's farm lands will be a trend toward more intensive farming methods. Modern technology, including an increased use of fertilizers, pesticides and irrigation, will be incorporated in these methods. As costs of production and the value of land rise, more marginal or presently unused agricultural land will probably be utilized for food production. This will reduce the total amount of acreage now constituting food and shelter areas for wildlife.

The projections for increased livestock production alone in the Pacific Northwest indicate that competition with wildlife interests will become more critical in future years. The comparisons in millions of pounds of production for liveweight animals are,¹⁸⁰

	<u>1960</u>	<u>1985</u>
Cattle and calves	1,284	3,557
Sheep and lambs	167	166
Hogs	154	203

¹⁸⁰Information based upon Bonneville Power Administration data (1, p. 27).

	<u>1960</u>	<u>1985</u>
Chickens	137	205
Turkeys	42	42
Totals	1,784	4,173

Changes in farming methods will also intensify already serious questions regarding the support of wildlife on lands which are and will become increasingly more valuable for agricultural production. Efforts have been made by the Oregon State Game Commission in cooperation with other conservation agencies in the state over the past twenty years to encourage farmers to provide some areas for wildlife (250, Vol. 24, p. 14-15; 250, Vol. 16, p. 21-23). This habitat improvement program has been based on the assumption that if given some cooperation, the farmer would designate or set aside certain nonproductive areas mainly for upland game species. A critical factor which must be considered in regard to this program is the lack of an economic incentive for farmers to do this. Under the system of a publicly owned wildlife resource no total economic value has been established for wildlife by individual species or as a whole. It is suggested here that the aesthetic values, to birdwatchers, photographers and people in general who appreciate wildlife, have not been assessed economically and added to the sport value of these animals. In 1965, 33 million hunters and fishermen spent a total of four billion dollars to engage in their sports. But this money goes to businessmen other than farmers (214, p. 2). Unless an economic

base is determined, and unless some adequate economic incentive is provided for farmers who allow for wildlife production, it is feared that free public hunting on private lands may come to an end.

Analysis

Human Population vs. Wildlife

The outlook for Oregon's wildlife resources is at best very discouraging. The increase in human population is undoubtedly the most important factor governing the eventual status of all ecological conditions in the state including those for both man and wildlife. As the human population grows in Oregon, as in the rest of the United States, the concomitant industrialization surrounding that growth also increases. Industrial pollution of air and water seem to be unavoidable handmaidens to the march of progress. Mass urbanization and housing sprawl are also directly linked with industrial growth. Spreading housing tracts and their related service areas continually nibble away at valuable farm lands, especially fertile bottomlands near water courses. New and improved highways which link these areas of residence and commerce also necessarily pass through the most valuable agricultural land.

The expanding human population also demands an increase in outdoor recreation facilities, which even now are not keeping pace

with population growth.¹⁸¹ Technological advances in transportation, camping equipment, and sporting gear have drawn more people into the field and have encouraged previous non-sportsmen to make use of wildlife resources. It is now possible to drive or fly to former remote areas for hunting and fishing over a long weekend. The development of campgrounds under the multiple use concept on public lands has provided facilities for an increased number of hunters and fishermen in recent years and has intensified pressure in many regions which were formerly only lightly used.

In view of current projections for population increases the trend in all of the above population-related problems will be to create worsening and more complex problems in man's relationship with the natural environment. In fact, even with due consideration for all management practices, there will simply be less wildlife available for more people.

Big Game

Big game hunting in Oregon is presently experiencing signs of decreased hunter yield. The greatest number of big game animals

¹⁸¹The Oregon Department of Planning and Development Anticipates one million licensed hunters and anglers in the state in 1970. These hunters and anglers are expected to spend 90 million dollars that year in pursuit of these sports (272, p. 139-140).

harvested in modern times was in the late 1950's and early 1960's. Since that time there has been a gradual decline in total numbers taken and an even further decline in hunter success ratio. The tripling of the deer and elk yield which took place between 1950 and 1960 was largely brought about by a change in management practices. During that period a change-over from harvesting mainly male animals to a system of either-sex hunting took place. This change allowed a much higher kill than previously. It merely indicates a more efficient harvest rather than an improvement in environment or increased big game production due to better management.

In addition to harvesting a great number of female animals which had previously been lost to hunters, this system allows the shooting of many younger animals of both sexes which formerly enjoyed protection. It is apparent from the standpoint of mere harvest alone that hunting a younger age class of any animal population will increase the yield of animals taken from that population. Unless there is an excessive removal of pre-reproductive animals this method of harvesting younger animals is the only practical means to meet increased hunter demand.

This method of hunting is practical from the standpoint of increasing yield but it does not provide the hunter with as many older animals which are often of a larger size.

Biologically, after an animal has reached the limits of its

physical growth all of the food energy which it consumes is used for maintenance. Therefore, any food it consumes thereafter could be used for the growth of younger animals. Failure to harvest such older animals may cause a general depletion in the population's food supply without increasing the hunter yield. When males only are hunted a very high percentage of the animal population consumes food energy which does not directly contribute to the harvest. The females in a population, such as deer or elk, can be harvested regularly if a stable population is being maintained. All mature animals not needed for reproduction are essentially wasted according to the plans of intensive management.

Taking into account this policy and reasoning concerning either sex hunting it is easily seen that a larger harvest can be provided by such hunting as long as a stable population is maintained. The ultimate limit on any population, deer, elk, antelope or other big game, however, is the size and condition of the land area in which they must live. No appreciable increase in land available for the production of most of Oregon's big game animals has taken place concurrently with the liberalization of harvest methods. The number of hunters, however, has increased continually and continues to increase at an even greater rate. Other than the areas which will be opened up by logging, thereby creating more black-tail deer and some elk habitat, no appreciable increases in big game habitat are projected

for the future. In fact, with more intensive and extensive agricultural practices, industrialization, and the enlargement of housing areas predicted for the future, much big game habitat is expected to be lost rather than gained.

Hunters who have expressed the desire for opportunities to bag large bucks or bull elk have at times been unable to understand the limitations placed on this type of trophy hunting. They fail to recognize that the present system is dictated by an increased hunting population which demands a high success ratio. There is a difference between managing big game so that more people will take home an animal regardless of size or trophy value and managing for trophy value alone. Providing "satisfactory" hunting opportunities for a very large number of big game hunters makes it impractical to manage big game for trophy value alone.

Specialized forms of trophy hunting have already come into being in Oregon. The introduction of bighorn sheep and mountain goats has led to a system of limited harvest on those animals. This system is considered to be practical because it harvests mainly older or post-reproductive animals before they are subject to natural mortality. Among the animals in the trophy class, antelope have remained as such in Oregon since the re-opening of the antelope season in 1938. This hunting has been strictly regulated because the antelope population has failed to grow in accordance with its potential

for reproduction.¹⁸² The very limited trophy harvest of approximately five percent of the antelope population per year would appear to allow a phenomenal increase in population. Unless the limiting factors on antelope herd size are discovered and corrected, antelope will continue to provide only a very limited amount of hunting.

In the past few years other programs have been designed to provide the hunter with some form of trophy hunting. The Hart Mountain trophy hunt is one example of this attempt. This hunt makes provision for a limited number of hunters to take four-point bucks on certain areas of Hart Mountain National Antelope Refuge. It is expected that this kind of specialized hunting will increase as the number of hunters continues to rise.

The competition for all trophy hunting becomes more intense each year. The system of distributing permits for this type of hunting, meanwhile, has become complicated. Only a very small percentage of the hunters who apply for these permits receive them. In addition to a random selection system for trophy hunting permits, the same system is used for permits to harvest antlerless elk. The number of applicants for this type of hunting is also increasing annually. In 1967 there were 22,021 applicants for 4,700 available antlerless elk permits. Also in 1967 there were 5,674 applicants for 845 antelope

¹⁸² Doe antelope normally produce twins each year.

tags, and 595 applicants for 5 Rocky Mountain goat tags. This compares with 6,282 applications for 785 antelope tags, 942 applications for 8 Rocky Mountain goat tags, and 1,675 applications for 6 lava-bed bighorn sheep tags in 1968.¹⁸³

Beginning in 1964, separate elk tags were issued for hunting Roosevelt and Rocky Mountain elk. The geographical dividing line chosen to separate these two sub-species was U. S. Highway 97. This division has caused hunters to choose between hunting either one or the other of Oregon's two forms of elk during the general elk seasons. The objective of the division is to increase the distribution of elk hunters and relieve hunting concentrations mainly in the Roosevelt elk hunting areas. The success of this objective has not been totally evaluated but a slight decline in the proportion of Roosevelt tag holders to total bag sales has been noted (323).

This system of regulation is indicative of a trend toward more regimentation of hunters in the future as a management policies indicate the need for better hunter distribution. Much of what has been termed intensive management for the future involves programs concerned with "people management" as well as wildlife management. As a result of increased demands on big game species it is likely that

¹⁸³ These figures were obtained by the writer from the Oregon State Game Commission.

hunting regulations will change from more liberal and generalized laws to more specific and restrictive ones.

With the exception of the possible redistribution of coastal elk herds and further transplants of mountain sheep and goats, most of Oregon's big game niches are already filled. The possibilities for introductions of exotic big game species are not realistic unless competition with native wildlife and domestic livestock is disregarded. Increases in the black-tailed deer population may occur for some time in the future. These increases, however, in the future as in the past, may not be the result of better management but rather an unplanned benefit from increased logging operations in western Oregon. But there is a limit here also especially if a sustained yield is to be maintained in the face of increased demand by hunters and competition with timber interests.

Upland Game Birds

Twenty years ago most of the upland hunting areas in Oregon were easily accessible. Private landowners in most agricultural areas were liberal with access to their properties. Today, the trend is toward more limited access to these areas. The increased hunter population has brought about much of this change. Farmers and other land owners have seen the economic value of their property for upland hunting. Sportsmen's clubs and other private organizations

have been willing to negotiate with landowners for exclusive hunting rights on their properties. Posting of land to "no hunting" is a growing trend resulting from increased hunter competition and abuse of private property (250, Vol. 23, p. 25).

There has also been a decline in both the number of pheasant hunters and the number of pheasants harvested in Oregon over the past ten years.¹⁸⁴ Recent years have also shown a decline in hunters and yield of quail, Hungarian partridge, forest grouse and sage grouse. The hunting record for pigeons and doves has fluctuated over the past ten years. The largest kill of doves was in 1964, when 208,513 were taken. The record number of pigeons taken was 122,226 in 1958. Delayed season openings on these two gamebirds, due to high fire hazard conditions, has had an effect on the kill for 1966 and 1967. Delays of this nature often cause hunters to miss periods of peak southward migration and therefore kill records are not always fair indicators of relative abundance. Chukar partridge hunting reached a peak in 1963 when 28,299 hunters bagged 295,243 birds.

Land access is one reason for the declines in the number of

¹⁸⁴The trends in hunting mentioned in this section are based on Annual Reports of the Game Division of the Oregon State Game Commission and files made available to the writer by the Game Commission.

hunters seeking upland game. The most heavily posted counties in 1966 were Benton, Jackson, Polk, Wasco, and Washington. Polk and Wasco counties showed the highest percentage of no hunting with each having 46 percent of the land sampled posted as no hunting (249, Vol. 19, p. 112).

Since 1958 the state-wide average of land posted to no hunting has increased from 19 to 27 percent, and the percentages within certain counties have increased even more. The following changes are seen in certain Oregon counties:¹⁸⁵

<u>County</u>	<u>Percent 1958 no hunting</u>	<u>Percent 1966 no hunting</u>
Hood River	1	8
Marion	0	12
Sherman	8	27
Wasco	28	46
Washington	19	38

These figures do not indicate that every area within the state has had increased posting. But access to property in areas of better upland game habitat has become more restricted. Washington County in particular is expected to present less opportunities for upland game hunting in the future as it becomes increasingly consumed by

¹⁸⁵ Records of surveys for counties during these two different years do not list the same counties for both years, therefore counties were selected which appeared on both lists (249, Vol. 19, p. 96; 249, Vol. 19, p. 112).

suburban sprawl from the Portland Metropolitan Area.

Human population trends and decreasing upland game habitat coupled with more restricted hunting access will call for the establishment of more public shooting areas in the future. The harsh reality of this situation, however, is the unavailability of funds for the purchase, development and maintenance of areas large enough to meet the needs of future hunter populations. Funds now available to the Oregon State Game Commission and other public conservation agencies are inadequate for this purpose. Present programs for the encouragement of landowners to open their property to upland game hunters also fall short of the present and anticipated future demands for such areas.

One possible alternative to this situation is one of a land tax benefit afforded to land owners who elect to set aside areas for upland game habitat and who permit public hunting or trespassing on their property. This system would necessarily be of expense to all tax payers and would probably meet some opposition from non-hunters. The non-hunters, however, would also benefit from this program as it would provide habitat for many forms of wildlife in addition to game species. Photographers, bird watchers and people in general who appreciate nature would profit from a tax based program which provided property access and wildlife habitat improvement.

Waterfowl

The waterfowl harvest and the number of waterfowl hunters decreased in Oregon from the peak year of 1957 when 77,257 hunters engaged in waterfowl hunting and 1952 when a record number of 961,246 waterfowl were bagged. The 1965 harvest of waterfowl was the lowest recorded since annual surveys were begun in 1950. In 1965, 44,470 hunters took a total of 392,651 waterfowl. In the past two hunting seasons since then there has been an increase in both hunters and total harvest. Recently, the 1967 season showed that 50,825 hunters bagged 587,867 waterfowl.¹⁸⁶

The trend from 1952 to 1965 indicates that many hunters declined from hunting waterfowl during that period. The most recent trend, toward more waterfowl hunting, is felt to be indicative of a future trend of an increased number of hunters which will be brought about by human population growth. This new and increasing number of hunters may not be as selective as those of the past and waterfowl hunters are likely to hunt with less regard for conditions or possible yields.

Although migratory waterfowl seasons are initially established by the U. S. Fish and Wildlife Service, State regulations are set up

¹⁸⁶ Waterfowl hunting records were made available to the writer by the Oregon State Game Commission.

within this broader framework. The liberalizing or restricting of regulations within federal limits is entirely up to the state. This system has allowed Oregon to regulate its seasons in recent years from extremely long seasons such as the ninety-five day seasons in 1957 and 1958 to a shorter season of seventy-five days in 1961 and 1962. Bag limits on ducks have ranged from as high as seven to as low as four per day and on geese from six to only two per day since 1950. Regulations, including bag limits, apparently have not inhibited the number of waterfowl hunters.

Waterfowl populations have by no means declined everywhere in the state as is evidenced by the changes in the waterfowl populations of the Columbia Basin counties, which are Baker, Gilliam, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa and Wasco. Approximately 500,000 acres of farmland in east-central Washington were developed by the U. S. Bureau of Reclamation between 1950 and 1960. This project eventually created over one million acres of irrigated cropland which brought about an increase in the winter populations of mallards from 200,000 to over 700,000 birds between 1950 and 1961 (185, p. 239). This increase caused the State Game Commission to allow two additional mallards in the daily bag in Oregon's nine Columbia Basin counties. The stated purpose of this increase in bag limits was to break up large concentrations of mallards in that area and to secure a greater harvest of a population

which continued to build up with the additional wintering habitat (249, Vol. 13, p. 109).

Such build-ups in themselves, however, are not expected to solve the problems of future hunters. One of the best indicators for future trends in waterfowl hunting appears to be the increasing public use of "fee permit" game management areas. Presently the Oregon State Game Commission has established a fee system ranging from one dollar to three dollars per day for hunting privileges on five waterfowl areas. Permits are required by all persons entering these areas during waterfowl season. The Sauvies Island Management Area on the Columbia River near Portland, one of the above five, was acquired in 1947 with the aid of Pittman-Robertson funds. This area is an example of the intensive management practices which may become necessary statewide as the human population grows. During the 1966 waterfowl season, 11,310 hunters passed through checking stations on the area. These hunters bagged 17,362 ducks and 314 geese (249, Vol. 19, p. 176). In comparison with these 1966 totals, the 1949 waterfowl season attracted 1,665 hunters to Sauvies Island where they killed 1,896 ducks and 30 geese (249, Vol. 2, p. M-6). From the present hunting pressure and competition in this area, the tenfold increases of hunters and waterfowl kill such as the one which took place from 1949 to 1966 will not be possible for every twenty-year period in the future.

The Oregon waterfowl hunter, much the same as waterfowl hunters elsewhere in the United States, must be prepared for either increased competition and lower hunter success on all existing public shooting areas or a willingness to make significant economic contributions toward the acquisition of more waterfowl production and hunting areas. In the past the waterfowl hunters have contributed a great deal of the money necessary for the acquisition and development of waterfowl areas through their purchase of migratory bird hunting stamps. In recent years, however, the public use of wetlands has included an increasing number of non-hunters. In 1962, for example, less than four percent of the 10,870,500 people who visited national wildlife refuges went there to hunt (185, p. 743). It is felt that this other 96 percent of the public should also be requested to support some portion of the maintenance costs of these areas.

Malheur National Wildlife Refuge is one of Oregon's greatest potentials for waterfowl production, bird watching, photography, and managed waterfowl hunting. Its limitations, however, have far overshadowed its potential ever since its creation. The most critical of these limitations is Malheur's sole dependence upon a natural and uncertain water supply. Practically the entire water supply for the refuge comes from winter precipitation in the form of snowfall on Steens Mountain and snowmelt flowing into the Silvies River from the north. Dry years, such as 1963, are disastrous to waterfowl

production and the breeding and nesting of hundreds of thousands of associated wetland birds. The effect that these dry years have on waterfowl hunting is serious and they also caused a drastic reduction in other recreational values of the refuge. Naturalists and wildlife photographers who visit the refuge in increasing numbers each year often find thousands of acres of alkali dust where a productive wetland should exist.

The growing human population will bring about an ever-increasing demand for outdoor recreation areas and waterfowl hunting sites in Oregon. In view of this, plans should be made now to begin searching for a means to insure a constant and sufficient water supply for Malheur. Such a program would require significant federal spending but in terms of relative amounts spent by our government in other dry areas of the world this sum would appear to be slight.¹⁸⁷

The justification for such a program would be nearly impossible if it were to be based strictly on economic returns. The diversion of water from the Malheur, Owyhee, or Snake River for marsh flooding would probably be disputed on the grounds the water would be of more value for agricultural use in eastern Oregon or as a future supply for California's burgeoning population. The value resulting from the

¹⁸⁷ The Agency for International Development spent 59.4 million dollars in fiscal years 1965 and 1966 on aid to Tunisia (27, p. 462).

creation of such a recreation area and one of the greatest bird refuges in North America cannot be expressed in dollars and cents. The most difficult thing to face when presenting this idea is that the aesthetic rewards possible through programs such as this one become extremely hard to justify when the biologist or conservationist is put on the defensive by politicians and economists. The outcome is nearly always a dismissal of such "idealistic" schemes. If biologists and the general public continue to remain satisfied with judgments made by politicians and economists, there can be little hope for the needed conservation movements in the United States. Conservation movements are seldom cheap or easy and the difficulty in putting them into effect is usually that they offer returns hour by hour rather than dollar by dollar.

Oregon hunters, just as waterfowl hunters elsewhere in the United States, must choose among the options of a few crowded public shooting areas based on a first come first served or reservation system, expensive private clubs, or a willingness to finance and develop increasingly larger areas for waterfowl. All of these options will be costly in one way or another.

Furbearers and Non-game Animals

The status of Oregon's furbearers has historically been linked with the market value of furs. The trapping pressure on all species

open to trapping has been directly proportional to their market value and alternate economic opportunities of state residents. In recent years a general decline in fur prices and the relatively greater economic reward from other forms of employment have led to a continuous decrease in trapping pressure and the number of trappers.

Improvements in synthetic substitutes for furs plus changes in wearing apparel fashions have been largely responsible for the decline in fur prices. This trend is expected to continue and fur trapping in Oregon will in the future decrease in economic importance. Other than a continuance of trapping regulations and the complete protection of certain endangered species, furbearers will probably continue to go unmanaged, unstudied, and generally unnoticed.

Among Oregon's non-game animals it is expected that certain forms will become increasingly numerous and troublesome to man in future years. Two of these forms, the opossum and the nutria, are expected to be the greatest nuisances. The opossum's rapid spread throughout the Willamette Valley¹⁸⁸ will no doubt enlarge the area of its damage to the nests of ground nesting birds and cause increased complaints from poultry and other farmers.

The nutria has already caused extensive damage to water sheds and crops in western Oregon. No reliable data has been given

¹⁸⁸ See section on the opossum.

for the exact amount of damage caused by the nutria but it may amount to millions of dollars.¹⁸⁹ The spread of nutria continues to be a problem and they are expected to extend well into the marsh regions of eastern Oregon unless an effective control is developed.

Many of Oregon's present non-game animals may very well become game animals in the future. As restrictive hunting conditions brought about by a larger human population limit the opportunities for hunters, non-game animals may become a more important object in sport hunting. The cougar has already been moved to the protected list and may no longer be killed as a predator or non-game animal. The black bear is a game animal in national forest areas and perhaps will become a game animal statewide in the near future.

Many forms of non-game animals such as rabbits, raccoons, and others, may have to be protected and publicized as game animals to help fulfill future demands for hunting opportunities.

It would be very difficult to predict the time in the future when such changes will take place but they certainly will if the population of the United States continues to grow as it has. In countries with large populations, conditions brought about by intensive agricultural practices and widespread deforestation have left few hunting

¹⁸⁹ This is the writer's own opinion based on observations of stream bank damage caused by burrowing nutria.

opportunities. Japan, for example, hunts animals ranging in size from big game down to small song birds.¹⁹⁰ It is possible that future pressure for hunting opportunities will also cause the same kind of hunting here.

Summary of Oregon's Wildlife Situation

Wildlife is a product of the land and environment very similar to vegetation with the exception of wildlife's ability to migrate more rapidly. Available food, water, and shelter mainly determine which animals will be found in a given area. Some species are relatively inflexible in regard to habitat preference and at times combinations of adverse factors entirely eliminate them from an area. It is true that these forms are biologically not adapted to succeed under the new conditions, but if it is man who has made conditions adverse by changing the animal's native environment, such destruction is irresponsible.

The natural process of organic evolution, which led up to the distribution of wildlife found by Oregon's early explorers and pioneers, created a rich natural resource and an apparently well balanced ecosystem. The greatest concentrations of big game,

¹⁹⁰ The writer hunted nearly every kind of game animal in Japan during three hunting seasons from 1959 to 1962.

upland game, and waterfowl were found in areas of fertile soil and abundant moisture.

With white settlement, an inevitable pattern of agricultural development came about under the jurisdiction of private ownership. Unregulated and indiscriminate drainage, burning, and clearing took place to make way for crop and livestock production. These efforts were at times successful and at other times resulted in failure. In either case they usually proved to be detrimental to wildlife as a whole in the affected area. The reduction of the total land area available to wildlife populations was vast and serious.

Pioneers, just as many human beings do today, tended to evaluate wild animal populations in terms which related to their own code of social ethics. Predators were labelled as vicious destructive forms in a manner which correlated with the criminal element in man's own society. Therefore, among the earliest intentional and systematic changes brought about in wildlife populations was white man's war on predators.

These anthropomorphic ideas have not left us, and people still look upon scavengers with revulsion because they have food habits quite unlike those of humans. Forms of wildlife which are useful to man for sport, food or some economic value, are looked upon more favorably. Those forms of animal life which please man's aesthetic senses are most often preserved to satisfy man's selfish needs and

not for the sake of the animals themselves. These ideas have been a part of the total approach toward evaluating natural resources in the terms of capital gain and personal satisfaction.

In recent years, we have taken a somewhat more comprehensive view of the relative roles of various forms of wildlife and other natural resources. Ecological studies in many areas of natural science have led to a better understanding of the importance of all forms making up natural populations within total communities. Realizing the role of large predators as partial controls over deer populations is one example of such improved understanding. When these predators were extirpated because they presented a threat to domestic livestock, one system became unbalanced. Partly as a result of this the deer became a liability to agricultural interests as deer populations built up in large numbers and invaded rangeland.

With the advantage of hindsight it would be easy to criticize the pioneers for their activities. They, however, saw no signs for concern about depleting natural resources. Their period was one of confirmed belief in the theory that the natural resources were inexhaustible. This belief might be compared with the present popular belief in the limitless power of "science" to provide the world with continuous new solutions to its ever increasing problems.

Pioneer settlement of the most favorable animal habitat in Oregon and the subsequent displacement of many forms of wildlife

from these areas was the first step in a long and continuing process. Overutilization of rangelands, by those interested only in a maximum yield of domestic livestock in the shortest time, led to rapid depletion of cover on many areas in eastern Oregon. The introduction of noxious plant species and those of less value than native plants on many disturbed areas resulted in the loss of native cover causing erosion and destroying the soil moisture balance previously found there. The agricultural value of several drained wetlands turned out to be negligible when compared with their depleted usefulness for wildlife.

The over-utilization of wildlife during the period of early settlement, coupled with the loss of habitat, caused further depletion in animal populations. As the situation reached a critical point during the early 1900's, attempts were begun to protect some wild animals. These early attempts were based almost entirely on the premise that restrictive laws, instituted by law enforcement, would restore and perpetuate wildlife populations. This approach was ineffective because of lack of enforcement and resulted in the continued depletion of many wild animal populations.

The period of refuges and inviolate areas for wildlife was a part of early wildlife management experimentation. One of the results of this system was the creation of unmanageable surpluses in some places and critical shortages elsewhere. The build-up of mule

deer on the Murderer's Creek watershed resulting from overprotection, removal of predators and changes in browse conditions pointed out the shortcomings of the protection and the refuge system.

The concept of wildlife as a crop or renewable resource which could be harvested annually on a sustained yield basis with proper management offered a partial solution to the problem. Through the ideas of Theodore Roosevelt and the work of pioneer wildlife manager Aldo Leopold, the concept of a harvestable biological surplus arose in the early 1900's although it did not become popular with wildlife managers until the 1930's. It has now become the philosophy held by nearly every conservation agency in the country. The legal jurisdiction of the state over wildlife populations on all lands within its boundaries, public and private, has been another important factor in allowing the State Game Commission to effectively manage wildlife.

Federal regulations over the much depleted waterfowl populations and depreciated public domain in the 1930's further strengthened the efforts to restore Oregon's wildlife populations. The earlier establishment of a national forest system prevented private enterprise from exploiting millions of acres of Oregon's forest lands. Scientific investigations by the Bureau of Biological Survey and later aid from the Cooperative Wildlife Research Unit added to the total effort toward wildlife restoration in the 1930's.

One of the most significant differences between Oregon and

many other states has been its biological basis for wildlife regulations. Wildlife management in some states is set up under a system in which state legislators make biological decisions. Such a situation is always a hopeless one. The time lag between legislative sessions often causes game regulations to be ineffective. To further complicate this matter most legislators are not biologically trained. Wildlife management is a biological rather than a political problem, and from 1941 has been treated as such in Oregon. Management programs for Oregon's wildlife resources have for the main part been biologically sound. But often such programs result in direct conflict with preconceived ideas held by the general public. Ideal management programs are too often compromised by the fact that they create opposition from commercial interests.

As the hunting and recreation demands of the public continue to spiral upward with the human population explosion, programs of more intensive management must be applied to every available resource. The period of individual freedom and choice in hunting areas and game sought is rapidly coming to an end. In order to manage the wildlife resources effectively the utilization of these resources will have to be distributed in such a manner that permanent damage does not occur to any one area or species. Hunting interests will have to be diverted to new areas, especially to locations and species which have drawn little attention in the past.

Attempts to change public opinion will be the greatest challenge of the future. Habits and ideas are not easily changed but serious efforts in this direction will have to be made. Yet in general, wildlife biologists are not being prepared in their schooling to deal with the manifold and complex problems of public relations. These biologists are faced with a definite, immediate problem which urgently presents itself today. As elsewhere in the United States, land area in Oregon is finite and the exponential rate of human population growth must occur within that area. As Clark Walsh, the former Assistant Director of the Oregon State Game Commission, once put it,¹⁹¹ Oregon's future wildlife problems may not be insurmountable on a biological level but may very well be on the human or sociological level. He indicated that the biggest problem the Game Commission will face in the future will not be wildlife management but rather people management.

In this inspection of Oregon's wildlife resources, an attempt has been made to present a picture of exploitation, restoration, and some areas of limited hope for the future. But this final characterization may be more of a hope than a possibility in view of demographic projections for the period one hundred years from now.

¹⁹¹ Personal statements made to the writer, Portland, Oregon, August 28, 1967.

Oregon's present population of two million people is already presenting a problem of limited supply and greater demand on the wildlife resource. See Figure 7. Stop-gap attempts to provide hunting to satisfy sportsmen's demands will probably be the "order of the day" for a number of years to come. Ultimately, providing no drastic steps are taken to curtail the human population growth, most hunting could end. In addition, few forests will exist as we now know them. Most of the water will be obligated for man's personal, agricultural, and industrial use and nearly every acre of available fertile ground will be tied up with intensive agricultural practices.

The advent of these drastic changes will very naturally carry with it the annihilation of many of Oregon's wildlife populations. There simply will not be space for such luxuries. These predictions may seem radical, if not heretical, to some biologists but it is sincerely believed that unless human population controls are effected immediately, "dooms day" will occur.¹⁹²

It is easier for humans to punish themselves for how shortsighted they were than to convince themselves of how farsighted they should be. Kenneth Watt, an ecologist, wrote in the epilogue to his recent book on quantitative resource management his beliefs that

¹⁹²The basis for some of these judgments is supported by many recent publications (34, 57, 72, 259, 353).

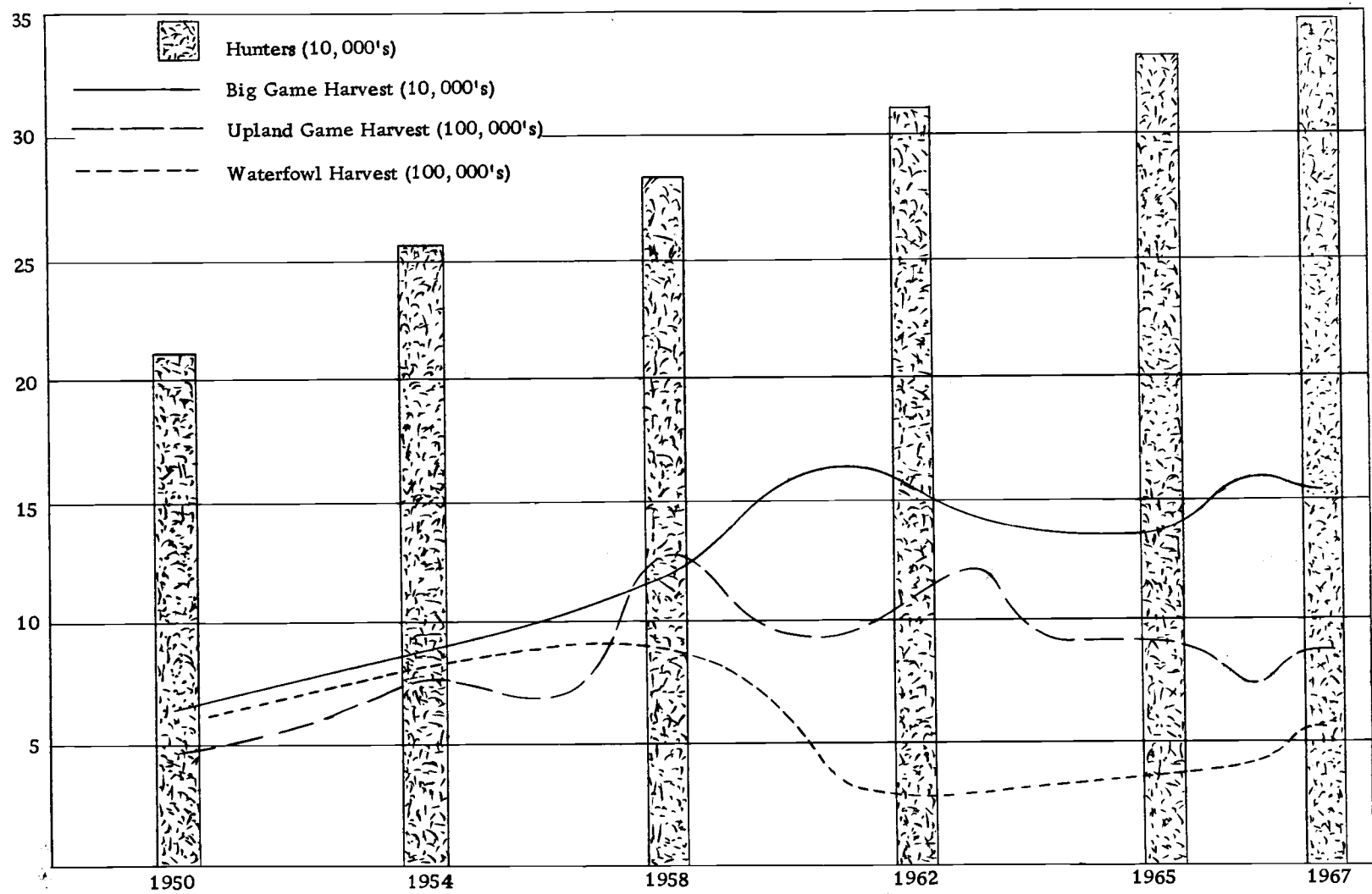


Figure 7. Hunting Demand & Yield (249, 250)

resource management no matter how intense cannot keep pace with the expanding population.

Ultimately, such a one-sided approach would reduce men everywhere to the role of pitiful scavengers, constantly combing the litter of a ravaged biosphere in search of scraps overlooked in prior searches by vast hordes of fellow scavengers. Increased efficiency of resource management, unaccompanied by internationally practiced birth control, can only lead our species rapidly down a one-way street to oblivion. Unless a massive worldwide program of birth control is begun now, no amount of efficiency in resource management will suffice for the needs of humanity (353, p. 439).

It is ironical that in this day of technological advancement and wildlife management practices, for the most part soundly based on biological principles, we should be facing a situation not unlike that found by our forefathers sixty years ago. Theodore Roosevelt's description, in the foreword of this thesis, might well have been written today and I invite the reader to compare the writings of conservationists sixty years ago with those writing today and to judge for himself whether or not progress is being made.

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