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1951
ANNUAL REPORT
GAME DIVISION



Oregon State Game Commission

1951

ANNUAL REPORT

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Oregon State Game Commission

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INTRODUCTION

The primary functions of the Game Division are to ascertain facts pertinent to the management of Oregon's game and fur resources; and execute management, development, and public service programs authorized by the Game Commission.

With exception of refinements and expansions, state-wide investigational programs have been carried on with continuity for the past five years. A comparison of past reports with current events indicates that findings have been generally valid.

Although over 60 permanent employees devote a major part of their time to Game activities, only eighteen men participate in investigational programs. Approximately half of their time is devoted to development, management and public service functions.

During the past year five regional offices have been established to coordinate fish and game activities and provide local supervision of expanding field programs. All regions are now functioning smoothly and the efforts of supervisors have produced measurable results in the game program.

Weather conditions and other uncontrolled variables favored most wildlife crops during the past winter. Game bird production was below average with a resultant slight decline in breeding populations. Big game animals recouped losses of the previous winter and although some herds remain below the five year average density, substantial increases were found in many areas, and the state-wide averages are above the five-year level.

The present program of the Game Division provides for annual measurements of population trends and limiting factors of game and fur species throughout the state; propagation and transplanting of game birds; improvement of game habitat through acquisition, cooperative development, and control of limiting factors; control of damage by game; and maintenance of high recreational standards.

The Oregon Cooperative Wildlife Research Unit, under the able direction of Mr. A. S. Einarsen, administers all long-range, basic game research studies and has developed many of the methods of inventory and management now being applied by the Game Division. Findings of the research unit are published at quarterly intervals, and although they are frequently referred to, they are not included in total in this report.

The Game Division works closely with landowners and allied public agencies and enjoys excellent cooperation as long as the requirements of wildlife do not conflict with other land uses. Decreasing tolerance of private owners for wildlife and recreation on their lands focuses attention upon the value of the 34 million acres of public land in Oregon. Current efforts to curtail the protective authority of administering agencies give Oregon citizens much reason for concern.

It is obvious that the management goal of producing and maintaining the maximum compatible number of game animals and birds on all suitable habitat is far from achieved. Evidence indicates that many big game herds continue to jeopardize their future by destroying the basic forage resources on their limited winter ranges. In many areas increases have occurred on agricultural lands where it must be recognized that big game animals are not compatible.

The current military emergency has prevented completion of negotiations for surplus lands in Jackson and Clatsop counties. However, approximately 2,400 acres of Camp Adair lands were deeded to the Commission before the emergency was declared. An aggressive developement program is being pursued on Camp Adair lands now known as the "E. E. Wilson Game Management Area".

The policy of expending "Federal Aid" funds on acquisition and development projects has been continued. Additional lands have been acquired on Government and Sauvie islands and approximately 6,000 acres of big game winter range have been acquired in eastern Oregon. Maintenance and operation costs on land acquisition projects will limit the continuance of the present policy.

In maintaining wildlife species at high levels of abundance, conflicts with other land uses are inevitable. An aggressive damage control program has been continued through 1951 at a cost of over eighty thousand dollars. In this endeavor it appears that the expanded efforts to control damage have only served to increase the number of complaints and in many instances the control measures applied are a poor substitute for selective harvests by the citizens of the state.

Oregon laws have protected beaver from public trapping since 1932. This protection, plus efforts of the Game Commission in transplanting beaver on all suitable streams, has resulted in surpluses which have created serious damage problems on agricultural lands. During the past winter the Game Commission's trappers have removed 6,008 beavers from complaint areas but the problems are still beyond control. Recent legislation authorizes the Commission to declare open seasons in problem areas and immediate use of this authority may correct problems in some sections of the state.

Continued low prices on long-haired furs have discouraged trapping of raccoon, skunk, fox, coyote, etc. and serious predation problems have resulted. Removal of the raccoon from the list of protected furbearers may encourage sport hunting of that species and thus alleviate a portion of the problem.

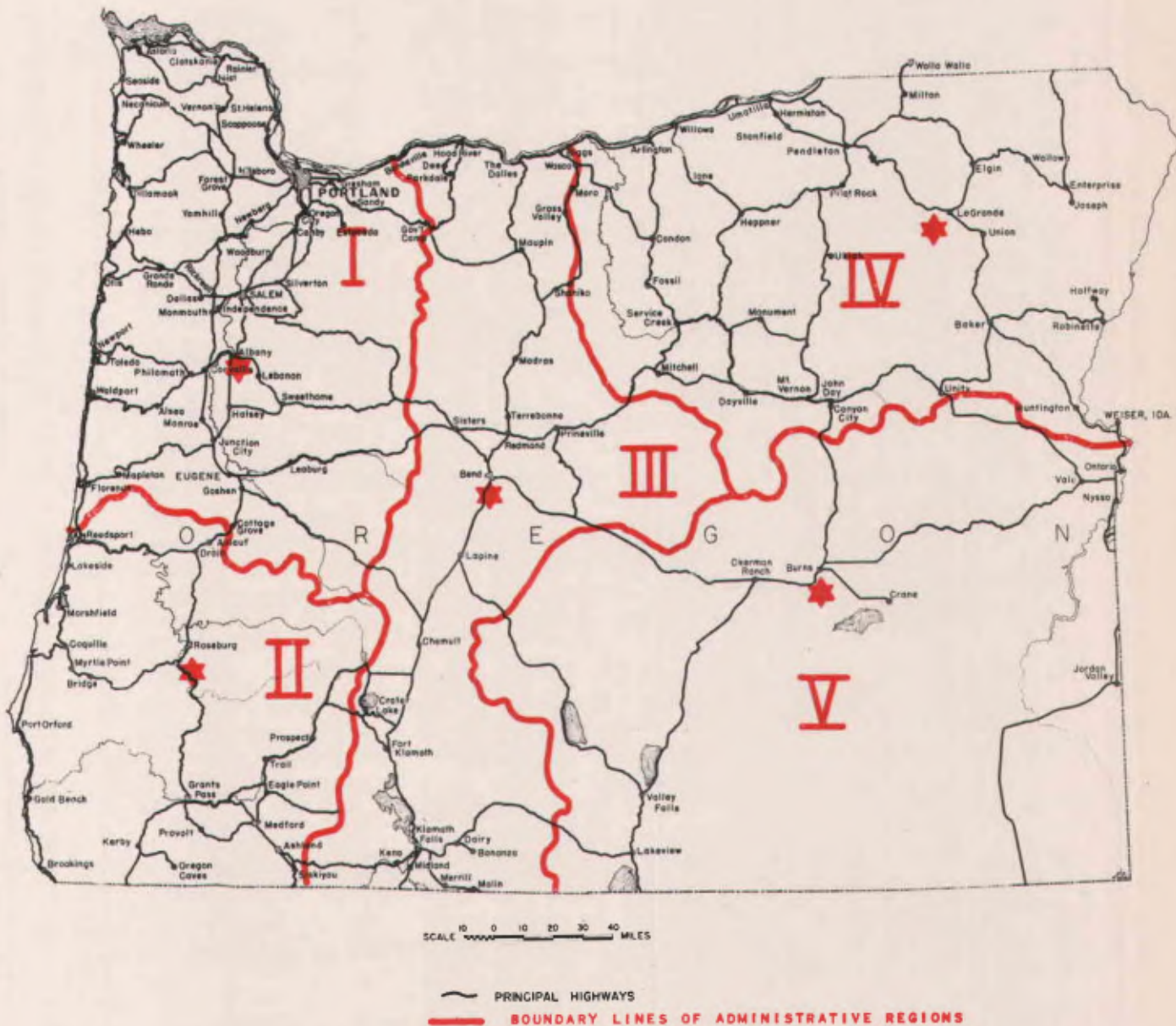
The U. S. Fish and Wildlife Service continues to administer the cooperative predator control program in a very effective and efficient manner. Recent legislation increases the annual allocation of game funds from \$12,000 to \$30,000 for this work.

Field personnel of the Game Division are to be commended for their sincere endeavor to ascertain unbiased facts and execute the many management and service programs authorized by the Commission. They have patiently accepted abuse from some individuals and obtained the respect of fair-minded citizens in their respective communities.

This report provides an assembly of the information gathered during the past year and a summary of the programs made in each major activity of the division. It is prepared in May and covers the period from May 1 to April 31 so that current information will be available for reference by the Commission in July when hunting and trapping regulations are established.

Although the information contained in this report indicates that there are many controversial problems and past utilization of the resources has been far from efficient, no effort has been made to recommend procedures for improvement. There are so many alternative methods of harvest and management that the desires of the public carefully weighed in the light of fact available, should eventually lead to an acceptable and sound game management program.

REGIONAL OFFICE ★



BIG GAME

Analysis of current findings pertinent to the management of big game species and review of previous years' findings reveals that nearly all species remain at high levels of abundance and range and damage problems continue to be common in many parts of the state.

The limited special seasons applied during the past ten years have generally failed to harvest enough animals to bring herds to compatible levels. Exceptions have been the general either-sex seasons on elk. These have accomplished the desired objectives with a minimum of conflicts.

Efforts to maintain big game animals on agricultural lands through fencing, paneling, hazing, and use of repellents have proven very expensive and of little value to the public or the wildlife.

Continued maintenance of mule deer populations above the carrying capacity of winter ranges has resulted in rapid destruction of preferred browse forage plants and a further lowering of carrying capacities for future generations of deer.

Opportunities to increase big game numbers through development of understocked ranges are apparent, but in many instances landowners are reluctant to cooperate because they have no assurance that the animals would be held at a compatible level after they became well established.

It is obvious that Oregon does not have enough big game animals to meet the demands of its rapidly increasing population and it cannot be assumed that maximum potential numbers are now on hand. However, it is clear that the present distribution of animals is far from equitable and there is little hope for improvement of the current situation until public tolerances will permit the intensity of management and regulation required to correct these inequities.

Any person who has hunted or observed big game animals can appreciate the difficulties encountered in attempting to census populations and determine limiting factors. Of the many variables that influence game populations, weather is the least predictable and has the greatest effect. Recognizing the futility of attempting to enumerate all animals, sample portions of each major herd range are systematically observed at a similar time each year. An average of these observations is then compared with those of previous years to determine trends in populations and related factors. The program is designed to obtain this type of information on all of the available big game habitat in the state but with limited funds and manpower it has not been possible to adequately sample all ranges and unknowns continue to far outweigh the knowns in big game management.

Although many hunters expressed the opinion that big game populations were far below normal numbers during the 1950 season, hunter report cards indicate that 44,051 deer, 5,391 elk, and 679 antelope were harvested. The 1948 harvest included 39,785 deer and 4,777 elk. Measurements and observations during the past winter indicate a substantial increase of deer on some ranges during the past year and in general the many range and damage problem areas are the same as in the spring of 1950.

The following sections present current findings by species of big game animals and provide a comparison with previous years' measurements.

BLACK-TAILED DEER:

Black-tailed deer occupy most of western Oregon, with the exception of the most intensively cultivated areas. Localized herds winter east of the Cascade summit, mainly in the White river, Metolius, and Klamath areas. Migrations between summer and winter ranges are not conspicuous, being characterized by gradual changes in elevation as weather conditions dictate.

The management of black-tailed deer is based upon types of habitat occupied. Habitat types are classified as dense old-growth timber, second-growth timber, southwestern Oregon hardwood shrub, open burned and logged-off areas, and areas adjacent to cultivated farmlands.

Dense timber stands, both old and second growth, are not conducive to high deer production. Not only are the more palatable forage plants shaded out, but food values of those which exist are low. The abundance of cover renders such areas difficult to hunt.

Deer populations remain low throughout the oak shrub habitat in Douglas, Josephine, and Jackson counties. Intensive sheep grazing, accompanied by parasite infestations, is indicated to be one of the factors responsible for this static situation.

By far the most productive of all black-tailed deer ranges are those open areas which have been burned or logged. Here the absence of a tree cover allows abundant, nutritious forage growth. Here also, hunter success continues to be high until a dense re-growth of brush develops. The Tillamook burn is an excellent example of productivity of cleared areas.

More effective fire control measures during recent years have restricted the incidence of large burns, but logging is continuing to open up new areas at an accelerated rate throughout western Oregon. Although much of the Coast range has been logged off and has reverted to second growth, the Cascades offer excellent potential range for the production of black-tailed deer if logging by the clear-cut method continues.

Crop damage on agricultural lands continues to be a major problem in western Oregon. Deer are not compatible with crop production and the resident animals involved must be controlled. Generally, the habitat near farm lands is brushy and not popular for hunting. Hence, the deer provide little in the form of recreation and are a constant source of irritation.

Population Trends:

Since winter concentrations are generally lacking, population trends of black-tailed deer are determined during the summer months when good road conditions permit access to all areas. Observations are made along permanent sample routes at a similar time each year. The number of animals observed is recorded as deer per mile of travel and indicated as an index for comparison with past years.

Population trend samples are covered on foot because dense cover prevents the use of other travel methods. Since the number of sample miles is limited, the cover is dense, and the animals are secretive, large numbers are not observed.

Reliability of the method is based upon consistent observations rather than numbers of animals tallied. Permanent routes have been established in most western Oregon counties with sampling being emphasized on the more productive types of habitat. Tillamook county continues to be sampled in greater detail than other sections of western Oregon. Further routes and the refinement of existing samples is necessary in the Willamette valley counties.

A summary of black-tailed deer population trends by counties and supervisory regions is tabulated in Table 1.

TABLE 1
BLACK-TAILED DEER POPULATION TRENDS

Counties by Regions	Miles Travelled	Deer Observed	Deer Density per Mile					
			1945	1946	1947	1948	1949	1950
Clatsop	86	295	0.4	0.6	1.0	2.1	2.4	3.4
Tillamook	134	436	1.9	2.3	2.5	3.5	3.4	3.3
Non-Burn	51	130	-	-	1.2	1.9	1.9	2.5
1939 Burn	37	144	-	-	4.1	5.1	4.4	3.9
1945 Burn	46	162	-	-	2.3	3.6	4.1	3.5
Washington	8	13	-	-	2.3	1.7	3.0	1.6
Yamhill	22	56	-	-	5.2	6.1	2.5	2.5
Polk	16	54	-	-	2.6	0.9	1.4	3.4
Marion	6	4	-	-	1.7	-	0.5	0.7
Lincoln	29	78	0.1	0.7	1.5	2.1	2.3	2.7
Benton	14	14	-	-	2.1	3.1	1.6	1.0
Linn	5	1	-	-	-	-	0.1	0.2
Lane	8	8	-	-	-	-	1.9	1.0
NORTHWEST	328	959	1.1	1.6	1.9	3.0	2.7	2.9
West Lane	-	-	0.2	0.3	0.3	0.4	0.5	-
West Douglas	34	28	0.4	0.2	0.3	0.4	0.8	0.8
Coos	70	207	-	0.2	1.4	1.2	2.4	3.0
Curry	40	149	0.3	0.2	1.0	0.7	1.1	3.7
Douglas	85	33	0.4	0.4	0.3	0.3	2.3	0.4
Josephine	20	12	0.5	0.2	0.3	0.5	0.2	0.6
Jackson	38	41	-	0.4	0.4	0.3	1.7	1.1
SOUTHWEST	287	470	0.5	0.2	0.6	0.5	1.4	1.6
Hood River	6	74	-	-	-	-	-	12.3
Wasco	45	232	-	-	-	-	-	5.2
Six Fingers	19	77	-	-	-	-	-	4.1
Badger creek	14	65	-	-	-	-	-	4.6
White river	12	90	-	-	-	-	-	7.5
CENTRAL	51	306	-	-	-	-	-	6.0
Totals and Averages	666	1,735	0.9	0.7	1.1	1.9	2.0	2.6

A total of 666 miles of sample routes was observed in seventeen western Oregon counties during the summer of 1950. A total of 1,735 deer was tallied, an average of 2.6 deer per mile.

For the first time, information on the Hood River and Wasco county black-tail herds is tabulated with western Oregon counties. Since winter concentrations are observed, these additions raise the over-all average. A consideration of similar counties for the past two years indicates an index of 2.3 deer per mile in 1950 as compared to 2.0 per mile in 1949. An increase is indicated.

The average index in Tillamook county is downward, an important trend since this area supports heavy hunting pressure. In breaking the county into habitat types of non-burn, 1939 burn, and 1945 burn, the only areas showing increases were those unburned. It is believed that heavy hunting pressure, and losses during the severe winters of 1949 and 1950, are responsible for the indicated decline of deer on the Tillamook burn. The 1950 kill in the Tillamook burn was approximately 59 per cent of that of 1949.

In southwestern Oregon, an abnormal number of deer observed on one sample accounted for the increased population noted in Curry county. Approximately four times as many sample mules were recorded in Douglas county during 1950 than in any previous year. Hence, a more reliable index of deer density is believed to have been obtained. Continued observations should produce stabilized results.

No prior information is available for Wasco and Hood River counties. Successive observations of winter concentrations will be necessary before a trend becomes apparent.

Although a modest over-all increase of black-tailed deer is indicated, the abundance of year-long forage and the apparent lack of any major limiting factor should result in substantially larger populations. Numbers on the open ranges, which are at present recognized to be preferred, do not approach the carrying capacity. The breeding potential is high but survival is not. Continued analysis of all factors affecting the species must be pursued.

Herd Composition:

Subsequent to the hunting season and prior to the time of antler shedding in January, a determination of black-tailed deer herd composition is made. Efforts are made to visit all major habitat types in western Oregon where population trends and other factors are measured.

In determining the herd composition (percentages of bucks, does, and fawns), as many animals as possible are classified. Composition is expressed as the ratio of bucks to does and fawns to does. Such information is of value in measuring the survival of bucks through the hunting season and whether or not adequate males remain for breeding purposes. The classification of fawns indicates the percentage of the annual crop which has survived through the summer and fall months.

A recapitulation of herd composition ratios for the past four years is presented in Table 2.

TABLE 2

BLACK-TAILED DEER HERD COMPOSITION

Counties by Regions	Deer Observed				Buck-Doe Ratios				Fawn-Doe Ratios			
	Bucks	Does	Fawns	Total	1948	1949	1950	1951	1948	1949	1950	1951
Clatsop	81	145	96	322	1:2.2	1:2.2	1:1.9	1:1.8	1:2.0	1:1.6	1:1.5	1:1.5
Tillamook	100	236	147	483	1:2.0	1:1.6	1:2.5	1:2.4	1:2.0	1:1.5	1:1.6	1:1.6
Washington	7	33	21	61	1:3.0	1:1.0	1:2.6	1:4.7	1:1.5	1:2.0	1:0.9	1:1.6
Yamhill	9	44	31	84	1:2.9	1:1.2	1:5.2	1:4.9	1:1.1	1:1.4	1:1.2	1:1.4
Polk	13	30	21	64	1:2.0	1:1.0	1:2.7	1:2.3	1:4.0	1:0.5	1:1.1	1:1.4
Marion	-	-	-	-	-	-	-	-	-	-	-	-
Lincoln	20	41	25	86	1:2.0	1:2.1	1:2.3	1:2.0	1:2.0	1:1.9	1:1.4	1:1.6
Benton	8	29	18	55	1:3.1	1:1.0	1:2.0	1:3.6	1:2.0	-	1:0.6	1:1.6
Linn	2	3	3	8	-	-	-	1:1.5	-	-	-	1:1.0
Lane	13	19	14	46	-	-	-	1:1.5	-	-	-	1:1.4
NORTHWEST	253	580	376	1,209	1:2.5	1:1.4	1:2.7	1:2.3	1:2.1	1:1.5	1:1.2	1:1.5
West Lane	-	-	-	-	1:3.5	-	1:4.0	-	1:2.0	1:2.0	1:0.8	-
West Douglas	-	-	-	-	1:2.5	1:4.0	1:3.8	-	1:0.5	1:1.6	1:1.0	-
Coos	-	-	-	-	1:1.4	1:3.3	1:3.4	-	1:3.0	1:1.0	1:1.2	-
Curry	-	-	-	-	1:1.2	1:3.9	1:4.3	-	1:1.8	1:1.1	1:1.2	-
Douglas	6	9	11	26	1:3.1	1:3.0	1:2.7	1:1.5	1:0.9	1:0.9	1:0.6	1:0.8
Josephine	1	3	3	7	1:3.3	1:2.0	1:1.5	1:3.0	1:0.9	1:0.7	1:1.5	1:1.0
Jackson	25	61	52	138	1:3.1	1:2.0	1:1.1	1:2.4	1:0.9	1:0.9	1:0.8	1:1.2
SOUTHWEST	32	73	66	171	1:2.6	1:3.0	1:3.0	1:2.3	1:1.4	1:1.2	1:1.0	1:1.1
Wasco	22	78	53	153	-	-	-	1:3.5	-	-	-	1:1.5
CENTRAL	22	78	53	153	-	-	-	1:3.5	-	-	-	1:1.5
Totals and Averages	307	731	495	1,533	1:2.5	1:2.2	1:2.9	1:2.4	1:1.8	1:1.3	1:1.1	1:1.5

A total of 1,533 animals was observed in sixteen counties producing black-tailed deer. Of this number, 307 or 20 per cent were bucks, 731 or 48 per cent were does, and 495 or 32 per cent were fawns. Expressed as ratios, one buck existed for every 2.4 does and one fawn for every 1.5 does. Last year the overall composition of the 1,318 deer observed was 18 per cent bucks, 47 per cent does, and 35 per cent fawns. An increase of bucks, possibly as a result of lower success during the hunting season, is evident. Fawn survival is below that of a year ago.

No major changes in herd composition are evident. The best fawn survival exists in southwestern Oregon, particularly in Douglas county, while ratios in other counties remain fairly uniform.

The percentage of bucks appears to be greater in those counties where hunter success is inhibited by an abundance of cover. In Clatsop county, one buck existed for every 1.8 does, an exceptionally high ratio, as is the 1 to 1.5 recorded in Linn, Lane, and Douglas counties. On the more open burns of western Washington and Yamhill counties, the percentage of bucks is lower as indicated by the ratios of 1 to 4.7 and 1 to 4.9, respectively.

Winter Losses:

During March and April systematic checks of black-tailed deer ranges are made to determine the extent of winter losses. All carcasses observed along established routes are recorded by sex, age, and cause of death. The loss trend is indicated as carcass per miles of travel.

One of the major factors causing mortality during the late winter and early spring months is malnutrition. Although ample quantities of forage are generally available, research has indicated that essential dietary requirements, particularly protein, are often lacking in the winter diet of black-tailed deer. Deficiencies most often occur after prolonged periods of cloudy or stormy weather when sunlight is at a minimum. After such periods, dead deer have been found with paunches full of food.

In cases where verification of losses by malnutrition is required, the bone marrow test is applied. A large leg bone, generally the femur, is broken and the marrow is examined. Bone marrow in a healthy deer is gelatinous in consistency and white to pinkish in color. The marrow of an animal suffering from malnutrition will be watery and dark pink to reddish in color.

A summary of winter losses on western Oregon ranges for the past three years is included in Table 3.

TABLE 3
BLACK-TAILED DEER WINTER LOSSES

Counties by Regions	Winter Losses				Total Carcasses	Miles Traveled	Trend Index		
	Sex		Age				Carcass/Miles Travel		
	Males	Females	Young	Adult			1949	1950	1951
Clatsop	2	0	1	1	2	47	1-9.3	1-2.0	1-23.5
Tillamook	6	4	9	1	10	82	1-4.4	1-0.6	1-8.2
Washington	0	0	0	0	0	12	1-2.0	1-2.2	0-12.0
Yamhill	0	1	1	1	2	30	1-9.0	1-3.3	1-15.0
Polk	0	0	0	0	0	13	1-7.0	1-8.5	0-13.0
Marion	0	0	0	0	0	27	-	1-1.0	0-27.0
Lincoln	0	0	0	0	0	14	1-7.0	1-3.7	0-14.0
Benton	0	1	0	1	1	14	1-8.0	1-4.7	1-14.0
Linn	0	0	0	0	0	20	-	-	0-20.0
Lane	0	0	0	0	0	19	-	0-5.0	0-19.0
NORTHWEST	8	6	11	4	15	278	1-5.8	1-1.3	1-18.5
West Lane	-	-	-	-	-	-	-	1-10.0	-
West Douglas	-	-	-	-	-	-	1-9.0	1-12.0	-
Coos	3	2	4	1	5	23	1-16.7	1-4.6	1-4.6
Curry	-	-	-	-	-	-	1-16.0	1-4.6	-
Douglas	0	0	0	0	0	9	0-16.0	1-20.0	0-9.0
Josephine	0	0	0	0	0	14	0-24.0	1-30.0	0-14.0
Jackson	0	0	0	0	0	15	1-35.0	1-64.0	0-15.0
SOUTHWEST	3	2	4	1	5	61	1-23.7	1-9.7	1-12.2
Totals and Averages	11	8	15	5	20	339	1-8.6	1-2.5	1-17.0

A total of 20 carcasses was recorded in 339 miles of travel, an average of one carcass per 17 miles. Weather conditions were extremely mild throughout western Oregon during the past winter with the exception of a short period in March. Consequently, losses were much lighter than the preceding two winters when prolonged snow storms, accompanied by sub-zero temperatures, occurred. Indicating the effects of weather on black-tailed deer survival, winter loss surveys subsequent to the severe weather of 1950 revealed one carcass for every 2.5 miles of travel, much more frequent than the one to 17 miles recorded this year.

Although winter mortality was very light, in all cases a comparison reveals an extreme of one carcass per 4.6 miles in Coos county to no carcasses in 27 miles of travel in Marion county. Losses in other counties vary between these limits.

MULE DEER:

With the exception of the Columbia basin wheat producing counties, mule deer are widely scattered over Oregon east of the Cascade summit.

Because of severe winters, migrations between high summer ranges and lower wintering areas occur twice yearly. As a rule, definite routes are followed by each particular herd and specific ranges are occupied seasonally. Although herds intermingle on the summer ranges, little or no exchanges between winter areas are evident.

Mule deer have had a history of fluctuating abundance. At the turn of the present century, populations were at a low ebb. As a result of restrictive legislation, management in the form of the buck law, shortened seasons, and large refuges, numbers increased to a peak in the late 1930's. Overutilization of forage resources on many winter ranges, both by livestock and deer, has curtailed increases in recent years.

Crook, Deschutes, Wheeler, Grant, Baker, Lake, Harney, and Malheur counties produce the greatest numbers of mule deer. In these counties, extensive stands of shrubs are situated at lower elevations adjacent to the higher summer ranges. Shrubs, which provide protein and remain available when crusted snow is present, are essential in the maintenance of mule deer through the winter months. On such ranges, the major management problem is to perpetuate and improve shrub species through the control of deer numbers and livestock use.

Throughout northeastern Oregon grass forage is available but shrubs on winter ranges are not adequate to support large deer herds. Mortality during severe winters continues to be high as is the case on the southeastern Oregon browse ranges where shrubs have been overutilized and killed out.

During the past winter, mild weather conditions favored the high survival of mule deer. Stormy periods, except during March, were of short duration and snowfall on winter ranges was not heavy. As a result of excellent growing conditions last fall, green grass was produced and remained available to deer throughout the winter. A widespread distribution of animals was possible and utilization of critical shrubs on winter range concentration areas was not as heavy as normal.

Population Trends:

For the purpose of measuring population trends, herd composition, and other factors, each mule deer herd is considered independently. Boundaries enclosing the summer and winter ranges of each herd have been outlined and recorded on maps.

Population trends are determined during the winter concentration period. That period from January through March is chosen for the work. Permanent samples identified by landmarks are established on each major winter range. These samples proceed from the lowest to highest elevation occupied by the herd and are distributed at intervals to cross section the range. Observations are made at a similar time each year to measure the trend of populations. An index of deer observed per mile of travel is used.

Various methods are utilized to cover the trend samples, dependent upon accessibility of the area. Travel on foot or horseback is generally employed, although automobiles are used where a network of roads covers the range and may be travelled each year regardless of weather conditions. Airplanes are useful on some of the more open ranges. In addition, airplanes are used to determine distribution before sampling from the ground.

Table 4 presents a summary of mule deer population trends for the past six years.

TABLE 4
MULE DEER POPULATION TRENDS

Herd Ranges by Regions	Miles Traveled	Deer Observed	Deer Density per Mile					
			1946	1947	1948	1949	1950	1951
Ochoco creek	35	211	5.6	4.0	9.4	9.4	9.4	6.0
No. Fk. Crooked river	25	256	11.0	12.3	9.5	11.0	11.2	10.2
Maury mountain	35	98	-	1.6	1.9	1.8	2.1	2.8
Metolius	65	198	2.1	1.5	2.6	2.6	2.7	3.0
Tumalo	50	89	1.7	1.3	1.2	1.5	1.5	1.8
North Paulina	120	578	2.7	2.5	2.7	3.2	3.5	4.8
Devils Garden	80	602	11.4	5.6	7.4	7.5	7.4	7.5
Hole-In-Ground	55	330	8.8	5.1	7.5	6.7	6.6	6.0
Swan lake	36	287	-	-	-	-	-	8.0
Gearhart mountain	47	345	-	-	-	-	-	7.3
Goodlow mountain	14	44	-	-	-	-	-	3.1
CENTRAL	562	3,038	-	-	-	-	5.9	5.5

TABLE 4 (Cont.)

Herd Ranges by Regions	Miles Traveled	Deer Observed	Deer Density per Mile					
			1946	1947	1948	1949	1950	1951
Wenaha	10	69	-	-	-	-	-	6.9
Saddle creek	24	90	-	-	-	-	-	3.8
Upper Imnaha	19	530	-	-	-	-	-	27.9
Wallowa lake	17	308	-	-	-	-	-	18.1
Minam	34	241	-	-	-	-	-	7.1
Walla Walla	37	384	-	1.7	4.3	3.1	7.3	13.4
Umatilla	31	374	-	4.9	6.4	4.8	5.3	12.1
Meacham	33	421	-	8.7	13.4	-	7.2	12.8
McKay creek	29	292	-	-	1.5	-	-	10.0
Birch creek	17	500	-	2.5	10.2	-	15.6	29.4
Ukiah	21	257	-	-	-	-	-	12.2
Heppner	39	650	-	-	11.2	-	8.8	16.9
No. Fk. John Day	68	683	-	4.9	7.1	2.0	11.2	10.0
Monument	22	504	-	-	-	-	-	22.9
Kahler basin	35	420	-	-	-	-	12.2	11.9
Waterman	21	202	-	-	-	-	-	9.6
North Ochoco	30	220	-	-	-	-	-	7.3
Grande Ronde	35	45	-	-	-	-	4.2	1.3
Keating	59	1,444	9.5	14.1	10.6	-	13.8	24.5
Sumpter	7	87	-	-	-	-	-	12.4
Burnt river	36	1,044	7.2	9.9	10.4	-	18.9	29.0
Lookout mountain	7	234	-	-	-	-	-	33.4
Mid. Fk. John Day	120	576	-	4.1	-	9.7	5.5	4.8
Northside	56	678	30.9	23.6	25.8	30.5	32.7	12.1
Canyon creek	8	4	-	-	-	8.3	8.3	0.5
Murderers creek	73	989	10.5	9.5	10.4	14.5	17.7	13.5
Izee	17	486	56.2	37.8	55.1	-	32.1	28.6
NORTHEAST	905	11,732	-	-	-	-	15.0	13.0
No. Silver lake	161	2,108	-	5.4	6.3	8.7	13.1	13.1
So. Silver lake	130	2,016	-	6.4	10.0	8.4	9.0	15.5
Chewaucan	12	206	-	-	-	-	-	17.2
Crooked creek	80	1,451	10.2	6.0	7.7	11.0	13.4	18.1
Deep creek	93	1,392	3.5	2.7	6.2	5.6	12.4	15.0
East Goose lake	16	155	22.4	7.4	10.5	23.0	14.5	9.7
West Goose lake	8	44	-	-	-	-	-	5.5
Dry mountain	30	574	-	9.6	11.4	23.5	19.7	19.1
Silvies river	29	490	-	13.2	4.0	-	16.1	16.9
Drewsey	22	355	-	-	-	-	-	16.1
Crane mountain	30	370	-	13.6	6.8	9.5	9.0	12.3
Alvord	18	938	-	32.9	46.8	31.8	41.2	52.1
Frenchglen	44	1,228	-	27.4	16.3	20.7	23.6	27.9
No. Fk. Malheur	68	408	-	-	-	-	5.0	6.0
SOUTHEAST	741	11,735	-	-	-	-	12.5	15.8
Totals and Averages	2,208	26,505	12.3	9.9	11.6	11.2	12.2	12.0

A total of 26,505 deer was observed in 2,208 miles of travel on 52 winter ranges, an average of 12.0 deer per mile. In 1950, 22,967 deer were recorded on 1,875 miles, an average of 12.2 deer per mile.

Although the over-all average indicates no radical decline in numbers an analysis of individual ranges is revealing.

The central region, comprising Crook, Deschutes, and Klamath counties, shows a decline in density from 5.9 deer per mile in 1950 to 5.5 in 1951. With the exception of Maury mountain, the trend of Crook county herds is downward. Those herds in northern Deschutes county are increasing on ranges where winter shrub supplies are adequate. In southern Deschutes county where winter forage conditions are critical the trend appears to be static or declining.

Northeastern Oregon indicates a downward trend from 15 deer per mile in 1950 to 13 deer per mile in 1951. Largely responsible for this condition is the uniform decline in Grant county. Herds in Umatilla county show a general increase. The trend on Burnt river and Keating, the two major herds in Baker county, is also upward. No previous information is available for Wallowa and Wheeler county herds for comparison.

The southeast region including Lake, Harney, and Malheur counties, indicates an increase as a whole. Lake county herds show a general increase as do those in Harney county. Only one herd was sampled in Malheur county and although the trend is upward, measurements are not indicative of the over-all situation.

Herd Composition:

Herd composition percentages of mule deer are determined in November and December following the hunting season and prior to the time that antlers are shed by the bucks. Concentrations on the winter ranges during this period permit classification of a large number of animals.

Ratios for the past four years are included in Table 5.

TABLE 5

MULE DEER HERD COMPOSITION

Herd Ranges by Regions	Deer Observed				Buck-Doe Ratios				Fawn-Doe Ratios			
	Bucks	Does	Fawns	Total	1948	1949	1950	1951	1948	1949	1950	1951
Ochoco creek	18	99	46	163	-	1:4.2	1:5.2	1:5.5	-	1:2.0	1:2.3	1:2.2
No. Fk. Crooked riv.	12	81	40	133	-	-	-	1:6.8	-	-	-	1:2.0
Maury mountain	10	57	29	96	-	-	-	1:5.7	-	-	-	1:2.0
Metolius	61	160	75	296	-	1:5.0	1:3.6	1:2.6	-	1:2.0	1:1.2	1:2.1
Tumalo	10	35	24	69	1:3.0	-	1:2.5	1:3.5	1:1.6	-	1:1.1	1:1.5
North Paulina	67	134	92	293	1:2.0	1:3.0	1:3.7	1:2.0	1:1.0	1:1.6	1:1.1	1:1.5
Deschutes river	6	19	12	37	-	-	-	1:3.2	-	-	-	1:1.6
Devils Garden	20	105	64	189	1:3.8	1:4.0	1:6.8	1:5.3	1:1.6	1:1.2	1:1.2	1:1.6
Hole-In-Ground	25	112	75	212	1:9.8	1:5.8	1:3.8	1:4.5	1:1.9	1:1.2	1:1.1	1:1.5
Swan lake	4	10	10	24	-	-	-	1:2.5	-	-	-	1:1.0
Gearhart mountain	25	78	41	144	-	-	-	1:3.1	-	-	-	1:1.9
Goodlow mountain	4	21	8	33	-	-	-	1:5.3	-	-	-	1:2.6
CENTRAL	262	911	516	1,689	1:5.0	1:4.4	1:4.0	1:3.5	1:1.5	1:1.5	1:1.2	1:1.8

TABLE 5 (Cont.)

Herd Ranges by Regions	Bucks	Does	Fawns	Total	1948	1949	1950	1951	1948	1949	1950	1951
Upper Imnaha	39	70	51	160	-	-	-	1:1.8	-	-	-	1:1.4
Walla Walla	11	41	17	69	-	-	1:4.6	1:3.7	1:2.2	-	1:1.5	1:2.4
Umatilla	-	-	-	-	-	1:4.7	1:6.2	-	1:1.6	1:2.1	1:1.4	-
Meacham	4	33	18	55	-	-	-	1:8.3	1:1.9	-	-	1:1.8
Birch creek	6	34	14	54	-	-	1:5.3	1:5.7	1:1.7	-	1:1.8	1:2.4
No. Fk. John Day	35	95	62	192	-	1:3.8	1:4.1	1:2.7	1:2.1	1:1.6	1:1.1	1:1.5
Kahler basin	14	45	29	88	-	-	-	1:3.2	-	-	-	1:1.6
Waterman	1	16	11	28	-	-	-	1:16.0	-	-	-	1:1.5
North Ochoco	3	11	5	19	-	-	-	1:3.7	-	-	-	1:2.2
Keating	18	124	112	254	1:4.0	-	1:6.8	1:6.9	1:1.8	-	1:1.0	1:1.1
Burnt river	47	144	96	287	1:9.0	-	-	1:3.1	1:1.2	-	-	1:1.5
Northside	37	153	93	283	1:9.3	1:3.3	-	1:4.1	1:1.6	-	-	1:1.6
NORTHEAST	215	766	508	1,489	1:7.4	1:3.9	1:4.9	1:3.6	1:1.8	1:1.9	1:1.4	1:1.6
No. Silver lake	58	299	268	625	1:2.9	-	1:4.3	1:5.2	1:0.9	1:1.6	1:1.0	1:1.1
So. Silver lake	42	164	136	342	1:8.0	-	1:3.0	1:3.9	1:1.2	1:1.6	1:1.0	1:1.2
Chewaucan	-	-	-	-	1:4.0	-	1:2.0	-	1:2.0	-	1:1.3	-
Crooked creek	26	168	140	334	1:11.0	-	1:6.6	1:6.5	1:1.4	1:1.6	1:1.2	1:1.2
Deep creek	28	159	141	328	1:8.0	-	1:7.9	1:5.7	1:1.1	1:1.4	1:1.1	1:1.1
Dry mountain	8	48	39	95	1:3.8	1:16.0	1:6.3	1:6.0	1:1.7	1:1.6	1:1.1	1:1.2
Silvies river	12	83	71	166	1:6.9	1:3.5	1:7.1	1:6.9	1:1.5	1:1.7	1:1.2	1:1.2
Drewsey	8	42	36	86	-	-	-	1:5.3	-	-	-	1:1.2
Crane mountain	18	95	107	220	1:3.4	1:2.9	1:7.9	1:5.3	1:1.7	1:1.0	1:1.1	1:0.9
Alvord	18	76	28	122	1:11.9	1:19.4	1:3.6	1:4.2	1:1.8	1:2.3	1:1.2	1:2.7
Frenchglen	40	161	172	373	1:3.2	1:4.3	1:4.5	1:4.0	1:1.3	1:1.0	1:1.2	1:0.9
No. Fk. Malheur	24	93	74	191	-	1:13.6	1:3.3	1:3.9	-	1:1.1	1:0.9	1:1.3
SOUTHEAST	282	1,388	1,212	2,882	1:6.3	1:9.9	1:5.2	1:4.9	1:1.5	1:1.5	1:1.1	1:1.1
Totals and Averages	759	3,065	2,236	6,060	1:5.5	1:6.4	1:4.8	1:4.0	1:1.8	1:1.6	1:1.1	1:1.4

A total of 6,060 deer was classified on 36 ranges. Of this number 759 or 12 per cent were bucks, 3,065 or 51 per cent were does, and 2,236 or 37 per cent were fawns. The average buck-doe ratio was 1:4.0 while the fawn-doe ratio averaged 1:1.4. In 1950, the over-all herd composition included 10 per cent bucks, 48 per cent does, and 42 per cent fawns.

An increase in numbers of bucks surviving the hunting season is evident. A possible explanation may be poor hunting success last fall which reduced the harvest. Although no major changes are apparent, higher percentages of bucks are indicated to be present in all regions.

Fawn survival is uniformly lower than last year. The average of 87 fawns per 100 does remaining on ranges in December of 1949 declined to 73 fawns per 100 does in December, 1950. It is possible that the poor condition of does after the severe 1949-1950 winter is the major factor responsible for lower fawn survival.

Winter Losses:

Losses through malnutrition are a major factor limiting mule deer populations. Mortality is generally heaviest during the late winter and early spring months when the animals feed almost exclusively on the new growth of weeds and grasses. Although such forage species are particularly palatable during the spring of the year, high water content and low nutritive values prove detrimental to deer already weak from a winter of privation.

To measure malnutrition losses, observations are made during and after the winter census on concentration areas. Losses are recorded by sex and age when identification is possible, and the index of trend is indicated as miles of travel per carcass observed.

A comparison of winter losses for the past three years is tabulated in Table 6.

TABLE 6

MULE DEER WINTER LOSSES									
Herd Ranges by Regions	Winter Losses				Total Carcasses	Miles Traveled	Trend Index		
	Sex		Age				Carcass/Miles Traveled		
	Males	Females	Young	Adults			1949	1950	1951
Ochoco creek			1		1	35	-	1:4.7	1:35.0
No.Fk.Crooked riv.	1	1	1	1	2	35	-	0:8.0	1:17.5
Maury mountain					0	35	-	0:8.0	0:35.0
Metolius		1		1	1	65	-	0:31.0	1:65.0
Tumalo					0	50	-	0:18.0	0:50.0
North Paulina	1	1	1	1	2	120	-	1:95.0	1:60.0
Devils Garden		1		1	1	80	-	1:8.8	1:80.0
Hole-In-Ground					0	55	-	1:6.5	0:55.0
CENTRAL	2	4	3	4	7	475	-	1:21.0	1:67.9

TABLE 6 (Cont.)

Herd Ranges by Regions	Winter Losses				Total Carcasses	Miles Traveled	Trend Index		
	Sex		Age				Carcass/Miles Traveled		
	Males	Females	Young	Adults			1949	1950	1951
Walla Walla					2	52	1:16.0	1:9.5	1:26.0
Umatilla	1		1		4	35	1:1.6	1:2.4	1:8.8
Meacham					2	43	-	1:5.1	1:22.5
McKay creek					0	15	-	-	0:15.0
Birch creek					0	25	-	1:21.0	0:25.0
Heppner					0	12	-	1:8.0	0:12.0
No. Fk. John Day	1		1		2	69	1:1.1	1:2.0	1:34.5
Monument					0	22	-	-	0:22.0
Kahler basin			3	2	5	59	-	-	1:11.8
Waterman					0	40	-	-	0:40.0
North Ochoco					0	57	-	-	0:57.0
Keating	5	4	8	1	9	32	-	-	1:3.6
Burnt river	2	1	4	1	5	38	-	-	1:7.6
Northside		1	1		2	56	1:2.1	1:1.0	1:28.0
Izee					0	17	1:0.5	1:0.3	0:17.0
NORTHEAST	9	6	18	4	31	572	1:1.7	1:3.7	1:18.5
Dry mountain	1		7	2	9	30	1:3.0	1:0.8	1:3.3
Silvies river			3	1	4	29	-	1:14.5	1:7.2
Drewsey			1		1	22	-	-	1:22.0
Crane mountain	1		2	1	3	30	1:24.0	1:3.7	1:10.0
Alvord	1			1	1	18	1:3.6	-	1:18.0
Frenchglen	3	2	6	1	7	44	1:9.0	1:4.9	1:6.3
No. Fk. Malheur					2	50	1:1.6	1:2.1	1:25.0
SOUTHEAST	6	2	19	6	27	223	1:5.5	1:2.4	1:8.3
Totals and Averages	17	12	40	14	65	1,270	1:1.8	1:3.3	1:19.5

A total of 65 carcasses was observed in 1,270 miles of sample on 30 winter ranges, an average of 1 carcass per 19.5 miles. Winter losses were fewer than during 1950 when 1 carcass per 3.3 miles was observed and 1949 when the ratio was 1 to 1.8 miles of travel.

As in previous years, males appeared to be most vulnerable. Of those carcasses where the sex could be determined, 60 per cent were males. Seventy-four per cent of the mortality was among fawns of the previous year.

In Deschutes and Crook counties, mortality was approximately one-third that of the previous winter. Only on the North Paulina range did a higher loss occur.

Umatilla, Morrow, and Grant county ranges suffered uniformly light losses. On the North Fork of the John Day river, notorious for heavy winter losses, only two carcasses were found in 69 miles of travel. The heavily overutilized Izee and Northside areas in Grant county also experienced a high survival of deer.

The heaviest losses noted were in Harney county. Twenty-five carcasses on six ranges, an average of 1 loss per 6.9 miles, were recorded. Particularly important is the frequency of carcasses located on the Dry mountain range.

Considering all ranges as a whole, winter mortality was low. Favorable weather conditions permitted a widespread distribution of deer and concentrations on critical areas were limited.

ROOSEVELT ELK:

Roosevelt elk are widely scattered throughout the Coast and Cascade ranges, although greatest numbers are found in Coos and Clatsop counties. Some transplants of Rocky Mountain elk in the Cascades, particularly in Klamath and Clackamas counties, have resulted in an intermingling of the two sub-species.

The more open burns and logged areas are preferred habitat while dense stands of timber are occupied to a lesser degree. The most productive ranges appear to be those offering open edges adjacent to dense escape cover.

By nature, Roosevelt elk are gregarious and have a limited range. This "homesteading" characteristic poses definite management problems. Much suitable habitat remains unoccupied by elk, although adjacent to established herds. With the exception of poaching and hunting harvest, mortality appears to be limited and reasons for the lack of sizeable increases are not apparent.

Since localized herds remain accessible and are vulnerable during the hunting season, protection of immature males must be provided. Enforcement of the three-point regulation should continue to preserve ample bulls for breeding purposes.

One of the most pressing problems faced in the management of Roosevelt elk is crop damage. Those herds living adjacent to agricultural areas are a hazard to crop production. Much of this problem, particularly in Coos and Clatsop counties, is created by the development of second growth timber which has shaded out preferred elk forage and forced the animals to farm edges.

Population Trends:

Population trends of black-tailed deer and Roosevelt elk are determined concurrently. Permanent samples are consistently walked at a similar time each year to provide a trend index of elk observed per mile of travel. Emphasis is placed upon sampling the most productive habitat in the Coast range.

A comparison of the trend measurements for the past six years is presented in Table 7.

TABLE 7
ROOSEVELT ELK POPULATION TRENDS

Counties by Regions	Miles Traveled	Elk Observed	Elk Density per Mile					
			1945	1946	1947	1948	1949	1950
Clatsop	86	584	3.0	3.7	4.3	7.2	8.7	6.8
Tillamook	134	274	1.0	0.5	1.1	1.1	2.1	2.0
Non-Burn	51	70	-	-	-	-	-	1.4
1939 Burn	37	78	-	-	-	-	-	2.1
1945 Burn	46	126	-	-	-	-	-	2.7
Lincoln	29	34	0.1	0.8	0.7	1.1	0.9	1.2
NORTHWEST	383	1,166	1.4	1.7	2.3	3.1	3.9	3.0

TABLE 7 (Cont.)

Counties by Regions	Miles Traveled	Elk Observed	Elk Density per Mile					
			1945	1946	1947	1948	1949	1950
West Lane	-	-	0.3	0.2	0.0	0.0	0.0	-
Coos-Douglas	104	346	1.0	0.6	1.1	1.7	2.0	3.3
Curry	40	0	0.0	0.1	0.2	0.7	0.4	0.0
SOUTHWEST	144	346	0.8	0.3	0.6	1.2	1.4	2.4
Totals and Averages	527	1,512	1.2	1.3	1.8	2.6	2.8	2.9

A total of 527 miles was sampled and 1,512 animals observed during the summer of 1950, an average of 2.9 elk per mile of travel. This figure is comparable to the over-all average index of 2.8 elk per mile observed the previous year.

Of particular importance are the figures for Clatsop, northern Coos, and western Douglas counties where the largest herds are located. A decline from 8.7 to 6.8 elk per mile is indicated in Clatsop county. Observations were made prior to the hunting season and it is probable that the extended either-sex season last year will result in a further noticeable decline in numbers. In Coos and Douglas counties, a continued increase is apparent.

Tillamook county, currently closed to hunting, indicates a stable population for the past two years. A breakdown by types of habitat shows a higher density in the most recently burned sections. While 2.7 elk per mile were recorded on samples in the 1945 burn area, 2.1 elk per mile were observed within the 1939 burn and 1.4 elk per mile on those unburned portions of the county.

The average index for the northern coast counties indicates a decline in numbers while an increase is evident on the southern portions of the Coast range. Scattered herds in Curry county render adequate sampling difficult and the 1950 figures are not considered reliable.

No consistent information is available on the scattered herds in the Cascade range. Herds are known to winter in the vicinity of the Clackamas river, eastern slopes of Mt. Hood, Breitenbush, Metolius, Blue river, Middle Fork of the Willamette, Deschutes river above Benham falls, and Upper Klamath lake. Widespread distribution of the animals, dense cover, and inaccessibility render the determination of trends difficult. General observations indicate a lack of substantial increases on any area mentioned.

Herd Composition:

The ratios of bulls, cows, and calves in the various elk herds are determined during the fall and winter. These ratios provide a measure of the survival of calves and the carry-over of bulls for breeding and future hunting. As many animals as possible are classified in order to improve reliability of the information.

An analysis of Roosevelt elk herd composition for the past four years is presented in Table 8.

TABLE 8

ROOSEVELT ELK HERD COMPOSITION

Counties by Regions	Elk Classified				Bull-Cow Ratios				Calf-Cow Ratios			
	Bulls	Cows	Calves	Total	1948	1949	1950	1951	1948	1949	1950	1951
Clatsop	34	159	78	271	1:3.4	1:3.6	1:3.8	1:4.7	1:2.8	1:2.5	1:2.8	1:2.0
Tillamook	28	77	35	140	1:2.4	1:2.6	1:2.9	1:2.7	1:2.5	1:2.2	1:3.0	1:2.2
Lincoln	7	21	5	33	1:2.8	1:3.3	1:5.5	1:3.0	1:2.0	1:2.5	1:2.2	1:4.2
NORTHWEST	69	257	118	444	1:3.1	1:3.4	1:3.5	1:3.7	1:2.7	1:2.4	1:2.8	1:2.2
West Lane	-	-	-	-	-	-	1:7.0	-	-	-	1:3.5	-
Coos-Douglas	17	62	21	100	1:7.8	1:4.2	1:3.7	1:3.6	1:2.4	1:3.0	1:2.3	1:3.0
Curry	0	15	4	19	1:2.1	1:1.9	1:5.0	0:19.0	1:2.4	1:3.0	1:3.5	1:3.8
SOUTHWEST	17	77	25	119	1:5.3	1:3.5	1:3.8	1:4.5	1:2.4	1:3.0	1:2.4	1:3.1
Totals and Averages	86	334	143	563	1:3.4	1:3.4	1:3.6	1:3.9	1:2.6	1:2.5	1:2.6	1:2.3

A total of 563 animals was classified on elk ranges in six western Oregon counties. Of this number, 86 or 15 per cent were bulls, 334 or 59 per cent were cows, and 143 or 26 per cent were calves. One bull existed for every 3.9 cows and one calf for every 2.3 cows. In 1950, the over-all average of all herds classified was 17 per cent bulls, 60 per cent cows, and 23 per cent calves.

A decrease in the percentage of bulls in western Oregon as a whole is evident. In the northern portion of the Coast range, Clatsop county indicates a continued spreading of bull-cow ratios over the past four years. A higher percentage of bulls exists in Tillamook county which has remained closed to hunting. Stable ratios are evident in northern Coos and western Douglas counties. Only one herd was classified in Curry county and no bulls were observed. Consequently, results there are not indicative of a true cross section.

The over-all percentages of calves indicate an upward trend during the past four years. Improved calf-cow ratios are evident in Clatsop and Tillamook counties while more widespread ratios developed on the southwestern Oregon elk ranges. On the basis of current calf crops, population increases should be greater than are now being realized.

ROCKY MOUNTAIN ELK

Rocky Mountain elk are widely distributed throughout the Blue and Wallowa mountains in northeastern Oregon. Protection in the form of closed seasons subsequent to 1900 fostered an increase of the species, and continued hunting since 1933 has resulted in scattering the animals to new ranges.

Elk are adapted by nature to survive under rigorous conditions and losses as a result of malnutrition and predation are normally light. Consequently, hunting serves as the major control of populations.

Management problems vary with the type of habitat. Evidence indicates that elk are competitors with deer for winter browse supplies on the southeastern Oregon ranges in Crook, Harney, Malheur, Baker, Wheeler, and Grant counties. A greater demand for deer hunting and limited capacity of winter ranges requires the control of elk numbers on such ranges.

An abundance of bunchgrass range lacking adequate browse supplies for winter survival of deer in parts of Wallowa, Union, Umatilla, and Morrow counties is suited to the production of elk. Increases within the carrying capacities of such ranges can be encouraged by protecting antlerless elk.

Damage to hay, grain, and other crops results in areas where elk invade agricultural lands. Alleviation of haystack damage through the use of panels is possible but the harvest of animals in other cases is necessary.

During the past winter elk herds have thrived. Weather conditions, except for a brief period in March, were extremely mild and there was a widespread distribution of animals. Excellent grass growth last fall provided an abundance of forage which remained available throughout the winter. Concentrations were not evident and winter feeding was unnecessary.

Population Trends:

Inaccessible concentrations of elk during the winter months necessitate the use of airplanes to determine population trends on many ranges. Sampling on foot or horseback is employed where conditions permit. Sampling is most satisfactory in March and April when the animals concentrate on open slopes to graze.

Permanent flight routes have been established on most northeastern Oregon elk ranges. Observations are limited to the early morning hours, although evening flights in Umatilla county are proving successful. Population trends are expressed as animals observed per mile of travel. As experience is gained, modifications of flight routes are made to improve reliability of the sampling method.

A summary of trends for the past five years is included in Table 9.

TABLE 9
ROCKY MOUNTAIN ELK POPULATION TRENDS

Herd Ranges in Northeast Region	Miles Traveled	Elk Observed	Elk Density per Mile				
			1947	1948	1949	1950	1951
Wenaha	10	113	-	-	-	-	11.3
Chesnimnus	109	490	-	-	-	3.6	4.5
Minam	34	95	-	-	-	-	2.8
Walla Walla	37	340	-	4.4	6.5	10.2	9.2
Umatilla	26	36	-	0.3	1.7	2.0	1.4
Meacham	33	219	-	3.0	-	2.8	6.6
McKay creek	15	37	-	-	-	-	2.5
Birch creek	17	120	-	9.3	-	4.2	7.1
North Fork	57	52	-	4.0	1.6	0.3	0.9
Monument	22	28	-	-	-	-	1.3
Heppner	12	0	-	0.7	-	0.5	0.0
Mt. Emily	80	108	-	-	-	0.7	1.4
Grande Ronde	106	461	-	-	-	3.3	4.3
Middle Fork	120	352	3.6	5.3	2.0	3.4	2.9
Camp creek	-	-	1.5	-	2.6	3.6	-
Grub creek	40	9	2.9	-	4.2	2.5	0.2
Beech creek	8	21	-	0.7	-	1.7	2.6
Canyon creek	-	-	0.8	0.8	0.6	1.3	-
Totals and Averages	726	2,481	2.8	3.3	2.8	2.4	3.4

A total of 2,481 elk was observed in 726 miles of travel, an average of 3.4 elk per mile. Although this figure is appreciably greater than the 2.4 elk per mile recorded in 1950, it is not felt to be indicative of the true situation. The initiation of sampling on the Wenaha and Chesnimnus ranges in Wallowa county where high densities were recorded tends to distort the picture.

A comparison of trends on the Umatilla and Grant county ranges, where a series of measurements is available, provides a more reliable analysis. The over-all 1951 average for the two counties shows a density of 3.2 elk per mile as compared to 2.4 in 1950, 2.8 in 1949, and 3.3 in 1948.

The average density on Umatilla county samples was 4.2 elk per mile, an increase over the 3.7 recorded in 1950. Populations are apparently increasing as a result of bull-only hunting regulations subsequent to the liberal harvest of both sexes during the 1949 season.

In Grant county, where either-sex hunting has continued, the population index declined from 2.8 elk per mile in 1950 to 2.3 elk per mile in 1951. Such a decline indicates the effectiveness of hunting both sexes in controlling elk populations.

It has been found difficult to obtain consistent results when measuring elk population trends. Weather conditions influence winter distribution of elk much more than mule deer. During mild winters, herds in Grant and Baker counties occupy densely timbered areas at higher elevations and cannot be readily located.

In Wallowa, Umatilla, Union, and Morrow counties, weather also influences the spring concentration on exposed slopes so that dates of sampling vary. Those herds in Malheur and Harney counties also winter in different localities dependent upon weather conditions. Although results are unsatisfactory, all available information has been presented and efforts will be continued to improve sampling techniques.

In testing methods of measuring elk population trends, pellet group counts have been made on the Chesnimnus range in northern Wallowa county for the past four years. This method involves the counting of all fecal deposit groups on samples located at random over the summer range. Each sample transect is 396 feet long and 11 feet wide, representing one-tenth of an acre. By counting pellet groups on samples and applying results to the entire range, an index of density can be determined. One advantage of the system is immobility of the groups which permits statistical comparisons.

A summary of pellet group count data is included in Table 10.

TABLE 10
CHESNIMNUS RANGE PELLET GROUP COUNTS

Year	Number of Transects by Cover Types				Average Number of Pellet Groups per Acre		
	Non-Forest	Open Timber	Dense Timber	Total	Elk	Deer	Cattle
1947	473	319	236	1028	27	5	25
1948	163	180	141	484	47	12	45
1949	317	458	293	1068	31	8	29
1950	-	-	-	-	40	12	34

Fecal deposits of deer and cattle were tallied as well as those of elk. Research has indicated that deer defecate an average of 12.7 times in a 24 hour period. Similar frequencies also occur with elk and cattle so direct comparisons of densities on the basis of fecal counts are possible. It is interesting to note that yearly averages of groups per acre for all classes of animals tend to rise and fall in direct proportion to one another. This trend, coupled with the fact that approximate cattle numbers are known, encourages further work with the method.

Herd Composition:

Sex and age ratios are determined subsequent to the hunting season. Since bull elk retain their antlers longer than deer, composition percentages may be determined over a longer period.

Herd composition data in the northeast region for the past three years are tabulated in Table 11.

TABLE 11

ROCKY MOUNTAIN ELK HERD COMPOSITION

Herd Ranges In Northeast Region	Elk Classified				Bull-Cow Ratios			Calf-Cow Ratios		
	Bulls	Cows	Calves	Total	1949	1950	1951	1949	1950	1951
Wenaha	21	222	103	346	1:3.7	1:6.7	1:10.6	1:2.8	1:4.4	1:2.2
*Chesnimnus	4	18	12	34	1:7.7	1:10.5	1:4.5	1:1.7	1:1.2	1:1.5
Minam	20	46	14	80	1:2.3	-	1:2.3	1:3.6	-	1:3.3
Walla Walla	47	166	66	279	1:2.6	1:4.6	1:3.5	1:3.2	1:3.2	1:2.5
Meacham	10	57	22	89	-	1:3.0	1:5.7	-	1:1.3	1:2.6
Birch creek	11	57	19	87	1:5.1	1:5.0	1:5.2	1:2.9	1:1.0	1:3.0
North Fork	8	34	13	55	-	-	1:4.2	-	-	1:2.6
Grande Ronde	4	36	16	56	-	1:20.0	1:9.0	-	1:1.2	1:2.3
Totals and Averages	125	636	265	1,026	1:4.3	1:6.8	1:5.1	1:2.6	1:1.7	1:2.4

* 1951 data based on observations before hunting season

A total of 1,026 animals was classified on eight herd ranges in the north-east region during 1951. Of this number, 125 or 12 per cent were bulls, 636 or 62 per cent were cows, and 265 or 26 per cent were calves. Expressed as ratios, 1 bull existed for every 5.1 cows and 1 calf for every 2.4 cows. In 1950, composition of all herds classified averaged 9 per cent bulls, 58 per cent cows, and 33 per cent calves.

The lowest percentage of bulls was noted on the Wenaha range in Wallowa county. With the exception of 1949, hunting seasons during recent years have restricted the harvest to bulls only. The same situation exists on the Grande Ronde range in Union county, which has consistently indicated a small percentage of bulls. Sex ratios on all other ranges appear to be satisfactory.

Calf percentage seems to be fairly uniform, although lower than last year. It is possible that severe wintering conditions may have reduced the vigor of cows prior to the 1950 calving season and thus affected the crop.

As a check on the age classes of bulls, a record has been maintained for the past four years in Umatilla county. All bulls are classified as to the number of antler points. Although not always correct, those with one to two points per antler are considered to be yearlings while the three and four-point classes are two-year-olds. Bulls with five or more points per antler are considered mature.

A summary of antler point classification in Umatilla county is presented in Table 12. These measurements indicated a satisfactory ratio of young bulls in the Umatilla herds.

TABLE 12
ANTLER POINT CLASSES - UMATILLA COUNTY

Number of Points	Number of Bulls in Class				Per Cent in Class			
	1948	1949	1950	1951	1948	1949	1950	1951
1 and 2	16	15	9	40	56	37	53	49
3	1	1	2	2	3	2	12	2
4	3	10	1	8	9	24	6	10
5	5	9	3	15	16	22	17	18
6	5	6	2	17	16	15	12	21

ANTELOPE:

Antelope are widely scattered over the semi-arid plateaus of Harney, Lake, Malheur, Crook, and Deschutes counties. Short sagebrush habitat is preferred and it is here that the major concentrations are found.

Populations continue to fluctuate. A sharp decline in the early 1940's necessitated a closed season in 1946. Subsequent increases have permitted controlled hunting of bucks for the past two years.

Evidence indicating coyote predation to be an important limiting factor has prompted extensive poisoning programs on antelope ranges for the past five years. Increased fawn survival is now occurring but antelope numbers remain low. Water scarcity during the late summer and fall months may be important but unsatisfactory increases are apparent on those ranges where water is adequate. The abundance of year-long food supplies over vast sections of excellent habitat, coupled with limited potential crop damage, encourages increases in antelope populations above those now being realized.

Population Trends:

Sampling by airplane is utilized to determine the trend of antelope populations. Widespread distribution of the animals, often on inaccessible ranges, necessitates a method of travel which provides speed and maximum visibility.

Representative winter ranges have been permanently marked on maps for trend sampling and a series of flight routes have been recorded for each. Generally during the first two weeks of February flights are made over all areas. Flying time is used to determine the miles traveled and trend is indicated as antelope observed per mile. For consistent results, observations are made in the early morning hours and during periods when snow is not present to confuse the observer. Light planes of the high-wing type are employed to insure maximum visibility.

A summary of population trends on major antelope winter ranges for the past five years is presented in Table 13.

TABLE 13
ANTELOPE POPULATION TRENDS

County	Location	Miles Traveled	Antelope Observed	Antelope Density per Mile				
				1947	1948	1949	1950	1951
Crook-Deschutes	Bear creek	181	353	-	0.8	1.4	0.6	1.9
	Glass butte	186	0	-	0.4	0.2	0.2	0.0
	Pine mountain	182	183	-	1.8	1.2	1.7	1.0
		549	536	-	1.0	0.9	0.8	1.0
	Drakes flat	155	795	-	2.7	4.8	3.5	5.1
Lake	Silver lake	205	118	-	3.0	3.8	2.9	0.6
	Clover flat	45	31	-	-	1.3	1.2	0.7
	Paisley	10	42	-	-	-	-	4.2
	Albert lake	25	27	-	-	-	-	1.1
		440	1,013	-	2.8	4.1	3.0	2.3

TABLE 13 (Cont.)

County	Location	Miles Traveled	Antelope Observed	Antelope Density per Mile				
				1947	1948	1949	1950	1951
	Catlow valley	270	410	0.9	0.9	1.2	1.7	1.5
	Foster flat	80	345	1.9	1.6	4.4	4.1	4.3
	Bridge creek	40	53	-	-	-	1.2	1.3
	Red "S" field	60	110	1.7	1.5	1.5	1.8	1.8
	Harney valley	90	62	-	1.7	-	0.5	0.7
	Blitzen valley	80	21	0.1	0.1	0.1	0.1	0.3
	Coleman mtn.	90	178	1.6	2.0	2.8	4.5	2.0
	Chain lakes	160	209	1.3	1.9	1.7	1.7	1.3
	Sagehen flat	240	832	4.6	7.7	-	4.5	3.5
	Big Spring table	240	2,550	5.9	1.0	12.9	9.5	10.5
	Hart mountain	160	211	0.3	3.4	-	1.2	1.3
	Squaw butte	120	37	0.3	0.8	-	0.2	0.3
	Dry valley	-	-	1.0	-	-	-	-
Harney		1,630	5,018	2.0	2.2	2.7	3.0	3.1
	Freezeout mtn.	70	48	-	-	0.2	0.9	0.6
	Juntura	70	256	-	-	1.4	1.6	3.6
	Saddle butte	88	138	-	-	1.3	2.7	1.5
	Crooked creek	88	196	-	-	0.5	1.5	2.2
	Mahogany mtn.	70	126	-	-	0.3	3.2	1.8
	Antelope res.	88	22	-	-	0.1	0.2	0.3
	Rattlesnake cr.	105	846	-	-	0.9	2.9	9.7
	Antelope cr.	245	0	-	-	1.3	1.1	0
	Whitehorse	140	38	-	-	0.8	0.1	0.3
	Harper	70	35	-	-	-	-	0.5
	Brogan	70	16	-	-	-	-	0.2
Malheur		1,104	1,721	-	-	0.8	1.5	1.6
Totals and Averages		3,723	8,288	2.0	2.0	1.9	2.3	2.2

A total of 32 ranges was sampled in five southeastern Oregon counties. In flying 3,723 miles of permanent routes, 8,288 animals were observed, an average of 2.2 antelope per mile. This represents an over-all decrease from the 2.3 antelope per mile observed in 1950 but indicates a slight upward trend in numbers since 1947.

The highest number, 5,018, was observed in Harney county where a consistent but unspectacular increase is indicated. The large herd which winters adjacent to the Nevada line shows a variable distribution between years and may be found in the Sagehen flat, Big Spring table, and Hart mountain areas.

Population trends in Malheur, Crook and Deschutes counties remain relatively stable with little apparent change. Sampling in Lake county has been expanded due to widespread winter distribution and more extensive measurements will be required to assure accuracy.

Antelope have the highest breeding potential of any big game species in Oregon. Twin-fawns are the rule and survivals through the summer months are

high. Food appears to be adequate and other limiting factors of major importance are unknown. Larger numbers and a better distribution are desirable. On the basis of population trend measurements for the past five years, the stability of antelope populations gives reason for concern.

Herd Composition:

Percentages of bucks, does, and fawns on the various antelope ranges are determined in early August when the animals concentrate near water.

A recapitulation of herd composition for the past four years is presented in Table 14.

TABLE 14
ANTELOPE HERD COMPOSITION

County	Antelope Classified				Buck-Doe Ratios				Fawn-Doe Ratios			
	Bucks	Does	Fawns	Total	1948	1949	1950	1951	1948	1949	1950	1951
Crook-Deschutes	28	24	6	58	1:1.7	1:2.1	1:1.2	1:0.9	1:5.4	1:3.9	1:1.0	1:4.0
Lake	114	195	151	460	1:1.2	1:2.0	1:2.7	1:1.7	1:0.8	1:1.6	1:1.7	1:1.3
Harney	178	276	324	778	1:1.7	1:1.1	1:1.0	1:1.6	1:0.9	1:1.1	1:1.2	1:0.9
Malheur	51	117	74	242	-	1:3.0	1:1.4	1:2.3	-	1:1.5	1:1.0	1:1.6
Totals and Averages	371	612	555	1,538	1:1.5	1:2.0	1:1.3	1:1.6	1:2.4	1:2.0	1:1.2	1:1.1

A total of 1,538 antelope was classified in August. Of these 371 or 24 per cent were bucks, 612 or 40 per cent were does, and 555 or 36 per cent were fawns. One buck existed for every 1.6 does and 1 fawn for every 1.1 does. The previous year, 29 per cent bucks, 39 per cent does, and 32 per cent fawns were observed.

Although a slightly lower percentage of bucks is evident over antelope ranges as a whole, existing males are in excess of those needed for breeding purposes, and that surplus remains available for harvest. Buck-doe ratios in Lake and Harney counties are near the average. The ratio in Malheur county indicates fewer bucks, possibly as a result of high hunter success the past two years. Inadequate sampling in Crook and Deschutes counties is not believed indicative of the existing situation.

The over-all average survival of 1 fawn to 1.1 does is excellent and indicates an improvement over the past four years. The ratio of 1 fawn to 4 does in Crook and Deschutes counties is based upon a small sample which may not be adequate to assure accuracy.

RANGE CONDITIONS:

Western Oregon:

Sufficient quantities of forage are available at all seasons of the year for western Oregon deer and elk herds. Game concentrations during brief periods of heavy snow may result in overutilization of local food supplies, but the weather generally moderates before the situation becomes critical.

Some evidence indicates a decline in the quality of forage during late winter after prolonged cloudy periods. The protein content of most western Oregon shrubs frequently falls below the minimum requirements for deer.

Winter mortality may result from nutritional deficiencies under such conditions.

Black-tailed deer and Roosevelt elk prefer the open ranges which have been burned over or logged off, and it is here that the highest populations are found. Although some big game animals occupy dense timber, continuous shading restricts the quantity and quality of forage with the result that populations remain low. Accelerated logging activities, particularly along the western slopes of the Cascades, continue to open up preferred habitat. Management in the form of law enforcement and temporary hunting closures until escape cover develops will encourage the quick build-up of deer and elk populations. Attention is being continuously focused on potential areas which offer opportunities for such management practices.

Much of western Oregon, including the open burns and logged-off areas, remains underutilized by big game. Substantial increases can be supported. Populations in excess of seasonal food supplies may develop but such a possibility does not seem apparent at this time.

Eastern Oregon:

Ample forage at all seasons of the year remains available for antelope herds in the high desert section of southeastern Oregon. Short sage species, utilized heavily by antelope, are abundant and widely distributed. A decline in sheep numbers during recent years has removed the major source of competition. The main problem with antelope continues to be that of increasing populations and distribution rather than inadequate forage supplies.

Many deer and elk herds in eastern Oregon are faced with seasonal food shortages. Some concern has been expressed over inadequate summer food supplies, notably on the Paulina creek deer range in Deschutes county and the Chesnimnus elk range in Wallowa county, but winter ranges are the most critical areas.

To better understand range conditions, it is necessary to review the history of big game populations. At the turn of the present century, elk and deer were scarce. As a result of restrictive legislation and management in the form of closed seasons, the buck law, and large legislative refuges, increases were encouraged. Numbers continued to increase until the saturation point on many winter deer ranges was reached in the middle 1930's. Surpluses in excess of carrying capacities succumbed to malnutrition. In most cases regulations permitting the harvest of antlerless animals were not adopted in time to prevent malnutrition losses and the attendant range deterioration. The trend from scarcity to over-populations occurred with elk, although to a lesser degree.

Other factors besides game increases affect the welfare and condition of forage on winter ranges. Soil, moisture and temperature are not conducive to high forage production. Drought, insects and rodent infestations have periodically caused serious damage. Excessive livestock grazing in the past damaged plant cover, often irreparably. Today, much big game winter range is privately owned and grazed heavily by livestock during the spring and fall. In many cases, deer and elk herds increased in the face of declining forage resources created by factors other than game abuse.

Forage is recognized as the basic resource upon which eastern Oregon big game must be managed. Of most concern are mule deer which support the heaviest hunting pressure. Shrubs are considered to be essential in maintaining deer through the winter. Not only do shrubs provide protein but they remain available for browsing when crusted snow conditions prevail. Elk, on the other hand, are able to thrive on dry bunchgrass throughout the winter with a minimum of browse.

Oregon is fortunate in having extensive stands of palatable shrub species at lower elevations throughout the southeastern part of the state. Such areas support sizeable herds of deer from November through April. The northeastern counties are characterized by steep bunchgrass slopes suitable for the winter maintenance of elk. Since evidence indicates that the two big game species compete for shrubs, elk numbers must be controlled in southeastern Oregon. The lack of ample shrubs for the winter maintenance of large deer herds in northeastern Oregon encourages the promotion of elk.

The importance of forage in big game management necessitates the determination of range trends. Of all information collected on eastern Oregon ranges, forage measurements are the most important. To date, measurements remain inadequate and techniques are not refined. Much more emphasis on range research and the application of research results must be applied.

A discussion of the forage measurement program is appropriate. Since forage shortages generally occur on winter ranges, a majority of the work is confined to these areas. The wide variety of vegetation necessitates concentration on a relatively few key species for study. A key species is one preferred by game and contributing a sizeable percentage to the total diet. Overuse of the preferred key species is generally followed by overutilization of less palatable plants, with range deterioration the result. On most of the southeastern Oregon mule deer winter ranges bitterbrush, one of the most abundant and palatable shrubs, is selected as the key species for study. In other sections, particularly northeastern Oregon, where shrubs are lacking in suitable abundance, other plants, generally perennial grasses, are chosen as key.

The study of shrub conditions is confined to transects which are established on the winter concentration areas. Each transect consists of 20 plants permanently marked. After the livestock grazing season, the average annual growth of twigs is determined for all plants to measure current production. Also, percentages of grazed and ungrazed twigs are recorded to determine the amount of forage removed during the summer months. Subsequent measurements of twig lengths the following spring are used to determine utilization of annual growth by deer throughout the winter.

On ranges where shrubs are not considered key species, transects have been established to measure utilization of all forage plants. Each transect consists of twenty circular plots placed in a straight line one chain apart and permanently marked with a steel peg. The individual plot encloses one hundred square feet. At the time of establishment, a record is made of ground surface occupied by each plant species. Periodic measurements of plant composition and density over a period of years serve to indicate forage trends. Semi-annual measurements of production and utilization are consistently recorded as with browse transects. An important value of over-all forage measurements is in determining key species for concentrated study.

A summary of forage measurements on eastern Oregon winter ranges during the past year is included in Table 15. Numbers of study transects are indicated where established. Ocular estimates on ranges lacking transects are marked with an asterisk. Proper use is defined as the percentage of current growth which may be removed and still permit the plant to maintain its stand and vigor. Research with bitterbrush indicates 60 per cent utilization as proper. Proper use factors for other species were derived from the livestock palatability tables prepared by the U. S. Grazing Service, now Bureau of Land Management. Since no information on big game was available, proper use during the winter season for cattle and elk were considered comparable on elk ranges and sheep and deer on deer ranges.

TABLE 15
FORAGE UTILIZATION

Herd Ranges by Regions	Number of Study Transects	Key Forage Species	Average Twig Length (Inches)	Utilization			Proper Use of Key Species
				Summer	Winter	Total	
N.Fk.Crooked r.	4	Bitterbrush	3.9	24	42	66	60
N. Paulina	14	Bitterbrush	3.0	4	20	24	60
Devils Garden	12	Bitterbrush	4.4	5	60	65	60
Hole-In-Ground	3	Bitterbrush	4.2	3	53	56	60
*Ochoco creek	-	Bitterbrush	-	25	40	65	60
*Maury mtn.	-	Bitterbrush	-	20	40	60	60
*Metolius	-	Bitterbrush	-	5	40	45	60
*Tumalo	-	Bitterbrush	-	5	20	25	60
*White river	-	Bitterbrush	-	-	-	70	60
*Badger creek	-	Bitterbrush	-	-	-	80	60
*Six Fingers	-	Bitterbrush	-	-	-	65	60
CENTRAL		33	3.9				
*Imnaha	-	Wheatgrass	-	-	-	40	70
*Wenaha	3	Wheatgrass	-	-	-	25	70
Walla Walla	1	Idaho Fescue	-	20	40	60	80
Umatilla	3	Idaho Fescue	-	10	40	50	80
*Meacham	-	Idaho Fescue	-	25	45	70	80
*McKay creek	-	Idaho Fescue	-	50	35	85	80
*Birch creek	1	Idaho Fescue	-	35	35	70	80
*Ukiah	-	Idaho Fescue	-	40	20	60	80
N.Fk. John Day	10	Bitterbrush	-	4	39	43	60
Kahler basin	5	Bitterbrush	-	-	-	41	60
Waterman	1	Bitterbrush	-	-	-	25	60
N. Ochoco	4	Bitterbrush	-	-	-	44	60
Monument	-	Bitterbrush	-	10	40	50	60
*Heppner	-	Idaho Fescue	-	5	20	25	50
Grande Ronde	3	Idaho Fescue	-	8	-	-	50
Burnt river	4	Bitterbrush	3.0	10	29	39	60
Northside	10	Bitterbrush	3.9	-	-	55	60
*Canyon creek	-	Bitterbrush	4.5	12	31	43	60
*Izee	-	Bitterbrush	4.2	5	59	64	60
*Middle Fork	-	Bitterbrush	5.0	6	42	48	60
NORTHEAST		45	4.1				

* Ocular estimates.

TABLE 15 (Cont.)

Herd Ranges by Regions	Number of Study Transects	Key Forage Species	Average Twig Length (Inches)	Utilization			Proper Use of Key Species
				Summer	Winter	Total	
Interstate	133	Bitterbrush	3.2	10	30	40	60
N. Silver lake	4	Bitterbrush	6.2	19	41	60	60
S. Silver lake	8	Bitterbrush	4.4	33	29	62	60
*E. Goose lake	-	Bitterbrush	-	-	-	60	60
Deep creek	8	Bitterbrush	4.1	13	15	28	60
Dry mountain	4	Bitterbrush	3.7	1	51	52	60
Silvies river	7	Bitterbrush	2.9	14	38	52	60
Crane mountain	4	Bitterbrush	3.2	10	45	55	60
Frenchglen	4	Black Sage	-	-	-	4	50
*N. Fk. Malheur	-	Bitterbrush	-	-	-	85	60
SOUTHEAST	172		4.0				
Totals and Averages	250		4.0				

* Ocular estimates.

A total of 250 forage study transects was measured, 33 in the central region, 45 in the northeast region, and 172 in the southeast region. The average twig length of bitterbrush as measured last fall was 4.0 inches. Comparable measurements over a period of years indicate that 3 inches is the average. Hence, forage production last year was approximately one-third greater than normal.

Summer use of bitterbrush in all cases was moderate. Total utilization exceeded the permissible maximum of 60 per cent on the North Fork of the Crooked river, Devil's Garden, Ochoco creek, White river, Badger creek, Six Fingers, Izee, and South Silver lake ranges. The maximum was reached on the Maury mountain, North Silver lake, and East Goose lake ranges. Other southeastern Oregon wintering areas showed lower use.

The most comprehensive bitterbrush measurements were made on the Interstate winter range, where 133 transects were measured. Utilization on the concentration area averaged 40 per cent. This average, however, does not reflect the over-all situation since use on 20 per cent of the transects measured exceeded the allowable maximum. This condition prevails on nearly all of the problem browse ranges even though averages appear to be within tolerable limits.

Utilization of key grass species did not exceed the arbitrary proper use except on one range, McKay creek in Umatilla county. The majority of grass measurements were on elk ranges, where populations are not considered excessive.

Average utilization on more than one range was not determined because proper use of the various key species differs.

Conservative forage utilization the past winter reflects mild weather conditions which generally prevailed throughout eastern Oregon. Continued measurements and refinement of techniques are essential to establish range trends. It is probable that management of big game numbers must be based on the use of key forage species during average to severe winters rather than moderate ones.

Northside Forage Study:

As a result of controversy over effects of deer grazing during the early spring months, a special study has been continued for two years on the north side of the John Day river in Grant county.

Livestock men in the area have repeatedly expressed concern regarding deer damage to Sandberg bluegrass, the most abundant perennial remaining. To measure effects of trampling and grazing prior to the time that deer left the winter range, a series of plots was established during the fall of 1949. Each plot consisted of a fenced deer-proof enclosure twenty feet square. During early April, 1950, all bluegrass on two twenty-five square foot samples selected at random was clipped. To check effects of deer use, similar clipping outside the enclosures was conducted. Weights of all samples were recorded and statistically analyzed.

Results indicated that total bluegrass herbage on protected plots averaged 196 pounds per acre, while the total herbage remaining on areas grazed by deer was 101 pounds per acre. The deer had removed 95 pounds of bluegrass per acre or 48.5 per cent of the total herbage present at the time livestock were turned on the range.

Although significant, the study did not provide information on the recovery, if any, of bluegrass after grazing by deer ceased. To secure such information, the project was revised and continued through the past year.

During the fall of 1949, two twenty-foot square plots were marked at each of fourteen sites where Sandberg bluegrass was the dominant vegetation. One plot was selected with the flip of a coin and fenced to exclude deer. In April, 1951, before livestock were turned on the range, all bluegrass on two random twenty-five square foot samples on the fenced and unfenced plots was clipped and weighed. Results indicated an average of 31 per cent less herbage on areas grazed by deer.

To determine the impact of deer use on total bluegrass production, the unfenced plots were protected from cattle with barbed wire as soon as the initial measurements were completed. Clipping and weighing on selected samples was conducted at the completion of the growing season. Flower stalks on the second series of samples were counted to determine effects of early deer use on reproduction.

The second series of measurements in May revealed that 24.6 per cent less herbage remained on areas grazed by deer, a recovery of 6.4 per cent after deer use ceased. An average of 18 per cent less flower stalks was present on bluegrass in areas utilized by deer.

HUNTING SEASONS:

General Deer Season:

The general deer season extended from September 30 through October 22 in all counties except Sherman for black-tailed and mule deer bucks with forked antlers. White-tailed bucks with forked antlers were legal in Douglas county.

Hunting conditions were not favorable during the 1950 season. Ample moisture throughout the summer provided an abundance of forage, and deer were widely scattered. Bright moonlight on the opening dates permitted feeding at night and, consequently, deer were bedded down in thick cover during the daylight hours. Freezing weather and a snowstorm throughout southeastern Oregon on the opening weekend tended to discourage many hunters. As a result of these conditions, hunter success was low during the early part of the season. Hunters became discouraged quite readily and returned home. Although success improved after mule deer started to migrate the middle of October, hunting pressure remained light.

A hunter's-choice regulation was enacted at the July hearings of the Commission. This regulation established a two-day season on October 21 and 22, when a deer of either sex could be bagged by any holder of an unused deer tag. Agricultural lands in western Oregon and much of southeastern Oregon outside national forest boundaries were included. Because of poor success and the evidence of heavy mortality the previous spring, hunters throughout the state expressed concern over the effects of the hunter's-choice regulation. Since a measurement of deer populations to determine the true situation would not be made until winter, the Commission canceled the two-day season and extended the general season on bucks for five days.

For the third consecutive year, return cards submitted by deer hunters have been used to determine the statewide kill. A machine analysis was made of 108,851 cards, or 63 per cent of the 173,429 tags issued. To determine the success of hunters who failed to return cards, a random sample of 5,433 license purchasers was conducted. Of this number, 3,822 indicated that they hunted deer, of which 25.4 per cent were successful. Results of the random survey were correlated with the machine analysis to determine the total deer harvest. The statistical standard error in this computation is 1.4 per cent plus or minus.

A recapitulation of the deer kill by counties for the past three years is presented in Table 16.

A total of 173,429 hunters purchased tags for the 1950 deer season. Of this number, 44,051 or 25.4 per cent were successful in bagging a buck. Although the kill is 13,209 less than 1949, it exceeds the 1948 total by 4,266 bucks.

Many more hunters purchased tags and did not participate than in 1948 and 1949. It is quite probable that cancellation of the hunter's-choice season discouraged hunting by many who had planned on bagging an antlerless animal. Prospects of a hunter's-choice season may also have prompted the purchase of more deer tags than would otherwise have been sold.

Hunting pressure was heaviest in northwestern Oregon, although success was below that of other sections. Of the 42,729 hunters participating, 9,117, or 21.3 per cent were successful. With the exception of Tillamook, Washington,

TABLE 16
GENERAL DEER SEASON

Counties by Regions	Number of Hunters			Bucks Harvested			Per Cent of Hunters Successful		
	1948	1949	1950	1948	1949	1950	1948	1949	1950
Benton	2,776	2,983	2,742	507	603	608	18.3	21.1	22.2
Clackamas	2,038	2,355	2,446	350	458	398	17.2	19.4	16.3
Clatsop	3,450	3,768	4,317	790	917	982	22.9	24.3	22.7
Columbia	3,135	3,297	2,976	440	687	572	14.0	20.8	19.2
Lane	7,892	7,222	8,184	1,423	1,833	2,019	18.0	25.4	24.7
Lincoln	3,177	2,041	2,034	545	630	486	17.2	20.9	23.9
Linn	3,059	3,454	3,515	636	917	892	20.8	26.5	25.4
Marion	2,452	2,669	2,803	428	516	515	17.5	19.3	18.4
Multnomah	374	314	314	33	57	35	8.8	18.1	11.1
Polk	2,447	2,826	2,097	522	745	479	21.3	26.4	22.8
Tillamook	9,976	9,734	6,754	3,268	2,349	1,288	32.8	24.1	19.1
Washington	2,611	2,669	1,948	755	802	406	28.9	30.0	20.8
Yamhill	2,157	2,198	2,599	473	458	437	21.9	20.8	16.8
NORTHWEST	45,544	45,530	42,729	10,170	10,999	9,117	22.3	24.2	21.3
Coos	6,340	4,553	5,080	1,198	1,490	1,588	28.9	32.7	31.3
Curry	1,673	1,099	1,052	361	458	452	21.6	41.7	43.0
Douglas	8,512	6,908	7,098	1,746	2,464	2,289	20.5	35.7	32.2
Jackson	8,264	6,437	6,548	1,365	2,063	1,670	16.5	32.0	25.5
Josephine	3,096	2,355	2,412	394	630	624	12.7	26.7	15.9
SOUTHWEST	27,885	21,352	22,190	5,064	7,105	6,623	18.2	33.3	29.8
Crook	4,692	4,867	5,866	1,240	2,005	1,759	26.4	41.2	30.0
Deschutes	8,560	13,183	13,148	2,180	4,756	2,200	25.5	36.1	16.7
Hood River	1,669	1,413	1,170	168	172	162	10.1	12.2	13.8
Jefferson	975	1,256	1,377	245	344	401	25.1	27.4	29.1
Klamath	9,972	11,932	12,354	3,104	5,443	3,976	31.1	45.6	32.2
Wasco	1,878	1,884	2,585	311	458	529	16.6	24.3	20.5
CENTRAL	27,746	34,535	36,500	7,248	13,278	9,027	26.1	38.1	24.7
Baker	1,607	5,495	5,603	1,721	2,521	2,155	30.7	45.9	38.5
Gilliam	-	314	326	-	114	120	-	36.3	36.8
Grant	9,904	9,734	10,094	3,033	5,558	3,219	30.6	57.1	31.9
Morrow	1,742	2,041	1,738	392	859	476	22.5	42.1	27.4
Umatilla	4,971	4,396	3,990	896	1,089	827	18.0	24.8	20.7
Union	5,488	4,485	3,979	1,138	1,260	1,353	20.7	28.1	34.0
Wallowa	5,494	2,512	3,481	1,250	1,146	1,045	22.8	45.6	30.0
Wheeler	2,264	2,512	2,570	755	1,374	1,149	33.3	54.7	44.7
NORTHEAST	35,470	31,489	31,781	9,185	13,921	10,344	25.9	44.2	32.5
Harney	9,252	7,536	7,807	3,266	4,011	3,161	35.3	53.2	40.5
Lake	12,741	13,659	15,588	3,860	6,900	4,663	30.3	50.5	29.9
Malheur	3,106	2,983	3,170	886	1,146	1,116	28.5	38.4	35.2
SOUTHEAST	25,099	24,178	26,565	8,012	12,057	8,940	31.9	49.9	33.7
Tagholders not Hunting	4,741	6,544	13,664						
Totals and Averages	166,618	163,628	173,429	39,785	57,260	44,051	23.9	35.0	25.4

and Yamhill counties where hunting is confined largely to portions of the Tillamook burn, success has remained fairly uniform for the past three years. The reported kill in the Tillamook burn counties, in 1950 was 2,131 deer.

In southwestern Oregon, 22,190 hunters bagged 6,623 bucks for an average success of 29.8 per cent. Although below the 1949 kill, no major changes are apparent.

Deschutes county showed the greatest decline in kill. Approximately the same number of hunters participated in 1950 as in 1949 when the southern portion of the Deschutes refuge was opened. The surplus of bucks available in 1949 was not present in 1950. Nearly twice as many hunters visited the county during 1949 and 1950 as in 1948. Hunting pressures should decline if the refuge continues to remain open, which will raise the success ratio. Increased kills were made in Wasco and Jefferson counties, but numbers bagged in other central Oregon counties were lower.

The highest hunter success in 1950 was experienced in Wheeler county. Here, 44.7 per cent of the 2,570 participants were successful. The total kill increased in Union and Gilliam counties but declined in other sections of northeastern Oregon.

Lake county was visited by more hunters and supplied more bucks than any other county in the state. A total of 15,588 hunters harvested 4,663 bucks for an average success of 29.9 per cent. Success in Harney and Malheur counties was below 1949 but exceeded that of 1948.

TABLE 17
AVERAGE WEIGHTS OF BUCK DEER

Region	Two Points				Three Points				Four Points & Over			
	1947	1948	1949	1950	1947	1948	1949	1950	1947	1948	1949	1950
Northwest	116	118	116	117	141	137	146	141	176	160	169	165
Southwest	89	85	87	96	111	105	109	119	130	135	136	147
Central	113	-	96	120	111	-	155	122	181	-	157	160
Black-tailed Deer Averages	102	102	102	111	126	121	127	127	153	147	152	157
Central	101	91	86	98	138	123	116	126	163	180	165	170
Northeast	-	102	97	94	140	134	133	132	172	179	170	168
Southeast	105	104	104	112	147	141	139	137	174	172	172	166
Mule Deer Averages	103	99	96	101	142	133	129	132	170	177	169	168

During each hunting season, hog-dressed weights of bucks are recorded by field agents throughout the state. For comparative purposes, weights are averaged by antler point classes. A four-year summary is included in Table 17.

Average weights of bucks were heavier in 1950 than in 1949. It is obvious that forage conditions influence body weights more than any other factor and measurements over a period of years will be necessary to determine trends.

Special Deer Seasons:

Four special deer seasons were held in 1950. Results are summarized in Table 18.

TABLE 18
SPECIAL DEER SEASONS

Name of Season	Dates	Number of Hunters	K I L L				Per Cent of Hunters Successful
			Bucks	Does	Fawns	Total	
Interstate	Oct. 18-19	1,299	-	512	176	688	53
Burnt river	Nov. 3-5	300*	-	102	34	136	45
Silverton hills	Nov. 3-5	800*	55	79	65	199	25
White river	Dec. 2-5	291	-	150	101	251	86
Totals and Averages		2,690	55	843	376	1,274	47

* Tags issued. Checking stations not operated so number of participants undetermined.

The Interstate season included the summer range and migration routes of the Interstate deer herd which summers on the Fremont forest in Lake county. and winters on the Modoc forest in California. A cooperative program with the California Division of Fish and Game and U. S. Forest Service is in effect to manage the herd. On the basis of information collected, the harvest of 3,000 antlerless animals in 1950 was agreed upon to balance numbers with winter range carrying capacities. Both California and Oregon were to participate in the removal. Since it was necessary to hunt during the migration of the herd when the deer were scattered in dense cover, success in Oregon was low. A total of 688 antlerless animals was bagged by 1,299 hunters, an average success of 53 per cent.

The Burnt river season in Baker county was designed to harvest surplus antlerless deer in excess of winter forage capacities. The kill totaled 136 animals. Average hunter success was 45 per cent.

Special seasons in the Silverton hills area of Marion county and White river in Wasco county were authorized to control damage. One hundred ninety-nine deer of both sexes involved in strawberry damage were bagged at Silverton. The White river season resulted in the removal of 251 antlerless deer causing damage to grain, hay, and pasture crops.

Archery Seasons:

Interest in bow and arrow hunting increases each year. Sufficient archery areas have been established to meet the demand. To provide maximum success and encourage the sport, deer and elk of both sexes are legal. Special areas are selected which offer game concentrations in a minimum of cover. The season precedes that for rifle hunting.

Although no special fee is required, archers are issued a free permit with a report card attached. This system eliminates the necessity for checking stations and provides information on hunter success.

Table 19 includes a summary of 1950 archery seasons.

TABLE 19
ARCHERY SEASONS

Name of Area	Dates of Season	Number of Archers	K I L L					Per Cent of Archers Successful
			Bucks	Does	Fawns	Elk	Total	
Baker	Sept. 16-28	39		1			1	2.6
Cow creek	Sept. 16-28	78		2	2		4	5.1
Canyon creek	Sept. 16-Oct. 17	118	2	2	2		6	5.1
Mt. Emily	Sept. 16-28	115	1	1		2	4	3.5
Tillamook	Sept. 16-28	560	7	41	7		55	9.8
Totals and Averages		910	10	47	11	2	70	7.7

A total of 910 archers hunted during 1950 as compared to 657 in 1949. The bag of 68 deer and two elk represents an average success of 7.7 per cent, lower than the 9.1 per cent success of 1949. Two thousand one hundred and ninety-four man days of hunting effort were expended, an average of 31 days to bag an animal.

Five areas were open to archery hunting. The season extended from September 16 through 28 except at Canyon creek where it terminated October 17. Success was highest on the Tillamook burn area where 560 hunters bagged 55 deer. Only one deer was bagged at Baker by the 39 participants.

General Elk Season:

The 1950 general elk season extended from October 25 through November 19 in western Oregon. Bulls with three or more points per antler were legal in that portion of the state generally west of U. S. Highway No. 97 except portions of Polk, Washington, Yamhill, Tillamook, and Douglas counties. Those hunters with unused tags were permitted to bag an elk of either sex on areas adjacent to agricultural lands in Clatsop county from November 20 through December 17. The extended either-sex season was also applicable in the Loon lake area of western Douglas county from November 20 through December 31.

Southeastern Oregon was open for the hunting of both sexes from October 25 through November 19 while the bag was limited to bulls in the northeastern section of the state.

Rainy weather throughout the season in western Oregon was typical of conditions in the past. Those hunters who were experienced and persistent had fair success. A violent windstorm at the start of the eastern Oregon season discouraged many hunters but the hardy individuals who waited for tracking snow bagged a high percentage of the total. As a result of continued either-sex regulations, success on the southeastern Oregon ranges declined.

To determine the kill, report cards submitted by hunters were subjected to a machine analysis. Of the 24,713 tags sold, 15,479 or 63 per cent, were included in the analysis. A random survey of 5,433 license purchasers was conducted to measure the success of elk hunters who failed to return cards. A total of 683 license holders reported that they hunted elk, 149 or 21.8 per cent of whom were successful. This information was correlated with the machine analysis to determine statewide totals. Statistically, the figures represent accuracy within three per cent.

Information on the 1950 elk kill is presented in Table 20.

TABLE 20
1950 GENERAL ELK SEASON

County	Number of Hunters	Bulls	Cows	Calves	Totals	Per Cent Successful Hunters	Per Cent Spike Bulls
Clackamas	9	1	-	-	1	11.1	-
*Clatsop	4,499	645	725	254	1,624	36.1	-
Columbia	44	4	-	-	4	9.1	-
Coos	710	147	-	-	147	20.7	-
Curry	25	2	-	-	2	8.0	-
Deschutes	28	2	-	-	2	7.1	-
*Douglas	343	50	14	7	71	20.7	-
Hood River	6	4	-	-	4	66.7	-
Jackson	2	-	-	-	-	0.0	-
Klamath	17	2	-	-	2	11.8	-
Lane	180	38	-	-	38	21.1	-
Lincoln	48	16	-	-	16	33.3	-
Linn	2	-	-	-	-	0.0	-
Marion	19	4	-	-	4	21.1	-
Tillamook	123	28	-	-	28	22.8	-
Wasco	21	4	-	-	4	19.0	-
Western Oregon Subtotals:	6,076	947	739	261	1,947	32.0	-
Baker	2,227	165	149	58	372	16.7	21.7
Crook	216	10	18	11	39	18.1	37.5
Gilliam	3	-	-	-	-	0.0	-
Grant	3,635	333	295	90	718	19.8	20.4
Harney	324	10	23	16	49	15.1	12.5
Jefferson	21	2	3	2	7	33.3	-
Lake	4	-	-	-	-	0.0	-
Malheur	518	19	42	14	75	14.5	20.0
Morrow	447	66	-	-	66	14.8	30.8
Umatilla	2,671	459	-	-	459	17.2	32.1
Union	4,160	561	258	96	915	22.0	36.4
Wallowa	2,369	574	109	41	724	30.6	35.7
Wheeler	131	11	5	4	20	15.3	37.5
Eastern Oregon Subtotals:	16,726	2,210	902	332	3,444	20.6	31.4
Tagholders Who Did Not Hunt	1,911						
State Totals & Averages:	24,713	3,154	1,646	591	5,391	21.8	31.4

* Cows and calves harvested during extended either-sex season.

A total of 24,713 hunters bagged 5,391 elk during the 1950 season, an average success of 21.8 per cent. During 1949, a generous either-sex season in eastern Oregon resulted in the kill of 9,134 elk by 26,096 hunters, success averaging 35 per cent. Similar regulations were in effect for 1948 as in 1950, and, except in Clatsop county, kills were comparable.

Success was highest in western Oregon where an extended season for elk of both sexes on Clatsop county agricultural areas produced a heavy kill.

Approximately 1,000 antlerless animals were bagged during the period from November 20 through December 17. An additional area open to bull hunting around Onion Peak also increased the Clatsop county kill above normal. In Douglas county, 38 bulls were taken during the general season while the remainder of the kill was made in the Loon lake area after November 19. The kill in Coos county declined from 184 in 1949 to 147 in 1950.

The continued either-sex seasons in Baker, Grant, Harney, Malheur and Crook counties have not decimated the herds but have broken up concentrations and increased distribution of animals. Similar regulations in 1948 and 1950 permit comparisons for Union, Umatilla, and Wallowa counties. Union and Wallowa counties show increases over the 1948 kill, while Umatilla county is down, indicating population changes as a result of hunting both sexes in 1949.

A comparison of elk hunting success by years since 1933 is included in Table 21.

TABLE 21
SUMMARY OF GENERAL ELK SEASONS

Year	Licenses Sold	Hunters Checked Out	Eastern Oregon		Western Oregon		Totals	# Hunter's Success Ratio
			Bulls	Cows	Bulls	Cows		
1933	2,440		579				579	
1934	3,140	3,169	752				752	23%
1935	2,743	2,446	692				692	28%
1936	3,947	2,611	547				547	21%
1937	3,064	2,548	634				634	25%
1938	3,867	2,463	734		294		1,028	42%
1939	4,378	3,022	842	379	227		1,448	48%
1940	6,152	4,245	1,152	1,179	198		2,529	60%
1941	9,203	8,733	1,169	2,388	184		3,741	43%
1942	9,753	9,432	1,296	1,067			2,363	25%
1943	13,471	10,538	1,375	882	696		2,953	28%
1944	10,513	6,995	1,204	351	439		1,994	29%
1945	12,625	7,270	2,243		222		2,465	34%
1946	15,939	11,106	1,945	1,365	256		3,566	32%
1947	16,689	10,836	1,519	243	356		2,118	20%
1948	22,536	17,911	2,534	2,347	409		5,430	24%
1949	26,096	17,273	2,614	6,071	449		9,134	35%
1950	24,713	15,479	2,210	1,234	947	1,000	5,391	22%
Totals	191,269	136,077	24,041	17,506	4,677	1,000	47,364	
Averages								25%

* Sex not indicated on cards

Based on check-out cards rather than total license sale.

The type of regulation, particularly amount of area open for elk of either sex, affects hunting pressure. Although the general trend in pressure is upward, liberal regulations for 1949 appreciably increased the number of hunters, followed by a decline in 1950. Hunter success and kill also varies with the regulations in effect. During the past 18 years, elk hunters have averaged 25 per cent success. This average is considered higher than can be expected in the future as hunting pressure increases and the herds are managed to control competition with deer and other interests.

Special Elk Season:

One special elk season was held in 1950 on the Starkey area in Union county. Designed to balance numbers with forage supplies on the winter range, the season resulted in removal of 103 antlerless elk by 220 hunters.

Antelope Season:

A limited number of tags was issued for antelope hunting in 1950. The season authorized taking of buck antelope with horns longer than the ears and was confined to portions of Lake, Harney, Malheur, and Deschutes counties. The popular Drakes flat area in Lake county was excluded from the season.

Although antelope numbers are not increasing as rapidly as desired and much suitable range remains unoccupied, bucks in excess of those needed for breeding purposes exist. Moderate harvests can be permitted if the kill is confined to mature males.

Sportsmanship was fair during the 1949 season but deteriorated in 1950. Concentrations of hunters in favored localities is believed responsible. Airplanes and automobiles were used to harass antelope herds in Lake and Harney counties. Many hunters camped at waterholes and interfered with the animals drinking for several days at the start of the season. Since antelope must be managed as a trophy species, being too limited in numbers for general hunting, sporting qualities of the animal must be emphasized. Antelope hunting offers an excellent opportunity to stalk and select a trophy head which should be the goal of those who participate.

More restrictive regulations are in order. The use of airplanes and automobiles for hunting must be controlled, as well as the practice of camping at water holes. To prevent concentrations of hunters, which encourage promiscuous shooting, areas should be zoned with limited tags issued for each area.

Table 22 summarizes 1949 and 1950 antelope seasons.

TABLE 22
ANTELOPE SEASONS

County	Number of Hunters		K I L L				Percentage of Hunters Successful	
			1949		1950			
	1949	1950	No.	Per Cent	No.	Per Cent	1949	1950
Lake	499	672	308	53	282	41	62	42
Harney	321	446	196	33	202	30	61	45
Malheur	109	197	82	14	139	21	75	71
Deschutes	-	107	-	-	56	8	-	52
Totals and Averages	929	1422	586	100	679	100	63	47

A total of 1,422 hunters bagged 679 bucks in 1950 as compared to the kill of 586 by 929 hunters in 1949. The average success was 47 per cent in 1950 and 63 per cent in 1949.

Lake county, particularly in the Guano creek area south of the Hart mountain refuge, supported the heaviest hunting pressure and the greatest kill. Success was highest in Malheur county, averaging 71 per cent followed by Deschutes county with 52 per cent.

BIG GAME DAMAGE CONTROL:

The problem of big game damage is becoming more severe each year. A total of \$83,243.28 was spent in 1950 to investigate and alleviate damage complaints. The importance of damage in the administration of game resources is apparent when this sum is compared with the \$49,250.92 spent on other big game activities.

As farm prices advance, human and game populations expand, marginal land comes into production, and the Commission's damage control program becomes better known, complaints will increase. At present, much of the field agents' time in agricultural counties is devoted to investigating complaints.

Damage is most common along the edges of the Willamette, Rogue, Umpqua, and Hood River valleys and adjacent to the coast. Production of high-value crops such as berries, seed, fruit, and vegetables in areas surrounded by brush, encourages deer depredations.

Resident herds of elk along the coast create problems on agricultural lands. As a result of dense second-growth timber development in recent years, many elk herds are being forced to live along farm edges. Forage and grain crops are often damaged. In Clatsop and Coos counties, the problem has become serious and remedial measures continue to be necessary.

Elk and deer damage complaints in eastern Oregon are not so numerous as in the western part of the state, but individual problems are more serious. Haystacks are jeopardized during the winter months, particularly by elk where the animals concentrate adjacent to livestock-producing sections. Many landowners object to trampling and grazing by big game in the early spring when the soil is wet and grass growth first develops. Grain fields on winter ranges are also damaged by early spring use.

Prompt investigation of all damage complaints is necessary. In many cases, controls can be suggested. Attention to all problems encourages a better understanding between complainants and the Commission, which furthers cooperation essential to long-range solutions.

As a guide in damage control, the Commission has adopted the state-wide policy outlined below:

1. Apply mechanical and chemical repellents.
2. Assist landowners in fencing high-value crops and haystacks where continuous problems can be expected and removal of the animals is impractical.
3. Harvest offending animals by special seasons or permits to complainants.
4. Continue search for new methods of control.

A discussion of the various damage control procedures is provided in the following paragraphs.

Chemical Repellents:

Experimental work with Goodrite z.i.p. has been continued through the past year. Field agents supply this material to landowners throughout western Oregon and in isolated instances east of the Cascades.

In most cases, results have been encouraging. The high cost of the material limits its use to home gardens and small plantings of less than an acre. One pound of the concentrated paste is mixed with $2\frac{1}{2}$ gallons of water to form a spray. An adhesive material insures lasting benefits, but continued applications are necessary as new plant growth develops. With the exception of lettuce and other produce where the removal of spray by washing is difficult, Goodrite is recommended for nearly all crops damaged by deer.

Application of the repellent to one planting of blueberries proved deleterious to the plants. Spraying during the middle of a very hot day may have been responsible. Otherwise, no plant injury due to Goodrite has been evident. In view of the above experience, however, the Commission assumes no responsibility for the effects of repellent sprays supplied to landowners for experimental purposes.

Fencing:

The construction of deer- and elk-proof fences continues to be encouraged where high-value crops are produced. Generally, the program is restricted to isolated farms surrounded by dense cover where continued depredations can be expected. Small plantings of berries, orchards, gardens, and specialty crops with a high value per acre are usually involved.

During the past year, wire costs have increased and the availability is uncertain. If material shortages become more acute, the program may be discontinued.

Although the reimbursement rate of \$2.50 per rod remains the same, rising costs have necessitated revision of the specifications. Posts with a top diameter of 5 rather than 6 inches may now be used. The maximum distance between posts has been changed from 12 feet to 1 rod. Twelve-inch stay wire may be substituted for 6-inch stays on the top width, although 6-inch wire continues to be required for the bottom width.

Approximately one-half of the cost of constructing fences continues to be shared by landowners. Since landowner contribution is high, the program tends to be limited to valuable crops where damage is severe.

A recapitulation of fencing agreements signed since the program was initiated in November, 1949 is presented in Table 23. Completed fences are tabulated in Table 24.

TABLE 23

FENCING AGREEMENTS

Counties by Regions	Number of Fences by Crop Types										Rods Con- tracted	Money Committed
	Straw- berries	Cane- berries	Cran- berries	Gardens	Orchards	Seed	Hay and Pasture	Nursery	Lily Bulb	Other		
Clatsop		1		3		1	2				476	\$ 1,190.00
Columbia	7									1	1,785	4,462.50
Multnomah	2										462	1,155.00
Washington	8	1									1,584	3,961.25
Yamhill	2				2						989	2,473.12
Clackamas	3										535	1,338.75
Polk	4										497	1,241.50
Marion	14										2,147	5,368.75
Benton				2	1						277	672.50
Lane	1			1	1						288	567.00
Northwest	41	2		6	4	1	2			1	9,040	\$ 22,430.37
Coos		1	20	8					1		2,641	6,602.50
Curry			6	2				1	2		1,162	2,905.00
Douglas				3							180	451.25
Josephine					1	6	1				2,798	6,995.48
Jackson					5						903	1,015.50
Southwest		1	26	13	6	6	1	1	3		7,684	\$17,969.73
Hood River	2										243	607.50
Deschutes							1				21	53.75
Central	2						1				264	\$ 661.25
Union					1						85	212.50
Baker				1		1					182	455.00
Northeast				1	1	1					267	\$ 667.50
Lake							1				420	1,050.00
Southeast							1				420	\$ 1,050.00
Totals	43	3	26	20	11	8	5	1	3	1	17,675	\$42,778.85

TABLE 24
FENCES COMPLETED

Counties by Regions	Number of Fences	Rods Fenced	Money Expended
Clatsop	2	68	\$ 170.00
Columbia	4	527	1,317.50
Multnomah	1	379	947.50
Washington	7	1,311	3,278.75
Yamhill	2	376	940.62
Clackamas	3	535	1,338.75
Polk	4	497	1,241.50
Marion	8	1,463	3,658.75
Benton	2	222	535.00
Lane	2	217	389.50
NORTHWEST	35	5,595	\$ 13,817.87
Coos	5	371	927.50
Curry	4	463	1,157.50
Douglas	2	126	315.00
Josephine	2	1,148	2,870.00
SOUTHWEST	13	2,108	\$ 5,270.00
Deschutes	1	21	53.75
CENTRAL	1	21	\$ 53.75
Total	49	7,724	\$ 19,141.62

A total of 121 fencing contracts has been signed. Although some fences will not be completed due to wire shortages, the sum of \$42,778.85 has been committed for the construction of 17,675 rods.

Coos county leads all others in the number of fences contracted, particularly for the protection of cranberry bogs. The largest sum, \$6,995.48, is committed in Josephine county where large acreages of clover seed are produced.

A total of 43 fences has been contracted to protect strawberries, followed by 26 to protect cranberries, and 20 to protect gardens. Requests to fence other types of crops are fewer in number.

Since the fencing program was initiated, 7,724 rods have been completed, 44 per cent of the total contracted. Strawberry growers in Marion and Washington counties appear to be the most aggressive in completing fences.

Tree Cages:

Deer damage to young trees by browsing and antler-rubbing can be severe. Since protection is necessary for a short period, usually three to five years, tree cages are effective. Each cage consists of wire wrapped about three stakes. The average diameter is 36 inches and removal for cultivation is possible.

Wire and stakes are loaned for an indefinite period until damage ceases. Landowners construct the tree cages and are responsible for their maintenance.

Tree caging is confined to young orchards, usually less than 100 trees. Deer-proof fences have been found to be more economical for larger acreages.

A summarization of the tree-cage program is included in Table 25.

TABLE 25 TREE CAGES		
Counties by Regions	Number of Landowners	Number of Tree Cages
Benton	1	16
Marion	1	16
Yamhill	4	914
NORTHWEST	6	946
Douglas	1	4
Josephine	1	30
Jackson	3	70
SOUTHWEST	5	104
Hood River	11	1,335
CENTRAL	11	1,335
Union	6	870
Baker	4	450
NORTHEAST	10	1,320
Totals	32	3,705

A total of 32 small orchards has been protected by 3,705 cages. The demand is greatest in Hood River county where 11 landowners have been furnished materials for 1,335 tree cages. Yamhill county is next with 914 cages, followed by the cherry-growing area of Cove in Union county.

Paneling:

Haystacks in eastern Oregon can be protected from winter concentrations of deer and elk by the use of wooden panels. The general construction consists of 1 by 4 to 1 by 12-inch boards secured with a "Z" brace. Dimensions vary from 8 feet square in elk areas to 6 feet square on deer ranges.

Panels were first constructed in 1945, and the program has expanded since that date. A summary of panels loaned to eastern Oregon ranchers to date is provided in Table 26.

TABLE 26
HAYSTACK PANELING

Counties by Regions	Number of Landowners	Number of Panels	Number of Haystacks Paneled	Number of Panels in Reserve
Crook	17	1,510	98	122
Deschutes	6	344	22	76
CENTRAL	23	1,854	120	198
Wallowa	23	924	58	12
Umatilla	3	68	3	449
Union	13	853	61	9
Baker	49	3,220	230	234
Grant	24	989	60	262
NORTHEAST	112	6,054	412	966
Lake	25	1,185	64	386
Malheur	6	217	11	250
SOUTHEAST	31	1,402	75	636
Totals	166	9,310	607	1,800

A total of 9,310 panels has been loaned to 166 landowners for the protection of 607 haystacks. An additional 1,800 panels remain in reserve for future emergencies.

Control of Animals:

In many cases, repellents, fencing, and other forms of damage control are impractical.

Section 82-330, O.C.L.A., provides that landowners suffering game damage may appeal to the Commission for a permit to kill the offending animals. Where depredations are caused by a few animals and the influx of others from surrounding areas is unlikely, a kill permit is the most economical and effective solution. Such permits are issued by the regional supervisors and stipulate that the landowner must dress and deliver all carcasses to a designated cold storage locker. Identification tags are supplied permit holders for attachment to carcasses and, also, self-addressed cards to notify the regional office when a kill has been made. Kill permits stipulate the number of animals to remove and effective dates in order to maintain control of the program.

Where damage is widespread and large numbers of animals are involved, special seasons may be necessary. Such seasons are held at a time when maximum effectiveness can be achieved. The number of permit holders is predetermined in order to control the total kill. Although the recreational values of special seasons are limited, they provide the most effective control of big game populations which have proved incompatible with agriculture.

Two damage-control seasons were held last year. A total of 200 deer of both sexes was removed from the strawberry-producing Silverton hills area in Marion county, while 251 antlerless deer were taken in the vicinity of White river east of Mount Hood.

SMALL GAME

Oregon's current upland game management program provides for an annual evaluation of all available upland game habitat, including a measure of population trends and limiting factors of major game species so that the Game Commission can have sound information upon which they can base regulations and management.

Artificial propagation of pheasants continues to be a major activity and other procedures, such as trapping and transplanting, have been applied to increase the distribution and densities of upland game species.

A classification of the available upland game habitat indicates that only approximately half of the six million acres of agricultural land in Oregon can be presently classified as suitable upland game habitat or productive of an annual surplus for harvest. With the hope of bringing a part of this marginal land into production and increasing the production of game birds on suitable habitat, a habitat improvement program is underway to provide the lacking essential requirements of game birds.

Seed stock refuges have been established and maintained in areas lacking escape cover so that a nucleus of game birds will be protected during open hunting seasons. In addition, much publicity has been given to the merit of protecting females of polygamous species and other hunting regulations designed for the protection of game birds and the future of upland game hunting.

The ring-necked pheasant continues to be Oregon's most popular upland game bird, but with the increasing hunting pressure more hunters are pursuing quail, rabbits, and other small game species than during previous years.

Location of suitable areas for liberation of farm-reared pheasants is becoming more difficult in eastern Oregon each year. Liberation sites must meet all requirements of pheasants. Such areas are generally well-populated with birds already and many landowners feel that a maximum density has been attained.

The current rapid increase in human density and economic development in Oregon is hastening the day when maintenance of game populations will be no greater problem than providing access to private lands for public recreation. At the present time, a high percentage of the lands in the more popular upland game hunting areas are posted to prevent trespass or hunting and landowners frequently refuse to cooperate in plans for the production of more game because of the many hazards encountered during hunting seasons. An appeal to sportsmen through news releases and posters is believed to have had some effect in the past two years but a well-planned program for the promotion of better farmer-sportsman relationships is needed if a serious access problem is to be avoided in future years. Expansion of Orenco type farm-game cooperatives is planned for the coming year.

Other activities, such as predator control, have been undertaken during the past year but an accurate measure of their effect upon upland game populations is not at present available.

Although weather conditions during the past winter resulted in a lighter than normal loss of game birds by predation and exposure, a slight decline is indicated in the number of breeding birds available this spring. The present

average state densities are lower than the average for the past five years, but with normal reproduction a surplus will be available for harvest in the fall of 1951.

The following paragraphs summarize the information obtained and activities of the upland game department from May 1, 1950, to May 1, 1951.

RING-NECKED PHEASANTS:

Chinese and Mongolian pheasants continue to carry most of the upland game hunting pressure in Oregon, and as a result, the pheasant receives substantially more attention than other upland game species.

Population Trends:

A comparison of pheasant density measurements by county from 1947 to 1951 is included in the following table. It will be observed that, although some counties show an increase of pheasants, the state-wide average is down about two birds per 100 acres. This decrease is difficult to account for.

The eastern Oregon densities are greater and ample breeding stock is present in most counties. Western Oregon counties show a more pronounced decline in pheasants. Changing agricultural methods have much to do with this situation. Development of hormone brush killers, intensive draining of low-grade lands, and clean farming practices are constantly reducing winter feed and cover, particularly in the Willamette valley.

For the past three years an effort has been made to measure the effect of hunting seasons by conducting an upland game census of representative counties before and after the hunting season. A state-wide census is made in the spring, just prior to nesting season. This procedure has provided an index of hunter kill only in areas where all crops are harvested prior to the pre-season census. In irrigated areas where many crops are not harvested before hunting season the post-season census often indicates a higher density than that of the pre-season census. For example, in Malheur county the pre-season census in 1948 showed 29 birds per 100 acres, while the post-season census a month later indicated 54 birds per 100 acres.

Any practical method of measuring population trends requires that the census be conducted under the same conditions of cover and bird habits each year. Disadvantages of this pre-season and post-season census indicated that the data obtained was not valuable in most instances. This census was abandoned in 1950 and a sample of pre-season and post-season sex ratios was substituted to obtain a measure of the efficiency of the harvest.

TABLE 3
SEASONAL MEASUREMENTS OF PHEASANT SEX RATIOS

Region	Cock to Hen Ratio		
	October, 1950	December, 1950	Spring, 1951
Northwest	1:0.61	1:0.87	1:1.12
Southwest	1:0.97	1:0.89	1:3.20
Central	1:0.75	1:2.24*	1:2.51
Northeast	1:0.88	1:1.75	1:2.61
Southeast (Malheur)	1:1.13	1:5.14	1:3.88

* Based on inadequate sample.

TABLE 2

SUMMARY 1951 UPLAND GAME SPRING CENSUS

Region	Habitat Area	Samples		Pheasants			Valley Quail		Bob White		Hun		Cottontail	
		No.	Acres	Cock	Hen	Uncl.	Total	per 100 acres	No.	per 100 acres	No.	per 100 acres	No.	per 100 acres
Northwest	No. Willamette	82	5,003	123	116	25	264	5.3	106	2.3	6	0.1	0	0.1
	So. Willamette	67	4,375	249	301	95	645	14.7	197	4.5	66	1.5	0	-
Southwest	Rogue, Umpqua	28	1,620	44	142	0	186	11.5	180	11.1	0	0	0	-
Subtotal	Western Oregon	177	10,998	416	559	120	1,095	10.0	483	4.4	72	0.7	0	-
Central	Columbia	21	1,961	107	237	3	347	17.7	502	25.6	0	0	10	0.7
	Upper Deschutes	37	2,305	63	140	0	203	8.8	580	25.0	0	0	0	-
	Klamath	14	817	46	149	102	297	36.6	6	0.7	0	0	0	0.1
Northeast	Blue Mt. Valleys	79	5,601	203	471	90	764	13.6	333	6.0	0	0	46	0
	Umatilla	53	3,180	270	754	341	1,365	42.9	796	21.9	12	.4	53	0
Southeast	Great basin	27	1,577	106	160	5	271	12.2	125	7.9	0	0	0	-
	Malheur	40	2,304	178	829	36	1,043	45.4	14	0.6	103	4.5	46	0
Subtotal	Eastern Oregon	271	17,745	973	2,740	577	4,290	24.1	2,356	13.3	115	6	155	0.08
State Total		448	28,743	1,389	3,299	697	5,385	18.6	2,839	9.9	187	0.65	155	0.06

TABLE 3

1947 - 1951

UPLAND GAME SPRING CENSUS

County	REGION	Pheasants per 100 Acres					Sex Ratio		Valley Quail per 100 Acres			Bob White Quail per 100 Acres			Hungarian Partridge per 100 Acres			
		1947	1948	1949	1950	1951	M	F	1948	1949	1950	1948	1949	1950	1948	1949	1950	1951
Columbia		10.0	17.0	9.9	6.7	7.4	1:1.67	-	-	-	-	-	-	-	0	0	0	0
Multnomah		11.0	14.0	11.7	2.6	7.6	1:1.0	-	-	-	-	-	-	-	0	0	0	0
Clackamas		8.0	21.0	6.6	8.6	5.0	1:0.04	7.7	2.7	4.6	-	1.4	-	7.7	0	0	0	0
Washington		13.0	5.0	7.2	6.8	4.0	1:0.64	-	-	-	-	.01	-	0.7	0	0	0	0
Yamhill		6.0	7.0	6.4	3.6	4.4	1:1.36	3.6	9.9	4.8	5.1	4.2	2.0	.01	-	.1	-	-
Marion		4.0	13.0	10.3	5.1	8.9	1:1.88	3.7	5.1	1.1	6.9	.6	2.9	.3	0.6	-	-	-
Polk		7.0	11.0	10.4	13.3	5.0	1:0.8	3.4	7.2	3.0	2.5	2.0	0	-	0	0	0	0
Benton		29.0	40.0	37.2	29.6	15.5	1:0.95	2.8	6.3	6.0	9.6	.5	.01	1.9	1.3	0	0	0
Linn		24.0	42.0	35.8	19.8	14.8	1:1.45	3.8	2.9	2.5	3.9	2.4	5.2	1.25	1.2	-	.1	-
Lane		14.0	29.0	14.7	8.5	13.9	1:1.2	1.0	-	2.4	0.7	6.3	7.3	.4	2.2	0	0	0
SUBTOTAL-NORTHWEST		15.0	23.0	18.2	12.8	10.2	1:1.12	2.7	3.8	2.5	3.6	2.2	3.0	.85	0.8	-	.05	-
Coos		.3	2.3	1.1	.9	.5	1:1	15.6	9.6	10.9	15.1	0	0	0	0	0	0	0
Curry		n.c.	n.c.	n.c.	-	-	-	n.c.	n.c.	16.0	5.5	n.c.	n.c.	0	0	n.c.	n.c.	0
Douglas		12.0	6.2	8.6	4.0	5.4	1:1.4	4.1	3.9	-	1.5	0	1.0	-	0	0	0	0
Josephine		13.0	17.7	13.3	6.5	1.6	1:0.5	21.6	66.6	23.0	5.5	0	0	0	0	0	0	0
Jackson		15.0	14.2	20.5	17.0	23.3	1:4.8	32.0	36.6	2.3	26.5	0	0	0	0	0	0	0
SUBTOTAL-SOUTHWEST		-	10.0	14.0	5.2	7.2	1:3.0	13.1	18.7	6.2	11.9	0	0	0	0	0	0	0
SUBTOTAL WESTERN OREGON		14.0	19.5	16.0	10.5	10.0	1:1.33	5.2	7.5	3.4	5.8	1.7	2.3	62	56	-	-	0

- Present but not observed on samples

TABLE 3 (Cont.)

County	Pheasants per 100 Acres						Sex Ratio			Valley Quail			Bob White Quail			Hungarian Partridge		
										per 100 Acres			per 100 Acres			per 100 Acres		
	1947	1948	1949	1950	1951	M to F	1948	1949	1950	1951	1948	1949	1950	1951	1948	1949	1950	1951
Hood River	9.0	8.0	7.7	n.c.	2.9	1:1	-	-	n.c.	-	0	0	n.c.	0	0	.04	n.c.	-
Wasco	11.0	15.5	33.5	28.0	21.5	1:2.2	27.0	32.0	17.5	38.1	0	0	0	0	.2	12.0	1.6	.4
Sherman	14.0	14.7	27.4	13.1	11.4	1:3.2	52.0	33.0	1.6	6.9	0	0	0	0	2.0	5.4	4.9	1.2
Jefferson	3.0	5.5	4.0	8.2	17.6	1:1.85	46.0	25.0	62.5	94.7	0	0	0	0	2.2	4.0	14.9	-
Crook	7.4	18.7	6.3	9.8	11.4	1:2.4	33.6	12.8	13.7	10.9	0	0	0	0	-	-	.35	-
Deschutes	.7	.4	2.1	1.8	1.9	1:2.2	16.7	15.0	11.6	17.5	0	0	0	0	.7	.2	.24	-
Klamath	15.0	13.1	12.7	39.1	36.6	1:3.2	-	-	1.4	0.7	0	0	0	0	-	-	-	-
SUBTOTAL-CENTRAL	-	12.8	10.5	15.8	15.8	1:2.5	34.0	21.4	25.1	22.6	0	0	0	0	0.7	1.3	4.9	.2
Gilliam	10.0	16.6	17.0	27.4	17.2	1:1.45	39.0	16.6	46.3	20.0	0	0	0	0	1.2	2.3	1.8	-
Wheeler	20.0	13.0	11.0	21.4	16.8	1:0.7	104.0	103.0	41.6	45.0	0	0	0	0	1.2	3.3	2.5	1.7
Grant	22.0	24.7	33.0	n.c.	23.6	1:7.1	90.7	36.0	n.c.	64.1	0	0	0	0	.5	-	n.c.	-
Morrow	33.0	36.6	41.8	57.1	26.6	1:2.8	26.0	54.9	36.1	13.4	0	0	0	0	.3	7.8	3.8	1.7
Umatilla	58.0	69.1	69.0	50.8	48.0	1:2.8	37.0	54.4	15.0	25.2	.5	1.8	3.3	.5	3.5	2.6	1.3	1.7
Baker	35.0	22.5	11.6	13.1	13.5	1:1.4	-	-	1.8	.9	0	0	0	0	1.1	.6	1.1	.3
Union	12.0	16.5	15.6	12.7	10.5	1:1.9	4.6	.2	-	2.0	0	0	0	0	2.6	1.4	3.1	1.0
Walla	14.0	7.3	9.7	18.9	14.2	1:3.9	1.2	-	-	-	0	0	0	0	.4	-	-	1.4
SUBTOTAL-NORTHEAST	-	33.1	21.66	31.6	21.4	1:2.61	24.1	18.9	9.3	12.9	.1	.4	1.4	.11	2.1	1.6	1.5	1.1
Lake	n.c.	n.c.	n.c.	9.4	6.3	1:1.1	n.c.	n.c.	10.9	11.3	n.c.	n.c.	0	0	n.c.	n.c.	-	-
Harney	21.0	23.4	24.6	29.8	22.9	1:1.6	7.2	6.6	11.1	6.2	0	0	0	-	-	.1	-	-
Malheur	60.0	38.7	40.5	45.2	45.4	1:4.66	0	.6	2.8	0.6	-	1.8	5.3	4.4	6.4	6.2	5.6	2.0
SUBTOTAL-SOUTHEAST	-	33.6	35.6	35.7	33.8	1:2.5	1.1	2.8	4.4	3.6	-	1.3	2.8	2.7	2.4	4.3	1.5	1.2
SUBTOTAL																		
EASTERN OREGON	30.0	28.5	25.3	27.0	24.1	1:2.8	21.2	16.3	13.7	13.3	.08	.4	1.1	0.6	1.2	2.0	2.5	0.9
TOTAL STATE-WIDE	22.0	25.1	21.6	20.8	18.6	1:2.36	15.4	12.6	9.8	9.9	1.5	1.2	.95	.65	.8	1.3	1.5	0.54

- Present but not observed on samples

It is difficult to account for some of the higher sex ratios in the spring than in the post-season count. It may be due to scheduling the post-season count too soon after the season while the cocks are still in hiding.

Data obtained indicate a more efficient harvest of males in eastern Oregon counties.

Statistical Analysis of Census Data:

Standard methods of statistical analysis have long been used to check the validity of measurements. Such analysis has not been applied to Oregon's game work in the past. After the 1951 census, an analysis was made of all permanent records of upland game census data for the last five years.

Certain facts were apparent from this analysis. Two of the more important of these were that the county unit method of reporting trends was too small for accuracy and the other was that many sections of the state have been over-sampled and more work done than actual management needs justify.

Significance of census data was tested by the chi square test. In all but two counties, data are significant at least to the point of measuring a population change 99 out of 100 years. However, counties where few birds are counted have such a high standard error that the value of the data is questionable. Statistical errors are a function of the number of birds counted, not the number of acres censused. By using exactly the same sample areas each year and lumping the data by habitat or production types, the information is valid and sampling can be reduced in many areas. The 1951 Annual Report is the last one in which it is planned to present the county density table. A great deal of detailed work will be needed in changing the method and recomputing past trends. This work will be accomplished prior to the next spring inventory.

Habitat areas to be used for the new report base are:

1. North Willamette - Includes Columbia, Multnomah, Washington, Clackamas, Yamhill, Polk, and Marion counties.
2. South Willamette - Includes Benton, Linn, and Lane counties.
3. Rogue-Umpqua - Includes Douglas, Jackson, and Josephine counties.
4. Columbia basin - Includes Wasco, Sherman, and Gilliam counties.
5. Upper Deschutes - Includes Jefferson, Crook, and Deschutes counties.
6. Klamath basin - Includes only Klamath county.
7. Umatilla basin - Includes Morrow and Umatilla counties.
8. Blue mountains - Includes Wallowa, Union, Baker, Grant, and Wheeler counties.
9. Great basin - Includes Lake and Harney counties.
10. Malheur county.

The coastal counties and Hood River provide marginal pheasant habitat. Census will be taken, but not reported as it is a management indicator only. A summary of the statistical analysis is presented for reference.

TABLE 4
STATISTICAL ANALYSIS OF PHEASANT CENSUS DATA

Report Area	Acres Sampled	Years of Observations	Average No. Birds Counted	Value of Chi Squared	Approximate Standard Error Per Cent
North Willamette	3,278	4	288	73.60	6.2
South Willamette	2,134	5	505	102.93	4.4
Rogue-Umpqua	1,440	4	176	12.72	7.5
Columbia basin	-	-	-	-	-
Upper Deschutes	1,605	4	101	29.12	10
Klamath	-	-	-	-	-
Umatilla	2,520	5	1,324	83.31	2.8
Blue mountain*	4,120	4	621	37.71	4
Great basin	1,602	2	308	17.56	5.7
Malheur	1,140	5	631	145.69	4

* Does not include Grant and Wheeler counties in this tabulation.

- Census samples have been changed and not enough identical samples are available for this study.

Data in the above table were obtained from samples run each year during the period indicated. Numerous other samples were missed one year of the series and were not used for that reason. Therefore, the actual average number of birds was higher for computation purposes in past annual reports. When the census system is revised in the field, the average number of birds will be higher and standard errors lower in most instances. To cut the standard error in half it is necessary to quadruple the number of birds sampled.

Data from this analysis will be presented in detail in a special report.

Production:

Each pheasant hen available in the spring has a potential productivity of at least 12 pheasants. If this potential production were attained with a sex ratio of one cock to two hens there would be nine pheasants available in hunting season for every one available in the spring. Census data and brood counts indicate that the normal increase is more nearly two to one. Therefore, the greatest loss must occur during the nesting and rearing season.

Inclement weather affects the survival of young pheasants on game farms; however, past attempts to correlate monthly precipitation and average temperatures with pheasant production failed to show any direct relationship. Weather is an important factor in the growth of cover, time of mowing, and other related agricultural activities. Weather has very little effect on the time pheasants begin laying.

Data gathered in the State of Washington indicate that pheasants in the wild begin laying on almost the same date each year. However, weather, cover, and other factors cause variations of over two weeks in the time nesting begins.

Brood counts were originally scheduled between June 20 and July 10, 1950. Production figures obtained for eastern Oregon were low and supplemental counts were made between July 19 and 25 with more encouraging results. Results of both counts are presented in Tables 5 and 6.

The best measure of production could be obtained in August after most of the crops are harvested. Such a measure is of little use when hunting regulations must be made in July.

TABLE 5
1950 PHEASANT BROOD COUNTS

Region and County	Hens Observed	Hens With Brood		Average Chicks per Brood	Average Chicks per Hen		
		No.	Per Cent		1950	1949	1948
NORTHWEST							
Willamette valley	90	69	77	8.2	6.3	4.7	3.8
Sauvie island	62	35	56	8.3	4.7	-	-
SOUTHWEST							
Douglas	4	3	75	6.0	4.5)		
Jackson	26	17	66	5.8	3.8)--4.9		6.1
Josephine	4	4	100	8.3	8.3)		
Subtotal							
Western Oregon	186	128	69	7.8	5.7	4.7	4.8
CENTRAL							
Crook	41	7	17	14.8	2.5)		
Deschutes	11	-	-	-	-)--4.2		1.3
Wasco	24	11	46	14.0	6.4)		
Sherman	8	2	25	4.0	1.0)--8.0		5.9
Jefferson	10	5	50	9.3	4.7)		
Hood river	7	-	-	-	-		
Subtotal							
Central region	101	25	25	12.8	3.2	-	-
SOUTHEAST							
Malheur	222	27	12	5.6	0.7	2.0	1.9
Harney	27	25	92	8.4	7.8	6.0	4.6
Lake (Summer lake)	8	5	63	9.0	5.6	2.9	0.7
Subtotal							
Southeast region	257	57	22	6.9	1.5	-	-
NORTHEAST							
Wallowa	98	21	21	5.7	1.2	1.6	-
Union & Baker	104	43	41	7.0	2.9	3.9	0.7
Umatilla	159	84	53	5.2	2.7)		
Morrow	35	13	37	5.3	2.0)--3.0		3.5
Wheeler	8	5	63	4.0	2.5	-	-
Gilliam	7	6	86	3.8	3.2	-	-
Grant	15	3	20	4.5	0.9	9.5	0.8
Subtotal							
Northeast region	426	175	41	5.5	2.3	-	-
Subtotal							
Eastern Oregon	784	257	33	6.8	2.2	3.6	2.7
State Total	970	385	40	7.1	3.0	3.8	3.3

TABLE 6
PHEASANT BROOD COUNTS

July 19 to July 25, 1950

Region and County	Hens Observed	Hens with Brood		Average Chicks per Brood	Average Chicks per Hen			
		No.	Per Cent		July 19 to 25, 1950	June 20 to July 10, 1950	1949	1948
CENTRAL								
Crook	9	8	89	4.7	4.2	2.5)---	4.2	1.3
Deschutes	-	-	-	-	-	-)		
Wasco	37	30	81	11.3	9.2	6.4)		
Sherman	6	6	100	6.5	6.5	1.0)---	8.0	5.9
Jefferson	3	2	67	5.0	3.3	4.7)		
Hood river	5	1	20	-	-	-)		
Subtotal Central region	60	47	78	8.9	7.0	3.2	-	-
SOUTHEAST								
Malheur	27	18	67	6.2	4.1	0.7	2.0	1.9
Harney	21	19	90	8.3	7.5	7.8	6.0	4.6
Lake (Summer lake)	5	5	100	4.5	4.5	5.6	2.9	0.7
Klamath	37	19	51	3.8	2.0	-	-	-
Subtotal Southeast region	90	61	68	5.5	3.7	1.5	-	-
NORTHEAST								
Wallowa	63	11	18	6.1	0.9	1.2	1.6	-
Union & Baker	36	25	70	5.7	3.9	2.9	3.9	0.7
Umatilla	66	53	81	3.6	2.9	2.7)---	3.0	3.5
Morrow	23	16	69	2.6	1.8	2.0)	-	-
Wheeler	-	-	-	-	-	2.5	-	-
Gilliam	-	-	-	-	-	3.2	-	-
Grant	12	8	67	6.0	4.0	0.9	9.5	0.8
Subtotal Northeast region	200	113	57	4.1	2.3	2.3	-	-
Total Eastern Oregon	350	221	63	5.3	3.3	2.2	3.6	2.7

Several small special studies have been undertaken in certain districts to obtain some measure of losses from other factors.

Highway mortality figures were recorded on major highways in the south Willamette district. Mileage was approximately the same each month. The data indicate how vulnerable young birds are to traffic losses.

Month	Number of Highway Kills
May	2
June	4
July	47
August	40
September	13
Total	106

In Malheur county, data were obtained on mowing losses for the second year.

Year	Number of Contacts	Acres Mowed	Hens Killed		No. Nests Destroyed	
			No.	Per 100 A.	No.	Per 100 A.
1950	26	643	172	27	381	59
1949	16	480	160	33	900	187

The figures are high and indicate a large loss; however, the sample is small and the data are not applicable to the entire county.

Dummy pheasant nests were put out in the southwest region. Seventeen nests were placed out and three or 18 per cent were destroyed within two weeks by farming operations. No nests were destroyed by predators.

Hunting:

<u>Area</u>	<u>Season</u>	<u>Bag Limit</u>
Northwest region and Douglas county	Noon, October 14 through October 22.	Two cocks a day; four in the season.
Central region; Northeast region; and Jackson, Josephine, Lake and Harney counties	Noon, October 14 through October 29.	Three cocks a day; nine in the season.
Malheur county	Noon, October 14 through November 5.	Four cocks a day; 12 in the season.

Table 7 indicates the results of the 1950 field check of hunters. It will be noted that both birds per hunter and birds per hour hunted increased over 1949. Young birds comprised 64 per cent of the bag and indicated a higher survival than in the preceding year.

Of the 623 birds classified in eastern Oregon, only 84 or 16 per cent showed predominantly Mongolian characteristics.

Hunting conditions varied from fair to good in eastern Oregon. Rainy weather was prevalent during the western Oregon season and reduced both kill and hunting pressure. The late hatch and early season were responsible for a reduced kill in Malheur county. Many young cocks were not colored sufficiently to distinguish them from hens during the first portion of the season.

Field agents again posted signs urging that pheasant hens be saved.

A random kill survey was conducted in conjunction with other portions of the 1950 game questionnaire. The following data were determined or computed from this survey.

Hunters answering questionnaire	=	4,732
Number hunting specifically for pheasants	=	1,621
Average times afield per pheasant hunter	=	3.1
Pheasants killed per hunter day	=	0.8
Total number of pheasant hunters	=	74,968
Total number of pheasants killed	=	192,118

Data regarding the number of pheasant hunters are accurate with a standard error of 0.69 per cent. Data regarding times afield and birds per day are subject to more inaccuracies; however, the sample is large and any small inaccuracies should be constant from year to year. The field check data indicated 0.78 birds per man day and the random survey indicated 0.81 birds per man day. This is remarkably close. The mail survey data is more valid and should be used.

4-H Club Pheasants:

The Oregon Game Commission has participated in a cooperative educational program for 4-H Club members for approximately 16 years. Club members order eggs through their respective 4-H Club agents. The eggs are shipped from the game farms free and all pheasants successfully raised to the age of 10 weeks are purchased by the Commission at \$1.00 per bird. The pheasants are frequently released on the club member's farm to stimulate interest.

During the 1950 season, 1,356 birds were purchased by the Game Commission. A total of 5,033 eggs was delivered to 4-H members. Production was one bird for each 3.7 eggs furnished.

It is believed that these pheasant-rearing projects for youth groups have educational values; however, there is need to integrate a more flexible program with pheasant rearing. A certain amount of habitat improvement could be required in conjunction with the pheasant rearing.

Cooperative Farm-game Projects:

The Orenco farm-game cooperative was operated for the second season in Washington county. Details of the project were substantially the same as those in 1949. The only exception was to allow landowners to select a "safety zone" where hunting was reserved for the landowner and his guests. Colored armbands were furnished for these hunters. Demand for these zones was limited and only 100 acres of the project area were posted for this purpose. Continuation of safety zones will be of questionable value.

Liberations of farm-reared birds were made at various times during the summer; however, the majority of the kill came from two liberations of 375 and 371 mature cocks before each weekend of the hunting season.

Hunting pressure was lighter than in the preceding year, but this was due to limited publicity on the project. The hunters utilizing the Orenco project were very well pleased, and landowner reaction was again exceptionally favorable. Patrolmen made only three arrests.

Statistics of the season follow:

Hunters checked in the field -	383
Total kill -	
Mature liberated birds - 148	
"Wild" unmarked birds - 34	182
Birds per hour -	0.22
Birds per hunter -	0.47

TABLE 7
1950 PHEASANT SEASON

Region	District	Hunters		Pheasants		Pheasant Age Classes				Pheasant Varieties				
		No.	Hours	No.	Per Hunter	Per Hour	Young		Old		China		Mongolian	
							No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Northwest	Willamette valley	373	1,044	156	.42	.15	78	68	37	32	156	100	-	-
Southwest	Southwest	102	316	45	.44	.14	26	59	18	41	45	100	-	-
Subtotal Western Oregon		475	1,360	201	.43	.15	104	65	55	35	201	100	-	-
Central	Klamath	20	55	20	1.00	.36	-	-	-	-	2	10	18	90
	Central	37	83	41	1.10	.49	29	71	12	29	20	49	21	51
	Columbia	68	194	64	.94	.33	24	60	16	4	20	59	14	41
Northeast	Umatilla	313	1,113	260	.83	.24	173	67	87	33	245	94	15	6
	Northeast	46	112	53	1.15	.47	16	73	6	27	52	98	1	2
	Grant	53	162	28	.53	.17	21	75	7	25	12	70	5	30
Southeast	Lake	17	34	7	.41	.21	6	86	1	14	7	100	-	-
	Harney	23	69	32	1.39	.46	18	56	14	44	24	75	8	25
	Malheur	125	453	159	1.27	.35	87	55	72	45	157	99	2	1
Subtotal Eastern Oregon		702	2,275	664	.95	.29	374	63	215	37	539	86	84	16
State Average 1950		1,177	3,635	865	.78	.24	478	64	270	36	740	90	84	10
State Average 1949		899	2,880	814	.91	.29	298	51	286	49	515	85	91	15

Fate of the 746 mature cocks liberated during the season is of special interest. Of these, 182 were checked in the field and 62 additional bands were subsequently received by mail, giving a known kill of 244 or 33 per cent. The actual kill was probably in the vicinity of 50 per cent since past experience indicates that many bands are never reported. Only one marked bird from the 1949 field-rearing project was taken.

Sauvie island, owned by the Game Commission, was utilized for the same type of project. Six hundred and ninety-five mature cocks were liberated and 278 were identified in 520 hunters' bags. The average kill was 0.61 birds per hunter and 0.22 per hour. Only 25 non-tagged juvenile birds were checked to account for kill of both wild stock and 1,436 young pheasants liberated during the summer. Assuming that half or 718 were males and the 25 killed all came from this liberation, only 3.5 per cent of the males were taken by the hunter.

Of the 695 mature cocks liberated, 392 were either checked in the field or by mail and personal contact for a return of 56 per cent. Hunters were more restricted as to access than at Orenco and a higher per cent of them checked in the field. This accounts for the greater proportion of bands recovered from mature birds.

Survival Studies:

The Summer lake pheasant study was continued on much the same basis as in past years. The findings are presented in tabular form and a five-year tabular summary in the section on Oregon's pheasant propagation program.

1950 liberations and the resulting survival to hunting season are presented in the following tables.

TABLE 8
1950 LIBERATIONS AND SURVIVAL

Date	Age	Number Birds	Known Losses	Harvest	
				No.	Per Cent
Feb. - March	Adult*	139	7	16	11.5
April	Adult**	87	7	9	10.3
August 19	Eight weeks(1)	987	12	244	24.6
August 19	Eight weeks(2)	1,127	6	176	15.6
September 5	Eight - twelve wks.	600	10	124	20.6
November 30	Adult**	296		141	47.6

* Wild-trapped birds

** Farm-reared birds

(1) Field-reared Mongolian

(2) Field-reared China

The 1950 hunting season was from November 10 to December 27, inclusive. The later than normal opening was an attempt to reduce hunting density and avoid accidents to hunters. This was successful as only 62 per cent of the kill was made the first three days as compared with 80 per cent in 1949. Only 17 per cent of the kill was unmarked or wild birds, compared with the five-year average of 40 per cent. Wild populations will not hold up under heavy hunting pressure and shooting of hens, even with very heavy liberations.

The data gathered at Summer lake has been used to select age classes, rearing methods, and liberation methods for Oregon's artificially-reared pheasants. The ultimate use of the data is given in the section on Oregon's artificial propagation program.

The Federal Aid Department is preparing a bulletin on the findings of this project, and it will be available for distribution prior to the end of the year. For that reason, this section of the report is not as complete as has been the case in past years. Field work on this project terminated in January, 1951.

Live Trapping and Transplanting:

Authority was given by the federal government to trap surplus pheasants from the Malheur refuge, Harney county, for liberation in other areas. Weather conditions were too mild for successful trapping and only 48 pheasants were taken. These birds were all liberated in Harney county.

Upland Game Bird Damage:

Damage by upland game birds is light. The principal offender is the pheasant and his major damage is to family vegetable gardens. Some row crops, melons, etc., occasionally are damaged.

In Malheur county, damage complaints are increasing as pheasant habitat declines. The district agent in that county has worked out the following system for control: Wheat is fed at the edges of the damaged fields and hazing with a shotgun is done in the early morning and late evening in the middle of the field. Hazing is continued for four or five days, and feeding continues until the damage period for the particular crop involved is over.

Occasional kill permits are issued in the melon areas of Umatilla and Morrow counties. Numerous hazing permits are given in the Multnomah-Clackamas refuge where substantial garden damage occurs each spring. A small covey of quail was live trapped and moved from a damage area in the southwest region. The district agent reports that the use of millet as bait was responsible for success of the operation.

VALLEY QUAIL:

The California Valley Quail (Lophortyx californica vallicola) is an exotic in all but the southwestern part of Oregon. This species, with some assistance through trapping, transplanting, and artificial propagation, has become established and attained varying densities in all counties.

This species does not normally conflict with agriculture and is recognized as an asset by most landowners.

Hunters are only beginning to appreciate the value of quail as game birds because their past preference has been for the larger pheasant. With the increase of hunting pressure, it appears that more hunters are specifically hunting quail because they provide more sporting shooting and can be hunted on marginal lands without conflict with landowners or other hunters.

Population Trends:

The 1951 spring census indicates that Valley quail generally decreased in eastern Oregon and increased in western Oregon. Surpluses should be available for harvest in the same general areas open to hunting in 1950. Quail hunting is a major factor only in central Oregon, and with a normal hatch enough birds will be available. The mild winter was excellent for quail and areas which

suffered heavy losses in previous severe winters show a remarkable recovery.

Paragraphs on census methods in the pheasant section of this report apply equally to Valley quail. Quail numbers will be considered in reassigning census samples and the same report units will be used for determining densities.

The decline noted in Malheur county is disappointing and indicates that more extensive transplanting is necessary.

Live Trapping:

Mild weather during the past winter prevented successful live-trapping operations. The only large-scale trapping to be done in the near future is to obtain more birds for Malheur county. All regions now have traps on hand and it is anticipated that future live trapping will be done within the regions to restock individual coverts rather than large-scale transplanting operations.

Production:

More intensive brood counts made in 1950 gave the greatest total of Valley quail broods to date. These data are presented as a matter of record in Table 9.

TABLE 9
VALLEY QUAIL BROOD COUNTS
JULY 19 TO JULY 25, 1950

Region	Hens Observed	Hens with Brood		Average Chicks per Brood	Average Chicks per Hen
		No.	Per Cent		
Central	36	18	50	12.9	6.5
Southeast	21	11	52	12.6	6.6
Northeast	30	16	53	9.3	5.0
Total					
Eastern Oregon	87	45	52	11.4	5.9

Hunting:

Season: Noon, October 14 through October 29.

Bag limit: Ten quail per day; not more than 20 per season.

Open area: Jefferson, Wheeler, Gilliam, Morrow, Crook, Deschutes, Grant, Harney, Lake, Klamath, Umatilla, Jackson, and Josephine counties.

Not enough quail were checked to classify properly the bag. A total of 412 hunters checked in quail territory had only 124 quail. This shows the more or less incidental kill of quail.

The 1950 random hunter survey included a section on quail. The following information was gathered or computed from this survey:

TABLE 10
RESULTS OF 1950 RANDOM HUNTER SURVEY - QUAIL

Hunters answering questionnaire	-	4,671
Number hunting specifically for quail	-	274
Average times afield for quail hunters	-	2.807
Quail killed per hunter day	-	1.789
Total number of quail hunters	-	12,777
Total number of quail killed	-	64,163

Data obtained regarding the number of quail hunters are accurate, with a standard error of 0.34 per cent. Information regarding times afield and quail killed is subject to more error as it is based on only 274 positive answers. However, it is the best information available and should be comparable from year to year.

HUNGARIAN PARTRIDGE:

The first Huns were brought into Oregon in 1900 and released in Multnomah and Marion counties. Later the game farms raised Huns and they became most successfully established in Umatilla, Wallowa, and Malheur counties.

Census data indicate a fair distribution of Huns in most eastern Oregon counties but densities have been low since 1945. The current census indicates a slight decrease in Hun numbers in most counties.

The spring census does not provide a measure of Hun densities that can be compared with other upland game species because Huns normally begin pairing off in February and, for this reason, a smaller percentage of the Huns present are observed. Huns also inhabit foothill grass ranges not normally included in the pheasant quadrats. It is assumed that by recording consistently the Huns observed upon established census samples at a similar time each year an index of trends will be obtained.

Remnants of the past releases of Huns persist in Yamhill, Marion, and Linn counties but these few scattered coveys have decreased noticeably in the last few years.

The Wildlife Research Station has undertaken a project for the introduction of Huns from Denmark or other humid European areas, which may be better adapted to western Oregon habitat. Two hundred of these birds were allowed to disperse from a field-rearing project in Benton county. These birds have been thoroughly searched for, but have not been located to date.

Breeding stock held at the game farm will permit sizeable initial liberations during the coming year.

With favorable reproduction, surpluses may exist in Sherman, Jefferson, Wheeler, Morrow, Wallowa, and Umatilla counties. If more hunters went after Huns, this would not be true, but since the Hun kill is incidental to pheasant hunting an open season is not overly harmful.

A modest open season was held from noon October 14 through October 29. The bag limit was three a day and not more than six during the season. Open

area included Malheur, Morrow, Umatilla, Wallowa, Wheeler, Gilliam, Jefferson, Baker, Union, and Grant counties. Hunter bag check data give an indication of the low kill of Huns. No hunters checked were hunting specifically for Huns.

TABLE 11
1950 HUNGARIAN PARTRIDGE BAG CHECK

County	Number Hunters	Huns Killed
Morrow	90	19
Umatilla	223	8
Baker	31	1
Union	15	1
Grant	53	1
Malheur	125	7
Total	537	37

Brood data on Huns is limited; however, of 18 hens observed by field agents 72 per cent had broods. The average chicks per hen was 5.2.

BOB-WHITE QUAIL:

At the present time, Bob White quail are present in limited numbers in the Willamette valley, Malheur, and Umatilla counties. *The original introduction in the Willamette valley was from Indiana in 1882 and the quail were released in Linn county. The Bob Whites in Malheur county are credited to a planting in the Boise valley, Idaho, in 1875.

In recent years, this species has not produced surpluses for harvest, and the current spring census indicates a substantial decrease in Bob Whites for all three areas. Cause of this decline, other than changing habitat, is not known.

This species has a very high aesthetic value because of its inoffensive habits and cheerful call but is handicapped by its habit of roosting on the ground in sparse cover and does not appear to have the potentialities of Valley quail and pheasants as a sporting bird.

An increase in the distribution of the species through artificial propagation or trapping and transplanting would be desirable and an excellent public-relations factor with landowners.

CHUKAR PARTRIDGE:

Breeding stock on the two eastern Oregon game farms is sufficient to produce about two thousand young Chukars for release during the coming year.

State police reported one brood of Chukars seen (1950) several miles from the Table Rock liberation site in Jackson county. The district agent saw eight Chukars on Bald mountain in the Siskiyou during the spring of 1951. Source of these birds is unknown. Reports have been received that Chukars are crossing the Nevada line and are present in southern Harney county. Game Commission employees have not found these birds to date.

* Gabrielson and Jewell: Birds of Oregon.

RUFFED AND BLUE GROUSE:

The native Ruffed and Blue grouse are well distributed throughout the timbered sections of the state. High densities have not been reached recently; however, in coastal counties densities have continued to increase with a modest hunting season. The possibility of a maximum density factor must be considered for grouse. All grouse are cyclic and, therefore, populations may be expected to fluctuate.

A measure of grouse population trends is obtained in western Oregon by recording all grouse observed on big game census samples. In eastern Oregon, most big game samples are done in winter and density measurements of grouse are not as practical. District agents are attempting to solve this problem and data have been collected as shown in the following tables.

Two broods of rare Franklin's Grouse (15 birds) were seen near Hot Point in Wallowa county.

Estimates indicate that Blue grouse continue to increase in eastern Oregon, while Ruffed grouse remain static.

More grouse and Mountain quail brood counts were obtained than usual and the information is summarized in the following tables.

TABLE 12
1950 GROUSE BROOD COUNTS
JUNE 20 TO JULY 10

Species and Area	Females Observed	Females with Brood		Average Brood	Chicks per Hen (1950)
		No.	Per Cent		
Blue Grouse					
Western Oregon	12	2	17	8	1.4
Northeast region	18	13	72	6.4	4.6
Ruffed Grouse					
Western Oregon	6	5	84	7.8	6.5
Northeast region	3	1	33	8	2.7
Sage Grouse					
Southeast region	47	34	72	4.6	3.4

TABLE 13
1950 GROUSE AND MOUNTAIN QUAIL BROOD COUNTS
JULY 19 TO JULY 25, 1950

Species and Area	Females Observed	Females with Brood		Average Brood	Chicks per Hen
		No.	Per Cent		
Mountain quail					
North coast	6	3	50	9.3	4.7
Blue grouse					
Northeast region	8	8	100	8.0	8.0
Coast	11	8	73	6.0	4.4

TABLE 13 (Cont.)

Species and Area	Females Observed	Females with Brood		Average Brood	Chicks per Hen
		No.	Per Cent		
Ruffed grouse North coast	4	3	75	5.7	4.3
Sage grouse Southeast region	53	35	67	3.7	2.4

Grouse hunters are difficult to contact in the field. Total information expected will always be small. Those hunters that participated in the 1950 season were well pleased. A seven-day season was allowed and a season limit of two Blue or Ruffed grouse permitted. A regional summary of the hunter check is presented in tabular form.

TABLE 14
SUMMARY OF GROUSE HUNTER SURVEY BY REGIONS

Region	Hunters Checked	No. Grouse Killed		Grouse per Hunter		Total
		Blue	Ruffed	Blue	Ruffed	
Northwest	9	2	2	.22	.22	.44
Northeast	101	85	21	.84	.21	1.05

A small age class of the kill was:

Blue grouse, 26 per cent adult - 74 per cent juvenile
Ruffed grouse, 8 per cent adult - 92 per cent juvenile

TABLE 15
EASTERN OREGON GROUSE TRENDS
WALLOWA COUNTY SPRING COUNT

Method of Census	Miles Traveled	Grouse Seen	Per Mile		
	<u>Richardson's grouse</u>				
Foot	37	104	2.8		
Car	459	83	.18		
Horse	66	119	1.8		
Total	562	266	4.8		
	<u>Ruffed grouse</u>				
Foot	6	6	1.0		
	Klamath county (Summer count)				
Year	Miles Traveled	<u>Sierra Grouse Seen</u>		<u>Mt. Quail</u>	
		No.	Per Mile	No.	Per Mile
1949	346	10	.03	104	0.33
1950	346	12	.03	104	0.33

TABLE 15 (Cont.)

Umatilla county

Year	Miles Traveled	Grouse Seen		Per Mile	
		Blue	Ruffed	Blue	Ruffed
1949	162	46	7	.28	.04
1950	254	58	7	.23	.03

TABLE 16
GROUSE AND MOUNTAIN QUAIL TRENDS IN WESTERN OREGON

County	Miles Traveled	Blue Grouse				Ruffed Grouse				Mountain Quail			
		No.	Per Mile			No.	Per Mile			No.	Per Mile		
			1950	1949	1948		1950	1949	1948		1950	1949	1948
Clatsop	133	68	.51	.33	.36	27	.20	.14	.00	8	.06	.03	.5
Tillamook	216	79	.37	.38	.28	5	.02	.11	.03	36	.17	.18	.47
Lincoln	43	7	.16	.30	.30	3	.07	.10	.03	75	1.74	2.4	3.17
West Lane	-	-	-	.04	.0	-	-	.0	.0	-	-	.74	.5
West Douglas	34	0	.0	.0	.12	26	.76	.90	.35	37	1.1	1.3	.23
Coos	70	4	.06	.27	.21	6	.09	.04	.02	138	2.0	2.6	.7
Curry	40	34	.85	.20	.18	0	.0	.05	.03	0	.0	.56	.5
Douglas	173	2	.01	.20	.05	2	.01	-	.02	35	.22	-	.1
Jackson	50	11	.22	.23	.05	1	.02	.05	.02	17	.34	.56	.3
Josephine	55	14	.25	.19	.01	1	.02	.13	.01	2	.04	.28	.06
Willamette basin	51	54	1.06	.72	-	-	-	-	-	-	-	-	-
Total	865	273	.31	.31	.18	71	.08	.12	.06	348	.40	.84	.55

MOUNTAIN QUAIL:

Oregon's native Mountain quail at one time maintained high densities in western Oregon and in central Oregon counties on ranges that are now occupied by Valley quail.

A common theory of residents is that the two species are not compatible and that the Valley quail have driven the Mountain quail away. There are no observations to substantiate this theory but it is true that Mountain quail are now most commonly found on foothill or sagebrush ranges and are seldom observed in agricultural areas where Valley quail are most common.

A measure of population trends in coastal counties indicates a substantial decrease in numbers of Mountain quail in that area and reports from eastern Oregon districts indicate a more static population.

Western Oregon measurements show a decline from 0.84 birds per mile to 0.40 birds per mile traveled.

District agents will trap surplus Mountain quail where concentrations exist to restock adjacent suitable habitat.

SAGE GROUSE:

The present distribution of Sage grouse is similar to antelope except that Sage grouse extend into Grant, Union, Baker, and Wheeler counties.

Measurement of Sage grouse trends has been done by spring counts of males on the strutting grounds. A series of observations must be made to obtain reliable data. Inaccessibility in the spring prevents strutting-ground counts in Malheur county. Strutting-ground counts were abandoned in Baker county because of shifting strutting areas and work conflicts. A substitute method of grouse per mile will be used there.

TABLE 17
POPULATION TRENDS BASED ON TWO YEARS' DATA

County	No. Areas	Male Grouse Counted	
		1951	1950
Harney	5	475	515
Deschutes	3	123	128

POPULATION TRENDS BASED ON THREE YEARS' DATA

County	No. Areas	Male Grouse Counted		
		1951	1950	1949
Harney	4	350	365	380
Deschutes	3	121	124	305

POPULATION TRENDS BASED ON FIVE YEARS' DATA

County	No. Areas	Male Grouse Counted				
		1951	1950	1949	1948	1947
Harney	2	155	180	135	130	112

Spot counts are made in the late summer on concentration areas in Malheur county. Available data show a slight decline; however, the 1950 counts were made a month earlier than 1949, and concentrations were probably not as large.

TABLE 18
MALHEUR COUNTY SAGE GROUSE COUNTS

Area	1949	1950
Cow lakes	550	400
Jordan valley	600	450
Antelope flat	1,400	1,000
Beulah reservoir	42	55
Ironside	70	85
Total	2,662	1,990

Population data from other areas are meager. Birds are holding their own and spreading their range in Lake county. Two hundred birds are in the Waterman flat area of Wheeler county. Sight records in the Virtue flat area of Baker county this spring account for 330 birds.

Available census data indicate a static or slightly declining population. Counts made over the longest period should be the most reliable and they are equal to or above the five-year average.

TABLE 19
SAGE GROUSE STRUTTING GROUND COUNTS

County	Strutting Grounds	Male Grouse Counted				
		1947	1948	1949	1950	1951
Deschutes	Four corners	-	-	212	71	63
	Con Guiney	-	-	93	53	58
	County line	-	-	-	-	29
	Seven miles east of Pine mountain	-	-	-	4	2
Harney	Frenchglen	67	85	95	120	105
	Lone Pine road	35	45	40	60	50
	Oakerman lake	-	-	100	125	130
	Palimano buttes	-	-	45	60	65
	Willow creek	-	-	-	150	125
	White Horse	-	-	-	60	-
	South Corral	29	-	-	-	23

Live Trapping:

Ninety-six Sage grouse were live trapped in southern Malheur county in August and liberated in Wasco county. Ten of these were trap and shipping casualties. Five of these ten showed tapeworm infestations on autopsy.

Harvest:

An open season of seven days was held in portions of Malheur, Lake, Deschutes, and Harney counties. Three grouse were permitted during the season. Hunting pressure was heavier than in 1949 and success was good. Table 20 summarizes field data.

TABLE 20
1950 SAGE GROUSE KILL

County	Number of Hunters Checked	Grouse Killed	Grouse per Man	Admitted Cripple
Deschutes	25	54	2.2	8
North lake	11	18	1.6	2
South lake	13	17*	1.3	-
Harney	43	33**	0.8	-
Malheur	41	119***	2.9	1
Total	133	241	1.8	11

* All with tapeworm.

** 14 young, 17 adults.

*** 20 per cent with tapeworm.

WILD TURKEYS:

A few wild turkeys survive in southwestern Oregon. Disease and poaching have provided a continuous drain on their numbers. There were an estimated 250 turkeys in 1949. Only a few are now left. Twenty are known to survive on the Whitetail refuge, and a few are left near Black bar on Rogue river.

It is questionable whether future introductions would be of value. Turkeys are primarily a wilderness bird, and the foothill country of southwestern Oregon is no longer a wilderness area.

SILVER GRAY SQUIRREL:

Measurement of population trends of this species is very difficult. Even measurements based on damage complaints are unreliable. Big game census samples in the southwest district contact squirrel habitat and a record has been kept of squirrels seen.

TABLE 21
SILVER GRAY SQUIRRELS SEEN

County	Miles Traveled	Squirrels Seen	
		No.	Per Mile
Jackson	50	6	.11
Josephine	55	7	.13
Douglas	173	2	.01
Total	278	15	.05

Silver gray squirrels are increasing along the State Line road in southern Lake county.

UPLAND GAME REFUGES:

It has been the policy of the Commission to maintain seed stock refuges for the protection of upland game birds in heavily hunted areas that are lacking in escape cover. These contract refuges are not made for the convenience of the landowner and must have a definite game value. It is anticipated that refuges will not be set up in the future unless the landowner will cooperate in habitat improvement projects.

The present status of upland game refuges is indicated in the following tabulation by game management districts.

TABLE 22
UPLAND GAME REFUGES

Region	District	Legislative*		Contract		Total		% of Suitable Habitat
		No.	Acres	No.	Acres	No.	Acres	
Northwest	Willamette	5	12,300	40	32,211	45	44,511	3.5
Southwest	Southwest	0		2	2,000	2	2,000	0.8
Central	So. Deschutes			1	400	1	400	0.3
	Columbia basin			14	11,990	14	11,990	6.0
Northeast	Wallowa			5	1,000	5	1,000	1.7
	Union, Baker	1	1,000	6	3,400	7	4,400	1.6
	Umatilla	4	5,440	19	23,479	23	28,919	11.4
Total		10	18,740	87	74,480	97	93,220	3.9

*Estimated useful area.

The legislative refuges referred to in the above chart include state lands declared refuges by proclamation of the Governor and permanent refuges established by acts of the state legislature. The principal objective of most of these refuges is to protect lives and property in the vicinity of state institutions and densely settled suburban communities.

The contract refuges are established by the Oregon Game Commission through an easement with each individual landowner within the refuge area. These agreements are legally recorded and normally extend over a five-year period.

PROPAGATION OF GAME BIRDS:

During the 1950 propagation season Oregon's four game farms produced 70,137 pheasants, 458 Chukar partridge, and 128 European grey partridge.

The European partridge were produced on the Corvallis Game Farm from eggs obtained in Denmark by the Oregon Cooperative Wildlife Research station. In addition, approximately 200 of these birds were raised and released by the research unit on a study area.

The Chukars were raised at the Hermiston and Ontario farms from eggs obtained from Washington, Idaho, and Wyoming.

All of the Chukar and grey partridge raised on farms were held as breeding stock for the 1951 season.

Few capital improvements were made on game farms in 1950. Pens and rearing equipment for Chukars were constructed on the Ontario and Hermiston farms, and development of propagation facilities on the E. E. Wilson Game Management Area (Camp Adair) was started in 1950.

Oregon's game farms are designed for production and release of young birds during the summer months and do not have adequate pens to hold large numbers of mature birds for release in the fall or spring.

The principal limiting factor of Oregon's game bird propagation program is the limited quantity and poor quality of domestic setting hens available for incubation and brooding purposes. All farms are designed for use of domestic hens and aggressive poultry improvement programs by commercial poultrymen have nearly eliminated the types of hens that are most satisfactory for hatching and rearing game birds. A detailed analysis of the 1950 season indicates that only one-third of the hens purchased were satisfactory for use through the brooding season, and the average cost of hens per bird raised was 40 cents or approximately 23 per cent of the total average cost.

1950 Production and Costs:

A summary of the 1950 pheasant propagation season is displayed in Table 23.

There are so many variables in operating procedures and types of birds produced and released that production and cost records of different farms are not directly comparable. For example, during the 1950 season, the Corvallis farm released only 16,702 birds. Two thousand sixty-two of these were mature birds held through winter and released in the spring of 1950. Fourteen thousand, six hundred forty were released during the summer and fall months, and 2,667 were held for 1951 breeders. The cost per bird released from this station in

1950 was \$1.74. The Eugene Game Farm did not hold any mature birds in 1950, did not require much maintenance work, and successfully raised 83 per cent of the 24,000 pheasants started on the Wilson Management Area. These birds were all released at an age of eight weeks and the net cost per bird from that operation was \$1.14.

TABLE 23
SUMMARY 1950 PHEASANT PROPAGATION

	EUGENE	CORVALLIS	HERMISTON	ONTARIO	TOTAL
Pheasants on Hand, 1-50	-	2,172	2,387	5,926	10,485
Spring Liberations	-	2,062	2,282	5,468	9,812
Winter Losses	-	110	105	458	673
Eggs Gathered	50,852	50,820	62,421	45,224	209,317
Eggs per Hen	62	55	34	33	46
Eggs Set	38,000	32,700	45,092	50,510	166,302
Eggs to 4-H, etc.	4,631	5,001	6,780	426	16,838
Birds Hatched	(1) 24,600	(2) 23,092	29,959	29,994	107,645
Per cent	65%	71%	66%	59%	
Known Losses	2,886	4,025	9,599	5,681	23,591
Unknown Losses	1,109	1,400	3,934	6,784	12,417
Per cent Lost	17%	24%	45%	41%	
Birds Raised	20,055	16,717	16,426	17,529	70,137
*Birds Released	19,465	14,640	11,132	15,134	60,371
Birds on Hand	-	2,667	5,294	2,395	10,356
Total 1950 Liberations	19,465	16,702	13,414	20,602	70,183
Total Pheasant Months	41,700	59,350	65,550	67,150	233,750
Breeders	2,800	7,600	11,500	20,500	42,400
Young	38,900	33,450	32,850	37,050	142,250
Holdovers	-	18,300	21,200	9,600	49,100
Gross Operating Cost	\$24,856.60	\$31,900.85	\$40,738.22	\$42,573.82	\$140,069.49
1950 Receipts	2,116.61	2,174.37	4,632.70	3,560.86	12,484.54
Inventory Credits	455.00	640.96	2,750.18	362.63	4,208.77
**Net Operating Cost	\$22,284.99	\$29,085.52	\$33,355.34	\$38,650.33	\$123,376.18
Cost Per Bird Released	1.14	1.74	2.49	1.88	1.76
Cost Per Bird Raised	1.11	1.74	2.03	2.20	1.76
Cost Per Bird Month	.53	.49	.51	.58	.53

* 1950 Production only

(1) 550 Chicks transferred to Summer lake

(2) 950 Chicks transferred to Summer lake

**Net Cost as shown in 1950 Financial Statement

To obtain a comparative measure of costs, the age of birds released and the period of care must be considered. An estimate of the total number of birds cared for each month provides a basis for total bird months of use or care during the year, and it will be observed that a prorate of costs on that basis is comparable.

These data indicate that the gross cost of producing and maintaining a pheasant for one month is 53 cents.

In considering this figure, it must be recognized that it represents a prorate of all operation and maintenance costs at each station throughout the year and necessarily includes items other than direct feeding and care of pheasants.

An analysis of pheasant production costs indicates that in the current economy the initial cost of different age classes of pheasants is as follows:

Eight-week-old summer released pheasants	- \$1.66
Adult cocks in October	- \$2.33
Adult hens in spring	- \$3.13

Value of Game Farm Birds:

Cost data indicate that farm-produced pheasants cost an average of approximately \$1.76. However, this expense is only the initial investment and the true cost to the sportsmen of the state must include consideration of the end product, which is birds in the hunter's bag.

It is obviously not economically feasible to artificially produce pheasants at a cost of \$1.76 in quantities that would assure a bag limit of six or eight birds for all holders of a \$4.00 hunting license.

The original purpose of game farms was to provide a breeding stock of pheasants for unstocked areas. That program was effective and popular with sportsmen and has been continued by weight of popular demand for the purpose of supplementing established populations.

Studies at Summer lake have provided a measure of the direct return to hunters and studies by the Oregon Cooperative Research Station have provided a limited measure of the values of released birds as future breeding stock.

The following paragraphs summarize findings to date and indicate some opportunities for a better utilization of game farm birds.

Vigor and Productivity:

A controlled study of pheasant behavior on 400-acre Protection island from 1937 through 1942 by the Wildlife Research Station demonstrated that farm-reared birds were vigorous and productive. Two cocks and six hens started in the spring of 1937 produced a population of 1,898 birds in six years. (See Table 24.)

The island was farmed and grazed during the period of study, but with those exceptions the birds were only molested by a normal complement of predators.

TABLE 24
POPULATION TRENDS OF RING-NECKED PHEASANTS, PROTECTION ISLAND,
March 1937 to November 1942

Natural reproduction based on initial planting of game farm-reared stock										
Year	Spring Season Inventory (March)					Fall Season Inventory (November)				
	Cocks	Hens	Unclassi- fied	Total	Decrease Over Winter	Cocks	Hens	Unclassi- fied	Total	Increase Over Spring
1937	2	6	0	8	-	20	20	0	40	400%
1938	15	15	0	30	25%	33	43	24	100	230%
1939	38	43	0	81	10%	224	184	18	426	438%
1940	185	97	0	282	33%	402	305	137	844	199%
1941	369	272	54	705	16%	783	650	107	1540	118%
1942*	723	471	131	1325	13%	903	831	164	1898	43%

* The smaller increase in 1942 was perhaps influenced by (1) high density, (2) poor nesting weather, and (3) absence of tilled crops. Pheasants depended entirely upon wild seeds, berries, and green vegetation after November, 1941. No seed crops were available after that date.

The Protection island study indicated the following facts:

1. Artificially reared ring-necked pheasants have a high productive potential.
2. Density tolerances of the species will level populations in spite of protective efforts. Evidence of intolerance and a decline in productive rate occurred when density reached two birds per acre. This became a major limiting factor when the peak of five birds per acre was attained.
3. The hen pheasant is most vulnerable to natural hazards. With complete protection from hunting, the sex ratio was three cocks to one hen.
4. Farming practices influence production and maintenance of pheasants. Toward the end of the study, farming operations were abandoned and the island was heavily grazed. This change in land use contributed to a decline in the population.

During the war, Protection island became a military post, and the Research Unit was forced to abandon its studies on that area.

In 1947, the Unit selected another Puget Sound island (Eliza) which was smaller (150 acres) and has initiated studies to determine the most efficient age and season of release for artificially reared pheasants.

Results of this five-year study are summarized in Table 25.

The procedure followed on this island was to release birds at a given season, study their behavior and harvest all of the birds remaining at the end of the study period.

Eliza island trials have included only fall and spring liberations of mature birds. Similar studies of the benefits of summer-released young birds will follow.

TABLE 25
ELIZA ISLAND STUDIES
Survival and Egg Production of Released Pheasants

Date of Release	Period of Study	Pheasants Released			Source	Survival			Eggs per Nest	Production per Hen Released
		Cocks	Hens	Total		Cocks	Hens	Total		
12/20/47	4 mo.	1	51	52	Farm	1	16	17		
12/31/48	4 mo.	11	5	16	Farm	3	2	5		
		11	5	16	Wild	8	2	10		
**12/20/49	4 mo.	4	20	24	Farm	4	10	14		
		6	20	26	Wild	5	10	15		
Winter survival	4 mo.	33	101	134	All	21	40	61		
						64%	40%	45%		
6/4/47	6 mo.	10	100	110	*Farm	9	30	39	5.1	0.28
**6/4/49	6 mo.	10	100	110	*Farm	5	56	61	6.3	0.50
Survival & production of breeders		20	200	220	*Farm	14	86	100	6.	0.4
						70%	43%	45%		
4/2/48	9 mo.	5	50	55	Farm	1	12	13	12.5	1.86
**4/6/50	9 mo.	5	50	55	Farm	4	16	20	11.8	2.04
Survival & production of mature birds	9 mo.	10	100	110		5	28	33	12.	1.95
						50%	28%	30%		

* Farm breeders released after peak of laying season

** Predator control practiced

These studies indicate the following facts:

1. Game farm breeding stock liberated late in the laying season will nest and rear some young, but production is low. (6.5 eggs and 0.4 birds)
2. Mature birds, released prior to the laying season, lay a normal complement of eggs. (12 eggs and 2 birds)
3. Survival to November of fall- and spring-released mature birds seldom exceeds 50 per cent even under controlled conditions. (Average - hens 40 per cent; cocks 66 per cent)
4. There is no substantial difference in the survival rate of farm-reared and wild-trapped birds.

Banding Studies:

Initial survival studies were based upon a voluntary return of bands retrieved from birds found dead or bagged by hunters. Returns from 35,861 banded pheasants released in western Oregon in 1940 and 1941 are summarized in Table 26.

Cooperators returned 277 or 0.8 per cent of the bands. Of these, only 168 or 0.5 per cent were bagged by hunters, and the remaining 109 or 0.3 per cent were found dead as victims of predators or accidents.

TABLE 26
SUMMARY OF VOLUNTARY BAND RETURNS 1940-45

Year	Age Class	Banded Birds	Hunter Return	Losses Reported	Total Return
1940	4 Mo. Nov.	1,810	23 - 1.2%	8 - .4%	31 - 1.7%
1941	4 Mo. Nov.	1,607	11 - .7%	15 - .9%	26 - 1.6%
1941	4 Mo. Nov.	2,759	4 - .1%	8 - .3%	12 - .4%
Fall release total		6,176	38 - .6%	31 - .5%	69 - 1.1%
1940	8 Wks. Summer	2,327	13 - .5%	2 - .08%	15 - .6%
1941	8 Wks. Summer	24,841	102 - .4%	56 - .2%	158 - .6%
Summer release total		27,168	115 - .4%	58 - .2%	173 - .6%
1941	1 Yr. Spring	2,337	15 - .6%	20 - .8%	35 - 1.4%
Total all classes		35,681	168 - .5%	109 - .3%	277 - .8%

Of the 168 pheasants bagged by hunters, only six or 3.5 per cent were taken on the second year after release.

Information obtained from this banding program was considered inconclusive for the reason that it was dependent upon the cooperation of sportsmen in returning bands, and it was considered probable that only a small percentage of the bands recovered by hunters were reported.

Summer Lake Studies:

Recognizing the fallacy of depending upon a voluntary return of bands by hunters, the Commission authorized a more controlled study in Summer lake valley. Summer lake was chosen for this study because the available pheasant habitat was well isolated and the Commission owned a large part of the hunting area.

The Summer lake habitat is of a meadow type and is not highly productive of pheasants; however, most of the pheasants were released on the game management area and, therefore, received more protection than they would under normal circumstances.

This study was started in 1946 and has provided a measure of the effectiveness of all available classes of pheasants. All released birds were marked. Liberal hunting seasons allowed 50 to 60 days of hunting, with an either-sex bag limit of 12 birds every year except 1947. All hunters were required to check in and out of the valley through checking stations and all birds were classified and tagged before permitted to leave the study area.

Table 27 summarizes findings at Summer lake by classes of birds released.

Although variations in hunting pressure, weather conditions, and other factors are responsible for variations in returns on different years, the following conclusions can be drawn from the studies:

1. The direct return of released birds to the hunter is in proportion to the time interval between liberation and hunting season.

- a. Hunters bagged 29 per cent of the young birds released in summer, two months prior to opening of season.
 - b. Hunters bagged only five per cent of the mature birds released in the previous fall and spring.
2. Only 39 or six tenths of one per cent of the 6,069 pheasants that may have been exposed to a second hunting season were bagged by hunters. The number of released birds that may have survived to reproduce during the first nesting season after release is an unknown quantity. However, it is quite certain that less than five per cent survived for longer than one year.
 3. A planting of wild-trapped and game farm-reared mature birds in the spring of 1950 showed no appreciable difference in the ability of the two classes to survive and produce hunting.
 4. Pheasants produced on the area and allowed to disperse as they matured produced no better results than birds transported from game farms.
 5. A comparison of the returns from Chinese and Mongolian strains of pheasants, field reared on the area, indicated that survival of the Mongolian pheasants was greater than that of the Chinas.
 6. Known natural losses accounted for only two per cent of the birds released.

The number or percentage of unmarked birds harvested on the study area that were progeny of released birds is not known.

Summary of Survival and Production Studies:

In reviewing the available measurements of survival and productivity of released pheasants, it will be concluded that they have not been consistent; however, similar fluctuations have been evident in wild populations and there are obviously many variable factors which influence survival, productivity, and efficiency of the hunter. Recognizing these variations in measurements, it is believed that averages are more valid than the extremes.

The following paragraphs summarize data by age classes and seasons of release.

Young Pheasants in Summer:

Summer lake studies provide the best measure of the immediate survival and return of summer-released birds.

An average return of 29 per cent was obtained.

TABLE 27
SUMMARY OF SUMMER LAKE PHEASANT SURVIVAL MEASUREMENTS

Liberation Date	Age Class	No. Birds	Known Losses	Harvest						Total	Per Cent Harvested
				1945	1946	1947	1948	1949	1950		
8/16/45	8 wks.	596	2	*47	15		1			63	15.7
11/28/45	5 mos.	501	8		18					18	3.6
8/27/46	8 wks.	390	9		211					211	54.1
8/27/46	16 wks.	176	14		101					101	57.4
3/19/47	Adult	475	31			17	2			19	4.0 11%
8/30/47	8 wks.	196	5			15				15	7.6 15%
8/30/47	6 wks.	200	9			21				21	10.5 21%
8/15/48	(1)7 wks.	1,232	8				526	15		541	43.9)
8/15/48	(1)6 wks.	875	6				266	18		284	32.4) 33%
8/28/49	7 wks.	500	35					94	1	95	19.0
9/1/49	(1)8 wks.	932	20					292	2	294	31.5
9/1/49	(2)8 wks.	592	15					111	1	112	18.8
Feb & Mar/50	(3)Adult	139	7						16	16	11.5
April/50	Adult	87	7						9	9	10.3
8/19/50	(1)8 wks.	987	12						244	244	24.6
8/19/50	(2)8 wks.	1,127	6						176	176	15.6
9/5/50	8-12 wks.	600	10						124	124	20.6
11/30/50	Adult	296							141	141	47.6
Totals		9,901	204	47	345	53	795	530	714	2,484	25.0
Unmarked Birds Harvested:					547	107	359	455	148	1,616	

(*) Incomplete count. (Study started in 1946)

(%) Per cent of cocks harvested. (Hens were protected in 1947)

(1) Field-reared Mongolians.

(2) Field-reared Chinas.

(3) Trapped and transplanted from Malheur refuge.

Summary by Classes of Birds Released

Class	Age	Liberation Season	No. Released	No. Harvested	Per Cent Harvested
Summer Released, Farm Reared, Young Birds:					
Mongolian	6 wks.	Aug., 1947	200	42	21
Mongolian	7 wks.	Aug., 1949	500	94	19
Mongolian	8 wks.	Aug., 1946 & 1947	586	241	41
Mongolian	12 wks.	Aug., 1950	600	124	21
Mongolian	16 wks.	Aug., 1946	176	101	57
Subtotal Farm Reared Young Birds			2,062	602	29.2
Summer Released, Young Birds Raised on the Study Area:					
Mongolian	6 wks.	Aug., 1948	875	284	32
Mongolian	7 wks.	Aug., 1948	1,232	541	44
Mongolian	8 wks.	Aug., 49-50	1,919	538	28
Chinese	8 wks.	Aug., 49-50	1,719	288	17
Subtotal Field Reared Birds			5,745	1,651	29
Total Summer Released Birds			7,807	2,253	29
Farm Reared Adults:					
Winter	6 mo.	Dec., 1945	501	18	3.6
Spring	9 mo.	April, 47-50	562	28	5
Subtotal Winter & Spring			1,063	46	4.3
Adults in Hunting Season		Nov., 1950	296	141	47.6
*Wild Trapped Adults (Spring)		Mar., 1950	139	16	11.5
Total All Classes			9,305	2,456	26

* Compare with April 1950 Release of Farm Reared Adults (10.3% Return)

Although hunting pressure and hunting conditions varied, the pressure was many times greater than normal, and it appears safe to assume that hunters consistently harvested at least 60 per cent of the birds present on all seasons except 1947, when hens were protected. In reconstructing events, it appears probable that at least 50 per cent of the young birds released were lost before the hunting season and that hunters harvested at least 60 per cent of the birds remaining. Harvest of only 0.5 per cent of these birds during the second season supports the contention that a high percentage was harvested during the first season.

Mature Pheasants After Season:

Studies at Summer lake and Eliza island provide measures of survival of pheasants released in the late fall.

*Eliza island loss (Dec. to Nov.) - 87 per cent (68 per cent cocks; 89 per cent hens).

Summer lake loss (Dec. to Nov.) - 96.4 per cent.

Eliza island provides the most accurate figure because all birds were harvested at the end of the study periods; however, it appears probable that the normal survival of birds on Eliza island is higher than at Summer lake because the climate is more moderate and there are fewer hazards.

Mature Pheasants in March:

Experience with mature pheasants released at the start of the breeding season indicated that substantial losses occurred during spring and summer months.

Eliza island loss (March to Nov.) - 70 per cent (50 per cent cocks; 72 per cent hens).

Summer lake loss (March to Oct.) - 95 per cent.

Here again Eliza island shows the highest survival, and differences in habitat and efficiency of harvest are the probable causes of inconsistency.

Spring-released birds on Eliza island produced an average of 12 eggs per nest and two birds per hen released. It is possible that some Oregon habitat would permit a greater production, but in view of the many natural and man-made hazards the average of two young birds per mature hen released in the spring appears reasonable.

Mature Pheasants in June:

The value of mature birds held for breeding stock on game farms as liberation stock after the farms have taken 40 or more eggs per hen has been the subject of much discussion. Eliza island measurements indicate that the production of these birds is low, averaging six eggs per nest and 0.4 birds per hen. This class of bird has not been tried on Summer lake, but on Eliza island the summer and fall loss was 55 per cent, consisting of 30 per cent of the cocks and 57 per cent of the hens.

* Refers to combination of fall and spring trials.

Mature Cocks Released During Hunting Season:

Limited experience with liberation of mature cocks immediately before and during hunting season indicates that the efficiency of the hunter or intensity of hunting has substantial effect upon the return of released birds.

In 1949, 1,444 banded cocks were released in Willamette valley counties immediately prior to the hunting season. Hunters reported harvest of 167 or 11.5 per cent of those birds.

During the 1949 season, 104 bands were recovered from 278 cocks released upon a semi-controlled "Orenco" public hunting area in Washington county. It was estimated that at least 60 per cent of the cocks were harvested by heavy hunting pressure on that area.

In 1950, 746 cocks were released on the Orenco hunting area and 695 on Sauvie island. Two hundred and forty-four or 33 per cent of the cocks on Orenco were reported harvested and 398 or 57 per cent of the cocks on Sauvie island.

On November 30, 1950, 296 banded birds were released at Summer lake, where a better measure of the harvest could be obtained. Hunting pressure was comparatively light at Summer lake during the 27 days that those pheasants were available for hunting and only 147 or 47.6 per cent were harvested. This harvest of 47 per cent during the last half of the Summer lake season supports the assumption that hunters have been harvesting at least 60 per cent of the birds during the entire season.

In view of these experiences, it appears probable that hunters would harvest 60 per cent to 70 per cent of cocks released during season if the birds were liberated where hunters had access and knowledge of the liberations.

An immediate return of 60 per cent of these birds is believed conservative on well-planned hunting areas; however, the return would probably not exceed 15 per cent or 20 per cent if they were broadcast.

Cost of Released Birds in the Hunter's Bag:

By applying the available measures of production costs and returns to the hunter, an approximate true cost can be obtained which may indicate a need for some changes in the current program.

Many factors influence the return of released birds to the hunter. The more important of these are:

1. Ability of released stock to survive and reproduce.
2. Efficiency of the hunter and hunting regulations.

It also follows that variations in habitat, weather, etc. influence both of the above factors and they are not constant or similar on different habitats or seasons.

Because of variations in cost and survival of the different age classes of pheasants, each of the three major classes will be considered separately.

Young Pheasants Released in Summer:

Summer lake studies indicate that eight-week-old pheasants survive nearly as well as 12- or 16-week-old birds; therefore, the eight-week-old bird which can be released for \$1.21 will be used in this illustration.

It will be assumed that 100 eight-week-old birds are released in August, that 50 per cent are lost by October 15, hunters harvest 20 per cent of the cocks present during the season, and survival through winter and summer is similar to that experienced on Eliza island.

August liberation of 100 eight-week-old pheasants @ \$1.66 = \$166.00.

Fall loss, 50 per cent	25 cocks	25 hens
Harvest, 20 per cent	- 6	0
Winter loss, 36 per cent and 60 per cent	<u>- 7</u>	<u>-15</u>
Spring Balance	12	10
Production (2 per hen)	10	10
Summer loss, 50 per cent and 72 per cent	<u>- 6</u>	<u>- 7</u>
Fall balance	16 cocks	13 hens
Second harvest, 20 per cent	3	
Total harvest (2 seasons) = 9 cocks for \$166.00 = \$18.44 per cock harvested.		

Mature Hens in March:

The following illustration may apply in western Oregon counties but does not appear to follow in many eastern Oregon counties where nesting cover is not normally available until May.

March liberation of 100 hens @ \$3.13 = \$313.00. - 100 hens

Production (2 birds)	100 cocks	100 hens
Summer loss, 72 per cent	<u> </u>	<u>-72</u>
Fall balance	100	128
First harvest, 20 per cent	-20	
Winter loss, 36 per cent and 60 per cent	<u>-29</u>	<u>-79</u>
Spring balance	51	49
Production (2 birds)	49	49
Summer loss, 50 per cent and 72 per cent	<u>-25</u>	<u>-35</u>
Fall balance	75 cocks	63 hens
Second harvest, 20 per cent	-15	
Total harvest (2 seasons) = 35 cocks for \$313.00 = \$8.94 per cock harvested.		

Adult Cocks in Season:

October liberation of 100 cocks @ \$2.33 = \$233.00.

Maintenance of 200 acres of public hunting area @ 25¢ = \$50.00.

First harvest, 60 per cent	60 cocks
Winter and summer loss, 68 per cent	<u>-27</u>

Balance second season	13 cocks
-----------------------	----------

Second harvest, 23 per cent	3 cocks
Total harvest (2 seasons) = 63 cocks for \$283.00 = \$4.50 per cock harvested.	

Conclusions:

On the basis of the foregoing information, it appears that either the mature cock released directly for the gun or the hen pheasant in spring is a better investment than a young bird in summer.

Although the cock liberated in season unquestionably provides the greatest immediate return per dollar expended, there may be a carry-over of breeding hens from the spring-released hens which will more than offset the greater cost of cocks harvested during the first two seasons.

Summer lake studies demonstrate that young pheasants released in summer have a value, but returns do not appear commensurate with costs.

The principal conclusion to be drawn from these measurements is that there is a tremendous loss in both liberated and wild pheasants. Possibly the sportsman's dollar would be better spent in plugging some of the holes in the leaky bucket (habitat) which carries our small game populations. On the other hand, the current extensive habitat-improvement program is not keeping pace with the rapid destruction of cover and food in the guise of better agriculture through clearing, drainage, and application of potent insecticides and weedicides. In light of these trends, it may be more practical to resort to such heroics as liberating cocks for the gun on supervised hunting grounds where hunting pressures far exceed the productivity of the habitat and utilize mature hens to supplement established populations in areas that continue to provide productive habitat.

It must be recognized that artificial propagation is not a satisfactory substitute for sound management based upon an intimate knowledge of population trends and limiting factors.

It appears that the current production of 70,000 pheasants could be substantially reduced without jeopardizing established populations on suitable habitat and the game farms might serve a better purpose by propagating other species which are not at present established throughout the state.

TABLE 28
1950 PHEASANT LIBERATIONS

District County	Mature	Young	Total	Shipping Loss	Total Liberation
Northwest District					
Benton	239	2,430	2,669	2	2,667
Clackamas	-	1,457	1,457	1	1,456
Columbia	-	3,494	3,494	129	3,365
Lane	-	4,020	4,020	5	4,015
Linn	-	3,166	3,166	3	3,163
Marion	768	2,088	2,856	5	2,851
Multnomah	-	46	46	2	44
Polk	26	2,350	2,376	1	2,375
Washington	-	3,913	3,913	23	3,890
Yamhill	50	3,224	3,274	5	3,267
Total Northwest:	1,083	26,188	27,271	176	27,095
Research Unit	62	-	62	-	62
Southwest District					
Douglas	914	4,068	4,982	3	4,979
Jackson	-	3,558	3,558	4	3,554
Josephine	-	1,573	1,573	5	1,568
Total Southwest:	914	9,199	10,113	12	10,101
Western Oregon Total:	2,059	35,387	37,446	188	37,258
Central District					
Crook	237	1,665	1,902	4	1,898
Deschutes	255	1,035	1,290	6	1,284
Hood River	316	550	866	5	861
Jefferson	1,008	1,567	2,575	12	2,563
Klamath	-	3,420	3,420	7	3,413
Sherman	254	1,152	1,406	6	1,400
Wasco	230	1,370	1,600	3	1,597
Wheeler	200	640	840	5	835
Total Central:	2,500	11,399	13,899	48	13,851
Northeast District					
Baker	1,085	1,665	2,750	18	2,732
Gilliam	200	880	1,080	3	1,077
Grant	980	900	1,880	109	1,771
Morrow	-	1,799	1,799	6	1,793
Umatilla	1,077	1,280	2,357	8	2,349
Union	875	2,040	2,915	17	2,898
Wallowa	-	2,000	2,000	-	2,000
Total Northeast:	4,217	10,564	14,781	161	14,620
Southeast District					
Harney	441	1,500	1,941	-	1,941
Lake	400	2,724	3,124	5	3,119
Malheur	487	-	487	5	482
Total Southeast:	1,328	4,224	5,552	10	5,542
Eastern Oregon Total:	8,045	26,187	34,232	219	34,013
State Totals:	10,104	61,574	71,678	407	71,271

1950 PHEASANT PRODUCTION

Source	Pheasants
Corvallis Farm	16,702
Eugene Farm	19,465
Hermiston Farm	13,414
Ontario Farm	20,602
Malheur Refuge	139
4-H Clubs	1,356
Total Production:	71,678

WATERFOWL:

Accumulation of waterfowl data increased somewhat over last year. The major portion of this work has been standardized and reported as a portion of the work of the Pacific Flyway Committee. For more specific details refer to flyway reports 11, 12, 13, and 14. A total of 10 key waterfowl areas is censused weekly and 10 banding stations are operated.

Census:

Field agents of the Game Commission participated in the annual nationwide waterfowl inventory for the fourth year. Data obtained on permanent census samples by these agents are presented.

An over-all decrease of 11.8 per cent for wintering waterfowl in Oregon was noted from the previous year. This decrease occurred primarily in the coastal counties and Columbia basin.

Full data obtained during the weekly key-area census may be obtained in the flyway reports previously mentioned.

Flyway Population Trends:

Data furnished by the Fish and Wildlife Service for the Pacific Flyway indicate that duck numbers are down 6.9 per cent, geese are up 117.7 per cent, and coots are up 130.7 per cent. The combined change for all waterfowl is up 14.2 per cent over 1950. General data for all four flyways indicate increases in the Pacific, Mississippi, and Atlantic, while the Central Flyway was down slightly.

TABLE 1
COMPARATIVE DATA
JANUARY INVENTORY, 1948-1951

Species	1951	1950	1949	1948
Mallard	56,258	84,119	44,611	73,288
Gadwall	562	1,269	208	0
Baldpate	20,726	20,212	27,841	8,443
Green-winged Teal	5,732	5,868	1,759	573
Shoveller	110	1,866	253	114
Pintail	10,745	25,504	13,228	9,926
Wood Duck	65	13	68	63
Redhead	158	91	52	11
Canvasback	2,361	2,133	1,632	1,435
Scaup	3,878	3,080	2,232	1,972
Ring-necked Duck	217	281	258	91
Goldeneye	530	778	228	173
Bufflehead	645	635	445	796
Ruddy	653	669	732	486
Unidentified ducks	10,860	8,694	14,863	3,300
Scoter	416	634	245	186
Merganser	316	543	230	310

TABLE 1 (Cont.)

Species	1951	1950	1949	1948
Coot	20,297	9,483	7,596	5,683
Snow Goose	2	0	36	0
Cackling Goose	1,756	1,390	1,065	975
White-fronted Goose	8	0	0	2
Canada Goose	22,230	7,244	19,236	12,542
Black Brant	2,110	3,600	803	2,614
Swan	109	165	165	209
Totals	161,054	178,271	137,786	123,192
Change from previous year:	-11.8%	+29.4%	+11.8%	

Harvest:

Season: Noon, November 3 to December 27, inclusive.

Bag Limit: Ducks - six a day and six in possession.

Geese - six a day and six in possession.

The season in general was below average. Weather was very clear and mild during the first portion of the season. The late season was very wet and waterfowl were widely dispersed.

The November 3 opening was too late for the southeastern region, and the December 27 closing date eliminated much good hunting in western Oregon.

Hunter kill data have been secured in the past by a random bag check throughout the state. These data indicate general hunter success and are of interest from a trend measurement standpoint. Comparative data for the last five years are:

Year	Birds per Man-day
1946	1.53
1947	1.52
1948	2.27
1949	2.00
1950	1.72

A statistical survey was made by mail after the 1950 season closed. This information is reliable and is the best available. Future kill data will be obtained by this method. Bag checks will still be necessary, however, to determine the species composition of the kill. A comparison of the data obtained by both methods follows.

TABLE 2
COMPARISON - BAG CHECKS & RANDOM SURVEY

	Number of Hunters	Days per Hunter	Ducks per Day	Geese per Day	Waterfowl per Day
Bag check	1,228	-	1.45	0.27	1.72
Mail survey	1,461	5.82	1.39	0.20	1.59

Computation of the results of the 1950 random mail survey reveals that 1,461 out of 4,651 hunters queried hunted waterfowl. That is, 31.41 per cent of the licensed hunters hunted waterfowl. This figure is quite accurate as the standard error is only 0.68 per cent. The 1,461 hunters reported 5,816 times afield and killed birds as shown in Table 2.

An estimate of the waterfowl kill is obtained by using the following formula:

Licenses sold x per cent duck hunters x times afield x kill per day = total kill.

Duck kill	=	554,271
Goose kill	=	<u>77,590</u>

Total waterfowl killed = 631,861

This method will provide valuable trend data for future use in the state and also for the Pacific Flyway. Field checks of hunter bags will be necessary to obtain species composition of the kill. Data gathered during 1950 are presented in the following table. Application of the per cent of total to the computed kill of either ducks or geese will give a reasonably accurate numerical value to the kill of each species.

TABLE 3
1950 DUCK KILL BY SPECIES AND PER CENT
(DATA FROM 1,228 HUNTER BAG CHECKS)

Species	Number Killed	Per Cent of Total
Mallard	789	44.2
Baldpate	262	14.8
Pintail	225	12.7
Green-winged Teal	151	8.5
Wood Duck	78	2.9
Scaup	69	3.9
Bufflehead	45	2.5
Gadwall	27	1.5
Ring-necked Duck	25	1.4
Shoveller	23	1.3
Goldeneye	20	1.1
Redhead	19	1.1
Canvasback	16	0.9
Ruddy	15	0.8
Merganser	11	0.6
Scoter	2	0.1
Cinnamon Teal	1	-
Total	1,778	

TABLE 4
1950 GOOSE KILL BY SPECIES AND PER CENT
(DATA FROM 1,228 HUNTER BAG CHECKS)

Species	Number Killed	Per Cent of Total
Cackling Goose	152	45.0
Canada Goose	59	17.3
Snow Goose	57	16.9
Brant	33	9.8
Lesser Canada	19	5.7
White-fronted Goose	18	5.3
Total	338	

The decline of the kill in 1950 as shown by available bag check data is due to three factors: reduced migrations, wide distribution of water together with mild weather, and the reduction in the possession limit. All factors are believed equally responsible. The small possession limit greatly reduced hunting pressure in southeastern Oregon.

Data presented in the preceding paragraphs and tables do not include hunting data from the public shooting grounds or game management areas. These areas attract a large number of novice hunters and that, together with localized waterfowl populations, would distort the state-wide picture were the data included. The following tables summarize the kill data from the four public shooting grounds.

TABLE 5
1950 SUMMARY
PUBLIC SHOOTING GROUNDS

Area	Season	Hunter Days	K I L L			Success Ratio
			Ducks	Geese	Total	
Summer lake	55 days	3,132	2,957	699	3,800	1.23
Sauvie island	33 days	2,465	3,017	53	3,070	1.25
Chewaucan	39 days	417	308	255	563	1.35
Warner	39 days	996	532	937	1,469	1.52

TABLE 6
1950 WATERFOWL KILL BY SPECIES
PUBLIC SHOOTING GROUNDS

Species	Summer lake	Sauvie island	Chewaucan	Warner valley	Total
Mallard	1,046	1,143	217	267	2,673
Baldpate	557	1,029	28	72	1,686
G-w. Teal	520	351	9	4	884
Pintail	269	303	31	131	734
Spoonbill	170	25	5	15	215
Gadwall	73	3	10	10	96
Scaup	25	40	3	14	82
Canvasback	32	78	2	1	113
Redhead	180	3	0	6	189
Ruddy	43	2	1	2	48

TABLE 6 (Cont.)

Species	Summer lake	Sauvie island	Chewaucan	Warner valley	Total
Goldeneye	8	2	0	3	13
Bufflehead	16	8	2	2	28
Ring-necked duck	0	1	0	2	3
Merganser	10	19	0	0	29
Cinnamon Teal	3	0	0	0	3
Oldsquaw	2	0	0	0	2
Wood Duck	2	2	0	0	4
Black Duck	1	0	0	0	1
Snow Goose	407	0	59	366	832
Canada Goose	128	48	93	102	371
Cackler	129	1	74	296	500
White Front	20	0	26	148	194
Lesser Canada	15	4	3	18	40
Ross's Goose	0	0	0	6	6
Black Brant	0	0	0	1	1
Coot	144	8	0	3	155
Pheasant	789	0	0	0	789

In past seasons a detailed breakdown of the waterfowl bag check by sex and age has been presented. This information is of little, if any, value from the standpoint of the state. Small samples make the value questionable even for the Pacific Flyway. The Flyway Committee has decided not to present the information in the flyway reports. For this reason, sex and age data are discontinued in the annual game report.

Losses:

The winter of 1950-1951 was generally mild. No unusual waterfowl losses were noted and no winter feeding was undertaken.

Approximately 1,500 waterfowl died of botulism on Arcadia lake in Malheur county in August and September of 1950.

Waterfowl Production:

Permanent census samples have been established throughout the state and two-year trends are available. Because of personnel changes, it was impossible to run the samples in the Klamath basin in 1950. Data for 1949 in the comparative tables have been re-computed without the Klamath samples to make the data more comparable. Samples, particularly in eastern Oregon, are generally located on choice habitat and do not indicate the over-all production of the state as a whole.

Weather and water conditions were generally good with an above-average runoff. Spring migrations and nesting season were about one to two weeks later than in 1949.

Substantial increases were noted in both breeding populations and brood production throughout the state. However, samples are not large and some of

this increase may be well within the statistical standard error. For this reason, the increases were probably not as great as the figures indicate.

Breeding populations - changes are:

East of Cascades:	+157 per cent
West of Cascades:	+ 70 per cent
State-wide increase: (estimated)	+125 per cent

Statistical summary of the measurements and comparative data are presented in the following tables.

TABLE 7
OREGON WATERFOWL BREEDING POPULATION
EAST OF CASCADES, 1950

Sq. Miles Censused	Species	Pairs Seen	Single Drakes Seen	Total Pairs	Total Ducks	Pairs per Sq. Mile	Ducks per Sq. Mile
19.25	Mallard	287	67	354	708	18.4	36.8
	Pintail	41	14	55	110	2.85	5.7
	Cin. Teal	232	8	240	480	12.41	24.82
	Blue-w. Teal	4	-	4	8	.02	.04
	Gadwall	119	7	126	252	6.53	13.06
	Redhead	68	4	72	144	3.73	7.46
	Canvasback	7	-	7	14	.04	.08
	Ruddy	11	6	17	34	.88	1.76
	Shoveller	40	9	49	98	2.54	5.08
	Canada Goose	146	*	146	292	7.56	15.12
Total		955	115	1,070	2,140	55.58	111.16

* Only pairs of geese counted.

TABLE 8
OREGON WATERFOWL BREEDING POPULATION
WEST OF CASCADES, 1950

Sq. Miles Censused	Species	Pairs Seen	Single Drakes Seen	Total Pairs	Total Ducks	Pairs per Sq. Mile	Ducks per Sq. Mile
27.8	Mallard	56	36	92	184	3.30	6.60
	Pintail	10	3	13	26	.47	.94
	Cin. Teal	4	-	4	8	.14	.28
	Blue-w. Teal	2	-	2	4	.07	.14
	Wood Duck	21	11	32	64	1.16	2.32
Total		93	50	143	286	5.14	10.28

TABLE 9
COMPARATIVE DATA, WATERFOWL BREEDING POPULATIONS
EAST OF CASCADES, 1949-1950

Species	1949		1950	
	Pairs per Sq. Mile	Ducks per Sq. Mile	Pairs per Sq. Mile	Ducks per Sq. Mile
Mallard	7.9	15.8	18.4	36.8
Pintail	1.33	2.66	2.85	5.7
Cin. Teal	9.1	18.2	12.41	24.82
Blue-w. Teal	-	-	.02	.04
Gadwall	2.07	4.14	6.53	13.06
Redhead	2.51	5.02	3.73	7.46
Canvasback	-	-	.04	.08
Ruddy	-	-	.88	1.76
Shoveller	-	-	2.54	5.08
Canada Goose	9.7	19.4	7.56	15.12
Total	32.7	65.4	55.58	111.16

TABLE 10
COMPARATIVE DATA, WATERFOWL BREEDING POPULATIONS
WEST OF CASCADES, 1949-1950

Species	1949		1950	
	Pairs per Sq. Mile	Ducks per Sq. Mile	Pairs per Sq. Mile	Ducks per Sq. Mile
Mallard	1.63	3.26	3.3	6.6
Pintail	-	-	.47	.94
Cin. Teal	-	-	.14	.28
Blue-w. Teal	-	-	.07	.14
Wood Duck	.33	.66	1.16	2.32
Canvasback	.04	.08	-	-
Total	2.00	4.00	5.14	10.28

TABLE 11
COMPARATIVE DATA, OREGON
BROOD CENSUS

Period	East of Cascades			
	Broods per Square Mile		Young per Square Mile	
	1950	1949	1950	1949
May	5.8	.9	30.6	4.9
First half of June	3.6	.41	20.0	2.8
Second half of June	6.2	.59	39.2	4.7
First week in July	9.9	1.1	57.2	9.8
Second week in July	3.4	2.3	22.4	14.46
Third week in July	22.2	-	148.6	-
West of Cascades				
First half of June	2.3	.88	13.1	5.1
Second half of June	.61	-	2.4	-
First half of July	2.3	.94	8.1	7.1
Second half of July	.8	-	4.6	-

TABLE 12

BROOD CENSUS SUMMARY IN OREGON - 1950

EAST OF CASCADES

Period	Census Area Sq. Mi.	Species	Total Female Censused	Per Cent Female W/Broods	Average Brood Size			Broods per Sq. Mile	Number Young per Sq. Mile
					Class 1	Class 2	Class 3		
May	5	Canada Goose	29	*100	5.3	-	-	5.8	30.6
June	8.1	Mallard	46	15	5.5	8.3	-	.9	6.4
First half		Pintail	13	8	6	-	-	.1	.7
		Cin. Teal	3	33	5	-	-	.1	.6
		Gadwall	1	-	-	-	-	-	-
		Redhead	9	45	6.7	7	-	.5	3.5
		Shoveller	1	-	-	-	-	-	-
		Wood Duck	1	100	-	3	-	.1	.4
		G-w. Teal	2	100	4.5	-	-	.2	.4
		Canada Goose	8	*100	4.4	5.3	-	1.0	4.7
		Coot	5	100	4.3	4	-	.6	2.5
		Total	89	32.5	-	-	-	3.6	20.0
June	2.75	Mallard	10	-	-	-	-	-	-
Second half		Pintail	4	-	-	-	-	-	-
		Cin. Teal	2	-	-	-	-	-	-
		Gadwall	2	-	-	-	-	-	-
		Redhead	7	-	-	-	-	-	-
		Scaup	14	-	-	-	-	-	-
		B-w. Teal	1	-	-	-	-	-	-
		Ruddy	8	-	-	-	-	-	-
		Canada Goose	17	*100	-	6.1	10	6.2	39.2
		Merganser	7	-	-	-	-	-	-
		Total	72	23.6	-	-	-	6.2	39.2
July	8.5	Mallard	14	72	7.2	5.3	10	1.2	8.1
First week		Pintail	4	75	7	-	8	.4	2.6
		Cin. Teal	17	88	6.6	6	-	1.8	11.4
		Gadwall	2	100	8	-	-	.2	1.9
		Redhead	9	78	6.7	6	9	.8	5.9
		Ruddy	6	67	4.5	-	-	.5	2.1
		G-w. Teal	2	100	5	-	-	.2	1.2
		Scaup	3	33	6	-	-	.1	.7
		Canada Goose	40	*100	-	4.4	5.2	4.7	23.3
		Total	97	87	-	-	-	9.9	57.2
July	5.6	Mallard	26	19	9	-	7.7	.9	7.3
Second week		Pintail	10	10	8	-	-	.2	1.4
		Cin. Teal	1	-	-	-	-	-	-
		Gadwall	9	22	11	5	-	.4	2.9
		Wood Duck	3	100	6.5	4	-	.5	3.0
		Shoveller	1	-	-	-	-	-	-
		B-w. Teal	2	-	-	-	-	-	-
		Ruddy	9	22	-	5	-	.4	1.8
		Scaup	4	-	-	-	-	-	-
		Canada Goose	6	*100	-	5.7	5.3	1.1	5.9
		Total	71	27	-	-	-	3.4	22.4
July	5	Mallard	21	72	9.2	7.5	-	3.0	26.8
Third week		Pintail	4	25	5	-	-	.2	1.0
		Cin. Teal	12	91	5.3	10	7	2.2	13.6
		Gadwall	30	100	8.5	-	10	6.0	49.6
		Redhead	12	75	5.4	7	-	1.8	13.2
		Ruddy	2	100	5	-	-	.4	2
		Canada Goose	43	*100	-	-	4.9	8.6	42.4
		Total	124	89	-	-	-	22.2	148.6

* No attempt made to count female geese without broods.

TABLE 13

BROOD CENSUS SUMMARY IN OREGON - 1950

WEST OF CASCADES									
Period	Census Area Sq. Mi.	Species	Total Female Censused	Per Cent Female W/Broods	Average Brood Size Class Class Class			Broods per Sq. Mile	Number Young per Sq. Mile
June First half	6	Mallard	20	45	5.4	6	-	1.5	8.2
		Wood Duck	6	67	6.7	4	-	.7	4.0
		Shoveller	1	100	-	6	-	.2	1.0
		Total	27	52	-	-	-	2.3	13.1
June Second half	15	Mallard	13	38	5	6	4.7	.33	1.7
		Pintail	1	100	-	-	3	.07	.2
		Wood Duck	10	20	-	2.5	-	.14	.33
		B-w. Teal	1	100	3	-	-	.07	.2
		Shoveller	1	-	-	-	-	-	-
		Total	26	35	-	-	-	.61	2.4
July First half	9.5	Mallard	17	70	-	2	5.1	1.3	6.1
		Wood Duck	5	20	-	-	2	.5	1.0
		Shoveller	1	100	-	-	2	.5	1.0
		Total	23	61	-	-	-	2.3	8.1
July Second Half	20.5	Mallard	18	72	-	4	6.4	.6	3.9
		Wood Duck	5	20	-	-	2	.1	.4
		Shoveller	1	100	-	3	-	.1	.2
		Pintail	1	100	-	-	4	.1	.2
		Total	25	64	-	-	-	.8	4.6

Fall Migrations:

An analysis of weekly counts on the Pacific Flyway study census area has been made for the 1949 and 1950 fall migrations.

It is difficult to account for population variations between the fall migrations of 1949 and 1950 on the various key area census units. Some of the changes do not appear to have any reason other than migration fluctuations or reduced populations. Others are readily explainable. A brief discussion of each area will be of value.

1. Western Oregon:

An average reduction of 30 to 40 per cent in waterfowl was noted. The coastal area showed almost 70 per cent less birds than before. Mild weather and late appearance of wintering birds were largely responsible.

The Willamette valley was down 10 to 20 per cent. Pintail numbers especially declined. Habitat improvement caused an increase of 30 per cent in the birds utilizing Fern Ridge reservoir.

2. Eastern Oregon:

Counts on the key census areas showed about the same number of waterfowl as in 1949.

At Summer lake the peak numbers were slightly lower, but the season-long increase was 30 to 50 per cent. Snow geese declined about 40 per cent.

McKay reservoir showed an increase of about 20 per cent, mostly in ducks. Mild weather was a large factor in both areas. Snake river samples showed a decline of about 20 per cent. Many wintering birds were late or did not arrive at all.

The Malheur refuge was down about 40 per cent. The decline occurred in most species of ducks. Low water supplies were an important factor in reduced duck use. Snow geese increased substantially.

3. State Data:

State data will show an average of about 5 to 15 per cent reductions in waterfowl. These figures are gross estimates. Variable weather conditions and migration patterns make a more precise summary impractical from year to year.

Banding:

Banding stations operated during the past year are located as follows:

Summer lake	- Lake county
Hermiston	- Umatilla county
Ontario	- Malheur county
Sauvie island	- Columbia county
Warner valley	- Lake county
Nehalem bay	- Tillamook county
Government island	- Multnomah county

Banding on game management areas is done by the refuge biologists. All other banding is undertaken by the district game agents. Birds banded are presented in Table 14. For a complete breakdown by sex and age, see the appropriate Flyway quarterly reports.

TABLE 14
WATERFOWL BANDING
MAY 1, 1950 TO APRIL 30, 1951

Species	Banding Station							Total
	Summer lake	Ontario	Hermiston	Sauvie island	Gov't. island	Nehalem bay	Warner valley	
Mallard	445	903	1,280	437	64		23	3,152
Pintail	106	460	32	10		2		610
Baldpate	1	10	156	225				392
G-w. Teal	48		18	52			1	119
Cin. Teal	7							7
Gadwall	58		1				3	62
Redhead	20						1	21
Canvasback						2		2
Gr. Scaup	1					84		85
Les. Scaup	2			1		8		11
Ring-neck			1					1
Am. Goldeneye			1					1
Bufflehead						2		2
Black Duck		1						1
Canada Goose	12			3			78	93
Snow Goose	1							1
Coot	11				13			24
Totals	712	1,374	1,489	728	77	98	106	4,584

TABLE 15
RECOVERY OF BIRDS BANDED AT SUMMER LAKE

Species	Place of Recovery													Total
	Local	Cal.	Wn.	Nev.	Tex.	Colo.	Ida.	Utah	Mult. Co.	Klamath Co.	Linn Co.	Coos Co.	Grant Co.	
Mallard	18	13	2				1		1	2	1			38
Gadwall	14	10		1				1		3		1		30
Pintail		3			1					1				5
Baldpate	1	3				1							1	6
G-w. Teal	1	6	1											8
Redhead	1	1												2
L. Scaup	1													1
Cin. Teal				1										1
Canada Goose	2	3					1							6
Coot		1												1
Total	38	40	3	2	1	1	2	1	1	6	1	1	1	98

TABLE 16
BIRDS RETRAPPED THREE MONTHS TO TWO YEARS AFTER BANDING

Place Banded	Species	Place Retrapped		Total
		Local	Washington	
Hermiston	Mallard	29	4	33
Nehalem bay	Greater Scaup	3		3
	Bufflehead	1		1
Summer lake	Mallard	4		4
	Pintail	3		3
Ontario	Mallard	2		2
	Pintail	1		1
Total		43	4	47

TABLE 17
RECOVERIES OF BIRDS BANDED AT SAUVIE ISLAND

Species	Place of Recovery								Total
	Local	Wash.	Calif.	B.C.	Alberta	Coos Co.	Tilla. Co.	Yamhill Co.	Morrow Co.
Mallard	2	1				1			4
Pintail	3	1	2	1		1	1		9
Baldpate	3				1	1		1	7
G.-w. Teal	1	1							2
Total	9	3	2	1	1	3	1	1	22

TABLE 18
RECOVERIES OF BIRDS BANDED IN TILLAMOOK COUNTY

Species	Place of Recovery				Total
	Local	Washington	California	Lane County	
Lesser Scaup		1	1	1	3
Ring-neck		1			1
Bufflehead	1				1
Total	1	2	1	1	5

TABLE 19
RECOVERY OF BIRDS BANDED IN COOS COUNTY

Species	Place of Recovery			Total
	Local	Washington	Umatilla County	
Mallard	3	1	1	5

TABLE 20
RECOVERIES OF BIRDS BANDED AT LAKEVIEW

Species	Place of Recovery		Total
	California	North Dakota	
Mallard	8	1	9

TABLE 21
RECOVERIES OF BIRDS BANDED IN WARNER VALLEY

Species	Place of Recovery						Total
	Local	Calif.	Idaho	North Dakota	Harney Co.	Klamath Co.	
Mallard	1	11	4		1	1	18
Pintail		3		1			4
Canada Goose	2	3					5
Total	3	17	4	1	1	1	27

TABLE 22
RECOVERIES OF BIRDS BANDED AT LA GRANDE

Species	Place of Recovery							Total
	Local	Calif.	Idaho	Alberta	Wash.	Washington Co.	Malheur Co.	
Mallard	2		3	1	1	1	1	9
Cinnamon Teal		1						1
Total	2	1	3	1	1	1	1	10

TABLE 23
RECOVERY OF BIRDS BANDED AT HERMISTON

Species	Place of Recovery												Total
	Local	Wn. Co.	Cal.	Ida.	Nev.	Alba.	Sask.	B.C.	Mont.	Alas.	Wn. Co.	Mult. Co.	Grant Co.
Mallard	46	61	2	7	1	25	5	9	5	1	2	3	1
Pintail			2			1							
Baldpate		1	1										
Total	46	62	5	7	1	26	5	9	5	1	2	3	1

TABLE 23 (Cont.)

Species	Place of Recovery												Total
	Jeff. Co.	Crook Co.	Malheur Co.	Coos Co.	Marion Co.	Sherman Co.	Union Co.	Linn Co.	Wasco Co.	Jackson Co.	Benton Co.	Lake Co.	
Mallard	1	1	1	2	2	2	1	1	1	1	1	1	183
Pintail							1						4
Baldpate													2
Total	1	1	1	2	2	2	2	1	1	1	1	1	189

TABLE 24
RECOVERY OF BIRDS BANDED AT ONTARIO

Species	Place of Recovery										Total
	Local	Ida.	Cal.	Mont.	Alba.	Sask.	Utah	Columbia Co.	Klamath Co.	Clackamas Co.	
Mallard	17	31	1	2	8	2	1	1	1	1	65
Pintail	1										1
Baldpate	1										1
G.-w. Teal		1									1
Hybrid	1										1
Total	20	32	1	2	8	2	1	1	1	1	69

TABLE 25

NUMBER OF DUCKS ON OBSERVATION SAMPLE AREAS



Special Studies:

Through the cooperation of Mr. William D. Barron, graduate student at Oregon State College, an intensive study of Wood Duck populations and kill in the Willamette valley was undertaken. Field data gathered in 1949 showed indications that Wood Ducks were being overshot.

Barron's study and correlation of 1949 and 1950 data substantiated this belief.

During 1950 Wood Ducks comprised four per cent of the bag and 9.7 per cent of the population. During the hunting season alone, Wood Ducks comprised only 3.5 per cent of the waterfowl population.

The November 3 opening of the season favored Wood Ducks, as the peak of the population migrated by October 23. Woody streams and sloughs had a much heavier kill of Wood Ducks than did other habitat types. Small refuges could be very effective in protecting Wood Ducks from overshooting.

Table 25 is a graph showing the population data gathered during the study. It is planned to continue this work for two more years to substantiate findings and correlate migration data from year to year.

SNIPE:

Densities of Jack Snipe are measured in western Oregon during the upland game spring census.

TABLE 26
SNIPE DENSITIES, WESTERN OREGON

Region	Birds per 100 Acres			Acres Censused 1951
	1949	1950	1951	
Northwest	1.6	1.8	9.45	8,944
Southwest	-	0.31	2.8	1,620

MOURNING DOVE:

Dove census work consists of two phases--a measurement of wintering birds in the Willamette valley, and a state-wide pre-season census in August. The spring census is taken during the upland game census, while the August count is made with car strips and results are expressed as birds per mile.

TABLE 27
1951 SPRING DOVE CENSUS

Region	Birds per 100 Acres			Acres Censused 1951
	1949	1950	1951	
Northwest	3.1	3.4	2.5	8,944
Southwest	8.2	2.8	16.3	1,620

TABLE 28
1951 DOVE CENSUS
LAST HALF OF AUGUST

Region	County	Miles Traveled	Doves Observed	Doves per Mile	
				1951	1950
Central	Deschutes	50	62	1.2	1.5
	Crook	50	456	9.1	12.8
	Wasco	43	98	2.3	-
	Jefferson	38	206	5.4	-
Northeast	Wheeler	28	76	2.7	-
	Gilliam	37	45	1.2	-
	Umatilla	66	138	2.1	1.9
	Morrow	61	221	3.6	1.9
Total, Eastern Oregon		373	1,302	3.5	1.8
Northwest	Yamhill	50	10	0.2	0.7
	Polk	60	58	1.0	0.5
	Lane	19	8	0.4	0.2
	Benton	21	12	0.6	0.2
Total, Western Oregon		150	88	0.6	0.4

In Umatilla county, the district agent counted 1.1 doves per mile (156 miles) in June and July. In August the count increased to 2.5 doves per mile (192 miles). This demonstrates the productive potential of Mourning Doves. One dove was found still in the nest on September 11, 1950 near the close of the hunting season.

Harvest:

Regulations of the federal government provided a 15-day season between September 1 and 15. The bag and possession limit was 10 birds.

Migrations are usually under way prior to the September 1 opening in the northern counties of eastern Oregon. Few birds are to be found there at that time. However, an earlier opening would find many birds still nesting, as several broods a year are raised. Hunting pressure is constantly increasing on doves, particularly in central Oregon.

Few doves are killed in western Oregon and these only incidental to pigeon hunting.

Success ratios obtained during the last five years in eastern Oregon are:

<u>Year</u>	<u>Doves per Day</u>
1946	2.55
1947	6.94
1948	4.68
1949	5.16
1950	6.95

TABLE 29
1950 DOVE HUNTING SUCCESS BY COUNTY

County	Hunters Checked	Doves Killed	Success Ratio, 1950	Success Ratio, 1949	Cripples
Crook	12	73	6.1	3.0	-
Deschutes	50	367	7.3	4.5	17
Jefferson	23	173	7.5	5.9	8
Lake	48	388	8.1	10.0	15
Umatilla	14	47	3.4	6.3	-
Morrow	4	10	2.5	-	-
Malheur	8	51	6.4	6.7	-
Total	159	1,109	6.95	5.16	40

A small sample for age classification was made in Umatilla and Malheur counties as follows: 34 adults to 62 juveniles, or an age ratio of 1 adult to 1.8 juveniles. In the central region, the following average weights were recorded:

TABLE 30
DOVE WEIGHTS IN OUNCES

Male		Female	
Adult	Immature	Adult	Immature
4.6	4.25	3.92	3.67

BAND-TAILED PIGEON:

The population status of pigeons has been determined by hunter bag checks in the past. Census methods were placed into effect this year.

Intensive hunting pressure, commercialization, and past declines in pigeon numbers are serious. The breeding potential is low, generally only one egg per pair per year.

Overshooting and a low productive potential mean that reduced populations may require years to recover.

The special 1950 pigeon report follows:

Pre-season Census:

A pre-season census was inaugurated throughout western Oregon in an effort to develop additional means of measuring population trends. Field agents counted pigeons during the few days immediately preceding the season. These counts were made at concentration points from daylight until the morning flight ended. This method has been tried since 1946 on Nehalem bay and data obtained by census approximate data from hunter bag checks. Trend data therefore are available only for the Nehalem bay sample.

TABLE 31
NEHALEM BAY PIGEON CENSUS

Year	Pigeons Counted
1946	270
1947	1,007
1948	817
1949	561
1950	593

Data obtained at the other areas are presented as a matter of record. Pigeons are migratory birds and the frequency of their visits to the mineral spring concentration areas is not known. Consequently there are daily fluctuations that may distort the data obtained. However, by utilizing several samples and using the total figure for trend information, the resulting data will be of significance.

TABLE 32
1950 BAND-TAILED PIGEON CENSUS

Area	County	Date Census Was Made	Pigeons Counted
Nehalem bay	Tillamook	8-31	593
Coosten	Coos	8-31	284
Dutch canyon	Columbia	8-31	224
Aurora	Marion	8-31	300
Grande Ronde	Polk	8-27	91
Whitaker	Polk	8-29	96
West Monmouth	Polk	8-26	151
Waterloo	Linn	8-31	138
Crawfordsville	Linn	8-31	223
Silver springs	Yamhill	8-27	47*
Sulfur springs	Benton	8-24	40*
Cheshire	Lane	8-31	53*
Kester	Benton	8-25	88*
Pigeon butte	Benton	8-26	105*
Total Census			2,100
Total Spot Count			333*

* Indicates spot check rather than full morning count.

Season: September 1 to September 30, 1950, inclusive.

Bag Limit: Eight a day and not to exceed 24 during the season.

Hunting Data:

Population information is secured from kill data. Data obtained during the 1950 season show a slight increase in birds per man day. This may indicate a slight increase in pigeon numbers; however, pigeons are a migratory bird and harvest fluctuations are to be expected. Data obtained from year to year are not exact, but the general trend of several years' measurement levels out fluctuations and more accurately portrays population changes. Hunter success is highest during hot, dry weather. The 1950 season was exceptionally hot and dry. This is an important factor increasing the 1950 kill.

It will be noted in Table 34 that a high success was recorded in the southwest district. During 1949 migrations were late and no kill was recorded for approximately the same number of hunters checked in this area. Subtracting the 1950 kill in southwestern Oregon and recomputing the success ratio, gives a kill of 2.2 birds per man day for 1950, almost identical with the 1949 data.

TABLE 33
COMPARATIVE KILL DATA

Year	Hunters Checked	Pigeons Checked	Success Ratio Birds per Man Day
1946	74	394	5.32
1947	304	1,053	3.41
1948	466	1,405	3.01
1949	1,200	2,678	2.23
1950	947	2,253	2.38

Hunting pressure and pigeon habits vary in different sections of the state. For this reason it is advisable to record and compare kill data by geographical locality.

TABLE 34
KILL BY GEOGRAPHICAL LOCALITY

Area	Hunters Checked	Success Ratio		
	1950	1950	1949	1948
North coast	58	2.34	2.00	3.31
South coast	32	4.47	3.62	4.22
Willamette valley	806	2.23	2.19	2.89
Southwestern Oregon	51	3.37	0.00*	2.83

* No migration during 1949 open season.

Hunting pressure is heaviest in the Willamette valley. Mineral spring concentration areas are the only places where hunting is extensive. Manpower and time were not available to make as intensive a check as has been done in past years; however, ten representative springs have been chosen as sample areas and it is planned to devote the available time to checking these springs. Comparative data on these springs are presented in the following table. It will be noted that of the nine areas where trends are available, five showed higher success in 1950 while four showed a decline.

TABLE 35
WILLAMETTE VALLEY PIGEON KILL BY AREA

Area	County	Hunters	Kill	Success Ratio			
		1950	1950	1947	1948	1949	1950
Dutch canyon	Columbia	34	59	-	-	2.3	1.74
Aurora	Marion	176	574	-	3.4	2.5	3.26
West Monmouth	Polk	21	70	6.1	3.0	4.0	3.33
Whitaker	Polk	45	150	-	-	4.2	3.33
Fairdale	Polk	7	12	-	-	-	1.71
Grande Ronde	Yamhill	37	87	-	-	1.7	2.35
Sulfur springs	Benton	21	27	0.9	1.3	0.77	1.29
Pigeon butte	Benton	14	46	4.7	1.7	2.4	3.28
Waterloo	Linn	272	183	-	1.0	1.04	0.67
Crawfordville	Linn	179	594	3.5	2.8	3.00	3.32

Age Ratio:

All birds were classified for age. The plumage characteristic for determining age is the presence or absence of the white-neck crescent. Data obtained by this method have been corrected for the error determined by an autopsy sample.

Age ratios obtained and computed are presented in Tables 36 and 37. Indications point to a below-normal hatch in 1950. It is again pointed out that pigeons lay only one egg per pair per year.

TABLE 36
AGE CLASS OF PIGEONS KILLED

Area	No. Birds Examined	Age by Neck Crescent		
		Adults	Young	Unclassified
North coast	136	110	12	14
South coast	143	115	28	
Willamette valley	1,802	1,261	260	281
Southwestern Oregon	172	41	117	14
Total	2,253	1,527	417	309*

* Unclassified birds were those neck wrung in the field and the neck plumage removed.

TABLE 37
CORRECTED AGE RATIO OF KILL

Year	Corrected Age		Adult-Young Ratio
	Adult	Young	
1949	1,871	603	3.10 : 1
1950	1,489	455	3.27 : 1

Kill Frequency:

A kill frequency was tabulated for the second year. This frequency table includes only those hunters who would give their exact kill, not those who insisted it be divided equitably among all members of the hunting party. The approximate reduction of kill by any reduction of the bag limit may be readily computed from this information. A reduction to five birds in the daily limit would thus reduce the kill 12.3 per cent based on two years' data.

TABLE 38
KILL FREQUENCY

No. of Pigeons Killed	Hunters Making Kill (1950)	Per Cent of Total		
		1950	1949	Both Years
0	326	35.0	29.8	32.1
1	143	15.3	17.6	16.1
2	117	12.5	16.5	14.7
3	83	8.8	10.5	9.7
4	73	7.8	7.9	7.9
5	52	5.6	7.0	6.4
6	42	4.5	3.7	4.1
7	26	2.8	3.4	3.1
8	76	8.1	4.9	6.4
Total	938			

Crippling:

Each hunter checked was asked how many of the birds he dropped were not recovered. Three hundred ninety-one lost birds were reported during 1950. The ratio of recovered to nonrecovered birds for the last two years is:

1949 - 4.56 to 1
1950 - 5.76 to 1

There was considerable land clearing near the Aurora spring during the past year. This made the pigeons easier to recover and accounts for at least some of the reduction in lost birds.

The value of this type of survey is questionable and it will not be continued. Observations at each shooting area indicate a much higher loss than hunters will ever report.

Migrations:

No information has been acquired to modify the theory of pigeons from a particular area utilizing one spring. The four preliminary band returns bear out this concept. These birds were banded at Nehalem bay in May and recovered within 20 miles of Nehalem bay in September.

Managment Methods:

The potential management methods discussed in the 1950 Annual Report are still valid and recommended. One additional method will be tried. This is the construction of artificial springs to attempt a control of pigeon distribution. Analysis of the water at several springs has been made. The apparent essential factor is chlorides, and a concentration of 10 grams of table salt to one quart of water will be used in the artificial springs.

HABITAT IMPROVEMENT

This report covers the third year of operation of the habitat improvement activity. The department has continued with emphasis on the same practices as in the past, and with a modest expansion in most categories. All six points in the Commission's general program statement are being closely followed.

PERSONNEL:

Each of three regions, the northwest, central, and northeast, has had one field agent assigned to specialize in habitat improvement throughout the year. Recently, an additional field man has been added to the Willamette on a full-time basis. On the average, approximately one month of the district agent's time is charged to this activity. In addition, much seasonal assistance is received from other regular personnel. Some temporary help is required on the three-man planting crews.

COOPERATION:

Cooperation with other public agencies has continued at about the same level. The following account summarizes developments during this year:

U. S. Soil Conservation Service:

The Nursery division of the Pacific Coast region supplied at cost 167,700 shrubs of eight species. This allocation was based on a purchase request for 250,000 shrubs. In addition, 150 plants of three species new to the program were donated at their request for trial on the McKay refuge. This resulted from an inspection trip last fall with two of the Nursery division personnel to Commission projects in the Columbia basin and their favorable reaction toward the projects visited. A current agreement requests 250,000 seedlings for 1951-52.

U. S. Fish and Wildlife Service:

Cooperative development of McKay refuge in Umatilla county is continuing. Grain plantings matured well and were heavily utilized. Twenty acres of wheat and barley and one acre of safflower have been seeded. Some gopher control work was conducted. This spring, 7,962 shrubs, including replacements, were set out for a three-year total of 18,159, exclusive of replacements.

U. S. Forest Service:

A third agreement was signed in November, 1950 resulting in three more waterholes for deer in the Paulina mountain country. Ten waterholes have now been completed.

The Fremont forest staff was provided with half a sack of bitterbrush seed for a cooperative demonstration range reseeding project.

U. S. Bureau of Land Management:

Eight reservoirs have been constructed at cost in Lake county. (Four holes dug in 1949 have not been previously reported.) Two more reservoirs are under construction, by agreement, in the same district. Six other waterholes for antelope have previously been reported.

State Extension Service:

Mutual cooperation is continuing at a satisfactory level. County agents are frequently contacted. Each is notified annually of all plantings in the county.

The J. J. Astor Experiment Station at Astoria supplied 1,800 pounds of lotus major seed at a small fraction of the market price for use in seeding coast range sites for big game.

State Board of Forestry:

Permission again was received to seed designated sites within the Tillamook burn.

Their entire multiflora rose production (12,100) plus 7,000 other seedlings, as requested, was supplied for the program. Five thousand plants were furnished to the nursery upon request.

Washington State College:

A total of 87,000 seedling shrubs and trees was received from the Washington State Pine Nursery through agreement with the college. A current order for 125,000 plants is to be delivered during 1951-52.

Soil Conservation Districts:

Cooperative working agreements are still in effect with the same five districts. Special emphasis was placed this year on developments in the new Sherman district where more than 40,000 shrubs were planted and five permanent water developments were constructed on the lands of sixteen cooperators.

Southern Pacific Company:

Plantings on two right-of-way sites (approximately 4 acres) in Klamath county were maintained last summer. This spring, 8,780 shrubs were planted, much of it replacement.

Great Northern Railway:

Shrub plantings along this right-of-way in Klamath county were continued for the second year with 6,620 seedlings planted this spring.

HABITAT IMPROVEMENT FOR UPLAND GAME:

Development of upland game habitat continued to be the major activity of the department. Cover, food, or water improvement projects were undertaken in 29 counties during the year. The food plots and some water developments are of temporary nature, but generally they are repeated on the same sites year after year. One hundred ninety-one new cooperators participated in this part of the program in 1950. In line with the plan stated in the 1950 report, improvement projects are becoming more concentrated and individually are of larger size.

Cover:

Shrub Planting:

The planting of trees and shrubs suitable for upland game protection and emergency food continues to lead all other practices in the number of projects undertaken.

It is roughly estimated that at least 80 miles of new multiflora rose hedge were planted during this period. Approximately one-half million rose bushes (exclusive of replacements) have been set out in three years eventually to establish some 160 miles of living fences.

Table 1 lists the sources of planting stock and the amounts received to date. There was an over-all increase of 38 per cent over the quantity received a year ago. Due to a more favorable purchasing situation, the cost increased only about 23 per cent. This is mainly due to a reduction in the amount of multiflora rose stock purchased from commercial nurseries. None of it was used in eastern Oregon this year; sufficient quantities of apparently better-acclimated stock were received from the Washington State and the Soil Conservation Service nurseries. The percentage of commercial stock has decreased each year, as follows: 1948-49, 91 per cent; 1949-50, 54 per cent; 1950-51, 26 per cent. Most other sources provide planting stock at cost.

TABLE 1
SOURCE OF SHRUB AND TREE PLANTING STOCK

Source	1948-49	1949-50	1950-51
Commercial Nurseries	110,175	147,650	97,518
U. S. Soil Conservation Service	-	86,270	167,950
Washington State Forest Nursery	8,100	19,500	87,100
Oregon State Forest Nursery	2,800	2,000	11,100
Oregon Game Commission Nursery	-	19,050	14,850
Totals	121,075	274,470	378,518

Of the 378,418 woody plants received during this period, 2375 were planted on big game ranges, 1,500 willows were for beaver plantings, and 5,000 southernwood were supplied to the State Forestry department upon request. The remaining 369,543 plants were allocated to the districts for upland game projects.

Table 2 lists by species the quantities received each year. The three species added at the bottom of the table were planted at the request of the Soil Conservation Service for trial on the McKay refuge demonstration area. The osage orange was secured for trial in Sherman county upon request of the SCS representative in that district. Multiflora rose accounts for almost two-thirds of the total, but this is a percentage decrease (15 per cent) as compared to the previous year. It amounted to 90 per cent the first year. The percentage may be further reduced as additional quantities of other species become available. An even one hundred thousand fewer plants were received than were on order from the various sources.

TABLE 2
SHRUBS AND TREES RECEIVED

Common Name	1948-49	1949-50	1950-51	Total
Multiflora rose	93,175	209,894	238,468	541,537
Southernwood	3,445	22,045	21,600	47,090
American plum	2,925	7,708	20,000	30,633
Bladder-senna	2,330	3,620	19,700	25,650
Snowberry	-	3,400	16,700	20,100
Golden willow	-	5,478	10,000	15,478
Skunkbush sumac	-	4,180	8,700	12,880
Western dogwood	-	2,840	9,700	12,540
Matrimony vine	-	4,000	7,600	11,600
Caragana	890	3,650	7,000	11,540
Black locust	-	614	5,000	5,614
Redosier dogwood	-	-	5,000	5,000
Russian olive	500	81	3,000	3,581
Russian mulberry	50	-	2,500	2,550
Scotch pine	-	581	1,000	1,581
Chinese arborvitae	-	693	500	1,193
Osage orange	-	-	1,100	1,100
Evergreen blackberry	-	-	800	800
Golden currant	-	400	-	400
Ponderosa pine	50	120	-	170
Bitter cherry	-	-	50	50
Silverberry	-	-	50	50
Rocky Mt. juniper	-	-	50	50
Totals	103,365	269,304	378,518	751,187

Table 3 summarizes the shrub plantings by county for western Oregon. Approximately one-third of the total stock was planted on farms in these counties. Effort was concentrated on a few selected areas in the Willamette valley. Plantings were made in all other counties in the valley but the majority of these were the result of requests received from landowners. The average planting on these scattered sites was less than half the size of those in the three counties selected for concentration. Fifty-one farms in Benton, Linn, and Marion counties were planted this year as compared to forty-four places in the other six counties.

Southwestern Linn county with its large fields of grass and notably poor distribution of permanent cover was selected for primary emphasis. Here, the number of cooperating landowners increased from three to thirty and the number of shrubs planted increased from three thousand to forty-three thousand.

In Benton county, the newly acquired E. E. Wilson Game Management Area was entirely bounded with multiflora rose for a future hedge and many other plants were set out in the interior. The Department of Fish and Game Management at the State College was provided with 1,500 rose plants for student use in field assignments. The Department of Animal Husbandry continued the co-operative test plantings of rose on their hill pastures.

Continuing development of two areas in the farm lands of western Marion county places it second in the number of cooperators and quantity of stock planted.

TABLE 3
SHRUBS AND TREES PLANTED FOR UPLAND GAME IN WESTERN OREGON

Region and County	Number of Cooperators						Number of Trees and Shrubs						Totals
	1948-9	1949-50	1950-51 Projects		Totals	1948-9	1949-50	1950-51 Projects		Totals			
	Total	Total	New	Old		Total	Total	New	Old		Total		
	(New)												
NORTHWEST													
Benton	-	4	4	2	6	8	-	3,250	3,450	16,068	19,518	22,768	
Clackamas	-	10	10	-	10	20	-	3,775	7,750	-	7,750	11,525	
Clatsop	-	1	-	-	0	1	-	200	-	-	-	200	
Columbia	1	-	1	-	1	2	1,000	-	100	-	100	1,100	
Lane	-	6	5	2	7	11	-	6,550	2,125	3,225	5,350	11,900	
Linn	-	3	30	0	30	33	-	3,150	40,825	-	40,825	43,975	
Marion	2	17	13	2	15	32	750	17,750	13,000	4,900	17,900	36,400	
Multnomah	-	7	13	-	13	20	-	2,650	5,250	-	5,250	7,900	
Polk	1	1	2	1	3	4	1,000	500	3,800	1,000	4,800	6,300	
Washington	-	6	6	1	7	12	-	2,700	2,950	100	3,050	5,750	
Yamhill	4	5	3	1	4	12	1,750	6,800	2,100	3,200	5,300	13,850	
Totals	8	60	87	(9)	(96)	155	4,500	47,325	(81,350)	(28,493)	109,843	161,668	
SOUTHWEST													
Coos	3	-	-	-	0	3	1,000	-	-	-	0	1,000	
Curry	13	-	-	-	0	13	4,250	-	-	-	0	4,250	
Douglas	1	6	-	1	1	7	400	5,400	-	150	150	5,950	
Jackson	3	13	7	1	8	23	1,350	8,900	3,650	1,300	4,950	15,200	
Josephine	3	3	1	-	1	7	250	1,000	200	-	200	1,450	
Totals	23	22	8	(2)	(10)	53	7,250	15,300	3,850	1,450	5,300	27,850	

TABLE 4
SHRUBS AND TREES PLANTED FOR UPLAND GAME IN EASTERN OREGON

Region and County	Number of Cooperators						Number of Trees and Shrubs					
	1948-9	1949-50	1950-51 Projects		Totals	1948-9	1949-50	1950-51 Projects		Totals		
	Total	Total (New)	New	Old				Total	New		Old	Total
CENTRAL												
Crook	7	5	1	1	2	13	3,065	4,335	600	6,265	6,865	14,265
Deschutes	6	7	3	0	3	16	3,290	5,290	1,140	-	1,140	9,720
Hood River	2	0	2	0	2	4	40	-	2,840	-	2,840	2,880
Jefferson	1	3	21	3	24	25	100	4,573	24,820	24,140	48,960	53,633
Klamath	25	9	2	10	12	36	26,780	27,450	1,250	25,650	26,900	81,130
Sherman	7	3	10	3	13	20	6,640	12,198	27,565	12,465	40,030	58,868
Wasco	7	20	2	1	3	29	2,580	23,560	560	1,000	1,560	27,700
Totals	55	47	41	(18)	(59)	143	42,495	77,406	58,775	69,520	128,295	248,196
NORTHEAST												
Baker	3	9	0	1	1	12	2,375	35,095	0	6,250	6,250	43,720
Gilliam	4	6	3	1	4	13	1,800	11,420	5,700	4,025	9,725	22,945
Grant	11	5	0	0	0	16	4,745	5,550	0	0	0	10,295
Morrow	2	0	3	1	4	5	1,070	90	3,350	1,000	4,350	5,510
Umatilla	11	3	4	5	9	18	20,125	19,516	13,415	27,037	40,452	80,093
Union	3	9	2	0	2	14	3,150	14,640	3,800	0	3,800	21,590
Wallowa	1	1	0	0	0	2	900	19,055	0	0	0	19,955
Wheeler	2	2	2	0	2	6	650	1,800	2,050	-	2,050	4,500
Totals	37	35	14	(8)	(22)	86	34,815	107,166	28,315	38,312	66,627	208,608
SOUTHEAST												
Harney	5	3	-	-	0	8	5,775	6,525	-	-	0	12,300
Lake	22	8	5	4	9	35	6,325	15,445	5,553	16,070	21,623	43,393
Malheur	8	5	4	-	4	17	4,500	3,965	3,400	-	3,400	11,865
Totals	35	16	9	(4)	(13)	60	16,600	25,935	8,953	16,070	25,023	67,558

TABLE 5
SHRUBS AND TREES PLANTED IN EASTERN OREGON DURING 1950-51

County	Rose	Southern-wood	Plum	Snowberry	Bladder-senna	Matrimony Vine	Willow	Western Dogwood	Redosier Dogwood	Caragana	Sumac	Olive	Locust	Mulberry	Osage	Blackberry	Scotch Pine	Arbovitae	Juniper	Silverberry	Bitter Cherry	Totals
Baker	6,250																					6,250
Crook	4,000	1,000	510		900					200				200				55				6,865
Deschutes	1,040		100																			1,140
Gilliam	3,700		500		750					1,425		1,800	950	350			150	100				9,725
Hood River	2,840																					2,840
Jefferson	27,060						8,500	8,300	5,000								50	50				48,960
Klamath	10,000	2,000	5,000	5,000	4,900																	26,900
Lake	4,520	910	4,150		2,660	7,200					1,500			683								21,623
Malheur		1,000	100			1,500					150		425	225								3,400
Morrow	2,900	100	200		150					550			300	150								4,350
Sherman	16,380	8,300	3,300	4,330	3,950					1,370		550		50	1,100		275	425				40,030
Umatilla	26,750	3,080	1,400	5,250	650						1,682			390		800	300		50	50	50	40,452
Union	3,800																					3,800
Wasco	1,360	50		50										100								1,560
Wheeler	650				400					350		100	550									2,050
Total																						
Reported	111,250	16,440	15,260	14,630	14,360	8,700	8,500	8,300	5,000	3,895	3,332	2,450	2,225	2,148	1,100	800	775	630	50	50	50	219,945
Percentages	50.6	7.5	6.9	6.6	6.5	4.0	3.9	3.8	2.3	1.8	1.5	1.1	1.0	1.0	0.5	0.4	0.3	0.3	-	-	-	100.0

TABLE 6
SHRUB SURVIVAL EASTERN OREGON, FALL 1950

County	Multiflora Rose		Southernwood		American Plum		Golden Willow		Snowberry		Caragana		Bladder- senna	
	No. of Sites	Per Cent *	No. of Sites	Per Cent	No. of Sites	Per Cent	No. of Sites	Per Cent	No. of Sites	Per Cent	No. of Sites	Per Cent	No. of Sites	Per Cent
Crook	9	21-90	5	35-90	8	45-100	2	85-90	4	42-90	4	42-90	4	42-90
Deschutes	10	55-90	5	65-100	2	40-65	2	69-80	2	0	2	0	2	0
Jefferson	2	83-95	1	100	2	28-50	1	75	1	0	1	0	1	0
Klamath	27	11-90	6	42-90	12	30-90	2	20-40	2	0	2	0	2	0
Sherman	8	25-90	2	40-80	1	75	2	30-60	1	75	1	0	1	0
Wasco	21	19-90	3	58-100	6	2-10	6	38-100	7	3-20	4	0	6	0
Baker	14	20-65	1	0	5	26-65	2	15	1	15	3	22-60	1	0
Gilliam	10	8-30	---	---	6	5-20	3	67-100	---	---	---	---	---	---
Grant	12	12-60	9	40-90	6	5-20	3	67-100	---	---	---	---	---	---
Morrow	2	5-10	---	---	1	0	---	---	---	---	---	---	---	---
Umatilla	11	38-90	4	60-90	4	35-85	---	---	1	95	1	20	4	50-90
Union	11	12-50	2	90-95	---	---	3	32-85	1	60	---	---	2	25-50
Wallawa	2	42-75	1	90	1	40	1	25	1	60	---	---	2	70-80
Harney	4	10	1	0	1	0	---	---	---	---	1	0	---	---
lake	7	28-50	3	71-80	2	60-80	---	---	---	---	---	---	1	0
Malheur	9	19-75	1	35	1	15	---	---	---	---	1	20	1	15

* Percentage figures represent average and maximum planting survival, respectively.

It is anticipated that these four sites in the heart of the valley and near population centers will continue to receive increasing emphasis.

In Tables 3 and 4, some 1949-50 figures have been adjusted to conform with later data received from the districts during this period.

All figures in Table 3 indicate multiflora rose except as follows, and each of these three represent part of one project which also includes rose:

	<u>Benton</u>	<u>Douglas</u>	<u>Josephine</u>
Snowberry	400	50	50
Mulberry	100	50	50
Sumac	-	50	50

Table 4 shows shrub planting data for eastern Oregon counties. In each region the number of new cooperators continued a downward trend although the total quantity of shrubs planted continues to increase. Concentration of projects was particularly emphasized this year in accordance with the existing plans for the program. The areas selected for primary consideration and development during the next few years are the Madras irrigation project; the Klamath project; the block comprising the Wasco, Sherman, and Gilliam Soil Conservation Districts (particularly Sherman) with which cooperative agreements are in effect; and a smaller block in the wheatlands of northeastern Umatilla county. Many less extensive pheasant ranges are also receiving attention. Landowners within the Madras project are reacting favorably toward the program and this area received the greatest increase in number of shrubs planted during the past year. This work is progressing in close cooperation with the Wildlife Research Unit. In Sherman county the habitat improvement program has expanded appreciably since entering into agreement with the newly organized soil conservation district. The game agent formerly at Madras is now headquartered at Moro and is concentrating his work on habitat improvement in the two major areas. Almost half (49 per cent) of the new cooperators in shrub plantings this year live in Jefferson and Sherman counties. They received 40 per cent of the available shrubs. The four counties, Jefferson, Klamath, Sherman, and Umatilla, received 72 per cent of the total stock available for eastern Oregon - an increase from 30 per cent in 1949-50. Projects in Klamath and Umatilla counties were chosen from the start of the program as important centers for development. Unfortunately, adverse environmental conditions in the Klamath basin have so far resulted in the poorest shrub survival of any preferred locality.

Table 5 represents a breakdown by species and county of upland game shrub plantings in eastern Oregon made during a one-year period ending May 1, 1951. Comparison with Table 2 (after deducting stock used in other categories) indicates a considerable difference not accounted for elsewhere. Part of this may be attributed to normal losses of planting stock and to the fact that not all spring planting had been completed. Multiflora rose was still the leading species although it dropped from three-fourths of the 1949-50 total to one-half in 1950-51. Southernwood and American plum continue to rank next. A total of 21 species was used, several of them for test purposes only. No shrubs were reported planted during this period in Grant, Harney, or Wallowa counties.

Shrub Maintenance:

Shrub planting crews equipped with the necessary transportation and farming equipment were busy during parts of November and December in the north-east region, from November to March in western Oregon, and from February to May throughout eastern Oregon. Planting started almost a month earlier this spring than in 1950. Last summer many of the larger plantings in the northeast region were maintained with a cultivator mounted on a jeep. In the Klamath basin one man irrigated major plantings, such as the railroad rights-of-way, with a portable pump. In the Malheur district, and perhaps others, the game agents cultivated or irrigated new projects.

Two roto-tiller type cultivators have been purchased. It is intended that they will be used to maintain new plantings in the major concentration areas of eastern Oregon. The two portable pumps are to be used in the Klamath district and on the Madras project. Other districts are all encouraged to maintain plantings by the most practicable means. Many of the new projects in the Willamette valley are already being cultivated or mulched.

Shrub Survival:

At the end of the 1950 growing season approximately 200 sites planted to shrubs in eastern Oregon were checked to determine survival percentages by species. No attempt was made to record causes of loss; however, some districts reported some of the more obvious reasons such as accidental destruction by farm machinery, browsing by cattle and rodents, weedicide sprays, fire, and flooding. These are ordinarily of scattered occurrence and minor importance. Unfavorable climatic and edaphic conditions are important factors contributing to loss in eastern Oregon. The limitations which they impose on the growth of the various species are not yet known. More careful selection and advance preparation of sites, proper choice of species, better care in handling and storing planting stock, and improved care after planting would undoubtedly increase the percentage of survival. The information necessary to accomplish this objective can be acquired through field experience which in turn would be facilitated by the establishment of carefully located test plots.

Table 6 shows the number of sites planted to major species in eastern Oregon counties, and the average and highest survivals at the end of the last growing season. No attempt was made to segregate plantings according to age, and the table represents results after both one and two growing seasons. The average percentages represent the over-all actual condition of plantings rather than a delimitation of the species possibilities. The figures showing the highest survival of any individual project indicate at least the minimum survival attainable under prevailing conditions, aided generally by some degree of maintenance.

The following list (Table 7), based on the data in Table 6 and for other species (generally one or two samples) noted at the same time, includes those exceeding 50 per cent survival at the end of one or two growing seasons. Reference to Table 4 of the 1950 report will show which species were used. Entries are in descending order. All species in the "Average" column should also be included under "Maximum."

TABLE 7
HIGHEST SHRUB SURVIVAL - FALL, 1950

County	Average		Maximum	
	50 Per Cent or More		At Least One Planting 50 Per Cent or More	
Crook	Willow		Plum, caragana, southernwood, rose	
Deschutes	Southernwood, willow, rose		Plum	
Jefferson	Southernwood, rose, willow		Plum	
Klamath	None (10 species)		Southernwood, plum, rose	
Sherman	Plum, snowberry, sumac, arborvitae, Scotch pine		Rose, southernwood, willow, dogwood	
Wasco	Southernwood		Willow, matrimony vine, dogwood, rose, sumac, locust	
Baker	None (8 species)		Rose	
Gilliam	None (8 species)		Plum, caragana	
Grant	Willow		Southernwood, rose	
Morrow	None (2 species)		None	
Umatilla	Snowberry, olive, mulberry, ponderosa pine, locust, southernwood, bladder-senna		Rose, plum	
Union	Southernwood, snowberry, sumac		Willow, rose, bladder-senna	
Wallowa	Southernwood, bladder-senna, snowberry		Rose, sumac	
Wheeler	None (1 species)		None	
Lake	Locust, Scotch pine, southernwood		Plum, olive, rose	
Harney	None (5 species)		None	
Malheur	None (5 species)		Rose	

Table 8 lists the survival of multiflora rose plantings checked in western Oregon. A complete inventory has not been taken in the Willamette valley to date. There seems to be little doubt that this species will grow well there without special maintenance on average or better sites within the farming area. Fruit has been produced during the second growing season after planting and its use by pheasants has been observed. Most losses have been due to flooding and to the activities of man and his livestock.

TABLE 8
MULTIFLORA ROSE SURVIVAL - WESTERN OREGON - FALL, 1950

County	No. of Sites	Per Cent Survival		County	No. of Sites	Per Cent Survival		Remarks
		Average	Maximum			Average	Maximum	
Benton	1	90	90	Douglas	6	11	50	Non-irrig.
Lane	3	30	60	Douglas	1	90	90	Irrigated
Linn	3	45	65	Jackson	12	3	15	Non-irrig.
Marion	10	60	95	Jackson	4	61	95	Irrigated
Polk	1	90	90	Josephine	1	0	0	Non-irrig.
Washington	1	90	90	Josephine	5	72	90	Irrigated
Yamhill	3	95	100	Coos	2	42	83	Two yrs.
				Curry	9	48	96	Two yrs.

Shrub Nursery:

This activity was set up a year ago to assist the habitat improvement program by producing some of the required shrub and tree planting stock. A 10-acre irrigated field was made available at the Hermiston Game Farm, a portion of which was in use during this period. A nurseryman was employed in March, 1950 to devote approximately half his time to this activity. He resigned in September to attend graduate school and was not replaced. This spring, the game farm superintendent added the nursery work to his other duties.

Production to date this spring has been approximately 6,800 multiflora rose. A small quantity remains to be dug.

Propagating stock set out this spring for field planting next year was as follows:

<u>Cuttings</u>	<u>Seed</u>
25,000 multiflora rose	15 lbs. multiflora rose
10,000 golden willow	1 lb. bladder-senna
3,500 redosier dogwood	1 lb. dogwood
1,500 southernwood	1 lb. Russian olive
	$\frac{1}{4}$ lb. wild crabapple
	$\frac{1}{4}$ lb. mulberry

Since the Camp Adair tract has become available a small field has been used for production of multiflora rose from cuttings. During the past winter 8,050 useable rooted plants were harvested and placed on western Oregon farms. A better site was selected this spring and propagating stock was set out, as follows:

22,000 multiflora rose cuttings	
8,000 multiflora rose seedlings	(rec'd from State Forestry)
	(too small for field planting)
5,000 multiflora rose seedlings	(Missouri stock)
	(too small for field planting)

Food:

Shrub Planting:

Woody species primarily for the production of permanent, year-round cover are also of value in supplying edible fruits many of which are available over a long period. Several species including the multiflora rose, bladder-senna, and snowberry are now bearing fruit after two growing seasons. In the Willamette valley on March 10, following a week of snow which reached a depth of approximately eight inches, two pheasants were observed feeding on the fruits of multiflora rose. They eventually took practically all the fruit within reach along this 100-foot two year old hedge.

Standing Grain:

Purchase of small grain strips after careful selection was continued on a small scale in two districts as listed in Table 9.

Grain Planting:

Table 9 also lists 1950 and 1951 projects with remarks concerning utilization of the former. It will be noted that waterfowl sometimes make the most use of such plantings.

One new site of four acres has been leased in Marion county and is to be seeded to grain or other crops.

TABLE 9
FEEDING AREAS PRIMARILY FOR UPLAND GAME

County	Acres	Crop	Remarks
<u>Planted</u>			
<u>1950</u>			
Benton	5	Sudan grass	Camp Adair. About 75% utilized.
Douglas	1	Millet; field peas	Crop failure.
Malheur	1	Mixture of annuals	Game farm. Demonstration.
Umatilla	5	Wheat	McKay refuge. Used by thousands of ducks.
Wallowa	15	Oats	Fish hatchery. Less use than barley in 1949.
Yamhill	5	Millet	Carlton lake. Used by pheasants.
<u>1951</u>			
Benton	3	Mixture of annuals	Camp Adair.
Crook	1	Wheat	
Douglas	4	Barley, speltz, peas, millet, sunflower	
Umatilla	20	Wheat, barley	McKay. Also 20 A. summer fallowed.
Umatilla	1	Safflower	McKay. Barley from Fish and Wildlife.
Wallowa	15	Barley	Fish hatchery.
<u>Purchased</u>			
Benton	2/3	Wheat	Full utilization.
Marion	1	Barley	Two strips. Used by pheasants, bobwhites, and ducks.
Marion	2/3	Oats	Donated.
Marion	1/2	Barley	Used by pheasants and quail.
Marion	1/2	Barley	Used by bobwhites and ducks.
Marion	2/3	Wheat	Used by pheasants.
Marion	2	Corn	Three strips. Pheasant use.
Marion	3	Corn	Donated.
Polk	1 1/4	Barley	Used by pheasants and quail.
Polk	-	Barley	Used by pheasants and quail.
Umatilla	1	Wheat	Donated. Fenced. Light use.

Food Plots:

Last spring each game district in eastern Oregon was requested to plant in small plots a variety of seeds which were furnished with the hope of finding a mixture adapted to each district and suitable for winter food for upland game birds. Seed varieties supplied to the districts were: dwarf sunflower, Japanese buckwheat, proso millet, field peas, sudan grass, sweet clover, rape, safflower, and burnet. The project was too late in getting underway for some

areas to expect success; in fact, two districts didn't plant any seed. This spring 350 pounds of the same varieties were supplied to the districts for further trial. A summary of 1950 results in several counties as reported by the district agents follows:

Sherman: Sunflower, sudan grass, and millet matured well, also some safflower. Pheasant use on sunflower and safflower. Deer used sudan. Rape made good growth. Others failed.

Umatilla: Millet fair, produced good seed when it did mature. Sudan fair to good; most of it that grew produced seed. Dwarf sunflower failed, but a giant variety sown earlier all produced seed. Rape some success, still green in October. Others failed but, "It is believed that they all would have been successful if planted at least a month earlier. The buckwheat, millet, and sudan grass show particular merit Pheasants destroyed much of these plantings as soon as and before the seeds sprouted."

Jefferson: Under irrigation all varieties grew very well. (No sweet clover or peas were planted.)

Klamath: Irrigated a few times during the season, several plots on the railroad right-of-way grew very well. "Food plots matured and seed used by Pheasants." On a ranch site, "The food plots did very well and showed considerable use by the birds Millet was used the heaviest and next was sudan grass.... Sunflower was completely used when inspected."

Harney: Sudan grass, millet, and rape grew; the others failed. Rape eaten by rabbits. No signs of game use.

Malheur: One acre plot on game farm. Sudan and millet very good; sunflower, rape, and burnet grew fairly well. Others should do better if planted earlier. Approximately 100 pheasants flushed from the plot during hunting season.

Feeding Stations:

Feed hoppers were reported in use only from the central district. Utilization data are not available.

Water:

Temporary-type water developments were in use during the past season in the Willamette valley. The two principal types used were the water barrel with float valve, and troughs made by cutting old hot water tanks in half lengthwise. One seep was also developed. The numbers and locations of these units were as follows:

<u>County</u>	<u>Troughs</u>	<u>Barrels</u>	<u>Seep</u>
Benton	2	-	-
Linn	8	2	-
Marion	-	5	-
Polk	4	-	-
Washington	4	3	1

The district agent reported as follows concerning these watering places: "To our knowledge each and every unit was used by upland game, some on the first day after installation; the units made possible liberations of game farm birds in areas formerly devoid of water; usage by game farm (liberated) birds continued throughout the summer....; use by wild populations was entirely satisfactory by pheasants, valley quail, and doves."

Last fall two small concrete devices similar to the ramp portion of the standard guzzler were constructed on the E. E. Wilson Game Management Area. Each has a capacity of approximately 70 gallons. They have no collecting apron but depend upon runoff. For this type of area where an occasional cleaning out is no problem, they may prove to be more satisfactory than the temporary developments.

During this period, eighteen more concrete guzzlers were constructed. Eight are located in Umatilla county, five in Gilliam and five in Sherman. Most of the new units are of approximately half the size built previously. Water in old units of about 500 gallon capacity has not been dropping more than six to 12 inches during the entire season. Most units were full by January this year. All five of the old units were used by game birds last summer.

HABITAT IMPROVEMENT FOR MIGRATORY BIRDS:

Refuge System:

Progress continues to be slow in acquisition by lease of sites suitable for construction of waterfowl resting ponds. Those now under lease and in operation during this period are:

Buchanan pond. Benton county. Five acres including a 1-acre dug pond flooded in season. Millet was seeded, but failed. Twenty-five sacks of grain donated by the landowner were fed at the pond during the winter. The pond was pumped full on October 18-20. On the 19th, 21 wood ducks used the pond; on the 20th, there were 54 wood ducks. On December 19, an estimated 500 geese and 800 ducks (mallard, teal, and baldpate) were observed. On January 9, approximately 300 ducks were at the pond.

Evers pond. Washington county. A 5-acre tract of which two or more acres hold water naturally. The landowner left a 400-foot strip of reed canary grass along the fence bordering the site. It was used by pheasants for roosting cover and feeding. In mid-December the district agent reported more waterfowl use than last year. On December 12, he observed about 400 ducks, mostly teal, mallards, baldpate, and pintails.

Hansard ponds. Yamhill county. On June 6, 1950 a 5-year lease was signed with C. B. Hansard permitting development of three existing ponds located near the North Yamhill river. One pond was enlarged to about three acres, a spillway was constructed and the dike seeded to alta fescue and ryegrass, and fenced. On December 13, 250 teal, mallard, and wood ducks were observed. Grain was fed during January.

Feeding Areas:

Table 10 lists grain fields planted primarily for waterfowl.

TABLE 10
FEEDING AREAS PRIMARILY FOR WATERFOWL

County	Acres	Crop	Remarks
Lane	65	Barley	Planted fall, 1949. Gibson island, Fern ridge. During October, 1950, estimates of as many as 20,000 ducks (10/25) and hundreds of geese utilized 90 per cent of the crop.
Yamhill	6	Millet	Used by some ducks and from 100 to 500
		Reed canary	Canada geese in January.
Benton	4	Millet	Buchanan pond. Crop failure. Grain was fed during winter.

Nesting Projects:

At Fern ridge reservoir in Lane county, 65 small islands were constructed for duck nesting sites. Rushes and sedges were transplanted to these islands for cover. Loafing platforms were also provided for each site.

Ten rafts have been constructed and placed on Davis lake in the central district to provide duck nesting sites.

Fifty wood duck nest boxes were constructed and erected in Benton, Linn, and Lane counties. By May 10, 17 boxes were in use.

Miscellaneous:

Ten acres of cattails were mowed at Fern ridge as a trial for improving the area for duck and goose feeding. Some ducks were reported using the area in March.

At Fern ridge six trial plots of grass and related plants were set out on the mud flats.

Three islands totaling 14 acres on Fern ridge reservoir were sprayed with 2, 4-D to control Canadian thistle.

One artificial spring was constructed at Camp Adair for band-tailed pigeons.

HABITAT IMPROVEMENT FOR BIG GAME:

Range Reseeding:

North coastal district. Seeding of small key areas in the Tillamook burn was continued for the second season. A total of 1,080 pounds of lotus major and 200 pounds of burnet were seeded in February on an estimated 420 acres on ten drainages. In addition, 450 multiflora roses were planted.

Seedings made a year ago on the Tillamook burn were visited in November.

At that time lotus and burnet had made good growth; deer had been utilizing both species. Some grass species had made a good start on the trial plots. In January deer were making extensive use of the plants, including multiflora rose.

In the same district, 400 pounds of lotus were broadcast over approximately 60 acres on Nicolai mountain in cooperation with the Westport Rod and Gun Club, and 200 pounds of lotus were seeded on 60 acres along Big creek in cooperation with the Knappa, Svenson, Brownsmead Rod and Gun Club.

Willamette district. The small burn seeded in Benton county last year was reportedly showing good results in June.

A small acreage of burned-over forest land near McDonald forest, Benton county, was seeded to 27 pounds of lotus and burnet in March.

Northeast district. The spring, 1950 seeding on the Keating range was unsuccessful. The area was summer fallowed and seeded again on October 20 to 50 pounds of big bluegrass, 70 pounds of beardless wheatgrass, and 20 pounds of bitterbrush seed. No germination was noted by April 12, 1951.

Grant district. On the North Fork range, 20 pounds of big bluegrass and beardless wheatgrass seed were broadcast on several sites during October as a trial.

Upon request from the Forest Service, half a sack full of bitterbrush seed was supplied to the Supervisor, Fremont National Forest, for trial with a grass reseeding project.

Shrub Planting:

This spring the following listed planting stock was provided for test planting on the North Fork winter range acquisition project:

1,000 Southernwood
100 American plum

100 Sumac
725 Matrimony vine

One thousand matrimony vine planted on this project in April, 1950 were in poor condition last fall due, partly at least, to severe browsing by cattle.

Browse Pruning:

No further work has been undertaken on the Grant county mahogany pruning project. Observations in October, 1950 indicated that about 50 per cent of the mahogany topped off in December, 1948 remains alive. Most of the trees pushed over to make the tops available have been heavily utilized by deer and are still alive. No evidence of layering has been noted.

Water Developments:

Construction of waterholes in the Deschutes National Forest in cooperation with the Forest Service was continued with completion of three more units in November. Bentonite has been added as necessary to some of the seven units previously dug. One waterhole was fenced. In June all waterholes were reported to be in good condition and in use. By September it was necessary to haul water to four units. Deer were using five waterholes inspected during March. The district agent states that, "....before the waterholes were put in hardly a

deer track was to be found in much of the area. Now there are trails beginning to show up leading to the developments." Crediting water developments and use of salt, he says, "This change in (deer) distribution is exactly what is being hoped for in the development plans."

In Lake county eight reservoirs have been constructed in cooperation with the Bureau of Land Management. Four of these were completed in 1949. Two additional units are now under construction in the same area. These sites are selected cooperatively on dry ranges where improved antelope distribution is desired. These waterholes were reported to be full in February.

In Malheur county the district agent reported that, "All the antelope waterholes had water in them this spring at the time of the antelope census, but it is not known that they will contain water the entire year."

HABITAT IMPROVEMENT FOR FURBEARERS:

Willow Planting:

The planting of one year old rooted willows on the headwaters of potential beaver streams has continued on a small scale. Table 11 summarizes this activity to date.

TABLE 11
WILLOW PLANTING FOR BEAVER

County	Location	Planted	No.	Type	Date	Survival	Remarks
						Per Cent	
Crook	Ochoco N.F.	6/48	130	Cuttings only	11/50	5	
Crook	Ochoco N.F.	6/49	200	Rooted	11/50	50	Fenced.
					11/50	45	Open
Crook	GI Ranch	5/50	400	Rooted	11/50	80	Loss to stock
Crook	Hampton Bu.	6/50	1125	Rooted	12/50	90	
Grant	Malheur N.F.	4/49	400	Rooted	10/50	10	
Grant	Malheur N.F.	6/50	200	Rooted	10/50	50	
Lake	Fremont N.F.	4/49	600	Rooted			
Lake	Fremont N.F.	7/49	400	Rooted	9/50	45	Loss to flood- ing and beaver

SUMMARY:

Table 12 summarizes by districts and regions the total number of new projects in each game category begun during each year of the program. These have been listed as permanent or temporary according to the nature of the project. For example, shrub plantings are considered to be a permanent improvement; a grain strip is of temporary value. A total of 564 projects (93 per cent) is classified as permanent.

TABLE 12
TOTAL NUMBER OF PROJECTS

Districts	Upland Game						Waterfowl				Big Game				Fur		Totals
	Permanent			Temporary			Permanent		Temp.	Permanent			Temp.		Permanent		
	1949	1950	1951	1949	1950	1951	1949	1950	1951	1950	1949	1950	1951	1950	1949	1950	
N. Coastal	1																15
Willamette	7	59	88	4	19	1	3	2	2								187
Region 1	7	60	88	4	19	1	3	2	2								202
Southwest	7	22	8														37
S. Coastal	16													1			17
Region 2	23	22	8											1			54
Klamath	25	9	2														36
Central	13	12	4	2				1							1	2	44
Columbia	17	26	40		2												85
Region 3	55	47	46	2	2			1							1	2	165
Umatilla	19	13	16	1													49
Northeast	6	18	2	2	1	1											31
Grant	11	5						1							1		20
Wallowa	1	1															2
Region 4	37	37	18	3	1	1		1							1		102
Lake	22	8	5														44
Harney	6	3		4											1		13
Malheur	8	5	4										6				23
Region 5	36	16	9	4											1		80
Totals	158	182	169	9	5	22	1	3	4	2	11	21	10	1	2	3	603
				545				10				43			5		
Percentages				90.4				1.7				7.1			0.8		100

FEDERAL AID TO WILDLIFE RESTORATION

Excise tax receipts on sporting arms and ammunition for the first eight months of the current (1951-52) fiscal year are \$11,851,142.66. This is \$5,788,602.70 in excess of the collections for the same period during the last fiscal year. What the trends in excise tax receipts might be for the remaining four months of this fiscal year is anyone's guess; however, it appears safe to predict that the total receipts will be considerably in excess of those for any previous year since the Federal-Aid program has been in effect. It is probable that the international situation caused a fear of shortages to prevail, resulting in "stampede buying" on the part of sportsmen and retailers.

TABLE 1
1950-51 FUNDS

Total Receipts Fiscal Year 1951	
Available July 1, 1950	\$9,351,613.60
Administration Costs for	
U. S. Fish and Wildlife Service	561,096.82
Oregon's Share	214,143.45
State Matching Money	71,381.15
Fiscal Year Budget	285,524.60
Reversion to Migratory Bird	
Fund from Oregon	None
Carry-over of Unobligated Funds	
(State and Federal)	248,415.42
Total Funds Available for	
Obligating in Oregon on July 1, 1950	\$ 533,940.02

The backlog of \$13,467,468.61 earmarked for Federal Aid to Wildlife Restoration activities still remains in the U. S. Treasury. It is doubtful if any of this backlog will be appropriated this year.

Congress has taken no action on the Federal-Aid appropriation for the next fiscal year. It is probable that the full 10 per cent tax will be appropriated.

The "Dingell Bill" or the Federal Aid in Fisheries Restoration and Management finally passed Congress and was signed by the President. It will become effective July 1, 1951. Oregon's share of the first appropriation is estimated to be approximately \$60,000.00, which with the state's one-third share added would be an operating budget of about \$80,000.00

TABLE 2
FEDERAL AID IN WILDLIFE RESTORATION ACTIVITIES IN OREGON.

Fiscal Year	Federal Appro- priation	State Share	Total Money Available	Money Obligated by Projects	
				Type of Project	Amount Obligated
1939	\$ 19,250.23	\$ 6,416.74	\$ 25,666.97		
1940	30,281.25	10,093.75	40,375.00		
1941	49,519.26	16,506.42	66,025.68		
1942	56,415.32	18,805.11	75,220.43		
1943	25,186.89	8,395.63	33,582.52		
1944	20,667.36	6,889.12	27,556.48	From 1939 to 1950 see Pages 78 - 80 1949 Report and Pages F-2 and F-3 1950 Report.	
1945	18,342.60	6,114.20	24,456.80		
1946	21,374.70	7,124.90	28,499.60		
1947	55,360.81	18,453.60	73,814.41		
1948	198,084.53	66,028.18	264,112.71		
1949	260,542.10	86,847.38	347,389.47		
1950	250,846.11	83,615.37	334,461.48		
1951	214,143.45	71,381.15	285,524.60		
Total to Date	<u>\$1,220,014.61</u>				

Acquisition

Sauvies island		
Stonebrink tract	135.44 A	\$ 9,300.00
Stutzer tract	392.00 A	65,300.00
Watson tract	19.60 A	29,200.00
Government island		
McGuire island	184.80 A	17,628.00

Land Lease

Calkins-Summer lake	120.00A	350.00
Pennington - Summer lake		
	127.00A	150.00
State lands	3,470.00A	500.00
Pilot Rock Lumber Company		
	4,838.00A	<u>725.70</u>

\$123,153.70

Development

Summer lake		
Construction of residence and garage		\$19,051.69
Sauvies island		
Dike improvements, clear- ing of lands, fencing, renovation of buildings, and farming new lands		12,136.37
Government island		
Management, planning, engineering, renovation of buildings, communication facilities, roads and im- provement to roads, fenc- ing, and farming new lands.		<u>28,491.10</u>

\$ 59,679.16

Maintenance

Summer lake	\$19,751.60
Sauvies island	<u>21,981.30</u>

\$ 41,732.90

Investigation

Habitat Investigation	<u>\$23,027.55</u>
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\$ 23,027.55

Coordination

\$13,069.35

\$ 13,069.35

\$260,662.66

TABLE 3
COMPARISON OF OREGON'S FEDERAL-AID ACTIVITIES WITH THE NATIONAL PROGRAM.

	Per Cent of Net Obligations by Type of Projects				
	Survey and Investigation Percentage	Land Acquisition Percentage	Development Percentage	Maintenance Percentage	Coordination Percentage
National Average					
1939 - 1948	31.8	27.2	34.6	0.9	5.5
Oregon's Activities	8.8	47.3	22.9	16.0	5.0
1950 - 1951					

TABLE 4
SUMMARY OF OREGON'S FEDERAL-AID PROJECTS GAME MANAGEMENT AREAS:

Area	County	Acreage	Approximate % of Completion	
			Acquisition	Development
Summer lake	Lake	13,345	100	85
Sauvies island	Multnomah, Columbia	10,500	70	10
Government island	Multnomah	2,565	75	10
Klamath area	Klamath	10,000	0	0
Warner valley	Lake	157,200	0	2
North Fork of the John Day	Grant, Umatilla,	25,000	25	1
Big Game Winter range	Morrow			
Wenaha Big Game Winter range	Wallowa	1,027	0	0

SUMMER LAKE:

During the past year, water controls have been completed. Major diking is complete, but some minor dikes and canal checks will have to be installed. A manager's residence and a six-car garage have been completed. The old residence will be renovated to serve as a checking station and barracks.

Small patches and strips of land adjacent to cultivated fields have been broken up, increasing our farmlands from 349 to 370 acres. The past winter was relatively mild and utilization of crops was less than in the previous two winters but still high enough to justify crop production. The utilization as measured by clipping and weighing test plot samples was as follows:

TABLE 5
UTILIZATION OF TEST PLOTS

Plot No.	Location	Weight - Ounces				Per Cent Used
		Inside Plot	Outside Plot			
			Sample 1	Sample 2	Average	
1	Calkins field	3	2	2	2	33
2	Calkins field	1	1	1	1	0
3	Church field	7½	1	2	1½	80
4	Below hdqrs.	2	½	0	¼	87
5	Rest lake field	½	¼	0	1/8	75
Total		14	4-3/4	5	4-7/8	65

A headquarters site has been selected and purchased. Planning is under way for suitable permanent buildings to be constructed. The site selected is above any known high water flood level.

Farming: Crops planted during the fall of 1949 and utilized to some extent by the wintering waterfowl of 1949-1950 and intended to be harvested for seed during the summer of 1950 were destroyed by flood conditions in June, 1950. A major break in the small dike protecting some 600 acres of agricultural land inside the dike belonging to the Game Commission caused the loss of the already planted crop and seriously delayed the planting of new crops. The high water was a near record for lateness of season and by the time the flood waters had subsided and the ground dried sufficiently for working by machinery, it was too late for normal midsummer crops. Consequently, the major effort was diverted to fall planting of crops for use by the wintering waterfowl. No spring crops were planted because of the advance threat of high water; consequently, there was no loss other than the delay in time of planting and that planted in the fall of 1949.

The chart below lists food crops planted during 1950:

TABLE 6
1950 WILDLIFE FOOD CROP PLANTINGS
SAUVIES ISLAND GAME MANAGEMENT AREA

Date Planted	Species	Acreage	Remarks
August 3-8	Hog millet	40.25	Poor usage, most failed to head.
August 7-8	Sudan grass	2.5	Poor usage, most failed to head.
August 8	Buckwheat	0.5	Poor usage, most failed to head.
August 11	Common rye	1.0	Poor usage.
September 28	Winter wheat	28.0	Good usage by geese but not entirely utilized.
September 29	Abruzzi rye	16.5	Excellent usage by Baldpates.
September 29	Trebi barley	8.0	Excellent usage by Baldpates.
September 30	Alta fescue	2.5	Some usage during midwinter and early spring.
September 30	Com. rye & red clover	18.5	Moderate usage during midwinter.
Total Acreage		117.75	

Some acreages, such as the alta fescue and common rye and red clover were planted more as a soil improvement benefit rather than a direct benefit to wintering waterfowl. Emergency dike-improvement work by the U. S. Army Engineers on the dike resulted in the removal of several acres of topsoil with resulting clay areas that were planted to soil improvement crops.

Recreation:

A. Waterfowl Hunting

The method of operation of the public shooting ground portion of the game management area was similar to that mentioned in last year's report with the following three exceptions:

1. The fee for the blind area was increased to \$3.00 per man day,

2. Area "L", formerly a blind area, was changed to a free-lance area, and
3. Hunting was on the average of four days per week instead of three as last year.

In general, the 1950 hunting season was more successful than the 1949 season, as approximately 50 per cent more hunters had a higher average daily success ratio than the prior year. The free-lance method of hunting was in general successful, although there was some complaint of marauding hunters with improper hunting attire and attitude interfering with the other people. The blind area, despite the increased fee, accommodated some hunters every day, and it appears there are some hunters that desire the permanent blind feature and the reduced interference from others.

The hunting data is reported under the Waterfowl section of this report.

B. Pheasant Hunting

Dates for pheasant hunting for 1950 were separate from the waterfowl hunting season. Cock pheasants were liberated immediately prior to and during the pheasant hunting season. The number of pheasant hunters allowed was unlimited and some abuse occurred when hunters found they were not checked by enforcement officers and consequently some of them returned again during the same day and secured two or more limits per day.

C. Crow Hunting

Crow hunting was very limited during the past year with only a few persistent and successful hunters returning to the area. The sport of crow hunting has not been too popular in this region, perhaps because of the high price of shells. Limited shooting of crows on Sauvies island results in rapid dispersement of the crow flight lines to new areas.

D. Dog Trials

The Oregon Retriever Dog Trial Club held two trials, one on the Labor Day holiday of 1950 and on March 6, 7 and 8, 1951. On March 8 a count resulted in the tabulation of 249 cars and 620 people in attendance.

E. Fisheries

As state ownership increases and public access to fishing waters is made available, the recreational value of the spiny-ray fisheries aspect of the project increases. On Sunday evenings it was not unusual to have to wait from one to two hours for your turn on the ferry, mostly because of fishermen.

The development plans previously outlined were designed principally for waterfowl although fisheries was not overlooked. These developments will help fisheries.

One thousand one hundred and eleven muskrats were harvested in a unit management system by a private trapper operating on a 50-50 basis. Two beavers were also taken.

Water measurement data give southeastern Oregon a rating of 180 per cent of normal for the 1950-51 season. This is the greatest water supply since 1917. Summer lake is more stable than most sump-type lakes because it is fed principally by the constant flow of Ana springs. However, the abundant water has raised the lake slightly, making our dikes more susceptible to wind-water erosion. We are expecting some trouble but feel fortunate that this high water did not come two years ago when the new dikes were soft and not protected by vegetation.

Silver lake, 15 miles north of Summer lake, has filled with water for the first time in 33 years. The question of what this will mean to the waterfowl of southeastern Oregon, particularly Summer lake, is being studied.

Screening of the east river diversion and the Summer lake irrigation ditch is being planned for the next year's operations.

SAUVIES ISLAND:

General: The engineering survey by H. W. Haner and Associates, consulting engineers, has been completed. This survey included initial surveys and engineering data necessary for the future planning for major water controls, roads, and dams.

Estimated Cost of Project: This estimate is for the development required to control the water surface level by the use of storage reserve.

The estimated costs are based insofar as possible on current prices for similar work and estimate quotations from equipment and material suppliers. The cost of engineering design is included in the totals.

Sturgeon and McNary Lakes Area

a. Gilbert River Control Dam	\$ 39,700.00
b. Crane Slough Dam	5,000.00
c. Oak Island Control Dam	11,500.00
d. Access roads	<u>52,500.00</u>
Total	\$108,700.00

Cunningham Slough Area

a. Cunningham Slough Control Dam	\$ 27,200.00
b. Access roads	<u>35,500.00</u>
Total	\$ 62,700.00

Total Estimated Costs

a. Sturgeon and McNary Lakes Area	\$108,700.00
b. Cunningham Slough Area	<u>62,700.00</u>
Total Estimated Cost	\$171,400.00

GOVERNMENT ISLAND:

General: Approximately 1,650 acres have been purchased on Government island, with only one privately owned farm left.

No hunting was permitted on the island proper during 1950, although the state lands adjacent, consisting of tide flats and sand bars, were open to public hunting without special restrictions.

Potential: Government island, strategically located in the Columbia river about 10 miles east of Sauvies island, is being purchased by the Game Commission because of its natural waterfowl habitat and the necessity for additional resting and feeding area for the Pacific Waterfowl Flyway. It has both high and lowlands, suitable either for wildlife food plantings or the development of natural aquatic waterfowl food.

Its peak winter population during the year 1950-51 occurred during the latter part of February, 1951, when approximately 2,000 waterfowl were observed on the island. It is intended by more extensive food plantings to increase the importance of Government island as a feeding and resting ground during the winters. Years ago, when grains and row crops were planted on the island, it ranked with the best sections of the Willamette valley as a pheasant producing area.

Development: Active work on the development of Government island started in mid-October, 1950, when personnel were installed in living quarters on the island. Development work since then has been directed toward renovation of the living quarters, digging of a new well, initiation of waterfowl and upland game census techniques, general planning of fencing and road improvement projects, securing of new machinery and equipment, and general reconnaissance of the area. A contour map of water levels was secured during the late summer of 1950 by a 2-man team recording the falling water levels at specified intervals.

A development project for new fencing, wildlife food planting, and the first water control engineering project has been approved for the year 1951.

Fifty-seven acres of cottonwood trees were plowed under during the summer of 1950 and were planted to permanent pasture grasses and clover early in 1951. Other permanent pastures will be planted on the highlands and short-term grains in the lowlands after flood waters have receded. Permanent pastures, with grasses and legumes of special interest to waterfowl, have proved very beneficial to large flocks of baldpates and geese on both Government and Sauvies islands.

KLAMATH AREA:

The importance of the Klamath basin as a major link in the Pacific Waterfowl Flyway is becoming more apparent and gaining more recognition as such. In contrast to this, reclamational promotions are a more serious threat than ever before. Farmers, both as individuals and as organized groups, have more "ready" cash than usual and are looking at reclamation projects as good investments. The agitation for veterans' homesteads is also pinching wildlife interests in the Klamath basin.

For several years, the U. S. Fish and Wildlife Service has promoted the idea of maintaining waterfowl habitat in Oregon and northern California as a means of reducing crop depredations and resulting game losses in California. California sportsmen and farmers have not supported this plan until recently. The Bureau of Reclamation is recognizing the value of such a plan.

A proposal is now under consideration for the U. S. Secretary of Interior to cause a complete study to be made of the Klamath basin to determine the needs of wildlife and methods of providing such needs. If this proposal goes through and the report is approved, many of the conflicting issues between wildlife and reclamation in the Klamath basin would be settled.

In November, a "show-me" trip for the Oregon State Game Commission was held in the Klamath area. The entire basin waterfowl problem was reviewed and an aggressive policy adopted. During the past year, the state activities are briefly as follows:

1. Negotiations have been continued with the Weyerhaeuser Timber Company to prevent the draining of the 3,000-acre Aspen lake.
2. An offer to purchase the 600-acre Howard marsh (Shoalwater bay) has been made to the California-Oregon Power Company.
3. The Oregon State Game Commission and the Bureau of Reclamation have been negotiating a 50-year lease on the 1,060 acres of public domain in Hanks marsh.
4. Acquisition of the 141-acre Keyser tract in Hanks marsh was attempted but the asking price of the owner was too high.
5. The proposal to remove approximately 5,000 acres of the Tule lake refuge lands from secondary wildlife use for veterans' homesteading has been strongly opposed.
6. The Oregon State Land Board has been contacted regarding state school lands in Squaw Point marsh and at Round lake. We have received assurance that these marshlands would not be disturbed without our knowledge.

The state's activities in the Klamath basin, excepting the Howard marsh deal, are now more or less at a standstill pending action on the proposed study by the U. S. Department of the Interior.

WARNER VALLEY:

Warner Valley Management Area was set up in March, 1951. Norman Minnick was assigned as refuge manager of this 157,220-acre unit. A temporary headquarters has been set up at the Hart Mountain CCC Camp.

TABLE 7
THE PRESENT STATUS OF WARNER VALLEY LANDS

Type	Acres Private	Acres Federal	Acres State	Total
Cultivated (grains)	9,100		6,980	16,080
Marsh hay & grazing	23,600	1,280	4,580	29,460
Meadow hay & grazing	11,900	640	4,400	16,940
Sagebrush	10,200	65,000	5,740	80,940
Alkali flat		1,200	4,000	5,200
Underwater	500		8,100	8,600
Total	55,300	68,120	33,800	157,220

Note: The lands previously classified cover all of the bed of Warner valley proper. Not all of these lands have sufficient game potential to be of importance.

This management area has been set up as a joint operation of the U. S. Fish and Wildlife Service, the U. S. Bureau of Land Management, and the Oregon State Game Commission. Under this agreement, an administrative committee composed of representatives of the three agencies was formed. The three agencies will participate in the development and management of the area to the extent of their available resources.

About 22,000 acres of public domain are being reclassified for wildlife use and will come under full control of the Warner Valley Management Committee.

Negotiations are continuing with the Oregon State Land Board for control of approximately 15,000 of the 33,800 acres they control.

The 55,300 acres of private land are mostly wild hay fields and meadows owned by livestock men. Their methods of management are such that they are raising about as many birds as if these lands were specifically managed for wildlife. Consequently, Warner valley land acquisition will probably never be extensive. We feel there is a need for a system of brood areas interspersed through these private lands to provide for the broods during haying season. We hope to obtain these necessary areas for development of brood ponds through leases, easements, or agreements, resorting to acquisition only if absolutely necessary.

The principles of management to be applied to Warner valley are briefly:

1. Water stabilization in nesting areas.
2. Water conservation as accomplished by diverting water from shallow flats and lakes to deep channels and potholes to reduce evaporation and increase the perimeter areas.
3. Protection of nesting areas and brood area.

A public shooting ground was set up on the Warner Valley Stock Company lands for the first time last season. Through a cooperative agreement with William Kittredge, president of the Warner Valley Stock Company, a large section of the south Warner grain fields and some marshland was made available to hunters for the first time. Warner Valley Stock Company owns about

22,000 acres in south Warner. This was closed to hunting except the designated public shooting area which was varied from 6,000 to 10,000 acres as conditions warranted. We hope to continue this cooperative project.

NORTH FORK OF THE JOHN DAY BIG GAME WINTER RANGE:

This project involves 23,610 acres of overgrazed south slope range land lying in a 3-mile wide strip along the north side of the North Fork of the John Day river. The project starts at U. S. Highway 395 and extends west about 15 miles. The area is primarily deer winter range. It is used very lightly by elk except in unusually hard winters. Tract ownership:

Owner	Acres	Per Cent of Total
Private (35 tracts)	17,750	75.2
Morrow county	1,160	5.0
State of Oregon	60)	
Oregon Highway Commission	40)	0.4
U. S. Forest Service	800	3.4
U. S. Public Domain	<u>3,800</u>	<u>16.0</u>
Total	23,610	100.0

The total estimated cost of this project is \$78,100.00.

This project covers lands that, from a grazing standpoint, are classified as spring and fall range. However, livestock has been on this area the entire season. Particularly the fall and winter grazing has been detrimental to game interest.

This acquisition will not remove any livestock operation in its entirety but will necessarily curtail certain practices of several. The project borders the Umatilla national forest and cooperative management of grazing between the two agencies can greatly enhance the value of the project.

Fortunately, the bulk of the private land is owned by timber companies. Their operation is compatible with our interest but their lands are not for sale. Hunting and grazing rights have been leased on about 7,000 acres from the Pilot Rock Lumber Company and Harris Pine Mills for an annual rental of 15 cents per acre, which is very little more than taxes. These leases are for 20 years and give the right to fence, administer hunting and grazing, and carry on habitat improvement practices. The Heppner Lumber Company and Kinzua Lumber Company have committed themselves to similar leases but the routine procedure of preparing and executing such leases has not been completed at this time.

A request has been submitted to the U. S. Bureau of Land Management for reclassification of the 3,090 acres of public domain for wildlife use. Favorable action is anticipated for the near future.

Acquisition has not progressed sufficiently to block out areas large enough to justify boundary fencing this year. It appears that boundary fencing can be started in 1952.

A field of alfalfa and several species of habitat improvement plants have been planted on areas that can be protected.

WENAHUA BIG GAME WINTER RANGE:

A large herd of elk summering on the Umatilla national forest moves down along the breaks and lower bench lands on the north side of the Wenaha river during hard winters. In mild winters the herd stays in the higher elevations of the watershed and causes little conflict with private holdings. In hard winters the herd moves down the lower north side bench to the cultivated fields of two landowners. Here, game damage problems are so serious that one landowner has resorted to killing elk. He was arrested and exonerated by Circuit Court action. Indications are that part of these elk come from summer ranges in Washington and an effort is being made to determine the number.

These two landowners have 1,019 acres. The holdings block the migration of 1,000 to 1,500 head of elk that would otherwise not only graze this area but have freer access to north slopes along the lower Wenaha and the Grande Ronde rivers. Acquisition of this private land would accomplish two things: First, it would remove a "bottleneck" in the elk herd's migration route. Second, it would provide a chance to improve the forage production on the 1,019 acres.

TABLE 8
ESTIMATED COST OF ACQUISITION

Owner	Acres		Value	Improvements	Estimated Present Worth
	Tillable	Non-tillable			
Max Mallory	271	498	\$20,021.00	\$4,625.00	\$24,646.00
Frank Shultz	52.5	197.5	4,795.00	1,600.00	6,395.00
Total	323.5	695.5	\$24,816.00	\$6,225.00	\$31,041.00

A project for acquisition of this area was submitted to the Federal Aid Division of the U. S. Fish and Wildlife Service. It was rejected on the basis that 1,019 acres was inadequate range for 1,000 to 1,500 head of elk. Also, the landowners have placed a value on their lands far in excess of the appraisal. As a result, the acquisition project is inactive, at least for the present time.

FEDERAL-AID INVESTIGATIONS:

The Summer Lake Pheasant Studies were terminated at the end of 1950. A bulletin is being prepared to cover the data collected on this project and will be published in 1951.

The investigation of specific game habitat areas has been continuing along the same lines that were originally set up. However, more emphasis has been placed on big game winter ranges and less on waterfowl areas.

Surveys have been made on the following areas and copies of these reports are available in the Portland office:

A. Waterfowl

Area	County
Miller lake	Klamath
Shoalwater bay	Klamath
Manning marsh	Klamath

B. Big Game

Area	County
White river	Wasco
Grant county	Grant
Keating	Baker
Burnt river	Baker
Troy	Wallowa
Starkey	Union
Bridge creek flats	Umatilla, Grant

PUBLIC SHOOTING GROUNDS:

Kill data for these shooting grounds are given under the Upland Bird and Waterfowl sections of this report. A brief summary of the Public Shooting Grounds as operated in 1950 follows:

TABLE 9
SUMMARY OF OPERATION OF PUBLIC SHOOTING GROUNDS IN 1950

Area	Acres in Refuge	Acres of Public Hunting	Daily Charge	No. of Permits	K I L L			Success Ratio
					Ducks	Geese	Total	
Summer lake	6,950	6,400	\$2.00	3,132	3,101	699	3,800	1.23
Sauvies island	5,230	3,258	3.00 (blinds) 2.00 (free lance)	2,465	3,017	53	3,070	1.25
Government island	2,100	500	None	(1) Unknown	Unknown	Unknown	Unknown	Unknown
Chewaucan	45,000	3,000	1.00	417	308	255	563	1.35
Warner valley	14,000	8,000	1.00	996	532	937	1,469	1.52
Malheur refuge	(2) (Closed in 1950 because of low water levels.)							

- (1) The state-owned lands below the mean high water line were open to hunting. Hunters were not checked.
- (2) Water on the Malheur refuge was either so low or entirely nonexistent on all the areas that could be opened to public hunting that the area was closed by Commission regulation.

FURBEARERS

BEAVER:

More beavers were dead-trapped and pelted last winter than at any time since 1924, the first year of the last series of open seasons. A total of 6,008 beavers was removed throughout the state from lands where written complaints had been received from the landowners. Beavers were removed from the properties of 1,012 landowners who had signed beaver trapping agreements. Many other complaints were trapped from areas where written complaints were received but no contract signed.

Despite the trapping of 5,749 beavers during the 1949-50 winter and 5,988 last winter, beavers are continuing to increase in all areas at a much faster rate than we have been able to trap them. Many streams on public and non-agricultural lands are now overstocked and large increases of beavers are found in agricultural areas, despite our trapping efforts. Damage complaints continue to come in at an increasing rate.

In order to allow the Game Commission more latitude in properly managing beavers, the legislature passed a bill which gives the Commission the power to open and close seasons and areas, set bag limits and, in general, take appropriate action to maintain the proper number of animals in the proper locations.

A breakdown of the beavers dead-trapped by counties for the past five years follows:

TABLE 1
BEAVER DEAD-TRAPPING RECORDS BY COUNTIES

County	1946-47	1947-48	1948-49	1949-50	1950-51
Baker	87	120	132	72	125
Benton	77	111	119	94	260
Clackamas	48	163	191	293	269
Clatsop	492	565	567	527	542
Columbia	405	781	663	1,129	698
Coos	2	12	9	20	15
Crook	185	136	113	218	158
Curry	-	-	2	33	36
Deschutes	72	118	54	60	39
Douglas	115	48	103	322	329
Gilliam	34	18	13	37	68
Grant	196	342	218	425	179
Harney	383	302	108	278	232
Hood River	17	22	5	20	61
Jackson	22	44	32	59	56
Jefferson	11	17	19	102	-
Josephine	-	3	10	8	27
Klamath	29	52	27	33	81
Lake	98	72	15	152	153
Lane	216	400	450	478	801
Lincoln	15	2	1	8	9
Linn	104	260	224	257	336
Malheur	236	169	161	132	217

TABLE 1 (Cont.)

County	1946-47	1947-48	1948-49	1949-50	1950-51
Marion	205	188	193	212	196
Morrow	42	80	86	74	42
Multnomah	67	134	93	154	242
Polk	19	35	24	16	75
Sherman	13	9	5	-	-
Tillamook	17	25	45	121	110
Umatilla	56	133	87	102	159
Union	111	51	33	37	105
Wallowa	35	38	49	77	59
Wasco	70	38	20	41	74
Washington	37	30	25	65	72
Wheeler	24	53	48	70	121
Yamhill	2	13	10	27	62
Total	3,542	4,584	3,954	5,749	6,008

After a disastrous trapping winter during 1949-50 when pelts averaged only \$17.17, few share trappers could be found to trap again for a one-third share. The Commission then authorized the continued payment on this basis, with a guarantee of \$7.00 per pelt return to the share trapper for his winter's catch. Returns on pelts sold to date show most hides sold for over a \$21.00 average, and the minimum guarantee to the trappers, in most instances, has been fulfilled.

To date, 663 beaver pelts were sold through the Seattle Fur Exchange, bringing an average of \$22.55; and 2,965 through the Denver Fur Auction Company for an average of \$23.43. There are now an additional 1,826 pelts at Denver which will be auctioned off on May 24 and 554 still in the hands of the trappers. The over-all average to date has been \$23.27.

A total of 451 pounds of beaver castors was sold for \$4.75 per pound.

A market developed for beaver carcasses in the vicinity of Portland. Two buyers were found, one paying $2\frac{1}{2}$ cents per pound and the other two cents per pound for carcasses delivered. One-half cent per pound was retained by the Game Commission and the balance paid to the trapper. One of these buyers also picked up carcasses at various points throughout the Willamette valley, paying $1\frac{1}{2}$ cents per pound. The trapper of these was reimbursed 1 cent per pound. One trapper found a mink farmer to take his carcasses at 15 cents apiece. He was then paid 10 cents apiece for his share.

Disposal of carcasses has always been a problem to the trapper. Such outlets are welcome financially and solve a major problem of carcass disposal.

The following is a complete breakdown of the catch and sale record of pelts by trapper.

TABLE 2
RECORD OF SALES

Trapper	Address	Number Beaver Pelted	Number Beaver Unsold	Number Beaver Sold	Net Sale Price	Trappers Share	Game Comm. & Landown- ers Share	Average Pelt Price
Alvin Bennett*	La Grande	105	45	60	\$ 1,402.08	\$ 140.21	\$1,261.87	\$ 23.37
D. D. Bradshaw*	La Grande	114	64	50	1,008.24	100.82	907.42	20.16
James W. Brooks	Langlois	33	18	15	314.16	104.72	209.44	20.94
Don Cellers*	Hermiston	16	-	16	125.04	-	125.04	7.82
Don Cellers*	Hermiston	106	43	63	1,437.60	143.76	1,293.84	22.82
Cavanaugh & Naggiar*	Lakeview	82	29	53	1,202.64	-	1,202.64	22.69
Carl L. Collins	Reedsport	14	14	-	-	-	-	-
Confiscations*	-	4	4	-	-	-	-	-
Conn & Tiedeman	Jewell	678	587	91	2,440.56	813.52	1,627.04	26.82
Frank Elder	Monument	37	15	22	417.12	139.04	278.08	18.96
C. R. Friesz	John Day	2	-	2	39.12	13.04	26.08	19.56
Frank L. Gentry*	Heppner	127	44	83	1,849.92	185.00	1,664.92	22.29
Don German	Eugene	467	38	429	9,570.96	3,190.32	6,380.64	22.31
Horace Hill	Brogan	37	-	37	944.40	314.80	629.60	25.52
W. E. Holderman*	Philomath	319	76	243	5,552.40	555.24	4,997.16	22.85
R. C. Houston*	Paisley	43	25	18	451.20	45.12	406.08	25.07
Wayne Huff *	Halfway	60	40	20	451.44	-	451.44	22.57
H. E. Jones	Bend	16	4	12	331.68	110.56	221.12	27.64
John Kelly	Freewater	16	-	16	350.88	116.96	233.92	21.93
A. L. Knighten	Halsey	97	47	50	1,062.24	354.08	708.16	21.24
Miles O. Langdon*	Burns	184	31	153	3,608.16	360.81	3,247.35	23.58
Clyde Long*	Nyssa	171	71	100	2,295.36	229.54	2,065.82	22.95
Melvin Lord	Mitchell	84	51	33	832.80	277.60	555.20	25.22
Ferrel McKinney	Amity	57	-	57	1,349.04	449.68	899.36	23.67
Ferrel McKinney*	Amity	145	74	71	1,556.40	155.64	1,400.76	21.92
Malheur Refuge**	Burns	38	15	23	615.12	307.56	307.56	26.74
Verne Mallery*	Redmond	110	68	42	1,065.84	106.58	959.26	25.38
W. I. Mallery	Prineville	102	66	36	859.92	286.64	573.28	23.89
Nils Manninen	Clatskanie	10	8	2	44.16	14.72	29.44	22.08
Raymond Morehouse	Lapine	2	2	-	-	-	-	-
Cecil Motley*	Halfway	39	18	21	396.72	-	396.72	18.89
Robert Nill	Antelope	8	4	4	96.72	32.24	64.48	24.18
Robert L. Oliver	Reedsport	32	14	18	371.52	123.84	247.68	20.64
V. E. Olsen	Canby	150	65	85	2,162.64	720.88	1,441.76	25.44
W. C. Olsen	Canby	17	3	14	351.60	117.20	234.40	25.11
K. A. Pritchett	Days Creek	10	-	10	235.92	78.64	157.28	23.59
Ralph Rhea*	John Day	111	28	83	1,747.44	174.74	1,572.70	21.05
A. B. Richey	Bly	46	16	30	787.92	262.64	525.28	26.26
Frank Schneider*	Venator	53	-	53	1,062.48	106.25	956.23	20.05
Frank Schneider	Venator	18	3	15	292.08	97.36	194.72	19.47
Jack Shade*	Lakeview	8	8	-	-	-	-	-
Harold Siegel*	Roseburg	175	83	92	2,229.84	222.98	2,006.86	24.24
Harry C. Stokes*	Grants Pass	124	48	76	1,379.28	137.93	1,241.35	18.15
Sam B. Super	Jefferson	37	-	37	920.16	306.72	613.44	24.87
Guy Taylor*	Portland	119	38	81	2,066.40	206.64	1,859.76	25.51
Harold Taylor	Scappose	378	2	376	9,199.68	3,066.56	6,133.12	24.47

TABLE 2 (Cont.)

Trapper	Address	Number Beaver Pelted	Number Beaver Unsold	Number Beaver Sold	Net Sale Price	Trappers Share	Game Comm. & Landown- ers Share	Average Pelt Price
Homer Taylor	Troutdale	129	50	79	\$2,062.32	\$ 687.44	\$1,374.88	\$ 26.11
Lee Taylor	Portland	387	64	323	7,737.60	2,579.20	5,158.40	23.96
Leroy Taylor	Eugene	303	303	-	-	-	-	-
Malcolm Taylor*	Dufur	135	55	80	1,778.40	177.84	1,600.56	22.23
Jack B. Thomas#	Fort Klamath	24	8	16	439.20	-	439.20	27.45
James Trent Jr.*	Cloverdale	110	51	59	1,254.00	125.40	1,128.60	21.25
Marion Walker	Pistol River	11	1	10	153.84	51.28	102.56	15.38
J. O. Weldon	Albany	263	30	233	5,745.36	1,915.12	3,830.24	24.66
Arthur Woolley	Drain	41	5	36	783.12	261.04	522.08	21.75
Bruce Yeager#	Coquille	4	4	-	-	-	-	-
Totals and Averages		6,008	2,380	3,628	\$84,432.72	\$19,967.90	\$64,464.82	\$ 23.27

* No share

* Salary trapper, receives 10%

** 50% share

Balance of trappers receive 33 1/3%

Only 133 beaver were live-trapped and transplanted during the summer of 1950. Due to a lack of suitable planting sites only beaver which had to be immediately removed from complaint areas were taken. The table below gives the counties in which beaver were transplanted, the record for 1949, and the total number of beaver planted in the various counties since 1939. All beaver the past three years have been ear-tagged for future identification. Some of these have already been re-caught. As more are taken, additional information will become available on migrations and life history.

TABLE 3
BEAVER LIBERATIONS

County	1949	1950	Total
Baker	7	7	129
Benton	27	-	65
Clackamas	-	4	47
Clatsop	4	5	99
Columbia	-	-	23
Coos	12	-	114
Crook	1	10	34
Curry	4	2	94
Deschutes	2	1	71
Douglas	2	1	204
Gilliam	-	-	4

TABLE 3 (Cont.)

County	1949	1950	Total
Grant	4	9	66
Harney	11	9	223
Hood River	-	-	12
Jackson	3	-	26
Jefferson	4	-	30
Josephine	4	2	86
Klamath	-	-	85
Lake	6	18	211
Lane	6	-	100
Lincoln	16	24	100
Linn	5	-	37
Malheur	43	13	296
Marion	-	-	59
Morrow	-	-	-
Multnomah	7	-	16
Polk	2	-	28
Sherman	13	-	15
Tillamook	1	-	67
Umatilla	9	-	24
Union	9	-	61
Wallowa	2	-	17
Wasco	21	19	153
Washington	-	-	16
Wheeler	1	-	1
Yamhill	-	9	12
Totals	227	133	2,625

In addition to the beaver taken by the Game Commission, Indians took an additional 142 from their reservations.

TABLE 4
BEAVER TAKEN BY INDIANS FROM RESERVATIONS

Reservation	1945	1946	1947	1948	1949	1950	1951
Klamath	99	157	62	129	49	57	88
Umatilla	60	54	74	64	27	26	24
Warm Springs	80	78	67	103	65	31	30
Totals	239	289	203	296	141	114	142

OTHER FURBEARERS:

Fewer trapping licenses were sold last winter than at any time since 1924, the first year records were kept. There are as many furbearing animals now as at any time covered by these records, but on most species the price has dropped to such a low level that few trappers can operate profitably, except in areas where the more wanted furs are plentiful. Only 1,286 licenses were sold as compared with 1,501 the previous winter, 2,272 for the 1948-49 winter, and 2,581 for the 1947-48 season. The increased license fee from \$3.00 to \$6.00, in addition to the low fur prices, has also been a factor in the reduced license sale.

At no time since 1944 have long-haired fur animals commanded any attention in the fur trade. Consequently, in recent years the animals have been lightly trapped, resulting in vastly increased numbers. Since most long-haired fur animals are predatory by nature, this increase has resulted in increased predation on game and livestock.

The following table shows the comparative average prices realized on the various fur species since 1943.

TABLE 5
AVERAGE PRICE PER PELT

Species	1944-45	1945-46	1946-47	1947-48	1948-49	1949-50	1950-51
Mink	\$12.85	\$21.24	\$13.38	\$21.99	\$11.94	\$15.17	\$18.62
Muskrat	1.54	2.08	1.31	1.92	1.13	.89	1.45
Marten	*	33.88	17.08	*	*	*	16.61
Otter	14.71	24.15	22.00	19.33	15.02	11.09	17.46
Wildcat	5.73	4.60	1.99	1.82	.77	.81	1.00
Coyote	3.26	3.08	1.58	2.24	.81	.81	.73
Badger	1.33	1.00	.82	.97	.92	1.75	.44
Raccoon	1.79	1.65	.97	1.06	.74	.53	.73
Fox	1.73	1.55	.86				
Red				1.41	1.23	1.35	.72
Gray				.66	.47	.30	.52
Skunk	1.36	1.18	.87	.63	.65	.33	.43
Civet cat	.59	.84	.50	.36	.25	.69	.28
Weasel	.66	.94	.91	.99	.94	.80	1.16
Nutria	#	1.64	1.67	.75	1.44	1.53	2.58
Opossum	.28	.40	.24	.24	.20	.39	.36

* Closed season.

No catch reported.

Mink again was the wanted item, bringing an average price of \$3.45 more than the previous year. Muskrats also showed a price increase of 56 cents, from 89 cents to \$1.45. Otter registered an advance of \$6.37, but they are of little economic value due to their scarcity. The balance of the furs taken were not in demand and comparatively low prices again were paid.

A season on marten was held for the first time since the 1946-47 season. Only 373 of these animals were reported taken. This low number is believed mainly due to the comparatively low market and not a scarcity of the animals. Marten trapping is carried on in mountainous country by only a few of the most rugged trappers. All but a few of them pulled in their traps after the first two weeks when it was found they could not profitably operate at the \$16.61 average price per pelt being paid.

Only 22 opossum were reported taken in Clatsop county. They are, however, continuing to increase and extending their range into Tillamook and Columbia counties.

Summer lake refuge was again share-trapped, with 1,111 muskrats taken. Only 465 of these pelts have been sold, bringing a net return of \$1,010.70 for an average of \$2.17 per pelt. They were sold at the peak of the market, which has since dropped about 15 per cent.

Several reports have been received of fisher sign in southwestern Oregon. These fairly reliable reports, plus a sight record of one from the Cascades west of Bend, are the only recent indications that the animal has not been exterminated in the state.

A bill was passed by the legislature which gives the Game Commission the power to declare the raccoon a predatory animal and allows for removal by other means than those governed by trapping regulations.

TABLE 6
1950-51 FUR CATCH

County	Otter	Mink	M-Rat	Coon	Marten	Skunk	Cv-Cat	Wesl	Fox	Gray Red Fox	Possm	Bdgr	W-Cat	Cyote	Bear	Cugar	Nutria
Baker-49	-	216	2441	6	7	-	-	9	-	-	-	2	6	3	-	-	-
Benton-26	1	92	153	108	-	1	5	1	34	-	-	-	23	12	-	-	-
Clackamas-39	5	85	675	78	-	5	1	3	6	-	-	-	9	4	-	-	-
Clatsop-115	30	473	2739	115	1	19	34	34	-	-	22	-	49	11	4	-	-
Columbia-77	20	224	2459	48	-	4	17	20	-	-	-	-	29	14	-	-	-
Coos-67	8	266	582	93	48	1	20	15	-	-	-	-	16	2	-	1	-
Crook-6	-	12	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Curry-14	2	53	163	42	38	1	5	1	-	-	-	-	8	-	2	-	-
Deschutes-19	-	24	1132	-	45	-	-	21	1	-	-	1	15	-	-	-	-
Douglas-74	16	276	295	102	3	8	20	3	-	-	-	-	15	11	8	1	-
Gilliam-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant-21	-	136	272	21	16	-	-	6	-	-	-	-	-	-	-	-	-
Harney-17	-	110	3103	27	-	62	2	4	-	-	-	1	64	12	-	-	-
Hood River-10	1	16	392	5	-	4	-	3	1	-	-	-	-	-	-	-	-
Jackson-65	1	9	3082	87	24	2	-	3	6	-	-	-	37	122	3	-	-
Jefferson-2	-	11	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Josephine-17	4	12	934	18	1	1	10	3	4	-	-	-	5	4	1	-	-
Klamath-21	-	9	3385	2	73	9	-	9	-	-	-	-	6	1	-	-	-
Lake-14	-	-	1631	-	-	-	-	-	-	-	-	-	1	4	-	-	-
Lane-140	14	884	2071	253	19	7	41	34	12	1	-	-	44	33	7	2	-
Lincoln-56	2	271	613	93	-	-	3	16	9	4	-	-	47	23	-	-	31
Linn-54	10	118	2200	191	-	27	25	8	66	1	-	-	5	2	-	-	-
Malheur-79	6	117	11264	18	-	-	1	2	-	-	-	1	11	5	-	-	-
Marion-68	3	91	1400	159	-	40	2	6	35	4	-	-	2	-	-	-	-
Morrow-4	-	-	151	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Multnomah-36	31	92	1782	26	-	29	2	5	1	-	-	-	7	1	-	2	-
Polk-13	-	31	52	8	-	1	-	2	-	-	-	-	4	-	-	-	-
Sherman-1	-	-	-	1	-	-	1	-	-	-	-	-	1	-	-	-	-
Tillamook-50	26	311	1392	67	-	1	24	26	-	-	-	-	9	2	-	-	-
Umatilla-46	-	107	3218	28	8	9	-	19	-	-	-	2	1	1	-	-	-
Union-38	-	112	1703	4	48	-	-	25	-	-	-	-	6	-	-	-	-
Wallowa-30	-	55	2108	48	42	1	-	311	-	-	-	-	11	5	-	-	-
Wasco-12	1	41	139	16	-	-	-	-	-	-	-	-	-	8	-	-	-
Washington-16	-	27	410	54	-	7	16	8	5	6	-	-	15	12	-	-	-
Wheeler-2	-	4	4	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Yamhill-20	1	34	139	187	-	20	1	-	17	6	-	-	1	2	-	-	-
Total	182	4319	52289	1905	373	259	230	598	197	22	22	11	456	286	25	6	31

1319 Reports.

PREDATOR CONTROL

The major portion of predator control in Oregon is carried on by the Predator Control Division of the U. S. Fish and Wildlife Service, using funds supplied by the various counties, State Game Commission, State Department of Agriculture, and Federal Government. A total of \$125,764 comprises this matching fund for the fiscal year ending June 30, 1951. The contributions are as follows:

Counties	\$ 84,461.50
State Game Commission	12,000.00
State Department of Agriculture	21,212.50
Federal Government	<u>8,090.00</u>
Total	\$125,764.00

Not included in the above total are the costs of federal administration and a \$5,000.00 special Game Commission fund. This special fund has been set up to continue the employment of federal trappers in counties where matching funds have been exhausted and where it is advisable to continue control work. Trappers are transferred to the Game Commission payroll but continue to be administered by the Fish and Wildlife Service.

Excellent cooperation has been experienced in predator control work under the above arrangement. Whenever severe game predation occurs, federal trappers have been assigned to remove the offenders. Poisoning and trapping programs have been carried on on antelope kidding grounds, deer winter ranges, and pheasant rearing projects with excellent success.

Mainly through the use of 1080 poison, although traps, getters and strychnine are also used extensively, the coyote population in eastern Oregon has been reduced to a probable all-time low. There are indications, however, that they are again on the increase in a few counties. Bobcats, which are not affected by 1080 in the dosages used, are continuing to increase throughout the state. Greater efforts are now being made to trap these animals.

Forty federal trappers, between April 30, 1950 and May 1, 1951, destroyed:

Coyote	3,213	Skunk	277
Bobcat	863	Raccoon	615
Bear	140	Badger	234
Fox	350	Porcupine	921
Cougar	10	Weasel	4
Housecat	56	Mink	2

Incomplete reports show game division personnel also killed some predators incidental to other activities:

Coyote	40	Magpie	948
Bobcat	52	Crow	502
Fox	2	Raven	114
Housecat	102	Hawk	58
Skunk	7	Owl	26
Gray diggers	33	Porcupine	25
Raccoon	2		

Between June 1, 1950 and May 15, 1951, the Game Commission paid \$9,512.50 in bounties on 143 cougars at \$50.00 and 1,357 bobcats at \$2.50. No wolves have been bountied since 1945. The following table shows distribution of animals bountied by county.

TABLE 1
BOUNTIES PAID

County	Bobcat			Cougar		
	1948-49	1949-50	1950-51	1948-49	1949-50	1950-51
Baker	60	84	79	3	2	-
Clackamas	57	35	17	12	8	9
Clatsop	102	65	111	-	2	1
Columbia	94	38	47	1	-	-
Coos	90	83	74	4	3	9
Crook	75	1	-	-	-	-
Curry	39	47	40	14	7	5
Deschutes	31	114	50	-	-	-
Douglas	204	178	124	44	47	37
Gilliam	-	-	1	-	-	-
Grant	-	-	-	-	-	2
Jackson	246	287	271	16	15	12
Jefferson	-	-	-	6	1	2
Josephine	113	75	106	12	12	5
Klamath	-	-	-	-	-	1
Lane	112	158	95	31	41	38
Lincoln	78	91	78	4	4	5
Linn	16	54	44	13	9	3
Malheur	-	-	-	2	-	-
Marion	26	3	11	13	10	3
Morrow	1	-	-	-	-	-
Multnomah	10	5	5	11	1	7
Polk	28	14	18	9	1	1
Tillamook	84	24	-	-	-	1
Union	-	-	-	1	4	1
Wallowa	76	101	75	5	9	-
Wasco	21	27	65	-	1	1
Wheeler	16	58	46	-	-	-
Yamhill	-	2	-	-	-	-
Total	1,579	1,544	1,357	201	177	143

DIRECTORY OF PERSONNEL
GAME DIVISION

Activity	Personnel	Headquarters	Address	Phone
Chief of Operations	McKean, J.W.	Portland	Office	WE 5866
Big Game	Mace, R.U.	Portland	Office	CH 9894
Upland Game & Mig. Birds	Morse, W.B.	Portland	Office	CH 3202
Federal Aid	Meyers, A.V.	Portland	Office	BR 4217
Fur Mgt. & Pred. Control	Kebbe, C.E.	Portland	Office	WE 5642
Habitat Improvement	Stanton, F.W.	Portland	Office	CA 4621
NORTHWEST REGION:				
Regional Supervisor	Zumwalt, L.C.	Albany	1224 E. 8th	2235
District Game Agent	Batterson, W.M.	Nehalem	Rt. 1, Box 29	2215
District Game Agent	Cummings, M.S.	Portland	3011 S.W. Texas	CH 8270
District Game Agent	Ives, F.F.	Corvallis	720 N. 32nd	2568-W
Asst. Game Agent	Shepard, C.	Corvallis	Rt. 2, Blueberry Dr.	2031-W
Trapper	Holderman, W.E.	Philomath	Rt. 2, Box 92 A	
Trapper	Taylor, Guy	Portland	4553 N.E. 88th	TR 8864
Game Farm Supt.	Dickinson, R.C.	Eugene	Rt. 2, Box 240	56085
Game Farm Supt.	Kirkpatrick, D.	Corvallis	c/o State Game Farm	2277-M
Refuge Mgr. Sauvie Is.	Young, W.A.	Portland	Rt. 4, Box 85 Burlington	488
Refuge Biol. Sauvie Is.	Hoffmeister, A.H.	Portland	9839 N. Syracuse	
Refuge Biol. Government Is.	Masterson, N.	Vancouver	Rt. 1, Box 1624	
Game Research	Schneider, L.F.	Corvallis	2212 Harrison	1777-M
SOUTHWEST REGION:				
Regional Supervisor	Vaughn, J.W.	Roseburg	Box 977	3-5373
District Game Agent	Luman, I.D.	Grants Pass	Box 677, 1937 Leonard Rd	2844
District Game Agent	Yeager, Bruce	Coquille	Box 734, 961 N. Heath	
Trapper	Stokes, H.C.	Grants Pass	1769 E. Fruitdale Rd.	
CENTRAL REGION:				
Regional Supervisor	Mathisen, L.M.	Bend	222 E. Third St.	1163
District Game Agent	Ebert, Paul	The Dalles	Rt. 4	6304
District Game Agent	Bonn, Paul	Bend	649 E. Quimby	1372-J
District Game Agent	Cochrun, K.	Klamath Falls	5112 Bryant St.	
Asst. Game Agent	Madden, E.	Moro	General Delivery	
Trapper	Mallery, V.	Redmond	Box 202	2-R-4
Trapper	Taylor, M.	Dufur		
SOUTHEAST REGION:				
Regional Supervisor	Lightfoot, W.C.	Hines	Box 8	2582
District Game Agent	Mason, Ellis	Burns	Box 341	Hines 2251
District Game Agent	Langdon, C.R.	Ontario	Rt. 2, Box 72C	016-J-1
District Game Agent	Claggett, A.B.	Lakeview	Box 111	904
Warner Valley Mgr.	Minnick, N.	Plush	Box 35	
Refuge Mgr. Summer Lake	Leyva, Hugo	Summer Lake		6-T-2
Refuge Biol. Summer Lake	Foree, Wm.	Summer Lake		6-T-2
Game Farm Supt.	Sevey, Harold	Ontario	Rt. 1, Box 225	023-J-1
Trapper	Langdon, M.O.	Burns	Box 442	2552
Trapper	Long, Clyde	Nyssa	Box 933	68-R
NORTHEAST REGION:				
Regional Supervisor	Brown, W.H.	La Grande	Box 226	6903
District Game Agent	Masson, W.V.	Pendleton	319 N.W. 5th	1566
District Game Agent	Laughlin, E.T.	Enterprise	Box 413	166-W
District Game Agent	Morton, E.K.	Baker	3150 Tenth	1539
District Game Agent	Smith, C.E.	Mt. Vernon	General Delivery	
Special Investigator (PR)	Lemons, C.	John Day		203-M
Asst. Game Agent	Briggs, F.E.	La Grande	705 M. Ave.	6903
Asst. Game Agent	Ely, J.F.	La Grande	2608 N. Birch	6903
Asst. Game Agent	Corthell, R.A.	Heppner	Box 284	
Trapper	Bennett, A.	La Grande	Box 496, 1106 H St.	319-J
Game Farm Supt.	Alexander, J.K.	Hermiston	c/o State Game Farm	6566