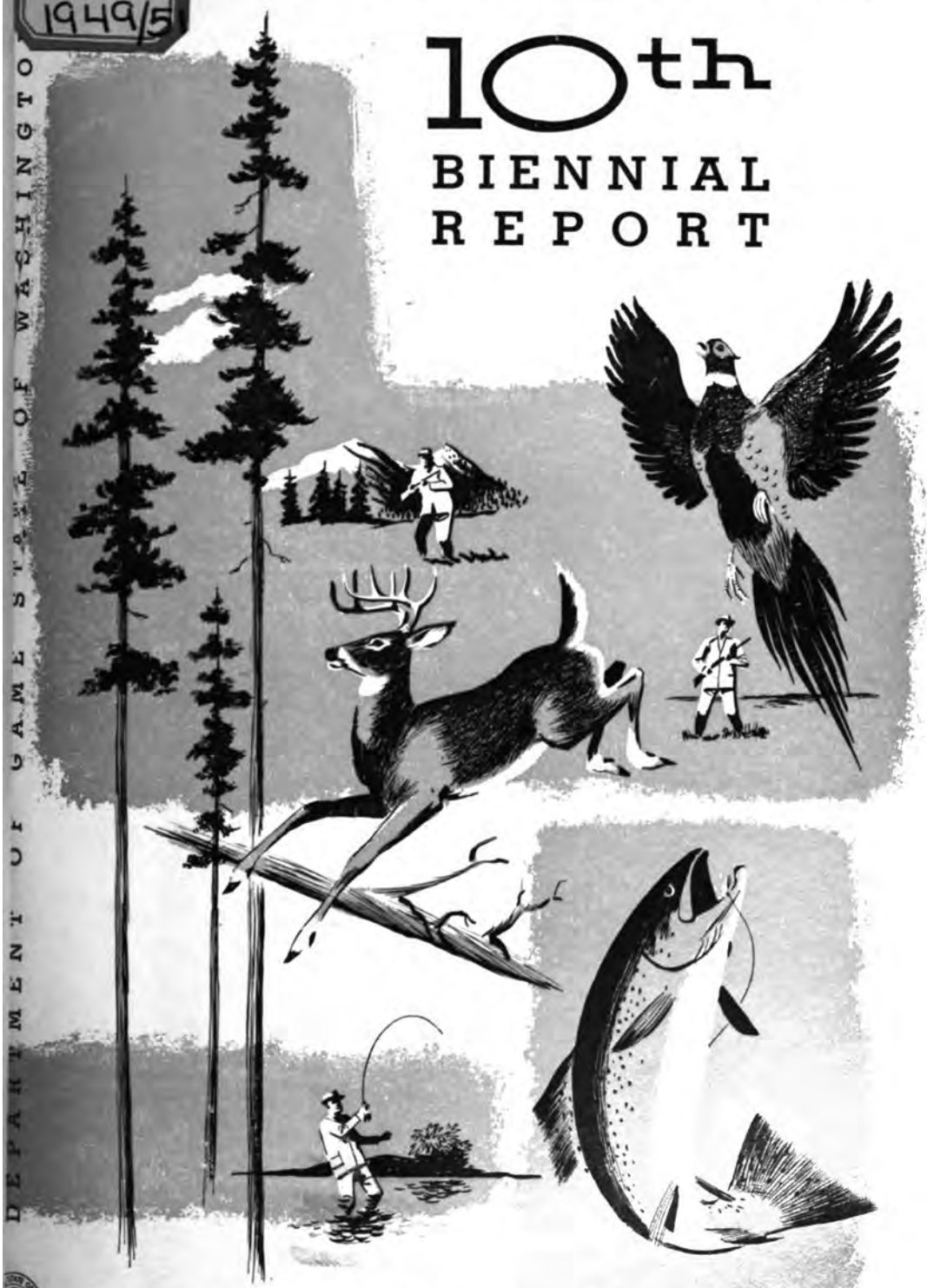
GTON STATE GAME COMMISSION'S

10th BIENNIAL REPORT

DEPARTMENT OF GAME STATE OF WASHINGTO



FROM APRIL 1, 1949 to MARCH 31, 1951

LETTER OF TRANSMITTAL

To His Excellency
Arthur B. Langlie
Governor of the State of Washington
Olympia, Washington

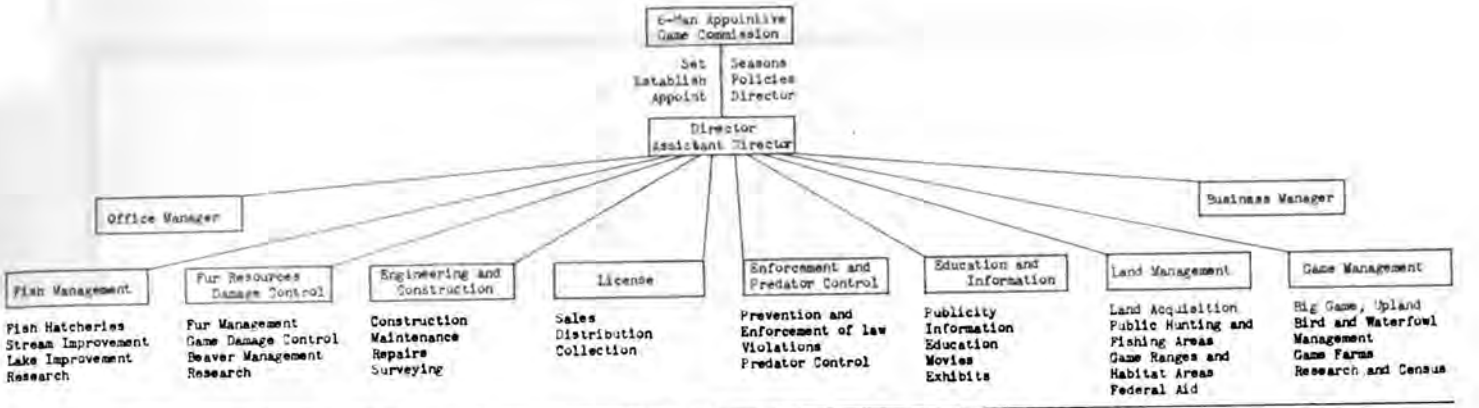
Dear Sir:

Herewith is submitted, in accordance with the law, the tenth report of the Washington State Game Commission for the biennial period beginning April 1, 1949, and ending March 31, 1951, inclusive.

Respectfully submitted,

WASHINGTON STATE GAME COMMISSION

Virgil B. Bennington, Chairman
Stephen J. Morrissey
J. A. Loudon
Walter Failor
Dr. W. R. Bernard
Claude C. Snider



THE WORK OF EACH DIVISION IS COORDINATED IN THE FIELD THROUGH 11 ADMINISTRATIVE DISTRICTS

DISTRICT 1 Spokane	DISTRICT 2 Colfax	DISTRICT 3 Walla Walla	DISTRICT 4 Yakima	DISTRICT 5 Wenatchee	DISTRICT 6 Stanwood	DISTRICT 7 Seattle	DISTRICT 8 Tacoma	DISTRICT 9 Longview	DISTRICT 10 Aberdeen	DISTRICT 11 Columbia Basin Moses Lake
COUNTIES: Ferry, Pend Oreille, Spokane, Stevens	COUNTIES: Lincoln, Adams, Whitman, E. Franklin	COUNTIES: Walla Walla, Columbia, Garfield, Asotin	COUNTIES: Yakima, Klickitat, W. Benton, Kittitas	COUNTIES: Okanogan, N. Douglas, Chelan	COUNTIES: Whatcom, Skagit, Island, San Juan	COUNTIES: Snohomish, Kitsap, King	COUNTIES: Pierce, Thurston, Lewis	COUNTIES: Pacific, Wahkiakum, Cowlitz, Clark, Skamania	COUNTIES: Clallam, Jefferson, Grays Harbor, Mason	COUNTIES: Grant, E. Douglas, SW Adams, W. Franklin, E. Benton
HATCHERIES: Colville, Ford, Pend Oreille, San Poil, Spokane		HATCHERIES: Walla Walla, Tucannon	HATCHERIES: Goldendale, Naches, Yakima	HATCHERIES: Chelan, Chiwaukum, Omak	HATCHERIES: Bellingham, Lake Whatcom	HATCHERIES: Arlington, Seward Park, Tokul Creek	HATCHERIES: Mossyrock, So. Tacoma, Puyallup	HATCHERIES: Vancouver	HATCHERIES: Aberdeen, Shelton	
GAME FARMS: Colville, Spokane	GAME FARMS: Kennewick	GAME FARMS: Walla Walla	GAME FARMS: Ellensburg, Yakima		GAME FARMS: Whidbey Isl.	GAME FARMS: Auburn	GAME FARMS: Lewis County, So. Tacoma			
GAME RANGES: Sherman Creek		GAME RANGES: Wm. T. Wooten	GAME RANGES: Oak Creek, Squaw Creek, Klickitat, Sunnyside	GAME RANGES: Methow, Sinlahekin	GAME RANGES: Skagit, Lake Terrell				GAME RANGES: Olympic	

THE DEPARTMENT OF GAME

The Washington Game Department was formed in 1932 by an initiative vote of the people of the state. Prior to that time, each county had maintained its own separate system.

The State Game Department is entirely self-supporting, receiving its principal revenues from the sale of hunting and fishing licenses, fines, fur sales, tagging fees and other miscellaneous types of revenue. Revenues of the Department in its first year of operation were $356,827.15. In the year of 1950, the figure was close to three million dollars. In 1933, 127,240 people hunted and fished in the state. Approximately 500,000 enjoyed this foremost type of recreation in 1950.

The Department owns and operates 24 trout hatcheries, engaged in raising trout to stock the lakes and streams of the state. In 1950 these hatcheries produced 44½ million fish. Ten game farms are operated for the purpose of raising Chinese pheasants. In 1950 they produced more than 110,000 pheasants for planting throughout the state. In addition, a number of trout eyeing stations are maintained and more than 90,000 acres of land are owned or controlled and managed for the propagation of wildlife.

These facilities represent a capital investment in the fish and wildlife populations of the state of many millions of dollars. The importance of hunting and fishing as an industry to the state has been conclusively shown by a survey conducted by the Bureau of Business Research of the University of Washington. The survey indicates that in 1946, the sports of hunting and fishing represented an annual income to the people of the state of more than $78 million.

Twenty per cent of the fees received from the sale of resident hunting and fishing licenses are set aside for the purchase of public hunting and fishing areas and game habitat areas. Eventually these lands will constitute a priceless heritage for future generations and will assure the perpetuation of the sports of hunting and fishing for the future citizens of the state.

The State Game Department maintains a working force of approximately 350 full-time employees, actively engaged in game and fish work in all sections of the state. Many of them have been employed in game work for more than 25 years. Some 70 employees are college graduates in game and fishery management courses. Many of these men are engaged in scientific research on game and fish problems.

The Department's operations are now coordinated in central headquarters in Seattle and are divided into eight operating divisions—Fishery Management, Fur and Damage Control, License, Engineering and Construction, Enforcement and Predator Control, Education and Information, Land Management, and Game Management. Its field affairs are conducted through a system of 11 district supervisors located in strategic game areas in the state.

The affairs of the Department are administered by the State Game Commission who also establish hunting and fishing seasons and bag limits and make regulations having the force of law relating to these functions.

The Game Commission is composed of six members, three of whom are residents of Eastern Washington and three of Western Washington. They are appointed by the governor for terms of six years on a staggered basis so that every two years, two commissioners are either reappointed or two new appointments made.

GAME MANAGEMENT

Game is a renewable resource, and as such is a product of the land. It is a proven fact that with careful study and well-founded management plans, huntable populations can be increased so as to supply as large as or a larger animal harvest than in the past. History and research show that land management for game plays an important role in attaining this goal. Our land use has a direct bearing upon wildlife. Since game and land management are inseparable, the following discussion will be considered as one unit.

The hunting seasons are the annual harvest period for the wildlife that is produced throughout the state. They are the culmination of all the efforts to manage and administer the game resources. The success of the game program is measured quite largely by the magnitude of the annual harvest. The largest possible harvest that still does not jeopardize the supply for the future is the goal of all game managers.

COMPARATIVE CHART OF LICENSE SALES

Year	*Number of Licenses Sold*	*Number of Big Game Seals Sold*	*Amounts Received*
1933	129,622	None	$312,544.50
1934	158,313	None	381,126.00
1935	164,477	47,253	417,304.28
1936	187,881	57,818	483,166.03
1937	207,875	70,407	553,133.50
1938	212,770	71,061	558,991.50
1939	219,278	80,270	589,895.00
1940	231,060	88,021	626,577.00
1941	257,253	108,127	727,025.00
1942	261,640	104,430	727,318.50
1943	310,347	136,656	913,157.50
1944	310,516	125,001	906,090.00
1945	353,263	142,149	1,054,108.00
1946	445,166	179,536	1,363,162.00
1947	463,047	191,787	1,417,223.00
1948	438,733	205,785	2,017,438.00
1949	486,138	238,445	2,250,371.00
1950	471,039	237,388	2,238,252.50

HUNTER'S ANALYSIS*

	1949	*1950*
Hunted	277,754	247,280
Hunted Birds	149,047	122,760
Hunted Waterfowl	87,462	87,340
Hunted Game Animals	209,502	198,880
Hunted Deer	203,400	189,310
Hunted Elk	49,607	55,770

* Based on questionnaires sent to one per cent of license holders.

PHEASANT, DEER, AND ELK KILL FOR 1949-1950 SEASON

County	Total Pheasant Kill 1949	1950	Total Deer Kill 1949	1950	Total Elk Kill 1949	1950
Adams	6,920	4,155				
Asotin	1,740	1,719	353	265	612	452
Benton	18,817	16,308				
Chelan	7,810	4,911	8,284	14,240	182	80
Clallam	1,861	1,341	775	1,409	164	260
Clark	5,301	5,109	329	227		
Columbia	5,706	3,504	262	232	416	565
Cowlitz	3,278	2,418	1,039	1,820	71	221
Douglas	4,249	2,670	477	478		
Ferry	364	567	739	896		
Franklin	2,468	2,073				
Garfield	9,145	5,547	184	143	548	544
Grant	8,456	5,814	95	86		
Grays Harbor	4,087	2,793	2,301	3,350	528	1,299
Island	6,313	4,179	643	723		
Jefferson	1,254	717	762	686	228	420
King	9,591	7,038	878	2,162	5	41
Kitsap	2,509	1,971	171	537		
Kittitas	25,251	17,109	1,281	1,013	2,064	1,645
Klickitat	1,214	441	1,646	473	14	
Lewis	8,093	6,732	2,833	3,755	12	164
Lincoln	19,019	8,115	186	200		
Mason	1,012	690	711	1,375	84	311
Okanogan	13,678	6,561	17,773	2,903		
Pacific	1,174	1,224	1,471	3,786	567	1,107
Pend Oreille	728	465	944	2,035	2	10
Pierce	8,336	6,924	3,500	4,009	5	
San Juan	5,180	2,856	211	454		
Skagit	8,417	5,961	636	1,240		
Skamania	162	72	296	184	17	48
Snohomish	8,336	6,078	505	994		
Spokane	29,460	16,932	985	1,928		
Stevens	6,758	6,477	2,476	5,703	2	
Thurston	5,099	2,673	2,003	2,649		
Wahkiakum	1,335	1,236	353	1,056	89	143
Walla Walla	17,239	16,737	63	86	77	29
Whatcom	9,712	4,839	482	1,183		
Whitman	52,769	26,316			2	
Yakima	81,824	72,276	585	278	2,318	3,401
Unknown			5,607		872	
TOTALS	404,665	283,548	61,839	62,558	8,879	10,740

OTHER GAME KILLS

	1949	1950
Hungarian Partridge	82,829	42,680
Chukar Partridge	44,861	7,480
Pigeons	94,468	90,640
Quail	320,581	136,400
Grouse	61,133	55,110
Ducks	634,947	805,090
Geese	34,691	30,140
Bear	5,198	6,270
Rabbits	.....	89,540

The above figures are computed from a questionnaire sent out to one per cent of the license holders at the close of the hunting seasons.

The questionnaire results are considered the most accurate method of determining statewide kills as it has been possible to secure a ninety per cent return from a random sample of hunters by this method. The punchcards are used to get county and sex breakdowns of deer, elk and pheasants harvested.

Deer

Big game animals hunted in the State of Washington include deer, elk, bear, and mountain goat. The deer are divided into three main groups, namely mule deer, found in most of the mountainous areas of eastern Washington; black-tailed deer, found throughout western Washington and the Columbia River Gorge; and white-tailed deer, found in the northeastern section of the state.

Deer are by far the most important game species and may be considered the "bread and butter" of big game hunting. The principal problems with regard to deer are those of range, habitat, and damage to agricultural crops.

Deer are animals of the sub-climax type. In other words, they thrive best on a range that is gradually changing or progressing towards the climax or stabilized type. In western Washington deer herds thrive in logged off or burned over areas that are starting to grow back to the climax forest type. As the forest develops, the deer herds are gradually crowded or starved out to the point where they are found only along the edge of heavily forested areas. The heavy logging during the past thirty to forty years produced a lot of excellent deer range in western Washington, but the reforestation of most of this land is rapidly diminishing the amount of land available for game production. Most areas support sizable deer herds for only about twenty years after the area is logged or burned.

The recently inaugurated program of tree farming and sustained yield will eventually more or less stabilize the game producing habitat from year to year with about twenty per cent of the western part of the state producing good game herds at all times.

Mule deer herds in the eastern part of the state differ considerably from the black-tailed herds of western Washington in that these animals are largely migratory, summering in the high Cascade Mountains and moving as much as thirty to forty miles each fall to winter range on the lower fringe of the moun-

tains adjacent to the farming areas. These winter ranges are the key to the deer herd. Summer ranges are extremely broad and carry a bountiful supply of feed, but the winter ranges are quite limited and subject to over-use by both game and domestic animals. Control of the number of deer on these winter ranges is imperative in order to maintain a supply of forage for deer in the future.

During the past fifteen years much of the deer food in Chelan and Okanogan counties has been destroyed by over-use, largely by the animals themselves, resulting in excessive deer kills whenever winters were severe. These losses have probably accounted for many more deer than were taken by hunters during legal open seasons.

White-tailed deer in the northeastern section of the state are somewhat similar to the mule deer in that their numbers are also limited by the winter carrying capacity, and the herds have been subject to severe winter die-off due to food shortages.

Deer Management Problems

The biggest problem with regard to big game animals is to guarantee a supply of forage for future years. This necessitates a control of herds at a point at which they will not over-browse and over-graze the forage plants and so kill out their food supply for the future.

Over the past 50 years the livestock industry has destroyed much of the forage-producing capacity of most of the western ranges. This has been caused by over-stocking of livestock. The same thing has been happening to big game ranges.

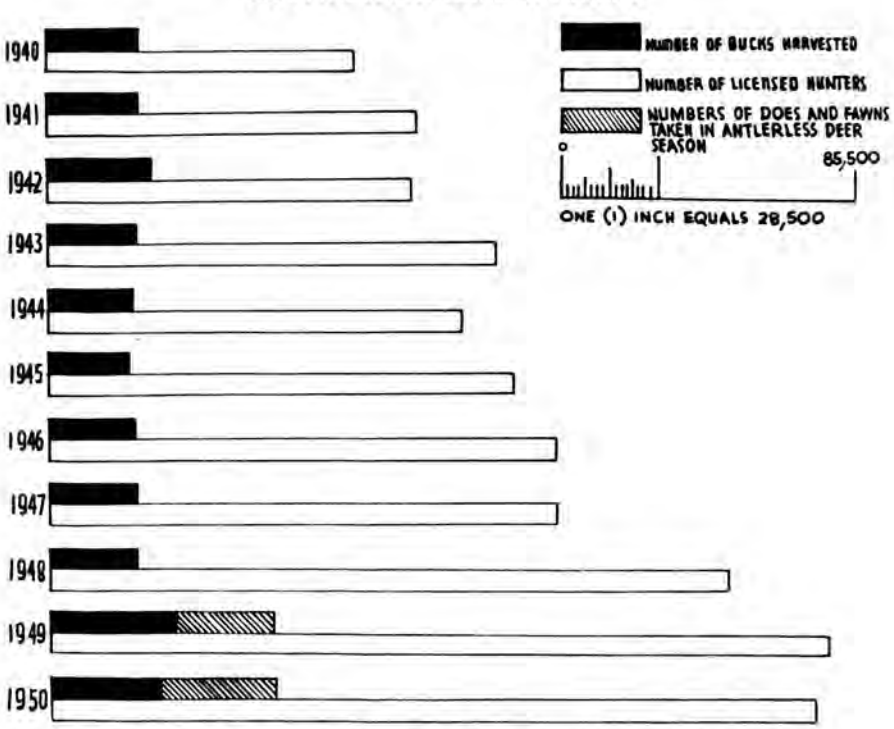
Many deer winter ranges in portions of north central Washington now produce less than half the deer food that they did fifteen years ago. This means that these ranges can now support only half the deer that they formerly had.

Hunting Seasons

During the biennium the hunters of the state harvested far more deer than were taken in any previous 2-year period. The seasons legalized the taking of deer of either sex in line with research findings in Washington and other states. There was a general trend all over the country to allow either sex seasons to adequately harvest the annual increase of the game crop, and also to protect the range forage supplies for future generations.

A 62,000 deer kill each year was better than double the hunting kill of previous buck seasons. These seasons accomplished some reductions in the over-populated ranges in north central Washington but not in the over-all deer population of the state.

With more food left for the remaining deer, the fawn survival increased and the winter kill decreased to the extent that most of the hunter harvest was replaced by annual reproduction.



The biologist contention that the hunters' harvest does not "kill off" the game herd is borne out in this graph. Figures show the buck kill has remained almost constant since 1940, even after the doe season of 1949.

Research

The most important special study on deer during this biennium was started in July, 1949, on the Clemons Tree Farm in Grays Harbor County in cooperation with the Weyerhaeuser Timber Company which owns the land. The Game Department started an intensive study of black-tailed deer and their relationship to logging and timber management in western Washington. The study includes field research on the wild deer occupying the Tree Farm and an annual check of all the hunters using a 56-square mile area. It also consists of feeding experiments on penned deer wherein native black-tail are fed various combinations of wild browse plants and weighed at intervals to determine the gain and loss of weight on the various foods.

A total of 514 deer were harvested from the study area during the 1950 regular buck and 3-day either sex seasons. Yet, subsequent research has shown that annual reproduction was almost as great as the heavy kill with a result that it caused only slight decrease in the next year's population.

Study figures indicate that the either sex season took between twenty-five per cent and thirty per cent of the population while one year's fawn crop was capable of increasing the herds about this much.

Other deer research includes a study of the principal deer winter range of eastern Washington carried on by a crew of three specially trained range technicians. This crew worked during the biennium on a survey of the game forage available on the Department-owned wildlife ranges and on other important game winter ranges.

Probably one of the most important studies now being conducted is a range plant investigation on the Sinlahekin Game Range in Okanogan County. In this project the Department is attempting to find some new or exotic forage plant that can be easily propagated and planted on arid ranges where the native food plants have been depleted or killed out. Most of the present browse plants used by deer and elk are from fifteen to thirty years old and replanting of these species to build back the range would require at least ten years of protection before they would be large enough to withstand heavy use by game. To get away from these tremendously slow-growing species, the Department is attempting to develop, or breed, a new or "super" game forage plant. In the realm of domestic agriculture great strides have been made in this type of development. Farmers no longer plant wild corn, wild wheat, wild oats, or wild apples, and if they had to do so, the nation's food supply would be tremendously reduced. However, all of the present range research in the United States is still dealing with the wild forage plants. This is a tremendous project and undoubtedly will require far more resources than any one state can muster.

The results of the study have shown what plants cannot be transplanted to thrive and grow in these conditions. Bitterbrush, the native slow-growing wild browse plant, is still the best that has been found; consequently, it is being used in all the Department's range revegetation work at the present time.

Elk

During the biennium, the Game Commission continued its policy of maintaining elk herds in presently occupied ranges and more or less stabilizing the herds to protect the forage resources. These stabilization seasons called for regular controlled annual harvest of some female elk from all of the principal herds.

Elk feeding was carried on in the winter when needed, and special herding techniques were again required in the Yakima area where the helicopter was used to keep elk out of farms and orchards.

Special studies on elk include regular winter counts of the Yakima and Blue Mountain herds to determine annual harvestable surpluses, and range studies to determine the effect on forage production. During the winters of 1949 and 1950, 213 elk were trapped on the Oak Creek refuge and tagged to study their migration habits.

Bear

Approximately 5,000 bear are killed annually by hunters in the state of Washington. Generous seasons open the year-round were granted in much of western Washington where many bear became a menace to agricultural crops and farm animals.

Mountain Goat

Washington's goat population is estimated at between 5,000 and 6,000 by both the U. S. Forest Service and the Department, and their number has been the same for the past ten years.

Mountain goat requirements are very specific. They must have wind swept ridges for winter feeding areas and water close to precipitous cliffs in the summer time. The number of such areas in the state and the number of goats that these areas will support are definitely limited. Reproduction of the herd beyond a certain point is lost because of the lack of favorable habitat.

In order to make use of this resource which would otherwise be wasted, a mountain goat season was set in 1948. At that time, 150 permits were issued and 56 goats taken. The number of permits was increased to 400 in 1949 and 1950 and the number of animals taken to 82 and 99 respectively, but still the goat population remains constant.

Research men are convinced that if no goats were killed for 20 years, their numbers would still not increase.

Land Management and Game

In the past, wildlife was a natural resource subject to the traditional American policy—explore, exploit, and exhaust. As game moved through these stages, the basic concepts of Game Management changed continuously.

Administrators became aware that if they were to properly manage and produce a game crop, they must avail themselves of additional tools and gear their program to the changed and ever changing economy and ecology of the country. Now game is a crop to be produced annually.

The game crop differs significantly in one respect from most other crops of the land. By tradition and by law this crop is not the property of the individual upon whose land it grows but is owned jointly by all of the people of the state. It can only follow then that each person privately controlling a portion of the land area of the state has a basic community responsibility toward the continuance of the production of this crop in connection with the management of the lands he controls. It must also follow that the state game administrative body has the designated responsibility of performing or assisting in the performance of those necessary land management practices that are partly or wholly beyond the scope of the basic responsibility of the individual.

It is basic to assume that the continued production of an annual crop from the land can only be assured when land is managed for the production of that crop. The state and the individual both must assume their responsibility to achieve this end.

The state must not only carry on certain specific management programs on land secured solely for game use, but must assist and stimulate the individual toward land use practices which will benefit both the land owner and game.

Needs for and Methods of Acquisition

The need for an individual acquisition or contiguous project area is dependent upon local conditions and the needs of the species to be served. For big game it is generally agreed that land acquisition is needed to insure the future of the herd by controlling winter concentration areas which support

a herd having adequate summer range and by removing isolated or finger-like private holdings from primary game ranges in order to relieve game damage and competitive use by stock. It is also important in the removal of migration blocks to seasonal herd movements and in the control of land for public use to permit entry into major hunting areas.

Control of land areas should generally be gained by outright purchase or, in some instances, by long term lease or specific management agreements.

For waterfowl, acquisition is needed to retain or provide feeding, rearing or resting areas and to provide a harvesting area for the use of non-club shooters.

The management of land for upland birds is necessary in order to establish or retain properly balanced areas of habitat evenly dispersed through the game range, to provide feeding sites for emergency periods and release sites for propagated birds and to assure the right of public harvest of the crop being produced.

ACQUISITION PROJECTS
(To April 1, 1951)

Name	*Acres Controlled and Owned*	*County*	*Type of Project*
Skagit Flats	1,820.48	Skagit	* Waterfowl
Lake Terrell	862.57	Whatcom	* Waterfowl (Also Upland Game Birds)
Sunnyside	1,493.70	Yakima	* Waterfowl (Also Upland Game Birds)
Tjossen Mill Pond.	30.10	Kittitas	Waterfowl
Oak Creek	39,491.46	Yakima	* Big Game Range (Elk prin., also deer)
W. T. Wooten	11,234.83	Col.-Gar.	* Big Game Range (Elk prin., also deer)
Sinlahekin	11,396.55	Okanogan	* Big Game Range (Deer, also game birds)
Methow	9,846.46	Okanogan	* Big Game Range (Deer)
Squaw Creek	10,099.72	Kittitas	Big Game Range (Antelope)
Sherman Creek ...	6,339.19	Ferry	* Big Game Range (Deer)
Klickitat	2,833.26	Klickitat	* Big Game Range (Deer)
Olympic†	70.00	Grays Harbor	* Big Game Range (Deer and Elk)

* Denotes public shooting area.

† The Olympic game range totals 281,042.06 acres of which 154,284.06 acres are owned by large timber companies and will not be acquired; 28,974.99 acres as small private holdings will be the principal acquisition. The remaining land is in County or State ownership and will be handled by tracts with the agencies as they fit into a game and timber pattern.

Damage Control

Deer and elk damage to agricultural and horticultural crops in the state of Washington has increased to the point where corrective measures must be put into operation. Since land which normally had been the range of big game has been taken over by farms, game has naturally turned to the planted crop for food, bringing about the problem of damage control.

Several types of curative measures are now used. The first is the seven foot and eight foot woven wire fencing, the only one which is one hundred per cent effective. This fencing is expensive, costing approximately $1,200 per mile for material. At present, there are 145 miles of the fence in operation. Approximately 41 miles were constructed during the past biennium.

Second, herding, on foot, horseback and through the use of pyrotechnics and the helicopter, has been put into operation. This method is only temporary and can be used when severe winter weather forces large herds of deer and elk into the lowlands.

The third, and most economical measure yet perfected is a repellent which will give ninety per cent protection to all types of strawberry crops, cane-type berries, truck gardens, young fruit trees and nursery crops. One application of this spray after leaf growth has been developed will in most cases be effective for three months. This repellent is non-poisonous and non-corrosive. It will not leave any offensive taste to a human being but retains its repellent effect for big game animals.

Finally, the Department pays damage claims on agricultural and horticultural crops. This is not a corrective measure but merely subsidizes landowners for damage suffered. Damage claims filed with the Game Department which can be settled for less than one thousand dollars can be approved for payment by the State Game Commission. Claims for more than that amount must be approved for payment by the State Legislature. Legislation authorizing the Game Commission to pay small claims has simplified and speeded up reimbursement to landowners and has helped to bring them closer together with the Department on damage problems. During the past biennium $41,133.33 were paid on 165 damage claims.

UPLAND BIRDS

Species and Distribution

The most important bird in Washington from the standpoint of statewide distribution and hunter take is the **Ring-necked** or **Chinese Pheasant.** This bird was first introduced into the state in 1883. The initial release was followed with many others and the bird has since established itself in nearly every agricultural region in the state. The heaviest concentrations are found in those areas of eastern Washington affording an adequate supply of food from weed growth and residue from the production and harvesting of agricultural crops. Generally, in such areas there is also an adequate supply of good brush cover to protect the birds from predation and severe winter storms. Those areas lacking in these factors in eastern Washington have a smaller pheasant population as does most of the western side where the cold wet winter and spring rains have limiting effects on the population densities.

Quail

Quail, either California or Valley, the Mountain quail, Bobwhite, and the Scaled quail are as widely distributed as are pheasants. In fact, in many areas these birds build up higher populations further from agricultural lands than the pheasants. Huntable populations are primarily in eastern Washington. As far as can be determined, there were no quail native to the state with the possible exception of the Mountain quail in the southeast corner. Apparently the

Bobwhite quail, liberated in Walla Walla county in 1865 was one of the first introduced game birds. In 1871 Bobwhites were released on Whidby Island and increased so rapidly that within a matter of eight or ten years quail were being trapped and transplanted from Whidby to other areas in the state. At the present time the only heavy Bobwhite populations are in restricted areas along the canyons of the Snake and Columbia Rivers in eastern Washington.

The Valley or California quail furnishs the bulk of the quail shooting. The first known release of this bird was made near Olympia in 1857. This was followed with a release in 1860 in the vicinity of Fort Vancouver, and in the 1870's birds were released over most of the western side. Although most of the hunting for quail is now done in eastern Washington, the major importations and releases in that part of the state did not occur until the period between 1910 and 1920. The Colville, Columbia, Okanogan, and Yakima valleys consistently furnish the best quail shooting.

The Mountain or Plumed quail was introduced into the state about the same period and into similar agricultural areas as the California variety. Following an initial boom, the populations decreased to a low point with the exception of certain areas in the Blue Mountains.

Scaled quail of the arid southwest were first introduced in 1906 with additional introductions made from 1910 to 1920. The bird established itself in the arid waste lands of Yakima and Benton counties in the region between Moxee and Hanford. Since the birds' preferred method of escape is on foot, very few hunters are interested in pursuing them over the dry sage-covered hills in the hope of eventually getting in some shooting.

Partridges

The partridges, Hungarian and Chukar, are in actuality large European or Asiatic quail. The Hungarian partridge is a large gray-tan quail with a reddish tail and often a reddish horseshoe-like mark on the chest. It is commonly found throughout the agricultural lands and grass lands adjacent to agriculture in eastern Washington and throughout the agricultural lands in western Washington. The first importations of these birds into the state in 1897 apparently were unsuccessful as was the release of 250 in Spokane county in 1906 and in the next few years; however, they have since been successfully introduced into nearly every section of the state. Never were these birds as productive as they were in the early 1920's and 1930's. The largest populations now probably are found in localized areas in Grant, Adams, Lincoln, and Asotin counties.

The large slate-gray Chukar partridge is readily recognized by its reddish legs and beak, brown barred flanks, and black lines through the eyes and adjoining the throat. Introductions of this native of India during the 1920's were unsuccessful. From 1928 to 1931, 3,356 were produced and liberated from the game farms of the state, establishing themselves in the rimrock bunch grass areas in the Columbia and Yakima River drainages. During the latter part of this biennium, additional releases were made in the Snake River drainage. They were first hunted in the state in 1949 and furnished some excellent shooting for those hunters who were willing to work the rugged terrain in which they are found. Attempts at liberation in western Washington have been unsuccessful.

Grouse

There are six varieties of grouse in the state of Washington, but only three are found in numbers sufficient to support an open season.

Blue grouse, including both the dusky and sooty varieties, are found in the mountain regions; ruffed grouse are distributed sparsely through many of the lowland and foothill valleys, and the Franklin grouse or "Fools hen" is found in limited numbers in the Cascade Mountains.

Sage grouse, or sage hens, are found in some parts of eastern Washington, and sharp-tailed grouse or Western prairie chickens inhabit some of the foothills of rangeland in north central Washington. A few ptarmigan still inhabit the high Cascade Mountains, above the timber line.

Although all these varieties are native to Washington, there seems scant possibility of ever bringing them back to major importance. Settlement of the state has changed their natural habitat and caused them to be replaced by introduced species better adapted to survival in farming communities.

Management Problems

The primary problems involved in the management of any of the upland bird species is of course that of producing annually a harvestable crop to meet the growing demands of the hunting public. For all species this is complicated by the fact that the bird populations fluctuate sharply from year to year as a result of differences in weather conditions during the winter and the early spring. In the case of grouse, the fluctuations also follow a definite cycle of from nine to eleven years between population highs. It appears probable that the Hungarian partridge populations also are affected by the same cyclic influences. Changes of agricultural practices and crop production, insect control practices, the control of noxious weeds and a general intensification of land use resulting from the rapidly increasing human population in the state all create specific problems to be faced in the management of the upland bird species in order to produce the annual crop for harvest.

The orchard areas of north central Washington were in the past consistently good bird producers in that the weed growth in and around the orchards produced a source of food and the orchards themselves produced cover which was supplemented by native growth in the seepage areas around the orchards. The use of DDT and certain other insecticides has reduced these areas to a minor place in the upland bird producing regions of the state.

The removal of brush type cover resulting from weed control activities is becoming a serious threat to the possible maintenance of pheasant populations in certain of the wheat producing sections of eastern Washington.

Research and Investigations

District game biologists must keep the bird populations in their areas under constant study so that the Game Commission will at all times have on hand a factual picture of the field conditions and thus be able to keep the management program in accord with ever-changing conditions.

The biologists' studies are of two general types: those aimed at gaining information regarding population fluctuations and detailed studies of specific problems. Each year a census is made of the upland birds on permanent sample areas throughout the state to determine the adult bird population at the start of the breeding season. At this time a check is also made of their

sex ratio which in turn reveals the effect of the past shooting season on the wild broodstock.

With the start of the hatching season, the size and ages of the game bird broods seen are recorded in order to determine the relative success of their reproductive effort. The figures gained from these routine population studies can be compared with similar figures for previous years. Such a comparison clearly reveals whether the population trend is up or down.

As a sidelight, these studies have emphasized the almost uncanny ability of cock pheasants to survive a hunting season. Pheasant population counts made during the winter and spring months indicate that in some of the state's more important pheasant areas, a surplus of male birds is being carried through the winter. A spring breeding sex ratio of one cock to six or seven hens would be adequate; still, in many areas the ratio is one cock to two hens or one to three. If the range is up to carrying capacity, these surplus cocks coming through the winter displace hens which could add to the production of the fall harvest.

Several detailed studies aimed at finding answers to specific problems were made on upland birds during the biennium. A thorough investigation of the habitat requirements of the Chukar partridge was carried on with the result that the Department again began propagating chukars on the Ellensburg Game Farm for planting in suitable areas in eastern Washington. Study further highlighted the fact that the chukar has a very high rate of increase in the wild under favorable conditions and withstands all except the most severe winters. Figures gained during the hunting season when compared with the known population total indicate that the hunters' take even under a liberal season has little effect on the over-all population since much of the range, due to its roughness, is not available to the hunter.

Research also indicated that, unlike the pheasant, the chukar is not dependent upon agriculture. Because of this, many of the non-agricultural regions of eastern Washington will now be able to produce good upland bird hunting.

Three detailed studies on pheasants were carried on in cooperation with Washington State College during the biennium. The first of these dealt with the effect of insecticide sprays on upland birds. It has been definitely established that, as a result of the development and use of certain new insecticides, the orchard areas of the state will in the future be of small value as bird producing areas. As a result, the Department has amended its management program to avoid pheasant liberations in these regions.

Another study carried out jointly with the college demonstrated that governmental payments were being made to landowners in eastern Washington for the reduction of the all-important brush-type cover at a greater rate than the Game Department was replacing cover under its pheasant habitat development program. With factual information as a background, a series of meetings was held with the various agencies concerned and the situation corrected.

The third study aimed at finding the answer to previously unexplainable life history and behavior patterns of these birds has not been concluded. One important bit of information gained during the biennium points to the fact that temperature during the breeding season may have as much as or greater influence on the success or failure of the nesting season than precipitation has.

Continuous experimental work was performed on pheasant nutrition and propagation methods with a result that a definitely better quality of birds is being liberated from the state game farms which in turn results in a better survival of the birds after they are released into the wild.

Management Programs

(1) Law Enforcement and Predator Control:

The over-all management program for upland birds is made up of several phases. The success of each phase of the program is somewhat dependent upon the success of all the others, and a high degree of coordination is required to assure maximum production of an annual crop for harvest by the bird hunters. As previously mentioned the results of propagation, habitat development or other management programs would be of little value without the proper law enforcement and control of the take. Hence the year-round activities of the Enforcement Division and the setting of the season are important parts of the upland bird management program. It would indeed be unsound to set a season permitting an over-harvest of the bird crop and as a result have an inadequate broodstock supply at the start of the next year's breeding season.

It would be equally unsound to set forth hunting restrictions that would force an under-harvest of the birds with a result that they would be lost to age, predation and accident.

It should also be pointed out that the control of predators is a part of the upland game bird management program of the Game Department and that a high degree of success has been achieved in reducing magpie populations in eastern Washington thereby undoubtedly saving thousands of nests from destruction. Continuing efforts to keep other predator populations at a minimum have also resulted in making the birds that would have otherwise been taken by predator available to the hunter.

(2) Artificial Propagation:

One of the oldest tools used by game managers in producing a game crop is that of artificial propagation on game farms. The value of any artificial propagation program is controversial and is largely dependent upon the manner in which the birds are used. Past studies in this state have demonstrated that good quality birds liberated into good habitat will survive and furnish hunting as well as add to the wild broodstock. In this respect the game farms are essential as an insurance policy to make sure that we have an adequate supply of birds in the field each spring to produce in the wild as large a harvestable crop as possible.

It is true that it is unsound to attempt to grow enough birds on the game farms to furnish good hunting. However, in the production of hen pheasants required for spring brood stock plants and release into areas that have suffered heavy mortality as a result of severe winter conditions or other catastrophes, the department automatically produces a surplus of pheasant cocks on each of the ten state game farms. If these birds are released into good habitat shortly before opening of the hunting season, they form a worthwhile supplement to the wild produced cock birds taken by the hunter. During this biennium a new method of rearing and releasing birds has been carried on in sections of eastern Washington. The birds are hatched on one of the regular game farms and placed out in the field on an unfenced tract located in the more heavily hunted, better bird districts. Here they are cared for by Department personnel until they are old enough to take care of themselves. Their foster-mother setting hens and the field coops are picked up and returned to the game farm. The birds so raised are never trapped and shipped for release but are left in the area in which they were reared. This eliminates the loss due to shock

which accompanies the normal liberation of game farm reared birds. It is also no problem for these birds to adapt themselves to a new environment in that their transition from game farm to wild birds is one that automatically takes place during the process of their growing up.

As in the past the Department has encouraged 4-H Clubs to carry on pheasant rearing projects; and, although the number of birds raised by 4-H Club members or sportsmen clubs is not necessarily large in relation to the output of the state game farms, the program furnishes the least expensive birds produced by artificial propagation. The program further serves an excellent educational purpose.

GAME BIRDS PLANTED IN STATE OF WASHINGTON

	April 1, 1949 to March 31, 1950	*April 1, 1950 to March 31, 1951*	*Total*
Pheasants planted from game farms.....	111,845	101,076	212,921
Pheasants planted from 4-H Clubs.....	2,231	3,676	5,907
Pheasants planted from other sources.....	3,297	2,758	6,055
Total Chinese pheasants planted.....	117,373	107,510	224,883
Chukar partridge planted.....		1,473	1,473
Grand total game birds planted.....	117,373	108,983	226,356

(3) Habitat Development:

The great percentage of the take of upland birds in this state is made up of wild produced birds. The capacity of the state for producing birds in the wild is entirely dependent upon the amount of usable habitat available. It has further been demonstrated that the success of survival of game farm liberated birds is greatly dependent upon their being released into good habitat. In view of this, it is obvious that one of the most sound and lasting methods of maintaining or increasing the production of upland birds in the state is by retaining existent habitat and developing more. The Game Department's pheasant habitat development program is aimed at accomplishing both of these. By working with other conservation agencies and with farm groups to educate them as to the value of cover to game and its related values—conservation of soil and moisture, much can be gained toward the retention of existent upland bird habitat. To start out with bare ground and make all the necessary plantings of grass and shrubs and develop a source of year-round water would be a very costly procedure, for the money invested would actually create a small amount of additional upland bird habitat. However, throughout many of the pheasant ranges of the state there are potentially excellent patches of pheasant cover in good relation to year-round food supply that are not producing birds either because of lack of nesting cover, water, or brush type cover. By furnishing the missing factor these areas become productive. This development work is being carried on primarily in the wheat growing regions of eastern Washington under cooperative agreement with private land owners. Trained game technicians make a detailed survey of the farm ownership and determine what areas could be developed to benefit game. Wherever possible dual benefit of game and soil conservation is sought. Following this detailed survey, the proposals are discussed with the landowner and an agreement as to specific areas

and their use is reached. The landowner consents to set aside portions of his farm for Game Department use for a period of ten years at no cost. The Department then makes the necessary plantings and other development. Water is furnished in dry areas by the installation of cisterns which collect rain and snow water and store it for use of birds during the summer period. Where brush type cover is the limiting factor, ground is plowed and prepared and shrubs are transplanted.

In other areas, grass may be seeded into the prepared soil to furnish nesting and roosting areas. In nearly all cases a food hopper is placed on the tract for use during extremely severe winter conditions when other food supplies are covered by deep snow.

One of the most important developments in western Washington has been the installation of food hoppers in patches of good native cover for use as release areas upon which to make the plants of game farm reared birds. In line with the development of habitat by the Department personnel, cooperation is extended to landowners desirous of increasing the upland bird populations on their own. Technical assistance and advice is furnished to any landowner requesting it. In addition, free multiflora rose plants are furnished to bona fide farmers who will agree to take care of the plants until they are established. This particular species will at maturity form a cattle-proof permanent fence as well as furnish excellent upland bird cover and a source of emergency food. The landowners of the state are increasingly demonstrating the fact that they constitute an outstanding group of true sportsmen, for in addition to donating land for game production the farmers participating in the cooperative habitat program also agree to leave the major portions of their property open for hunting.

SUMMARY—PHEASANT HABITAT DEVELOPMENT PROGRAM
(Up to April 1, 1951)

Project	*No. Farms Under Agreement*	*No. Habitat Areas Set Up*	*Acres in Habitat Improvement*	*Open to Public Hunting (Acres Farmland Under Agreement)*
Adams	65	251	1,247	76,295
Spokane	124	228	467	47,230
Douglas	21	52	226	34,060
Lincoln	7	33	120	10,410
Walla Walla	2	11	8	4,040
Other*	36	37	51	3,530
TOTALS	255	612	2,119	175,565†

* Clallam, Okanogan, Grays Harbor, Benton, Jefferson, Mason, Whatcom, Grant.

† Does not include 32,480 acre Harder Public Hunting Area or 16,600 acre Richardson Public Hunting Area; both signed up on Farmer-Cooperative Agreements.

(4) Farmer-Sportsman Program

Closely allied to the Farmer-Cooperative program in opening lands to public hunting is the Farmer-Sportsman program carried on by the Department's Education and Information Division. The two plans combined provided 716,040 acres of hunting land for sportsmen in 1950 (491,040 under Farmer-Sportsman and 225,000 under pheasant cooperative).

Department biologists set out on a summer game and range survey.

A black-tail buck deer. Black-tail comprise more than one-half of the state's deer population.

Part of the Department's research at the Clemons Tree Farm is aimed at determining the nutritional value and palatability of browse plants for game animals. Here a biologist places a daily ration of huckleberry on the feeding shelf for use on one of the experimental deer.

Browse utilization studies are conducted on the state's game ranges. The biologist checks the bitterbrush periodically through the winter and spring to see how much of the plant is used and how this utilization affects growth.

A bull elk on the Oak Creek game range in Yakima county.

Big game are trapped, examined and tagged as part of the Department's long term range and migration studies. These elk are awaiting release after being marked with a metal tag placed in their ear.

Two hunters exhibit their limit bags of pheasants taken in Yakima county during the 1950 season.

The Game Department holds school annually to keep personnel informed on new developments in enforcement and all phases of game and fish management. Director John Biggs talks over some of the problems with this attentive group of "pupils."

"Hunting by Permission" signs have opened up more than 400,000 acres of hunting land to Washington's sportsmen.

The most numerous and coveted of Washington's game birds—the Chinese pheasant.

Snow Geese in flight over Skagit Flats.

Unlike the Farmer-Cooperative program which offers the farmer material benefit through the development of his lands, the Farmer-Sportsman program gives him nothing but the good will of the sportsman.

The farmer is provided with black "Hunting by Pemission" signs which tell the sportsman that hunting is his for the asking. Red "No Hunting" signs are supplied for posting in critical areas near livestock and personal property.

Favorable comments received from both parties in the farmer-sportsman relationship in 1950 indicate that at last a program has been found for true farmer-sportsman cooperation.

WATERFOWL

Species and Distribution

The state of Washington offers good shooting on most of the important species of waterfowl found in North America with the exception of the black duck and the blue goose. Generally, however, the bulk of the hunting effort for **ducks** is directed toward the mallard, pintail, teal, and widgeon. In eastern Washington, the Canada goose and its sub-species are widely hunted and make up the bulk of the hunter take of **geese**; whereas, in western Washington, the kill on geese is directed toward snow geese, brant, and white-fronted geese and, to a lesser extent, toward the Canada geese.

Diving ducks, scaup, ring-necked, ruddy and other species, although locally abundant in certain areas, are not hunted extensively.

Management Problems

Since waterfowl are generally migratory and a large percentage are not resident to the state or even to the nation throughout the entire year, the management of their take is covered by international treaty and administered within general limits by the U. S. Government through the Fish and Wildlife Service. Because of this fact, little attention has been paid to the management possibilities of these game birds by individual states in past years. However, preliminary investigations have indicated that if each of the states were to increase the local production of waterfowl within its boundaries, the overall populations within any one waterfowl flyway would be increased. Further, additional facts as to the abundance and harvest of waterfowl within each state would be of great value to the Fish and Wildlife Service in setting seasons so as to more properly harvest the available supply of ducks and geese without incurring an over-harvest on any individual species.

With the ever-increasing demand upon the state's game populations and more intensified land use, the problem of finding a place to hunt waterfowl is becoming increasingly acute.

Research and Investigations

During the biennium the Game Department inaugurated a major program of waterfowl research and management. The investigations being carried on within the state are correlated with similar investigations going on from Alaska to Mexico in the various states in the Pacific Flyway, the province of British Columbia, and by the Fish and Wildlife Service so that a complete picture may be presented for each waterfowl species as it moves from the Arctic to

the wintering grounds. Every participant in the study, including Washington, carries on detailed investigations covering breeding, hunter kill, and migration studies through the banding of trapped birds and population trend studies for each species by periodic sample counts. The information gained by each state and agency is made available throughout the flyway through compilation into a quarterly **Pacific Flyway Waterfowl Report.**

These statistics have enabled the Game Department to enter actively into the field of waterfowl management. They have also furnished valuable information to the Fish and Wildlife Service enabling it to justify increasing the daily bag limits of ducks on the Pacific Flyway. For example, since it has been found that the wintering population of black brant along the coast of Washington is being consistently under-harvested, efforts are being made to enable the waterfowl shooters of the state to take considerably more than in the past. Band returns from waterfowl trapped and banded within Washington demonstrate that, with the exception of the extreme western flight of ducks which come down through Grays and Willapa Harbors, the majority of the waterfowl in the state during the hunting season spend the winter either here or in neighboring Oregon and British Columbia. In view of this, it is evident that any work the Game Department can do to aid the survival of these wintering birds will result in an increased number returning to the northern breeding grounds.

Since the inception of the study, the state of Washington has produced approximately the same number of ducks each year that the hunters have killed. This does not necessarily mean that all the ducks killed in the state were produced locally, but it does indicate that if each one of the states in the Pacific flyway can increase the local production of waterfowl, the over-all hunter take in the flyway will increase correspondingly if proper seasons are established.

Specific investigations have been carried on aimed at increasing the usable waterfowl habitat of the state. This problem generally resolves itself into means of making waterfowl marshes more productive by eliminating undesirable vegetation and by increasing desirable food producing plants. The common cattail is number one on the unwanted list in that cattail growth becomes so rank in marshes as to reduce the usable areas to ducks and crowd out those marsh plants which do produce waterfowl food.

An extensive series of test applications of various weedicides and combinations of weedicides has been carried on in an effort to find an economical method of cattail control. It now appears that the application of the weedicide 245T mixed with fuel oil at the rate of one part to twelve sprayed on the plants when they are approximately eighteen inches high is the most satisfactory method of control. Experimental plantings of food producing marsh plants have indicated that prairie bullrush and water smartweed are very well adapted to this state and in most cases outrank even wild rice in their value as waterfowl food producers under growing conditions in this state.

One of the most important methods of increasing the available food for waterfowl is by growing wheat, barley, peas or corn in close proximity to water areas used by ducks.

Management Programs

As previously mentioned the control of the harvest of waterfowl within the state through the determination of the extent of the hunting season and the bag limit is in the hands of the U. S. Fish and Wildlife Service rather

than the State Game Commission. The Commission has the power only to shorten the season or reduce the limit from the recommendations given and to select the opening date from the several choices presented by the federal agency. The Fish and Wildlife Service also cooperates in law enforcement on waterfowl regulations. It has two full time law enforcement officers stationed in this state.

In order to increase the production of waterfowl within the state, furnish additional feed for migrant birds and provide a place for the free lance shooter to put out his decoys, the Game Department is continuing its program of acquiring and developing waterfowl management units. Sufficient land has been acquired on the Lake Terrell area, Whatcom county; Skagit area, Skagit county, and the Sunnyside Game Range, Yakima county, to enable the Department to produce approximately five hundred acres of grain for waterfowl and upland bird feed annually and furnish in the neighborhood of ten thousand man days free shooting each season.

There has been even at this early date a substantial increase in the number of mallard, teal, and other local nesting ducks that are produced on these areas. The Carl D. Harder cooperative hunting area in east-central Washington has served the waterfowl hunters as well as the upland bird hunters in that district. Negotiations are under way to acquire a management area along the lower Columbia River in Clark county and to secure control of land areas on major impoundments being created in the Columbia Basin and behind McNary Dam in the south-central part of the state. It appears that without the expenditure of monies for land purchase, the Department will be able to develop a major waterfowl management unit on the reservoir behind McNary Dam and on the Potholes Reservoir in the center of the Columbia Basin.

PREDATOR CONTROL

To minimize the depredation of game and agriculture by predatory animals and birds is the function of the predator control division.

Giving impetus to the need for predator control has been the blasting of the "nature's balance" theory. "Let nature take its course and the control of predators will take care of itself" has been proved a fallacy—for when predators were left to their own merits, statistics show that game populations were small. And, it was not always a case of the survival of the fittest for it was not only the weak and crippled that fell prey—predators were not that selective. Finally, the belief that predators would eventually eat themselves out went the way of the frontier since with the advent of large farms, before the predator could eat himself out, he would eat the farmer out first.

Until 1948, it was felt that a bounty on coyotes, cougar and bobcat was the answer to bringing predator damage to game and agricultural crops under control. A survey taken at that time on coyotes showed that the take was varying little from year to year. It was apparent that coyotes were being taken only by persons incidental to their own duties and that these individuals would continue to take them anyway with or without the bounty as a lure. Coupled with this was the fact that predator populations remained the same in areas where they were a particular menace.

To assure that the predators would be taken from regions where their presence was particularly undesirable, the coyote bounty was removed in July 1949, and salaried men were hired to do the job. This staff of twenty-two

men has since that time taken at least the same number and, in some cases, more coyotes than under the old bounty system. More important than the number taken was the fact that the predators were removed from the principal trouble areas where their elimination has been a major benefit.

Bounties on bobcat and cougar which still attract the true trapper are still in effect.

The control of predators has been of particular value to the Department in the survival of game birds released from the state's game farms. Prior to the planting of pheasants, the predator division goes to work clearing the area of ground and air varmints leaving it to the exclusive use of the planted birds.

Helping out the staff in the removal of unwanted animals and birds during this biennium has been the introduction of sodium fluoracetate, commonly called Compound 1080. This new chemical was first used experimentally in Okanogan county in 1950. Since that initial attempt and subsequent trials were so successful, 1080 has been used extensively throughout eastern Washington. The Department has accepted this modern warfare on predators as the best solution yet to combatting the predator population. It has been found that one application of the compound has reduced predators about seventy-five per cent. In general wherever used, the coyote population has been reduced from sixty-five to seventy-five per cent.

The Department's declaration of war on unwanted predators will continue in line with its aim, not to completely exterminate them, but rather to control their depredatory effect on the state's game and agricultural resources.

RECAPITULATION OF BOUNTIES PAID

	Bounty Paid	April 1, 1949, to March 31, 1950		April 1, 1950, to March 31, 1951		TOTAL	
		No.	Amount	No.	Amount	No.	Amount
Coyote Pups	$1 00	294	$294 00	.....	.....	294	$294 00
Adult Coyotes*	5 00	1,120	5,600 00	908	$4,540 00	2,028	10,140 00
Bobcats	5 00	689	3,445 00	1,189	5,945 00	1,878	9,390 00
Cougars†	50 00	20	1,000 00	.....	.....	20	1,000 00
Cougars	75 00	133	9,975 00	248	18,600 00	381	28,575 00
Magpies	10	11,169	1,116 90	9,060	900 00	20,229	2,016 90
Crows	10	2,854	285 40	2,019	201 90	4,873	487 30
Ravens	10	78	7 80	7	70	85	8 50
Totals	.....	.....	$21,724 10	.....	$30,187 60	.....	$51,911 70

General Bounty on Coyotes discontinued July 1, 1949.

* Includes coyotes taken on Commission Basis.

† Bounty on Cougars raised to $75.00 each, effective July 1, 1949.

PREDATORS TAKEN BY DEPARTMENT PERSONNEL

	April 1, 1949 to March 31, 1950	*April 1, 1950 to March 31, 1951*	*Total*
Coyote	5,504	5,632	11,136
Bobcats	223	248	471
Cougars	2	4	6
Magpies	20,104	15,332	35,436
Crows and Ravens	4,828	2,958	7,786

FISHERIES MANAGEMENT

Biologists look upon the fishing seasons as a period of harvesting the fish crop, and water areas as aquatic pastures towards which we must take the same view as we do our land pastures. Any pasture may be over-grazed, resulting in small or dwarfed stocks whether they be cattle, deer, elk or game fish. Selective harvesting without control of the weed species cannot operate to the advantage of the angler.

Catch Records

Fisheries management is practicable only when adequate information on the success or failure of a given program is available; thus catch records, as the yardstick by which the fisheries techniques are measured, enable biologists to evaluate the work done within their districts. These inventories of the fishermen's baskets are obtained from the game protectors' checks, from resort owners, from catch record boxes and from letters and cards of inquiry.

The analysis made from the catch records obtained annually from each body of water form, over a period of years, a very accurate picture of its production. Other studies confirm what should be the production potential of the same body, thus the management program for that lake or stream is devised.

Fish Marking

During 1949 and 1950 as an additional method of gathering information, the marking and tagging program was continued for research purposes. Over 200,000 fish were marked and planted out, and fishermen were requested to watch for the experimental fish in their creels.

Lake Fishing

Each year finds an increasing number of anglers utilizing the many lakes of the state. By far the biggest portion of the increase is being absorbed by the easily accessible lowland lakes; the more remote mountain waters in many cases being only lightly fished do not pose any great problems as far as maintaining fish stocks. The use of the airplane in planting high lakes has almost entirely eliminated the laborious back-pack and mule string plantings, resulting in the release by air of some 1,072,702 trout in 55 lakes in 1949 and 1,823,-108 fish in 88 lakes in 1950.

Lowland lakes have held up well under the intense fishing pressure, although some of the more popular lakes have had as high as eighty per cent of the total season's catch removed within the first month of the fishing season. Obviously it would be more desirable to spread the catch more uniformly, and as more and more lakes are brought into production, primarily through the lake rehabilitation program, it is to be hoped that fishing intensity will be fanned out.

To protect our streams, more limited in their production capacities as well as in their numbers, a vast amount of research is going into the improvement of the lake program. It must always be remembered that heavy stream fisheries jeopardize our migratory species—cutthroat and steelhead; consequently, lake trout fishing must be kept increasingly attractive to fishermen to alleviate as much stream fishing pressure as possible.

Lake Rehabilitation

The primary method by which many low-producing lakes have been brought into fertility has been through chemical treatment. Under this management system, specifically selected waters are cleared of the scrap and stunted fish inhabiting them, and after a sufficient period of time elapses to permit the dissipation of the effects of the chemical and the building up of plant foods, game species are once more released into the waters.

Pioneering in this field, Washington has rehabilitated the following acreages to date:

1946— 726 acres, opened to fishing in 1948
1947—1,300 acres, opened to fishing in 1949
1948—1,200 acres, opened to fishing in 1950
1949—2,300 acres, opened to fishing in 1951
1950—2,986 acres, to be opened to fishing in 1952 and 1953

As the lake treating program progresses, it has become apparent that it too has its limitations. Research during the biennium was particularly pointed to chemical studies of the material being used in this work. Summarizing the results, the following conclusions have been drawn:

1. The temperature definitely affects the length of time a lake will remain toxic, as well as the rate at which the fish die.
2. The higher the temperature, the faster the chemical will dissipate; thus to insure a complete kill, rehabilitation should be performed in the fall at lower temperatures when higher toxicity will be retained for a period of months.
3. The presence of organic material reduces the effectiveness of the rotenone and increases the rate of dissipation.
4. Direct sunlight increases the rate of dissipation.
5. Dissipation is generally more rapid in hard waters.
6. The time required for fish to die is generally shorter in waters of high alkalinity.
7. The rotenone product itself will have a toxicity variance, that is, each "batch" of five per cent rotenone (the required percentage) must be tested for toxicity properties and deterioration after storage.

The most extensive rehabilitation project during the biennium was performed in the late summer of 1950 on Bumping Lake in the Cascade Mountains. Bumping, formerly a natural body of water, is now one of the large reservoir lakes impounded for the irrigation of the Yakima Valley. Choosing a time of the year when the water was lowest, leaving the lake with a surface of some 659 acres, the department undertook the clean up job. Using 46,000 pounds of rotenone at a cost of approximately $13,000, the work has apparently accomplished a complete eradication of the scrap fish population. Replanted with cutthroat and silvers, it will be reopened to fishing in 1953.

The rehabilitation program, in effect now for over four years, has proven itself an important and integral part of fisheries management. The first opening day after rehabilitation and restocking, and the season which follows have seen phenomenal fishing successes, measured in terms of limit takes of large, healthy fish. The second year, success ratios in some cases have not been so high, and biologists concentrated in solving this problem during the biennium. It was discovered that the major factor which has affected the fish production of a rehabilitated lake in seasons subsequent to the first opening has been

"double cropping." In the early spring, April and May, small trout averaging in size some five hundred to the pound are planted. These small fish are intended to provide fishing for the season of the succeeding year. Experience, however, has shown that fry planted in April and May in a rehabilitated lake frequently achieve legal size by the following August and have been in many cases subjected to an intense fisheries in September and October; consequently, many lakes become almost completely fished out in one year. To prevent double cropping, shorter seasons have been introduced on many of the rehabilitated lakes with closure dates occurring around August 1. This management practice protects the second crop of fish, providing succeeding seasons comparable to the first.

The possibility of reinfestation will of course always be with us, and the reappearance of scrap fish in a lake which has been rehabilitated indicates that (1) live bait may have been illegally used and permitted to escape from the hook, providing a breeding stock of these species, or (2) a complete kill was not effected in the first place. Some factors which would affect the latter are heavy weed growth, lake-bed fresh water springs, temperatures, rotenone concentrations and water composition. Through research, more and more of these problems are being understood, and allowances are being made for them.

Weed Control

Since the use of herbicides for the purpose of aquatic weed control often affects the fish life in a body of water, the Game Department conducted several weed eradication projects during the biennium, seeking a safe but effective agent which could be recommended to resort owners and lake shore residents. In addition the Department has found it desirable to remove weeds from certain lakes before the rehabilitation work is performed.

Lake Fertilization

Experiments in fertilization have been conducted in two lakes during the biennium, both of which serve as broodstock sources to the silver and cutthroat artificial propagation programs. Spawning operations in the spring of 1951 and 1952 will show the effects of this work, and if the results are positive such efforts will be continued.

Habitat Construction

Although the state of Washington enjoys an unusually large number of lakes, in some areas of eastern Washington fishable bodies of water are at a minimum. To provide sports fishing in these regions, the Game Department has created artificial lakes, impounding waters which have been planted with trout, adding immeasurably to the recreational facilities of sections not liberally endowed by nature. To date thirteen such impoundments have been created, two in Charley Creek, a tributary to Asotin Creek in Asotin County; six within the boundary of the Tucannon Game Range in Columbia and Garfield counties, and five inside the Sinlahekin Game Range in Okanogan County. Out of the total thirteen, six were constructed within this biennium.

Stream Fishing

Streams supporting populations of resident species of trout are to be found in all parts of the state, those in central and north central Washington pro-

ducing the greatest number of fish. Rainbow, cutthroat and Eastern brook are the principal species caught.

The more heavily fished streams continue to depend upon annual plantings, mostly legal-sized, to stand up under the pressure. In coastal waters accessible to migratory fish, the Department avoids planting resident species as such plantings would serve to attract fishermen, and immature migrants would inevitably be taken.

Thus stream fishing in coastal waters and many Columbia River tributaries is chiefly for steelhead trout and sea run cutthroat, and these fisheries are encouraged. While runs of steelhead occur at all times of the year, the principal fisheries occur during the winter and summer months. It should be noted that fishing for sea run cutthroat along the salt water beaches is increasing rapidly in popularity.

Whitefish are sought during the winter months, primarily in Yakima and Kittitas counties. A heavy fishery has recently developed in the Columbia River near Vantage where fish up to three pounds are taken. The whitefish propagate themselves naturally, only a few having been raised in the hatchery for experimental purposes.

Steelhead

During the biennium, special emphasis was placed on the steelhead program. Additional hatchery rearing space was set aside for steelhead and several research experiments were set up in an effort to increase the production of the artificial rearing program.

The returns of marked fish in research experiments indicated quite clearly that size is an important factor in the survival of planted fingerling. Greatest returns were consistently noted from the release of seven to eight inch fingerling. Through advanced rearing techniques, many hatcherymen now rear steelhead to this size in eleven to twelve months. Some hatcheries, however, due to lower water temperatures which retard growth must hold steelhead up to two years to obtain the size desired.

A few lakes tributary to key steelhead waters have been used to supplement hatchery and natural production. Steelhead fry planted in these lakes have been observed traveling downstream after reaching migrant size. The utilization of lakes as rearing ponds could prove to be extremely important in areas where the waters from stream courses have been over-appropriated for other uses such as irrigation, domestic water supply, and power.

As an annual check on the magnitude of steelhead runs in rivers of the state, and to better regulate the sports catch, the steelhead permit card is still required. Information obtained from the return of these cards has proven to be of increasing value. Coupled with creel-checks by Department personnel, a fairly accurate measure of steelhead populations is obtained. Populations showing downward trends may be protected by game laws or bolstered by artificial propagation. Results of management practices can be likewise watched through such information.

Permit card returns indicate that some 50,000 anglers fish for steelhead during the winter season. These anglers catch approximately 60,000 steelhead each season. Few fishermen succeed in catching the season's limit of 24 fish. During the 1949-1950 season only 115 anglers reached that goal.

Information from permit cards has been used to excellent advantage in establishing proper open seasons. For example, rivers subject to low fishing

intensity may receive extended open seasons to properly harvest the steelhead; or, in instances of overfishing, seasons may be shortened. As a further refinement in the setting of seasons, action is not taken by the Commission until three or four months prior to the normal opening date of the winter season. This contrasts with the previous procedure of establishing steelhead seasons during the regular January meeting of the Commission in conjunction with the setting of the regular trout seasons. The short-comings of setting a season nearly a year in advance and prior to the conclusion of a current season is obvious.

A separate steelhead season pamphlet established in the biennium has been very successful.

Spiny-ray Fishing

In 1949 and 1950 a complete program for spiny-ray species was prepared. A check was made by each district fisheries biologist on all lakes in his area for waters which are now producing or have the potentiality of producing good spiny-ray fishing, primarily bass. The list includes some 180 lakes, and for each a permanent program of improved fishing has been devised.

The Equalizing Reservoir in Grant County will be, when waters are finally impounded, some 27 miles long. It will inundate Devil's Lake which offers fair bass and bluegill fishing at the present time. The Department believes that with the completion of the project the reservoir will provide extremely fine spiny-ray fishing.

A bass trap was constructed in Pearygin Lake, Okanogan County, and by January, 1950, 205 bass from ten inches to three pounds were obtained and transplanted into Kahlotus Lake, Franklin County. Kahlotus, previously treated for the removal of scrap fish, became reinfested and has not produced the fishing that had been hoped. Further work on this lake will be necessary.

Through the cooperation of the Atomic Energy Commission, a number of small-mouth bass were obtained within the restricted area and transplanted into the Yakima River, along with a number seined from the sloughs of the Snake River. Seining from the potholes of the Columbia met with only mediocre success, the 23,000 fish taken being placed in Silver Lake and Byron Ponds.

Since Washington has relatively few ideal bass lakes, studies are being made on the effects of mixed fish populations in many of our waters in an attempt to establish a spiny-ray-trout ratio planting which can be maintained to the advantage of both species. The main problem remains, however, that bass and other spiny-rays with their slow rate of growth in the cold water lakes of this state will not stand an intensified fishery.

Trout Hatchery Program

The success of Fishery Management activities, particularly of the lake rehabilitation program, would not be possible without a system of hatcheries to artificially rear and supply fish in large numbers for planting in all trout waters of the state.

Hatcheries provide the fish for stocking virgin and rehabilitated waters. They are necessary too for the annual restocking of those highly productive lowland lakes which offer no suitable spawning areas for trout.

The further worth of artificially propagated fish has been demonstrated in studies which show that very few trout survive to maturity in heavily fished

waters necessitating yearly plants of hatchery reared fish. Research has also established the fact that large fingerling of legal size are required to provide suitable fishing in streams and waters which support fish populations of mixed species. Such fingerling can be obtained only from artificial rearing.

Increases in the trout hatchery program occurred during the biennium in both facilities to rear trout and in the number and weight of fish produced. Two new hatcheries, making a total of twenty-four in all, were constructed and placed into full operation. The Tucannon hatchery located on the Tucannon River in Columbia County is primarily a fingerling station. Six 40-foot circular ponds utilize the entire flow of the spring water supply, and are capable of rearing some 150,000 trout to legal size annually. Near Omak a second hatchery is providing trough space needed to rear the fry or very small fingerling required to keep pace with the lake rehabilitation work in the north central Washington area. Fingerling rearing space is also provided by four circular ponds.

An increase in the number and weight of trout produced became possible with the completion of the new hatcheries. The personnel responsible for rearing fish at older hatcheries must be given a great deal of credit also. Careful work in controlling fish disease, and in solving other problems of fish culture all contributed to the rearing of a greater number of larger trout. Records show that 604,614 pounds of trout were liberated in 1950. This is more than twice the poundage released in 1946.

Cooperation from other fisheries agencies, both state and federal, contributed considerably to the setting up of a well-rounded and efficient trout program. Hatchery space at federal facilities was often provided to supplement our own hatcheries. Rearing pond space was provided at U. S. Fish and Wildlife hatcheries in north central Washington for the temporary holding of large fingerling until planting conditions were most favorable.

Cooperative work with the Colville Indians provided Eastern brook trout eggs at no cost to the Department. Rich trout waters on the Colville Reservation are being jointly managed to provide more fishing for license holders.

Along with the addition of several large tank trucks, the stepped up plane planting program mentioned previously has facilitated a more efficient fish releasing schedule.

GAME FISH LIBERATED

Species	*April 1, 1949 to March 31, 1950*	*April 1, 1950 to March 31, 1951*	*Total*
Cutthroat	3,339,457	2,301,620	5,641,077
Eastern Brook	2,255,599	2,283,668	4,539,267
Rainbow	10,093,111	12,304,484	22,397,595
Silvers	26,124,956	26,506,060	52,631,016
Steelhead	1,170,220	1,074,882	2,245,102
Miscellaneous Trout	.....	.....	316,639*
Total	42,983,343	44,470,714	87,770,696

* Made up of 18,194 Lock Leven, 261,506 Silver Salmon, and 36,939 Chinook Salmon.

STATE TROUT HATCHERIES
FISH FEED DATA

Year	Poundage Fed	Cost of Feed	Cost Per Pound
1933	100,000	$9,330.00	$.093
1934	119,467	10,700.00	.105
1935	206,172	14,200.00	.07
1936	417,741	20,000.00	.05
1937	297,299	13,800.00	.045
1938	422,083	15,600.00	.038
1939	328,000	12,200.00	.04
1940	525,505	19,815.00	.038
1941	585,427	22,723.00	.039
1942	811,882	39,014.41	.048
1943	952,487	59,704.96	.063
1944	1,139,201	64,141.82	.0563
1945	1,398,986	67,220.22	.0483
1946	1,594,483	128,948.74	.08
1947	2,298,877	129,372.63	.056
1948	2,623,203	157,526.05	.06
1949	2,627,087	157,840.26	.06
1950	3,414,448	195,330.14	.057

Public Fishing Areas

One of the fundamentals of good fishery management is the assurance that the fish produced will be harvested by the majority of the state's sportsmen. To make certain that the state's fish crop would be utilized in this manner, the Department inaugurated the public fishing area program designed to give free access to the state's fishing waters.

When the program was started in 1947, the Department owned land on only 17 lakes and streams. By April 1, 1951, the total had reached 101 areas; over 70 of them had been developed complete with parking and sanitary facilities.

Far-sighted sports groups, who recognized the need long before the program was started, have contributed many of the access areas they had previously purchased. Public spirited citizens also donated some of their own lake frontage property. Others helping out have been the Department of Public Lands by withdrawing from lease or sale many lake front properties and the counties by transferring lake frontage and requiring lake front sub-divisions to make provisions for public access.

The public fishing area program has been closely integrated with the lake rehabilitation program. Present Department policy is to treat only those lakes having access over public property. Future stocking is also influenced by the presence or absence of entry over public ground.

Eyeing Stations

Although the problem of obtaining sufficient eggs to maintain the rainbow trout program has largely been eliminated through the development of sturdy hatchery broodstock which may annually be counted upon to produce some 20 million eggs, the silver trout, steelhead, and, to a considerable extent, the

cutthroat artificial propagation program is still dependent upon wild stocks of fish. To obtain these eggs, traps are constructed on various lakes and streams of the state to gather fish for spawning purposes. In many cases where hatchery installations are not almost immediately adjacent, eyeing stations must be maintained. Here troughs are set up in which the fertilized eggs may be retained until the eyed stage of development is reached, a period of twenty to thirty days. After that time the eggs, then not nearly so perishable, may be shipped directly to hatcheries throughout the state to be hatched and reared.

Each year from 20 to 30 million silver trout eggs are taken from Lake Whatcom, and Bear Creek, a tributary to Lake Washington, to fulfill the hatchery demands.

Two to three million cutthroat eggs are taken annually from Kings Lake, Pend Oreille County, and Twin Lakes, Chelan County. Rounding out the requirements of the rainbow program, the Packwood Lake eyeing station remains the one installation at which wild broodstock of the species remain a source of supply. Over a million steelhead eggs are gathered every season from the three traps on the Samish River, Soos Creek, and Chambers Creek.

In addition to regular and minor maintenance work on the eyeing stations, major improvements were made on the structures at Bear Creek, Chambers Creek, Kings Lake and Twin Lakes.

Stream-Flow Data

Of major importance in the management of all stream trout fisheries is the information provided on stream-flow measurements by the U. S. Geological Survey crews. The program cost $24,000 for the biennium, one-quarter of the expense being borne by the Department of Game, one-quarter by the Department of Fisheries, and one-half by the Federal Government. The work is of particular importance on the west side where approximately two-thirds of the watersheds have been studied. Each year the crew concentrates on one particular watershed, leaving key stations to continue gathering statistics in subsequent years. A stream can carry no more fish than may be supported during the critical summer and early fall low-flow periods; consequently, the studies are emphasized during that time. In addition, the type of spawning traps and other Game Department installations which are required are dictated by the maximum flows as recorded by the survey crews.

Water Rights

Applications for water rights are made to the State Supervisor of Water Resources, who is required by law to send copies to the Departments of Fisheries and Game for their recommendations. Many such requests constitute no hazards to fish life but others do.

Personnel of either department are assigned to make field investigations which are correlated with the stream-flow data gathered by the U. S. Geological Survey, and final recommendations are made jointly by the two departments.

During the biennium 1,411 applications were received for consideration, the water to be used primarily for irrigational or hydroelectric purposes. Less than ten per cent were protested outright due to the severity of the fish problems which would ensue. The possible construction of dams receives careful and critical inspection, and, in the event that the two departments find that

water may be taken without the construction of such a stream barrier, the application will receive such a recommendation.

Fish protective devices stipulated in the approval of a water-right application may include fishways in the event that a dam is to be built; low flow minimums which must be maintained are specified when water is taken for irrigation purposes. Screening is also required on all irrigation diversion intakes, and in conjunction with some hydroelectric installations where fish life is involved.

STREAM IMPROVEMENT APPLICATIONS

The law also provides that all private improvement projects in and along streams must be approved by the Departments of Fisheries and Game. In this case the application is submitted directly to either Department outlining the proposed work. Generally those projects which pose the greatest hazards to fish include:

1. Equipment working in the gravel of a stream bed between September to June which may destroy the nests of eggs deposited there.

2. Work in swamp areas where a roiling of silt will smother eggs or small fish just emerging from the graveled spawning areas downstream.

3. Channel changes which destroy habitat, or in some cases even trap fish of migratory species and thus prevent them from traveling on to the sea to achieve their mature growth.

4. Dynamiting which can destroy the entire fish population in the immediate vicinity.

5. Improperly laid culverts creating adverse water flow conditions blocking migratory fish.

6. An interruption to the food cycle which must exist to support fish life.

Approximately 1,684 applications for stream improvement work were received during the biennium.

Habitat Improvement

Other corrective measures designed to increase the productive capacity of various streams throughout the state include the removal of three log jams, ten outmoded and presently useless dams, as well as two falls. Two fish ladders were constructed. The net result of this work was to open up several hundreds of miles of spawning and rearing areas formerly inaccessible to migratory fish.

THE DAM PROBLEM

During the biennium Department personnel devoted a great deal of time and effort in working on problems connected with proposed dams and dams actually under construction. In order to safeguard our fishery resources, it is imperative that the best possible fish protective facilities be provided. These include devices for safely passing fish both up and down dams, and screening to prevent undue losses in turbines and diversions. Some of the dams and the problems they posed were:

McNary Dam

The McNary, probably more than any other dam now under construction, presents the greatest threat to migratory fish runs. This dam is located a short distance upstream from Umatilla, Oregon, and when completed will be ninety-five feet high. Fish protective facilities will cost an estimated 20 million dollars. The facilities to be provided for upstream passage of fish include:

1. Two gravity fish ladders.
2. A large powerhouse collection system.
3. Fishway entrance and channel located at the center of the dam.
4. Pumps to provide auxiliary attraction water.

In addition to the above, some fish will use the navigation locks when boats are passing through.

The major installation for the protection of downstream migrants was split gates which were provided to eliminate great sudden changes of pressure. The turbines are to be of the slow speed type, minimizing the losses of small fish on their way to the ocean.

Box Canyon Dam

This dam, to be built by the Pend Oreille County PUD for hydroelectric purposes, is to be above the Grand Coulee Dam. In that location, it is clear that no anadromous fish are involved; however, it will flood out several miles of good riffle area having a high potential fishing value. At present the area is not heavily utilized but produces some fine big fish for local anglers. No special fish protective devices have been recommended at this time as they could not be economically justified.

Chief Joseph Dam

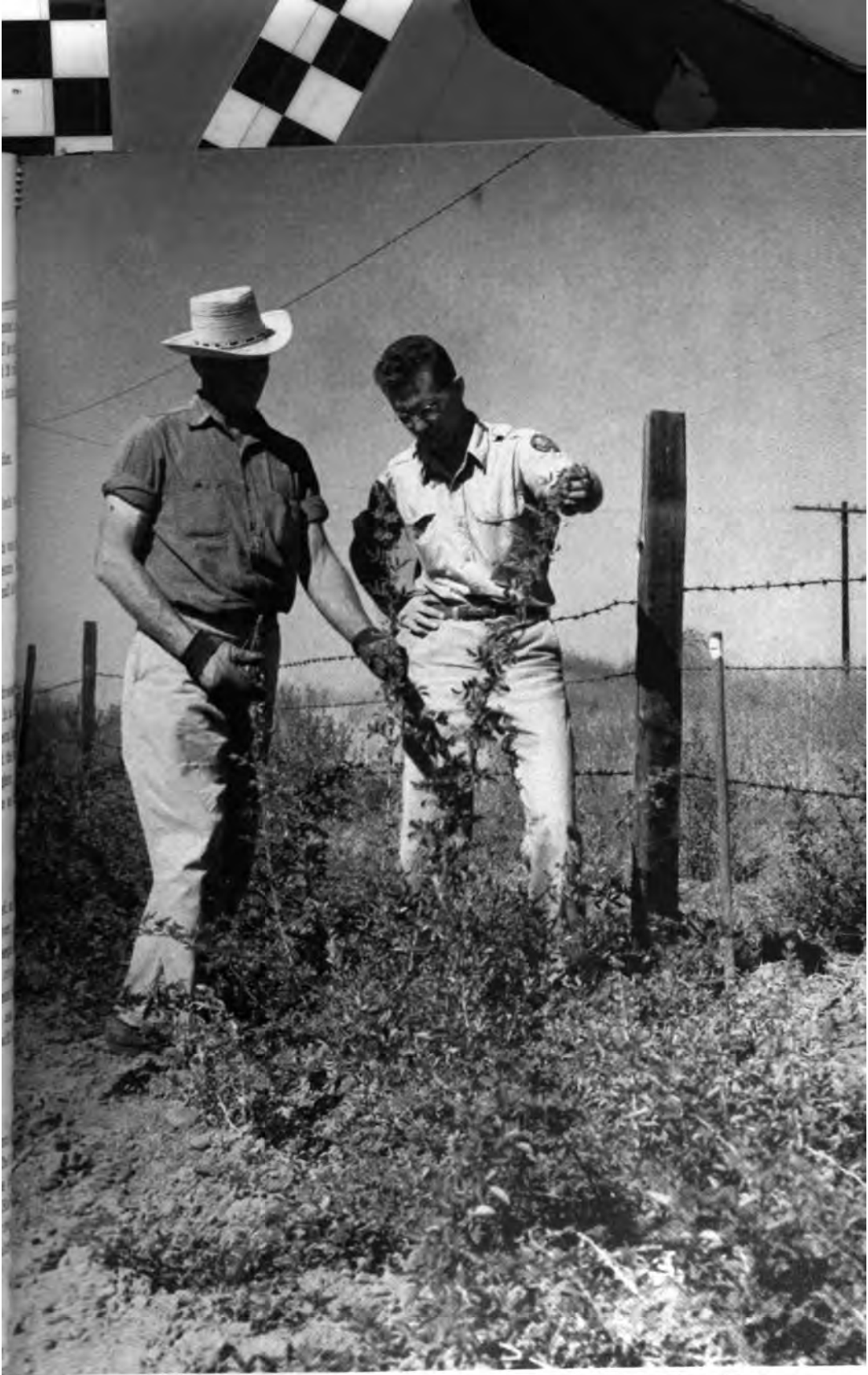
This dam is under construction at the present time. It is located on the Columbia River a short distance above the mouth of the Okanogan River. No important tributaries enter the Columbia between the site of Chief Joseph and Grand Coulee Dams. Undoubtedly some migratory fish use the main river in that stretch, though the numbers are not known. Since the impoundment will flood the river up the Coulee Dam, it was not deemed advisable to ask for fishways. Two small irrigation diversions are planned in connection with the dam, and they will be screened if the necessity is demonstrated.

Ice Harbor Dam

This would be the lowest of the so-called four lower Snake River dams, and would be constructed a short distance above the mouth of the Snake. The dam has been authorized by Congress, but no money for construction has been appropriated. Fishery people are apprehensive of the effects of Ice Harbor and the other three lower Snake River dams, since they will not only create problems for the safe passing of fish, but also will inundate much valuable spawning and rearing area.

Cowlitz Dams

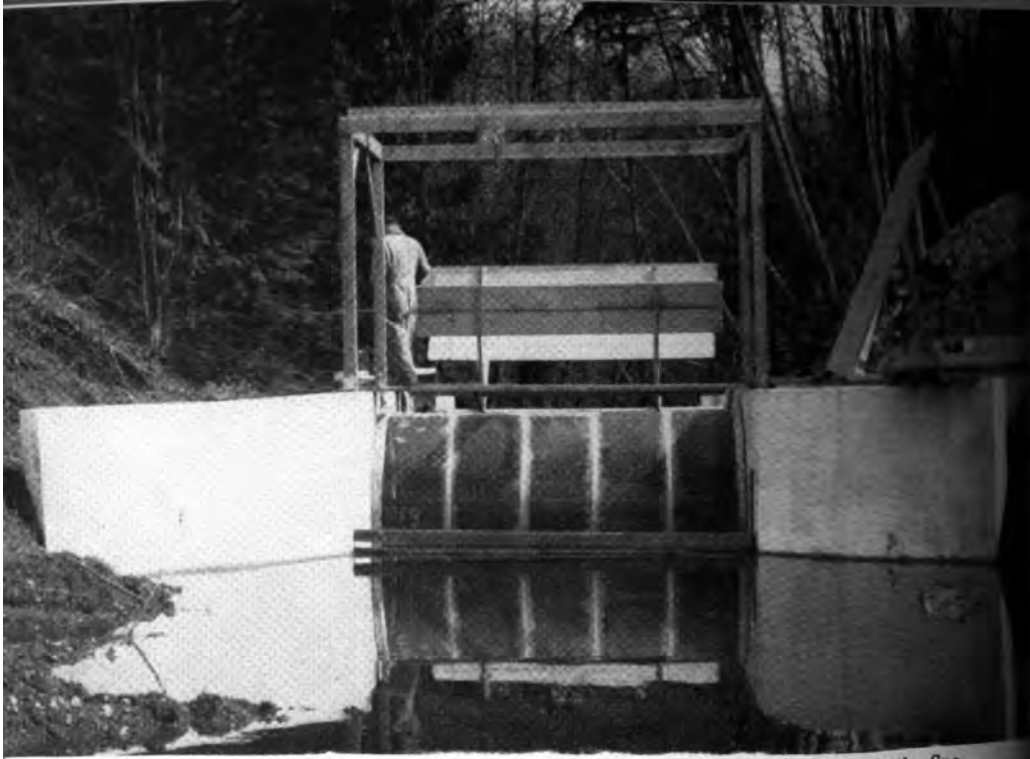
By far the most publicized controversy over the construction of any dam has been that of the Cowlitz. Conservation interests, including the Department of Game, won the first legal step in the battle with the passing of the Cowlitz



Much needed pheasant habitat is provided through the plantings of mutiflora rose cuttings. A landowner in the Columbia basin looks over a year's growth of the plant with a Department biologist.

Above, BEFORE, and below, AFTER, pheasant habitat work on a privately owned plot in Adams county. Development included the planting of multiflora rose with permanent grass, and black locust. A cistern was also installed.

Twenty tons of suckers, and not one game fish, were brought to the surface in the Department's rehabilitation of Blue Lake in Okanogan county. The lake was replanted with trout.



The dam and fish screen constructed on the outlet of Lake Bosworth, Snohomish county, to prevent fish from escaping.

This outlet structure on Loon Lake, Stevens county, was built to control the level of the lake. Provisions have been made for the installation of a power-driven fish screen.

A hatchery assistant prepares a few fish for release in one of the state's streams. More than 600,000 pounds of fish are planted annually from the state's 24 trout hatcheries.

Stream fishing is popular with all Washington fishermen. This family enjoys opening day fishing at Issaquah Creek.

Aerial view of the main hatchery building and outdoor rearing ponds at the Puyallup Hatchery.

Hundreds of opening day fishermen flock to this public fishing area on Bay Lake, Pierce county.

A rehabilitated lake provides limits of trout for these opening day fishermen.

Four-H club members get a lesson in wildlife management. Participation at Four-H camps is the summer feature of the Department's youth education and conservation program.

Marten tagging experiments are carried o each winter by the Department's trappin force. The animals ar trapped, tagged an then released in an ef fort to determine thei migration habits.

River Sanctuary Act during the 1949 session of the State Legislature, which served in effect to prohibit the construction of the Mossyrock and Mayfield Dams proposed by the City of Tacoma for power purposes on the Cowlitz River. Since that time the Federal Power Commission has issued a permit to Tacoma, authorizing the city to go ahead with the construction. The litigation in progress at the present writing is designed to fully clarify the question of State versus Federal rights, in view of the Power Commission's decision which is contrary to present state laws.

Screening

By the close of the 1949-1951 biennium, some 220 fish screens were in full operation throughout the state. During the two-year period, 13 of the revolving drum type and 14 of the panel or plate type screens were installed by the screening crews. In addition major repairs were performed on 46 other structures.

The revolving screens have proved to be a very effective method of protecting migratory fish runs as well as resident species in many Washington streams where the demands of agriculture have resulted in the construction of numerous canals and diversion ditches for irrigation purposes. Fish reaching the screens placed across the diversion are conducted through a by-pass back into the main streams. Fish traps placed temporarily at these points have proven the merit of maintaining the screens, and the count of fish taken in the traps shows that under just normal circumstances one unscreened ditch can draw off a major portion of the locally produced resident trout long before fishermen even have a chance at them.

Screens are also used in conjunction with hydroelectric dams to prevent small fish from being drawn into the turbines. Present state water-use laws require that the main cost of the construction of diversion screens must be borne by the irrigation or power company, who have been working most cooperatively with the Departments of Fisheries and Game. The two state departments, incidentally, operate together on all problems which affect migratory fish.

The panel or plate type screens are used in most instances at lake outlets, serving to hold resident trout within the lake and to prevent scrap fish entering by these routes. Much of the lake screening work has been done in conjunction with the lake rehabilitation program to prevent reinfestation and is on occasion constructed as part of an installation to stabilize a lake level.

All screen installations must be checked regularly to insure the proper operation of the mechanism and to effect the removal of any floating debris which, particularly in the spring high water period, imperils the structures.

The crew, in addition to their regular screening construction and maintenance duties, handle a number of miscellaneous construction jobs that have proved to be of great economic value to other divisions in the Department, including fish planting tanks, beaver pelt drying hoops, shop stoves, watering troughs and iron gates, to name a few.

FUR RESOURCES

Beaver Program

Beaver in the state of Washington are handled entirely by the Game Department.

Eight full-time beaver trappers employed by the Department live-trap beaver out of lowland damage areas during the summer months and transplant them into new watershed areas. The animals are tagged by placing a small piece of metal, bearing a serial number, in their ear. In the 1949 tagging season 369 were live-trapped and transplanted. In 1950 there were 322.

During the late fall and winter months, pelt-trapping operations are carried on by the regular staff with the aid of 50 or 60 additional men employed on a pelt basis. Landowners may enter into a cooperative agreement with the Department whereby they receive 40 per cent of the average net proceeds from the sale of beaver taken on their property. The Department traps, prepares skins and markets all pelts, and after final sale, reimburses the landowner with his 40 per cent share. At the present time there are 2,030 such agreements in force in the state.

Fur prices were considerably better in the 1950-1951 season when the 7,082 beaver pelted averaged $23.04 per pelt. In the season of 1949-1950, 6,937 beaver were pelted, averaging $15.68 per pelt. Landowners were reimbursed $22,139.08 for the 3,484 pelts taken under agreement in 1949-1950, and $38,217.06 for the 4,333 taken on a contract basis in the 1950-1951 season.

Fur Trapping

Trapping of fur bearers other than beaver is carried on by licensed trappers throughout the state. The proceeds from Washington's fur trapping industry reached a total of $686,521.85 for the entire biennium, jumping to $425,539.36 in the 1950-1951 season from $260,982.49 in the previous year. Although the returns rose, the number of trappers dropped from 2,008 to 1,823.

The following tabulations show the take by animal for the two seasons:

Year	*Muskrat*	*Mink*	*Marten*	*Racoon*	*Otter*	*Red Fox*	*Skunk*	*Civet*	*Weasel*
1949-1950.....	73,083	7,032	645	2,333	435	31	363	100	1,313
1950-1951.....	76,732	7,307	962*	2,533	505	23	283	45	733

*Figure based on 100 per cent returns. Others are based on a percentage of the returns made.

ENFORCEMENT DIVISION

Game law enforcement is the primary duty of a State Game Protector; however, the problem of policing is integrated with the many and varied phases of the field of game management.

This division is composed of a chief patrol officer and a staff of eighty uniformed and trained protectors. Every effort is made to insure that the field force is composed of the best qualified men available. Many of the present officers are men who joined the Department in 1933, the date of its inception, and the rest are younger men who have college degrees in game management or police science, or law enforcement experience in this and other states.

Each officer receives at least six months, and more often a full year, of probationary training duty with experienced personnel of the Department before he is assigned a protection district.

To keep the men who patrol Washington's 66,836 square miles abreast of current developments in the game field, formal training schools are held annually. Qualified experts in police service, game management and other closely allied fields conduct extensive courses for all officers.

An ever-increasing state population, expansion of farm lands and growth of business and industry have changed the status of the old time game warden from strictly a protector to a game management specialist. Game protection today has developed to a high point of efficiency. To maintain this efficiency protectors must not only be familiar with police duties but also well versed in closely related fields.

REPORT OF THE ENFORCEMENT DIVISION
FINES, ARRESTS, CONVICTIONS

	April 1, 1949 to March 31, 1950	*April 1, 1950 to March 31, 1951*
Total Number of Arrest	2,826	2,739
Total Number of Acquittals	28	32
Total Number of Appeals	4	11
Cases Turned Over to Other Authorities (i. e., Juvenile Auth. or Fed. Auth.)		8
Total Number of Convictions	2,794	2,688
Total Number of Juveniles (included)	19	36
Food Fish Cases (included)	40	13
Big Game Cases (included)	516	519
"Loaded firearm in motor vehicles" or "Shooting from a public highway" Cases (included)	405	576
Fur-bearing Animal Cases—Trapping, etc. (included)	49	60
Jail Sentences Imposed	8,337 days	5,693 days
Jail Sentences Suspended	4,219 days	4,370 days
Jail Sentences Served	4,118 days	1,323 days
Fines Assessed	$130,234.50	$132,848.25
Bail Forfeited	6,056.50	10,117.00
	$136,291.00	$142,965.25
Fines Suspended	$36,968.50	$45,350.50
Fines Collected	79,776.92*	77,122.86*
Fines Served in Jail	10,651.75	4,192.00
Fines Unpaid to Date	8,893.83	16,299.89
	$136,291.00	$142,965.25

* Note: One-half of the fines collected goes to the State Game Fund and one-half to the county in which the arrest is made.

EDUCATION AND INFORMATION

Education

With the first year's school conservation education program conducted during the early part of 1949, the Department's field force under the direction of the Education and Information Division presented an expanded school lecture service over this biennium.

Protectors, and fish and game biologists, during the months of January through April of both 1950 and 1951, appeared before approximately 50,000 students in 307 of the state's secondary schools. Programs presented various phases of the Game Department's conservation activities, and were illustrated by its educational films. The response to this work has been most enthusiastic on the part of students and teachers alike; thus, it has been adapted as a permanent part of the division's educational program.

Instruction in various phases of the game management program in the 4-H summer camps continued through the biennium. Two members of the division during the months of June through mid-August annually visit these camps, instructing in such courses as game, fish, bird and predatory animal management, identification and control, fly tying, and safety with firearms. Approximately four thousand 4-H youngsters are reached this way each summer.

A concerted effort was made to work with allied state departments in preparing a well-rounded youth conservation education program, in order that the combined personnel might make a better coordinated approach to the subject. It is felt that eventually this cooperative work will bear fruit.

Information

Game Bulletin: The first issue of the quarterly Washington State Game Bulletin went to press in July of 1949. Circulation began with some 2,500 names on the mailing list. This list had grown to over twelve thousand by the end of the biennium. Distributed free of charge, the Bulletin is sent to all persons requesting it. Such organizations as sports clubs, farm groups and schools have been placed automatically on the list, and it has become quite evident that it is serving as an excellent public relations means with these various groups and agencies.

News Release Bulletin

A monthly news release containing current information was sent to all the state's press services and newspapers. Spot news releases leave the office at least once a week.

Personnel Bulletin

Personnel were kept informed through a Departmental Newsletter, issued monthly by the Education and Information office.

Reports

Progress reports on the various activities of the Department frequently received their final editing in the division.

Information Stations

A somewhat different medium for contacting the public was employed for the first time with the operation of Information Stations on important highway routes into the major hunting areas of the state. From here, information on local hunting and road conditions was disseminated. Apparently such efforts were met with considerable approval, as indicated by some 23,000 sportsmen who visited the original station set up during the 1950 seasons.

Farmer-Sportsman Relations

Of primary importance, the Farmer-Sportsman sign campaign weathered its first two years during the biennium. Personnel of the Department undertook the major responsibility of the contact work during the 1950 hunting seasons and as a result of their efforts 924 landholders opened 491,040 acres to hunting. This property prior to that time had been for the most part closed to hunting entirely; thus, the efforts of the State Farmer-Sportsman Relations Council, comprised of members of the State Sports Council, Grange, Farm Bureau, Wool Growers' Association, Cattlemen's Association, and the Game Department, began to bear fruit in its third year of operation. Farmers supplied with the "Hunting by Permission" signs of the Council registered a general approval of the program, and their generosity, coupled with the hunters' cooperation, has heralded a new era in the problem of "where to go to hunt."

Motion Pictures

One new film, LAKE REHABILITATION, was added to the departmentally produced movie file, bringing the total number of pictures up to eight. Circulation figures of the films during the 2-year period indicate that they were viewed by some 1,293,000 persons, including a television audience of 934,000.

Exhibits

Limited by money and personnel, the division found it necessary to keep exhibits at a minimum, presenting nine annually in the major sport shows and fairs of the state. The combination of animal-fish-still picture-film displays presented at various shows were viewed by a total of 500,000.

ENGINEERING DIVISION

The work of the engineering division during the past biennium was well-apportioned between the building of new installations and the maintenance of those already in existence.

Hatcheries

Of the new installations, the major projects were the construction of the Omak and Tucannon hatcheries. Hatchery building and superintendent's residence at both, and the four rearing ponds at Omak and six at the Tucannon amounted to over half of the capital outlays on hatcheries.

New hatchery buildings were also erected at the Tokul Creek and Colville hatcheries. Colville also had a superintendent's residence constructed as did

Pend Oreille. Other capital outlays went toward the improvements and installations at Goldendale, Spokane, Lake Whatcom and South Tacoma hatcheries.

Game Farms

The conversion of 15 nesting rooms to brooder rooms with fenced runways at the Spokane Game Farm was the principal construction project on game farms.

Big Game Ranges

Keepers' residences and garage buildings were constructed at the Wooten and Methow ranges with a barn also erected at the latter. Two new impoundments and major improvements to the keeper's residence on the Sinlahekin rounded out the big game range outlay.

Other work included a new metal warehouse and storage yard at the Ritzville shop which is used in the Department's pheasant habitat program and the development of 35 additional public fishing areas.

FINANCES

Every person who purchases a hunting and fishing license in the state of Washington has a financial interest in the Department of Game and its operations. He is literally one of nearly half a million stockholders who has contributed towards carrying on a successful program of hunting and fishing in this state.

As is fairly well known, the Game Department is unique among public organizations in that it is completely self-supporting and receives no general tax funds of any nature. Its operations are supported principally by monies received from the sale of hunting and fishing licenses, although it has substantial revenues of other types. The total receipts available for use at the present time approximate $3,000,000 yearly.

To equitably and uniformly allocate these funds to all of our various functions is one of the most difficult tasks which the State Game Commission has. A game program to be successful must be one in which the different functions of propagation, control and research are carried on so that, together, they will achieve the desired objective of providing the maximum amount of fishing and hunting consistent with the state's geographical complexion and with the funds available for carrying on this program.

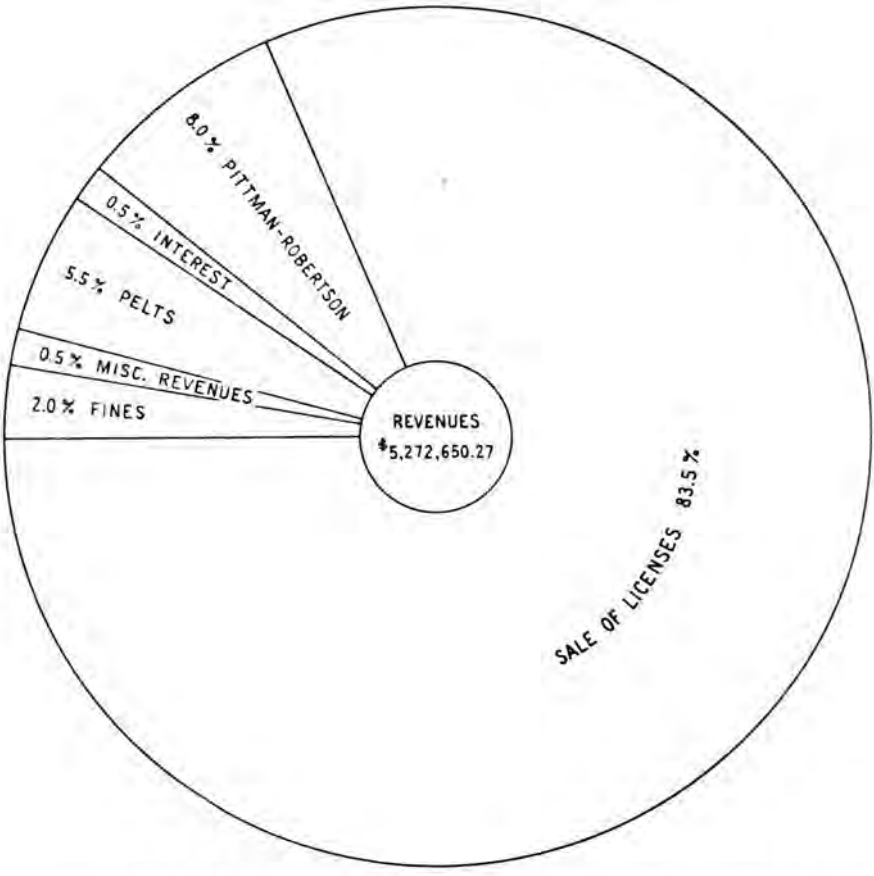
Not so many years ago this was a relatively simple matter, since at that time the game program was comprised basically of law enforcement and fish and bird propagation. Today the Department engages in many types of work which were completely unknown then. That the Department is operating well financially is amply demonstrated by the fact that despite an all time high of expenditures during the biennium which substantially exceeded income for the reason that it was felt desirable to presently expand the game program as much as possible to meet the heavy demands being made upon it, the Department still maintains a comfortable cash reserve in the game fund. This can be considered as money in the bank in the event that legislative appropriation is necessary for emergency use, or to cushion any sudden drop in license sales that might have an adverse effect on any of the Department's operations.

Budgets

Departmental budgets are prepared and expended on a biennial basis, or two year period of time. The Department is required to present a budget of its expected expenditures starting on April 1, 1951, and ending March 31, 1953. To do this is a rather difficult and complex operation as the Game Commission must forecast nearly three years ahead what future conditions and needs will be, what revenues will be during that period, and what ways these revenues might best be expended to carry on the most satisfactory game program possible.

After such a budget has been prepared, and before it is finally adopted by the Game Commission, it has been the practice to hold budget hearings with representative sports groups throughout the state in order that license holders may be made aware of the financial program of the Department of Game, and further, that they may offer any suggestions to improve the financial plans as laid down.

After the budget has been approved by the Game Commission, it is forwarded to the office of the Governor of the state who, through his Director of Budget, makes a careful analysis of it and any changes believed desirable or



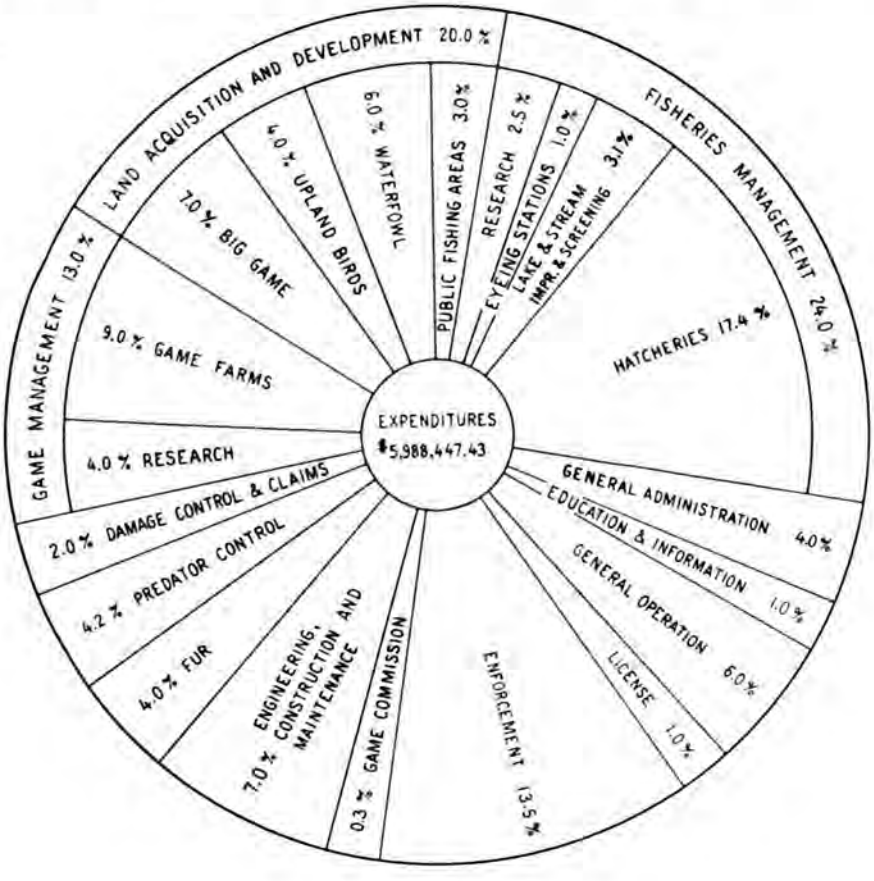
necessary. The budget is then presented by the Governor to the State Legislature for its consideration. The Legislature may again make any changes it sees fit. The Legislature gives the final authorization for the expenditure of funds, figuratively telling the Game Commission that "we authorize you to spend your funds in the manner shown in this budget, if you earn and have available for use the amount of money which you propose to expend during the period of time covered by this budget." It then remains the duty of the Game Commission to carefully weigh its expenditures against its income in order that the two may be held constantly in balance.

While the Commission is given a certain degree of flexibility in expending these funds so that it may cope with unexpected situations or conditions, it is required to generally follow the pattern of expenditures set up in its financial program as approved by the State Legislature and the Governor.

The Director of Budget constantly watches all expenditures of the Department of Game, as well as all other state departments, to see that the greatest degree of efficiency is achieved and that the budget pattern is followed.

Primary Accounts

The budget of the Department is divided by the State Legislature into various primary accounts, which are as follows: (1) Salaries and Wages. Funds in this account cover all expenditures for payment of either salaries or wages during a two year period of time. (2) Operations. This covers all operational requirements of the Department such as feed for its hatcheries and game farms, maintenance of these facilities, purchase and repair of necessary equipment, damage prevention, predator control, lake rehabilitation, enforcement, educational work and literally hundreds of other expenditures of this nature. These are the two principal operating accounts of the Department, and in these are carried the major portion of the funds expected to be expended. In addition, separate accounts are set up for the (3) Payment of Game Damages, (4) Acquisition of Lands for public hunting and fishing areas and game habitat areas, (5) Capital Outlay and Major Repairs, which include any new facilities which are to be constructed during the period as well as large scale repairs. Finally, there is an account for (6) Wildlife Restoration and Research, a program carried on in cooperation with the U. S. Government under which it provides 75 per cent of the monies expended.



After the Legislature has established the amount of monies to be spent out of the various accounts, no changes can be made and money cannot be switched from one primary account to the other. In this respect the operations of the Game Department vary somewhat from those of a business, for should a business prepare a budget which, let us say, contemplates the expenditure of a certain amount of money for manufacturing a product and a certain amount of money for advertising this product, later finding that it must spend more money for manufacturing than for advertising, it can readily transfer funds to achieve this end. This the Game Department cannot do under any circumstances; therefore, it sometimes finds itself in the situation of having surplus funds in one account which might be greatly needed in another but cannot be used due to the legislative prohibition against transfers of this nature.

It is true that the Game Commission is given some degree of latitude in the expenditures of monies within an account, but only to a minor degree. It must be remembered that if funds are switched from one function to another, there will be no more to replace them. For instance, if more protectors were employed than allowed for, their salaries could well necessitate the reduction of personnel needed on the hatcheries or game farms. Consequently, the Game Commission is expected to expend its funds uniformly in order that necessary money will be as equally available for use in the last month of the 24-month budget period as it is for the first.

In almost every other respect, however, the Department is operated very much like a large private business. It receives its funds in the form of license revenues and is expected to produce game and fish with these revenues to be returned to the license holder who finances its operations. Therefore, great stress is placed upon receiving full value for all monies used. The program could only be expanded as license revenues increase and would be curtailed in the event that they decrease.

The Department at the present time owns and operates hatcheries, game farms, game ranges and other assets which have a replacement value of not less than ten million dollars. Particularly in the acquisition of public hunting and fishing areas is great progress being made, and one need not stretch his imagination to feel that these lands will become increasingly valuable as time goes on, constituting a heritage which has been bought and paid for in our time and which will be used perpetually by future generations. Thus all of the Department's funds are not being used for everyday operations, but a substantial amount of money is being "plowed" back into the game program as a capital investment to be forever enjoyed by the people of the state.

The charts which precede this article show in detail how every dollar received and made available for the use of the Game Commission was spent during the biennium, covering the period of April 1, 1949, to March 31, 1951.

It is the desire and hope of the Game Commission and the Game Department that every interested person and every license holder be fully informed as to how his money is being spent. As one who is paying part of the cost it is our belief that he is entitled to, and should have, this knowledge.

SUMMARY OF RECEIPTS AND EXPENDITURES
April 1, 1949-March 31, 1951

Game Fund Balance on Hand, March 31, 1949, Treasurer's Report		$1,276,576.88
REVENUES April 1, 1949-March 31, 1951		5,272,650.27
Total		$6,549,227.15
EXPENDITURES April 1, 1949-March 31, 1951	$5,988,447.43	
Warrants issued prior to March 31, 1949—paid during 1949-1951 biennium	266,667.85	
Transfers (money erroneously credited to Game Fund which was transferred out and into correct fund)	26.75	
Total monies disbursed from Game Fund		$6,255,142.03
BALANCE		$294,085.12
Warrants issued and not cashed in 1949-1951 biennium		522,747.37
Cancelled warrants biennium		3,306.67
GAME FUND balance on hand, March 31, 1951, Treasurer's Report		$820,139.16

EXPENDITURES FROM STATE GAME FUND
April 1, 1949-March 31, 1951

Code No.	*Appropriation*	*Expended for Biennium*
49-1	Salaries and Wages	$2,091,567.17
49-2	Operations	2,146,016.72
49-3	Payment of Claims for Deer and Elk Damage	22,928.93
49-4	Payment of Game Animal Damages and Expenses	18,204.40
49-5	Wildlife Restoration and Research	840,760.36
49-10	Capital Outlays and Major Repairs	318,182.65
49-15	Acquisition of Lands for Public H & F Areas and Game Habitat Areas and Other Purposes	547,778.49
	Reliefs	3,008.71
	Total Expenditures for Biennium	$5,988,447.43

SUMMARY OF REVENUES—APRIL 1, 1949-MARCH 31, 1951

COLLECTIONS BY DEPARTMENT OF GAME Credited the State Game Fund		Number of Licenses Issued 4/1/49-3/31/50		Number of Licenses Issued 4/1/50-3/31/51	Total Amount Collected 4/1/49-3/31/50	Total Amount Collected 4/1/50-3/31/51
State Resident Hunting and Fishing Licenses	@ $5.00	293,050		317,712	$1,465,250.00	$1,588,560.00
State Non-Resident Hunting and Fishing Licenses	@ 25.00	272		270	6,800.00	6,750.00
Oregon Resident Hunting and Fishing Licenses	@ 45.00	1		1	45.00	45.00
	@ 65.00	90		9	5,850.00	585.00
State Alien Hunting and Fishing Licenses	@ 25.00	4		6	100.00	150.00
Idaho Resident Hunting and Fishing Licenses	.....	.....	@ 50.00	5	.....	250.00
State Non-Resident Game Bird Licenses	.....	.....	@ 15.00	361	.....	5,415.00
State Non-Resident Fishing Licenses	@ 5.00	5,749	@ 5.00	7	28,745.00	35.00
			@ 10.00	320	.....	3,200.00
Oregon Non-Resident Fishing Licenses	@ 15.00	261	.....	1,662	3,915.00	24,930.00
State Fur Dealer Licenses	@ 10.00	61	.....	56	610.00	560.00
State Taxidermist Licenses	@ 5.00	24	.....	20	120.00	100.00
State 10-Day Non-Resident Fishing Licenses	@ 1.50	17,279	.....	12,114	25,918.50	18,171.00
Oregon 10-Day Non-Resident Fishing Licenses	@ 5.00	50	.....	1,189	250.00	5,945.00
Idaho 10-Day Non-Resident Fishing Licenses	@ 3.00	10	.....	603	30.00	1,809.00
State Resident Supplemental Elk Licenses	@ 5.00	47,337	.....	52,700	236,685.00	263,500.00
State Non-Resident Supplemental Elk Licenses	@ 25.00	71	.....	114	1,775.00	2,850.00
Oregon Supplemental Elk Licenses	.....	.....	@ 35.00	1	.....	35.00
Oregon Game Bird Licenses	.....	.....	@ 20.00	4	.....	80.00
Idaho Game Bird Licenses	.....	.....	@ 20.00	3	.....	60.00
State Private Game Farm Licenses—New	.....	.....	@ 20.00	20	.....	400.00
State Private Game Farm Licenses—Renewal	@ 10.00	105	.....	92	1,050.00	920.00
State Game Importers Licenses—New	.....	.....	@ 20.00	4	.....	80.00
State Game Importers Licenses—Renewal	@ 10.00	11	.....	2	110.00	20.00
State Resident Trapping Licenses	@ 5.00	2,009	.....	1,821	10,045.00	9,105.00
State Non-Resident Hunting and Fishing Licenses (Sold as Reciprocals)	@ 22.50	5	.....	.....	112.50	.....
	@ 50.00	8	.....	.....	400.00	.....
Duplicate License Fee	@ .50	2,113	.....	1,687	1,056.50	843.50
County Resident Hunting and Fishing Licenses	@ 2.50	93,695	.....	86,362	234,237.50	215,905.00
County Alien Fishing Licenses	@ 5.00	92	.....	106	460.00	530.00
Total Game Licenses Sold	.....	462,297	.....	477,251	$2,023,565.00	$2,150,833.50
Big Game Seals	@ .50	228,148	.....	245,865	114,074.00	122,932.50
Total Receipts from Licenses and Seals	.....	690,445	.....	723,116	$2,137,639.00	$2,273,766.00

SUMMARY OF REVENUES—APRIL 1, 1949-MARCH 31, 1951—Continued

COLLECTIONS BY DEPARTMENT OF GAME Credited the State Game Fund	Number of Licenses Issued 4/1/49-3/31/50	Number of Licenses Issued 4/1/50-3/31/51	Total Amount Collected 4/1/49-3/31/50	Total Amount Collected 4/1/50-3/31/51
Fines Collected for Violation of State Game Laws, Remitted Direct to State Treasurer by Counties (⅓ Credited to Game Fund)	.....	.....	$39,888.46	$38,561.43
	.....	.....	10.00	.....
	.....	.....	.....	55.84

SUMMARY OF REVENUES—APRIL 1, 1949-MARCH 31, 1951—Continued

COLLECTIONS BY DEPARTMENT OF GAME Credited the State Game Fund	Number of Licenses Issued 4/1/49–3/31/50	Number of Licenses Issued 4/1/50–3/31/51	Total Amount Collected 4/1/49–3/31/50	Total Amount Collected 4/1/50–3/31/51
Fines Collected for Violation of State Game Laws, Remitted Direct to State Treasurer by Counties (½ Credited to Game Fund)			$39,888.46	$38,561.43
Juvenile Court Fines			10.00	.....
Sale of Sacks			.....	55.84
Sale of Blueberries			728.00	.....
Sale of Aluminum Bird Bands			25.60	34.50
Sale of Mules			140.00	.....
Sale of Fish Tags			659.70	638.30
Sale of Pelts			81,425.92	219,040.18
Sale of Confiscated Material			17.00	.....
Sale of Poultry			9,585.62	7,746.48
Sale of State Property			286.10	205.41
Tagging Game, Game Fish and Furs			1,192.60	1,497.10
Miscellaneous			1,232.16	2,814.76
Deposit Interest			17,260.22	11,830.85
Reimbursement by Federal Government of 75% of money expended from appropriation "Wildlife Restoration & Research" (Pittman-Robertson Act) deposited in State Treasury and not through Department of Game Office			126,667.46	299,701.58
Total Revenues			$2,416,757.84	$2,855,892.43
				2,416,757.84
Total Revenues for Biennial Period—April 1, 1949-March 31, 1951				$5,272,650.27

NOTE: As a result of an act of the State Legislature, certain license fees were increased effective January 1, 1949. At the same time some types of licenses were eliminated. This is reflected in an increase in revenues in the sale of licenses after that date.

EXPENDITURES
April 1, 1949 to March 31, 1951

DIVISIONS	SALARIES April 1, 1949 to March 31, 1950	OPERATIONS April 1, 1949 to March 31, 1950		SALARIES April 1, 1950 to March 31, 1951	OPERATIONS April 1, 1950 to March 31, 1951		TOTALS April 1, 1949 to March 31, 1951	
STATE GAME COMMISSION	$3,401 91		$2,271 88	$5,950 00		$4,221 62		$15,845 41
GENERAL ADMINISTRATION	59,442 69			63,816 86			$123,259 55	
Operational		$22,990 34			$32,759 11			
New Equipment		3,520 37	26,120 71			32,759 11	58,879 82	182,139 37
Retirement–Employer's 5 % Contribution			45,963 11			61,395 81		107,358 92
GENERAL OPERATING								
Department Building	1,617 40			1,717 63			$3,335 03	
Operational		$8,142 44			$10,654 47			
New Equipment		30 35	8,172 79		157 75	10,812 22	18,985 01	22,320 04
Warehouse and Shop	20,948 53			21,372 62			$42,321 15	
Operational		$10,595 41			$20,455 21			
New Equipment		5,256 05	15,851 46		5,435 31	25,890 52	41,741 98	84,063 13
GENERAL OFFICE	78,352 60			79,568 24			$157,920 84	
Operational		$26,458 54			$24,854 19			
New Equipment		3,800 24	30,258 78		345 42	25,199 61	55,458 39	213,379 23
LICENSE DIVISION	4,554 42			4,690 95			$9,245 37	
Operational		$5,859 63			$11,320 79			
H & F licenses, pamphlets, etc.		25,412 13			21,404 50			
New Equipment			31,271 76		8 28	32,733 57	64,005 33	73,250 70
GAME MANAGEMENT DIVISION								
Management and Research	30,814 83			29,163 86			$59,978 69	
Operational		$13,077 80			$13,699 63			
New Equipment		1,232 22	14,310 02		756 82	14,423 45	28,733 47	88,712 16
Game Farms	93,334 34			90,518 73			$183,853 07	
Operational		$60,673 78			$55,277 15			
Feed for Birds		69,561 77			94,551 64			
Purchase Setting Hens		15,591 95			13,445 20			
New Equipment		9,223 49	155,050 99		4,659 72	167,933 71	322,984 70	506,837 77
Repairs and Maintenance to Farms	3,155 90		3,695 10	2,967 57		17,263 62		27,412 19

FISHERY MANAGEMENT DIVISION								
Management and Research	$49,118 76			$51,516 27			$100,635 03	
Operational		$17,084 34			$21,620 36			
New Equipment		4,008 18	$21,092 52		1,749 03	$23,369 39	44,461 91	$145,096 94
Eyeing Stations	11,874 27			14,486 20			$26,360 47	
Operational		$6,045 38			$5,875 81			
Fish Trap Construction		2,670 76			3,241 88			
New Equipment		2,126 43	10,842 57		138 20	9,255 89	20,098 46	46,458 93
Lake and Stream Improvement and Screening	17,055 02			19,079 51			$36,134 53	
Operational		$7,154 04			$14,714 70			
Lake Rehabilitation		40,650 54			53,887 44			
U. S. Geological Survey		3,000 00			3,000 00			
Materials—Stream Improvement		4,792 09			8,946 32			
Screen Construction		2,406 91			2,543 12			
New Equipment		3,959 98	61,962 66		1,620 60	84,712 18	146,674 84	182,809 37
Hatcheries	193,376 71			204,973 44			$398,350 15	
Operational		$68,007 65			$75,025 29			
Hatchery Feed		139,699 15			176,292 46			
Storage on Feed		18,141 11			19,037 68			
Purchase of Eggs		12,238 90			15,357 06			
New Equipment		20,118 70	258,205 51		16,126 86	301,839 35	500,044 86	958,395 01
Repairs & Maintenance to Hatcheries	21,523 59		27,938 32	13,880 49		24,313 33		87,655 73
PREDATOR CONTROL DIVISION	58,466 75			69,015 44			$127,482 19	
Operational		$24,488 72			$32,318 85			
Bounties		21,724 10			30,193 60			
Poison and Bait		3,065 05			2,517 34			
Traps		1,556 34			4,661 60			
New Equipment		1,858 82	52,693 03		5,739 48	75,430 87	128,123 90	255,606 09
FUR & DAMAGE CONTROL DIVISION								
Fur Management	$5,216 35			$9,305 86			$14,522 21	
Operational		$4,600 27			$6,211 76			
New Equipment		906 98	$5,507 25		325 45	$6,537 21	12,044 46	$26,566 67
Damage Control	61,882 97			82,879 79			$144,762 76	
Operational		$13,453 94			$22,816 86			
Contract Beaver—Landowners share 40%		22,177 89			22,180 34			
Materials—Deer and Elk Control		6,560 42			3,634 41			
Feed in the Open		16,154 59			2,786 76			
Fencing Agreement		12,707 39			6,053 97			
Payment of Game Animal Damage Claims		30,066 74	101,120 88		11,066 59	68,538 93	169,650 81	314,422 57

EXPENDITURES—Continued
April 1, 1949 to March 31, 1951

DIVISIONS	SALARIES April 1, 1949 to March 31, 1950	OPERATIONS April 1, 1949 to March 31, 1950		SALARIES April 1, 1950 to March 31, 1951	OPERATIONS April 1, 1950 to March 31, 1951		TOTALS April 1, 1949 to March 31, 1951	
ENFORCEMENT DIVISION								
Game Protectors	238,647 83			265,915 06			$504,562 89	
Operational		$96,672 55			$125,874 26			
Uniforms		4,005 68			1,917 73			
New Equipment		20,189 89	120,868 12		25,313 15	153,105 14	273,973 26	778,536 15
Deputy Game Protectors	5,004 90			9,292 68				14,297 58
Pack String	2,869 07		2,770 67	2,917 52		1,903 11		10,460 37
EDUCATION & INFORMATION DIVISION	12,210 25			18,238 45			$30,448 70	
Operational		$6,373 87			$11,654 52			
Movies and Movie Expense		4,588 66			7,391 00			
Biennial Report		4,131 80						
Game Bulletin and newsletters		1,115 06			1,842 00			
New Equipment			16,209 39		1,201 01	22,088 53	38,297 92	68,746 62
ENGINEERING, CONSTRUCTION & MAINTENANCE	32,702 30			37,652 91			$70,355 21	
Operational		$21,017 90			$36,258 75			
New Equipment		4,567 05			12,450 42			
Contract Construction		118,613 04	144,197 99		135,345 17	184,054 34	328,252 33	398,607 54
ACQUISITION & DEVELOPMENT OF LANDS	$185,093 35			$223,879 94			$408,973 29	
Operational		$161,884 88			$261,251 67			
Purchase of Property		175,847 21			229,693 19			
Taxes, Assessments and Fees		5,303 55			5,138 15			
Lease and Land Rental		1,163 14			1,227 64			
New Equipment		56,914 09	$401,112 87		69,063 42	$566,374 07	967,486 94	1,376,460 23
								$5,985,438 72
RELIEFS								3,008 71
TOTAL								$5,988,447 43