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BIENNIAL REPORT OF THE
FISH COMMISSION
OF THE STATE OF OREGON
1947



HATCHING HOUSE AND REARING PONDS
BONNEVILLE FISHERIES STATION

BIENNIAL REPORT
OF THE
FISH COMMISSION
OF THE STATE OF OREGON
TO THE
GOVERNOR AND THE FORTY-FOURTH
LEGISLATIVE ASSEMBLY
1947



FISH COMMISSION OF THE STATE OF OREGON

Hon. John C. Veatch, Chairman, Portland

Hon. Robert L. Jones, Clifton

Hon. Earl H. Hill, Cushman

Arnie J. Suomela, Master Fish Warden

SALEM, OREGON
STATE PRINTING DEPARTMENT

LETTERS OF TRANSMITTAL

Portland, Oregon, July 1, 1946

**TO HIS EXCELLENCY, the GOVERNOR, and the MEMBERS
of the FORTY-FOURTH LEGISLATIVE ASSEMBLY.**

Gentlemen:

Herewith is transmitted the biennial report of the Fish Commission of the State of Oregon for the period from July 1, 1944 to June 30, 1946.

FISH COMMISSION OF THE STATE OF OREGON

John C. Veatch, Chairman.

Portland, Oregon, July 1, 1946

**FISH COMMISSION OF THE STATE OF OREGON,
Portland, Oregon.**

Gentlemen:

In accordance with the provisions of statute, I herewith submit for your consideration the report of the operation of the department together with financial statement for the biennial period July 1, 1944 to June 30, 1946.

Respectfully submitted,

ARNIE J. SUOMELA,

Master Fish Warden.

REPORT OF THE MASTER FISH WARDEN

We are now entering a post war era of expansion and industrialization in Oregon. The population of the state has increased and with this influx of people, especially to our cities and towns, the demand for fish and fisheries products has exceeded to a considerable extent the supply of this commodity. This increase in demand is usually accompanied by greater efforts to obtain greater yields which in turn may have the effect of depleting the fisheries resources. Furthermore, plans for further development of the rivers for industrial uses are being contemplated and this provides an impetus to the over-all expansion of the state, which has the ultimate effect of further reducing the fish populations inhabiting these waters. Of course any further uses of the rivers in which our great salmon runs reproduce must be viewed with alarm. The early development of our state provides a history of destruction of the spawning habitat of the salmon. It is believed that well-planned expansion, in both population and industry, can proceed without seriously affecting our natural resources. However, during this early development little consideration was given for the needs of the fisheries in these streams. As a result miles and miles of tremendously important spawning areas were made unavailable and unsuitable for anadromous fish. Improper planning of multiple uses of water, which has destroyed large areas of river systems formerly suitable for the reproduction of these fishes, together with increased and uncontrolled exploitation has caused a serious threat of depletion of many of these fisheries.

A continuation of the present trend of yield and abundance of our major fisheries, coupled with the unrestricted and improper planning of water uses, can only lead to virtual extinction of our great fisheries resources, particularly the salmon. In order to arrest this decline in abundance of many of the commercially and recreationally exploited stocks of fish a program of conservation, rehabilitation and management has been inaugurated by the Fish Commission.

Following the directive of the act contained in Senate Bill 291, the Fish Commission appointed Arnie J. Suomela as executive head directly responsible to the Commission under the act creating his office for the administration of all laws of the state applicable to commercial fisheries and commercial fishing. Mr. Suomela assumed the responsibilities of his office on August 12, 1945 and the following appointments were made: M. T. Hoy, Assistant Master Fish Warden; Irvine French, Director of Hatcheries; and Hugh C. Mitchell, Liaison Officer between the Commission and federal agencies. In October, Donald L. McKernan was named Director of Research. The reorganization has increased the efficiency of the department and has provided unified over-all supervision and correlation of endeavor in carrying out established policies of the Commission. It is the objective of the Commission to obtain maximum efficiency of administration and operation necessary and imperative to insure an effective and sound fisheries management program.

It will be the policy of the Commission to not only study, through biological research, the causes and effects of the decline of the various fisheries, but to study methods of rehabilitation of the species involved. In addition it will also be the policy of the Commission to evaluate and increase the efficiency of artificial propagation and to use the hatcheries to supplant and rehabilitate, but not replace, natural spawning. By such policy, the conservation of our fisheries will resolve itself into a program of fisheries management where all phases and factors are considered.

During the past biennium the functions of the department have been considerably expanded. The tremendous program of the army engineers which calls for the construction of multiple purpose dams on most of the rivers of Oregon threatens to deplete the salmon resource to a point where it will no longer exist in commercial abundance. It shall suffice to say that from the standpoint of the Fish Commission, this program of harnessing the rivers

of the state for multiple purpose use with its resultant curtailment of the natural spawning areas of our inland rivers is the greatest challenge that fisheries science has ever been forced to accept. I believe we are witnessing the most crucial period in the history of our fisheries, and that complete development of those plans may well spell the doom of the great salmon resources of the northwest.

Again it may be pointed out that, provided this program goes through as scheduled, the only remaining hope for the salmon is artificial or hatchery propagation. It might be well to point out that the Commission is not opposed to the development of new industries for the betterment of the state, but it does object to new resources being developed which threaten a valuable natural resource, such as the fisheries.

In addition to these man-made factors affecting our fisheries resources there is always the menace of over-fishing and the improper utilization of this great resource both from a commercial and recreational standpoint. When fish were plentiful funds were not available for the development and acquisition of knowledge with which to determine the maximum yield that could be taken from our rivers and not have accompanying depletion. It is believed that these factors, accompanied by the general loss of spawning areas and changes in the character of the streams, have caused a general over-all decline of some runs of fish in many of our rivers. The only logical method of rehabilitating the salmon runs is to apply corrective measures to all factors causing the decline. Dealing with the problem of salmon fisheries, well thought out regulations based on adequate biological data must be applied not only to river fisheries but to the ocean troll fishery as well.

The problems of the ocean fisheries are almost as complex. Some of these fishes are not migratory to any great extent and are continuously subjected to exceedingly heavy exploitation the year round. Little is known of the biology of these species, and until such time as data can be gathered, it is difficult to apply intelligent regulations. Many of these ocean fisheries, like the salmon troll fishery, operate from one or two miles off our coast to forty, fifty and even one hundred miles offshore. The jurisdiction of the states is at the present time based upon the three-mile limit which is entirely inadequate to properly administer all of the offshore fisheries. Therefore, the three Pacific Coast states of Washington, Oregon and California have drawn up a proposed form of interstate compact which, when made legal by the state and national legislatures, will provide the means by which these fisheries can be properly regulated. The proclamation by the President of the United States in September 1945, stating the intentions of the United States to extend its jurisdiction beyond the three-mile limit, has been interpreted by competent legal advice as making possible the regulation of the offshore fisheries by cooperative efforts of the states involved.

The adoption of this compact will provide the necessary authority for the study and regulation of all the ocean fisheries. At the present time knowledge is lacking upon which to base proper conservation measures. The research staff of the Fish Commission in cooperation with the biological divisions of both Washington and California is planning studies on some of the more urgent fisheries problems of mutual concern.

Considerable progress has been made towards planning a comprehensive program of fisheries management. The expanded program planned for the next biennium is based upon the immediate needs of the various fisheries and will provide the basis for proper conservation and management of the many stocks of anadromous and marine fishes.

The industry has expanded during the past two years after a decline of the general fishing effort during the war years. The catch of spring chinook on the Columbia in 1946 was very poor in spite of a relatively high escapement over Bonneville Dam during the early months of the year. The fall chinook, silver and dog salmon catch on the Columbia has been relatively constant during the past several years. The size of runs of fall chinook salmon in coastal streams is not generally favorable.

Because of the discovery of larger stocks of rock fishes off the coast, the bottom fishery with slight variations in trawl gear has transferred much of its efforts to this species. With the technical advances made in canning methods there has occurred a great demand for this once unimportant bottom fish. The fishery for rock fish has relieved the fishing effort from some of the more heavily fished species of flounders and sole involved in the fishery.

The crab industry is expressing concern over the general conditions existing in this fishery, and preliminary observations indicate a definite need for management.

The tuna fishery, which landed over 22,000,000 pounds of albacore in 1944, took in the neighborhood of only 5,000,000 pounds during 1946. During the past two years a drastic drop in landings has occurred, and the question arises as to the stability of the fishery. Studies are now being contemplated by the various states to determine the factors responsible for the abundance and erratic occurrence of the tuna.

The shark liver industry has been showing some signs of heavy exploitation, and the Commission plans on studying the condition of these stocks with the purpose of managing the fishery to obtain maximum sustained yields.

The shad fishery has been expanding and this important species has become the mainstay of a portion of the coastal fishery.

Therefore, it is essential that we obtain as quickly as possible the basic data and knowledge upon which to base a sound conservation program. The basic fishery resource, which belongs to all the people, has long been of tremendous importance to the economy of the State, and in many species serious signs of depletion are in evidence. The time has arrived to openly recognize the basic conservation needs of the fisheries. In the past it may have been possible to ignore the true conservation of the resource because of large residual populations of fish in our streams and in the ocean. Now it appears that the majority of our fisheries have reached their peak of production and many are beginning to decline.

In this connection it seems proper, therefore, that I briefly discuss the minimum requirements of any conservation agency which is given the responsibility of conserving a natural resource. Mainly because of the lack of funds, the Fish Commission has not been able to carry out a long range fisheries conservation program. No matter how sound a fisheries conservation program might be, it will have little chance of success without funds with which to employ qualified scientific and technical help to gather facts upon which these management programs are based. Even with adequate funds successful conservation programs are not possible unless further requirements are provided. In order to regulate the utilization of the resource in accordance with the extent of changes in size of the runs, flexible authority must be vested in the Fish Commission in order that seasons, et cetera, may be changed to provide protection to populations of fish whose numbers are declining, or permit fishing on those stocks which will permit an increased fishery. In addition to these factors adequate enforcement of regulations is imperative without which the value of a management program is impaired. Therefore, these three diverse and important tools must be available and synchronized in order to form a successful coordinated program for the management of the fisheries resources.

At the beginning of the biennium the department was operating on a self-sustaining basis, entirely dependent upon revenue receipts from license fees, poundage fees and other minor income. In view of these uncertain and fluctuating receipts and a cash deficit of some six thousand dollars created during the previous year, the financial structure of the department during the first year of the biennium was unsound. The operation and activities of the department had been considerably curtailed but despite this it soon became apparent that the anticipated revenue receipts would be insufficient to carry on without incurring a sizable cash deficit by the end of the first year. The Emergency Board, recognizing the need for

funds, granted our request for an Emergency Fund Appropriation of \$20,000.00 for expenses during the fiscal year ending June 30, 1945. Only \$15,052.14 of this appropriation was expended.

The 1945 Legislature supplemented our revenue receipts with an appropriation of \$165,000.00 from the general fund of the state which became available for expenditure during the second year. The revenue receipts of the department were exempted from payment of tithe to the state general fund, which provided some \$12,000.00 additional funds for expenditure.

While funds so provided for use of the Commission are somewhat greater in amount than were available during past years when the sole source of operational funds of the Commission was through monies received from poundage fees, license fees and other minor sources, the actual amount to become ultimately available for our use continues to remain uncertain and unpredictable in a major degree. The same wide fluctuations in that portion of our funds derived from these sources of revenue receipts previously referred to are still possible and equally probable under present plans of financing. Obviously, it is impossible, even under present and improved financial conditions, to plan consistent and comprehensive management programs, accurately set up budgets for a given period, or to carry on departmental activities and operations necessary to the continued preservation and perpetuation of the resource without continued fear of uncertainty and constant interruption therein. The future administrative and functional activities of the Commission should be placed on a permanent and sound basis by making direct appropriations from the general fund of the state of all funds necessary therefor.

It is, therefore, my recommendation, that adequate funds be provided by direct appropriation from the state general fund, thereby eliminating the uncertainty of carrying out a program of operation as planned on account of fluctuating receipts.

A detailed statement of receipts and disbursements during the biennium, together with other statistical data, is shown elsewhere in this report.

DIVISION OF FISH CULTURE

The main objective of the Division of Fish Culture is to liberate the maximum number of young fish of favorable size and condition to produce the maximum return of adult fish in the most economical manner.

As indicated in the last biennial report, the salmon runs of this state constitute one of its most important natural resources and represents one of the principal sources of food supply. The contribution of the fishing industry of this state to the war effort was of immense value and its potential worth to the citizens of this state is of equal importance. Many people are wholly or in part dependent upon the continued supply of anadromous food fishes in the streams of Oregon for their livelihood and well being. The investments of our citizens in this important industry represent many millions of dollars. In addition, there is the ever increasing sports fishery which has a considerable recreational value.

The artificial propagation of fish as carried on by this department becomes increasingly important in view of the great number of proposed dams and hydro-electric plants in the Columbia River and its tributaries. The hope of maintaining the runs of salmon in the Columbia River and many of its tributaries will unquestionably be largely dependent upon artificial means of production. This will be especially true in the Willamette River and its important tributaries.

It is now the established policy of this department to permit the escapement of a large percentage of the up-stream migrating adults, past the egg taking rack sites, for natural spawning. In some instances, however, this procedure is not possible because of insurmountable barriers such as that found in the Walterville Power Canal on the McKenzie River, and at the Bonneville hatchery where the fish return to the ponds from which they were liberated and no further movement upstream is possible.

Because of the heavy snow fall in the Cascade Range during the winter of 1945-1946, the attending run-off in the Willamette tributaries was of such magnitude that the installation of racks was impossible until after a portion of the early fish had passed beyond the rack sites. In addition to this escapement an additional number of adults which were held at the racks in the main McKenzie, South Santiam, and North Santiam Rivers, were released for natural spawning. It is the purpose of this department to follow this procedure in the future to an even greater degree and in a more detailed manner.

At most stations egg-takes have been curtailed to fit the capacity of the rearing ponds rather than the hatchery capacity. There is an abundance of evidence which indicates that the advanced feeding of fingerlings, particularly spring chinook, silver salmon and blueback, has brought about important improvements in the survival of the young. This return, as adults, indicates tremendous possibilities for future operations where the advanced rearing procedure is followed. Unfortunately, some of the stations of this department were designed as egg-collecting stations or short period rearing stations, which was considered a proper and effective procedure at the time of their institution. These stations did not require a year-around water supply. Plans have been made for rebuilding and relocating stations so as to provide sufficient water necessary for advanced fingerling feeding.

The pond systems at all the stations operated by this department are being enlarged and rearranged wherever and whenever possible to provide suitable facilities for the advanced fingerling feeding program.

Marking experiments have been and are being carried on at Bonneville, Alsea, and at the Willamette stations under the supervision of the Division of Research to determine, among other things, the most advantageous time for the liberation of fingerlings.

The department was able to obtain a steel liberation tank which is equipped with a gasoline pump for constant circulation and water aeration. The first work with this piece of equipment was that of transplanting approximately 8,000 ripe smelt from the Cowlitz River in Washington to the Sandy River in Oregon in February 1946. By this move it is hoped to introduce into the Sandy River races of smelt which inhabit the Cowlitz, as these runs are constant and return earlier than the Sandy River runs. It is the plan of the department to continue this transplantation for several years, subject to approval by the Department of Fisheries of the State of Washington.

During the spring and summer of 1946 the liberation truck was kept almost constantly in operation. Liberations were begun in the spring at most all of the stations. In some cases fingerlings were transplanted to the headwaters of the parent stream and its tributaries.

It is impossible to hold the total number of the resulting fry and fingerlings from a season's egg-take at some of the stations and employ the advanced feeding program. Therefore, when the station's holding facilities become crowded, liberations are made in the upper reaches of streams after a scientific study has been made and suitable conditions and environments have been determined in which to liberate the young.

Aside from an attempt to determine what factors other than rearing and time of liberations might increase returns of reared fish, marking experiments are also being carried on to determine proper planting sites.

The operation of a shad battery near Scappoose was maintained during the past biennium. This work is pure salvage since the eggs are taken from fish caught by fishermen in their regular operations.

Improvements of facilities have been scheduled for the stations operated by this department. Some improvements have been accomplished and others have been started. However, most of the urgently needed work has been left undone because of a shortage of material and finances.

Ox Bow Station

At the Ox Bow Station the egg-take during 1946 amounted to 3,570,000 fall chinook eggs. Enough fish were allowed to pass upstream to spawn naturally which would have produced an additional take of 3,000,000 eggs. By this procedure the stream is allowed to produce a natural supply of salmon in addition to that which is supplied from the hatcheries. This method of fisheries management is a safeguard against the possible loss of a season's crop of eggs by damage to spawning beds by floods or by other catastrophies. At this station many structural improvements are necessary. A few were completed during the past biennium and more are planned. Returns from liberations at this station are showing a steady increase each year; this year's return being considerably greater than during any previous year. The 1944 egg-take was 3,280,000. In 1945, it was 3,625,000. The egg-take in these years represents both actual and potential as compared to a potential egg-take of 6,570,000 in 1946.

Klaskanine Station

At the Klaskanine Station the silver salmon egg-take for 1945 was 5,727,860. The egg-take for the previous cycle in 1942 was 1,439,000. Sixty new standard size hatching troughs and a new head trough were installed at the Klaskanine Station. Considerable repair work has been accomplished on the entire pond system and a great deal more is needed and contemplated. Extensive repairs were completed on the dam across the Klaskanine River, and a new pipeline was laid from the hatching house to the intake. New food grinding equipment was added to the station.

Bonneville Station

At the Bonneville Station, the silver egg-take for 1945 was slightly under a half million eggs which represents approximately one-half the possible number of eggs that could have been taken since only about one-half the total run of silver salmon entered the ponds at this station. This was the first appearance of silver salmon at Bonneville in any appreciable numbers, and it is believed this return can be attributed to longer periods of rearing before liberation. The returns have been correspondingly great at some of the other stations. Fourteen hundred feet of 20-inch pipeline was installed at this station. Three hundred feet of lateral pipeline was also laid. The dam in Tanner Creek which furnishes water for the entire hatchery system was repaired and the old decking replaced. The returns of all species from liberations at this station have shown a steady increase. The return of fall chinook in 1946 was the largest on record with a potential egg-take of over 20 million.

McKenzie Station

At the McKenzie River Station the land which had formerly been occupied under a lease agreement was purchased. Excavations were made to provide an additional 700 feet of ponds but up to this time the ponds have not been placed in operation because of the inability to obtain the necessary materials for the completion of the separation dams to be placed in them. An entirely new head rack was constructed in the main McKenzie and a retaining rack placed in the Walterville Power Canal, this being a new departure from former methods employed here. Several thousand spring chinook of the 1945 brood are being held for year-around feeding at this station.

Middle Willamette Station

At the Middle Willamette River station at Oakridge considerable new work has been completed. A new series of ponds with concrete dams were constructed. These ponds were placed in the vicinity of the hatching and feed houses centralizing the fish cultural work at this station. A new pipeline and a settling basin were also added. The danger of damage from floods, such as that which occurred in December 1945, has been largely eliminated by the construction of a new dyke and the removal of several log jams in Salmon Creek. A small cold storage plant was provided for this station and is now in operation. On December 29, 1945, the pipeline supplying the hatching house was washed out. The entire stock of fry was being held in trays in the hatching house and their liberation became immediately necessary. This stock of fry had barely reached the swimming up stage and the survival of this brood was probably not very high.

North Santiam Station

The North Santiam River station also suffered extensive damage from the flood waters of December 1945. The entire pond system was inundated and the troughs in the hatching house were floated off their supports. It was necessary to remove the stocks of fry and fingerling being held in the hatching house and place them in the inundated ponds. The damage wrought has since been repaired and improvements added. The upper pond system was rebuilt and the water supply rearranged so as to provide a maximum amount of water and aeration for each pond. The main hatchery intake was widened and extended and an auxiliary pipeline laid to the hatching house. A refrigeration plant of approximately 10 tons capacity was installed at this station. An advanced feeding program is being carried on here. Approximately 20,000 spring chinook of the 1945 brood are being held for a longer rearing period. Some difficulty was experienced holding spring chinook fingerlings during the summer months.

South Santiam Station

The South Santiam station escaped without serious damage from the flood of December, 1945. This station is badly in need of additional equipment and repairs. More ponds and an adequate water supply are essential in carrying out the advanced feeding program planned for this station. One new pond is now in the process of construction. Several thousand fingerlings of the 1945 brood are being held for liberation during the late winter and early spring. A marking experiment is also being conducted on this brood of fish. This station has also been equipped with a new refrigeration plant.

Sandy River Station

The water supply at the Sandy River station is not considered satisfactory, and there are other detrimental features which make the operation of this station difficult and uncertain. Studies are being conducted on other sites and it is expected that the present location will be abandoned for one more favorable to fish cultural operations. The fish cultural work at this station has been fairly satisfactory considering the many difficulties encountered in operations.

Tillasqua Station

At the Tillasqua station which is located on Big Creek, tributary of the lower Columbia, extensive improvements have been undertaken. However, this work has been very slow and difficult due to a shortage of funds and materials. Three concrete ponds of the latest type have been completed and six more are under construction. A new 16-inch pipeline, 1500 feet long, was laid and a dam and concrete intake constructed in Big Creek. New standard size troughs were built for the hatching house. The feed house was rebuilt with a concrete floor added. New food grinding equipment was added to this station. The salmon propagation work has been very satisfactory and the returns are showing a steady increase. The flood of

December, 1945, rendered the racks inoperative, and the fishing season and resulting egg-take was cut short for the season. A ten-ton cold storage plant was also added to the equipment at this hatchery.

Foley Creek Station

At the Foley Creek Station in the Nehalem River, the water supply is considered inadequate. Other sites on the Nehalem system are being studied with the idea of relocating this station.

Trask Station

The hatching house at the Trask River Station has undergone major repairs. Extensive repairs were made on the water supply and to a limited extent on the pond system. Considerable repairs and alterations are necessary for the pond system at this station. It is planned to commence this work during the early summer of 1947. The fish cultural work at this station has been satisfactory and results have been good.

Siletz River Station

A new permanent rack was installed at the Rock Creek station on Siletz River, and new and improved holding ponds were also built. Considerable work was done on the pond intake from Rock Creek. A ten-ton refrigeration plant has been established at this station. Silver salmon fingerlings are being held at this station for a fourteen months' period and they were carried through the summer of 1946 in very good shape. It is planned to enlarge the pond system at this station.

Yaquina Station

The water supply at Yaquina Station is not adequate. A new hatchery location is being considered on Little Elk Creek where racks have been installed and a good egg-take is in prospect.

Alsea Station

At the Alsea Station a fourteen months' feeding program for silver salmon has been carried on for the past several years and returns from this advanced feeding are expected this winter. Silver salmon marking experiments are being carried on at this station by department biologists. Improvements and alterations are outlined for this station during the coming year.

Siuslaw Station

At the Siuslaw Station the water supply is inadequate and does not furnish a year around flow in sufficient quantity and proper temperature to permit the employment of the long-time feeding program. Consideration and study is being given a new location on Indian Creek. Racks have been installed in this stream and eggs will be collected there next winter. Troughs were set up in this stream and a feeding experiment carried on to determine the feasibility of holding fish in this stream during the period of maximum water temperature.

Coos Station

The salmon propagation work carried on by this department on the South Coos River was greatly handicapped by logging operations and splash dams. New traps and holding ponds have been located at the base of one of the splash dams. It is not known as yet how successful this operation will be. Forty thousand silver salmon fingerlings were held through the year and it is felt that twice this number can be held successfully. Additional water and pond space is contemplated for this station. The Coos Station suffered severe damage in the December flood of last year. This has since been repaired.

Rock Creek Station

The flume carrying the station water supply at the North Umpqua hatchery was carried away by the flood waters of December 29, 1945, and the liberation of the stock of fall chinook fry and fingerlings became necessary. The number of survivals will unquestionably be fewer than would be the case had the liberation occurred several months later. A cold storage plant has been added to this station's equipment.

Mill Creek Station

The station operated on Mill Creek on the Umpqua River at Scottsburg was completely destroyed by the high water which occurred December 29, 1945. It has been decided not to rebuild this station because of its vulnerability to flood conditions. A relocation of this station is being considered on Jackson Creek near the headwaters of the South Umpqua.

The general conditions of the buildings and facilities at most of the stations are poor and will probably remain so until such time as more money and materials are available for renovations. During past years, building and maintenance has necessarily been held at such a minimum that the accumulative effect has been to produce critical situations in several locations simultaneously. It is very evident that all the necessary work cannot be accomplished in any one season even though the necessary requisites are available. It is, therefore, expected that extensive maintenance and repair will be a major factor for some time to come.

Because of the evident success resulting from artificial rearing operations, the need for additional rearing capacities to adequately serve all river systems, is a factor which cannot be overlooked and which is being given quite extensive study. Field work has been done by qualified personnel on proposed hatchery site locations. It is hoped that modern up-to-date rearing facilities will become established which will aid in increasing the returns of fish to streams whose present runs are in need of rehabilitation.

DIVISION OF ENGINEERING

It has been estimated that since the salmon fishing industry was established on the Columbia River in 1866, the revenues from this important resource have amounted to approximately one billion dollars. In the survey made by the Fish Commission several years ago, it was revealed that processors and dealers on the Columbia River have an investment of over \$8,000,000 in boats, machinery, plants and other equipment. It was also disclosed that the investment of the fishermen operating on the river, in boats and equipment, was approximately \$5,000,000. During the five-year period, 1938-1942, it was estimated that the gross annual return to the industry from their investment averages nearly \$9,500,000. This income can be more fully appreciated when it is considered that such an amount would represent a 4 per cent return on a capitalized investment of \$230,000,000.

The above discussion has only dealt with the value of the Columbia River salmon fisheries. Important salmon fisheries are also conducted in several of the coastal streams and, in addition, a troll fishery of great significance is operative in offshore waters adjacent to our coast. Although the Fish Commission has no available data relative to the investment of equipment and gear of fishermen and investment of processors, or their income from these fisheries, it is believed, however, that the over-all value and income would amount to many millions of dollars.

The investment of the sport fishery for salmon and its many recreational ramifications is also very large.

These vast sums of money which are invested in the salmon fisheries, together with the founding of towns and villages which are peopled with fishermen and fisheries workers and employees in associated industries, are tangible examples of the influence that an established fisheries industry plays in the development of a region.

The raw materials, which in this case are the populations of salmon inhabiting our streams, are the basis for this great industry. In order that the greatest benefits to the State of Oregon continue from the fisheries resource it is evident that the populations of fish must be protected and maintained on a basis of sustained yield.

Many factors must be considered in connection with the maintenance and rehabilitation of our salmon fisheries, one of which is that proper physical condition of the streams be maintained. Salmon and steelhead trout ascend freshwater streams to distances of from several miles to several hundred miles from the ocean to deposit their spawn. After the young fish hatch, they spend varying periods of their early existence in fresh water after which they migrate to the sea. Upon reaching maturity they return to the streams and spawn like their parents did before them. It has been found that salmon return to the streams in which they were hatched, reared or liberated with a great degree of certainty. The populations or runs of salmon entering our streams are composed of many races, each of which form a self-perpetuating population. These races, or population units, must have access to their hereditary spawning grounds and their offspring must have an unobstructed passage to the sea if the total population of fish is to be maintained at high levels of abundance.

In this connection, the Fish Commission has initiated a program of stream clearance and channel improvement which will aid materially in the preservation and conservation of the fisheries resource. The funds which were appropriated to the Commission by the legislature during its 43rd session, has made this part of the fisheries improvement program possible. The work of this Division is closely coordinated with that of the research and hatchery divisions in the program of stream rehabilitation.

Some of the projects completed during the past two years are as follows:

Oregon City Falls

Much needed repairs were made to the fishway at Oregon City Falls. This work consisted of substantial repairs to broken and undermined walls; and additional improvements were made by the installation of several new baffle and training walls. The river channel in the immediate area of the entrance to the low water fishway was improved by the removal of numerous large boulders brought in from the face of the falls by high water. A counting station was installed in the main ladder which made it possible to determine the escapement of fish. Present plans call for further improvements to these fishways during the coming biennium. Observations by biologists during the past season indicated that there was considerable improvement in the ability of the fish to ascend this barrier.

Sherar Falls

The fishway at Sherar Falls on the Deschutes River is being rebuilt. The old ladder had a total length of 100 feet and an average width of 9 feet. These dimensions are being increased to a length of 150 feet and a width of 12 feet. Additional training walls will be added to control the flow of water in the ladder. The increased size of this fishway, together with new training walls, will permit the passage of fish at varying water stages.

Smith River Falls

At Smith River Falls added improvements were made to the fishway by blasting the resting pools deeper and the installation of reinforced concrete baffle walls. It is felt that because of these improvements many miles of spawning area were made available for salmon. Stocking of this area from hatchery fish is being contemplated at the present time.

Rock Creek

A channel was blasted through a rock reef at the mouth of Rock Creek, tributary of the Siletz River. In the past, salmon had difficulty in passing over this reef at low water stages. This channel, which is approximately 5 feet wide and 80 feet in length, will now permit easy passage of fish at all water levels.

Fall Creek

In Fall Creek, a tributary of the Alsea River, a natural falls is found which in the past has been a partial barrier to upstream migrants. A fishway, 8 feet wide, has been blasted through the falls, and reinforced concrete baffle walls and a concrete training wall were constructed. This fishway now furnishes easy access for migrating salmon to the upper 15 miles of the stream.

South Fork Wilson River

A natural falls in the South Fork of Wilson River which has been a partial block to upstream migrants at low water levels was partly removed to permit an easier passage for fish. This temporary work was an aid to the upstream migration of the run of fish that entered the stream in the fall of 1946. Further improvement by the erection of a new fishway at this point is included in the construction program for the coming biennium.

Tualatin River

A new fishway has been constructed by the Oregon Iron and Steel Company at their dam in the Tualatin River, tributary of the Willamette River, under the supervision of this division.

Eagle Creek Falls

A fishway at Eagle Creek Falls (Eagle Creek is a tributary of the Clackamas River) is now being rebuilt by the Game Commission and the Fish Commission on a cooperative basis. This falls has a vertical drop of 20 feet and with the completion of the ladder considerably more stream area above this point will be available to salmon and steelhead trout. Construction on this project was started in late September 1946, and after three weeks, work was discontinued because of high water. Work will resume again as soon as water conditions permit and completion of the job is anticipated before the close of the present biennium.

Jordan Creek

By the cooperative efforts of the Game Commission and the Fish Commission, a rock ledge was removed from the stream bed of Jordan Creek, which is a tributary of the Wilson River. This projecting ledge was located in a narrow gorge and had been causing large log jams to form at this point.

Wolf and Dogwood Creeks

Two abandoned sawmill dams, one in Wolf Creek, the other in Dogwood Creek, were removed. Both streams are tributaries of the Siuslaw River. The dams were located near the mouths of the streams and completely blocked upstream migrants from utilizing the natural spawning areas of the streams. The work here was also done by the cooperative efforts of the Game and Fish Commissions.

Clear Creek

The abandoned Bitner dam located in Clear Creek, which is a tributary of the Clackamas River, was also removed. The removal of this barrier, which was a serious block to migrating fish, now makes possible fuller utilization of the spawning grounds of the stream by anadromous fish.

Tahkenitch Lake

Several logs lying across the outlet stream from Tahkenitch Lake were removed to provide an easy passage for silver salmon and steelhead trout from the ocean to spawning areas in the lake. The Game Commission also cooperated in this work.

Wilson River

Since the Tillamook forest fire in 1933 considerable fire-killed timber has been falling into the Wilson River and its tributaries causing log jams to be formed at various points. Log jams have also been formed when unmarketable timber and debris has been deposited in the streams by extensive logging operations. During the winter of 1945-1946 a total of nine large log jams were removed from Wilson River and from its tributaries, Jordan Creek and Dog Creek. Six of these jams were removed by the cooperative efforts of the Highway, Game and Fish Commissions. The costs of this work were shared equally between the three state departments. Responsibility for the other three jams was assumed by logging operators in the area and were removed by them. At the present time the Wilson River system, with the exception of the upper reaches of Jordan Creek, is free from log jams which constitute barriers to upstream migrant fish.

Necanicum River

The Dempsey Dam, in the Necanicum River, which was no longer being used, was removed by cooperative efforts of the Fish and Game Commissions. An additional 20 miles of stream was made available for migratory fish as a result of this work.

Lewis and Clark River

In the summer of 1946 the city of Warrenton completed a concrete dam in the Lewis and Clark River. Beginning with the planning stage and continuing through the period of construction, this department has been directing the planning and installation of a concrete fishway at this barrier. It is expected that this fishway will be finished and in operation by January 1, 1947.

North Fork Willamette River

The Hines Lumber Company is constructing a new dam in the North Fork of the Willamette River at Westfir and the construction of an adequate fishway has been started. This fishway will be finished and in operation by the early summer of 1947.

In addition to the above mentioned work considerable time was spent surveying many other barriers and obstructions. Plans have been made to have many of the present inadequate fishways at several of the dams on the Willamette River replaced or rebuilt. The cost of most of these projects will be assumed by the individual companies owning the obstructions. A cooperative program with the U. S. Fish and Wildlife Service has been drawn up for the removal of barriers and the improvement of streams on the Columbia River system. It is expected that funds for this cooperative program will become available from the federal government through the "Mitchell Bill," which was signed by the President on August 8, 1946, and which authorizes cooperative work between state and federal fisheries agencies for the improvement of the spawning tributaries of the Columbia River.

It is hoped that this program will be initiated during the next two years. The benefits to be derived from the efforts of this division will be evidenced by the greater amount of spawning area available for adult salmon and the miles of stream opened for the natural rearing of the fingerling salmon and steelhead. The runs of many anadromous fish will then stand a greater chance of being maintained at a high level by this application of the management program.

DIVISION OF RESEARCH

The Division of Research was reorganized in October, 1945, after three years of inactivity. Donald L. McKernan was appointed Director of Research and two additional trained and experienced biologists were employed later in the year; they were John T. Gharrett and Donald R. Johnson.

Two general problems of immediate concern were investigated during the last half of the biennium. One problem had to do with the study of the fisheries resources of the Umpqua River which was conducted on a cooperative basis with the Game Commission. At its 43rd session, the legislature directed the Fish and Game Commissions to conduct studies on the salmon and steelhead trout on all coastal streams and submit recommendation for regulation of these species when the legislature convenes in January, 1947. Because of the limited finances and manpower in addition to the magnitude of the over-all problems involved, the Commission deemed it advisable to concentrate the coastal research studies to one river, namely the Umpqua. It is believed that methods of study developed in this investigation might in some parts be applied to studies of other coastal streams which are planned for the next biennium. The Umpqua River study has been in progress for about one year, and a joint report has been prepared which will be presented to the legislature by both Commissions with recommendations for regulations to be applied for conservation of the runs of salmon and steelhead trout in this river system.

The study of the Umpqua River has encompassed researches on all anadromous runs of fish which include spring and fall chinook salmon, silver salmon, summer and winter steelhead trout, shad, striped bass, and sturgeon. Some information on trout populations was also obtained. The general objectives of this study have been: (1) to determine the past history of the various runs of fish; (2) to determine their relative abundance in view of past records; (3) to analyze various factors involved in occurrence of depletion; (4) to study the biology and ecology of the species of fish in order to further determine methods of rehabilitation; and, (5) to recommend changes in regulations and any other measures necessary to conserve, rehabilitate and generally manage the fisheries resource of the Umpqua River.

The erection of multipurpose dams on the main tributaries of the Willamette River, as proposed in the program of the U. S. Army Engineers, will vitally affect the biology and ecology of the important spring run of chinook salmon and steelhead trout inhabiting this river. These runs of salmon are generally believed to be capable of yielding under proper management \$5,000,000 annually to the commercial and sports fishery. Because of the above impending program and the fact that runs of chinook salmon in the Willamette have declined in the past ten years, it was deemed advisable to begin management studies on this river. During the past year these studies have been in progress and an expanded program of research is planned on the Willamette during the coming biennium.

One phase of investigation was conducted cooperatively with the Game Commission. This was the study of the sports fishery in the lower Willamette River during the spring of 1946. It revealed that in the section of river from its mouth to Oregon City Falls, 12,630 spring chinook salmon were taken by sportsmen. Based on an average of 17 pounds per fish, this portion of river yielded about 214,700 pounds of fish to the anglers. From interviews with individuals in the upper river area it was estimated that approximately 200 fish were caught there before the close of the angling season for chinook salmon on July 1. This number of fish combined with the sport catch in the lower Willamette made a total calculated yield of about 218,100 pounds. Combining the escapement at Oregon City falls with the sport catch and the estimated number escaping into the Clackamas River, a total run of approximately 70,000 fish was estimated to have entered the Willamette in 1946.

The general objectives of the preliminary studies in 1946 were to determine: (1) the general magnitude of the run and how it compared with the parent run of 1941 which was studied by Craig and Townsend; (2) the success of the runs to reach their spawning grounds

and spawn; (3) the distribution of fish in the river system; and, (4) the effects of the contemplated development of the Willamette River on the runs of salmon.

The results of our preliminary study indicate that there are many factors affecting the survival of adults to spawning time, some of which are serious menaces to the continued maintenance of the populations of salmon entering the Willamette. Many barriers were studied. It was apparent that several of them delayed the upstream migration of adult salmon to such an extent that considerable mortality occurred before the fish spawned. In several cases adult fish were attracted into canals only to have their migration blocked at impassable barriers which were located within the diversions. The Walterville diversion on the McKenzie River was one in which a heavy mortality of fish occurred. Immediately below the power house located in the canal, approximately 1,750 adult spring chinook died prior to spawning, of which over 1,000 were females. Apparently the females were less able to withstand the unfavorable conditions found on their upstream migration to and at this point. It was calculated that approximately 60 per cent of the adult fish that entered the canal died before spawning. Such losses contribute seriously to the general decline in the runs. Preliminary studies of the Willamette River salmon runs show a serious decline in the returns of fish from a given brood year. As a result of these preliminary studies immediate steps are being taken to apply corrective measures at several barriers to check the loss of fish on their upstream migration.

• A report on the progress of these studies is being prepared, and an expanded program of study of the factors contributing to the general decline in the runs of salmon of the Willamette is planned for the next biennium.

As a part of the over-all program of fisheries management, studies and appraisals of artificial propagation are being made. Scientific methods must be applied to hatchery management practices in order that costs of production be kept at practical economic levels and that fingerlings be liberated in the best possible condition and at the proper time in order to insure maximum returns of adult fish. In order to determine the cost per adult fish produced and to determine the number of adult salmon returning to the fishery, a marking program on silver fingerlings was begun. This program was also devised to study the proper time of liberation of the fingerlings from the hatcheries so as to allow a maximum survival. One hundred and sixty thousand silver salmon fingerlings have been marked and liberated during the biennium. The first adult silver salmon from these experiments is expected to return from the ocean in the fall of 1947. The experiments are being conducted simultaneously at the Bonneville hatchery on the Columbia River and at the Alsea hatchery on the Alsea River.

Since October, 1945, as much information as possible has been gathered on many more of our commercial species of fish. Data has been collected on the crab, razor clam, sturgeon, smelt, and other fisheries. Plans and programs of research for the next biennium have been prepared which include studies of several of the important fisheries of the state in need of immediate management and conservation.

A joint study of the fisheries resources of the Columbia River with the State of Washington during the next two years has been planned. The data on the fisheries of the Columbia River must be obtained as quickly as possible so that a more comprehensive management program can be adopted.

Joint studies of the ocean fisheries of mutual concern have been discussed and planned with Washington and California, and already an exchange of data on the crab fishery is under way with Washington. Included in this program are research projects on the following marine species which will be made by the research staffs of the three states: the ocean troll, otter trawl, shark, tuna, and pilchard fisheries.

If present plans materialize, a comprehensive research program will be inaugurated on all the major fisheries of our state. It is believed that this program of research will yield the necessary scientific data upon which to base recommendations for future improvements and regulations and will assist in the maintenance and conservation of our fisheries resources.

STATEMENT OF RECEIPTS AND DISBURSEMENTS

Biennial Period Ending June 30, 1946

RECEIPTS

	Hatchery Fund	General Fund
	Fiscal Year Ending June 30, 1945	Fiscal Year Ending June 30, 1946
Licenses:		
Fishing	\$ 30,016.60	\$ 35,058.00
Dealers and Processors	10,536.94	12,360.28
Total License Receipts	\$ 40,553.54	\$ 47,418.28
Other Income:		
Poundage Fees	\$133,758.01	\$129,690.54
Fines and Confiscated Property Sales	2,977.18	2,184.83
Miscellaneous Income	335.34	2,457.22
Total Other Income	\$137,070.53	\$134,332.59
Total Revenue	\$177,624.07	\$181,750.87
Sundry Receipts:		
Transfers from Seal Fund	\$ 600.00	\$ 600.00
State Police Refund		4,239.37
Refunds	78.20	370.40
Total Sundry Receipts	\$ 678.20	\$ 5,209.77
TOTAL RECEIPTS	\$178,302.27	\$186,960.64
Appropriations:		
Emergency Fund Appropriation July 28, 1944	\$ 20,000.00	
General Fund Appropriation 1945-1947		\$165,000.00
TOTAL RECEIPTS and APPROPRIATIONS	\$198,302.27	\$351,960.64

STATEMENT OF RECEIPTS AND DISBURSEMENTS—Continued

Biennial Period Ending June 30, 1946

DISBURSEMENTS

	Hatchery Fund Fiscal Year Ending June 30, 1945		General Fund Fiscal Year Ending June 30, 1946	
Title on Revenue to State General Fund.....		\$ 12,328.71		
Oregon State Police.....		\$ 19,964.00		\$ 19,544.50
Division of Fish Culture:				
Artificial Propagation:				
Salaries and Wages.....	\$ 62,224.78		\$ 63,767.32	
General, Operating, Maintenance.....	30,921.99		18,922.54	
Hatchery Facilities and Equipment—				
Capital Outlay.....	18,122.54	\$ 111,269.31	8,908.46	\$ 91,598.32
Division of Research:				
Agricultural Research Foundation—Corvallis				
For Technological Research in Development				
of Fisheries Products.....	\$ 4,450.00			
Salaries and Wages.....			7,287.73	
General, Operating, Maintenance.....	180.81		3,652.05	
Research Facilities and Equipment—				
Capital Outlay.....		\$ 4,630.81	768.76	\$ 11,708.54
Division of Administration:				
Commissioners:				
Per Diem.....	\$ 455.00		\$ 475.00	
Expenses.....	574.95	\$ 1,029.95	653.95	\$ 1,128.95
Office and Miscellaneous:				
Salaries and Wages.....	\$ 15,110.52		\$ 26,966.90	
General, Operating, Maintenance.....	10,673.61		9,353.65	
Furniture and Office Equipment—				
Capital Outlay.....	1,511.41	\$ 27,295.54	671.38	\$ 36,991.93
Fishways, Channel Improvement and				
Stream Survey:				
Salaries and Wages.....	\$ 59.00		\$ 6,234.68	
General, Operating, Maintenance.....	81.65		4,690.50	
Equipment—Capital Outlay.....	133.48	\$ 274.13	5,532.84	\$ 16,458.02
Inspection and Patrol:				
Salaries and Wages.....	\$ 6,557.80		\$ 6,166.85	
General, Operating, Maintenance.....	2,363.14		1,697.24	
Equipment—Capital Outlay.....	966.87	\$ 9,887.81	1,140.74	\$ 9,004.83
TOTAL DISBURSEMENTS.....		\$186,680.26*		\$186,435.09
Balance.....		\$ 11,622.01		\$165,525.55
Balance at Beginning of Period.....		(6,023.43)		
Balance at End of Period.....		\$ 5,598.58		\$165,525.55
Unexpended Balance Emergency Fund				
Appropriation, Reverts to General Fund....	\$ 4,947.86			
Unexpended Balance Hatchery Fund—				
Transferred to State General Fund.....	650.72	\$ 5,598.58		
Unexpended Balance of General Fund				
Appropriation 1945-1947.....			\$ 63,451.00	
Unexpended Balance of General Fund				
"Fish Commission Fee Account".....			102,074.55	\$165,525.55

* Chapter 98, Sec. 25, Oregon Laws, 1945 provides that all funds remaining to the credit of the Hatchery Fund on July 1, 1945 are appropriated for the payment of expenses incurred prior to such date and that any balance remaining unexpended in the said Hatchery Fund on December 31, 1945 be transferred to the General Fund of the State. Disbursements made under this Act from July 1, 1945 through December 31, 1945 are included in this amount.

COMPARATIVE SCHEDULE OF LICENSES ISSUED
Fiscal Years Ending on June 30th

Licenses	Rate	1946	1945	1944	1943	1942	1941
Gillnet.....	\$7.50	982	874	857	871	962	1074
Setnet.....	*\$3.75- 5.00	1438	1120	979	1098	1018	912
Trap.....	25.00	59	53	46	43	45	37
Seine.....	Various	16	17	22	28	25	38
Troll.....	2.50	69	71	71	67	68	61
Boatpuller.....	2.50	260	216	257	264	250	272
Retail Fish Dealer and Peddler.....	5.00	1306	1118	929	911	995	1158
Wholesale Fish Dealer.....	25.00	189	166	135	115	131	133
Broker.....	50.00	4	2	3	3	3	3
Salmon Canner.....	25.00	26	13	11	15	12	9
Shellfish Canner.....	Various	7	6	9	10	13	10
Reduction Plant.....	25.00	5	9	4	3	7	6
Bagnet.....	5.00	(a)106	(b)341	76	143	94	45
Clam.....	5.00	815	514	297	225	147	345
Crab.....	5.00	375	301	346	268	324	182
Crawfish.....	5.00	28	21	20	12	11	20
Setline.....	1.00	218	200	161	71	71	89
Delivery.....	Various	1124	1031	989	871	877	889
Supplemental to Delivery.....	Various	11	20	12	18	29	24
Total Licenses.....		7038	6093	5224	5036	5082	5307

* The 1941 Legislature, by statutory amendment of section 83-615, O. C. L. A., increased the setnet license fee from \$3.75 to \$5.00, effective June 14, 1941.

(a) Includes 75 issued for Sandy River Smelt.

(b) Includes 238 issued for Sandy River Smelt.

COMPARATIVE STATEMENT OF LICENSES ISSUED

License Years Ending on March 31st

Licenses	Rate	1946	1945	1944	1943	1942	1941
Alsea Bay and River							
Gillnet	\$ 7.50	41	34	41	37	49	59
Setnet	\$3.75- 5.00	163	160	165	160	166	165
Boat Puller	2.50	4	2	5	3	4	8
Retail Fish Dealer and Peddler	5.00	50	29	27	36	42	45
Wholesale Fish Dealer	25.00	4	5	4	3	4	3
Shellfish Canner	Various	...	...	...	...	...	1
Clam	5.00	5	5	2	4	19	20
Crab	5.00	31	34	29	21	29	22
Total Alsea Bay and River		298	269	273	264	313	323
Brookings Harbor							
Wholesale Fish Dealer	\$25.00	2	1	1	...	...	...
Retail Fish Dealer and Peddler	5.00	...	1	3	...	...	2
Crab	5.00	1	...	...	...	...	...
Total Brookings Harbor		3	2	4	...	...	2
Chetco Bay							
Retail Fish Dealer and Peddler	\$ 5.00	8	3	...	...	...	...
Wholesale Fish Dealer	25.00	1	2	...	...	...	...
Crab	5.00	1	...	...	...	...	...
Total Chetco Bay		10	5	...	...	...	...
Clatsop Beaches							
Retail Fish Dealer and Peddler	\$ 5.00	2	1	...	1	1	1
Shellfish Canner	Various	3	3	2	1	2	1
Clam	5.00	424	242	197	57	192	238
Crab	5.00	11	19	15	19	...	...
Wholesale Fish Dealer	25.00	1	2	...	...	...	...
Total Clatsop Beaches		441	267	214	78	195	240
Columbia River and Tributaries							
Gillnet	\$ 7.50	524	508	542	568	629	667
Setnet	\$3.75- 5.00	220	177	184	161	187	178
Trap	25.00	53	48	44	41	40	39
Seine	Various	17	21	24	29	32	36
Troll	2.50	84	64	50	55	73	61
Boat Puller	2.50	182	162	215	241	217	244
Retail Fish Dealer and Peddler	5.00	862	744	725	739	838	837
Wholesale Fish Dealer	25.00	88	76	69	69	70	67
Broker	50.00	2	3	3	3	3	4
Shellfish Canner	10.00	1	1	1	2	2	...
Salmon Canner	25.00	12	9	8	10	7	8
Reduction Plant	25.00	6	4	4	5	6	6
Bagnet	5.00	(a)304	(b)107	71	147	81	60
Clam	5.00	...	...	1	...	...	...
Crab	5.00	20	2	3	6	20	10
Crawfish	5.00	24	23	12	11	16	23
Setline	1.00	186	142	99	43	66	79
Total Columbia River		2585	2091	2055	2130	2287	2319

(a) Includes 263 issued for Sandy River Smelt.

(b) Includes 14 issued for Sandy River Smelt.

COMPARATIVE STATEMENT OF LICENSES ISSUED—Continued

License Years Ending on March 31st

Licensees	Rate	1946	1945	1944	1943	1942	1941
Coos Bay and River							
Gillnet.....	\$ 7.50	56	37	35	19	21	30
Setnet.....	\$3.75- 5.00	161	102	74	61	73	89
Boat Puller.....	2.50	15	9	15	5	4	5
Retail Fish Dealer and Peddler.....	5.00	38	25	27	33	42	63
Wholesale Fish Dealer.....	25.00	15	9	10	10	11	11
Shellfish Canner.....	10.00	..	1	3	2	3	2
Salmon Canner.....	25.00	2	..	..	..	..	..
Clam.....	5.00	27	14	14	10	12	26
Crab.....	5.00	89	87	88	84	65	65
Total Coos Bay and River.....		403	284	266	224	231	291
Coquille River							
Gillnet.....	\$ 7.50	28	38	44	50	60	67
Setnet.....	\$3.75- 5.00	43	55	65	79	69	90
Boat Puller.....	2.50	2	2	4	10	17	10
Retail Fish Dealer and Peddler.....	5.00	11	16	17	14	14	22
Wholesale Fish Dealer.....	25.00	5	5	5	3	4	5
Clam.....	5.00	..	..	2	2	3	4
Crab.....	5.00	4	4	6	4	3	3
Salmon Canner.....	25.00	..	..	..	..	..	1
Total Coquille River.....		93	120	143	162	170	202
Depoe Bay							
Retail Fish Dealer and Peddler.....	\$ 5.00	11	6	16	14	16	13
Wholesale Fish Dealer.....	25.00	4	2	2	5	5	6
Crab.....	5.00	8	21	12	9	1	..
Total Depoe Bay.....		23	29	30	28	22	19
Lincoln County Beaches							
Clam.....	\$ 5.00	8	3	4	2	8	5
Total Lincoln County Beaches.....		8	3	4	2	8	5

COMPARATIVE STATEMENT OF LICENSES ISSUED—Continued
License Years Ending on March 31st

Licenses	Rate	1946	1945	1944	1943	1942	1941
Nehalem River							
Gillnet.....	\$ 7.50	52	49	48	55	69	69
Setnet.....	\$3.75- 5.00	115	125	108	110	116	132
Boat Puller.....	2.50	3	3	4	2	5	6
Retail Fish Dealer and Peddler.....	5.00	20	14	9	10	15	18
Wholesale Fish Dealer.....	25.00	5	4	2	3	3	4
Clam.....	5.00	1	...	...	...	1	2
Crab.....	5.00	10	11	5	6	10	8
Total Nehalem River.....		206	206	176	186	219	239
Nestucca River							
Retail Fish Dealer and Peddler.....	\$ 5.00	6	...	...	1	1	3
Clam.....	5.00	1	...	...	3	4	1
Crab.....	5.00	1	...	...	1	1	3
Wholesale Fish Dealer.....	25.00	1	...	...	...	...	...
Total Nestucca River.....		9	...	...	5	6	7
Netarts Bay							
Setnet.....	\$3.75- 5.00	4	4	6	6	6	4
Retail Fish Dealer and Peddler.....	5.00	4	1	1	1	5	5
Crab.....	5.00	13	4	5	9	11	9
Total Netarts Bay.....		21	9	12	16	22	18
Port Orford							
Retail Fish Dealer and Peddler.....	\$ 5.00	3	1	1	1	1	4
Wholesale Fish Dealer.....	25.00	3	1	1	1	1	4
Crab.....	5.00	22	20	11	16	14	17
Shellfish Canner.....	Various	...	...	...	...	...	1
Total Port Orford.....		28	22	13	18	16	26
Salmon River							
Gillnet.....	\$ 7.50	2	1	1	...	...	1
Setnet.....	\$3.75- 5.00	19	18	18	14	20	24
Boat Puller.....	2.50	2	1	2	1	...	1
Retail Fish Dealer and Peddler.....	5.00	8	5	7	1	6	5
Wholesale Fish Dealer.....	25.00	1	2	...	1	2	2
Crab.....	5.00	...	...	...	...	1	...
Total Salmon River.....		32	27	28	17	29	33
Sand Lake							
Setnet.....	\$3.75 -5.00	5	2	5	6	5	4
Crab.....	5.00	...	...	...	1	...	...
Total Sand Lake.....		5	2	5	7	5	4

COMPARATIVE STATEMENT OF LICENSES ISSUED—Continued
License Years Ending on March 31st

Licenses	Rate	1946	1945	1944	1943	1942	1941
Siletz River							
Gillnet.....	\$ 7.50	4	3	3	5	7	6
Setnet.....	\$3.75- 5.00	117	81	72	77	101	116
Boat Puller.....	2.50	3	2	2	4	2	5
Retail Fish Dealer and Peddler.....	5.00	31	23	14	11	16	23
Wholesale Fish Dealer.....	25.00	7	5	6	3	5	7
Crab.....	5.00	...	2	1	...	...	...
Total Siletz River.....		162	116	98	100	131	157
Siuslaw River							
Gillnet.....	\$ 7.50	32	31	30	31	48	53
Setnet.....	\$3.75- 5.00	50	30	21	18	36	52
Boat Puller.....	2.50	4	7	8	8	7	11
Retail Fish Dealer and Peddler.....	5.00	27	16	17	13	20	33
Wholesale Fish Dealer.....	25.00	2	2	2	3	3	3
Clam.....	5.00	5	5	4	2	7	7
Crab.....	5.00	8	7	11	4	4	3
Total Siuslaw River.....		128	98	93	79	125	162
Tillamook Bay							
Gillnet.....	\$ 7.50	82	71	73	59	62	72
Setnet.....	\$3.75- 5.00	207	208	207	201	174	166
Boat Puller.....	2.50	8	7	7	5	2	...
Retail Fish Dealer and Peddler.....	5.00	31	28	21	27	41	34
Wholesale Fish Dealer.....	25.00	11	10	11	10	10	7
Salmon Canner.....	25.00	1	...	1	1	1	...
Shellfish Canner.....	Various	1	...	...	...	1	...
Clam.....	5.00	25	20	17	22	23	29
Crab.....	5.00	39	44	47	38	41	28
Total Tillamook Bay.....		405	388	384	363	355	336
Umpqua River							
Gillnet.....	\$ 7.50	61	53	59	64	75	112
Setnet (Smith River).....	\$3.75- 5.00	86	79	81	73	62	81
Troll.....	2.50	1	...	...	...	...	...
Boat Puller.....	2.50	7	4	6	6	3	15
Retail Fish Dealer and Peddler.....	5.00	23	24	28	19	21	24
Wholesale Fish Dealer.....	25.00	9	6	7	5	8	6
Salmon Canner.....	25.00	1	1	1	1	...	...
Shellfish Canner.....	Various	...	2	2	4	2	1
Clam.....	5.00	12	4	2	2	11	3
Crab.....	5.00	2	5	3	5	3	5
Total Umpqua River.....		202	178	189	179	185	247

COMPARATIVE STATEMENT OF LICENSES ISSUED—Continued
License Years Ending on March 31st

Licenses	Rate	1946	1945	1944	1943	1942	1941
Yaquina Bay and River							
Gillnet.....	\$ 7.50	21	23	25	24	22	31
Setnet.....	\$3.75- 5.00	3	2	1	3	1	6
Boat Puller.....	2.50	2	3	4	4	3	5
Retail Fish Dealer and Peddler.....	5.00	48	34	33	40	44	53
Wholesale Fish Dealer.....	25.00	12	7	7	6	7	11
Clam.....	5.00	26	26	14	10	17	16
Crab.....	5.00	65	70	71	50	33	29
Setline.....	1.00	29	25	16	11	17	18
Shellfish Canner.....	Various	1	2	2	2	2	...
Salmon Canner.....	25.00	3	1	1	1	1	...
Reduction Plant.....	25.00	1	1	...	...	...	...
Total Yaquina Bay and River.....		211	194	174	151	147	169
Miscellaneous							
Troll (Pacific Ocean).....	\$ 2.50	1	1	2	1	...	...
Delivery.....	Various	1086	930	911	842	877	823
Supplemental to Delivery.....	Various	13	19	13	16	...	...
Total Miscellaneous.....		1100	950	926	859	877	823
Grand Totals.....		6373	5260	5087	4868	5343	5622
Recapitulation							
Gillnet.....	\$ 7.50	903	848	901	912	1042	1167
Setnet.....	*\$3.75- 5.00	1193	1043	1007	969	1016	1107
Trap.....	25.00	53	48	44	41	40	39
Seine.....	Various	17	21	24	29	32	36
Troll.....	2.50	86	65	52	56	73	61
Boat Puller.....	2.50	232	202	272	289	264	310
Retail Fish Dealer and Peddler.....	5.00	1183	971	946	961	1123	1185
Wholesale Fish Dealer.....	25.00	171	139	127	122	133	136
Broker.....	50.00	2	3	3	3	3	4
Salmon Canner.....	25.00	19	11	11	13	9	9
Shellfish Canner.....	Various	6	9	10	11	12	6
Reduction Plant.....	25.00	7	5	4	5	6	6
Bagnet.....	5.00	(a)304	(b)107	71	147	81	60
Clam.....	5.00	534	319	257	114	297	351
Crab.....	5.00	325	330	307	273	236	202
Crawfish.....	5.00	24	23	12	11	16	23
Setline.....	1.00	215	167	115	54	83	97
Delivery.....	Various	1086	930	911	842	846	801
Supplemental to Delivery.....	Various	13	19	13	16	31	22
Totals.....		6373	5260	5087	4868	5343	5622

* The 1941 Legislature, by statutory amendment of section 83-615, O. C. L. A., increased the setnet license fee from \$3.75 to \$5.00, effective June 14, 1941.

(a) Includes 263 issued for Sandy River Smelt.

(b) Includes 14 issued for Sandy River Smelt.

SEAL FUND

STATEMENT OF RECEIPTS AND DISBURSEMENTS

Biennial Period Ending June 30, 1946

RECEIPTS—From Sale of Seal Certificates

License	Rate	No.	Fiscal Year Ending		Fiscal Year Ending		
			June 30, 1945	No.	Amount	June 30, 1946	
Gillnet.....	\$ 2.50	509	\$1,272.50	565	\$1,412.50		
Setnet.....	2.50	96	240.00	105	262.50		
Troll.....	2.50	70	175.00	66	165.00		
Seine.....	20.00	17	340.00	16	320.00		
Trap.....	10.00	53	530.00	59	590.00		
Canner.....	50.00	9	450.00	\$ 3,007.50	17	850.00	\$ 3,600.00
Total Receipts.....			\$ 3,007.50			\$ 3,600.00	
LESS: Tithe 10% State General Fund.....			300.75			360.00	
Balance Receipts After Payment of Tithe.....			\$ 2,706.75			\$ 3,240.00	

DISBURSEMENTS

	Fiscal Year Ending June 30, 1945	Fiscal Year Ending June 30, 1946
For Bounties Paid on Seals Destroyed (73 @ \$10.00).....	\$ 730.00	(114 @ \$10.00)..... \$ 1,140.00
For Administrative Expenses.....	612.19	614.74
Total Disbursements.....	\$ 1,342.19	\$ 1,754.74
Excess Net Receipts Over Disbursements.....	\$ 1,364.56	\$ 1,485.26
Balance at Beginning of Period.....	9,584.65	10,949.21
Balance at End of Period.....	<u>\$10,949.21</u>	<u>\$12,434.47</u>

ARRESTS FOR VIOLATIONS OF COMMERCIAL FISHERIES CODE

Fiscal Year Ending June 30, 1945

Fishing and delivering fish without a license	31
Fishing prohibited methods	36
Fishing closed seasons and closed waters	23
Dealing in food or shellfish without a license	11
Possession of over-limit of clams	28
Possession of under-size sturgeon	1
Unlawful possession of food fish	2
Pollution of waters	2
Driving and parking on clam bar	4
Miscellaneous violations	6
Total arrests	144

ARRESTS AND DISPOSITION OF CASES

Fiscal Year Ending June 30, 1945

COUNTY	Number of Arrests	Number of Convictions	Number Pending, Dismissed or Not Guilty	Amount of Fines Imposed	Amount of Fines Suspended or Remitted	Number Fined or Suspended in Whole or Part
Clackamas	9	8	1	\$ 530.00	\$ 5.00	1
Clatsop	38	38	..	1,945.50	1,312.00	33
Columbia	4	4	..	350.00	130.00	2
Coos	8	8	..	800.00	580.00	8
Curry	2	2	..	50.00	50.00	2
Douglas	4	4	..	289.60	75.00	1
Lane	4	4	..	175.00	10.00	1
Lincoln	20	20	..	1,000.00	788.50	20
Multnomah	26	26	..	785.00	100.00	3
Tillamook	25	24	1	2,380.50	655.40	12
Umatilla	1	1	..	50.00	.....	..
Wasco	2	2	..	345.00	75.00	1
Washington	1	1	..	50.00	35.00	1
Total	144	142	2	\$8,750.60	\$3,815.90	85

ARRESTS FOR VIOLATIONS OF COMMERCIAL FISHERIES CODE

Fiscal Year Ending June 30, 1946

Fishing and delivering fish without a license	21
Fishing prohibited methods	35
Fishing closed seasons and closed waters	18
Dealing in food or shellfish without a license	18
Possession of over-limit of clams	19
Possession of undersize clams	7
Possession of undersize sturgeon	1
Unlawful possession of food fish	2
Pollution of waters	5
Driving and parking on clam bar	3
Miscellaneous violations	6
Total Arrests	135

ARRESTS AND DISPOSITION OF CASES

Fiscal Year Ending June 30, 1946

COUNTY	Number of Arrests	Number of Convictions	Number Pending, Dismissed or Not Guilty	Amount of Fines Imposed	Amount of Fines Suspended or Remitted	Number Pledged or Suspended in Whole or Part
Benton	4	3	1	\$ 150.00	\$ 150.00	3
Clackamas	6	5	1	200.00	60.00	1
Clatsop	22	21	1	891.00	555.00	18
Columbia	3	3		300.00	90.00	1
Coos	23	20	3	1,350.00	430.00	9
Crook	2	2		100.00	90.00	2
Harney	1	1		50.00	50.00	1
Jackson	4	1	3	25.00		3
Josephine	2	2		200.00	75.00	1
Lane	3	2	1	150.00		
Lincoln	18	17	1	870.00	494.00	14
Linn	4	4		175.00	135.00	3
Malheur	1	1		50.00	25.00	1
Marion	2	2		105.00	100.00	1
Multnomah	11	11		500.00	62.50	3
Sherman	2	2		65.00		
Tillamook	16	15	1	979.40	53.60	1
Umatilla	1	1		95.50		
Union	5	2	3	50.00		
Wasco	5	4	1	65.50		
Total	135	119	16	\$6,371.40	\$2,370.10	62

EGG TAKE

NUMBER OF EGGS TAKEN AT STATIONS OPERATED BY THE FISH COMMISSION

Fiscal Year Ending June 30, 1945

Fisheries Station	Chinook	Silver Salmon	Steel-head	Blue-back	Shad	Chum	Total
Alsea		1,137,000	375,000				1,512,000
Bonneville	10,529,000	506,000		404,400		60,000	11,499,400
Coos	90,000	1,410,000	876,000				2,376,000
Coquille		183,000	1,133,000				1,316,000
Klaskanine	2,810,000	8,198,000	150,000				11,158,000
McKenzie	1,197,000						1,197,000
Nehalem		13,000				31,000	44,000
Ox Bow Springs	3,280,000						3,280,000
Sandy		10,000					10,000
Santiam, N.	1,474,700						1,474,700
Santiam, S.	84,900						84,900
Scappoose					6,215,000		6,215,000
Siletz		1,926,000	74,850				2,000,850
Siuslaw		503,000					503,000
Ten Mile		1,500,000					1,500,000
Tillamqua	1,013,000	2,555,000	310,000			150,000	4,028,000
Trask	3,880,000	2,920,000				60,000	6,860,000
Umpqua	901,300						901,300
Willamette	2,430,000						2,430,000
Yaquina		211,000					211,000
Total	27,689,900	21,072,000	2,918,850	404,400	6,215,000	301,000	58,601,150

NUMBER OF EGGS TAKEN AT STATIONS OPERATED BY THE FISH COMMISSION

Fiscal Year Ending June 30, 1946

Fisheries Station	Chinook	Silver Salmon	Steel-head	Chum	Shad	Total
Alsea		492,257	250,000			742,257
Bonneville	13,655,000	409,630				14,064,630
Coos		172,656	223,732			396,388
Coquille		22,000				22,000
Klaskanine		5,727,860	49,910			5,777,770
McKenzie	1,780,000					1,780,000
Nehalem				33,000		33,000
Ox Bow Springs	3,625,000					3,625,000
Sandy	435,200	14,400	238,532			688,132
Santiam, N.	908,300					908,300
Santiam, S.	1,445,700					1,445,700
Scappoose					6,540,000	6,540,000
Siletz		1,512,050				1,512,050
Siuslaw		577,552				577,552
Ten Mile		520,000				520,000
Tillamqua	99,433	3,589,019		360,000		4,048,452
Trask	2,535,000	1,395,000				3,930,000
Umpqua	166,500					166,500
Willamette	1,469,225					1,469,225
Yaquina		14,600				14,600
Total	26,119,358	14,447,024	762,174	393,000	6,540,000	48,261,556

EGG TRANSFERS

Fiscal Year Ending June 30, 1945

Fisheries Station—		RECEIVING STATION											
Source	Species	Alsea	Bonneville	Coos	Klaskanine	Mill Creek	Nehalem	Sandy	North Santiam	Siuslaw	Tillamook	Umpqua	Yaquina
Bonneville	Chinook	500,155						329,912				500,155	250,044
Klaskanine	Chinook						1,000,000						
Klaskanine	*Silver Salmon		528,000			1,190,000	1,000,000				546,000		528,000
Ox Bow Springs	Chinook							175,000		510,000			
Ten Mile	Silver Salmon											500,000	
Umpqua	Chinook		326,150										

* 100,000 transferred to the U. S. Fish and Wildlife Service, Bangor, Maine.

EGG TRANSFERS

Fiscal Year Ending June 30, 1946

Fisheries Station—		RECEIVING STATION											
Source	Species	Alsea	Bonneville	Coos	Klaskanine	Mill Creek	Nehalem	Sandy	North Santiam	Siuslaw	Tillamook	Umpqua	Yaquina
Bonneville	Chinook	500,000					500,000	600,000		510,000	500,000	500,000	
Coquille	Silver Salmon			14,899									
Klaskanine	Silver Salmon		504,000	100,000			500,000						200,000
Ox Bow Springs	Chinook				700,000								502,320
Sandy	Silver Salmon		13,877										
Santiam, S.	Chinook								500,000				
Ten Mile	Silver Salmon											518,470	

LIBERATIONS

NUMBER OF FINGERLINGS AND FRY LIBERATED INTO THE WATERS OF THE
STATE OF OREGON BY THE FISH COMMISSION

Fiscal Year Ending June 30, 1945

Fisheries Station	Chinook	Silver		Chum	Shad	Total	Where Liberated
		Salmon	Steel-head				
Alesea	497,310	1,211,705	373,335			2,082,350	Alesea R.
Bonneville	120,000					120,000	Deschutes R., Trib. Columbia R.
	3,909,620	494,348		59,624		4,463,592	Tanner Cr., Trib. Columbia R.
Coos	60,000					60,000	Fifteen Mile Cr., Trib. Columbia R.
	87,380					87,380	Coos R.
Coquille		1,358,925	847,790			2,206,715	S. Coos R.
		174,715	1,094,240			1,268,955	S. Fork Coquille R.
Klaskanine	1,700,000					1,700,000	N. Fork Klaskanine R., Trib. Columbia R.
		2,355,000	139,000			2,494,000	Klaskanine R., Trib. Columbia R.
McKenzie	900,000					900,000	McKenzie R.
Mill Creek		332,766				332,766	Mill Cr., Trib. Umpqua R.
Nehalem	994,900	796,750		30,650		1,822,300	Foley Cr., Trib. Nehalem R.
Ox Bow Springs	2,149,062					2,149,062	Herman Cr., Trib. Columbia R.
Sandy	500,702	9,689				510,391	Sandy R., Trib. Columbia R.
Santiam, N.	1,375,931					1,375,931	Stout Cr., Trib. N. Santiam R.
Scappoose					6,215,000	6,215,000	Willamette Slough, Trib. Columbia R.
Siletz		1,893,500	71,240			1,964,740	Rock Cr., Trib. Siletz R.
Siuslaw	498,400	471,670				970,070	Knowles Cr., Trib. Siuslaw R.
Ten Mile		985,000				985,000	Templeton Cr., Trib. Ten Mile R.
Tillasqua	928,500	1,828,500	225,000	149,000		3,131,000	Tillasqua R., Trib. Columbia R.
	3,449,000	2,990,500				6,439,500	Gold Cr. and Trask R.
Trask		15,000				15,000	Salmon R.
				56,000		56,000	Gold Cr., Trib. Trask R.
Umpqua	492,951	499,450				992,401	Rock Cr., Trib. Umpqua R.
Willamette	2,308,125					2,308,125	Salmon Cr., Trib. Willamette R.
Yaquina	247,195	727,150				974,345	Simpson Cr., Trib. Yaquina R.
Total	20,219,076	16,144,668	2,750,605	295,274	6,215,000	45,624,623	

LIBERATIONS

NUMBER OF FINGERLINGS AND FRY LIBERATED INTO THE WATERS OF THE
STATE OF OREGON BY THE FISH COMMISSION

Fiscal Year Ending June 30, 1946

Fisheries Station	Chinook	Silver Salmon	Steel-head	Chum	Blue-back	Shad	Total	Where Liberated
Alsea		497,798					497,798	Buck Cr., Trib. Five Rivers R., Trib. Alsea R.
	498,902		245,692				744,594	Alsea R.
Bonneville	12,200,504	910,019			391,040		13,501,563	Tanner Cr., Trib. Columbia R.
	624,630	257,380					882,010	N. Fork Klaskanine R., Trib. Columbia R.
Klaskanine		2,565,000	35,731				2,600,731	Klaskanine R., Trib. Columbia R.
McKenzie	1,316,930						1,316,930	McKenzie R.
Mill Creek		753,334					753,334	Little Mill Cr. and Umpqua R.
	60,000	63,000					123,000	S. Fork Nehalem R.
Nehalem	84,000						84,000	Coal Cr., Trib. Nehalem R.
	350,533	326,030		32,242			708,805	Foley Cr., Trib. Nehalem R.
		100,000					100,000	N. Fork Nehalem R.
Ox Bow Springs	1,822,839						1,822,839	Herman Cr., Trib. Columbia R.
	605,750						605,750	Columbia R.
Sandy	337,220		222,380				559,609	Sandy R., Trib. Columbia R.
	383,706						383,706	Francis Cr., Trib. Sandy R., Trib. Columbia R.
Santiam, N.	28,910*						28,910	Stout Cr., Trib. N. Santiam R.
	795,614						795,614	N. Santiam R.
Santiam, S.	66,850						66,850	S. Santiam R.
	467,200						467,200	Green Peter Cr., Trib. S. Santiam R.
Scappoose						6,476,000	6,476,000	Willamette Slough, Trib. Columbia R.
Siletz		1,004,116					1,004,116	Rock Cr., Trib. Siletz R.
Siuslaw	499,707	541,869					1,041,576	Indian Cr., Trib. Siuslaw R.
Tillamook	576,666	3,641,920	47,000	353,454			4,619,040	Tillamook R., Trib. Columbia R.
		307,200					307,200	Mill Cr., Trib. Tillamook R., Trib. Columbia R.
		999,959					999,959	Gold Cr. and Trask R.
Trask	605,291						605,291	Gold Cr., Trib. Trask R.
	445,745	246,721					692,466	Lower Trask R.
	1,119,146	372,352					1,491,498	Upper Trask R.
Umpqua	*							
Willamette	*							
Yaquina	487,640	213,720					701,360	Little Elk Cr., Trib. Yaquina R.
Total	23,377,783	12,800,418	550,812	385,696	391,040	6,476,000	43,981,749	

* Because of flood conditions in December, 1945 it was necessary to liberate approximately 400,000 spring chinook fry at the N. Santiam River Station into Stout Creek, tributary of the N. Santiam River, approximately 650,000 at the Umpqua River Station into Rock Creek, tributary of the Umpqua River, and approximately 1,368,000 at the Willamette River Station into Salmon Creek, tributary of the Willamette River. The flood conditions made it improbable that any appreciable numbers of these fry would survive. Therefore they are considered a loss.

FINGERLINGS AND FRY ON HAND

June 30, 1945

Fisheries Station	Chinook	Silver Salmon	Steel- Head	Blue- Back	Total
Alsea.....		499,790			499,790
Bonneville.....	4,779,890	1,026,600		400,502	6,206,992
Klaskanine.....		2,795,000			2,795,000
McKenzie.....	147,000				147,000
Mill Creek.....		753,334			753,334
Ox Bow Springs.....	255,000				255,000
Santiam, S.....	66,850				66,850
Tillamook.....		1,000,000	47,500		1,047,500
Trask.....	24,900	1,000,000			1,024,900
Total.....	5,273,640	7,074,724	47,500	400,502	12,796,366

FINGERLINGS AND FRY ON HAND

June 30, 1946

Fisheries Station	Chinook	Silver Salmon	Steel- head	Total
Alsea.....		490,459		490,459
Bonneville.....	2,312,163	898,560		3,210,723
Coos.....		277,990	218,197	496,187
Klaskanine.....		3,784,669		3,784,669
McKenzie.....	200,733			200,733
Santiam, N.....	36,450			36,450
Santiam, S.....	315,942			315,942
Siletz.....		443,975		443,975
Tillamook.....		213,888		213,888
Trask.....	106,239	640,794		747,033
Umpqua.....		512,836		512,836
Total.....	2,971,527	7,263,171	218,197	10,452,895

SALMON ESCAPEMENT OVER BONNEVILLE DAM

Years 1938 to 1946

Chinook

	1938	1939	1940	1941	1942	1943	1944	1945	1946
January	*	6	.....	4	1	11	1	6	1
February	*	12	.....	.....	15	6	2	4	2
March	*	121	504	1,360	34	43	65	81	25
April	*	51,410	37,253	51,501	9,506	12,172	15,670	17,148	14,179
May	22,371	25,159	28,621	19,445	30,915	53,268	15,127	26,276	53,313
June	8,221	5,602	7,028	7,013	11,816	5,440	4,363	11,293	30,051
July	6,556	17,845	14,938	9,395	12,821	8,044	8,241	16,327	20,960
August	34,765	32,919	58,643	12,590	27,581	28,985	55,468	32,254	45,421
September	197,294	150,851	240,515	351,987	303,995	201,414	139,254	189,675	277,075
October	2,302	2,197	3,765	7,179	4,485	3,354	2,388	4,281	4,521
November	263	78	287	866	639	365	164	137	170
December	27	16	34	134	190	21	20	6	.....
Total	271,799	286,216	391,588	461,458	401,998	313,123	240,763	297,488	.....

Steelhead

	1938	1939	1940	1941	1942	1943	1944	1945	1946
January	*	23	5	37	4	14	50	1,003	63
February	*	19	96	76	37	18	157	1,078	551
March	*	560	1,688	1,641	256	654	1,019	3,066	3,040
April	*	8,110	4,125	6,392	3,642	3,374	6,142	4,685	9,839
May	6,622	1,587	998	1,518	4,159	4,698	2,227	1,557	5,481
June	2,382	1,490	4,489	994	1,588	1,564	1,169	1,109	3,265
July	19,455	36,581	61,175	21,940	19,905	7,755	21,868	24,600	20,559
August	29,231	38,062	46,071	29,600	41,973	29,894	24,508	40,483	58,356
September	46,618	33,891	64,377	50,542	76,622	41,051	35,907	40,194	38,296
October	2,264	1,264	1,786	3,980	2,411	2,444	6,129	1,925	2,067
November	339	216	292	1,063	566	573	1,119	302	262
December	92	119	59	304	182	92	226	142	.....
Total	107,003	121,922	185,161	118,087	151,345	92,131	100,521	120,144	.....

Blueback

	1938	1939	1940	1941	1942	1943	1944	1945	1946
January	*	.....	.....	.....	.....	.....	.....	.....	.....
February	*	.....	.....	.....	.....	.....	.....	.....	.....
March	*	.....	.....	.....	.....	.....	1	10	.....
April	*	48	.....	299	.....	.....	.....	51	9
May	1,025	189	206	1,052	13	9	16	521	67
June	17,811	29,386	59,639	23,536	12,624	4,525	3,098	1,507	7,805
July	53,864	43,124	85,885	39,193	41,301	33,613	11,171	6,903	64,704
August	2,097	616	3,063	1,615	1,477	1,697	659	498	1,746
September	235	19	11	50	60	1	127	11	23
October	6	.....	1	.....	.....	.....	.....	1	2
November	2	.....	.....	.....	.....	.....	.....	.....	.....
December	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	75,040	73,382	148,805	65,745	55,475	39,845	15,072	9,502	.....

*Data not available. Figures for 1938 are from May 7 to December 31, inclusive. Figures show number of fish. U. S. Engineers, Bonneville Division.

SALMON ESCAPEMENT OVER BONNEVILLE DAM—Continued

Years 1938 to 1946

Siversides

	1933	1939	1940	1941	1942	1943	1944	1945	1946
January.....	*	3	3	2	.....	.....	.....	.....	.....
February.....	*	.....	.....	.....	.....	.....	.....	.....	10
March.....	*	.....	.....	.....	.....	.....	.....	.....	4
April.....	*	.....	.....	.....	.....	.....	.....	.....	.....
May.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July.....	.....	.....	.....	.....	.....	.....	.....	2	22
August.....	3,070	1,810	1,451	1,317	1,193	762	1,052	239	227
September.....	10,995	12,226	10,212	16,061	11,061	1,676	3,021	533	3,609
October.....	972	310	213	369	147	89	103	16	1
November.....	141	15	33	160	.....	20	29	.....	.....
December.....	7	18	5	2	.....	.....	2	1	.....
Total.....	15,185	14,382	11,917	17,911	12,401	2,547	4,207	791	.....

Chums

	1938	1939	1940	1941	1942	1943	1944	1945	1946
January.....	*	2	.....	.....	.....	.....	1	2	.....
February.....	*	.....	.....	.....	.....	.....	.....	.....	.....
March.....	*	.....	.....	.....	.....	.....	.....	.....	.....
April.....	*	.....	.....	.....	.....	.....	.....	.....	.....
May.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
August.....	.....	.....	.....	1	.....	.....	.....	.....	.....
September.....	.....	6	.....	.....	.....	.....	.....	2	1
October.....	1,245	700	860	1,116	700	125	191	118	303
November.....	799	411	835	4,130	1,149	623	666	585	809
December.....	73	49	34	23	16	42	96	20	.....
Total.....	2,117	1,168	1,729	5,270	1,865	790	954	727	.....

Total Escapement by Months

	1938	1939	1940	1941	1942	1943	1944	1945	1946
January.....	*	34	8	43	5	25	52	1,011	64
February.....	*	31	96	76	52	24	159	1,082	563
March.....	*	681	2,192	3,001	290	697	1,085	3,157	3,069
April.....	*	59,568	41,378	58,192	13,148	15,546	21,812	21,884	24,027
May.....	30,018	26,938	29,825	22,015	35,087	57,975	17,370	28,354	58,861
June.....	28,414	36,478	71,156	31,543	26,028	11,529	8,630	13,909	41,121
July.....	79,875	97,550	161,998	70,528	74,027	49,412	41,280	47,832	106,245
August.....	69,163	73,407	109,228	45,123	72,224	61,338	81,687	73,474	105,750
September.....	255,142	196,993	315,115	418,620	391,738	244,142	178,309	230,415	319,004
October.....	6,789	4,471	6,625	12,644	7,743	6,012	8,811	6,341	6,894
November.....	1,544	720	1,447	6,219	2,354	1,581	1,978	1,024	1,241
December.....	199	202	132	467	388	155	344	169	.....
Total.....	471,144	497,070	739,200	668,471	623,084	448,436	361,517	428,652	.....

*Data not available. Figures for 1938 are from May 7 to December 31, inclusive.
 Figures show number of fish.

U. S. Engineers, Bonneville Division.

