

IMPROVING ON NATURE IN HATCHING SALMON.

How Oregon Fisheries Service Keeps Up the Supply of Big Fish by Taking Eggs From Female Salmon and Developing Them Into Sturdy Specimens

New Central Hatchery System Promises Greater Industry Than Ever Before in Course of Next Few Years. Work of Egg-Taking and Fish-Feeding

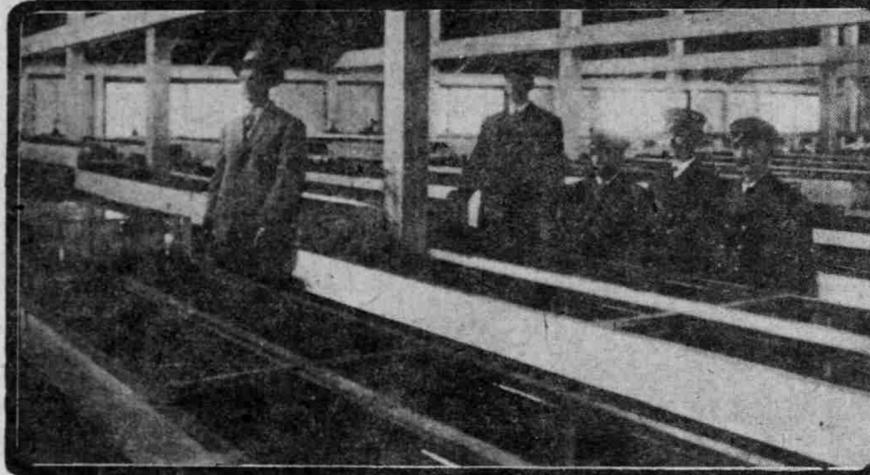


CENTRAL SALMON HATCHERY AND GROUNDS AT BONNEVILLE

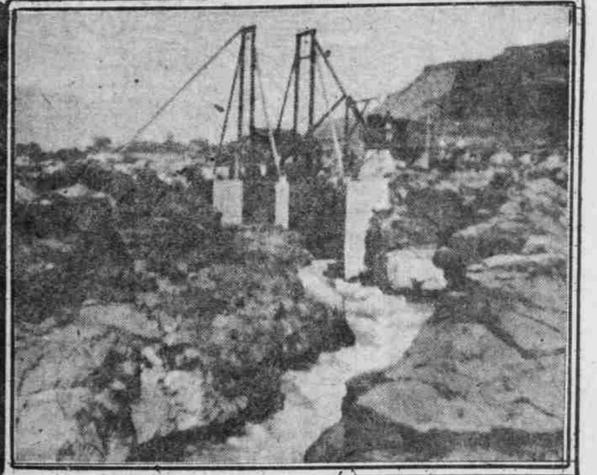
RETAINING PONDS AT CENTRAL HATCHERY WHERE YOUNG FRY ARE DEVELOPED



R. E. CLANTON, MASTER FISH WARDEN, FISHERIES



VIEW OF HATCHING TROUGHS BY WHICH SALMON EGGS ARE NURTURED



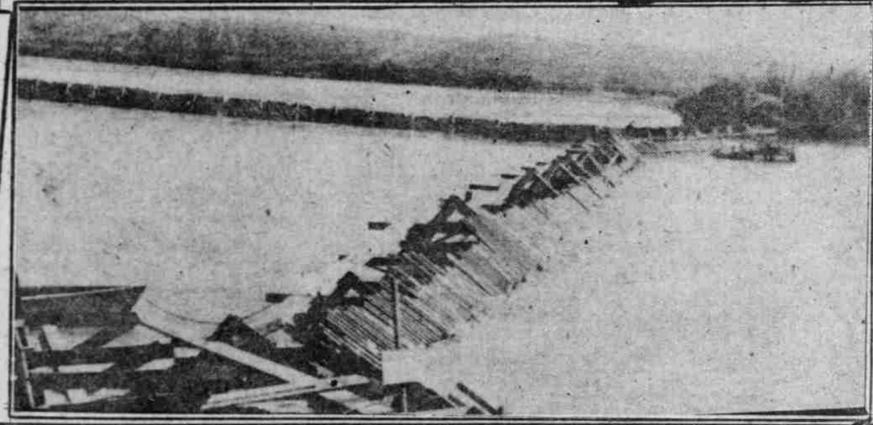
TYPE OF COLUMBIA RIVER FISH WHEEL WHICH CATCHES SALMON BY HUNDREDS



ONE HAUL FROM A COLUMBIA RIVER SEINE



E. C. GREENMAN, EXPERT IN CHARGE OF CENTRAL STATION



FISHER'S RACK WHERE "RISE" SALMON ARE CAUGHT AND NURTURED

Success in the broadest sense of the central salmon hatchery at Bonneville has laid the foundation for a greater salmon industry than ever in Oregon within the next few years. Not only is the fish supply holding its own under the new line of propagation but there is every assurance that from year to year there will be a marked increase in the supply, particularly in the Columbia River and its numerous tributaries.

It is well understood that but for the work of the fisheries service of the state the salmon industry would long since have passed out of existence—or at least would have ceased to be of any especial importance. Nature is totally unable to keep up the supply unaided in view of the heavy drafts made on the annual supply. Comparatively few salmon are able to get by the myriad devices for their capture that line the lower and upper reaches of the Columbia River.

Then, too, nature is exceedingly wasteful in her processes of propagating salmon. For while each female will deposit several thousand eggs, not more than 5 per cent of them ever develop into young fry on the natural spawning beds. Furthermore only a very small per cent of the young fry ever grow to mature fish.

To eliminate, so far as possible, the wastefulness of lavish nature is the aim of the hatchery service and the greatest stride in that direction yet made. As introduced a year ago by the Master Fish Warden H. C. McAllister and developed since then by R. E. Clanton, present head of the department. The scheme here is to hatch the eggs and retain the young fish until they are strong and durable. Thus they can make their way to salt water in comparative safety. Under the old plan of liberating young fry at the various eying stations, most of the supply went into the paunches of golly varden and other predatory fish. At the present time approximately

1,250,000 salmon enter the Columbia River every year. That is about the average for the past five years. This is a very small per cent of the young fry liberated annually. And inasmuch as it has been pretty clearly established that the mature fish return to the stream from which they came, the deduction is apparent that the majority were destroyed.

Improving on Nature.

Many years ago it was discovered that nature's wasteful hatching methods could be remedied. Hence the establishment of hatching stations. At these stations, located near natural spawning grounds along small streams, the females were caught in nets, traps or fishways and the ova taken from them. These eggs were freely fertilized with milt taken from live males and the eggs were then transferred to hatching troughs and carefully nurtured into young fry. It was the practice to liberate the fry while they were but a few days old and while still laden with yolk sacs which provided them with food until they were old enough to forage for themselves.

That process has for years kept the salmon industry going. But it was ascertained that the percentage of mature fish resulting was comparatively small. The cause was not hard to determine. The schools of young fry naturally were attracting perfect shoals of "cannibal" fish and the fry was meeting the fate that previously had been that of the unhatched eggs.

Now nature is being improved on in two ways. The waste of eggs is being eliminated and also the waste of young fry. When a young salmon is several months old he is able to avoid the avaricious dolly varden and other fresh water cannibals.

Instead of hatching the eggs at the smaller stations the new system is to ship them to the central hatchery at Bonneville. The eggs are taken in the old way along the smaller streams and are developed at the "eying" stations to the hatching point be-

fore going to Bonneville. At the central station the young fry are hatched and transferred to retaining ponds where they are fed and cared for until big enough to take care of themselves in that eternal struggle for survival of the fittest in fishdom.

Millions of Fish on Hand.

Fourteen million young fry are now in the retaining ponds of the central hatchery and all of these will be liberated during this year as rapidly as they reach a proper size. These fish have been hatched from eggs taken in the Willowa, Clackamas, McKenzie and Salmon rivers. There are several hundred thousand blueback salmon from Alaskan waters, in addition.

Supervising the huge task of properly feeding and caring for these millions of fish is one of the best fisheries experts on the Pacific Coast, E. C. Greenman, who has been in the state and Government service alternately for the past 15 years. Remarkable results are being obtained by Superintendent Greenman in demonstrating how small a per cent of loss need be met with. The daily loss reports at the Bonneville hatchery run from 5 to 25 fish per day, which is a record in itself considering the fact that there are 14,000,000 inhabitants of the hatchery.

While the central hatchery idea is still new in the state, its practicability and value has been fully established. It is certain that the percentage of eggs matured has been increased from 5 to from 60 to 70 per cent, 5 per cent representing the best nature is able to do. Then, instead of a million and a quarter of salmon in the Columbia on an average good year, Master Fish Warden Clanton is confident of being able ultimately to bring about an annual run of 10,000,000 or thereabouts. That, of course, will mean millions of dollars more to the state in revenue from the great salmon industry. So tremendous has been the promise

of the central hatchery idea that another station similar to that at Bonneville will shortly be constructed and put into commission near Astoria. Here eggs from Coast "eying" stations will be received and the young fry developed. Within the next few years the bulk of the eggs taken each year by the fisheries service will be handled in the improved way.

In a comparatively short while the actual returns will begin developing. For the next three years there will be no appreciable increase in the salmon supply, at least no increase is anticipated. On the fourth year, however, sheries experts are agreed that heavier runs will occur, especially in the Columbia River. This is accounted for in the fact that salmon, after being liberated, make their way to salt water and disappear for from three to four years. The present system being new, the increased runs attendant upon the lowered mortality

of young fry obviously will not occur until from three to four years hence.

With more fish in the streams the annual egg take of the fisheries service will also be increased and it will be possible to develop an even greater output. Thus it will become possible to gradually develop the salmon supply of the state and to maintain it so that salmon will be available in plenty from year to year.

There are a dozen hatchery stations

already in operation along the various streams of Oregon where salmon go to spawn. From early in the Spring until late in the Fall the crews at these stations are kept fishing. They get such mature salmon as have escaped the myriad snares of commercial fishermen or that have gone upstream during the closed season provided by state law.

Propagating the Chinook.

On most of the streams there are two varieties, steelheads and chinook. Several streams are productive of the small blueback salmon. The chinook is the great commercial fish and its propagation is the principal aim of the fisheries service. One big female chinook will yield 200, 300 or even more good eggs, and out of 2000 chinook eggs it is not unusual to hatch from 1400 to 1800. As has been demonstrated by Mr. Greenman at the central hatchery, there is nothing impossible about developing 95 per cent of the young fry after they have been properly hatched.

Every phase of the hatchery work requires skilled workmanship, and the men who operate the various stations, under Mr. Clanton, have been following the game for years, most of them having begun in the United States fisheries service. The hatcheryman's business has been evolved into a sort of exact science and the competent hatcheryman must know all about food fish and their habits, as well as knowing just how to take fish, strip them of the eggs, hatch the young fry and nurture them until ready to release.

Of recent discovery in the way of food for growing fish, is a sort of mud eel, existing by millions in the Willamette River. Heretofore frozen smelts have been kept in tons for feeding purposes, and this was a heavy item of expense. Several tons of eels have been put up and are now in use at Bonneville, where Superintendent Greenman finds that they are quite as satisfactory as the smelts, provided other food is given occasionally.

An interesting investigation is shortly to be made by Mr. Clanton into the habits of young salmon in making their way to salt water. It has never been satisfactorily explained just at what season and age the fish go to the sea although light on this subject would be of the greatest value. Some authorities insist that the young salmon disappears into the ocean in the Spring while less than a year old. Others insist that the Fall of the year is the going out period. In an effort to solve this mystery, Mr. Clanton proposes, in cooperation with Government experts, to liberate a quantity of five-inch specimens at Bonneville and follow their course through the medium of dipnets. It will be considerable of an undertaking but once the truth is known the liberation of young fish can be timed accordingly.

Cannermen are watching with deepest interest the new propagation methods, and while many were skeptical at first they now agree that a new era is ahead in the salmon industry of Oregon. The cannermen recently showed their faith in the new system by contributing \$1200 for the construction of a new retaining pond which Mr. Clanton could not complete at Bonneville on account of a shortage in the fisheries fund. Since then the state has added \$500 for the completion of retaining ponds and buildings at Bonneville, besides providing for the new receiving station near Astoria. At the Astoria hatchery, as at Bonneville, the young fish will be held until from five and six months to six long before being liberated.

THE SALMON'S ENEMIES ARE MANY.