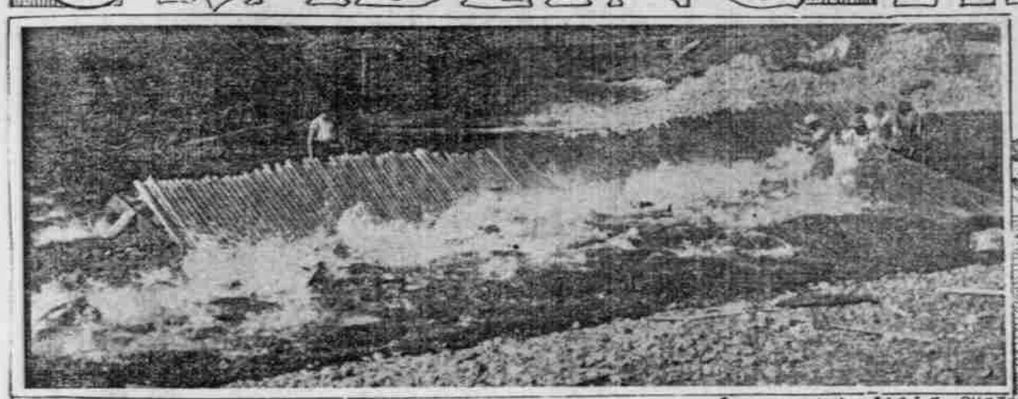
PART THREE

The Sunday Oregonian.

PAGES 25 TO 32

VOL. XIX. PORTLAND, OREGON, SUNDAY MORNING, MAY 13, 1900. NO. 19.

CRADLING THE CHINOOK &c.



DRIVING SPAWNING SALMON INTO TRAP

THE CRADLE of the Chinook salmon is the waters that ripple over the sand and gravel bars at the headwaters of the Columbia and the many streams that unite to swell its tide as it bears onward toward the sea. This is nature's cradle, but man has provided another, a trough through which water constantly flows, and in which the young salmon is hatched from the egg and kept until able to hunt food for itself in the river. Nature's cradle does not care sufficiently for the infant, hence man's solicitude.

The spawning grounds of the Chinook are many miles from the ocean, some of them more than 1000 miles inland, and all this distance the procreative instinct of the fish compels it to go, in order to deposit its eggs where they will be hatched. Entering the wide mouth of the Columbia, doubtless attracted and guided by the current of fresh water pouring from it some distance into the ocean, the salmon head up the stream. If they enter early, they do not hurry, but proceed leisurely along, but if late, they rush with all their energy, in order to reach the spawning grounds before the eggs become ripe. Once started, nothing stops them, except some obstacle they cannot surmount, and against this they beat until they often batter themselves to death.

By Great Leaps.

They force their way by great leaps up swift rapids and over low cascades, working their way along where no other fish would attempt to go. In early days the foot of cascades and high places were favorite fishing grounds of the Indians, who caught salmon there in countless numbers, using nets and spears. Even now, the white men take advantage of the instinct of the salmon which impels them to force their way steadily upstream, and catch them in great numbers in traps and wheels.

Having arrived on a bar in the shallow waters at the head of a stream, the female salmon digs a small circular pit in the gravel, by turning round and round, and in this pit deposits her eggs. The male salmon then fertilizes the eggs by exuding milt upon them. Having done this, the eggs are left a prey to other fish, and the parent salmon, according to the theory of pisciculturists, remain about the vicinity for a time, and then die. This theory is not undisputed, but the scientists seem to have the weight of evidence on their side.

At the old hatchery on the Clackamas, where observations have been taken for many years, there is a rack in the stream which prevents the fish from passing either way after it is put in. In years when the rack has not been put in until many salmon have passed up to spawn, no Chinook have ever been stopped by it on their way back to the sea. The variety of salmon known as steelhead has been stopped on the way down, but no Chinook. All other fish, except the salmon, when taken after spawning, show rudimentary eggs for another spawn, but of the thousands of salmon examined, not one has been found to have rudimentary eggs, thus forcing the conclusion that a salmon spawns but once.

Eats Nothing in Fresh Water.

The salmon eats nothing after he enters fresh water. The stomachs of many thousands of Chinook have been examined, and not one has been found to contain food. The theory of scientists is that the procreative instinct sustains the fish and forces it on to the final act of propagation, and that it becomes so weak from lack of nourishment, so battered and exhausted by its battles with rocks and cascades, its flesh so soft from the change from cold salt water to the warmer fresh water of the rivers, that after its procreative instinct has been satisfied by spawning, it has neither the physical vigor nor the instinct to preserve its life by returning to the cold and healing salt waters of the ocean. It therefore remains in the warm upper waters of the rivers, gradually growing weaker and becoming more and more covered with sores and ulcers, until it dies and is cast upon the bank of the stream, which is literally covered with the bodies of dead fish after the spawning season.

When the little salmon first develops from the egg, it much resembles a pollywog, having a little sack attached to its head, which supplies nutriment for a number of days. As soon as the sack has been absorbed, then the little fish, less than an inch long, begins to search for food, keeping well hidden under stones and in other places of concealment, to escape the trout and other enemies lying in wait to devour him. How many escape these enemies, from the time the eggs are deposited, until the young fry enter the great ocean, is only a matter of speculation, but it is believed that not more than 5 per cent of the eggs deposited on the spawning grounds become matured fish. Gradually the young salmon works his way down the many miles that lie between him and the ocean, growing all the time, until, perhaps at the age of six months, he enters the sea, when he has attained a size of about six inches in length.

One of the mysteries of the sea is the ocean habitat of the salmon. Where it goes, what it does, and what it feeds upon for three or four years, no one has ever discovered. That it finds some place where there is plenty of food is evident by its splendid condition when it again seeks the place of its birth for spawning. The deep sea work of the United States Fish Commission has failed to settle this question, and the salmon is entirely lost to sight, from the time it enters the ocean until it returns to the stream of its nativity. That it does return, a full-grown fish, to the same stream from which it departed a little more than a fingerling, is shown by the fact that the same varieties come into the river, year after year, and some of them are not found in other rivers on the same coast.

Another Unsettled Question.

How long the salmon remains in the ocean before returning is another unsettled point. It was formerly believed that it returned the fourth year. The general uniform size of Chinook—the great majority range from 20 to 25 pounds—suggests that one year's spawning all return at the same time, yet there are enough large fish, some of them weighing over 5 pounds, to render this evidence unsatisfactory.

An experiment inaugurated in 1895 by H. D. McGuire, then Fish and Game Protector of Oregon, and Waldo F. Hubbard, at that time superintendent of the Government hatchery on the Clackamas, has somewhat upset the theories as to the four-year period and the uniform size of fish. The adipose fin was cut off from 5000 young fry when they were released from the hatchery. This is a little fin at the base of the tail, and is of no particular utility to the fish. A close watch has been kept for these fish at the canneries and hatcheries.

The first were caught in 1898, three years after being released, somewhat upsetting the four-year theory. These weighed from 12 to 37 pounds. The next year more were caught, weighing from 22 to 46 pounds; none have been reported thus far this season. The total number reported is 300.

This shows that all the fish do not come back the same year, and that all have not attained the same growth. It apparently proves that salmon vary in size under the same conditions, just as large and small men grow up side by side. It also shows that no special instinct compels all of the salmon of one year's hatching to return for procreating at the same time.

TAKING SPAWN FROM SALMON

HALE. PHOTO

HALE. PHOTO

MILTING SALMON EGGS

HALE PHOTO.

INTERIOR FISH HATCHERY HALE PHOTO

UPPER CLACKAMAS HATCHERY

FROM PHOTO BY E. C. GREENMAN.

Gratifying Demonstration.

More gratifying than the knowledge gained on these points is the proof that the fish propagated at the hatcheries live and return to spawn the same as those born under natural conditions. If 300 full-grown fish out of 5000 fingerlings put in the water three and four years before were caught, due allowance being made for the number of marked fish that must have escaped notice, in the hurried and careless handling at the canneries, the value of fish hatcheries is amply demonstrated, and there is proof that the time, money and care devoted to artificial propagation of salmon for the Columbia River are not wasted.

The first effort to prevent the extinction of the salmon in the Columbia took the form of the establishment of close seasons by law, for the purpose of enabling the fish to ascend uninterrupted to the natural spawning grounds. The difficulty of enforcing these close seasons, and the utter impossibility of protecting the fish while upon the spawning grounds, rendered this legislation inadequate to accomplish the desired object, and the salmon continued to decrease in numbers alarmingly.

Finally, in 1876, persons interested in the fishing industry organized the Oregon & Washington Fish Propagating Company and built a small hatchery on a bank of the Clackamas, a few miles above its mouth. It began operations the following year, and collected 100,000 eggs. In the next three years it hatched out 2,000,000 eggs annually. For some reason the hatchery was then closed.

In 1887, so alarming had become the falling off in the run of salmon in the Columbia, the Legislature appropriated $12,000 to put the hatchery in repair and operate it. That year 1,500,000 eggs were taken. The United States Fish Commission took charge of the hatchery the next year, and during the next five years 21,000,000 eggs were taken, 90 per cent of which were hatched and deposited in the stream.

Upper Clackamas Hatchery.

Owing to the failure of the state to enact protective legislation desired, the Government declined for several years to operate the hatchery, although it is now running again on a small scale. This led the packers, through the earnest efforts of Mr. McGuire, to organize the Columbia River Packers' Propagating Company, in 1895, and a hatchery was located on the Upper Clackamas. Since then both Oregon and Washington have enacted more satisfactory legislation, and have provided for hatcheries, a number of which have been established, and the general Government has also built a large one on Little White Salmon, on the Washington side of the Columbia. Besides that one, there are three maintained by the State of Washington, supplying Chinooks for the Columbia—the Chinook, near the mouth of the river; one on the Kalama, and one on the upper waters of the Columbia.

On the Oregon side are two state hatcheries, on the Clackamas and Salmon Rivers, and the old Government hatchery on the Clackamas. Last year the Upper Clackamas hatchery handled 2,200,000 eggs, but it is expected by Fish Commissioner F. C. Reed to handle 10,000,000 this year, the season being favorable. At the Salmon River hatchery a special effort is being made to propagate the steelhead, but, owing to the fact that this fish spawns in the early Spring, when the river is at flood height, it is almost impossible to secure eggs. So far, 100,000 eggs have been taken this year.

There were put into the water last season 3,200,000 Chinooks on the Oregon side of the Columbia, and 23,000,000 on the Washington side, nearly all being the late run of fish. This year the output will probably be much greater. It is the intention of Commissioner Reed to build hatcheries this year on the Coos and Umpqua Rivers. On Rogue River, R. D. Hume has maintained a hatchery for a number of years, and this year he will probably be given the license money collected in that district to continue the work.

Method of Propagation.

The method of propagating fish artificially is comparatively simple, although requiring a great deal of care and an intimate knowledge of the scientific principles involved. The fish are usually caught by placing a rack across the stream selected for that purpose. The object of this rack is to detain the fish and to prevent them from ascending to the spawning grounds. As salmon will not turn about and go down stream, even when meeting an obstruction, this rack is sufficient to detain them.

They are kept in this way until the salmon roe is ripe and ready to be exuded, when they are caught for the purpose of obtaining the eggs. This is sometimes done by seining them out, and sometimes by the use of traps, the latter being preferable because the fish may then be taken out only as fast as they can be handled.

The salmon are taken from the trap one at a time, the female salmon being laid in a box called the midwife, for the purpose of holding the fish still. With a little pressure of the hand the ripe eggs are then pressed out into a little galvanized iron tray. The milt of the male salmon is then scattered over them, and after a short time clean water is put upon them until they are thoroughly washed.

Laid in Trays.

They are then laid in trays in a series of boxes, so graduated that fresh water runs through them continually, maintained at the temperature of running streams. When the eggs have eyed, which means when a little black spot appears upon them, showing they are inoculated and are in the process of incubation, it is then safe to transport them, and they may be carried any distance if properly handled. For shipping purposes, eggs are laid in little trays, one tray above another, in a stout wooden box, divided into two compartments, with a space between the compartments for ice.

When the little fish have all been hatched, they are kept for a time in tanks until they are big enough to look out for themselves, and are then deposited in the stream, where they remain several months, gradually finding their way down the river to the ocean. During this period they are subject to the ravages of predaceous fish, and to what extent they are destroyed in this way is uncertain. In any event, the loss is much less than the destruction of naturally spawned fish, because they are larger and stronger when first exposed to these ravages.

It is estimated that not more than 5 per cent of the eggs naturally spawned in the streams are hatched, and that a large proportion of the young fry of this small per cent are also destroyed. By artificial propagation fully 95 per cent of eggs are hatched. The superiority of this method over the natural one is therefore very apparent.

Varieties of Salmon.

There are a number of varieties of salmon entering the streams of the Pacific Coast from the ocean. They come in at different times during the season, the run of one variety generally overlapping the run of another, so that during certain times two or more varieties may be running at the same time. These fish vary considerably in their value for food.

By far the best in every respect is the quinnat, known by various names in different localities. This fish is more widely distributed than any other variety, and enters all the leading streams of the Coast from California to Alaska. It forms the bulk of the pack in the Sacramento River, the Columbia, Puget Sound, Fraser River and the Alaska streams. However, there is a wide difference in the quality of this fish in various sections.

It has its highest perfection in the Columbia River, where it is known as the Chinook. It is larger in size, darker red in color, and oilier than in other streams, and consequently is in higher demand in the market, at an advance price over any other kind of salmon, or the same variety packed in other places. The Puget Sound "sockeye" approaches the Columbia Chinook more nearly in this respect than any other, and the next in quality is the king salmon, of Alaska. The Chinook is the fish which the United States Fish Commission propagates, and it has steadily declined to handle any other kind of salmon on the Columbia.

In Accord With Commission.

The packers of the Columbia River are in full accord with the commission in this idea of hatching nothing but this variety of salmon, and they were not well pleased at the importation from California of the eggs taken from the Sacramento River, because the quinnat in that stream is smaller in size and inferior in quality to the Chinook of the Columbia. It is believed that it will never again be necessary to import salmon eggs from other streams to be deposited in the Columbia.

The steelhead salmon is the variety shipped fresh to Eastern markets during the Fall and Winter, and the desirability of propagating it at the hatcheries is now recognized, although the early season renders it very difficult to do so.

It is the intention of Commissioner Reed to mark 5000 more young Chinook this year by cutting off the adipose fin, thus repeating the experiment of 1896. Special effort will be made by the canners to make this experiment effective by carefully watching the fish brought to the canneries.

Art of Hatching Fish.

It is only within recent years that the art of hatching fish through the artificial production of the necessary conditions has been practiced. Since the human race first began its contest with animals of lower order for existence upon the earth, fish has constituted one of its most important foods. In a savage state, man had to rely largely upon the food produced by the unassisted operations of Nature, and naturally fish constituted a very important part of it. The races today enjoying a low degree of civilization also depend largely upon the generous bounties of Nature for their sustenance, and all those who live near the sea, or near inland streams and lakes, make fish a very large portion of their diet.

Cultivation of the soil as civilization progressed, and the discovery of means for converting numerous things into food products, have rendered it less necessary for man to rely upon fish for food. Yet the increase in facilities for capturing fish and for transporting it in a fresh condition to places far remote from the waters in which it is taken, has in the past few decades wonderfully increased the consumption of fresh fish, while the art of preserving it in cans has made it a common food the world over at all seasons. No longer is fish confined to the tables of those who live along the sea coast or bordering inland streams. There is scarcely a place in the civilized world where fresh and salt water fish are not now to be had in the markets at a reasonable price. Great as has been the increased demand for fish, there is no danger that the myriads of the finny tribe swarming in the depths of the ocean will ever be reduced in numbers by the raids made upon them by fishermen.

Not So Numerous.

This is not the case, however, with the finny inhabitants of our rivers and lakes. In the very nature of things they are not so numerous and their pursuit by fishermen is much keener. In many streams the food fishes have practically been exterminated by this war made upon them in the interests of the market, as well as by the pollution of the water through manufacturing enterprises carried on along the banks of rivers. Thus the advance of civilization and the increase of population have worked in both ways to destroy the supply of food in the rivers.

No less than 20 years ago salmon literally swarmed in all the streams of this region. As they passed up the larger rivers on their way to the spawning grounds each year, and from those entered smaller and shallower streams, it was easy to obtain an idea of the immensity of their numbers. Photographs have been taken of such streams during a run of salmon, in which the fish are shown packed so closely together that there scarcely seems to be water between them. Stages have been prevented from fording streams because of the immense number of fish passing up. The excessive fishing of the past two decades, the lack of sufficient legislation for the protection of the salmon during the spawning season, and the poor enforcement of such legislation as was directed to that end, have resulted in such a depletion of the salmon as to seriously threaten the extinction of that fish in the waters of this region. Such a result could not be contemplated with any degree of complacence in view of the fact that the salmon-packing industry in Oregon and Washington represents an income annually of from $5,000,000 to $6,000,000 and that salmon constitutes an important item of food in this region, in value aggregating at least $1,000,000 more.