SALMON FISHERIES OF ALASKA.

COMMITTEE ON THE TERRITORIES,
Thursday, May 1, 1902.

A subcommittee of the Committee on the Territories this day met, Hon. John A. Moon in the chair.

The subcommittee had under consideration House bill 9976, introduced by Mr. Sulzer, entitled "A bill to encourage salmon culture in Alaska, and for the protection of persons engaged in the production thereof."

STATEMENT OF HON. WILLIAM SULZER.

Mr. SULZER. Mr. Chairman, and gentlemen of the committee, as I have previously appeared before and addressed the committee at length regarding the bill under consideration which I introduced on the 23d day of January, 1902, entitled "A bill to encourage salmon culture in Alaska, and for the protection of persons engaged in the production thereof," and as the bill has been printed in the Record, and I have addressed the House in regard to it, I shall be very brief in what I say at this time to the subcommittee, especially as there are several gentlemen present more familiar with the subject who wish to be heard, and whom I shall take great pleasure in introducing to this subcommittee.

This bill, gentlemen, as I have previously stated, is for the protection of the salmon of Alaska and to prevent their extermination. It is well known by those who have studied this matter that unless there is some legislation to artificially propagate the salmon it is only a question of time when the salmon in Alaska will become extinct. Those who do this at their own expense should be protected.

The salmon industry is one of the great industries in Alaska. A great many canneries have been established there, are being established there, and will continue to be established. At the present time millions of dollars are invested. The product of these canneries is one of the most valuable products of the district and one of the great products of this country. It foots up every year into millions and millions of dollars. Besides the monetary question involved in this matter as an industry of the United States, the great point that I wish to make is this: I am in favor of protecting the fish and game of America, and I have always, since I have been a legislator, in my State and here in Washington, done all that I could to accomplish that purpose. It is a sad commentary on our civilization that by reason of our lack of judgment and foresight we have allowed the most valuable fish

of the Atlantic to be exterminated, and we have allowed the larger wild animals of our country to become practically extinct. In Alaska the salmon industry——

Mr. LLOYD. Just at that point; you have been in Alaska and investigated this matter yourself?

Mr. SULZER. Yes; I have made two trips to Alaska and have quite thoroughly investigated this matter. The salmon industry is to-day one of the great industries of that great country, and outside of the mineral industry it is the greatest and I believe the most valuable.

Mr. LLOYD. In addition to that you have some personal interest in it?

Mr. SULZER. Not at all. I have absolutely no personal interest in the matter other than as a believer in the theory, which is growing every day, that it is the duty of one generation to protect the natural food products for the next generation. I believe it is incumbent on us to protect the fish and game of our country for future generations. I believe we will be derelict in our duty to posterity if we fail to do this. Another thing, I am a disciple of Sir Izaak Walton, and a true friend of the wild fish and game. I protest against their wanton slaughter. While in Alaska I visited several of the big canneries and I am familiar with their operation. I have seen the way the fish are caught, prepared, and canned. I have also visited several of the hatcheries there and witnessed the way the salmon can be propagated, so that if the Government in some way will protect the people who are propagating salmon the fish will never become exterminated, and the supply, instead of diminishing, will undoubtedly be increased.

Of course, we know that canned salmon is one of the staple diets of the world, and I believe nine-tenths of the supply of the world is produced by the canneries of Alaska. I believe the statistics will show that for the last ten years the value of the supply of canned salmon that comes from Alaska will amount to several million dollars a year, and it will probably average a great deal more in the years to come because new canneries are being established all the time.

This bill is intended to give a little protection to the men who are willing to invest their money in salmon fish hatcheries in Alaska for the purpose of propagating the salmon and increasing the supply, giving these men the privilege of catching part of the salmon that will come back——

Mr. LLOYD. What is a hatchery?

Mr. SULZER. A salmon hatchery is a place where young salmon are artificially propagated. It is man aiding nature. The spawn are planted and protected; they soon develop, and these little fish grow, and then go out to sea after eight or nine months, and in nine, ten, or eleven years these same salmon return, it is claimed, to the very place where they were hatched.

Mr. LLOYD. It is a place where they are impounded?

Mr. SULZER. Yes; a place where they are hatched, cared for, and protected until they are ready to go to sea to come back after many years to spawn and die.

There is a gentleman here, Capt. John C. Callbreath, of Alaska, who has been experimenting with a salmon hatchery for a number of years, and he is more familiar with this subject than I am; hence I do not care to take up the time of the committee in going into the details of the matter. I fully explained to the committee the last time I was here that the salmon of Alaska are different in their habits of life

from the salmon of any other country in the world. They only spawn once and then they die. They are born, and after eight, nine, or ten months they go out to sea. We know not where they go. They are never caught in the ocean. They must go to and live in deep water, because they are never seen in the ocean. It is believed they come back after eight, nine, or ten years to the place of their birth, and the moment they spawn they die, so if the salmon are not protected by this method of artificial propagation it is only a question of time when they must be exterminated if the canneries continue business. They have been exterminated on the Atlantic coast, with the exception, I believe, of one river in Maine, and in Nova Scotia, Newfoundland, and Labrador.

Mr. POWERS. We get them, in the Kennebec and the Penobscot rivers, where they run up quite freely.

Mr. SULZER. Two rivers, then, in Maine. On the Pacific coast they are practically exterminated in California, Oregon, and Washington, and they will be exterminated in Alaska unless the Congress does something to prevent it. I think my bill will accomplish what is desired. The bill has been carefully considered and carefully prepared by gentlemen thoroughly familiar with the subject. It must be apparent that such a bill as this ought to pass. Now, gentlemen, that is about all I care to say at this time——

Mr. POWERS. Let me ask you one or two questions in reference to the scope of the bill. I see the purpose is to grant the right—

That any person or persons heretofore or hereafter authorized to establish or maintain a hatchery for the artificial production of salmon in the district of Alaska shall be entitled to the exclusive right of all fish that such hatchery may produce in excess of the normal product of such streams for a distance of 1 mile in all directions in tide water from the mouth of the stream upon which such hatchery may be located.

There is no limitation there as to time, and I just jotted this down. What do you think of adding another section—

that all rights and privileges granted by this bill are subject to the supervision and regulation and repeal by Congress?

We have a general statute in my State that makes everything in that way. This seems to grant an absolute right without any end to it.

Mr. SULZER. Just a word in that regard. The provisions of this bill give no monopoly to any individual or individuals or any company or corporation. The bill does not give exclusive rights. It gives certain rights.——

Mr. POWERS. That gives them about a thirty years' lease?

Mr. SULZER. Well, about twenty years.

Mr. LLOYD. As I understand, the history of the salmon is that there is no question but they return to the place where born.

Mr. SULZER. Yes; it is believed they return to the same place where they were born. So far as Alaska is concerned, I am informed it has been demonstrated they return in from eight to eleven years.

Mr. LLOYD. I have a curiosity to know how they determine they are the same salmon?

Mr. SULZER. I believe they mark the young fish when they go out to sea. When the young salmon are 8, 9, 10, or 11 months old they leave the little stream or lake in which they were born and start out for the ocean. They go out in schools and keep in schools. A few are marked, and they have been known to return. But, after all, little is known of their lives and habits. It is a great study.

Mr. POWERS. They are about that long [illustrating].

Mr. SULZER. Yes; and it is said they take and mark them then so they know and can tell the exact salmon when it comes back.

Now, gentlemen, just a few words more. This bill is not in the interest of the canneries, although in my judgment it would help and not hurt the canneries. I am informed that they have no objection to this bill. After careful study, it is my opinion that if this bill should become a law it will do more to perpetuate and increase the salmon than anything else that we can do at this time.

I say further, this bill gives no exclusive rights, no monopoly to anyone. It is a fair, just, and conservative bill, and ought to pass. If any member can suggest amendments that will improve it in any way I shall be glad to accept them. Another thing, this bill provides that nothing contained in it shall in any way prevent line or fly fishing by tourists, sportsmen, or persons who go to Alaska, or anyone in Alaska. It also provides that the Indians, or natives of Alaska, can catch the salmon for food, or for drying for winter use as food for themselves and their families. Hence, taking it all in all, I believe this bill is a very fair and a very just bill in the interest of one of our great industries, which, if not protected by a law similar to this bill, will ere long be destroyed, the greatest fish in the world exterminated, and one of the great staple diets of civilization eliminated.

Mr. POWERS. Another question. Under the first section of this bill it evidently creates no monopoly and says: "Any person who may hereafter" do it, but when you read section seven in connection with that section it says:

That the Secretary of the Treasury is hereby authorized to grant leases in accordance with the foregoing sections of this act, for a period not to exceed twenty years, etc.

What do you say to the Secretary of the Treasury after he grants a lease to a company having the right to grant another lease to another company on the same ground and territory?

Mr. SULZER. Well, sir, the bill provides that can be done provided the stream produces a certain number of fish. I think it says 10,000.

Mr. POWERS. Yes; but—

before any lease shall be granted the party or parties making application therefor they shall accompany such application with proof sufficient to establish the normal product of such streams; and no person shall be entitled to more than one hatchery lease with the privilege of stocking more than three barren lakes or streams and being protected in the product thereof.

And it says further on, "On streams producing not more than ten thousand." That is not exactly my point. A man goes on and establishes a hatchery under the first section of the bill and proves to the Secretary of the Treasury that the stream in its normal condition does not produce 10,000 salmon per annum. The Secretary of the Treasury grants a lease for about thirty years. Now, another man desires to go and establish a hatchery. Can he do it and get a lease after the first one?

Mr. SULZER. Certainly he can.

Mr. POWERS. The first section says so; but I am not sure about that.

Mr. SULZER. He certainly can get a lease, but he can not catch fish unless the stream will produce more than 10,000. This 10,000 refers to a stream which in its normal condition does not produce 10,000. In other words, it refers to barren streams. Take a stream where the fish grow, where they propagate themselves, there the Secretary of the

Treasury can grant leases to as many people as desire to establish hatcheries.

Mr. POWERS. The only reason I am asking the question is that I have got a little old Democratic prejudice against monopolies.

Mr. SULZER. So have I; we will never disagree concerning that proposition.

Mr. POWERS. That is what I am looking out for.

Mr. SULZER. So am I; and I want to say this, that if this bill in any way could be construed in establishing a monopoly I would not have introduced it, and I would be absolutely opposed to it if anybody else had introduced it.

Mr. POWERS. That is why I made the mere suggestion, that all rights and privileges granted by this bill should be subject to the supervision, regulation, and repeal by Congress, so if it was construed to add any kind of monopoly——

Mr. SULZER. I am willing to accept that amendment. Gentlemen, I have occupied more time than I intended. Of course, I can discuss this matter at any time with you, but these other gentlemen here can not, and——

Mr. POWERS. I heard you upon this bill before, and I confess frankly I could not see any objections to the bill except the question of allowing Congress to retain the right of handling the whole thing.

Mr. SULZER. As I said, I have no objection to that.

Gentlemen, I take pleasure in introducing to the committee Mr. John C. Callbreath, of Fort Wrangell, Alaska, who is perhaps more familiar with the subject-matter than any other man in the country.

STATEMENT OF MR. JOHN C. CALLBREATH, OF FORT WRANGELL, ALASKA.

Mr. CALLBREATH. Mr. Chairman and gentlemen of the committee, my friend Mr. Sulzer has left very little for me to say. I have jotted down some items here rather explanatory of the habits of the salmon of Alaska, and the reason why this bill is necessary to preserve the salmon of Alaska. The proposed law simply gives to parties a legal right to property they create from the wastes of nature at their own cost and without taking anything of value from the public domain. If they produce ten where nature has produced but one, they surely should have the right to the increase. They also enrich the waters outside the protected zone by thousands of fish that will be public property. Now the propagator will not get all the fish—probably not more than one-half of the fish—outside of this protected zone. Others are there to take the fish, and everyone is free to take them, and inside the protected zone the normal quota of the stream is free to everybody until that amount is taken. When the salmon commence to run, under the provision of this law, the public would have free access to catch those salmon up to the normal quota of the stream, and that quota must be established to the satisfaction of the Secretary of the Treasury before he will grant a lease by proof that can not be disputed.

Mr. LLOYD. You mean the normal product must be 10,000?

Mr. CALLBREATH. Many streams are less than 10,000. If it is 10,000, it shall be at 10,000. If it is less than 10,000, it shall be established at what it is. No title in fee simple is asked, merely a lease that need not be renewed unless the continuation should seem just and

proper. No person or corporation will have a monopoly of any stream. All have equal rights as provided in section 5. And no individual can have more than one franchise, or corporation more than one for each cannery actually operated. The rights of Indians are more than protected, as he has free access for food purposes to the artificial product, and in common with others to the normal product.

Fishing with hook and line is free to all. Limiting hatchery franchises to small producing streams will prevent clashing of interests, as streams producing ten thousand or less of the valuable redfish are considered of small value and are seldom fished by more than one party, while the large producers, running as high as two and a half million, are fished by several persons and corporations. The normal product might even be reduced to 5,000, which would still further limit the liability of conflict of interests. My own stream produces even less where I am hatching, it is less than five thousand, and I think all parties should have the right to a stream running as high as ten thousand. Those who have already maintained hatcheries on streams producing large numbers should be protected in all fairness. Now, there are three different parties that have been maintaining hatcheries for a number of years in Alaska on large producing streams. For instance, take the stream of Karluk. I presume the normal product would run close to 2,000,000. These 2,000,000 are the normal quota of the stream. Those 2,000,000 would be free for the public until they are all taken, and the propagator will never get any benefit of his propagation. Until the normal product are all taken parties who have started hatcheries on these large producing streams should in all fairness have the protection.

Mr. LLOYD. Do I understand that a man who establishes a hatchery under this bill is to have no benefit at all until the fish return and then shall have no benefit from their return except that which is in addition to what would be the normal product of the stream?

Mr. CALLBREATH. That is right, sir. We do not ask for anything except that which we produce. The normal quota we leave free, and they should be free. Of course we would have the same rights as others to the normal product.

Mr. POWERS. There is another thing. I understand this bill does not establish any hatchery on any stream that now produces 10,000 salmon a year?

Mr. LLOYD. I understand that, but I wanted to be clear about the other point.

Mr. CALLBREATH. There are thousands of streams and lakes that are barren. That is something I must explain. These barren streams—I am sorry some of the gentlemen have not been in Alaska, Mr. Sulzer has been there and can describe better than I can what barren streams mean—as you go along in Alaska you see falls on quite good-sized streams, and back you will see a hollow where the contour of the mountains will show you there is a great lake there. Those lakes are entirely barren because nothing can get into them. I propose to stock those lakes, and those lakes would be included although a man has no hatchery on those lakes, and you could not have one there because there are no fish; but if he stocks it, although there is no hatchery, he shall be entitled to the fish when they come back.

Mr. LLOYD. They would not come back.

Mr. POWERS. We do that in Maine, in a good many places we do

that identical thing. There is a fishway where the water comes over very rapidly, and you will find the salmon going up to spawn. I tell you we catch salmon in my town coming up that way. We do it by fixing up a fishway. I understand that thing fully. We are doing it in my State and have done it for years.

Mr. CALLBREATH. I consider that one of the greatest nurseries; it is greater than the natural hatchery ground, because there is a proportion of three of these barren lakes to five that the fish can get into.

Mr. POWERS. You would be surprised at the swiftness of the water as it comes along a sort of a race way that these salmon will go up.

Mr. CALLBREATH. They will actually climb it like a dog on a ladder. They hang on with their mouth, get hold with their tails, and wriggle and climb up like a dog.

Mr. POWERS. And where the water is coming over very rapidly. I can show you that where there are fishways.

Mr. CALLBREATH. There are thousands of streams and lakes that are barren because of falls near tidewater which no fish can pass on the upward passage. By stocking these streams with young fry you reclaim a desert, yet this can be accomplished, the commercial results of which would be enormous. To accomplish this, however, entails a considerable expense. No policy will advance the settlement of Alaska more than or as much as that provided for in this bill. Every industrious fisherman can and many will embark in salmon culture, and in connection with his hatchery will develop what there may be of agricultural resources that will never be utilized except in connection with some auxiliary industry.

Nearly all the lands suitable for agricultural purposes are situated at the mouths of streams. The 1-mile reserve to the propagator in many cases will not be sufficient protection, but a further reserve of 4 miles as set forth in section 2 of the bill, from which all parties are excluded from taking fish of the kind propagated, will leave those which might be in transit free to pass on to their native stream unhindered; and if they are the product of the protected hatchery, they will go there also unhindered. Now, the object of that is, in many cases there is a little narrow salt-water "gut," you may call it, running up in the mouth of the hatchery stream, and to give a man a mile of that would not be giving him a proper protection. Then again, his hatchery might be situated down close to the salt water, where, if you gave him more than a mile, you would give him a chance to get fish he did not produce, which we do not want to do.

Now, if the additional 4 miles is closed to all parties—the hatchery as well as anybody else—if the fish are in transit to another stream they will go unhindered, and if they belong to him they will come there. That is the reason why that clause is put in. Fishing for all kinds of salmon of the different species from those propagated, as well as those of other species of fish, is free and open to all. All parties are allowed to catch fish in this protected zone that are not of the kind the hatchery produces, and the propagator is simply given exclusive right to take the fish he produces. All others are free for everybody.

Mr. KUTCHIN. Other kinds of salmon, I will say.

Mr. CALLBREATH. Now I will read you something about the habits of the salmon.

Mr. SULZER. Regarding the habits of the salmon, your type-written statement can go in the record. Mr. Kutchin, of the Treasury Depart-

ment, is here and desires to say a few words. We only have a few moments left and I wish the committee to hear him.

Mr. CALLBREATH. I would like to explain one reason why the law as it at present stands is no protection to the salmon of Alaska. Congressman Knox made some remarks in opposition to this bill, and he stated that if the laws that were now in existence in Alaska were enforced there would be all the protection of the salmon that was required. That is a mistake. The law is tolerably well observed now. Now, the law only provides three-fourteenths of the fish shall be allowed to go up and spawn, but we will give them better than that—we will say a stream produces 50,000, and one-half would be allowed to go up; that would be 25,000.

That 25,000 is subject to all the marauders that prey on the 50,000 salmon and prevent them from being so numerous that they would block up the Pacific Ocean. They keep them down to the normal quota. They only reproduce themselves in the natural state; they do not increase. If they increase one-half of 1 per cent you would readily see in the lapse of ages that have passed the Pacific Ocean would not hold the salmon. They simply in a state of nature reproduce themselves. Say 25,000 go up that stream. They have to contend with all the marauders that formerly had 50,000 to feed upon. You can not reasonably expect there will be more than 25,000 come back. In fact, there will not be as many as 25,000. When they come back you cut them in two again, and how long before there will not be a salmon left in Alaska, or a mere nothing? That is what denuded the salmon of the Eastern seaboard. Their appliances were so inferior seventy or seventy-five or a hundred years ago that they took but a small percentage. Now they sweep the bays completely. I thank you, gentlemen, for your indulgence.

Mr. SULZER. I will say, gentlemen, that Mr. Callbreath has a typewritten statement regarding the habits of the salmon. I request it go in the record as a part of his remarks. I now take pleasure in introducing Mr. Kutchin of the Treasury Department.

There was no objection.

A peculiarity of the valuable red salmon is that they will not frequent a stream unless it has a lake that they can reach, where they may lay and ripen before ascending the small streams that put into the lake for spawning. Fully one-half of the small streams that produce a large percentage of the salmon of southeastern Alaska have no lakes on them, and fully three-fifths of those that have lakes are barred by falls between the lake and tidewater, over which fish can not pass; hence the scarcity of this valuable species of fish. The cohoe, dog, and humpback salmon, all inferior fish, take any stream on which there are spawning grounds. As a consequence they are very numerous and the valuable red salmon correspondingly scarce.

These valuable red salmon are fast becoming extinct, and, unless the Government institutes an extensive system of hatcheries and private parties are protected in the output of their hatcheries, will in the near future be numbered with the buffalo. No private party, unless protected in the results of his industry, can withstand the enormous pressure of the great combines. In my own case I have expended a small competency in the enterprise of salmon culture that will in the end be of incalculable benefit to the country; but unless I am protected in what I produce others will reap where I have sown. It is of record in

Holy Writ, "That he who buildeth a house shall dwell therein, and he who planteth a vineyard shall gather the fruit thereof." The claim of the salmon propagator is even stronger than that of the vinyardist, as a vineyard implies the occupation of good land, which can only be occupied by the vineyardist, and there is a limitation to good land, but the fruits of our hatcheries take no land for their growth; the broad Pacific is their range, and streams and lakes that are practically valueless—and as to the barren lakes and streams absolutely so—are their nurseries.

There are several things in connection with salmon propagating that are not generally understood except by those engaged in the business, prominent among which is the necessity of protecting the young fry while in fresh water from their great enemy, the sea trout, who also devour over one-half the eggs before they can be buried in the gravel by the parent salmon. Where they breed naturally this protection is next to impossible and entirely impracticable, but the propagator makes this his first step. In a normal state, where even no onslaught by fishermen at all is made upon them, the salmon merely reproduce their normal numbers, for if they increased one-half of 1 per cent each year in the thousands of past decades the ocean to-day would not contain them.

A single female red salmon contains an average of 3,500 eggs. In a state of nature probably 100 young fry would dig their way out of the gravel and begin life, which from the start is a fight for existence. Everything that swims, walks, crawls, or flies is their enemy, seeking to devour them; even their year older brothers who are still in the fresh water go for them ravenously, so that in the end but one of each sex will return at the end of ten or eleven years to plant their spawn and die as their parents did ten or eleven years before them.

With artificial propagation, out of the 3,500 eggs that one female produces the propagator gets 3,000, the remaining 500 being difficult to extract. From these 3,000 eggs the propagator will bring out an average of 90 per cent. The past winter my own hatchery brought out 97½ per cent, but the eggs the past year were unusually good. Like everything else in nature, no two years are exactly alike. This 97½ per cent were first turned out in preserves, where they are completely protected from all enemies until they have consumed the egg sack and become swimmers—a period of about six weeks—when they are gathered up by means of a fine dip net and placed in their native waters, where they would have been had their parents been allowed to spawn naturally. These waters have already been swept clean of the sea trout, the young salmon's greatest enemy, by means of a dam at the mouth of the stream over which no fish unaided can pass. The sea trout follow the salmon for plunder; the eggs and the young fry are their tidbits.

Below my dam is a barricade and trap where everything is gathered in that is trying to ascend the stream. The red salmon from which I am propagating are picked up with a dip net and carefully passed over the dam to the pond above; all else are consigned to a pen on shore, where death soon ends their marauding career, when they are chucked back into the creek and swept away. This is the protection that the propagator gives his weaklings. No protection at all do they have under natural conditions.

This system, as will appear from my statements, makes the propa-

gator turn out from the same number of salmon and in a place of comparative safety 30 to 1 more than the normal turn out that would be open to the destruction of their numerous enemies.

Let us now discuss the protection that the present law affords the salmon. To do this in an intelligible manner I must first describe the habits of the salmon when they come to the stream for spawning. The valuable red salmon come into the bays and inlets in the early summer months, at which time of year the creeks are low, and lie around, sporting and jumping from seven to ten days and longer, unless a rain occurs to swell the creeks, which is quite unusual at that time of year, but always, rain or no rain, they lie around five or six days.

The law suspends fishing from 6 p. m. Friday till 6 p. m. Sunday, thirty-six hours, which as a rule is well observed. The fisherman plies his work assiduously all day Friday, and when 6 o'clock comes around not a salmon is left in the bay. He then lays off till Sunday morning when a fresh supply will have come in, but not one will have gone up the stream. Of course he takes them in if there are competing seins in the bay, if not he will probably wait a day or two until there is a good school in the bay and he can make a fat haul; he is not afraid of losing them, they will wait his pleasure. By this you will see, gentlemen, that the fishermen can take all that come and still be within the law.

But suppose of a stream that had a normal run of 50,000 one-half were allowed to go up, the same number of marauders to prey on their spawn and young fry would be on hand as though the whole 50,000 had gone up. Now, if the 50,000 normally only reproduce themselves it is reasonable to suppose that 25,000 thousand would do no better—would they do as well, having to feed the marauders that formerly had the product of the whole 50,000 for their feast? I think not. I think something considerably under 25,000 would be the result. Now, when the product of the 25,000 returns let 12,500, half the product, go up, and so on, letting one-half go up each year, how long will it be before that stream is depopulated?

It was this process that denuded the streams of our Eastern seaboard. The primitive means of taking fish in those early days bore no comparison to the sweeping means now in use that rake the bays and inlets as with a fine-tooth comb. It is this process that is killing and will effectually exterminate our salmon fisheries of the Pacific. The remedy, and the only remedy, is artificial propagation. Protect the hardy fisherman in the fruits of his labor and he will build up the fisheries a hundredfold beyond what they were before the canneries depleted them, without a dollar cost to the Government. He will do more, he will give you a population of hardy seamen, of which Mr. Seward said Alaska would be the nursery; he will develop what there may be of agricultural resources; will be a permanent resident of the country, and his children to the manor born. Every fisherman, though he may never have made a voyage at sea, is half a sailor, and when he gains the other half, makes the best sailor in the world.

The belief expressed that these propagators would all be bought up by the great corporations is groundless, as well might we withhold the homestead from settlers on the public domain, lest when he obtained his patent he would sell out to the land shark. The small streams on which all future hatcheries would be confined are numbered by the thousands, the most of which, aye, all, would be utilized sooner or

later if the fisherman was protected in the product of his toil. Under present conditions the great combine can and will continue to gobble the entire product of the country.

If the boon asked for in this bill be granted, the fisherman, when the fishing season is over, instead of wasting his time and summer earnings around the saloons and dance houses of the towns, will be at his hatchery rearing salmon and supplying the market with a cheap luxury that will be within the reach of every factory girl or artisan in the land at a nominal cost—it will help kill the food trust.

I would draw a simile between the enormous increase in salmon that would follow the passage of this law and the phenomenal increase of the rabbit in California and Washington. The destruction of the coyote, hawk, and wild-cat (by the settlers), whose common food was the young rabbit, caused that little ruminant to increase to such an extent that concerted action was necessary to save the crops; whole townships turned out for drives to destroy the rabbits. Now the propagator will not only destroy the natural enemies of the young salmon as did the settler the coyote, but he will beat nature a hundredfold in their reproduction—he will, in fact, become a stock breeder of the advanced period in which we live. No cowboys will be required to round up his herds, droughts will not starve nor blizzards freeze them, the broad Pacific will be his pasture, the world his market, the human race his beneficiaries.

It is true property in fish is a new proposition, but we are living in an advanced age and new propositions are especially in order. Our Government claimed property rights in seals that are purely the product of nature, and the admittedly ablest jurist on that Commission, Baron Courcell, sustained our claim but was overruled by the majority. The propagator's claim is far stronger, as he lays no claim to nature's product, he simply claims that which he creates from the dormant capital of her great banking house, which he merely uses as a loan.

This Congress is considering the adoption of a ship-subsidy law to assist in building up a merchant marine. Give the propagator a property right in that which he produces and he will help fill their holds with freight and man their decks with seamen without one dollar of subsidy. Everything in this bill that might tend to give the propagator monopolistic privileges is carefully guarded; the onus of proof in every case is on the propagator. The Government will be winner thousands of dollars annually in the increased output of canned salmon, on which a tax of 4 cents per case is collected. It will give employment to thousands of laborers, will be a large factor in building a new State in the extreme Northwest, and vastly increase the food supply of the world.

STATEMENT OF MR. H. M. KUTCHIN.

Mr. KUTCHIN. Mr. Chairman and gentlemen of the committee, I had no expectation of making any formal statement in regard to the bill under consideration, but came in response to the invitation to endeavor to reply to questions which you might put.

Mr. LLOYD. Would you have the time to prepare a statement that might be submitted to the stenographer in the next few days?

Mr. KUTCHIN. That would be pretty sweeping; I have made five annual reports which cover almost every phase of the question.

Mr. LLOYD. I appreciate that.

Mr. KUTCHIN. I want to say in relation to this bill that I do not regard it as the sole or perhaps even the best method of preserving the salmon industry of Alaska. I regard it as a question of pure equity, and a proper protection of the rights of those who are seeking to contribute to that end. Every man who has the enterprise and public spirit to start a hatchery in Alaska ought to be protected. Under the present law such is not the case. There is a regulation of the Treasury Department now which requires that every conductor of a cannery or saltery in Alaska shall establish and run in cooperation with it a hatchery to reenforce nature. Geographic and climatic conditions make that impracticable and impossible as an universal rule. There are places where the streams freeze solid. There are other places where hatchery sites are inaccessible and unobtainable, and there are regions where at present they do not need any hatchery.

Conditions in southeastern Alaska are very different from those in other portions of the district. In southeastern Alaska there are many small streams. In Bering Sea, in Cook Inlet, in Shelikof Straits, and Prince William Sound there are very few streams and those are very large. I believe that the reenforcement of nature by artificial propagation is the only method of preserving the salmon industry of Alaska. The law as it exists is impracticable, contradictory, and of little effect. The prime spirit of it is that the fish shall be protected for access to the streams to spawn, and by a curious exhibition of ignorance the law applies only to "rivers and streams" in terms. As a matter of fact, except in Bering Sea, there is very little fishing done in the rivers and streams, and in southeastern Alaska I might say almost none; so that men plying their nets at the mouth of a stream and approaches sometimes would do all that a dam would do in preventing access of the fish to the stream; and there is nothing in the law to prevent it. It is not violations of the existing law that is decimating the salmon (if they are being decimated), but the stupendous machinery of the packing establishments there. In my experience of the fisheries of Alaska—I have been going there, this next trip will be my sixth cruise, I have traveled from eight to ten thousand miles every summer——

Mr. LLOYD. Has it been a part of your duty to see that the law is enforced?

Mr. KUTCHIN. It has been my paramount duty as far as possible, but the great area and the multitude of fisheries make it absolutely impossible to visit all of them. I suppose there are five hundred different streams and places where fishing is done. There are two men to maintain surveillance over all that region and police it, which, you see, is absolutely impossible.

Mr. LLOYD. The matter has been discussed somewhat in the House. Do you think additional help will remedy that?

Mr. KUTCHIN. It would in a measure, but a revision of the law which would cover all the waters where the fish are taken would be much better. As a matter of fact, the Secretary of the Treasury under that law has no power over the approaches of a stream. You can take all the fish that come and prevent any fish, practically, from going up the stream without violating the law at all.

In portions of Alaska there is a great abundance of fish now. In Bering Sea in going a distance of 5 miles last summer in a steam launch the wheel was clogged several times with live salmon, and we

had to stop and pick them out with a boat hook. It will be many years before those fisheries are destroyed. So far as the evidence is concerned there has been no decimation of the fisheries. The first year I went up there the take was something less than a million cases. It has gone on in an ascending scale steadily, with one exception. Last year it was over 2,000,000 cases, or 96,000,000 pounds of prepared food. In 1897 I think there were 29 canneries, and last year disclosed 55 and a large number of salteries.

It is a great industry, as Mr. Sulzer has said. It will average $4,000,000, perhaps, a year. The product of Alaska is about equal that of Puget Sound and Fraser River. There are something like 11,000 persons employed there and a large number of ships, and the product this year is approximately $7,000,000. The taxes paid to the Government this year are about $90,000.

My theory is that the Fish Commission, with an appropriation under the Government, should take charge of the hatchery business. There should be three or four large stations, with proper steamers for the distribution of the fry; the fry should be properly distributed in the streams, and supply all the packers who would prefer to procure their fry from the Government rather than to produce it themselves.

I do not believe that the attempt to reenforce these fisheries by the production of salmon in the hands of private parties will be effective. There is a large hatchery at Karluk—it was one of the greatest fisheries in the world at one time—and they put out 30,000,000 of spawn this year, but under the existing conditions there are four or five different companies that fish at that fishery who will take the fish produced by this one company, which is manifestly inequitable and unjust.

Mr. LLOYD. And the Fish Commission has no control over them at present?

Mr. KUTCHIN. The Fish Commission seems to be averse to going into Alaska. They treat of the scientific conditions, but they apparently do not wish to have anything to do with the policing and taking care of the fisheries.

Mr. LLOYD. You are satisfied from your own knowledge of the matter that the trouble at present is with the law and not with the officers of the law?

Mr. KUTCHIN. I am quite sure of that. I can say conscientiously——

Mr. LLOYD. I am asking specially about that because the Fish Commission or other parties have said that the fault was not on their part. I do not seek to make it personal, but since you were there, I want to ask the question directly.

Mr. KUTCHIN. I am glad to have you ask it.

Mr. SULZER. Just in that regard, permit me to say that during the two summers I spent in Alaska I never heard a man complain about Mr. Kutchin's work; they all spoke in the highest terms of it, but, as he says, the fault is with the law, not with the officials of the Treasury Department.

Mr. KUTCHIN. The law and the limitations that prevent the enforcement of its true intent.

Mr. LLOYD. Do you think the machinery could be remedied?

Mr. KUTCHIN. Just to the extent that three men would be more valuable than two and forty men would be better than four men.

Mr. LLOYD. But if you had the forty men, that would still not be enough?

Mr. KUTCHIN. I do not believe a regiment of men, under the existing law, can preserve the fisheries, for the reason that the machinery employed by the persons engaged in taking the fish is so stupendous that they will violate the spirit while preserving the letter of the law.

Mr. LLOYD. Can you suggest a simple plan that will make a law which would be effective?

Mr. KUTCHIN. I have cudgeled my brain a long time for some remedy, and have reached the conclusion that it rests on abundant artificial propagation; but no man knows that a hatched salmon has ever come back to fresh water; thus far it is purely experimental. I heard this summer that marked fish came back to a certain stream. I am certain it was a mistake, for they do not know whether they come back in four years (the common American idea). Mr. Huxley says seven years, and Mr. Callbreath eleven years. No man knows, as a matter of fact. But we know the success in the propagation of shad and other fishes. The habits of the salmon are unknown and it is experimental, but nothing can be accomplished unless it is initiated, and presuming that what is believed to be the fact in regard to other fish is true of salmon, they should be propagated and should return to the parent stream. I think that is the only remedy.

They will last longer in Bering Sea for the reason of the conditions in the great rivers where it is impossible to prevent their ingress to the spawning grounds—the width, the currents, and the tides—but they will ultimately be exterminated. Years ago the salmon rivers of Scotland were so teeming with salmon that the laboring men bargained that they should not be required to eat it more than three times a week. Now fresh salmon is a luxury for the rich, just as the white-fish on the lakes have become. They used to be packed in every little cove and port on Lakes Michigan and Superior, and now there are very few white-fish, and the packing of white-fish is almost gone. History agrees in all particulars that inland fishing is subject to extermination, and I believe that this will be true as to the salmon in Alaska to-day, that they are doomed within a reasonable period—within the life of any person here present.

This bill, which we are here to discuss, is fair and equitable. I think that any man who is disposed to put in his time and money and effort, as Mr. Callbreath and others have, should be protected, and I think this bill does it fairly and well, and that it does not encroach upon the rights of anybody. It does not give anybody the exclusive rights of streams. There will probably be contentions, where there are two men on a stream, as to how many fish each produced and how many of the returning fish are his, and a great deal of trouble of that sort, but that can not be well cared for in this particular bill. I think it is a good bill. So far as the preservation of fisheries is concerned I think there should be a vital revision of law. There should probably be limitations as to the duration of the fishing seasons and the size of the pack.

Mr. SMITH. I understood you to say that one of the infirmities of the law was that there were points that the present law did not cover at all?

Mr. KUTCHIN. The law is presumed to cover them.

Mr. SMITH. Does not the law cover the streams?

Mr. KUTCHIN. The language of the law is confined, as you remember, to the rivers and streams. Now, as a matter of fact, there is little

fishing in the rivers and streams except in Bering Sea. Karluk River is a little, narrow stream which has been the greatest fishery in Alaska. They lay a net there outside the mouth with a steam launch and they draw it in with a steam winch, and that net will embrace a mile of water; and this operation is kept up uninterruptedly, except during the closed season, while a salmon is to be had. It is inevitable that few fish are permitted to enter the river.

Mr. SULZER. Permit me to interrupt you right there. I have absolutely witnessed a haul bringing in over 40,000 salmon.

Mr. KUTCHIN. They have a story about pulling in 125,000 salmon this season in a single haul at Karluk. There is one of the eccentricities of salmon theories. The Karluk production was one of the largest and it has gone steadily down, every year smaller than the year before, and this year there were so many fish there that it was impossible to handle them and they were sent off 150 miles to replenish the meager supply of other canneries.

Mr. LLOYD. That would carry out the theory that they come back to the same point where the spawn is?

Mr. KUTCHIN. They do there. The fish at Karluk is distinctive in character. They are almost the smallest salmon in Alaska, and 150 miles away they get one of the largest fish. But in contradiction of that statement, I was down at one place last summer where fish were commonly scarce. The stream is said to have been fenced for many years, as it is inaccessible and had never been visited by an official. But that season there were swarms of salmon, and packers at a distance came to profit from the unusual run. It is as certain as anything can be that those fish were never hatched in that river. Where had they come from? They were unlike those ordinarily taken at adjacent fisheries.

At Chignik they have the most odious fishing system in the whole business, the traps. Traps starting out from the shore line and running to here [indicating] and then over here [indicating], half a mile long. Those traps are planted in the river so close together that you can not shoot a rifle without hitting a pile, and still the lake is full of fish. How they ever got up there no man knows. They have no business to use those traps, they are illegal under the spirit of the law. There is no such thing with them as a closed season. The law provides that the closed season shall be from 12 p. m. Friday until 6 p. m. Sunday. These infernal traps take everything that comes, all kinds of fish, even seals. There is a regulation that they should open those traps during the closed season, but it is not fully effective. Curiously enough in one section of the existing law traps are forbidden, and in another section it provides that they may be used if they do not extend more than one-third across the width of the river, and it has been decided that the traps are permitted under that provision.

Mr. POWERS. I understand you distinctly to state that you believe the existing law furnishes no adequate protection, for the reason that without violating the law parties can go farther out to sea and can catch nearly all the fish?

Mr. KUTCHIN. I do not think the existing law affords any protection; not in the small streams, except in so far as it provides for a closed season and forbids barricades.

Mr. CALLBREATH. In the small streams the existing law affords no protection whatever.

Mr. SULZER. Gentlemen, we have here Mr. H. B. Martin, who represents the American Anti-Trust League, and who is interested in this bill in the interest of the consumers of the country. I would like to have the committee listen to Mr. Martin a few moments.

Mr. MARTIN. I will not ask to make any argument. I want to leave with the committee the report of Commander Moser, of the United States Navy, giving extracts from his report on the Alaska salmon investigations in 1900, and the report of operations of the United States Fish Commission steamer *Albatross*, of which he was the commander; and in his report for 1900 he devotes pages 221 to 227, inclusive, about eight pages, to the methods used by Mr. Callbreath to propagate the salmon and increase the supply of young fish. In closing that report, which is very interesting and which will be instructive to the committee, I will leave it here as a part of the hearing. He says, in the last paragraph:

> Mr. Callbreath is positive that his fish will return, but he now believes the time has not yet arrived for the first output to mature. It is earnestly hoped he may realize all he anticipates, for the zeal and enthusiasm which he displays should meet with ample reward. In the meantime he is carrying on a very interesting experiment: If his fish return he will have demonstrated that salmon do return to the parent stream, he will have thrown much light on the age of fish, and he will have proved that a stream running a few fish can be made to yield abnormally. If this is demonstrated a law should be passed permitting the leasing of small streams for hatchery purposes and recognizing ownership in fish thus hatched. This would mean a great deal to southeastern Alaska, as it would draw settlers who could make a very good living by operating a hatchery and cultivating the little patches of land that are favorably located.

That is on page 227 of Captain Moser's report, which has just been placed in the hands of the Government Printing Office; this is from the advance sheets.

Mr. SULZER. I desire to say that the Secretary of the Treasury informed me that Captain Moser had made this report on the salmon industry of Alaska, and that the report had been sent to the Government Printing Office, but had not yet been printed, but that if I would send to the Government Printing Office they would give me advance sheets, and these are the advance sheets, a part of this report, relating to this very matter. I do not think this part of the report will take up more than a few pages, and I desire to ask the Committee to have it printed herewith.

Mr. MARTIN. The only other word I desire to say is very brief, and is that the interest I take in this matter of the preservation of the salmon fisheries is as a student of economics, and as one who desires to see the food supply of the world preserved and increased in every way possible. We know that the human race is increasing very rapidly in numbers, and we want to provide as good and abundant a food supply as is possible, and we want to prevent the creating of a monopoly, such as the recent beef trust, and so we favor anything that will increase the supply. From the reports of Captain Moser, who is an expert, and from the reports of Mr. Kutchin, the special agent, and from the statements of other gentlemen who are experts and authorities on this question, and from the testimony of Captain Callbreath, it is very evident beyond any question that it is necessary to do something to preserve the salmon fisheries from extinction, and as they are of enormous value as food supplies, and as this bill does not give any monopoly, but simply provides that the men who have worked and labored to increase

the supply shall be protected; in other words, that they may reap where they have sown, we believe that it would be proper and desirable legislation, and we hope that your committee will report the bill.

Mr. LLOYD. I would like to ask Mr. Callbreath whether he has made experiments in this line for some time?

Mr. CALLBREATH. Yes, sir; for ten years. I have been looking into the matter for some forty years, but this is the tenth year I have had this thing under my personal observation.

Mr. LLOYD. You mark the fish for return?

Mr. CALLBREATH. I never marked any fish.

Mr. LLOYD. When did you begin to mark any?

Mr. CALLBREATH. I never marked any fish. I have a check on them, which is far better than the mark, because the marked fish counts for nothing. Other people mark them just as you do. I have picked up in my place many fish that have the marks on them that you would suppose they came from Puget Sound, but they were all local fish. They cut off a fin, or they cut off part of the tail. My plan is the simplest thing in the world. I have a dam at the mouth of my stream over which no fish can pass unaided. When the fish come up to the dam, going to the spawning ground, I pick up the valuable fish with a dip net, and they go on up to the lake.

The humpback, an inferior fish, comes to this stream, probably from fifteen to twenty-five thousand, and I kill them all. I have killed them ever since 1892. There is no spawning ground below my ground, and I have killed that whole mess of fish since 1892, and they came back as plentiful last year as ever. When we progress further, these inferior fish will become extinct, and there will be an increase in the fish that I am producing there. The normal product has not been altered a particle: the smallest year was 2,500 and the largest year 5,000. Here [exhibiting] I have some specimens of fish that are 2 years old. They show you that these fish take a long time to grow. These specimens are just about to leave the fresh water and go to sea. As Colonel Kutchin has said, it is an experiment, and it is a very expensive experiment, one in which I have already spent $20,000 and have not received 1 cent yet, but I expect to get something from it. I know the whole world is wrong as to the salmon's age. I do not know how near I am right, but I will know before many years; but I do know that the whole world is wrong; I know that absolutely.

Mr. LLOYD. You know that because you have been killing this particular class of fish?

Mr. CALLBREATH. Yes, sir.

Mr. LLOYD. And you have been doing that for ten years?

Mr. CALLBREATH. Yes, sir; I keep a strict account of every red salmon that passes over my dam, male and female, and I know just how many start up the little streams, and all that. There is a peculiarity about the red salmon; he will not take a stream that has not a lake on it, and yet he does not spawn the lake. There may be two streams, one of which has fine spawning grounds, but the red salmon will not go up that stream unless there is a lake; he wants to lay in the lake in the deep water and ripen. The other fish take any stream on which there are good spawning grounds, but the red salmon will not.

Mr. KUTCHIN. I want to amplify my statement as to the enlargement of the force and the effect. You asked me if more men would improve the situation and make the law more operative. As to those

places where barricades are forbidden at the mouths of streams and where the closed season is observed, of course close observance of the regulations would be beneficial; but that would not prevent the steady extermination of the salmon.

Mr. SULZER. We are very much obliged to the committee for its attention, and I trust the bill will be favorably reported.

Thereupon the subcommittee adjourned.

The report submitted by Mr. Martin follows:

ALASKA SALMON INVESTIGATIONS IN 1900—REPORT OF THE OPERATIONS OF THE UNITED STATES FISH COMMISSION STEAMER ALBATROSS DURING THE SUMMER OF 1900.

[*By Jefferson F. Moser*, Commander, United States Navy, commander.]

[Pages 221 to 227, inclusive.]

CALLBREATH HATCHERY.

Mr. John C. Callbreath has been a resident of Alaska for many years; he was the manager of the Point Ellis cannery until it was destroyed by fire in 1892, and has lately been engaged in the transportation business on the Stikine River and in trading, making his home at Wrangell. He is a representative citizen, enterprising, and devoted to salmon culture.

In 1892, in connection with the Point Ellis cannery, he started the hatchery referred to under that stream heading. Having seen the rise of the salmon industry, and knowing, as all must know who are familiar with the question, that the abusive and excessive fishing and total disregard of the law by the fisheries must slowly but surely exterminate the salmon for commercial purposes, he determined to take a salmon stream that under normal conditions carried a few thousand redfish, and by artificial propagation increase the production to hundreds of thousands. He hoped that, if successful, a law would be framed making the increase his own property.

The hatchery is a private enterprise, unconnected with any cannery or fishery, and based upon the widely prevailing belief that the salmon return to the parent stream in four years after they are hatched. As this time has passed, however, without any apparent return, Mr. Callbreath has extended his period to ten years.

In establishing the hatchery a stream was sought satisfying the conditions imposed, and one was found at the head of McHenry Inlet. It is small, about one-half mile in length, and flows over a rocky and bowldery bed between heavily wooded shelving banks. At its head is a small lake 42 feet above tide water, slightly L-shaped, about three-fourths mile long by one-fourth wide, and bordered by low wooded banks. The stream was never known to supply more than from 3,000 to 5,000 redfish, a number too small to attract the attention of the commercial fisheries. In fact, it was known as a "cultus chuck" or worthless stream.

After making satisfactory arrangements with the Indians claiming the stream, a hatchery was built in 1892 on the right bank about 200 yards from the mouth, and suitable dams were thrown across the stream to impound the fish. The hatchery water was taken from the stream, conveying it by a flume from a point near the lake, where a

Ruins of trough and baskets, Callbreath's old hatchery.

dam was built. After operating the hatchery during the latter part of the season in 1892 and turning out about 600,000 fry, it was seen that the breeding fish could not be impounded properly in the stream, many dying, probably from exhaustion in attempting to pass the barrier. It was also found that the stream water used in the hatchery was unsuitable, not only on account of the wide range in temperature, but the organic matter it contained smothered the eggs and caused fungus. An excellent site having been found on the lake in the vicinity of the streams forming the natural spawning-beds, with a spring giving an abundant supply of pure water of very equable temperature, the hatchery was moved in the spring of 1893 to its present site. It was operated that year and every year until 1900, when the projector decided that his means would not permit him to continue the work unless some return was made.

From its first inception it was determined that, in order to obtain the best results, only the most desirable species should be admitted to the lake, and that all enemies must be removed and excluded. In order to carry this into effect dams were built across the stream with racks below them, as shown in the sketch, at a point about 100 yards from salt water, where an islet divides the stream into two parts. The dam and fence on the western side of the islet allow nothing to pass. The fence on the eastern side has a trap opening, admitting fish to the foot of the dam. Here the redfish and cohoes are lifted by dip nets to the pool above, from which point they can ascend quickly to the lake. Nothing can enter the lake which is not passed over the dam by hand. The humpbacks, dog salmon, Dolly Varden trout, and all enemies are carefully excluded, and the lake is therefore free of undesirable and predatory species. The lake has been carefully fished, and all enemies to the fry, such as cut-throats and other trout, sticklebacks, bullheads, sculpins, etc., have been removed, so that it is comparatively clear of enemies.

The hatchery is located on the northern side of the lake, about three-eighths mile from the head of the outlet, and midway between a series of 11 springs and feeders, the extreme distance being less than one-fourth mile from the main building. The hatching-house stands on the border of the lake, partly over a small feeder, and back of it is a substantial and comfortable log dwelling, 20 feet by 36 feet. Strung along the lake are two houses for the hatchery hands, each 12 feet by 16 feet, a smokehouse for smoking the stripped fish, and a tool house. The original cost of the plant, and all expenses connected with it to date (September, 1900), amount to $16,000.

The hatchery usually opens July 1, when preparations are begun for the season; stripping generally commences September 1; the place is closed about March 1.

The hatchery building is 75 feet long, east and west, by 11 feet in width; south wall 11 feet high, north wall 6 feet high; shed roof, with windows on the south side only; on the east end is an open-shed annex, 18 feet by 11 feet.

The troughs are 16 feet by 13½ inches by 5½ inches, inside measurement, made of planed lumber, 1½-inch bottom, 1¼-inch sides, covered with asphalt varnish. In the main building are 2 lines of troughs arranged in pairs, with 8 troughs in a line, making a total of 16, arranged with a passage around the lines as shown in the sketch. Each pair of troughs has a drop of 1 inch in its length, with a fall of 4 inches

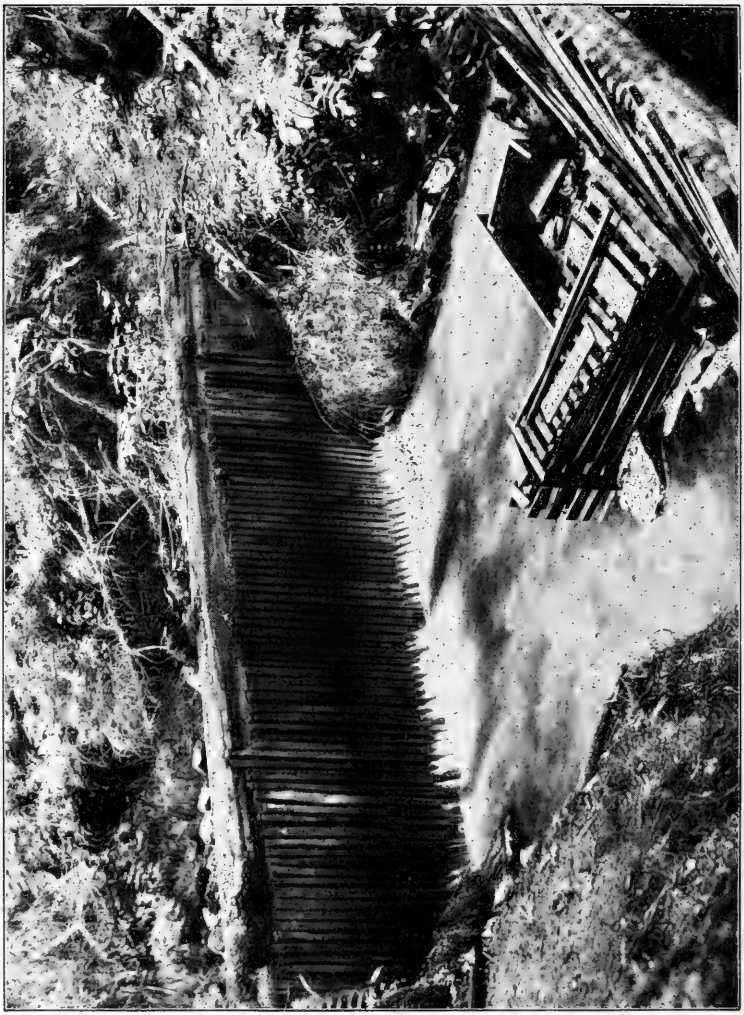
to the next. The first compartment in each trough is 8 inches in length, and receives and aerates the water; then come 7 basket divisions, each 24 inches long, separated by the Williamson system of division plates, 2 inches apart; the last space is 4 inches. The annex will accommodate 4 troughs, but it has seldom been used.

The baskets are of the usual wire webbing, five-eighths inch by one-sixth inch for redfish eggs, and five-eighths inch by one-fifth inch for cohoes, and are $23\frac{3}{4}$ inches by $12\frac{3}{4}$ inches by $4\frac{3}{4}$ inches, and have no wooden rims. They are supported an inch from the bottom of the trough by broad-headed nails and tin clips. All are well lacquered. A full basket contains 60,000 redfish eggs, or 30,000 to 35,000 coho eggs. The capacity of the hatchery is therefore 6,720,000 redfish eggs, and the annex 1,680,000 of the same species, but it is doubted if the latter can be regarded as a reliable factor in estimating the capacity.

The hatchery water is received from a pool about 150 yards north of the hatchery, which is supplied by three springs (see Sketch G) in the immediate vicinity, augmented by an additional spring, which is connected with the pool by a ditch. From the pool the water is conveyed by a covered flume to the west end of the hatchery building and is then distributed, as shown in the drawing. The flow is regulated at the closed end of the flume in the pool by means of holes in the bottom plank, in which plugs may be inserted, increasing or decreasing the supply as may be necessary. The main flume, midway in its length, is joined by a flume running from a reserve pool to the eastward, which may be used if necessary. The water is very clear and evidently quite pure, as no trouble has ever been experienced from fungoid growth. It is not filtered, but there are screens in the upper end of the flume to strain out foreign particles which may fall into the pool. The water is very equable in temperature and is said never to freeze. The lowest temperature observed in midwinter is recorded as 38° F., and the highest in midsummer 46° F. These are the extremes, the average range running from 39° to 45° F. During moderate winter weather the temperature of the water runs from 40° to 43° F.—never above the latter. While the temperature of the water is frequently taken during the season, there is no daily record from which curves may be drawn. The following may be noted as fair averages: July 25, 1898, 45° F.; September 14, 1898, 43° F.; lowest during the winter of 1898–99, 39° F.; April 15, 1899, 41° F. The lake water ranges from the freezing point in winter to 60° F. in midsummer. It is claimed that the present hatchery supply is sufficient for 15,000,000 eggs and that there are additional springs in the vicinity which, at small expense, can be utilized. In the hatchery the same water is used through four troughs, and if the annex is used, through five. It then passes by a sluice to the small creek under the hatchery.

The arrangements seem crude, and all fittings and appliances are constructed at the least expense, yet it all indicates an intelligent endeavor in a direction where there was but little previous experience in the work. Judging from the output, however, the hatchery has been very successful, and is a striking example of what may be done in this line of work if undertaken in an intelligent manner. Mr. Callbreath certainly deserves great credit, not only for the work he has accomplished, but for the proof he has given that a hatchery may be operated successfully for very little money.

Feeders, ripening pools, and nurseries.—The redfish and cohoes after



Trap pen and barrier in lower course of stream, Callbreaths Hatchery, McHenrys Inlet, S. E. Alaska.

entering the lake remain in its waters until ripe, a period varying from two to six weeks, sometimes longer, depending upon the condition of the fish as they enter from the sea; and when ripe they seek the feeders to spawn. In the immediate vicinity of the hatchery there are six feeders and springs which form natural spawning-beds and are arranged for taking ripe fish, and also several nursery ponds. (See sketch.) The mouths of these feeders are fenced and have trap openings, which admit the fish, but do not permit them to leave.

Feeders A, B, and K are tightly fenced to prevent adult fish from entering, as they are full of obstructions on which the fish might injure themselves. C, D, E, and F are spring pools, which have been cleared and improved, opening on the lake. The pool C is separated by a dam into two ponds, the inner one forming an excellent nursery. D is not considered very good. E is the best pond, and secures the largest number of breeders except J. F is a nursery pond; an inclined fence of brush surmounts the dam and partly shades the pool, which is believed to benefit the fry. G is the outlet for the overflow from the hatchery reservoir pool; it has several small pools, formed by widenings in the stream, where fry were one year planted but did not do very well. The lower of these pools, shown on the sketch, was also used as a nursery, but was unsatisfactory. H is the overflow from the auxiliary pool for hatchery supply, and receives the hatching-house waste; at times a few fish are permitted to enter and are spawned as needed to fill up baskets. J is the chief feeder entering the lake, and is about 100 yards east from the hatchery; the mouth is fenced with the usual trap opening, and from this point for about 70 feet upstream the banks are walled up with vertical slabs. At J the stream has been dammed to make an upper pool in which, and in the upper reaches, fry are released. The ripe fish are stripped on the west bank of the lower reach.

Spawning.—The ripe fish enter the pens through the traps and are secured by dip nets; they average about 7 pounds in weight. Spawning begins about September 1, and continues actively for about six weeks; a few ripe fish keep running until late in the winter, the latest arrivals having the most perfect eggs.

In spawning the wet process is used; a pan is half filled with water, into which the ova are stripped and the milt added; these are mixed with the fingers, and then set aside for one hour, after which the eggs are thoroughly washed, transferred to buckets, and carried to the hatchery where they are placed in the baskets.

It is found that impregnation will take place up to 3 minutes after the ova have been ejected, and that the best results are obtained by adding the milt between ½ and 1½ minutes after ejection.

Size of eggs.—The number of eggs of both redfish and cohoes has been frequently counted, and it has been found that a full healthy female of each species contains 3,500 eggs, but it is rare that the full number is obtained. As frequently some are left in the fish, and others are not in good condition, the count is made on 3,000 eggs to the full fish, or 20 redfish, or 10 to 12 cohoes, to the basket, the eggs of the latter being about twice the size of the former. When a large number of fish mature at the same time it is frequently found that some eggs have been voided, and in such cases it will take two and sometimes three fish to make one "count" fish.

In counting the eggs a condensed-milk can is used as a measure.

This measure, by repeated counting, has been found to contain 1,904 redfish or 848 coho eggs. A quantity of eggs from a healthy, normal, ripe female redfish was secured and measured with the following results: Forty covered 2 square inches and 20 in a line against a straight edge occupied a length of exactly 4½ inches, giving a single egg a diameter of 0.225 inch. It has been observed that brilliantly colored or unusually large or small eggs are apt to prove failures.

Several hundred cohoes are usually stripped each year and the eggs hatched. They run about six weeks later than the redfish.

The picking of eggs is done with ordinary tin forceps and is commenced six to eight weeks after the eggs are placed in the baskets. It is claimed that the percentage of bad eggs is very small, and that very little, if any, fungus appears. The delicate period is unknown here. It is probably covered during the time the eggs remain undisturbed.

Period of incubation.—The temperature records are not at all complete, and no attempt has been made to determine the thermal hatching unit. Generally it may be said that with a temperature of 45° F., the average highest, to 39°, the average lowest, the eye spots appear in from 30 to 38 days. A few are earlier, and a few are 45 days before they are well eyed out. In 90 days they are hatching rapidly; in 100 days two-thirds are hatched; in 110 days four-fifths are out, and the remainder straggle along for several months. As the hatchery closes March 1 the unhatched eggs are buried in the gravel, simulating the natural conditions. The cohoes hatch about 10 days earlier, and an experiment made with a basket of humpback eggs showed that they hatched in 70 days under conditions in which the redfish hatched in 90 days.

Eggs which hatch out well in advance of the mass ("prematures") and those equally late, produce usually very weak fish, or "freaks." It has been the experience here that it is useless to waste time on these fish, as they invariably die. It has been found that the fry just hatched collect in the lower end of the troughs, and to prevent loss they are removed as early as possible, within a day or two after hatching, and placed in the nursery, the upper ponds of the feeders, and sometimes in the lake, where the bottom is grassy or covered with pond lilies.

The yolk sac is absorbed in from forty-five to fifty days, but shows plainly at sixty days, though skinned over and in the belly. After this has taken place they are taken from the nursery and some are placed in the feeders and others in the lake, where the natural conditions are most favorable for their protection.

The loss varies from 8 to 12 per cent, depending upon the season; if there is an abundance of rain, permitting the fish to ascend without injury, the eggs are found in good condition and the loss is small. During a dry season the fish are kept from ascending until the fall rains, and as they partially ripen in the salt or brackish water the eggs are more easily injured. Realizing the advantage in having the fish arrive in the lake in a healthy, vigorous state, considerable work has been done at the outlet to remove obstructions and to improve the natural conditions.

Barren lakes.—Mr. Callbreath lays considerable stress upon the use of what he terms barren lakes in connection with hatchery work. These lakes have in their sea connections high falls or cascades preventing the passage of fish from the sea and usually are quite clear of the enemies of salmon fry. Mr. Callbreath has planted redfish fry in

two of these barren lakes, both discharging their water into Burnett Inlet. In 1894 and 1896, 1,000,000 redfish fry were planted each year in Burnett Lake, about 13 miles from the hatchery, and in 1895, 2,000,000 redfish fry were planted in Francis Lake, about 11 miles from the hatchery. The following coho fry have been planted in Falls Creek, previously referred to: 1893, 66,000; 1894, 50,000; 1896, 135,000; 1899, 60,000. The rest of the hatchery output has been planted in the home lake and feeders. The fry are transported as soon after hatching as the weather permits and before the egg sac is absorbed, as they then require fewer changes of water. Coal-oil cans are used for transportation cans; a screw-top mouthpiece, 1¼-inch opening, is soldered to the top of the can and the fry are poured in through a funnel having a large opening. A 5-gallon can will hold 30,000 redfish fry, or about 15,000 coho fry, and two such cans placed in the original case make a load for one man carried on the back with pack straps, and if the weather is cold, wrapped in blankets.

The following data, representing the output from this hatchery from July, 1892, to September, 1900, was furnished by Mr. Callbreath:

REDFISH.

Year.	Number adults passed over dam.		Total number of fry hatched.	Number of fry planted and locality.	
	Males.	Females.		Hatchery lake.	Other lakes.
1892	[1] 3,000	[2]	600,000	600,000	
1893	[1] 3,010	[2]	1,888,000	1,888,000	
1894	2,438	2,016	4,928,000	3,928,000	[3] 1,000,000
1895	2,799	2,497	4,960,000	2,960,000	[4] 2,000,000
1896	1,617	2,008	3,888,000	2,780,000	[3] 1,100,000
1897	1,817	1,572	2,000,000	2,000,000	
1898	1,189	821	1,800,000	1,800,000	
1899	1,058	1,175	1,385,000	1,385,000	
	10,918	10,089	21,441,000	17,341,000	4,100,000
1900	1,991	1,863	None stripped; fish allowed to seek natural spawning beds.		

COHOES.

Year.	Number adults passed over dam.		Total number of fry hatched.	Number of fry planted and locality.	
	Males.	Females.		Home lake.	Falls Creek.
1892					
1893	[1] 1,151	[2]	416,000	350,000	66,000
1894	256	230	363,000	313,000	50,000
1895	134	204	515,000	515,000	
1896	374	338	510,000	375,000	135,000
1897	590	500	526,000	526,000	
1898	158	142	250,000	250,000	
1899	991	963	950,000	850,000	60,000
	2,503	2,377	3,530,000	3,219,000	311,000
1900	526	482	None stripped; fish allowed to seek natural spawning beds.		

[1] Both sexes; not included in total. [2] Not known. [3] To Burnett Lake. [4] To Francis Lake.

In this record it should be remembered that the number of fish passed over the dam is not the number stripped. The number recovered for spawning purposes varies so much that no percentage

can be stated, and what becomes of those not stripped is a mystery to the hatchery people. For instance, in 1899 there were passed over the dam, between July 16 and October 26, 1,175 female and 1,058 male redfish, making a total of 2,233; and from August 29 to November 14, 963 female and 991 male cohoes, making a total of 1,954; of this number 1,367 redfish and 1,231 cohoes were recovered; this includes not only all spawned fish, but all found dead along the shores after diligent and repeated search.

The following experience at the hatchery may be of interest and worthy of record: On September 23, 1898, about 20 spawners were allowed to enter one of the hatchery ponds and spawn. On April 13, 1899, nearly seven months later, these spawning beds were turned over and a number of the young fish found with the egg sac not yet absorbed. The same run of fish stripped and hatched in the troughs had the egg sacs absorbed two months prior to that time. It is the opinion at the hatchery that the young go to sea in from ten to fifteen months after they are hatched, though some remain in the lake until they are from 20 to 24 months old.

Mr. Callbreath is positive that his fish will return, but he now believes the time has not yet arrived for the first output to mature. It is earnestly hoped he may realize all he anticipates, for the zeal and enthusiasm which he displays should meet with ample reward. In the meantime he is carrying on a very interesting experiment; if his fish return he will have demonstrated that salmon do return to the parent stream, he will have thrown much light on the age of fish, and he will have proved that a stream running a few fish can be made to yield abnormally. If this is demonstrated a law should be passed permitting the leasing of small streams for hatchery purposes and recognizing ownership in fish thus hatched. This would mean a great deal to southeastern Alaska, as it would draw settlers who could make a very good living by operating a hatchery and cultivating the little patches of land that are favorably located.