

## HATCHERIES.

### EXTENT OF OPERATIONS.

In 1915 seven salmon hatcheries were operated in Alaska, two of which were government stations and five were private hatcheries. In addition three small field or collecting stations were operated for short periods by the government, one of these being in conjunction with the Yes Bay hatchery, and the other two subsidiary to the Afognak hatchery. The aggregate annual capacity of the seven hatcheries is approximately 350,000,000 red salmon eggs, of which the two government stations are capable of handling nearly 150,000,000 eggs.

In 1914 the total take of red or sockeye salmon eggs in Alaska was 133,984,500, from which a total of 121,784,330 young salmon were liberated, chiefly during the spring of 1915. In addition there was a shipment of 3,000,000 to Oregon. This represents an increase over the previous season, when 119,668,680 red salmon were liberated in Alaskan waters. The take of red salmon eggs in 1915 totalled 173,499,100, or an increase of about 40,000,000 over the take in the fall of 1914. This gain was chiefly at the Bureau's station at Yes Bay. In 1915 the collection of humpback eggs aggregated 16,976,000 as compared with 19,108,000 in 1914, or nearly 2,000,000 less than last year.

OPERATIONS OF ALASKA HATCHERIES IN 1915.

Stations.	Red or sockeye salmon eggs taken in 1914.	Red or sockeye salmon liberated in 1914-15.	Red or sockeye salmon eggs taken in 1915.
Yes Bay	41,300,000	36,720,000	<sup>a</sup> 72,000,000
Afognak	7,390,000	5,444,830	<sup>b</sup> 8,183,000
Uganik	-----	-----	<sup>c</sup> 2,685,000
Seal Bay	-----	-----	<sup>d</sup> 3,232,100
Fortmann ( <i>nlu</i> )	22,500,000	20,820,000	<sup>e</sup> 26,520,000
Karluk	30,240,000	27,704,000	41,135,000
Quadra	21,300,000	20,300,000	7,500,000
Hetta	7,438,500	7,142,500	8,114,000
Klawak	3,816,000	3,653,000	4,150,000
<b>Total</b>	<b>132,984,500</b>	<b>121,784,330</b>	<b>173,499,100</b>

<sup>a</sup> Also 325,000 humpback eggs collected at Ketchikan and planted before hatching.

<sup>b</sup> A collection of 12,355,000 humpback eggs also made.

<sup>c</sup> A collection of 2,461,000 humpback eggs also made. All eyed eggs, both red and humpback, transferred to Afognak.

<sup>d</sup> A collection of 1,235,000 humpback eggs also made. All eyed eggs, both red and humpback, transferred to Afognak.

<sup>e</sup> A collection of 600,000 humpback eggs also made.

Notes.- Of the Yes Bay collections of sockeye eggs, shipments of 3,000,000 were made in the fall of 1914 and the same number again in October, 1915, to the Oregon Fish Commission. Also in the fall of 1915 a shipment of 100,000 was made to the Bureau's station at Quinault Lake, Washington, and 15,000,000 were transferred to Afognak.

## HATCHERY REBATES.

Under the terms of existing law those who operate private hatcheries in Alaska are allowed a rebate of 40 cents for every thousand red or king salmon fry released. This sum is the equivalent of the tax on 10 cases of canned salmon. The plan of operating private hatcheries is not looked upon with favor at the present time and it is hoped that in the near future legislation will be enacted to the end that they may be taken over by the government.

Pursuant to law, affidavit is made by the operators of private salmon hatcheries showing the number of fry released during each year ending June 30. The following table shows the rebate certificates due for the year ended June 30, 1915.

Output of salmon fry from private hatcheries during fiscal  
year ended June 30, 1915.<sup>a</sup>

Owners	Location	Red salmon fry liberated	Rebate due.
Alaska Packers Association	Naha Stream	20,820,000	\$8,328.00
do.	Karluk River	27,704,000	11,081.60
Northwestern Fisheries Co.	Quadra Lake	20,300,000	8,120.00
do.	Hetta Lake	7,142,500	2,857.00
North Pacific Trading & Packing Co.	Klawak Lake	3,653,000	1,461.20
Total		79,619,500	31,847.80

<sup>a</sup> In the case of the hatcheries where the seasonal distribution of fry is not completed before July 1, the remaining fry are shown in the subsequent fiscal year's report.

## HATCHERY INSPECTION.

At various times during the year 1915 the several private salmon hatcheries in Alaska were inspected by representatives of the Bureau of Fisheries. The purpose of these inspections is to determine the number of eggs taken and the number of young salmon liberated. Due note is made as to the methods of operation. Care is taken to check up the records of the hatchery in order to determine the correctness of returns covering the output.

### YES BAY.

From the 41,300,000 red salmon eggs taken in 1914 at the Bureau's station at Yes Bay, 36,720,000 young fish were liberated in the period from January to July, 1915. Of this collection there was also a shipment of 3,000,000 eyed eggs to the Oregon Fish Commission in October, 1914. Thus the losses were 1,580,000, or 3.8 per cent.

In 1915, the taking of red salmon eggs at Yes Bay began September 2 and ended September 29, when the hatchery was filled to its capacity of 72,000,000 eggs. In October 3,000,000 of these eggs were transferred to the Oregon Fish Commission and 100,000 were shipped to the Bureau's station at Quinault Lake, Washington, while in November 15,000,000 eggs were transferred to the Afognak station.

Arrangements were made to operate a substation in rented quarters at Ketchikan for the collection of humpback salmon eggs from fish ascending Ketchikan Creek. A take of 325,000 eggs had been made in the period from September 8, to 16, 1915, when operations were discontinued at the request of the citizens of Ketchikan, and the eggs were planted upon the

natural spawning grounds. In 1913 a substation was operated at Ketchikan, but in 1914 no eggs were obtained as there was no run of salmon in the creek.

Realizing the advantages of planting fingerlings rather than fry, the Bureau has expanded its efforts to feed as many of the young salmon at Yes Bay as possible before liberating them. Three rearing ponds, each 12 x 60 feet in size and 2½ feet in depth, constructed in 1914, were utilized for this purpose in 1915. Eighty troughs in the hatchery were also used for feeding young salmon. The food consisted of steelhead trout obtained near the hatchery and adult salmon which had been salted down after their eggs were taken the previous fall. These salmon are thoroughly freshened by placing in running water for 24 hours or more. The food is cooked, ground, pressed dry, and after grating and screening is ready to be fed. It appears to give satisfactory results. Some difficulty was experienced with the salmon held in the ponds when the weather warmed up to an unusual degree in the month of June. Most of the fingerlings then remaining on hand were accordingly planted in the lake.

A watchman was stationed on Yes Bay beginning July 13, 1915, and continuing through the run of red salmon to see that the order closing the bay to commercial fishing was fully observed.

#### AFOGNAK.

The collection of red salmon eggs at the Afognak station from August 1 to September 29, 1914, aggregated 7,290,000. From these eggs there was planted in the period from December, 1914, to May, 1915, a total of 5,444,830 young salmon, most of which were of fingerling size. The take of red salmon eggs at this station in 1915 continued from August 7 to

September 30, during which time 8,183,000 eggs were obtained.

A shipment of 15,000,000 red salmon eggs in 65 cases from the Yes Bay station arrived Afognak Village December 9 and were placed in the Bureau's warehouse at Litnik Bay. On account of unfavorable weather and great difficulties in transporting the egg cases over the ice it was not until December 22 that the last of the eggs reached the hatchery. Although made ready for shipment at Yes Bay on November 23, these eggs were in good condition with the exception of one case in which there had been some premature hatching.

From August 4 to September 14, 1914, there were taken at Afognak 6,574,600 humpback salmon eggs. From these eggs 119,480 young salmon were planted in the winter and spring of 1914-15. Most of the eggs from this collection went with the 2,534,000 collected from August 26 to September 5 at Uganik and the 5,000,000 purchased from the Karluk hatchery of the Alaska Packers Association, to make up the total of 12,500,000 humpback salmon eggs shipped in November, 1914, of which 7,000,000 were consigned to government hatcheries in Maine and the balance to stations of the Bureau in Washington.

The taking of humpback eggs at Afognak in 1915 extended from August 2 to September 21, the total collection being 12,355,000.

Nearly all the young salmon handled at the Afognak station were fed some time before being planted. Several tons of Dolly Varden trout and of spawned salmon had been salted down the previous season to be used for this purpose. In preparing the food the fish were freshened, cooked and pressed into a cake and left under pressure until cold, then cut in strips and run through a fine meat grinder several times, and fed after being put through a fine screen. The young salmon did very well on this

food. The construction of a series of twelve rearing ponds, each 20 feet long, 6 feet wide and 3 feet in depth is under way. When these ponds are completed it is anticipated that they will be of great assistance in holding and feeding young salmon. These ponds are so erected that additional ponds can be constructed just below them if necessary.

Fish-cultural operations in this region are still greatly handicapped on account of the volcanic ash resulting from the eruption of Mt. Katmai in 1912.

#### UGANIK.

The total collections at this point in 1915 were 2,685,000 red and 2,461,000 humpback salmon eggs. The loss was 85,000 red and 61,000 humpbacks, thus 2,600,000 red and 2,400,000 eyed humpback eggs were transferred to the Afognak hatchery. The Uganik field station was closed October 9.

#### SEAL BAY.

A new collecting and field station was established at Seal Bay on the northeast coast of Afognak Island. Some of the equipment used here was transferred from the field station operated in 1913 at Eagle Lake. Preparations for work at Seal Bay were begun in June and operations were brought to a close on October 13, 1915. Collections totaled 3,232,100 red and 1,235,000 humpback salmon eggs. The loss was 59,100 red and 111,200 humpbacks, thus leaving 3,173,000 red and 1,123,800 humpback eggs, all eyed, which were transferred to the Afognak hatchery.

#### FORTMANN.

The Fortmann hatchery is the largest salmon <sup>propagating station</sup> hatchery in the world, its capacity being approximately 110,000,000 red salmon eggs. It is operated by the Alaska Packers Association and is located on Heckman Lake about

eight miles from Loring, Alaska. The egg-taking season in 1914 extended from August 22 to November 30, during which period 22,500,000 red salmon eggs were secured. The number of young fish liberated therefrom in 1915 was 20,820,000, the loss thus being 1,680,000, or 7.4 per cent. The fry from the hatchery were transferred to nursery ponds where they were fed, following which they were liberated in the Naha Stream System, of which Heckman Lake is a part. A few fry were planted in some of the small streams tributary to the lake, it being thought that they would acquire sufficient growth in such protected waters to enable them to care for themselves better before becoming subject to the attacks of birds and larger fishes in the more open waters of the lake. This would be a good plan to follow at other salmon hatcheries in Alaska unless there are ample facilities for rearing to the fingerling size before planting.

In 1915 the egg-collecting season continued from August 21 to November 20, during which time the take of red salmon eggs was 26,520,000. The average number of eggs per female spawned is reported as 2,305. The earliest take of eggs began to hatch on November 9. From the records of the hatchery it has been determined that the period of eyeing in an average water temperature of 49° F. is 31 days, and with an average temperature of 46° is 41 days. With an average temperature of 46° the period of hatching is 82 days.

From August 22 to November 22, 1915, 600,000 humpback salmon eggs were taken experimentally. In connection with the taking of humpback eggs at this hatchery the following is extracted from a communication of December 10, 1915, from the Alaska Packers Association:

"It may be of interest to know that at our Fortmann Hatchery, located on Heckman Lake, there are practically no humpbacks. In 1913 about 5,000 Humpback eggs were taken from fish collected on Jordan Lake (next below Heckman Lake) and the fry resulting therefrom liberated from the hatchery. This year 119 salmon of this species were caught off the hatchery fishing grounds. It would appear that these results add to the theory derived from the study of the ages of salmon by scale markings, that humpback salmon are two years old at the time of spawning."

The foregoing opinion of the Alaska Packers Association is corroborative of investigations elsewhere which seem to establish quite conclusively that the humpback salmon is a two-year-old fish when it returns from the sea.

The eggs are not taken at this station by the method of incision, nor are the fish killed before they are stripped. This results in a loss of some eggs, as by the more modern practice of incision it is possible to obtain practically all ripe eggs. An examination of some of the salmon at Fortmann hatchery last fall showed that in the pocket between the gills and in other portions of the body cavity as many as 100 eggs were found. At least part of these eggs would have been saved if they had been taken by the method of incision.

#### KARLUK.

The Karluk hatchery is operated by the Alaska Packers Association. It is located about two miles up the Karluk River on Kodiak Island, in central Alaska, and has a capacity of upwards of 50,000,000 red salmon eggs. The egg-collecting season of 1914 extended from June 27 to September 30, and resulted in a take of 30,240,000 red salmon eggs, from which it was reported that there were liberated in 1914, 27,704,000 young fish. The loss of 2,536,000 was 8.3 per cent of the total. The

fry were liberated in nursery ponds where they were held a short time and fed, after which they were planted in the Karluk River.

The egg-collecting season of 1915 extended from June 26 to September 29, during which time 41,135,000 eggs were obtained. It is reported that the average number of eggs per female spawned was 2,620. Of the 8,050,000 humpback eggs taken from August 24 to September 8, 1914, 5,000,000 eyed eggs were sold to the Bureau of Fisheries, and from the remaining eggs 1,049,610 fry were liberated. The eyed eggs disposed of to the Bureau were transferred to the Afognak hatchery where they were included in a shipment of eggs most of which went to Maine, where an effort is being made to establish a run of Pacific Salmon in Atlantic waters.

#### QUADRA.

The Quadra hatchery is owned by the Northwestern Fisheries Co., and is located at Quadra in ~~the~~ southeastern Alaska. It has a capacity of about 21,000,000 red salmon eggs. The season of 1915 at this hatchery was not quite as successful in respect to the number of eggs taken as ~~it~~ was the previous season. In 1914 egg-taking began on August 5, ending October 11, during which period 21,300,000 red salmon eggs were taken, while in the period from August 9 to November 13, 1915, the total take of red-salmon eggs was 7,500,000. Until three years ago this would have been regarded as a very fair take, but since that time collections have been much larger, with the exception of that of 1915. Of the eggs taken in 1914 the total number of fry planted in the fiscal year ended June 30, 1915, was 20,300,000. This makes a loss of 1,000,000 eggs and fry, or 4.6 per cent. The eggs at this station are taken by the improved method of incision. The females are killed by a blow on the head

and are then hung in a vertical position by being impaled upon a sharpened nail. Pans to receive the eggs are placed on a stand beneath.

A series of small ponds near the hatchery into which the fry are placed after coming from the hatchery troughs are ideally situated in some respects, as they represent very closely natural conditions. These ponds are protected from the depredations of birds and other natural enemies by means of webbing which is spread across them. After the fry have remained in these ponds for some time and have attained considerable growth they are allowed to work down into the lake where they remain for a year before leaving for salt water.

#### HETTA.

The Hetta hatchery, which is operated by the Northwestern Fisheries Co., is located on Hetta Lake near the southern end of Prince of Wales Island, in southeastern Alaska. This hatchery was rebuilt in 1912 and now has a capacity of about 12,000,000 red-salmon eggs. In the egg-collecting season extending from August 8 to December 18, 1914, 7,438,500 red-salmon eggs were taken. The loss of eggs was 319,000, which was 4.2 per cent. The sworn statement returned by the Northwestern Fisheries Co. shows that 7,142,500 young red salmon were released in the fiscal year ending June 30, 1915. This might indicate a slight discrepancy from the above figures but it is accounted for by the fact that at the Hetta station it is customary to carry over a few of the previous year's fry into the succeeding fiscal year for which returns of fry released are made. The law provides that such returns shall show the number of fry liberated during the twelve months immediately preceding the 30th day of June.

The egg-collecting season of 1915 began August 19, when 216,000 red-salmon eggs were secured. At the conclusion of egg-collecting operations on December 31, 1915, a total take of 8,114,000 red-salmon eggs had been made. Totals of 2,044 females and 1,962 males were handled. All eggs were taken by the modern method of incision.

Some trouble has been experienced at this station on account of the unusual amount of fine sediment which is carried into the troughs from the supply pond a few hundred yards above the hatchery. This has been improved somewhat by a change in the method of drawing water from the supply pond, but further screening will be necessary in order to entirely overcome this difficulty.

#### KLAWAK.

The Klawak hatchery is located on the lake a few miles above the village of that name on the west coast of Prince of Wales Island in southeastern Alaska. This hatchery was reported last year as being operated jointly by the North Pacific Trading & Packing Co., and the North Alaska Salmon Co. This year, however, it is listed under the name of the North Pacific Trading & Packing Co. The capacity of the hatchery is approximately 10,000,000 red-salmon eggs. In the egg-collecting season extending from August 6 to October 2, 1914, a total of 3,816,000 were obtained and placed in baskets in the hatchery. During the continuance of operations which extended to April 15, 1915, the loss of eggs was 163,000, or 4.2 per cent. In the period from December 14, 1914, to April 15, 1915, the number of young red salmon liberated was 3,653,000. It is reported that all of these were in good condition. The hatchery is provided with a small rearing pond, but at

times it has not been servicable because of the fact that it freezes to the bottom. This difficulty can be overcome by deepening the pond. Operations would be facilitated further by the construction of another pond at least 20 by 30 feet in size.

Through the egg-collecting season of 1915, 4,130,000 red-salmon eggs were taken. It is expected that as successful results would follow in handling these eggs as in the previous season.

When the station was visited in September, 1915, by Inspector Walker, special attention was devoted to the conditions under which fry are liberated and the matter was discussed with the hatchery employees at some length. They were made to realize that hatchery efficiency does not merely consist in liberating a stated number of young fish, but rather that the percentage of those surviving until they are able to fully take care of themselves is the real basis for determining the efficiency of all fish-cultural work. Unusual interest was shown by the hatchery employees in the selection of suitable locations for the planting of the young salmon and the exercise of ~~good~~ judgment as to the time of planting, so that the greatest possible number of fish might survive.

In December, 1915, the North Pacific Trading & Packing Co., advised that they had in contemplation the blasting away of a number of rocks partly obstructing the outlet of the lake, the removal of which would give the adult salmon a better chance to get into the lake, and at the same time the lake would not rise during storms to such a height as to allow the fish to get around the fences at the different streams tributary to the lake where they are taken for spawning purposes. The Bureau expressed its hearty concurrence in the development of any plan

along this line that might have a beneficial effect on the supply of salmon or might in any way improve the operation of the hatchery. This work is in line with similar undertakings contemplated by the Bureau elsewhere in Alaska.