The Salmon of Alaska

One of the important resources of the nation for providing food for the forces employed in the Great War is the canned salmon of Alaska. During 1917 there were nearly six million cases of salmon packed in the Territory, enough to furnish a case of forty-eight pounds to each soldier on the battle front of the allied line in France; over a quarter of a billion pounds of food preserved in the finest manner for shipment and storage. Twenty-eight hundred and forty-one cars of a capacity of one hundred thousand pounds each would be required to transport it. So popular is it that genuine jealousy was manifested on the battlefront when captured prisoners were fed on canned salmon, while their captors were being served with cans of "bully beef" for a ration.

In addition to the pack of canned salmon, there is a vast quantity of the fish prepared in other ways—kippered, mild-cured, smoked, dry-salted, and frozen—amounting to over eight million pounds annually. The value of the salmon exports from Alaska for 1917 was $42,774,738, and every pound of the product a fine, clean, strong, portable food.

In a thousand inlets along the coasts of Alaska, from the delightful cove of Naha Bay to the crescent beach of Unalaska, the salmon may be seen, leaping from the water, gleaming like a silver bow. In Lynn Canal, in the tide rips about Forrester Island, about Cape Ommaney, in a hundred other places, the glint of the trolling spoon sparkles as it is thrown from the stern of the fishing boats, for no more royal sport is found in the pursuit of finny prey than is afforded by the king salmon.

Five species of salmon are found in the waters of the Territory: the king salmon (*Oncorhynchus tschawytscha*), sockeye or red salmon (*Oncorhynchus nerka*), silver or coho salmon (*Oncorhynchus kisutch*), dog or chum salmon (*Oncorhynchus keta*), and the humpback or pink salmon.

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1 Report of the Collector of Customs for Alaska, 1918.
salmon (*Oncorhynchus gorbuscha*). The scientific names are from the Russian language and are those adopted by Steller, the scientist, who sailed with Bering, nearly two hundred years ago, to the coasts of America.

The red salmon seeks a stream with a lake at the head; the chum chooses waters which may be thick with glacial silt, for he does not seem to be particular; the king goes up the longer rivers, sometimes fifteen hundred to two thousand miles from the sea, to place their eggs in the gravels of the smaller branches. In a nest hollowed in the bottom of a stream the female places her ovum, over which the milt of the male is spread, and the pebbles and sand are carefully overlaid to prevent the ever-greedy trout robbing the hidden hoard. The young salmon are hatched and slowly make their way back to the ocean to remain till their time comes to return. The period which elapses before they again seek the fresh water is not accurately known. Many experiments have been made and many theories advanced, but no one knows to a certainty. From four to twelve years have been the estimates made by different investigators as the time they roam the ocean depths before they return.

When the salmon come to maturity, and the instinct to perpetuate the species comes to them with irresistible force, they seek a stream of fresh water, up which they force their way to the spawning ground or beat out their life against the rocky barriers on the way. Nothing short of death stands in the way of their desire. Along the inlets move millions of the fish, thronging the watersways, filling the bays, crowding the mouths of the stream; impelled by the strange, mysterious force which drives them on, inevitably to die, for if accident or enemy does not prevent their progress, they lay the foundation for the fry of the future, and then drift on the bars, battered, discolored and dying. After the demands of nature are satisfied, it is said that no salmon returns to the ocean.

The popular belief is that the salmon return to the same stream in which they are hatched to find a place to spawn. This, like the belief that all salmon die after spawning, is not proven, but is true of most cases. That it is not true without exception is shown by the fact that every year hundreds of fish may be found flinging themselves at impossible falls up which no salmon was ever able to ascend and above which no salmon was ever hatched. In other cases, certain marked fish have been taken on their return to fresh water miles away.

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1 The salmon ascend the Lewes River so far as the lower end of Lake Marsh, where they were seen in considerable numbers early in September. Dawson, *Report on Exploration Made in 1887 in the Yukon District, N. W. T.*
from where they were hatched and marked. They go to sea, pass the years of their ocean life in the neighborhood of the place of their birth, wandering through their feeding grounds, then return approximately to the stream of their nativity when they reach maturity.

The natives, from the Thlingits of the southeast, all along the coast as far as the Arctic Ocean, and on the rivers of the interior, derive the larger part of their food from the salmon runs. They take the fish by various methods, split it open, each tribe after a cut of its own, and hang it on a rack to dry without salt. The product is called yukali by the Aleuts. It is so prepared to the present in many places, and today the greater part of the 30,000 natives of Alaska depend chiefly on the salmon as a means of sustaining life.

When the Russians came to the coasts a little more than a century and a half ago they found the racks of red yukali at the mouths of the streams, just as they may be found in a thousand places today. They proceeded to take advantage of the myriads of fish which thronged along the shores, and they chose places for their fisheries, notably at the mouth of the Karluk River, and the Ozerskoe Redoubt, at the outlet of the Globokoe Lake, near Sitka. The Karluk fishery was first utilized by Gregory Shelikof during the winter of 1784, and it was used during the whole of the period of Russian occupation, over half a million fish being taken on an average each year. About 1860, the chief manager of the Russian American Company made arrangements for preparing salted salmon in larger quantities, but the failure of the company to secure a new charter prevented the carrying out of the plans. The Redoubt fishery was the source of most of the supply for the Sitka station from the time of the settlement in 1804 until the transfer of the Territory in 1867, about 70,000 fish being taken there on an average each year. The fish were taken by the Russians with nets and with traps set in running streams, called zapors. These traps operated much the same as do the present fish traps, or pond nets, except that they were set in the stream and often closed the whole stream to the passage of the fish. The Russian method of preserving the fish was by salting in casks much after the present method of salting salmon. Their product was not large in quantity, never exceeding two thousand barrels in a year, of which part was exported to California and other places outside the Russian possessions.

But few salmon were taken during the early years of the Ameri-

1 Golovin, Obozor Russkikh Kolonii v Syvvernoi Amerike, p. 106.
can occupation, two thousand barrels of salted salmon only being produced in 1868, in addition to the local consumption. This was slowly increased for the next few years, several salteries being operated. At Kasaan, an Austrian named Baronovich, whose name was connected with almost every form of Alaskan enterprise from smuggling to copper mining, conducted a saltery; the Redoubt fishery was continued, also the Karluk saltery, and later one was established at Klawak. 5

In 1878 the canning of salmon was initiated by the establishment of two canneries — one at old Sitka, the other at Klawak — and the combined pack of the year was 8,159 cases. 6 The success of the business being demonstrated by these two ventures, the industry was extended to Prince William Sound and to Karluk during 1882. By 1884 a small establishment was located on the Nushagak, in Bristol Bay, which made a trial pack of 400 cases, the first in that vast region of Bering Sea where so many great plants are now situated and from which about a million and a half cases are now brought each season. The business advanced by rapid strides: twenty years after the first cannery was built there were twenty-nine in operation, and the pack totaled 254,312 cases. 7 The business had attracted some of the shrewdest men of the West. Competition in some places was keen, and a contest for the wealth of the waters was at hand. At the end of the next decade there were forty-eight canneries and thirty-nine salteries, while one pack had reached 2,169,873 cases, valued at $8,781,866. 8 Great as was this volume of trade, it was yet to be eclipsed by further development. During the year 1917 it climbed to over one-half the pack of the whole world, with a total of 5,951,350 cases, valued at $41,478,514, 9 the number of canneries reached 114, and the investment in the salmon fisheries totaled over $34,000,000.

These are the main steps in the upbuilding of the greatest industry of the Territory. It is at the climax of its prosperity, and its future depends on a wise management. It may be made to yield millions of revenue for all future time, or it may be practically destroyed in a few years.

In New England the streams at one time were filled with one of the salmon species, the Atlantic salmon (Salmo salar), identical

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with the salmon of Europe and of the affluents of the Atlantic Ocean. Its range was from Labrador to the vicinity of New York City, and within the boundaries of the United States were twenty-eight rivers which were frequented by them, from the St. John to the Housatonic. From almost every one of these rivers the salmon has been exterminated, although a few fish are caught in the streams of Massachusetts, and the rivers Kennebec and Penobscot in Maine yield a few thousand each year. The Maine rivers are stocked by hatcheries maintained by the government, and the eggs for the hatchery have been brought, first from Canada, later from Alaska. This illustrates the effect of unrestrained fishing for salmon in the United States.

The Old World has preserved its salmon better than has the old parts of the New; showing that our methods may be improved upon. Along the Rhine, thickly settled though it is and has been for over two thousand years, the fish is still found, although in limited numbers. Caesar found cities of forty thousand inhabitants along this stream before the birth of Christ, and the fishing has undoubtedly continued from that time to the present, yet the salmon still finds its way up the historic stream. The statistics of the whole river are unavailable, but the estimate of 65,000 salmon taken in each year is made by the Bureau of Fisheries.

Norway also has salmon, the value of the catch in 1896 being 1,069,979 kronor, of which the river fisheries produced 224,688 kronor and the sea fisheries 845,291 kronor. In addition to this the privilege of the rod and line fishing in the stream is rented to sportsmen for about 200,000 kronor.

In the Scottish seas and rivers the salmon still run. Three hundred years ago the annual average catch amounted to 47,000 pounds sterling. They have been depleted in those waters, but in 1864 the product was valued at 500,000 pounds sterling.

In Ireland the catch on the Galway was but 1,608 fish in 1853. Later a better system of protection was instituted, and the number rose to 20,512 in 1864, while the whole catch of the country was valued at 300,000 pounds sterling.

The presence of civilization alone does not entirely destroy the fish, although undoubtedly the clearing of the watershed and polluting

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13 Norway—Official Publication for the Paris Exposition, pp. 369, 373. The kronor is valued at about 25c.
the spawning grounds reduces the number very materially. If proper measures are taken to insure enough parent fish reaching the spawning grounds the supply will continue. The question is, are there enough fish passing to the breeding grounds in Alaska to insure the supply necessary for the preservation of the industry? The encroachment of civilization has not as yet made any marked inroads, and any decrease is to be directly attributed to over-fishing.

In Alaska, the salmon fishing was at first entirely unrestrained by any regulation whatever, and it was more than twenty years after it became a Territory of the United States before a law was passed for the fishery. When a law was passed it was practically inoperative for many years through lack of the means of enforcement. Along a coastline of more than two thousand miles, in which at intervals canneries were situated, there was no vessel at the command of the fisheries agent for many years. If the agent visited a cannery it was generally at the courtesy of the owner of the establishment, and he was transported in the tender of the cannery to and from the place. Under those conditions it was practically impossible to enforce the laws. Later conditions have been better, but to the present time the provisions for enforcing the laws are inadequate. In recent years, at a time when there were four boats in the Forestry Service in the Territory, there was but one boat in the Fisheries Service, although the fisheries covered much the greater length of coastline. Consequently many of the wise provisions for the protection of the fish are almost inoperative.

The laws were openly and brazenly violated in many ways and for many years, and to a great extent are unobserved at the present time. The superintendent of a cannery is sent to the country to put up a pack, and he is expected to do so without regard to the opposing conditions. If it is a four-line cannery and he is to put up a hundred thousand cases, he is paid a certain amount if he reaches those figures, and is perhaps given a bonus if that pack is exceeded. The men who have their capital invested are looking for a profit on the investment. He is there to "fill his tin," and when the fish run he takes them whether it is at the time prescribed for the closing of traps or not. When the run is on a day’s closing may lose the best of the season and a shortage of ten thousand fish. Far better to risk a fine of a hundred dollars if the Fisheries Agent inopportune appears on the scene than to lose a thousand dollars worth of fish. Many of them would prefer to observe the law, but it is as a superintendent tersely remarked: "If I don’t get the fish, the other fellow will."

The seines are drawn in the mouths of the streams where the
fish have collected in the brakish water, for the greater catch may be
taken at the place where they have gathered together to ascend, although it is forbidden by law. At one time a prominent fisherman
of Alaska was caught redhanded in a violation of the law by the
agent, and a warrant was procured for his arrest and served. He
was placed under $3,000 bonds. The report of the special agent for
the government states:

"The law, as you are aware, imposes a fine of $250 for every
day a stream is obstructed. . . . Court did not convene until after the
retirement of the district attorney, Mr. ——, and the appointment of
his successor, Mr. ——, who agreed to accept the nominal fine of
$100." 16

The condition at that time, and to some extent at the present, is
illustrated by a conversation related in a report:

"All I say is, 'Jimmie, go up to the trap and bring me down
15,000 fish.' All they've got to do is to take a gang of men on the
lighter, and she comes down on the next tide with 15,000. The next
day I say, 'Well, boys, go up and bring me down 18,000 fish.' And
they go and get them out of the other trap, for while they are working
one side the other side is fishing." 17

They never let the traps stop fishing, and the chances for a fish
reaching the spawning grounds through the cordon of nets and traps
is very small indeed. Fifty-six indictments were found during 1916
for violations of the laws. In many of the cases convictions were
secured, but as to how many cases passed without the knowledge of
the officers is unknown. The unlawful fishing is just as likely to be
done by a small fisherman as the larger operator. The corporations
are no more prone to unlawful procedure than is the man who owns a
seine only.

Some of the canneries are compelled to send as far as from
seventy-five to one hundred and fifty miles for their fish in some
instances. One superintendent states: "I would make my pack for
half the cost were it not for the conditions." Every stream is being
scrapped for every possible fish.

The best known and best stocked locations were the first to be
fished. They were the first to become depleted of fish. The Globokoe
fishery, so long the source of the Russian supply at Sitka, was fished out
in 1896 and the cannery moved away. The Karluk River, only sixteen
and one-half miles in length, heading in a lake on Kodiak Island, has

16 Report of Joseph Murray, Special Treasury Agent, for 1895 (Washington, Government
17 Ibid., p. 408
been one of the wonderful salmon streams of the world, perhaps the most remarkable of all when the length is considered. In 1890 nearly half of the whole pack of Alaska was made there. In 1893 there were seven canneries on its banks; today there are none. There are records of 100,000 salmon being taken at one haul of the seine. There are statements that the stream was at times so thronged with fish that it was impossible to cross the river with a rowboat. A fishing war was prosecuted which was carried on with steam tugs and Winchester rifles. Anchors were dropped into the nets of rivals, and then fishermen, nets and fish drawn to shore by powerful steam winches. The weaker were crowded off the grounds, and finally the more powerful companies were compelled to settle the case in the court upon an injunction proceeding.

A special agent of the Fisheries Department reported as follows:

"I found the fishermen with their nets in the narrowest part of the Karluk River, and so systematically do they work the nets that I could not see how it was possible for a fish to pass them to the spawning grounds." 18

The stream began to show the effects of overfishing, and a hatchery was established in 1891. This delayed the crisis, but a hearing became necessary before the Bureau of Fisheries in December of 1917, and the result was the closing of the stream to commercial fishing.

The Copper River has been so closely fished that the number taken has been restricted by special order of the Bureau of Fisheries, and the Bering River is in the same condition. During the present year a number of employes of the bureau have been employed in patrolling the streams in Southeastern Alaska, but the number so protected is but a few out of many.

In the earlier days of the industry, when the salmon in a certain locality became exhausted, the cannery moved to a new location or fished in other places. The overflow from other streams, together with the natural increase, restocked the waters in the course of a few years. This was the case with the Globokoe fishery, which has again become a producer, and two canneries are now projected to operate in the vicinity of the place which was denuded of fish in the '90's. At present every locality is so closely fished that there is no overflow to restore the depleted streams.

The spawning pools of the Chilkat River have but a fraction of of the number which formerly frequented them. The inlets of Klawak and Hetta yield more than half the fish that were taken there when

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18 Ibid., p. 445.
The fisheries were first established at those places. This is the more marked because there have been hatcheries on both inlets for years, and the natural production with the hatchery in addition is not equal to the demand imposed.

As early as 1893 the canning companies began to install hatcheries, thus acknowledging the need of assisting nature to keep up the supply of fish, which was already beginning to show signs of exhaustion in certain localities. The first attempt was at Karluk in 1891, but it was not successful until 1896. In 1892 Captain John C. Callbreath placed one on Kuiu Island. Other hatcheries were built, until at present there are seven in operation, two of which belong to the government and five are owned by private parties. The number of fry liberated during the season of 1915-1916 was 142,964,140, and the total number released from 1898 to 1916 has been 1,806,082,257. This is a material assistance in replenishing the supply, but does not at all take the place of the natural supply when the fish are allowed to reach their breeding grounds.

There were no taxes imposed upon the salmon fisheries of Alaska from 1867 to 1899. Under the Act of Congress of March 2, 1899, a tax of four cents a case was placed on each case of salmon canned and ten cents per barrel on salted salmon.

The necessity for replenishing the waters with fish was made the basis for a plea to Congress in 1906, and upon it a law was passed providing for the rebate of the taxes imposed as follows:

"Section 2. That the catch and pack of salmon made in Alaska by the owners of private salmon hatcheries operated in Alaska shall be exempt from all license fees and taxation of every nature at the rate of ten cases of canned salmon to every one thousand red or king salmon fry liberated, upon the following conditions."

The conditions provided for inspection of the hatchery, and upon approval of the conditions thereafter credit should be given for fry released according to the sworn statement of the agent or superintendent of the hatchery each year. Under this law there has been rebated to the canneries from 1906 to 1917 over a quarter of a million dollars from the Alaska Fund, and in 1918 the rebate amounted to the sum of $59,464.24.

The government has attempted to tally the escape of fish from the fishermen at the Wood River Reservation on Bristol Bay. The record unfortunately is not complete for a series of years, but the years

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taken show a small escape in 1915 as compared with 1908, the first year the tally was kept. 22

The means of procuring the fish are by gill nets, seines, traps, dip nets, gaffs, spears, etc., but principally by the first three. The number of appliances has more than doubled in the past ten years, the catch of fish is more than twice that of ten years past, but the average catch to each appliance in use is but a little more than half. 23 In 1910 there were 33,677,254 fish taken in Alaska; in 1916 there were 72,055,971, or more than twice as many. In the latter year there must have been nearly forty million less fish that reached the spawning grounds as compared with the former year. No ordinary number of hatcheries could compensate for this reduction. The female salmon spawns 3,500 eggs. Provided half of these fish were female, the reduction would be seventy billions of eggs, or nearly seventy times as many as all the fry released in the hatcheries of Alaska since the first release to the last year.

There is and has been a great waste of fish. Accidents cause loss. Sometimes there are thousands of fish that spoil because the cannery cannot take care of the whole catch, or for other reasons. In former years the salmon bellies only were salted, while the thicker part of the meat was thrown away. Many other kinds of fish are taken and thrown back to the sea, because no other fish than salmon is canned. The traps and seines take many others that become a total loss. The waste in cleaning is about one-third of the total weight, and at almost every cannery this is thrown into the sea to pollute the

The following table shows for each year since 1908 the commercial catch of salmon made in Nushagak Bay, the number of fish passing from Wood River into Lake Aleknagik, the total of both and the percentage of salmon that escaped the fishermen:

<table>
<thead>
<tr>
<th>Year</th>
<th>Nushagak Bay Catch</th>
<th>Wood River Tally</th>
<th>Total</th>
<th>Per Cent. of Escape</th>
</tr>
</thead>
<tbody>
<tr>
<td>1908</td>
<td>6,140,601</td>
<td>2,000,000</td>
<td>8,140,601</td>
<td>30</td>
</tr>
<tr>
<td>1909</td>
<td>4,877,635</td>
<td>883,244</td>
<td>5,760,879</td>
<td>16</td>
</tr>
<tr>
<td>1910</td>
<td>4,384,755</td>
<td>670,104</td>
<td>5,054,859</td>
<td>15.2</td>
</tr>
<tr>
<td>1911</td>
<td>3,513,837</td>
<td>824,299</td>
<td>4,338,136</td>
<td>11.1</td>
</tr>
<tr>
<td>1912</td>
<td>3,866,950</td>
<td>325,294</td>
<td>4,192,244</td>
<td>7.7</td>
</tr>
<tr>
<td>1913</td>
<td>5,236,008</td>
<td>753,109</td>
<td>5,989,117</td>
<td>12.3</td>
</tr>
<tr>
<td>1914</td>
<td>9,074,433</td>
<td>259,341</td>
<td>9,333,774</td>
<td>4</td>
</tr>
<tr>
<td>1915</td>
<td>5,618,457</td>
<td>551,909</td>
<td>6,170,366</td>
<td>--</td>
</tr>
<tr>
<td>1916</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Work not carried on this year.*


23 Traps were very little in use in Alaska before 1900. The increase in number of the different appliances and the decrease in their average catch is illustrated by the following table:

<table>
<thead>
<tr>
<th>Appliance</th>
<th>No.</th>
<th>1907 Total Catch</th>
<th>Average</th>
<th>No.</th>
<th>1916 Total Catch</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traps</td>
<td>70</td>
<td>8,440,056</td>
<td>120,670</td>
<td>373</td>
<td>23,982,614</td>
<td>64,296</td>
</tr>
<tr>
<td>Seines</td>
<td>213</td>
<td>15,312,032</td>
<td>71,887</td>
<td>434</td>
<td>25,725,808</td>
<td>59,276</td>
</tr>
<tr>
<td>Gill nets</td>
<td>945</td>
<td>11,069,846</td>
<td>11,742</td>
<td>3,051</td>
<td>21,620,517</td>
<td>7,086</td>
</tr>
<tr>
<td>Lines</td>
<td>24.124</td>
<td>55,219</td>
<td>24.124</td>
<td>24.124</td>
<td>144,715</td>
<td>144,715</td>
</tr>
<tr>
<td>Dip nets</td>
<td>33</td>
<td>34,300,608</td>
<td>34,300,608</td>
<td>34,300,608</td>
<td>72,055,971</td>
<td>72,055,971</td>
</tr>
</tbody>
</table>

The data for above table is from the Alaska Fisheries and Fur Industries, for the respective years (Washington, Government Printing Office).
water. At some points this waste is being utilized for by-products, and it is to be hoped that all will soon be saved. At Anchorage, from the small stream called Ship Creek, during 1916, over a thousand fish were wantonly gaffed for amusement during ten days of the running season and thrown back into the stream after being killed.

The result of the present methods will in all probability be the practical destruction of the industry in the near future unless a radical and thorough change is made. The scarcity of labor in the Territory during the present year may curtail the catch, and in this manner retard the destruction, but every effort is being made to take every fish procurable. The result of the uncontrolled exploitation of a public resource in wild life is shown by the extermination of the seals of the southern seas, the depletion of the Pribylof Herd, the extermination of the buffalo and the wild pigeon, the almost complete extinction of the sea otter, the great decrease of the whale and the walrus.

In 1892 there were 200,000 cases of salmon packed on the Sacramento River in California; in 1906 there were none. In 1901 were 998,913 cases of salmon packed on the Fraser River in British Columbia; in 1915 there were but 289,199 cases, and less since that time, until the Dominion government is considering closing the stream to commercial fishing in whole or in part.

The market price of the salmon is fixed by the combination of the great companies. They dictate the price it shall be placed on the market at the opening of the season. This price has risen from $4.60 per case in 1913 to $9.40 per case in 1917 on Alaska red salmon, and on Alaska pink it has risen from $2.60 per case to $6.60 in the same time. The pack was increased from 3,739,185 cases in the former year to 5,922,320 cases in the latter. Part of the increase in price went to small fishermen, but nearly one-third of the fish are taken by traps which are owned by the cannery corporations. According to the report of the Federal Trade Commission, the average profit of ninety companies in the business on the Pacific Coast, comprising 87 per cent. of the pack, or 7,426,678 full cases, was $2.28 per case, or 52.8 per cent. on the net investment in the business. At this rate of income they will have realized a return of their capital in three years with as much profit as the average investor secures in ten years, and they can afford to junk their entire plant if the salmon run fails.

The whale in Alaska waters is depleted, the sea otter is gone, the seal is undergoing a series of years of restoration. One of the greatest of the food supplies of the North is being threatened. The

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24 Ibid., p. 172.
means of livelihood of thirty thousand of the native people depends upon the salmon, and its destruction means suffering and death to them. If the waters are depleted it means a watery desert for years, and one which will require hundreds of thousands of dollars and years of time to restock.

The fishery in Alaska has heretofore been controlled by the general government and the laws relating to it have been enacted by Congress. To get a correct understanding of the conditions in a legislative body so far from the scene of action is a difficult matter, and the whole body of the nation is less interested in the resources of a territory than are the residents of that territory. The other states and territories have had the power to add their protection to that of the national government, but this has been denied to Alaska. There are two alternatives presented: one, to allow Alaska the right to add her assistance with power to enact laws on the fisheries; the other, for the United States to take the fisheries in hand as a war measure and limit the amount to be taken from each locality, and thus remove the ruinous competition which exists at the present.

Clarence L. Andrews.