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FISHERY INDUSTRIES OF ALASKA AND THEIR ADMINISTRATION

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General Statement. The fisheries of Alaska constitute the principal resource of the Territory, one of the important seafood producing regions of the world. Its 10,000 miles of coastline and diverse waters support a variety of marine species, which in turn form the basis for elaborate and often intensely prosecuted industries for their exploitation. Chief amongst these are the salmon, which collectively yield high quality food products valued around one-hundred million dollars annually. Authority for regulation and management of the fishery resources is vested in the Secretary of the Interior and administered by the Fish and Wildlife Service. Publications are available from this source covering specific lines of biological research.

Historical. Commercial fishing in Alaska had its inception around 1840 when a few small whaling and salmon salting operations were started. Isolation held the industry to meager proportions through the period of U. S. acquisition of the Territory from Russia in 1867. The advent of canning, with its solution of the problems of preservation and transportation, brought the salmon industry into its own. Starting from two canneries in 1878 with a pack valued at \$16,000, it has grown to where over one hundred plants now produce an annual pack worth nearly \$90,000,000.

Demand has grown for the other more popular fish and shellfish so that they too are now supporting industries that are developed as fully as the supply can stand. The fishery products from Alaska had a value of \$107,000,000 in 1947; the combined value of production from the time of purchase from Russia until 1947 is estimated at \$1,741,000,000.

Industrial and Biological - Existing Fisheries - Salmon. The Pacific salmon comprises five species in Alaskan waters, all of them important commercially. Their individual characteristics are treated separately but all have life histories similar in these respects:

- (1) They are anadromous, returning to fresh water from the sea to spawn.
- (2) They possess a generalized homing instinct, returning on their spawning migration to the same stream or locality in which they themselves were hatched or released as fry.
- (3) They mature, and spawn but once, shortly after which they die.

Sockeye or Red Salmon (Oncorhynchus nerka). This species is the most valuable for canning purposes because its flesh retains its bright red color after processing. Although it occurs throughout Alaska, its greatest abundance is to the Westward where it is the principal support of the industry in Bristol Bay, the Alaska Peninsula, and sections of Kodiak Island and Cook Inlet. Also local gillnet fisheries occur off the mouths of the large mainland rivers in Central and Southeastern Alaska. The peak of the run or spawning migration occurs usually in early July.

Sockeyes have the peculiar trait of ascending only streams that come from lakes, as it is in the lakes that the young fingerlings spend their first year or two of life. The adult fish are rather consistent in size, averaging around six pounds, and are largely 5-years old with, in places, a substantial proportion of fours and sixes.

Pink or Humpback Salmon (Oncorhynchus gorbuscha). Although the pack of pinks may equal or exceed by several times that of reds, its unit value is much lower. Although fully nutritious and well flavored, the meat is soft and pale in color and thus is not as attractive in appearance as red salmon. However, through sheer abundance they have supported extensive cannery operations in Southeastern Alaska, Prince William Sound and sections of lower Cook Inlet, Kodiak Island, and the Alaska Peninsula. They are taken chiefly by traps and seines. Although the time of the run is somewhat characteristic with each stream, the streams varied so greatly that in the virgin state there was a potential fishery for pinks throughout the entire summer. Intensive fishing has now so modified this that the run in each District is concentrated into a short period late in the season and their general abundance is greatly reduced.

The humpbacks are small salmon and average only about 4 pounds in weight, probably accounted for by their short life span of invariably two years. They run into almost any and all streams within their range, preferring the smaller ones and ascending only minimum distances.

Chum or Dog Salmon (Oncorhynchus keta). Although principally used for canning, this species runs a poor third to sockeyes and humpbacks, both in quality and quantity. The declining abundance of the other species in the face of rising demand has of recent years made the chum more desirable and it is at its best when frozen or smoked. In the can it is usually watery, pale and lacking in flavor.

Chums occur in much the same areas and at the same times as pinks and are caught with the same gear, but in much smaller numbers. Varying greatly in size, they average around 9 pounds in weight and their age at maturity varies from 3 to 5 years.

King Salmon (Oncorhynchus tshawytscha). With the cohoes, king salmon support a fishery quite different from the canning species described above. Trolling is carried on by small boats dragging skillfully fashioned, hooked lures which the salmon strike either from hunger or irritation. Because of their fine flavor, attractive appearance and the individual care they receive in catching, kings command a premium price on the fresh fish market or for a salting process known as mild curing. A lesser proportion are taken also by traps and nets and then canned, making a pack of superior quality. They ascend only the larger rivers, principally those of the mainland, and are not abundant. They run principally in the spring, appearing before any of the other species.

King salmon are voracious feeders and grow to large size, averaging over 20 pounds in weight; specimens of 50 pounds and over are not uncommon, and the record size is 125 pounds. Their age, too, varies greatly and ranges from 3 to 7 years.

Coho or Silver Salmon (*Oncorhynchus kisutch*). This species sustains the troll fishery in Southeastern Alaska during the fall, entering the fishery after the kings have gone. In all areas of Alaska, silvers form a minor part of the catch of all the various types of gear late in the season, although they support definite gillnet fisheries off several of the larger rivers. Troll-caught fish go into the fresh fish trade, but most of those taken with traps are canned, known then as "medium reds". They run in small numbers into almost all creeks; attain an age of 3 or 4 years and commonly range in size from 8 to 12 pounds.

Halibut (*Hippoglossus stenolepis*). Supporting a large spring fishery of unusual stability, the halibut is a bottom fish of wide distribution on the banks and shoals along the Alaskan coast. They are taken on long lines of baited hooks strung out along the bottom and are marketed almost exclusively in either fresh or frozen condition.

The halibut were so depleted by an intense fishery that in 1924 a treaty was negotiated between Canada and the United States which established an International Fisheries Commission to study and eventually control the fishery. By permitting the annual take of only a limited quota and by protecting the smaller sizes, the Commission has been successful in reviving the resource. So large a fleet is engaged, however, that the quota of late years has been caught in less than 2 months fishing. The quota for the entire Pacific Coast is about 53 million pounds, of which the United States fleet catches about 40 million pounds, having a value to the fishermen of over eight million dollars.

The fishery in earlier days was confined largely to waters within reach of Seattle and the cold storage plants of Southeastern Alaska, but larger boats now work farther to the westward, off Kodiak and the Alaska Peninsula.

Sablefish (*Anoplopoma fimbria*). Allied to halibut in being caught by the same boats and with the same gear, sablefish or "black cod" is a comparative newcomer in the ranks of commercial species. It came into popularity in the late '30's and has already shown unmistakable signs of depletion. It is now taken only in Southeastern Alaska; occurs in much deeper water than halibut and is marketed only fresh or frozen. Its acceptance on the market was a boon to the halibut fishery as sablefish can be taken when the brief halibut season is closed. Annual production is valued at about two million dollars.

Herring (*Clupea pallasii*). Herring fluctuate greatly in their annual abundance, and the industry achieves greater or lesser cyclic proportions as a result. Natural factors exert tremendous influence on their survival in the early, delicate stages, and regulation of the "take" is based largely on observations that indicate the expected abundance of the various year classes contributing to the fishery.

The principal use of herring is for reduction to meal and oil, although a small pack is salted for food purposes. They are regarded as a basic article in the diet of salmon and halibut and thus are a favorite bait with the fishermen. Three year olds are about the youngest herring taken in the commercial fishery but some specimens survive to 10 or 12 years of age.

The industry is centered in Southeastern Alaska, Prince William Sound, and around Kodiak Island. Large purse seine vessels are used in catching the herring, coming north as an off-season alternate to their usual occupation in the California sardine fishery.

Shellfish - Razor Clams (*Siliqua patula*). The Cordova clam canneries draw their supply from the extensive sand bars off the mouth of the Copper River. Although this region is the center of the industry in Alaska and easily produces one and a

half million pounds in a year, there is also limited and spasmodic digging of beaches of Cook Inlet and on the mainland shore of Shelikof Straits; Kodiak has a few razor clam spots on the seaward side of the island also.

The Copper River beds were depleted in the early 1920's by too much digging; as many as 100,000 cases being packed in a single year with a value of \$163,000. Regulation now imposes a quota limit of 40,000 cases and restricts digging to the spring months when quality is best. Maturing at 4 or 5 years and attaining an age of 18, razor clams taken in the commercial fishery average about 8 years. The industry now appears well stabilized with possibilities of expansion if outlying and more distant beds are utilized.

Butter Clams (*Saxidomus nuttali*). A small industry in Southeastern Alaska has been consistently maintained during past years but has lately been suspended because of rulings of the Food and Drug Administration concerning a possible toxic condition arising from the presence of a microorganism on which the clams feed. The extent of this fishery in Southeastern Alaska is definitely limited to its previous proportions because of the lack of suitable beaches and the slow growth of the clams. However, there is the possibility of developing new areas in Prince William Sound and farther to the westward not hitherto exploited. Alaska's hard clams are usually shucked whole and frozen in blocks, although a small canned pack has been put up in earlier years. They are taken exclusively by hand shovel during cycles of extreme low tides.

Shrimp. This industry has been well-established on a local basis at Wrangell and Petersburg since 1920 and provides a significant off-season contribution to the region's economy. Abundance on the various limited grounds has so declined, however, that the only substantial source of supply is now the flats to the north of the Stikine River mouth. Preliminary exploration has disclosed other more distant grounds in Southeastern Alaska and it is known that shrimp occur in commercial abundance in Cook Inlet and near Cordova and Yakutat.

The sustaining species of the shrimp industry is the "pink" although several other varieties occur in the catch too. They are caught with beam trawls and the tail meats are cooked and cold-packed after being separated by hand from the shell. The 1947 pack of 350,000 pounds was valued at \$326,000 at the packing shed.

Crab. It is necessary to distinguish between the common Dungeness crab (*Cancer magister*) of the entire Pacific Coast and the more northerly and westerly King crab (*Paralithodes camtschatica*). The latter occurs in very limited numbers in Southeastern Alaska but seems to be abundant in certain areas along both sides of the Alaska Peninsula, at Kodiak Island, and in lower Cook Inlet. King crabs are taken in deep water, either with trawls or tangle gear. They are very large, ranging up to 18 pounds with a five foot spread. It is this species that the Japanese fished so intensively, even in our own waters, before the war and with which they completely dominated the American market for canned crabmeat. Government sponsored exploration operations are now being carried on by U. S. interest with a view to developing this fishery.

The Dungeness crab occurs mostly in Southeastern Alaska and around Cordova, where it supports a minor but consistent industry. The catch in 1946 was almost two and a half million pounds, valued at more than \$600,000. They occur wherever there are shallow flats, a fact that greatly restricts their general distribution in Alaska. To maintain the level of abundance, regulations protect female and small male crabs and allow catching only in seasons when they are in good condition. Because of distance from market, all crabmeat is canned or cold-packed instead of being sold fresh as in the States.

Fur Seals (*Callorhinus alascanus*). Exploitation of the fur seals on the Pribilof Islands was started by the Russians shortly after discovery of the Islands in 1786. Between that date and 1834 it is estimated that 1,800,000 seals were killed for their skins. These were taken without regard to sex and resulted in such depletion that restrictive measures had to be adopted in 1835 prohibiting the killing of females. This resulted in a slow increase in the herd so that, by the time the Territory was purchased by the United States in 1867, the herd was estimated at about 1,000,000 animals compared with an estimated 5,000,000 in its original, unexploited state.

In 1868 Congress passed legislation prohibiting the taking of fur seals but, because of inadequate patrol, sealing continued. In 1869 the Pribilof Islands were set aside as a reservation. In those two years an estimated 329,000 animals were killed.

In 1870 the Treasury Department was authorized to lease the exclusive right to take seals on the Islands for twenty-year periods. Two such leases were granted from 1870 to 1890 and from 1890 to 1910. This leasing law was repealed in 1910 and the Bureau of Fisheries under the Department of Commerce took over the direct management of the fur seals and administration of the Islands, including the care of the native population.

In about 1879 pelagic sealing started (the taking of seals at sea). This practice was ruthlessly wasteful since seals were killed without regard to sex or size. Many of the seals killed sank before they could even be retrieved. This highseas fishery caused a controversy between the United States and Great Britain over the seizure of Canadian vessels by this country and jurisdictional rights in the Bering Sea.

By treaty this dispute was turned over to a tribunal of arbitration which met in Paris in 1893. The restrictions that were imposed as a result of the findings of this tribunal were not adequate for conservation, however, and the fur seal herd continued to decline. In 1897 Congress passed a law prohibiting the taking of fur seals by United States nationals in North Pacific waters. This also was ineffectual, since it could not prevent the taking of seals by nationals of other countries. By 1910 the seal herd was down to the perilously low level of about 125,000 animals.

On July 7, 1911 the United States, Great Britain, Japan and Russia entered into a convention for the protection of the herd which for the first time provided adequate protection. Under the terms of this convention, the United States assumed control of the herd on the Pribilof Islands and the skins taken were divided between the various signatories by prescribed percentages. This convention likewise prohibited pelagic sealing except by aborigines using primitive weapons and non-powered boats.

From the low of 125,000, the herd has increased to an estimated size of 3,613,653 animals in 1947. In addition, it has produced a total during the period from 1910 to 1947 of 1,146,556 skins having a gross value of \$36,422,412.

On October 23, 1940 Japan abrogated the 1911 treaty to be effective one year later. A provisional agreement was then concluded between the United States and Canada in 1942 and reaffirmed in 1947 for interim operation until a new convention can be concluded.

Management of the herd and the take is based on the life history of the species. Each year from early spring until fall they come ashore on the two principal Pribilof Islands, St. Paul and St. George, to give birth to their young and to breed. After the breeding season is over, they migrate southward as far as the California coast but do not go ashore. The females mature at 3 years and give birth to one pup

each season. The females average about 75 pounds in weight. In contrast, the bulls do not mature until their 6th or 7th year and will then average more than 500 pounds.

Fur seals are polygamous, thus making it possible to take skins from the surplus of bulls without injuring the growth of the herd. No cows are taken but the young bulls are segregated out in their third year and a certain proportion are reserved to supply breeding stock later. The rest are taken for their skins. Since breeding bulls will often maintain harems of as many as 100 cows, the number of 3 year old males that may safely be taken is quite large and lately averages 65,000 animals per season.

In addition, a byproducts plant is operated to render the carcasses and annually produces about \$80,000 worth of oil and meal.

At the time of assumption of the management of the Pribilof Islands in 1910, the Bureau of Fisheries was likewise charged with the care and protection of the natives living thereon. These people are not aboriginally native to the Pribilofs but were moved there by the Russians from the Aleutian Islands and Alaska Peninsula when exploitation of the seal herd was started.

Modern homes, schools, churches and other facilities have been built and maintained for the natives. They are furnished the necessities of life including basic food issues, medical attention and schooling. In addition, they are paid for their services in sealing operations.

These people are urged to increase their status toward full citizenship as rapidly as they are willing and able to assume the responsibilities. Under supervision they now have governing councils, their own canteens and police force. Because of close supervision and because the general public is not allowed indiscriminately to visit the Islands, the usual native scourges of tuberculosis, venereal disease and liquor are non-existent. The native population numbers about 500 people.

Latent Fisheries. Trawl species. During the recent war when there was a serious shortage of protein foods, a number of previously obscure bottom species of fish became of considerable importance on the market. Sole, flounders and rockfish were taken in great quantities by otter trawls off the Washington coast and sustained a sizeable filleting industry. So great was the demand that within a few years the supply became noticeably depleted in the exploited areas.

There is evidence that similar banks exist in the Bering Sea and off Kodiak Island. As problems of transportation and preservation diminish and as future need for food products increases, it is logical to suppose that a sizeable trawl fishery will develop in western Alaska waters.

Cod. Bering Sea, just north of the Alaska Peninsula, formerly supported a picturesque and lucrative fishery for codfish. Lack of demand, coupled with production and transportation problems has almost terminated this activity. However, the cod are known to exist there in great quantities and development of the potential await only an increased demand for this type of food product. An allied species, the pollock, occurs extensively throughout Alaskan waters and especially the Bering Sea. Although unknown now, it could yield a tremendous supply if conditions warrant.

Oysters. The Government encourages growers to experiment with oyster culture by practically giving them leases to tidelands desired for the purpose. Results of several attempts to cultivate the Pacific (previously known as "Japanese") oysters

in Southeastern have so far been rather disappointing. The water is too cold for natural spawning and the rate of growth of planted spat is too slow to be profitable. Improved techniques may eventually produce better results, however, as the initial efforts have not been too determined.

Byproducts. The discovery just before the war of the high vitamin content in the oils reduced from fish livers and viscera provided a lucrative addition to the fishermen's income and established a new industry in this important commodity. New processes for producing vitamins synthetically threaten to reduce the value of this type of fish "waste" but will probably not supplant it altogether.

The sheer waste of uncounted tons of organic refuse and trimmings from the canneries of Alaska each year has long been of concern to thoughtful people who realized its value as a component of fertilizers and animal feeds. Cost of reduction and transportation outweighed the market value, however, until recently. Several small operations are now in progress and it is to be expected that the constantly increasing demand for organic material will soon result in the utilization of most cannery waste.

Whaling. Alaska's original fishery, whaling, began in northern waters over a century ago. The development of petroleum and steel substitutes for whale oil and whalebone subsequently caused the industry to gradually atrophy until today there is no Alaskan whaling at all. The abundance of whales has substantially increased as a result and improving market conditions are now causing renewed interest in this fishery.

These animals, like walruses, still provide a vital source of food and fuel for the Eskimo people of the north but are not exploited commercially by them.

Nature Possibilities. Even today there is little knowledge concerning the abundance, distribution and characteristics of the numerous varieties of sea life that undoubtedly abound in Alaska's coastal waters. Although the relatively few species that support the fisheries of today are being developed even beyond their capacity for sustained production, a wealth of other marine food resources still remain untapped. The Government is lately encouraging exploration of far western and northern waters to discover new grounds and potential fisheries. This work will provide a much better idea of the potential seafood available and will probably also initiate some new industrial activity. The Bering Sea particularly has a shallow, level, muddy bottom of vast area that is ideally suited to the production of tremendous quantities of fish. Southeastern Alaska is understood and developed to the limit of its potential right now, but much remains to be learned about the more distant regions.

Government Administration - History. In the beginning, of course, fishermen took fish in the most convenient manner possible and conservation was ignored. Ill-advised practices made themselves felt in as short a time as ten years so that Congress in 1889 deemed it necessary to prohibit the erection of permanent gear or barricades in salmon streams. At the same time the Office of the Commissioner of Fisheries was established under the Secretary of the Treasury and directed to make an investigation as a basis for legislation that would place the industry on a sound, sustained footing. This study discovered what has continually been emphasized ever since: fishery problems are so everlastingly complex, intricate and variable that their solution is long and difficult.

Jurisdiction over Alaska's fur seals and fisheries was transferred from the Treasury Department to the Department of Commerce in 1903, to be administered by the Bureau of Fisheries. The Bureau was transferred to the Department of the Interior in 1939 and the following year was combined with the Bureau of Biological Survey to form the Fish and Wildlife Service.

Government Regulation and Management. Laws governing the administration of Alaskan fisheries derive from Congressional Acts, some of which make specific provisions for control, while others delegate certain broader fields to the Secretary of the Interior for his supervision. The Act of 1906 prohibited wanton waste of fish, assessed a small case-pack tax, required submission of statistics by fishery operators and gave the Secretary authority to prohibit commercial fishing in streams. The other more important act upon which regulations are based is the "White Act" of 1924 which prohibited all commercial fishing between 6:00 p.m. Saturday and 6:00 a. Monday, established the principle that escapement should equal catch, and gave the Secretary rather broad powers to make regulations he felt necessary to conservation. The Secretary's authority and responsibility is discharged through the Branch of Alaska Fisheries of the Fish and Wildlife Service.

It is a function of the Fish and Wildlife Service to determine the best means of managing the fisheries of Alaska through research and observation and, with that knowledge, to formulate regulations and enforce them. A considerable volume of complex regulations has gradually evolved to control and preserve the various fisheries and they are amended endlessly to meet changing needs and conditions. Fishermen, operators and resident Alaskans are consulted annually in an effort to secure the benefits of as wide experience and knowledge as possible.

Fish and Wildlife Service - Organization. The Fish and Wildlife Service as a whole has widespread duties that are national and even worldwide in scope, and is concerned with practically every important item of wildlife as well as fish in the United States; Alaska's fisheries are but one of its concerns. The Branch of Alaska Fisheries is the subdivision of the Service immediately concerned with management and enforcement in Alaska of both commercial fish and fur seals. It is advisedly assisted with scientific research conducted by the Alaska Investigations of the Branch of Fishery Biology. Chiefs of these Branches have headquarters at Washington, D. C., but actual administration of the work in Alaska is performed by the Regional Director at Juneau. Under the Regional Director are fishery field agents who administer surrounding districts from headquarters at False Pass\*, Chignik\*, Kodiak, Naknek\*, Anchorage\*, Cordova, Yakutat\*, Juneau, Sitka, Craig, Wrangell and Ketchikan.

A somewhat different organization pertains to the Pribilof fur seal operation, which is independent of the Juneau Regional Office. The Superintendent and his staff have seasonal headquarters at both Seattle and the Pribilofs and work directly under the central office in Washington, D. C. All activities covering fur seals are, of course, subject further to the terms of the international convention with Canada.

The halibut fishery is outside the purview of the Fish and Wildlife Service, except in matters of enforcement, as it is managed and regulated by the International Fisheries Commission established under treaty with Canada. All other commercial fisheries in Alaskan territorial waters, however, are subject under law to regulation by the Fish and Wildlife Service.

\* Seasonal only.