PACIFIC COD FISHERIES

By JOHN N. COBB

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DEPARTMENT OF COMMERCE
BUREAU OF FISHERIES
HENRY O'MALLEY, Commissioner

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Dean, College of Fisheries, University of Washington

APPENDIX VII TO THE REPORT OF THE U. S. COMMISSIONER OF FISHERIES FOR 1926
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NATURAL HISTORY OF THE COD

Strange to relate, while the fishery for Pacific cod has been prosecuted since early in the sixties, scientists are not yet agreed as to the proper name for the species. According to Bean[2] "Most writers

[1] Appendix VII to the Report of the United States Commissioner of Fisheries for 1926. B. F. Doc. 1014. (This is a revision of B. F. Doc. 830. A map showing the location and extent of the cod banks and the location of shore stations in Bristol Bay and Central Alaska in 1914 may be consulted in Bureau of Fisheries Document No. 830 or in the 1915 volume of the Report of thte Bureau of Fisheries.)

[2] The Cod Fishery of Alaska, by Tarleton H. Bean. The Fisheries and Fishery Industries of the United States, Pt. II, sec. 5, Vol. I, pp. 198, 199.

have referred to it under the name of *Gadus macrocephalus*, which was bestowed by Tilesius upon the Kamchatkan cod, the figure of which suggests that it was based upon a deformed individual. Cope, in 1873, described the young of the common Alaska cod as a new species, *Gadus auratus*, from specimens collected by Prof. George Davidson, of the United States Coast Survey, at Unalaska. Steindachner, in the Proceedings (Sitzungsberichte) of the Vienna Academy, LXI, 1, 1870, adopts the name *G. macrocephalus* for a large cod taken in De Castries Bay (mouth of Amur River), Siberia. In this example the length of the head is contained exactly three times in the total length to the extreme end of the pointed caudal peduncle. The same proportion, however, may be found in any place where large numbers of *Gadus morrhua* are taken, and it can readily be proven to be only a matter of individual variation."

In the summer of 1880, the late Prof. Spencer F. Baird, then United States Commissioner of Fish and Fisheries, sent Dr. Tarleton H. Bean to Alaska for the purpose of investigating its fish and fisheries, and he made the first extended report on the Pacific cod that had been made up to that time.[3] As a result of his investigations, he considers the Atlantic and Pacific cod as of the same species. Jordan and Evermann [4] call it *G. macrocephalus*, and in justification of this state.

> In external respects we recognize no distinction between this species [referring to a specimen 20 inches long taken in the Strait of Juan de Fuca by the *Albatross*] and the common eastern codfish, except that the head seems larger.

They also quote Doctor Gilbert [5] as follows:

> It has been frequently pointed out, and is well known to fishermen, that the Pacific codfish has a smaller air bladder or sound than the Atlantic cod. Pending an examination of this question, which we are not now in a position to make, we propose to recognize the Pacific cod as a distinct species.

Much has been said and written of the difference in size between the sound of the Atlantic cod and that of the Pacific. A large part of this is hearsay, based largely on the statements of fishermen, few of whom have ever made any effort to save them. I cut out a few sounds in 1913, but unfortunately these were lost in some way during transportation; and although it had been some years since I had cut a sound from an Atlantic cod, it seemed to me that the Pacific sounds were almost, if not quite, as large, but thinner. Some few years ago the Alaska Codfish Co. made an effort to save the sounds at one of its Alaska stations, but the men refused to do so except at an exorbitant price. A. Greenebaum, the president of the company, writes that the sounds are small in size.

The only authentic record I have of a direct comparison of Pacific and Atlantic sounds is in a letter from Dr. W. C. Kendall, ichthyologist, United States Bureau of Fisheries, under date of January 22, 1915, in which he states:

> The air bladder of the big Pacific cod [the weight of this was about 30 pounds and its total length about 39 inches], after removal, measured about 13 inches in length, with no perceptible horns excepting slight projections, but it had a very large pouch on each side of the anterior end.

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[3] The Cod Fishery of Alaska, by Tarleton H. Bean. The Fisheries and Fishery Industries of the United States, Pt. II, sec. 5, Vol. I, pp. 198–226.

[4] The Fishes of North and Middle America, by D. S. Jordan and B. W. Evermann. Bulletin, United States National Museum, No. 47, Pt. III, pp. 2541, 2542. (1898.)

[5] Ibid., p. 2542.

The air bladder of the big Atlantic cod [of a weight of 34¼ pounds and a length of 43½ inches] was of the same length approximately, pouches small, but the horns, which could not be fully straightened out, measured each 10 inches in length. In natural position in the fish they are coiled up.

The small Pacific cod [8 or (9?) pounds and 28⅜ inches long] was in such bad condition that the air bladder could not be removed intact, but the one horn that could be found was only 1 inch in length.

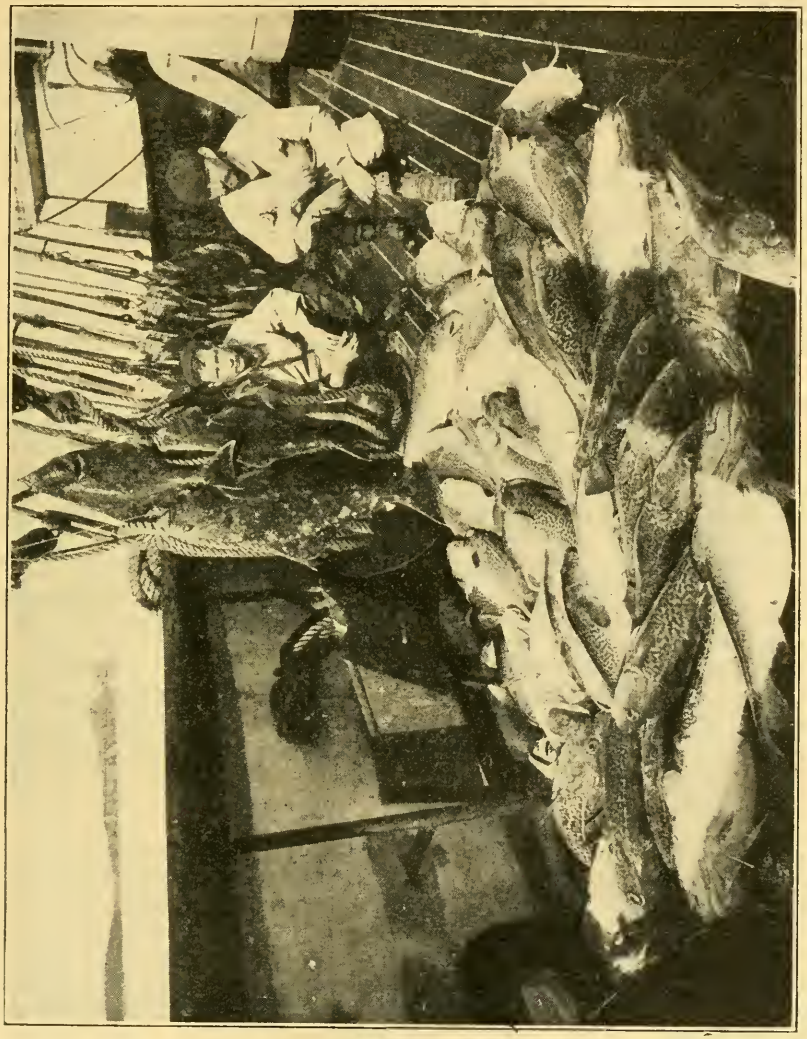

FIG. 1.—Alaska cod on the deck of the *Albatross*

The other Atlantic cod [weights and lengths about the same] had air bladders and horns, as follows: Length 9¼, horns 2½ and 3; length 10½, horns 3¼ and 3¼; length 10 inches, horns 7 and 5½ inches.

It is to be hoped that some one will soon take up the study of the comparison of the sounds from the cod of both oceans, as should the Pacific sound prove to be uniformly smaller than those from the Atlantic cod, it would furnish a distinguishing feature.

DISTRIBUTION

The Pacific cod occasionally is found as far south as Cape Flattery on the Washington coast. From Puget Sound north to southeast Alaska they are said to be more common, although in no part of this region is a commercial fishery maintained for them. A few are taken by the halibut fishermen and marketed under the name of "gray cod." In southeast Alaska, in early years, a small fishery was maintained in and adjacent to Chatham Strait, but nothing has been done here of recent years. Cod in abundance are not to be found until the Portlock Bank is reached. From here to Akutan Pass cod are very abundant, and probably will be found in considerable abundance along the Aleutian Chain beyond the pass. In Bering Sea, between Unimak Pass and Bristol Bay, are to be found several large and important banks adjacent to Unimak Island and the Peninsula. They have been reported as far north as St. Lawrence Island in Bering Sea, but none have been reported in the Arctic Ocean. Edgar O. Campbell,[6] a school-teacher for the United States Bureau of Education, on St. Lawrence Island, in a letter dated September 21, 1909, has the following to say as to the presence of cod around the island:

> A few codfish feed here and are caught every year from July to October, but not in any appreciable numbers except every third to fifth year. This year promises to be a good one, although the Eskimos are so timid they will not go out for more than a half mile from shore in their skin canoes. Some years the fish stay until in November and great numbers of them are caught by the ice as the sea freezes over. How do you suppose this happens? I have supposed that, as the top of the sea coats over with a slushy soft ice, the cod, for some reason or other, it may be for air, jump up through the ice and fall on the surface, their weight not being sufficient to carry them below into water again. At any rate they soon freeze and, as soon as the ice is solid enough to walk on, the Eskimo bring them home in great piles, like cordwood. This has happened twice since we came in 1901. In such years the fox catch is sure to be light, for the fox are so well fed they are wary of prepared bait.

On the Asiatic shore cod have been reported as far north as Cape Chaplin, East Siberia, while they have been found as far south as Hakodate in Japan. They are most abundant in the Okhotsk Sea.

SIZE

A very erroneous idea of the size of Pacific cod seems to be prevalent in certain works on ichthyology. Even as late as 1907 Evermann and Goldsborough[7] state: "We have no record of any large examples of this cod from the Pacific, where it perhaps does not reach a weight exceeding 15 or 20 pounds." Bean[8] reports having seen many that weighed not less than 30 pounds caught on the inshore banks, where the cod are notably smaller than those found on the offshore banks. He also quotes reports from others as to cod weighing from 20 to 50 pounds.

I spent the summer of 1913 at the Pirate Cove station of the Union Fish Co. During the greater part of the time no snappers

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[6] Mr. Campbell had written for information as to how the natives could best catch cod for their own use.

[7] The Fishes of Alaska, by B. W. Evermann and E. L. Goldsborough. Bulletin, U. S. Bureau of Fisheries, Vol. XXVI, 1906, p. 348. (1907.)

[8] The Cod Fishery of Alaska, by Tarleton H. Bean. The Fisheries and Fishery Industries of the United States, Pt. II, sec. 5, Vol. I, pp. 202, 203.

were to be seen and the fish averaged very large—probably 12 to 15 pounds most of the time. On June 15 I weighed six cod, selected so as to show the different sizes, with the following results: One weighed 40 pounds, length 43 inches from tip to tip; 1 weighed 37 pounds, length 42½ inches from tip to tip; 1 weighed 22 pounds; 1 weighed 21 pounds, length 39 inches from tip to tip; 1 weighed 23½ pounds; 1 weighed 11½ pounds, length 31 inches from tip to tip.

I had the first fish dressed immediately after being weighed and measured, and when ready for the salting tank it weighed 21 pounds. Before being weighed in the first place all of these fish had been bled by having their throats cut.

On a number of occasions I saw fish at the shore stations that undoubtedly would run over 40 pounds if put on the scales. All of the fish noted above were from inshore banks. Cod run larger in size on the offshore banks, and it is probable that fish running from 50 to 60 pounds are taken sometimes on Slime and Sannak Banks, where the largest cod are found.

During the winter months the cod are very thin and watery, and probably would not average in the round much more than 7 to 9 pounds.

There are no records of any monster specimens having been secured on the Pacific banks, similar to those reported occasionally from the Atlantic. Capt. J. A. Matheson, of Anacortes, Wash., who has been engaged in the cod fishery for a number of years, says that the largest dry-salted cod he ever received from his vessels weighed 18 pounds.

In the southern part of its range the cod are generally small, in many places being no larger than those known as snappers on the cod banks.

MIGRATIONS

On the main cod banks fish are to be found throughout the year, although they are very scare at times. On certain of the inshore banks cod are to be found all the year in considerable abundance, with periods of great abundance; on other inshore banks only during the winter months are the fish found in any abundance, while on others they are plentiful only during the summer months. Pirate Cove, Unga, and Kelleys Rock are all-the-year-round stations, the Sannak Island and Northwest Harbor stations are all-winter ones, while Sanborn and Dora Harbors are open only during the summer months. At the stations open the whole year the best fishing is usually from March to September, both inclusive. Part of this superiority undoubtedly is due to the better weather that prevails during these months than during the rest of the year, but the reports and statistics all agree in showing that there is a greater shoreward migration of the schools during this period.

SPAWNING

Cod are found spawning during the winter months, principally in January and February. Those caught during February and March and the early part of April usually are very thin, in consequence of their having spawned shortly before this.

In many females the eggs are not extruded at the regular period, and in many instances these eventually harden into an almost solid mass. At Pirate Cove, in 1913, my attention was early called to these delayed spawners. The first one was observed on May 10, shortly after my arrival at the station. From then on they occasionally appeared until early in August, when they became quite numerous. On June 25 I cut out of one female a roe that weighed 8 pounds. Occasionally the eggs were found in a mass with the usual envelope missing. In no instance that I observed did this condition seem to affect the health of the fish, all of them appearing to be normal fish so far as food qualities, weight, etc., were concerned.

YOUNG

Doctor Bean's observations showed young cod as present in shallow water near shore at some place or other on the Pacific side between Cooks Inlet and Unalaska between May and October, and that about the middle of the latter month they reach an average length of 4 or 5 inches.

On September 7, 1913, I first noticed large numbers of young cod from 2 to 4 inches in length swimming around Pirate Cove harbor, and they were still there in large numbers when I left on September 26. The small native boys would catch them occasionally on a baited hook or bent pin, which the fry would pursue eagerly. They were found occasionally also in the stomachs of adults brought in by the fishermen, showing conclusively that the cod do not discriminate against their own offspring.

FOOD

The food of the Pacific cod is as plentiful and as varied as in the Atlantic. Any fish that it can capture forms a part of its food. I opened and examined the stomachs of many cod at Pirate Cove station during the summers of 1912 and 1913, and was surprised at the variety of food found therein. During July, 1913, shrimp were exceedingly abundant in their stomachs. I also found three ducks with bright red feet, known locally as "Alaska pigeons." These evidently had been swallowed but a short time before, as they were all in an excellent state of preservation. Alaska pollock (*Theragra chalcogramma*) seemed to be the chief food of the cod, although, strange to relate, it was found to be absolutely worthless as bait when cut into pieces. Sculpins are frequently found in its stomach, as are also salmon, herring (*Clupea pallasi*), capelin, halibut, and sand launce (*Ammodytes personatus*). Yellow striped fish, or "Atka mackerel" (*Pleurogrammus monopterygius*), is a popular article of food. Sometimes young cod are found in the stomachs of the adults. Octopi and shrimp are favorites of the cod, and during the summer months their stomachs will be found, in certain sections, to be filled with the latter.

OTHER MEMBERS OF THE GADIDÆ

An odd feature of the cod fisheries of the Pacific is the total absence of the haddock and hake, which form such a large proportion of the catch of the Atlantic Gadidæ fishery. The pollock of Alaska

is quite different from the one found on the Atlantic. The minor species of the Gadidæ found on this coast are described below.

Ling.—The ling (*Lota maculosa*) is our only fresh-water member of the Gadidæ, and is said to be common in the Yukon Basin, and has also been reported from the Nushagak, Fraser, and Columbia Rivers. Large numbers are found in Lake Chelan, Wash. It attains a length of 1 to 3 feet. Although fully as palatable as the ling found in east-coast streams, it is rarely utilized as food, except in British Columbia and Washington, where small quantities are marketed.

Tomcod.—The tomcod, or wachna (*Microgadus proximus*), is found in abundance from Alaska to Monterey. In the more southern portions of its range it is often sold in the markets as "smelt." In form the tomcod is a miniature cod, and there is difficulty in distinguishing the young of the two species. The tomcod rarely exceeds a foot in length and is esteemed as a delicacy in many localities.

In the northern portion of Bering Sea the wachna, as it is called, is of great importance to the natives, who depend upon it for a considerable part of their food supply during the winter season. Mr. Dall [9] has the following to say of this fishery:

> This fish much resembles the common tomcod of the Eastern States, * * * but while the latter is of most insignificant importance from its scarcity and poor quality, the former species occupies a very important place in the domestic economy of both natives and Russians on both shores of Bering Sea. It is apparently a permanent inhabitant of these coasts, but is most abundant in the fall of the year, when the ice begins to form in the rivers and along the shores. The Waukhni fishery commences about the middle of October. At first it is caught from boats anchored close inshore, but later the natives cut holes in the new ice, set up two or three stakes, with a mat hung upon them to keep off the wind, and sit there all day, hauling them in as fast as the line is dropped into the water. The hook is made of white walrus ivory, furnished with a sharp pin set in obliquely but without a barb. The whiteness of the ivory, which is kept constantly in motion, attracts the fish, but no bait whatever is used. In November, when the ice becomes very thick and the cold increases, the fish retire to deeper water, and the fishing is over until the following spring. * * * They are preserved by removing the intestines and drying in large bunches strung on seal line, or by throwing them as they are into long cylindrical baskets made of twisted grass and keeping them entire in a frozen state. * * * They are among the most palatable of the many fish found in these seas, and the number preserved is so great as to be almost incalculable. They serve the natives for food, either boiled or in the frozen state. They also form an important article of dog feed in the northern portions of Alaska near the coast.

Hon. James Wickersham, former Delegate from Alaska, furnished me the following description of the apparatus used by the natives and their method of operating same:

> When the Eskimo woman is fishing through the ice on Bering Sea for tomcod she uses a line with a barbless hook at the end. She also has two short sticks in her hands and generally a baby strapped on her back. As soon as she gets a bite she slips one stick a foot or two down the line and begins raising it up. As soon as the stick gets too high she slips the other a few feet below the first but on the other side of the line, and thus continues hauling in the line with the sticks alternately until finally the catch comes above the ice. With a quick movement of the line and stick the fish is shook off, and frequently before it falls onto the ice is frozen solid. The woman is wearing heavy gloves, and the reason for not touching the wet line with the gloved hands is to prevent them from getting wet and covered with ice and thus becoming useless. The line is

[9] Report of Commissioner of Agriculture for 1870, p. 381. (1871.)

lowered in the same manner, and from long practice the natives are very expert. The fish are put in baskets and will keep fresh as long as they remain frozen. A windbreak of ice and snow is frequently constructed.

Alaska pollock.—The Alaska pollock (*Theragra chalcogramma*) is an abundant and widely distributed species in Alaska. It is found in the Bering Sea and the neighboring waters south to Sitka and the Kurils. It usually swims near the surface and forms a considerable portion of the food of the fur seal and the cod. It reaches a length of 3 feet, although the average is more nearly about half this. At present no use is made of it as food, although in time it will become an important item in the commercial fisheries. In 1907 the writer caught a specimen at Seward, Alaska, but it was apparently so rare in that locality that no one there seemed to recognize it.

South of Sitka is found a closely related species, *T. fucensis*, which is said to be abundant in Puget Sound and is found as far south as Monterey Bay.

Eleginus navaga is common and abundant along the entire Alaska coast and on the Asiatic side as far south as the Kamchatka Peninsula at least. It is rarely used as food because of the great abundance of other better-known fishes.

Polar cod.—The polar cod (*Boreogadus saida*) is common along the coasts of Arctic Alaska and northern Siberia. Like the pollock, this species has the lower jaw longer than the upper. They form an important article of food with the Eskimos during certain seasons of the year. John Murdoch [10] has the following description of the fishery:

> Usually during the latter part of October and early in November, after the sea has closed and when tide cracks form along the shore, the natives generally catch a good many of them at the very edge of the beach in about a foot of water.
>
> They use a short line of whalebone, to which is attached a small lure made of blackened ivory, which roughly represents an amphipod crustacean and is armed with a barbless hook.
>
> After this no more are caught till after the return of the sun, early in February. The natives say that they go away, and it is quite probable that they leave the shore and go off into deeper water. If there were any fish to be caught, the natives would undoubtedly fish for them during the winter months, as at this season they are frequently hard pressed for food.
>
> Early in February they become exceedingly abundant in about 15 fathoms of water wherever there is a level field of the season's ice not over 4 feet in thickness, inclosed between rows of hummocks of broken ice. * * * Large numbers of the natives from the Cape Smythe Village, especially women and children, resorted to this field nearly every day and caught these fish literally by the bushel.
>
> The fish are jigged and the hook is kept near the bottom.

SPECIES MISCALLED COD

A confusing feature on the Pacific coast is the number of species, unrelated to the Gadidæ and none of which resemble the true cod, which are commonly known as cod and which frequently are classed with the cod by the uninitiated. Among these the more prominent are the following:

Cultus cod, blue cod, buffalo cod, or ling cod (*Ophiodon elongatus*) is a large, coarse fish that reaches a length of 3 to 4 feet and a weight

[10] Natural History, Report of the International Polar Expedition to Point Barrow, Alaska, Fishes, pp. 129–130. (1885.)

of 30 or 40 pounds, with the flesh a livid blue or green in color. In cooking, the flesh of this fish turns white. It is found from Sitka to Santa Barbara, and is especially important as a food fish in British Columbia and the State of Washington.

Sablefish, black cod, coalfish, beshow, or skill (*Anoplopoma fimbria*) is found from the Aleutian Islands to Monterey. It is most abundant in the regions frequented by halibut, from southeast Alaska to the Washington coast. It attains a length of 18 to 20 inches and a weight of 5 pounds. Many are marketed in a fresh, frozen, or salted condition, and the fish is growing steadily in popularity. Usually it is taken in deep water, from 70 to 90 fathoms, though often it is found at depths of 200 to 250 fathoms. About 1916 I recommended that the name "sablefish" be used for this fish, and it has been so called since then.

Several species of Sebastodes (notably *S. ruberrimus*, *S. pinniger*, and *S. mystinus*), known as red rock cod, are found from San Diego to Alaska. They are excellent food fishes and are in considerable demand.

BANKS FREQUENTED BY COD

The codfishing banks are of two kinds—the inshore banks, which lie close in to shore, or in the bays, straits, and sounds between the numerous islands and the mainland and between the islands themselves; and the outer banks, which lie at varying distances off the mainland or the various groups of islands. Together they form by far the largest group of cod banks in the world.

Outside of the surveys made by the United States Bureau of Fisheries' steamer *Albatross*, very little has been done to fix with certainty the boundaries of the various banks and much remains to be accomplished in this line. The *Albatross* survey has been supplemented by data obtained from fishermen that frequent these banks and from personal observation over a period comprising several fishing seasons.

According to the investigations of the *Albatross*, the following represent, roughly, the areas of the offshore banks upon which she worked, although in several instances the work was suspended before the end of the bank was reached:

	Sq. miles
Slime Bank	1,445
Baird Bank	9,200
Between Ugomak Island and Kiliuluk Bay, in the Pacific Ocean	2,000
Davidson Bank	1,600
Sannak Bank	1,300
Between Sannak and Shumagin Banks	1,800
Shumagin Bank	1,800
Albatross Bank	3,700
Portlock Bank	6,800
Total	29,645

No attempt was made by the *Albatross* to seek for cod banks along the Aleutian Chain west of Akutan Pass, where cod are said to be numerous. Also no attempt was made to find banks in Bering Sea north of Cape Newenham, although cod have been found as far north as St. Lawrence Island.

No estimate ever has been made of the extent of the inshore banks, which are very extensive. It is probable that these would be from one-third to one-half the area of the offshore banks, possibly more.

No one knows the extent of the cod banks along the Asiatic shores of the Pacific Ocean, but they can not be much smaller, if any, than those on the American side, and it is possible that more extended investigations will develop that they meet the American banks at certain places.

OFFSHORE BANKS IN BERING SEA

Owing to a lack of good harbors in Bering Sea, the offshore banks are the only ones frequented at present by the fishing vessels, and these are among the most productive in all Alaska. As the holding ground on these banks is good, a properly equipped vessel finds little difficulty in riding out all ordinary gales. All cod banks so far found are situated mostly to the eastward of a line connecting Cape Newenham with the northwest cape of Unimak Island and off the northern side of Unalaska Island.

Slime Bank.—The first cod bank to be reached by a fishing vessel after entering Bering Sea is Slime Bank. As delineated by the *Albatross*, it begins directly off Cape Sarichef, the northwest cape of Unimak Island, is elongate in shape, and follows approximately the trend of the adjacent coast to within a few miles of Amak Island, its inner margin lying only a short distance off the land. It is about 85 miles in length and 17 miles in average width, broadening somewhat at the eastern end; its total area is estimated at about 1,445 square miles. The depths found on the bank range from 20 to 50 fathoms, while the bottom consists generally of black sand and gravel, frequently intermingled with pebbles, and sometimes of gray and yellow sand, rocks also occurring near the shore.

The deep water lying off the northern entrance to Unimak Pass forms the western end of the bank, 70 fathoms being found near the edge and depths exceeding 100 fathoms a short distance farther away. Off its northern edge the depths determined by the soundings of the *Albatross* range from 53 to 62 fathoms, with muddy bottom at three of them. Toward the eastern end, however, on the northern side sand and gravel occur, and in this locality the precise limits of the bank are still undefined.

There are no harbors suitable for cod vessels along the adjacent shore, although protection may be found in several bays, notably Dublin and Shaw Bays, during southeast to southwest winds. Amak Island, which lies about 11 miles off Izenbeck Bay, also furnishes some protection during the prevalence of southeast and southwest winds.

The bank derives its name from the presence of immense numbers of a large jellyfish, brownish or rusty in color, measuring 6 to 18 inches across the disk and provided with long slender tentacles having great stinging powers. It is said by the fishermen that the jellyfish never are observed upon the surface of the sea, but seem to occupy an intermediate zone toward the bottom. They claim that these animals sometimes interfere with the hooks that reach bottom and by covering the bait render it unattractive to the fish. When brought to the surface they are uncomfortable objects for the fisher-

men to disentangle from the hook and line. They do not become abundant until the latter part of June, when the fishermen generally move on to Baird Bank.

Probably the finest cod secured on any of the Alaska banks are taken on Slime Bank.

Baird Bank.—Baird Bank, so named by Captain Tanner of the *Albatross* in honor of Prof. Spencer F. Baird, the first United States Commissioner of Fish and Fisheries, was then generally known to the fishermen, and is yet to a few of them, as the Port Moller bank or ground. As described and charted by the *Albatross*, it commences a few miles east of Amak Island and extends northeastward off the northern side of the Alaska Peninsula to the vicinity of Cape Chichagof, at the mouth of the Ugaguk River, a distance of about 230 miles. It has an average width of about 40 miles and an extreme width of 58 miles, its total area being estimated at about 9,200 square miles, making it the largest known bank in Alaska, and some 800 square miles larger than Georges Bank in the North Atlantic Ocean.

The *Albatross* investigations, however, indicated a strong probability that the Kululak ground and the region off Cape Pierce are really extensions of this bank, the investigations not having been carried to a definite conclusion with respect to this matter. Outside of Bristol Bay the observations were not carried beyond the limits of the bank as defined by the *Albatross*, and the entire width of its western portion still remains to be determined. It is also not impossible, according to Captain Tanner, that some connection may be found to exist between Baird and Slime Banks to the north of Amak Island. A line of stations from Cape Newenham to the Northwest Cape of Unimak Island, however, showed good fishing only in the vicinity of land.

Like Slime Bank, but few harbors are to be found along the shores adjacent to Baird Bank. Vessels occasionally take refuge in Port Moller, Herendeen Bay, and Port Heiden, but usually the vessels ride out the storms or draw in close to the peninsula shore during southeast winds.

Kululak Bay.—Kululak Bay occupies a large part of the region included between Cape Constantine and Cape Newenham and contains Hagemeister Island and the Walrus Group. Within this area the *Albatross* investigators found cod in isolated spots, scarcely entitled to the name of banks. Extensive shoals occur off Hagemeister and the Walrus Islands, 6 fathoms being found about 15 miles to the southward of the latter. The principal fishing grounds are outside of these shoals as well as to the eastward and westward of them, in depths of 12 to 25 fathoms, the bottom consisting generally of sand, with some mud and gravel, and the fauna being essentially the same as on Baird and Slime Banks.

Some years ago the fishermen occasionally resorted to a small ground, called Gravel Bank, situated about 16 miles south-southwest from the southern end of Hagemeister Island, where large cod were reported to be abundant. It has depths of 16 to 20 fathoms, but its size is inconsiderable.

Vessels entering Bering Sea fish first on Slime Bank, usually in or just off Dublin Bay. From here they work to the eastward, leaving

for Baird Bank when the jellyfish become too numerous on Slime Bank. No fishing is now conducted on the Kululak ground.

The *Albatross* investigations were not carried north of Cape Newenham; cod have been reported at various places between here and Bering Strait and in the Arctic. They are said to be abundant in the neighborhood of St. Lawrence Island.

OFFSHORE BANKS IN THE NORTH PACIFIC OCEAN

The *Albatross* ran three lines of soundings over the area lying between the longitude of Ugamok Island, at the southern entrance to Unimak Pass, and that of Kiliuluk Bay (longitude 164° 55′ to 167° west) and between the coast and the inner edge of the steep submarine slope. These soundings were not sufficient to demonstrate the existence of a defined bank in this region, but it was estimated that an area of about 2,000 square geographical miles was suitable for

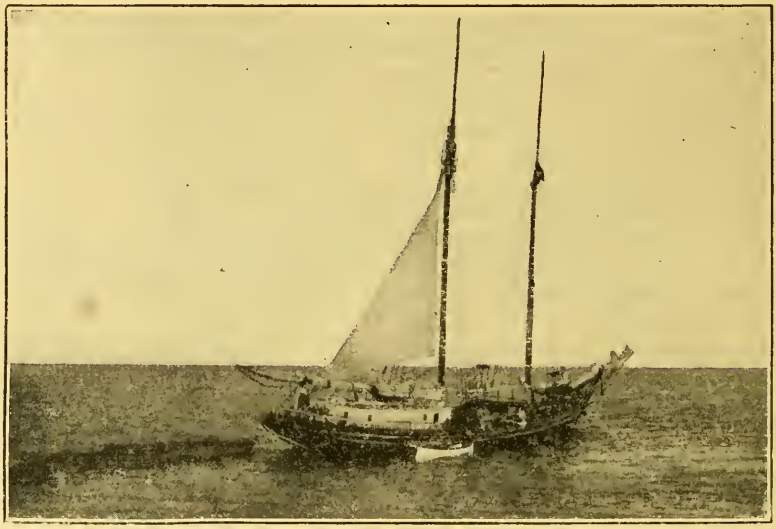

FIG. 2.—Schooner *Maid of Orleans* at anchor on Sannak Bank in the North Pacific Ocean

fishing. This has been borne out by the experiences of a number of fishing vessels that have made good catches at certain places in this area on various occasions.

Even farther to the westward occasional trials have been made by cod vessels, when becalmed inside the 100-fathom curve or when seeking water, and good catches of cod made.

Davidson Bank.—This bank was first reported by Prof. George Davidson, of the United States Coast Survey, about 1868, and was named in his honor. He made a number of soundings upon it in depths of about 50 fathoms and found cod abundant in some places. In 1888 the *Albatross* established the outline and surface contour of this bank with considerable accuracy.

The bank lies south of Unimak Island and extends westward from the neighborhood of the Sannak Islands to about the longitude of the southern entrance to Unimak Pass (about longitude 164° 40′

west). Its eastern end seems to be continuous with the shoal water surrounding the Sannak Islands. The greatest width of this bank off Unimak Island is 45 to 50 miles. Depths less than 50 fathoms were found over a large part of the bank, 41 fathoms being the shoalest water discovered. Between the shallow area and the islands to the north and northwest of it depths of 50 to 72 fathoms occur. The area of Davidson Bank is estimated at about 1,600 square miles.

The bottom upon the bank consists, in different places, of fine to coarse sand, pebbles, and gravel. Green mud is found at a depth of 95 fathoms near the outer edge of the bank and black sand in 342 fathoms just off the bank.

Sannak Bank.—The principal bank resorted to by the few vessels that fish throughout the season in the North Pacific is Sannak Bank. This bank lies to the east and southeast of the Sannak Islands, is somewhat elongate in shape, and trends in a general way northeast and southwest. About the central spot on the bank is in latitude 54° 20′ north, longitude 161° 53′ west. To the westward it joins Davidson Bank, the dividing line being at a point approximately south of the middle of the group. The soundings on this bank show depths from 30 to 82 fathoms. Much of the bottom is rocky; sand, pebbles, and gravel also occur. The estimated area of the bank is 1,300 square miles.

The cod taken on this bank are very large and of excellent quality, and are the finest fish taken on any of the Alaska banks, with the exception of those from Slime Bank in Bering Sea.

For the mariner unacquainted with these waters, this is a dangerous region, but for one acquainted harbors of refuge are numerous. Caton Harbor, formed by Caton, Elma, and Sannak Islands, is the chief place of refuge for the larger vessels, as it is easy to get into from either the northern or southwestern entrance, and inside there is excellent holding ground and ample protection from all winds. Small vessels, especially power vessels, in case of storm generally anchor close in to the leeward of Caton Island and are safe. On the northern side of Sannak Island vessels drawing 14 and 15 feet can enter Pavlof Harbor easily at high tide, but at low tide vessels drawing more than 6 feet would have difficulty in entering. The channel is rather tortuous but is buoyed. Inside the anchorage is limited, as the harbor is small. The Union Fish Co. has a large station here, and vessels can lie alongside the dock at all stages of the tide, large ones usually resting easily in the mud at low tide. Johnsons Harbor, where there is another station of the same company, can be entered at any stage of the tide, the entrance being unusually free from obstructions, but the harbor is so shoal throughout the greater portion that the vessel anchorage is restricted largely to the western part, a little inside the entrance. Farther to the westward are Moffets Cove and Company Harbor, on both of which are shore stations of the Alaska Codfish Co., and which are accessible to all cod-fishing vessels at high tide.

When fishing on this bank, the larger vessels generally ride out storms. When the vessel begins to drag, the anchor usually is buoyed and the vessel either puts to sea or goes to Caton Harbor.

Between Sannak Bank and the beginning of the Shumagin Bank, to the eastward, lies a large area of comparatively shoal water, over

the greater part of which cod are to be found in varying abundance, although this ground is not much frequented, owing to the absence of convenient safe harbors in its western half and the presence of the dangerous Sandman Reefs to the northwest. In the eastern portion vessels can easily find shelter among the Shumagin Islands. Occasionally a few vessels fish in this region for a short portion of the season. This area shows depths of 38 to 74 fathoms and is, roughly, about 1,800 square miles in extent. The bottom is exceedingly variable, consisting in various places of sand, mud, pebbles, gravel, and rocks, the latter occurring only near Sannak Bank on the one side and near the Shumagin Islands on the other.

Shumagin Bank.—Shumagin Bank lies to the south and southeast of the Shumagin Islands, with its outer margin following approximately the trend of the coast line formed by the adjacent islands.

FIG. 3.—Union Fish Co.'s Pavlof station, Sannak Island, Alaska

On the westward the bank has been traced to about longitude 159° 52′ west, but undoubtedly extends farther in this direction. East of the Shumagin Islands it reaches north to the latitude of the upper end of Big Koniuji Island. Its width within the 100-fathom curve to the south of the group varies from 15 to 35 miles to the nearest outlying island, while its area has been estimated at about 1,800 square miles. The depths over a large part of the bank are less than 50 fathoms, the bank not being separated from the islands by deep water. The character of the bottom on the bank varies greatly, sand, pebbles, gravel, broken shells, mud, and rocks being found in various places. Rocky patches are of frequent occurrence, even in comparatively deep water. These rocky patches are a grave source of danger to vessels anchored on the bank, as they chafe and break rope cables.

The schooner *Vega* fished on this bank, to the south of Simeonofski Island, in 1913 and 1914, and was compelled to use a couple of shots of chain next to the anchor in the latter year, having lost an anchor the previous year because a rope cable was employed. Owing to this danger and to the strong tides, few vessels ever have made a practice of fishing on this bank, although the fish rank in quality next to those caught on the Sannak and Slime Banks.

The area between the Shumagin Islands and Kodiak is very imperfectly known, largely because the fishing vessels do not frequent it, preferring to visit the better known banks. The *Albatross* (in 1888) ran a single series of soundings across this wide area, with a double line extending from the neighborhood of Lighthouse Rocks to Mitrofania Bay. These showed on the single line depths of 26 to 137 fathoms, while the double line showed depths of 44 to 73 fathoms.

Albatross Bank.—This bank lies off the southeastern side of Kodiak Island and extends the entire length of that island as well as in front of the Trinity Islands. At the eastern end it is almost continuous with Portlock Bank. Along some portions of the coast, as in the neighborhood of Sitkalidak Island, the bank is separated from the land by comparatively deep water, while in other places shoal water intervenes. The 100-fathom curve is distant 25 to 45 miles from the land, inside of which limit there is an estimated area of 3,700 square miles. Depths from 40 to 60 fathoms are most common on the bank. Beyond the 100-fathom line the slope is very abrupt. All varieties of bottoms occur, sand being most prevalent and rocky patches common.

Prof. George Davidson, one of the earliest investigators of the fishing banks off this portion of the Alaska coast, predicted the existence of this bank upon the evidence of a few isolated soundings. The bank was later named after the *Albatross*, which surveyed it.

In the early years of this industry this bank was frequented by small vessels with headquarters at Kodiak, but as most of the fish taken are smaller than on the other offshore banks, it has not been much resorted to except during the past seven or eight years.

Portlock Bank.—Portlock Bank extends northeastward from Kodiak Island to about longitude 148° 30′ west, a distance of 110 to 120 miles, and is widest at the western end. Its outline, as indicated by the 100-fathom curve, is irregular. It is the largest single bank south of the Alaska Pennisula, its area inside the 100-fathom curve being about 6,800 square miles. The boundaries of this bank have not been established conclusively as yet, and eventually it may turn out to be much larger than is supposed. No soundings were made by the *Albatross* nearer than 16 miles south of the Kenai Peninsula. Between longitudes 150° and 151° west the bank abruptly narrows, and thence maintains a width of 35 to 45 miles to its eastern end. There is a broad indentation, with depths of 102 to 166 fathoms, on the southern side; depths of 105 to 122 fathoms occur just off the northern border, and 106 to 761 fathoms off the eastern end, close to the 100-fathom curve.

The soundings made by the *Albatross* between longitude 150° west and the eastern end of the bank, inside of the 100-fathom line, show

depths of 66 to 99 fathoms. Near the central part of the bank, between longitudes 150° and 151° west, two soundings of 37 fathoms occur, while on the southern part depths of 40 to 72 fathoms were found. Between longitudes 151° and 152° west, the latter marking approximately the western boundary of the bank and the coast line, the depths, according to the soundings of the *Albatross*, range from 20 to 81 fathoms, the latter occurring near the land; but there were no indications of a marked or extensive depression between the bank and the shore.

Gray sand prevails over most of the bottom, mixed with pebbles, gravel, and broken shells in places, with occasional patches of mud and some rocky spots on the western part of the bank.

In 1888 the *Albatross* made a single series of soundings between the eastern end of Portlock Bank and Middleton Island, which showed depths of 87 and 101 fathoms about midway between the two, indicating a small area surrounded by much deeper water.

In 1911 the *Albatross* covered this same region more extensively in its search for halibut banks, but on neither occasion were cod found.

During the latter investigations the region between Middleton Island and Dixon Entrance was covered by the *Albatross*, but only an occasional cod was found, and the work of the halibut vessels over this area indicates that cod are quite scarce.

INSHORE BANKS

These banks generally are close to shore, usually around islands, and are those resorted to by the fishermen from shore stations adjacent (from whence the cured product is shipped to market) or by the natives and whites living close by, who catch enough for their immediate wants or cure a few for their food in winter. Observations at a number of places show that cod caught close to the mainland shores generally are smaller than those found on the offshore and the island inshore banks. Virtually no cod are taken for market on the inshore mainland banks.

It was noticed that sick cod generally sought the shelter of the harbors. At Pirate Cove, in the Shumagins, and at Pavlof, on Sannak Island, I frequently noticed medium-sized cod in the harbors, and almost invariably these were found to be sick or diseased. A few yards outside the harbors only clean, healthy fish were found, showing that their condition caused the diseased fish to seek the shelter of the harbor.

There are a few small banks in southeast Alaska. These banks, which vary from 5 to 7 fathoms in depth, are mainly in Chatham Straits, Lynn Canal, and Icy Straits. The fish are found on the banks in the summer, disappearing into the deeper water in the fall. The fish caught are comparatively small, examples more than 24 inches in length being rare. It is probable that if a search were made numerous other banks would be found.

Although cod are found occasionally near Sitka, Yakutat, in Prince William Sound, and Port Graham, near the lower end of the Kenai Peninsula, but few are taken by fishermen. At one time many cod were taken by the natives living on Kodiak, Afognak, and adjacent islands, but of late years the natives have given most of

their time to the salmon fishery. The fact that the cod found on these banks are very small has militated heavily against their sale in a dry-salted condition, in which trade only large fish are of much value. In 1909 the Alaska Commercial Co., at its Kodiak station, purchased from the native fishermen and dry-salted a considerable quantity of cod, but they were so small that they could be marketed in San Francisco only at a loss, with the result that the fishery was abandoned for the time being. During the last eight years the fishery has been renewed and is now quite important, the fishermen now resorting to the deeper waters, where larger fish are to be found.

In Chignik Bay cod are found frequently. At Mitrofania the natives cure considerable quantities for their own use, while in 1912 some stockfish was prepared by a number of the natives. In 1912 I investigated the ground off Ivanof Bay. Good, large cod are to be found here, but the vessels have never found it necessary to resort to this ground, while a shore station could not operate, as, should the wind from the ocean suddenly shift to the land, a dory would be blown straight out to sea. A vessel would find Kupreanof Harbor a very safe and convenient refuge.

On Herendeen Island, on Northwest Harbor, a small island to the northward of Little Koniuji Island, are located two shore stations, which are operated during the winter and spring months. During the summer months the cod are mostly on the offshore banks, too far away for the dories to take them. Several vessels have operated with marked success on this offshore bank, which is really a prolongation of Shumagin Bank, but as the bottom is rocky, anchors frequently are lost.

In the Shumagin and Sannak groups, shore stations to operate on the inshore banks have reached their greatest development.

In the Shumagins these banks are very numerous, spots where cod can not be taken at some time during the year being exceedingly rare. The best known banks are in West Nagai Strait and Gorman Strait. The majority of the Shumagin Island stations are on the former sheet of water, it forming virtually one continuous bank. On the western side fishing is carried on throughout the year, while on the eastern side fishing generally is begun in May and ended in August, June and July being the best months. The stations on the western side find the cod most abundant from March to October, the former month being the best. It is probable that they are just as abundant during the rest of the year, but the weather generally prevents much fishing. A considerable part of this bank, lying in the middle of the strait, has been fished but little, as the dories can not work that far from shore. During the last few years, however, the number of power fishing boats has been increased considerably, and as these can go much farther from shore than the dories, which are propelled by oars or sails, the middle ground is being worked more thoroughly. Occasionally the smaller vessels, with headquarters at the stations, have frequented the outer banks in West Nagai Strait. Around the Haystacks is an especially good fishing ground for a power fishing vessel. This ground extends from the pinnacle off East Head and the eastern point of Porpoise Harbor north to the southeast end of Andronica Island, and is said to extend

toward Wedge Cape, also, at the upper end of Nagai Island. The bottom on this ground is smooth and is composed of fine, hard gravel; the depth of water is about 30 fathoms. The strong tide and the proximity of the numerous small islets that form part of the group make the use of a power vessel necessary.

Should the otter trawl ever be adopted for codfishing, West Nagai Strait would be one of the most favorable spots in all Alaska for its operation, as it has a comparatively smooth sandy bottom with depths throughout the greater portion from 25 to 40 fathoms.

Pirate Cove, the oldest shore-fishing station operated in Alaska, is located on the northeast point of Popof Island. The grounds frequented by the fishermen of this place lie in Gorman Strait, between Popof and Korovin Islands, and along the eastern side of the island as far south as Popof Head.

In Unga Strait, an inshore bank begins at Gull Island, in 40 fathoms, and runs westward to Bay Point (known locally as Niggerhead). The bank is about a mile offshore and is about a mile in width, with a depth of about 30 fathoms nearly everywhere. The bottom is of packed sand, with very little moss.

In Portage Bay (now known as Balboa Bay) is a small bank, upon which large fish may be taken during the summer months. The bank extends up the middle of the bay to the 5-fathom sounding. The soundings on the bank range from 25 to 35 fathoms. The bottom is of gravel and contains numerous holes.

In Beaver Bay, along the peninsula, good fishing may be had. Here the bottom is sandy and the average depth is about 25 fathoms.

On the northern, eastern, and western shores of the Sannak Islands are inshore banks, on which cod are to be found throughout the late fall and winter; but throughout the rest of the year the fish are in water too deep for the station fishermen to fish. On the northern side are four shore stations. Owing to the danger of the fishermen being blown to sea in the gales that spring up very suddenly in this region, no shore stations have been established on the south side.

Along the shore of Unimak Island, from Cape Pankof to Cape Lutke, codfish used to be numerous during the summer months. This ground is really the inshore portion of Davidson Bank. At Dora Harbor, on the south side of Ikatan Peninsula, Unimak Island, are located two shore stations, and the fishermen from these fish out around Bird Island. For a year or two after the stations were opened they made big catches, but after that they dwindled until about 50,000 fish now represent the combined catches. Several schooners usually fish on the main ground, a few miles offshore during the spring months, off Cape Pankof being a favorite spot.

Just off Akutan Harbor, on Akutan Bay, cod are said to be abundant. While the schooner *Vega*, of Seattle, was taking aboard water in the harbor late in June, 1911, her fishermen, hand-lining from dories around the mouth of the harbor, caught 1,500 cod on one day and 2,700 the day following. The *Albatross* investigations in the same year showed that cod were abundant and quite large close inshore off North Head, Akutan Island.

The *Albatross* investigations showed that cod were abundant directly off Chernoffsky Bay, on the Bering Sea side of Unalaska

Island, during the summer, and it is probable that investigation will some day disclose many other inshore banks at various places along the Aleutian Islands where cod can be caught at all or at some seasons of the year.

But little is known of the inshore banks on the north side of the Alaska Peninsula, mainly because, owing to the lack of safe and convenient harbors adjacent to the banks, shore stations can not be operated.

BANKS ON THE ASIATIC SHORE

But little is known of the extent of the cod banks along the Siberian coast, as no detailed or even sectional surveys of them have been made. Our own vessels have done more toward showing their extent and productiveness than those of any other nation, except possibly Japan. The principal banks lie in the Okhotsk Sea and the Asiatic side of Bering Sea. How far north the fish range is still undetermined, but it is probable that they will be found about as far north on the Asiatic shore of Bering Sea as they are on the American shore; that is, to St. Lawrence Island. They are said to be found as far south as Chosen (Korea) and northern Japan.

HISTORY OF THE PACIFIC COD FISHERY

The history of the Pacific cod fishery is a record of the strenuous struggle of a few individuals and companies against its giant brother on the Atlantic coast, which, backed by great wealth, the prestige and advantage gained by years of unopposed command of the American markets, an almost unlimited supply of raw product, and at times the ability to import from the eastern Provinces of Canada large supplies free of all duty, has had an immense advantage over its younger and weaker brother. On this coast it has not been a question of being able to secure cargoes, but has been one of finding a market for the catch; a vastly greater catch could be made were a market available for it.

The fact of the presence of cod in Alaskan waters has long been known. In the speech of Hon. Charles Sumner[11] on the cession of Russian America to the United States, and which had such a powerful effect in favor of the treaty of cession then pending, is an abstract of the references made by early navigators and visitors in Alaska to its fishes. The first mention was made by a Russian navigator in 1765, who reported "cod, perch, pilchards, smelts," as being found around the Fox Islands. Other navigators and explorers who reported the presence of cod were Cook (1786), Portlock (1787), Meares, Billings (1792), Langsdorf (1804), Sutke, and Sir George Simpson (1841), all of whom speak of it as being a very common fish. But little use was made of it, however, owing to the abundance of salmon.

It is reported that in 1866 two or three small schooners fitted out at Victoria, British Columbia, and fished with fair success on the grounds immediately north of the Nass River. It is a question whether this fish was the true cod or one of the several unrelated species which bear the common name of cod.

[11] Speech of Hon. Charles Sumner, of Massachusetts, on the cession of Russian America to the United States, 48 pp. Washington, 1867.

Capt. Matthew Turner seems to have been the pioneer in the discovery of the commercial possibilities of the great cod banks of the Pacific Ocean. W. A. Wilcox, late field agent of the now United States Bureau of Fisheries, received from the late Captain Turner the following facts in connection with his discovery of various banks and his exploitation of same:[12]

In 1857 Capt. Matthew Turner, master of the brig *Timandra*, 120 tons, sailed from San Francisco with an assorted cargo for Nicolaevsk on the Amur River. He was detained, however, for three weeks at Castor Bay, at the head of the Gulf of Tartary, because the Amur River was full of ice when he reached the Asiatic coast. While the vessel lay there waiting, anchored in 3 fathoms of water, the crew began fishing over the rail with hand lines simply as a pastime. They were surprised to find plenty of cod, averaging about 2 feet in length. Captain Turner had not previously seen codfish, but some of his crew were familiar with the species, and he, knowing their market value at San Francisco, appreciated the importance of the discovery and became interested in the fishing. Two years later Captain Turner made another trip to the Amur River. Reaching Sakhalin Island, off the Gulf of Tartary, he began fishing for cod and found them very abundant. Only enough were taken for ship's use, however, for he was not provided with the means to cure more.

In 1863 Captain Turner once more sailed in the *Timandra* to Amur River. But this time he went prepared to catch and cure some cod on his return voyage. Besides fishing gear he carried 25 tons of salt. Returning he stopped to fish at the Gulf of Tartary. Cod were plentiful at first, and 10 tons were taken in a few days and salted in kench. But suddenly the fish disappeared and none could be caught. Then the brig ran down the coast to southern Kamchatka, where fish were found in abundance, and excellent success was met with on the first day. The vessel lay near the rocky coast, and on the second day, during the prevalence of a dense fog, both anchors were lost. This mishap compelled Captain Turner to abandon fishing and to leave the coast; he reluctantly sailed for home. His fish sold at San Francisco for 15 cents per pound, and his voyage would have been notably profitable if the loss of anchors had not interefered with obtaining a full fare. This was the first occasion that salt cod were landed on the west coast from Pacific fishing grounds.

In 1864 Captain Turner sailed in his brig on a cod-fishing voyage. Thus the *Timandra* was the first vessel to engage in this industry from Pacific ports. On the same grounds visited the previous year a fare of 100 tons of codfish was obtained and the voyage was remunerative. The same year the schooner *Alert* made a trip to Bristol Bay, Alaska, in pursuit of cod. Her voyage proved a failure, for she took only 9 tons of fish.

Captain Turner states that since he made his voyages to the Gulf of Tartary, as related above, no American vessels have gone there to fish for cod. His success, however, had a very decided effect upon the cod-fishing business in the North Pacific, and in 1865 six vessels sailed from San Francisco to the Okhotsk Sea in pursuit of cod. These were the first American vessels to visit that region on cod-fishing trips, and their sailing evidenced a resolution to begin the business upon a broad commercial basis.

But Captain Turner, who seems to have possessed the spirit and enterprise of a pioneer or discoverer, determined to look for cod-fishing grounds nearer home. Not disheartened by the ill success of the *Alert* in 1863, he sailed for Alaska on the schooner *Porpoise*, of 45 tons, March 27, 1865, and arrived at the Shumagin Islands May 1. He began fishing the same day. Cod were abundant and close inshore. As a result, he returned to San Francisco on July 7 with a fare of 30 tons of fish—something less than a full cargo, which might easily have been secured, only for the desire to market the catch in advance of the arrival home of the vessels that had sailed to the fishing grounds on the Asiatic side of the Pacific. This was the first fare of cod from the Shumagin Islands, a locality since famous in the annals of the Pacific codfishery.

The cod-fishing fleet of 1864 was composed wholly of rather small-sized schooners, most of which were orginally built in New England for the Atlantic

[12] Report on the fisheries of the Pacific coast of the United States, by J. W. Collins. Report of United States Commissioner of Fish and Fisheries for 1888, pp. 92, 93. Washington, 1892.

fisheries, but had sailed around Cape Horn to find employment in the business of the Occident. It is remarkable that one of those that crossed the Pacific, sailing about 5,000 miles from home, was only 20 tons, a mere boat in which to make such a voyage, and to return loaded "nearly decks to the water." Following are the names and tonnage (in round numbers) of the fleet: *Equity*, 63 tons; *Flying Dart*, 84 tons; *H. L. Ruggles*, 75 tons; *J. D. Sanborn*, 71 tons; *Mary Cleveland*, 91 tons; *Porpoise*, 45 tons; and *Taccon*, 20 tons.

The Okhotsk Sea fleet all secured full fares and returned in safety. The fish were small, averaging only about 3 pounds each when dry. But in those early days they were in demand and sold for from 12½ to 15 cents per pound, a price that gave remunerative returns and the promise of future success for the fishery. There was no lack of cod, and even with the method of fishing with hand lines over the vessel's side then in vogue, no difficulty was experienced in filling moderate-sized schooners in a reasonable time.

The first vessel to visit Bering Sea for cod was the schooner *Alert*, from San Francisco, in 1864. But little is known of this vessel and her owner or owners, but it is recorded that the venture was a failure, as only 9 tons of cod were secured.

The regular Bering Sea fishery was inaugurated by the schooner *Tropic Bird*, owned by the McCollam Fishing & Trading Co., of San Francisco, in 1882. The schooner *Isabel* also visited the Bering Sea banks a few weeks later than the *Tropic Bird*. Both made good catches, and as a result the next year five vessels visited these banks.

The schooner *Minnie G. Atkins* in 1867 discovered the Simeonofsky Bank, or what is now known as the Shumagin Bank. It was next visited by the schooner *Shooting Star*, formerly of Vinal Haven, Fox Island, Me., in 1870, and next by the *Scotland* and *Amanda Ager*.[13]

The first fleet of any size to fish around the Shumagin Islands was in 1867 and consisted of three schooners, the *Sanborn*, Captain Morse; the *Porpoise*, Captain Turner; and the *Sarah Louise*, Captain Holcomb. Most of the fish were caught off the western side of Nagai Island, on banks discovered the same season by these vessels.

J. L. McDonald [14] has the following to say as to the influence of the discoveries of these prolific banks in the Gulf of Alaska upon the negotiations for the cession of Russian America to the United States:

In January, 1866, the author, while attending the session of the legislature at Olympia, the capital of Washington Territory, determined to make another bold push for Alaska by soliciting the good offices of our Government for the purpose of obtaining a permanent foothold and to open the prolific fishing grounds in those regions to our ambitious fishermen. To this end we penned the following memorial:

"To His Excellency Andrew Johnson,
"*President of the United States:*

"Your memorialists, the legislative assembly of Washington Territory, beg leave to show that vast quantities of cod, halibut, and salmon of excellent quality are found along the shores of Russian America. Your memorialists respectfully request your Excellency to obtain such rights and privileges of the Government of Russia as will enable our fishing vessels to visit the harbors and its possessions, to the end that fuel, water, and provisions may be obtained; that our sick and disabled fishermen may obtain sanitary assistance, together with the privilege of taking and curing fish and repairing vessels in need of repairs. Your memorialists further request that the Secretary of the Treasury be instructed to forward to the collector of customs of this (Puget Sound) district, such fishing license, abstract journals, and log books as will enable our hardy fishermen to obtain the bounties now paid to the fishermen in the Atlantic

[13] The Cod Fishery of Alaska, by Tarleton H. Bean. The Fisheries and Fishery Industries of the United States, Pt. II, sec. 5, Vol. I, p. 213. Washington, 1887.
[14] Hidden Treasures, or Fisheries Around the Northwest Coast, by J. L. McDonald, p. 11.

States. Your memorialists finally pray your Excellency to employ such ships as may be spared from the Pacific naval fleet in surveying the fishing banks known to navigators to exist from the Cortez Bank to Bering Strait."

This memorial, written by a fisherman in behalf of the fishing industry on the northeast [west] coast, passed both branches of our Territorial legislature with commendable unanimity and dispatch. In forwarding a copy of the above-named memorial to the Secretary of State we imparted such information touching the fisheries around the Russian possessions, and the impulse which the opening of those resources to our fishermen would impart to the commercial development on the northwest coast. In acknowledging our humble services the illustrious Secretary assured us that "in consummating the recent purchase, I was strongly fortified by the letters which you wrote to me touching the valuable fisheries in those waters." The New York Times of April 1, 1867 (the acknowledged organ of Secretary Seward), said "that a memorial from the Territorial legislature of Washington Territory, dated January, 1866, asking the President to obtain certain rights for the fishermen, was the foundation of the present treaty."

On the 18th of October, 1867, the transfer of this vast territory from Russia to the United States was officially consummated by the respective commissioners of the two Governments at Sitka, in the presence of the Russians population, who cheerfully welcomed the few Americans there also present. The union has been very cheerfully accepted by the people of the Territory. Our Government, on assuming possession, found numerous adventurers from the Pacific States domiciled in various parts of the Territory engaged in trade and in developing the resources in those regions; vessels laden with ware entered every harbor; stores were opened as by magic in every acceptable roadstead along the southern and western coasts; an active competition for furs, oil, ivory, old copper, iron, and junk was earnestly inaugurated; commerce revived, the sails of our vessels whitened every creek, bay, and sound, and the staid Russians very soon obtained an insight into Yankee progress on the go-ahead principle.

The acquisition of Alaska by the United States in 1867 proved an especial boon to our cod fishermen, as it secured them from any interference on the part of the Russians, who had not welcomed them very heartily in previous years. This is well shown by the fact that while the fleet in 1867 numbered 3 vessels, the fleet of 1868 comprised 14 vessels.

The first vessel to attempt to make two trips in one season was the schooner *Porpoise*, Captain Caton, in 1868, but she got only half a fare on the second.

The first Alaska vessel in the fishery was one owned by Captain Haley, of Wrangell, who in 1879 visited the Hoocheno Bank, in Chatham Strait, southeast Alaska, and purchased his fare from natives who claimed the exclusive right to engage in the fishery. These fishermen used bark lines, with wooden iron-pointed hooks, and, as they considered a catch of 30 or 40 fish a good day's work, Captain Haley had to wait quite a while before he could accumulate a cargo. In later years several vessels engaged in the business along the same lines as Captain Haley.

An odd feature of the Pacific cod fisheries is that neither Portland nor Astoria have ever had vessels engaged in it. In 1877 Capt. Joshua Slocum, with the schooner *Pato* (about 45 tons register), was at the Philippine Islands, when he conceived the idea of making a cod-fishing voyage to the Okhotsk Sea and marketing his catch at the islands. Leaving the islands in March, he proceeded to the Okhotsk via Yokohama. Salt and fishing gear were obtained from vessels met at sea, and a cargo of 23,000 fish was soon taken. When the time for sailing arrived the captain decided not to return to the islands, but took his fare to Portland instead, where he sold it at a

profitable price. This was the only fare of cod to be landed at Portland.

For the first few years of the fishery no suitable facilities were in existence at San Francisco or elsewhere on the coast for curing the fish. In certain cases the fishermen received their share of the voyage in fish, which, after being cured in a good, bad, or indifferent manner by themselves, were hawked around the city.

The late Thomas W. McCollam, of San Francisco, enjoyed the distinction of having been the first man on the Pacific coast to establish the industry on a permanent basis. In 1867 he bought his first cargo of cod, and the next year he bought and cured several cargoes at Old Sausalito, but as this locality was not satisfactory he soon after established a new station at the mouth of Redwood City Creek, about 30 miles south of San Francisco.

Having decided to engage directly in fishing himself, Mr. McCollam went east in 1868, and in New England purchased the fishing schooners *Rippling Wave*, *Wild Gazelle*, and *Flying Mist*. The first was lost on the passage in Magellan Strait; the others arrived safely and were outfitted immediately and sent north to the Shumagin Islands for cod. In addition to handling his own fish, he also continued to buy the cargoes from other vessels.

In 1873 a partner was taken into the business and the firm was then known as Thomas W. McCollam & Co. In 1874 the schooner *Alfred Adams* was added to his little fleet, while the *Flying Mist* went sea-otter hunting on the Asiatic shore.

In 1876 the firm again changed the location of its home curing station, removing to Pescada Landing, opposite Sausalito, on Richardsons Bay, where its successor, the Union Fish Co., still carries on the business. In 1883 several new members were admitted into the firm and its name changed to the McCollam Fishing & Trading Co.

The first shore fishing station for cod in Alaska was established by this firm at Pirate Cove, Popof Island, in the Shumagin Group, in 1876, a more detailed description of which will be found in the chapter devoted to the history of the shore fishing stations in Alaska.

In 1893 the Pacific Marine Supply Co. was organized in San Francisco for the purpose of engaging in cod fishing and the carrying on of other business. The first published record we have of the company engaging in cod fishing was in 1896, when the former whaling schooner *La Ninfa* (also given as *LaNympha*) was outfitted and sent to Bering Sea. In 1904 the name was changed to the Alaska Codfish Co., and the business has been operated under this name since. In addition to a fleet of vessels the company also owns and operates a number of shore stations in Alaska.

In 1898 a combination of several San Francisco firms operating in the cod fishery, notably the McCollam Fishing & Trading Co. and Lynde & Hough, was formed and the name Union Fish Co. was selected for the new company.

From the very beginning San Francisco has occupied the premier position in the fishery; in fact for many years it was the only place on the coast where cod vessels were outfitted. The industry fluctuated much and the changes in the personnel were frequent. The late Charles P. Overton, for many years before his death connected

with the Union Fish Co., and one of the brightest men engaged in the industry, has written considerable upon the early history of the San Francisco fleet, and the author quotes from his writings as follows:

While making a review of the past years in the codfish business, probably the most interest would lie in recalling the names of those who have been prominently identified with the industry. Considering the few years that the business has been carried on and the restricted nature of it, the list is a surprisingly long one, and is one that should be published as a record to be preserved among the archives of the industry.

First, there was Captain Turner himself. Like most pioneers he did not make much of a financial success of it and soon abandoned it to others.

Sometime previous to 1870 Miller & Hall, the hay merchants, sent the brig *I. B. Lunt* two or three times. The fish were sold by Lynde & Hough, but the returns did not pay cost and interest and they dropped out.

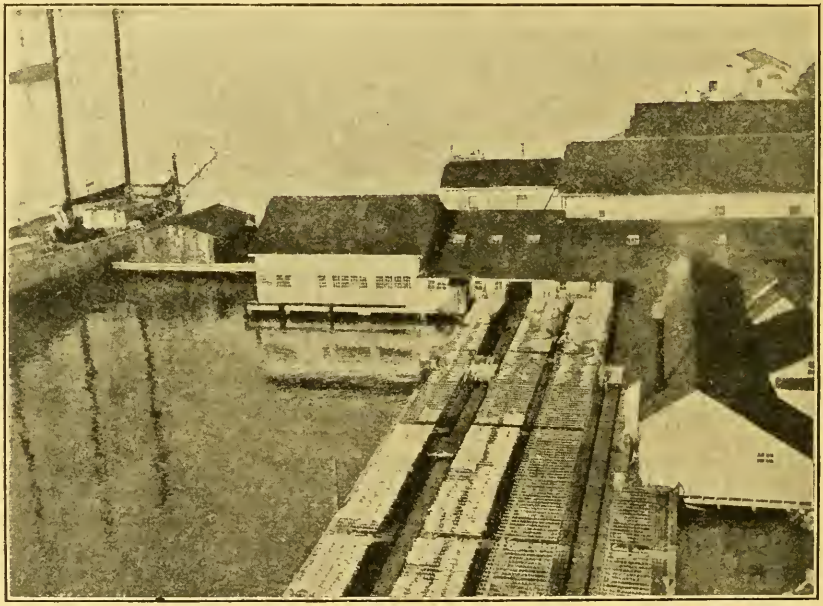

FIG. 4.—Union Fish Co.'s home station at Union City, San Francisco Bay, Calif.

Andrew Crawford, the ship chandler and Tahiti trader, had a schooner in the codfisheries previous to 1870. From 1870 to 1873 he operated the bark *Legal Tender*, Captain Wentworth. At first there was a profit, but the last two years were so unfavorable that Crawford withdrew from codfishing and turned his entire attention to the South Sea trade.

Donald Beadle was one of the prominent figures "on the front" in the early days having interests in the commission and shipping business, and in the old firm of Goodall & Perkins, and with Moss in some of the southern coast landings. Like everybody else on the front he had his turn at the codfish fever and was interested in the voyages of the *Bernice*, *Kinau*, and bark *Union*. At that time the fish were all cured direct ex-vessel and so many spoiled before they were sold that the losses were considerable.

Captain Wing, backed by the funds of his son-in-law, Bailey Sargent, of the American Exchange, bought the little bark *Domingo*, and the captain became a codfisher. With an occasional diversion to South Sea trading, he fished with more or less regularity for five or six years, Sargent backing the ventures until the captain died, practically of old age.

Col. C. L. Taylor dipped in as a venture about 33 years ago, and he still refers sadly to what it cost him for his experience.

In 1874 and again in 1876 a Captain Jacobsen sent the little schooner *San Diego* to the Choumagin Island grounds under Captain Wentworth. Two voyages were enough; then he sent her sealing. Explaining the change, he said: "Well, Captain Wentworth is a goot mon, but he is too expensible."

James J. Laflin, or, as everybody "on the front" knew him, Jimmy Laflin, a sailor boarding-house keeper, who would furnish a crew for any vessel "and no question asked," operated the schooner *Alaska* in the codfisheries during the seasons of 1876–1879. The first two years the cargoes arrived on a bare market and the profits were good—good enough to induce such an increased catch by him and others as swamped the market, and after the two years of good business and then two years of correspondingly bad business, Jimmy diverted his vessel into other trade, and she was finally lost in the Bering Sea bringing down a company of Alameda mining men from Golovin Bay.

Johnston & Veasey (1877–1879) were among the old-timers at it. They held on for three years. Veasey, later, drifted into a small produce business and died poor many years ago. Captain Johnston got down to going to sea again on monthly wages and then drifted around the water front looking for a berth of some kind and finally disappeared.

Another of the old-timers (1879–1884) was John Molloy, the junk and second-hand man of Clay Street, with the old brig *Glencoe* in the codfish business as a side issue. Like everything else that old John had, the vessel was poor, the salt was poor, and the fish were, of course, yellow or sour, dried up or slimy, but they went onto the market and helped damn Pacific codfish. Old John had a brother-in-law, a wealthy wholesale grocer, who furnished checks to keep him going. When the brother-in-law withdrew his support, old John went around town, bought everything he thought his credit would stand, and quietly went into bankruptcy—paying nothing on the dollar. He is dead and doubtless gone to his just reward. Any unkindness I may feel toward old John may possibly be because we were on the list of creditors when the end came.

From 1882 to 1888 Ed. H. Hansen, of Wright & Bowne, and Capt. A. Anderson, now of the Lewis, Anderson, Foard Co., with some others, operated the schooner *Isabel*, Captain Nickerson, in this business. For the first two or three years they caught the market short and did so well that they added the brig *W. H. Meyer*. But about this time the production began to exceed the demand, and they soon had to drop out the brig. Business became so poor they did not keep the old *Isabel* in good repair, and in the spring of 1888, while on her way to the fishing banks, she opened up somewhere out at sea. As many of the crew as could do so got into the dories, and after suffering many privations about half of them were rescued more nearly dead than alive. This ended the venture, and the partners paid up their losses and quit.

In 1883 Higgins & Collins, the wood and lumber men, with Wheeler Bros., small tugboat men, fitted out the schooner *Bonanza* on an eastern basis, importing eastern fishermen and eastern gear. They cured their fish on the deck of the vessel in Oakland Creek, and when they closed up their accounts each of the partners was an even $2,500 to the bad. That schooner *Bonanza* had an eventful and varied career. Built in 1875 as a yacht for William C. Ralston, the brilliant but unfortunate manager of the Bank of California, she has been freighter, trader, codfisherman, and finally as a whaler was crushed in the ice last year in the Arctic near Herschel Island. The story of her voyages to the remote and unfrequented waters of the North and South Pacific, the Behring Sea, and the Arctic Ocean would be worthy the pen of Robert Louis Stevenson.

In 1886 James Madison and some of his associates fitted out the schooner *Francis Alice*, and also started a little station at Ikatok in Alaska. The fish were offered on the street by Frank Bates, a broker, but the trade was filled up by the old companies, and the fish found such slow sale that the whole cargo was bought in by this company at a very low price. We later took over the station, and the schooner and the business was entirely closed out. Like a butterfly, it lived but one summer.

In 1894 a Captain Jorgenson bought the condemned steamer *Salinas*, converted her into a three-masted schooner, rechristening her the *Uranus*, and sent her codfishing. He did fairly well for two years then, with the backing of the firms outfitting him, he added the *W. F. Harriman*, also a condemned hull refitted. At the end of the third year his whole outfit passed into the hands of those who had been backing him, and he was known in the codfish business no more.

Young Duggan (1902) had a short and inglorious career as a codfish man, and some of the money that his father made in the shirt business went to pay what it cost the young man to listen to the siren song of the wily promoter. The schooner *J. G. Wall* went to the Bering Sea under the joint command of Captain Dollard (the promoter) and Henderson (an experienced codfisher). We bought their season's catch, and it lasted us just three days. One season was enough for Mr. Duggan.

Undoubtedly the most picturesque figure in the whole line was Nick Bichard. A native of the Isle of Jersey, a pioneer shipowner and merchant of San Francisco, he accumulated a fortune during the days of the Civil War and was early in the codfish business with quite a fleet of old vessels, both large and small, and for many years he was a prominent factor in the business. A large, swarthy man, erratic in speech and action, mixing codfish, coal, lumber, and junk, keeping most of his books in his head, he never knew what his cargoes cost him nor what they sold for. The codfish business absorbed more and more of his capital; then his real estate, two fine water lots on Stuart Street, the gore lot at California and Market Streets, and other property went the same way; the old vessels wore out and were lost and he finally died peacefully in the night of heart failure, leaving barely enough to bury him.

Chief among the old-timers and of those most largely interested and longest in the business was the firm of Lynde & Hough, two enterprising Yankees of the old school who started in Sacramento in pioneer days, came down to San Francisco, were in the commission business and, from selling codfish on commission, drifted into the codfishing business [in 1865] itself. There were for many years among the heaviest operators in codfish and, in addition, they dealt in all other kinds of salt fish, cornered the honey market, dipped into sealing in the Straits of Magellan, South Sea Island trading, fishing and trading stations in Alaska, salmon fishing, freighting, running a coasting passenger steamer, and anything else that promised a dollar, including "Okhotsk Sea Cod liver Oil" and "Dr. Fisherman's Lotion for Man and Beast." They and their surviving partner, L. E. Noonan, were well and favorably known from Alaska to South America and from Hawaii to Australia and the Orient. Their last venture was codfish mixed with mining, and finally both of the senior partners died, leaving no money but various debts behind them. Their location at California City was sold to the United States Navy Department for a coaling station, and their vessels and codfishing business were merged in the Union Fish Co.

L. E. Noonan was connected with the Lynde & Hough company for nearly 40 years, at first as general factotum and handy-man-ready-for-anything. He ran the fish yard, outfitted the vessels, hired captains and crews, packed and repacked salmon and mackerel, bought and sold on the street. Later he acquired an interest in the firm and, being of a more thrifty disposition and not interested in the mining, he was enabled to retire with enough to permit him to take a well-earned rest.

These epitaphs of those who have dropped into the business and then dropped out run in schools. Their course is something like this: The bright sun of prosperity shines for a season or two upon the regular stand-bys in the business and it looks very attractive and inviting to some chaps with an old vessel or a little spare money. So they jump in and for a time cut a brilliant dash in the business. So bright are they that the sun of prosperity is all in eclipse and everyone in the trade walks in a shadow. When they get tired of this or broke they drop out, and those who are left pick up the scattered ends of the trade, struggle out into the light again, and by and by there is some more prosperity and then a new crop of hopeful investors appears, and so on and on.[15]

One of the most picturesque figures in the industry, and one who cut a wide swath while in it, was Edward Pond. Beginning in 1902, with apparently no end of money, he sent two vessels to Bering Sea. In 1905 his fleet had increased to three vessels, two of which fished in the Okhotsk and one in the Bering Sea. Prices for fish were low in 1906 and 1907, and when the two vessels he had sent to the Okhotsk Sea in the latter year returned virtually empty, having been driven

[15] Pioneers in the Pacific Coast Codfish Industry, by C. P. Overton. Pacific Fisherman Annual, 1906, pp. 70, 71, and 75.

from the sea by the Russian authorities, he was forced to the wall, and his stock of fish on hand and to arrive was taken over by the Union Fish Co.

In 1905 the Pacific States Trading Co. was organized at San Francisco. A home-curing station was built on Carquinez Strait, about 30 miles from San Francisco, and named Woodside Glen. The schooners *Glen* (121 tons) and *John F. Miller* (170 tons) were sent to Bering Sea. The company also built several shore stations in Alaska, as noted elsewhere. Later the company added the schooners *Ottillie Fjord* (247 tons) and the *Dora Bluhm* (315 tons) to its fishing fleet. On September 30, 1907, the schooner *Glen* was lost on Unimak Island, with the loss of one life. While the schooner *John F. Miller* was engaged in an attempt to save the wrecked schooner a gale suddenly sprang up on January 8, 1908, and she was also driven ashore, 10 of her crew losing their lives. This disaster to two of its fleet, together with a heavy overproduction in 1908 causing a slump in the market, compelled the company to cease operations for a season or two. In 1909 the company's schooner *Ottillie Fjord* was outfitted and sent north by the Union Fish Co. In 1910 all operations were suspended, but in 1911 the company resumed operations at its shore station in Northwest Harbor, and also outfitted and sent north the schooner *Otillie Fjord*, and operated continuously until early in 1916, when the company finally abandoned the business.

For a number of years the majority of the San Francisco vessels resorted to the Okhotsk Sea for their cargoes of cod, and in some seasons nearly all of the vessel fishing was prosecuted there. In 1892 the Russian Government began to enforce a regulation imposing a license on all vessels fishing within 30 miles of shore, and from this time on the American vessels experienced alternate periods of harassment and quiet, according as the disposition of the Russian governor was toward lax or rigorous enforcement of the regulation. A typical instance of such harassment is cited by Wilcox.[16]

> The three-mast schooner *Hera*, 369 net tonnage, of the San Francisco codfish fleet, was the only American vessel that fished in the Okhotsk Sea. Her catch was all made from 10 to 30 miles from the shore. While fishing, the vessel was boarded by a Russian officer, who ordered that fishing cease and that the vessel report at once to the governor of the district and there procure a license. The master of the *Hera* denied that he was fishing in waters of Russia, as he was fully 10 miles from shore. The officer threatened to seize the vessel if his order was not obeyed. The master complied, and on reporting to the governor again protested as to his having any legal right or authority to interfere with him when fishing so far from land, no fishing having been attempted under 10 miles from shore. As before, a protest was not recognized, and $1,000 in gold was demanded for a license that must be procured before the vessel would be permitted to leave the port. A compromise was made by the master giving, under protest, his personal order for $1,000 on the owners of the vessel at San Francisco. The vessel then returned to the fishing grounds, completed her cargo, and returned to San Francisco with a catch of 159,000 codfish, of a net weight of 685,140 pounds. The order given by the master was forwarded to the Russian consul at San Francisco for collection; but the draft having been given under compulsion its payment was refused.

In 1907 matters began to assume a serious aspect. That year the following vessels had visited the Okhotsk Sea: The schooner *John*

[16] Notes on the Fisheries of the Pacific Coast in 1895, by W. A. Wilcox. Report of United States Commissioner of Fish and Fisheries for 1896, pp. 634, 635. (1898.)

D. Spreckles, the barkentines *Fremont*, *City of Papeete*, and *S. N. Castle*. Shortly after the vessels arrived and began fishing the Russian gunboat *Mandjur* appeared, and an officer boarded the *John D. Spreckles* and *S. N. Castle*. Taking their papers, the commander ordered the vessels to quit fishing, claiming they were within the 30-mile limit, and threatening to seize the vessels if they did not. As a result the vessels left the sea and returned to San Francisco almost empty.

A few days later, on June 12, the gunboat met and boarded the *Fremont* and seized her papers, also.

On June 19 the gunboat came alongside the *City of Papeete*, and the Russian commander seized her papers and ordered her to quit fishing. Captain Stensland, the master of the *City of Papeete*, went aboard the Russian patrol boat and showed her commander a copy of an opinion written several years before by John Hay, while Secretary of State, to the effect that under international law the vessels of any nation had a right to fish at any point 3 miles or more offshore. In anticipation of just such a happening this copy had been furnished to the master by A. Greenebaum, president of the Alaska Codfish Co., owners of the vessel. Secretary Hay's opinion seemed to have considerable influence with the officer, who at once steamed to the mainland to seek advice from his superior officers. On July 10 he returned and restored the ship's papers to the master, admitting that the 30-mile limit for fishing was not to be enforced.

On July 12 the Russian gunboat steamed alongside the *Fremont* and restored not only her own papers but also those of the *John D. Spreckles* and *S. N. Castle*.

In 1908 a fleet of three vessels fished in the Okhotsk Sea, while in 1909 only the barkentine *Fremont* fished on these banks. The latter vessel's master reported a considerable fleet of Japanese vessels fishing there for cod. This was the last season in which American vessels visited the Okhotsk Sea for cod.

In 1891 Capt. J. A. Matheson, of Provincetown, Mass., who had been engaged in the Atlantic codfishery for a number of years, sent his schooner *Lizzie Colby* around the Horn, coming himself by rail and establishing himself at Anacortes, Wash., and sent his vessel to the Alaska banks, this being the first venture on the coast other than from San Francisco. In 1905 the schooner *Fanny Dutard* was added to his fleet. In 1906 the schooner *Lizzie Colby* dropped out. In 1908 the schooner *Harriet G.* was purchased, and it and the *Fanny Dutard* sent north. In 1909 the same fleet was sent north, but in 1910 only the *Fanny Dutard* was outfitted. San Francisco parties, as noted elsewhere, purchased the plant and fleet in 1910, incorporated it as the Matheson Fisheries Co., and installed Captain Matheson as manager. In 1912 he dropped out altogether, but late in 1914 purchased the fleet of the Matheson Fisheries Co.—the schooners *Azalea* and *Fanny Dutard*—and sent it north under his own name in 1915.

The Puget Sound & Alaska Commercial Co. was the pioneer in the cod-fishing industry from Seattle, Wash. It began operations in February, 1892, and on March 5 dispatched the schooner *Moonlight*, of 68 tons, to the Bering Sea banks. The vessel returned on August 20 with 175,000 pounds of salt cod. No more is heard of the company after this first venture.

In 1896 Tracy H. Robertson organized the Oceanic Packing Co., with headquarters in Seattle, and outfitted and sent to Bering Sea the schooner *Emma F. Harriman*. She returned with a full cargo, but as the demand in the Northwest for cod was quite slack, the vessel was sent direct to San Francisco and the cargo sold there.

In 1897 the company sent to Bering Sea the brigantine *Blakeley* and the schooner *Swan*. The vessels returned with full cargoes, and these were prepared for market at a plant the company had built in West Seattle.

The Klondike rush had begun in 1897, and in 1898 the company became interested in the transportation business and diverted its vessels into this industry, in the course of which the schooner *Swan* was wrecked. In 1899 and 1900 the brigantine *Blakeley* was sent to the Bering Sea banks by the company, and returned each season with full cargoes. The business had not proved very profitable, however, and the company ceased operations in the latter year.

In 1898 Mr. Fay, a Seattle lawyer, sent the schooner *Lizzie S. Sorrenson* (89 tons) to Bering Sea. She returned with a full cargo and the fish were worked up at a plant built at Richmond Beach. The venture could not have been very profitable, as only the one trip was made. The *Lizzie S. Sorrenson* was a comparatively small schooner and her chief title to fame rests upon the unusual fate she eventually met. In 1909 the Tyee Co., which then operated a shore whaling station at Tyee, southeast Alaska, purchased the schooner, which was thereupon fitted with a gasoline engine and turned into a whaler. On May 10, 1910, a whale was sighted in the ocean about 8 miles southwest of Cape Addington. The vessel was cautiously worked to within gunshot and a harpoon driven into the animal. The weapon failed to reach a vital spot, and after an effort to escape the gigantic mammal turned suddenly and, charging the vessel, struck her full in the stern. The impact knocked out a portion of the vessel's bottom and she sank in a few minutes.

The Seattle-Alaska Fish Co. began business in Seattle in 1902, using for its home station the old West Seattle plant of the Oceanic Packing Co. The first year the schooner *Carrier Dove* was the only vessel outfitted, but in 1903 the schooner *Nellie Colman* was added. In 1906 the latter vessel was sold, her place being taken by the schooner *Maid of Orleans*. Only the *Carrier Dove* was outfitted in 1907, but in 1908 she was sold and the *Maid of Orleans* outfitted. In 1910 the company was absorbed by the King & Winge Codfish Co., of Seattle.

In 1904 the late W. F. Robinson, who had been connected with the New England fisheries for a number of years, and others bought the schooner *Alice* and, under the name of the Schooner Alice Co. (Inc.), sent her north. In 1905 the corporate name was changed to the Robinson Codfish Co., the schooner *Joseph Russ* purchased, and a large plant constructed at Anacortes, Wash. In 1911 the original plant was sold and another erected at once on the company's property in connection with a by-products plant that they owned. In 1912 the name of the company was changed to the Robinson Fisheries Co. On April 20, 1912, the schooner *Joseph Russ* was lost on Chirikoff Island, Alaska. In 1914 the schooner *Wawona* was purchased. and the same year she brought home the largest trip of cod—240,000 fish weighing about 1,100,000 pounds—ever caught and landed from

an American vessel up to that time. In 1915 she broke her 1914 record with a catch of 258,323 fish, weighing approximately 1,150,000 pounds.

In 1904 the late Andrew Webber, of Seattle, made a venture in the industry by sending to Bering Sea the little schooner *Ida May*, and repeated it the next season, after which he withdrew.

In 1905 the King & Winge Codfish Co., composed principally of King & Winge, the well-known shipbuilders of Seattle, sent the schooner *Harold Blekum* (185 tons) to the Bering Sea banks and continued doing so, adding the schooner *Vega* later, until 1910, when the company joined the consolidation known as the Western Codfish Co. The company had its home-curing station located in West Seattle.

The Blom Codfish Co. was organized in Tacoma in 1905 and sent the schooner *Falcon* (195 tons) north, in the meantime building its home-curing station at Quartermaster Harbor. The company had a very checkered career, finally ceasing business in 1914, when its assets, including the schooner *Fortuna*, passed into the hands of Seattle parties, who organized the Northern Codfish Co. for the purpose of carrying on the business. The latter company sent the vessel north in 1915, but dropped out of the business early in 1916, the schooner being chartered to the Pacific Coast Codfish Co.

The Pacific Coast Codfish Co. was formed in 1911 by former stockholders of the Seattle-Alaska Fish Co., which had been sold to the King & Winge Codfish Co. The company constructed a home-curing station at Poulsbo the same year and sent north the schooner *John A.* In 1913 the schooner *Chas. R. Wilson* was added, and in 1914 the schooner *Maid of Orleans*, while in 1915 the schooner *Fortuna* was chartered and added to the fleet.

In 1910 T. Tilmann, jr., of the firm of Tilmann & Bendel, and other San Francisco parties, none of whom had been engaged in the business heretofore, attempted to form a consolidation of the Puget Sound companies. A controlling interest was secured in the King & Winge Codfish Co., and this company then purchased the Seattle-Alaska Fish Co. The two properties were then merged under the name of the Western Codfish Co. The property of Capt. J. A. Matheson was purchased, and it was incorporated under the name of the Matheson Fisheries Co., with Captain Matheson in charge of operations. In the meantime the Union Fish Co., of San Francisco, purchased the cargoes of the schooners *Joseph Russ*, *Alice*, and *Fortuna*, the two former belonging to the Robinson Fisheries Co. and the latter to the Blom Codfish Co. The Western Codfish Co. had but a brief existence, dropping out of active fishing operations early in 1912, while in December, 1914, Captain Matheson bought from the Matheson Fisheries Co. the schooners *Fanny Dutard* and *Azalea* and sent them north in 1915 under his own name. After disposing of its 1914 catch the Matheson Fisheries Co. wound up its active career in the summer of 1915.

Early in 1917 the Northern Fisheries Co., a new company with headquarters at Anacortes, Wash., was organized, and in January sent out the old codfish schooner *Harold Blekum*, with material for a shore station to be erected on Kodiak Island. On the night of

March 3 the vessel went on the reef at Eagle Harbor, Kodiak Island, and was a total loss.

The same company also sent north the former halibut power schooner *Progress* (115 tons), schooner *Chas. Brown* (64 tons), power schooner *Valdez* (10 tons), and the power schooner *Hunter* (60 tons) to engage in fishing operations. The latter vessel, however, was wrecked on Sutwick Island on August 30, and, together with its cargo of codfish, was lost.

In 1918 this company purchased the controlling interest in the Union Fish Co. of San Francisco. In 1919 the Anacortes plant was closed, and after this operations were carried on at the San Francisco plant of the Union Fish Co.

In 1918 Lars Mikkelson organized the Bering Sea Fisheries Co. and built a station on Unalaska Island. The former mail steamer *Dora* (217 tons) was purchased and sent north to engage in fishing operations and to bring down to the home station (that was later established at Dockton on Puget Sound) its own catch and that of the fishermen at the station. On December 20, 1920, the steamer *Dora* struck on Noble Island and was beached on Vancouver Island, British Columbia, only a short distance away. She was salvaged subsequently and sold elsewhere.

The first Canadian company to engage in cod fishing on the Pacific banks was the Western Canadian Fish Co. This company built a home station at Barnet, British Columbia, in 1903, and sent the brigantine *Blakely* to Bering Sea. The company struggled along until the latter part of 1905, when it went out of the business.

In 1913 the Canadian Fish & Cold Storage Co., of Pince Rupert, British Columbia, outfitted the schooner *Albert Meyer* and sent her to the Bering Sea banks. She arrived there at almost the end of the fishing season, and as a result brought back but a few hundred fish. The vessel made another trip in 1914, when it met with fair success. As the market was very poor when she returned the company gave up this branch of its business.

HISTORY OF ALASKA SHORE-FISHING STATIONS

The natives living in the vicinty of the great cod banks of Alaska have depended upon them for a considerable part of their food supply, although not to such an important extent as they have upon the salmon. When the Russians came more and more home use was made of cod, and the same is true of their creole descendents to-day. With the exception of a few small shipments made from Kodiak in the early years of the industry, the catch of the natives and few whites living at other than the regular cod stations has all been consumed locally.

The late Thomas W. McCollam, of the McCollam Fishing & Trading Co., of San Francisco, was the first to perceive the advantages to be obtained from establishing stations close to the cod banks where the fishermen could go out daily in dories to the adjacent banks and the catch be stored ashore until a cargo accumulated, when a vessel could be sent north to bring them to San Francisco.

Early in the seventies a party of hunters had established a station at Pirate Cove, a very pretty and well-sheltered cove, with ample

depth of water, at the north end of Popof Island, one of the Shumagin Group. A wharf and several buildings had been constructed by the party. Mr. McCollam purchased this station and established here the first regular shore fishing station for cod in Alaska.

An agent and about eight fishermen were stationed here during the early years of its existence. At first the fish were all kenched, but later on tanks were sent up and the fish held in pickle until shipped. The station gradually increased in size and importance, and to-day, as well as in the past, is the largest and most important one in Alaska.

In 1886 a branch fishing station was established on Pavlof Harbor, Sannak Island. In 1890 a station was opened at Kasatska, on

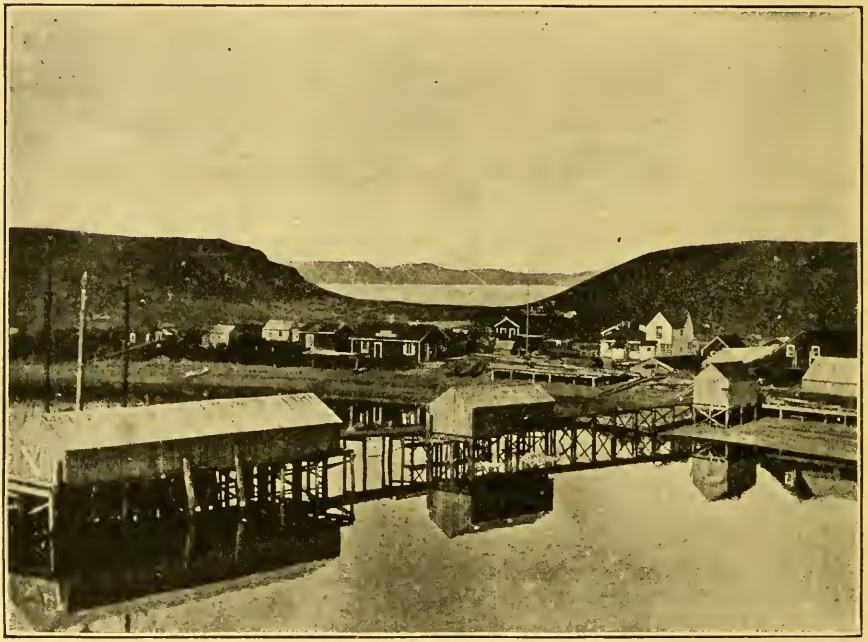

FIG. 5.—Pirate Cove, the pioneer codfish station of Alaska

the south side of Sannak Island, and was operated for several years, finally being abandoned because of the dangerous navigation for sailing vessels on that shore. The Port Stanley (Sannak Island) station was established in 1891 but was abandoned a few years later. All of these were what are known as " winter stations "—that is, stations operated in what are known as the winter months in Alaska; during the rest of the year the fish are too far out in the deep water for fishing with dories with the shore as the base.

In 1892 a station was established on Sanborn Harbor, Nagai Island, Shumagin Group, and this has been operated almost continuously ever since. Fishing is carried on here from the middle of spring to late summer.

In 1883 Ivan Petroff built a fishing station on Sitkalidak Island, close to the Indian village at Old Harbor, on the channel separating

Sitkalidak from Kadiak Island, where for a time considerable quantities of cod were cured and shipped to San Francisco.

In 1886 James Madison and associates, of San Francisco, fitted out the schooner *Francis Alice*, and also started a small station at Ikatak, on Unimak Island. The venture lived but one season, the station then being taken over by the McCollam Fishing & Trading Co.

Lynde & Hough, a well-known San Francisco firm, early entered the codfish industry and for a number of years were important factors in it. Besides a fleet of vessels the firm established a number of shore stations in Alaska. The earliest of their stations was at Sand Point, on Humboldt Harbor, Popof Island, in the Shumagin Group. This was in 1887. It was established principally as a trading and salmon-fishing station, its relation to the codfish industry being mainly as a supply station where the firm's vessels could land their cargoes and refit for another trip without having to return to the home port for this purpose.

The firm built a number of shore stations shortly after this—Unga Harbor (1888 or 1889) and Squaw Harbor (1889), on Unga Island; Henderson Island (1889), in the Shumagin Group; Company Harbor (1889) and Nelson Island (1890), in the Sannak Islands; Chicago Bay (1890), Alaska Peninsula, and Ikatak (1890), on Unimak Island. Several of these had but an ephemeral existence, as Chicago Bay, Nelson Island, and Henderson Island.

About 1898 the McCollam Fishing & Trading Co. and Lynde & Hough formed the Union Fish Co. as a selling agency for their product. It was not until 1902 or 1903, however, after the death of both Lynde and Hough, that the two concerns finally were merged into one and the whole business operated under the name of the Union Fish Co.

In 1876 A. Greenebaum, then and for a number of years subsequent agent for the Alaska Commercial Co., built a trading station for the company at Acherk Harbor (later known as Company Harbor) on Sannak Island. A little codfishing was prosecuted at times, but it was not until 1896, when it became the property of the progenitors of the Alaska Codfish Co., that it was used for this business exclusively. In 1897 the company established another station on Moffet Cove, a few miles east of Company Harbor.

In 1896 the Alaska Codfish Co. opened its Kelleys Rock station, situated about midway between Unga and Squaw Harbors. This, like the Unga station, is an all-the-year-round station and is by far the most productive one owned by the company.

In 1906 the Alaska Codfish Co. bought the Alaska Commercial Co.'s station at the town of Unga, on Unga Island, and began fishing operations in the fall. The next year the Union Fish Co. built a station here, but on the opposite side of the harbor. Fishing is carried on here throughout the year.

The present Squaw Harbor station of the Alaska Codfish Co. was first established as a salmon saltery by a man named Olsen, who also utilized it at times as a codfish station. In the summer of 1903 the present owners purchased it and have very much improved it since. It is a winter station. Its principal use to the company is as a supply depot for its near-by stations, the harbor being one of the safest in the Shumagins.

The Dora Harbor, Unimak Island, stations of the Alaska Codfish Co. and the Union Fish Co. were established in 1897 and 1898, respectively. While they were quite productive the first two seasons, they have been steadily diminishing in importance ever since. The Sannak Island station men are transferred to these stations in the spring, after the cod have moved off into the deep water surrounding Sannak Island, and are brought back again in the fall when the fish have again returned to the shoal waters.

About 1903 the Union Fish Co. built a station at Wedge Cape, Nagai Island, and operated it intermittently as a summer station until 1909, when it was abandoned.

In 1903 the Union Fish Co. built a station at Eagle Harbor, on Nagai Island, and operated it continuously up to and including

FIG. 6.—The town of Unga, Alaska, with the Alaska Codfish Co.'s station in the foreground

1909, since when it has been shut down owing to the difficulty of securing enough men to work it.

The first Puget Sound company to establish a shore station in Alaska was the Seattle & Alaska Fish Co., of Seattle, which built a station at Falmouth Harbor, on Nagai Island, in the spring of 1903. As this proved to be too far from the fishing grounds, the station was moved almost immediately to Squaw Harbor, on Unga Island. In place of the dories used at other stations, this company equipped the plant with Columbia River boats, two to four men going in each. The station was worked intermittently until 1910, when the company sold out to the King & Winge Codfish Co., which ultimately merged into the Western Codfish Co. It has not been operated since, owing mainly to its remoteness from the fishing grounds. It is now the property of John H. Nelson.

In the fall of 1902, John H. Nelson and John Einmo opened a shore station at Hard Scratch, on Snug Harbor, Unga Island, but operated it only one winter. In the fall of 1911 R. H. Johnson established a shore station here and has operated it ever since.

In the fall of 1905 the Blom Codfish Co., of Tacoma, Wash., built a station on the north shore of Eagle Harbor, Nagai Island, and operated it for a couple of years, when it was abandoned.

In the fall of 1905 the Pacific States Trading Co., of San Francisco, which had just recently started in business, established stations on Herendeen Island, Northwest Harbor, and at Ikatak, on Unimak Island, and operated them continuously until 1909. The latter station was not reopened, but operations were resumed at the former in the fall of 1911, and it was operated until early in 1916, when the company suspended operations and sold the station to the Union Fish Co. The Ikatak was a summer station, while the one at Northwest Harbor is a winter station.

In the summer of 1908 John H. Nelson, who had opened a station at Hard Scratch in 1902, started a station on Squaw Harbor and operated it every year until his death, when it passed into other hands. In the earlier years of its existence stockfish formed the bulk of the product, but during the last few years considerable dried salt cod has been prepared.

In 1914 A. Komedal, a merchant of Unga, established a station near that town and has operated it during the greater part of the time since.

In 1910 the Alaska Commercial Co. shipped to San Francisco aboard one of its regular trading vessels about 90 tons of cod that had been caught and cured by the natives of Kodiak. The fish proved to be quite small, and the company had so much difficulty in disposing of them that it did not repeat the experiment.

In subsequent years occasional lots of cod were caught by fishermen living on Kodiak Island and were cured and shipped to Puget Sound dealers, but the industry did not amount to much until 1917, when the Northern Fisheries Co., with headquarters at Anacortes, Wash., established a shore station on Kodiak Island and carried on operations here and also with a small fleet of vessels.

The demand for cod engendered by the World War by this time was felt all over the world, and the high prices realized drew a large number of Kodiak fishermen into the business; and until the collapse came in 1921, a small fleet of vessels, mainly powered with gas engines, and a considerable number of small sail and power vessels of less than 5 net tons each, operated on the banks lying off the east coast of the island, using the town of Kodiak as headquarters and shipping the cured catch to Washington ports through local dealers.

The demand for cod created by the war also led to the establishment of numerous small local stations scattered along the Alaska Peninsula and the numerous islands lying to the south of these and on the Aleutian chain. Unalaska, owing to its shipping facilities, was the center for several of the more important. When the slump came after peace was declared, most of these stations shut down and but few have since resumed operations.

During the summer of 1916 the Union Fish Co. established a new shore station on Tigaldi Island, which lies just off the entrance to

Unimak Pass, while in 1918 the Bering Sea Fisheries Co. opened an important station on Unalaska Island.

A notable feature of the industry in recent years has been the large number of individuals and meagerly financed companies preparing stockfish for the market. This work is carried on mainly during the winter months, when fishing for other species than cod is suspended. It requires but little capital, and as the demand in Washington has been fairly good, it has proved a remunerative source of income to the more energetic fishermen. The following statistics show the fluctuations in this branch of the industry in recent years:

Year	Pounds	Value	Year	Pounds	Value
1916	36,800	$5,990	1921	678,422	$74,626
1917	69,700	12,400	1922	64,000	9,600
1918	38,286	7,128	1923	39,800	5,970
1919	29,000	700	1924	39,300	5,869
1920	12,775	2,300			

In 1923 the San Juan Fishing & Packing Co. opened a shore station at Unalaska, and also has the power schooner *San Jose* (14 net tons), formerly engaged in halibut fishing, operating with the station as her base.

PERSONS EMPLOYED

With the exception of the owners, a few of the higher officials ashore, and several of the captains, but a small number of those engaged in the industry are native Americans. The large majority are of Scandinavian birth, with a few Finns, Germans, Canadians, etc. At the stations quite a few natives are employed as fishermen. No orientals are employed except occasionally as cooks at the stations.

The captains and mates of the vessels are almost all men who have worked up from the ranks of the fishermen. Operating on the codfish banks of Alaska requires considerable local knowledge of the banks, of the prevailing winds, and also of the most convenient spots for shelter and for water. While the majority of them are good navigators, a few are sadly deficient in this respect, yet their knowledge of Alaska conditions enables them to make about as many successful trips as their fellows who are better grounded in the science.

The men in charge of the stations are generally fishermen who have worked up from the ranks. While some of these men are excellent workers, with considerable native shrewdness, yet as the necessities of the industry require their constant presence in Alaska, they get very little opportunity to keep in touch with the world's progress, and generally continue throughout their business life to carry on business in the same old groove in which it was running at the time responsibility fell upon them. They are also a very poorly paid class of men, with virtually no opportunity for advancement beyond the position of station agent. This largely explains why the codfish industry of the Pacific coast is but little further advanced to-day, so far as methods of catching and curing the fish are concerned, than it was 50 years ago.

While a small proportion of the white men are excellent fishermen of the type required for hand-line fishing from dories, the majority of them are ordinary beach combers picked up on the water fronts of San Francisco and Seattle, or men of very little acquaintance with the sea even, let alone any fishing knowledge. The reason for this is that the salmon and halibut fisheries offer more congenial employment to the more intelligent and progressive of the fishermen. At the end of the salmon season in Alaska quite a few of the better class go to the shore stations and work there until the opening of the salmon season the following spring, when they take up the salmon work once more.

The natives generally are among the best of the station fishermen, as usually they are well acquainted with the locations of the many isolated spots that while rich in cod yet sometimes cover but a few feet or yards in extent and are difficult to find unless certain landmarks are well fixed in the mind. They are persistent and skillful fishermen and generally are among the high-line fishermen unless handicapped through age, disease, or bodily infirmity. They are apt to quit when the whim seizes them, but the author's experience with cod fishermen generally is that both whites and natives are apt to quit on very slight or no provocation at all, the desire for a change of scene at frequent intervals seeming, in their eyes at least, to be one of the essentials of the industry.

VESSELS AND BOATS

Fishing vessels.—Unlike the vessels used in the New England fisheries, there is no distinctive type employed on the Pacific cod fishery. Not a single vessel now used exclusively in fishing was built especially for that purpose. All of them were at one time brigs, barks, barkentines, or schooners employed in the carrying trade of the Pacific and were purchased for use in the fishery after they had attained varying ages. As the schooner rig has proved the most economical, the vessels have been altered gradually, until all are now of this rig. They vary in length from 102 feet 6 inches to 156 feet, and the net tonnage ranges from 138 to 464.

In Alaska a different type of vessel has been evolved. As the companies owning several stations frequently desired to transport goods and fish from station to station, small sailing vessels were employed in the early days. These had a large cargo capacity and were vessels that previously had been used in California waters for various purposes. As the trips made by these vessels necessarily were uncertain, owing to their dependence upon sails, it was soon seen that power vessels would be more profitable, and about 20 years ago the first vessels of this type were sent up under sail. In order to make them suitable for navigation under the trying conditions that prevail in this section of Alaska, they were greatly altered, but even then they proved far from satisfactory.

In 1912 the Union Fish Co., of San Francisco, had built on Puget Sound the first power vessel to be devoted exclusively to the codfish industry. It was a schooner-rigged vessel and was named the *Union Jack*. The vessel was 85 feet long, 18 feet beam, and had a net

tonnage of 39 tons. She was fitted with an 80-horsepower gasoline engine. As the owners had in view using this vessel during part of the year in fishing also, they tried to adapt her for both purposes, with the result that she proved somewhat unsatisfactory for either and was sold in 1913.

In 1914 the same company built another power vessel, the *Pirate*, to replace her. She is a two-masted schooner with knockabout rig and has a length over all of 64 feet 6 inches and a breadth of 21 feet.

FIG. 7.—Union Fish Co.'s schooner *Pirate*, Alaska station, fishing and working boat

The hold is 6 feet 10 inches deep and 23 feet long, which provides a carrying capacity of 100 tons. The after cabin has accommodations for the captain and two men. The galley and mess room also are located here. The forecastle provides sleeping quarters for six men. The engine room is just forward of the pilot house, from which the main engine is controlled, thus permitting the captain to operate the engine as well as the vessel. The propelling machinery consists of an 80-horsepower engine, while a 9-horsepower windlass is used for handling cargo. It is the company's purpose to use this vessel in fishing during the summer months and in freighting in local waters the rest of the year.

In 1917 the Alaska Codfish Co. built, and in 1918 sent north, two station tenders known, respectively, as *Alasco* (23 net tons) and *Alasco No. 2* (5 net tons). The first is 59.7 feet in length and is equipped with an 80-horsepower Union engine; while the latter is 43 feet in length and is equipped with a 40-horsepower Union engine.

As these proved to be very satisfactory, the company in 1919 built and sent north the *Alasco No. 3* (8 net tons), a vessel 55 feet in length and equipped with a 40-horsepower Enterprise gas engine. In 1920 still another, the *Alasco IV*, was built and sent north.

Transporting vessels.—For a number of years the companies operating shore stations in Alaska have been utilizing in fishing vessels of the same type and size as those used in taking cargoes of supplies north to the stations and in bringing back the fish caught by the station fishermen. Frequently the regular fishing vessels would be, and still are, sent north on this work during the winter season. As stormy weather, with plenty of fog, is the rule in the North Pacific Ocean, many of these vessels have met with an untimely end on the inhospitable shores in this region.

In 1913 the Union Fish Co., of San Francisco, had built a power schooner for this work. This vessel, which was named the *Golden State*, has a length of 145 feet, a breadth of 32 feet, and a depth of 11 feet 6 inches, and in addition to her engines is fully rigged as a three-masted, baldheaded schooner. She has a carrying capacity of more than 500 tons.

The propelling machinery consists of a 150-horsepower, 4-cylinder, distillate engine. It is connected with a two-bladed propeller by means of a disk clutch and spur-gear type of reverse. The two-bladed propeller is used in order that the blades may be placed in a vertical position when the sails are being used, and in this way the drag of an idle propeller is avoided to a large extent. The engine is so equipped that it can be handled at slow speed with ease.

The vessel has also a complete electric lighting plant, with dynamo and two sets of bilge pumps and a force or fire pump, all run off a countershaft, which is in turn run either from the main engine or when that is not running is driven by a 4-horsepower, single-cylinder engine situated in the engine room. Besides the quarters for its crew of 8 men, the vessel has cabin accommodations for 10 passengers.

Boats.—A considerable proportion of the dories in use with the fishing vessels and at the shore stations in Alaska were manufactured in New England and brought to this coast overland. Now a few of the coast boat builders are manufacturing them after the eastern model. The hand-line dories usually are 14 feet long, bottom measurement. Occasionally trawl lines are employed, in which event larger dories must be used in order to accommodate the additional man needed and the extra amount of gear required. These large dories are usually 15 feet in length on the bottom.

A few years ago one of the companies began to use line trawls at its shore station and employed round-bottom sailboats of the well-known Columbia River type in working them. The trawling experiment soon was abandoned and the boats were either sold or put to other uses.

During the season of 1914 the schooner *Fortuna* took north with her 12 portable engines suitable for attachment to the regular dories.

These were sold to the fishermen and were to be paid for out of the season's catch. The use of these engines did not prove satisfactory for a number of reasons, viz: The men generally knew nothing about their operation and care and grossly neglected them; the weight of the motor cut down the number of fish the dory could carry; while in rough weather, with the motor going and a load of fish aboard, the dory would ship heavy seas.

In recent years small gasoline launches have become a factor in the Alaska station fishing. Some of these are dories, some Columbia River type boats, while others are of nondescript types. Gasoline engines ranging from 2 to 12 horsepower have been installed in them. The chief disadvantage in the use of these in early days was that the regular hand-line fishermen operating from dories refused generally to permit the operators of these power boats to join with them in dressing the catch, and as a result they had to have a separate dress house, and unless there were enough of them to form a regular dress gang they found the business of dressing the fish rather laborious. As the number of power-boat fishermen increased at the various stations, however, this disadvantage was obviated. The companies also aided by concentrating the power fishermen at certain convenient stations. Two or more men generally go in the power boats, and as they are enabled to go with perfect safety to the outer and less-worked banks, their daily catch is much larger proportionately than that of the regular hand liners. The use of power also gives them a considerable advantage over the regular dory men, as they can go out in weather that would compel the sail and row dories to remain in port, and can go much farther away from the station and be sure of being able to get back.

The number of these boats is increasing yearly, and it is to be hoped that they will continue to increase, as the owners of them are among the most industrious of the fishermen—men who do not waste all they make in riotous living, as is the custom with the majority of fishermen. The larger companies never have encouraged the use of power boats, as they feared that in time the men operating them would become too independent and eventually become station owners themselves.

Nearly every hand-line fisherman carries a sail in his dory. The mainsail usually is of the leg-of-mutton type. Some have a jib, while a few also use a staysail. The sails generally are made of sheeting, which is much lighter than canvas. Fishermen are expected to furnish their own sails, together with the necessary mast and boom. For a number of years the companies provided these articles, but so many of the men failed to return them when paid off that the practice had to be abandoned.

LAY OF THE CREW

The methods followed in handling the catch and the lay of the crew are radically different from those on the Atlantic cod vessels. On eastern vessels the men catch and dress the fish and divide their share of the proceeds equally. On Pacific vessels the fishermen have nothing to do with dressing the fish, this being done by one or two dress gangs (the number depending upon the size of the vessel), the members of which are paid monthly wages, which begin the

moment the men are signed on and cease when the vessel returns to her home port. The fishermen are paid a certain sum per thousand fish.

In 1924 the fishermen on vessels operating from Puget Sound sailed under the following lay: Those catching under 7,000 fish received 1½ cents per pound; those catching between 7,000 and 9,000 fish, 1⅝ cents per pound; those catching over 9,000 fish, 1¾ cents per pound. The mate received one-fourth cent per pound more than the regular fishermen, while the second mate received three-eighths cent per pound more. Fish 28 inches or more in length are count fish; all under 28 inches in length count two for one. All fish must be bled by having their throats cut as soon as caught.

Under this arrangement the fishermen devote their entire working time to fishing, returning to the vessel only when a dory load has been obtained. In this way some of the fishermen will catch several hundred fish a day when good weather prevails. As hand-lining is employed almost universally, but one man goes in a dory.

A dress gang is composed of a splitter, header, throater, gutter, salter, a man to remove the black skin, and from one to two others, called "idlers," who pew the fish as may be needed. When two gangs are operating, some of the idlers do double duty and thus reduce the total number in the dress gangs. All members of the dress gang, and the cook, are encouraged to fish over the rail of the vessel, when not otherwise engaged, and for all fish so caught they are paid the same sum per thousand as the majority of the fishermen receive.

The owners of the vessels furnish all provisions, fishing gear, boats, and the bait taken along from the home port, the members of the crew not being required to furnish anything besides clothing and bedding.

The captains of Puget Sound cod vessels receive as their lay a certain sum per ton for the fish brought home. On the San Francisco vessels the captains generally are engaged by the year and are paid a salary. The arrangement of the owners with the captain is a private one and varies much, depending largely upon the reputation of the captain.

The following represent the average monthly union wages paid the various members of the dress gangs: First salter, $135 to $150; second salter, $90; head splitter, $125 to $175; second splitter, $90; header, $45; throater, $40; idlers, $30 to $40; salt passer, $40; cook, $150; cook's helper, $40 to $45; and donkeyman, $40. One Puget Sound vessel owner paid the head splitters an amount equivalent to that paid a fisherman bringing in 10,000 fish.

The great increase in recent years in the returns received by the more important members of the crew is well exemplified when it is stated that in 1895 fishermen received $25 per thousand fish; one salter, $65 per month; one splitter, $60; one cook, $55; four men to throat, head, and do the other dress work, $25 each per month.

The high-line fisherman of the 1925 fleet was Dan McEachern, of the schooner *Chas. R. Wilson*, who is credited with 20,070 fish, undoubtedly a record catch with hand lines for either the Pacific or Atlantic banks.

The lay on the local power vessels used in Alaska, which landed their catches at the shore stations there and to which they have been credited, is as follows: For dressed fish, 10,000 and over, $1 per hundredweight; for dressed fish, less than 10,000, 95 cents per hundredweight. At the stations the dory fishermen were paid 45 cents per hundredweight for whole round fish, while the splitters received 5 cents per hundredweight additional.

During the season of 1915 hand lines were used exclusively in fishing, but long lines, gill nets, and beam trawls have been used occasionally.

The hand lines are of special hard laid No. 72 untarred cotton seine twine. These are 7-pound cotton lines; that is, one dozen 25-fathom lines weigh 7 pounds. Two to three of these lines are required to make one single fishing line, and each fisherman operates at least two fishing lines. Each line is generally fitted with a spreader, to which are attached two snoods. The hooks in general use are the No. 8, eyed, japanned "Gravitation" and the No. 7 "Baylies." Most of the fishermen file down the long sharp point on the former hook. The leads weigh 5 pounds. No. 2 swivels are used in attaching the snoods.

Unlike his east-coast brother, the Pacific cod fisherman worries but little about bait. Before sailing, enough herring are taken along for a couple of days' baiting, but the fisherman usually gets enough shack fish the first day to furnish him with plenty of bait for the next day, and so on throughout the season. Sculpins, halibut, porgies, octopus, salmon, etc., form the principal sources of bait supply. In baiting the hooks the fish are slivered, steaks being cut from each side of the backbone. These are cut into three-cornered or square pieces, and are strung upon the hooks to the number of six to eight. Octopus is the favorite bait, a boatload of fish frequently being secured with pieces cut from one tentacle of this mollusk. Although clams are abundant in Alaska, the fishermen rarely ever bother to dig them for bait.

SEASON, METHODS, ETC.

The vessels generally leave their home ports between the middle of March and the middle of April, and arrive in the neighborhood of the Shumagin Islands, in the North Pacific, in from two to three weeks after sailing. The Shumagin Islands are about 1,553 nautical miles from Seattle and about 1,903 nautical miles from San Francisco.

As there is floating ice on the cod banks in Bering Sea at this time, most of the vessels fish off the southern side of Unimak Island. The early part of May some of the vessels move over to the southeast point of Sannak Island and spend the greater part of the season on the Sannak Bank, but the majority of them go into Bering Sea, where fishing usually is begun in Dublin Bay and on Slime Bank. Toward the latter part of June the Bering Sea fleet begins to work north onto Baird Bank, moving along by Port Moller and up as far as the mouth of the Ugashik River and occasionally, but not often, up into Bristol Bay proper.

The vessels that fish exclusively in the North Pacific Ocean sometimes spend the early part of the season on Shumagin Bank, working

later on the Sannak Bank. A few start fishing at Cape Pankof, off the southern side of Unimak Island, as stated above, and work thence onto Sannak Bank, where they finish the season.

One great advantage the Pacific fisherman has over his Atlantic brother is that he does not lose any time because of enemies of the cod driving them off the banks, as is the case in the east, where vessels are sometimes tied up for weeks on account of dogfish. While the dogfish is to be found in Alaska waters, it is not sufficiently abundant to become a pest.

All Pacific codfishing is done in the daytime. Owing to the high latitude of the banks and the fact that the vessel fishing season is the summer time, when the hours of daylight are most numerous, the hours of darkness rarely exceed four and are even less during June and July.

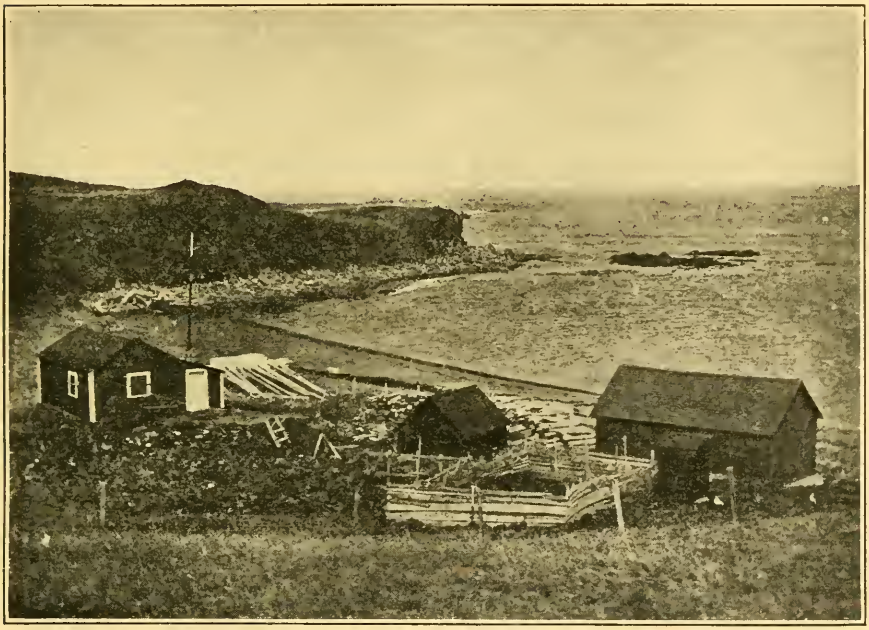

FIG. 8.—A cod fisherman's home on Sannak Island, Alaska

Early in the morning the dories are put over the sides of the vessel, which has been anchored in a favorable spot. Each dory is equipped with the necessary fishing lines, a small sail, a water beaker, a windlass for hauling in the anchor, a 10 or 14 pound anchor, a small keg buoy, a knife for cutting bait and bleeding the fish, a gaff for handling the large fish and with which most of the fishermen stun or kill the fish by striking it on the head with the handle.

But one man goes in a dory, and each rows away in search of a good place to fish. The direction in which they row is to a great extent governed by the tide and force of the wind, the idea being to utilize the wind and tide to help in getting back to the ship when the full dory would make rowing laborious. As the fish at times seem to be quite numerous in small, isolated areas, considerable luck enters

into the fishing. When one of the fishermen is perceived to be successful his mates are apt to try their luck on the same spot. The men return to the vessel about noon, or sooner if a dory load has been obtained. After obtaining their dinner they go out again, and sometimes a trip is made after supper. Each man's catch is counted as he pews the fish inboard upon his return to the vessel.

During the last few seasons some of the companies that operate both fishing vessels and shore stations have anchored certain of the former at favorable spots in the North Pacific, and, concentrating a fleet of local power and sail dories with the vessel as a focus, have used her as a salting station. As soon as the vessel wets all her salt she sails for the home port, while the local fishermen return to their former shore station and resume fishing there.

While the fishermen are out on their first trip of the day the members of the dress gang usually fish over the rail of the vessel, and some of them do this whenever they have a few spare moments. These men are paid a fixed sum (usually an average of the prices paid the fishermen) for all fish so caught, which is in addition to their regular wages.

Trawl or long lines.—But little trawling or long lining ever has been done by the vessels fishing on the Alaska banks, and none by those fishing on the Okhotsk banks. In 1888 the schooner *Arago*, belonging to Lynde & Hough, of San Francisco, employed long lines on the Bering Sea banks, but the fishermen claimed that the fleas (amphipod crustaceans) devoured the cod or injured them so badly that the use of such lines had to be abandoned.

But few efforts along this line were made by the vessels of the fleet until in 1913, when the schooner *Vega* and the power schooner *Union Jack*, belonging to the Union Fish Co., of San Francisco, used long lines for a considerable part of the season. On the *Vega*, which fished on the outer banks off the Shumagin Islands, the ground line of the trawl was of 20-pound tarred cotton. The gangings, which were about 3 feet in length and set about 6 feet apart, were of 6-pound tarred cotton. The hooks used were of the 10/O japanned Limerick brand. The lines were coiled in tubs made by sawing barrels into equal halves. Each dory crew was expected to have rigged up 42 long lines of 50 fathoms each, but under ordinary conditions would rarely ever have in the water at one time more than 14, one-half of the balance being baited and ready for use, while the rest were held in reserve in case of emergencies.

Around the edges of the top of the cabin of the vessel were nailed boards. When ready for the first baiting the fishermen dumped the bait onto the top of the cabin and then stood in the gangways and cut up the bait on the boards, and as fast as the hooks were baited the line was carefully coiled in a tub with the baited hooks in the center of the coil. Only one piece of bait, and that not a large one, is put on a hook.

The buoy line used was of 6-thread manila. At the surface the ends were marked by 10-gallon buoy kegs, painted red, attached to the buoy line by swivels similar to those used for this purpose by the halibut fishermen. On rough bottom the ground line was buoyed up by glass balls attached at intervals. Twelve or fourteen pound anchors were attached to each end of the trawl.

In the bow of each dory was fixed a roller that worked on a pivot, over which the ground line was hauled. There are always two men in a dory when a vessel is long-lining, one man to haul the line and shake off the fish, which he does by a dexterous twist of the wrist, while the second man baits the hooks and coils the gear in the tubs again. The men usually brought the line in when returning with the catch, but sometimes when the weather looked propitious the line would be underrun, the fish removed and new bait substituted, and allowed to fish again while the men took their catch aboard. Sometimes the lines would be set out late in the evening and allowed to remain down until the men went out early in the morning.

The long lines were handled in the same manner as on the Atlantic coast. In setting a line, two men go in a dory, one to throw the line and the other to row the boat. Having arrived at the place where the set is to be made, a buoy is fastened to one end of the buoy line and thrown over the side. The buoy line is then allowed to run out until the end is reached, when it, together with the upper end of the long line, is bent to the ring of the anchor. The anchor is then lowered over the side, and the line thrown from the tub until the lower end is reached; it is then fastened to the upper end of the second tub of line and so on until all of the tubs—two, three or more—have been set. The last end of the long line, together with the second buoy line, is bent to an anchor and thrown over the side, care being taken to prevent the buoy line from fouling with hooks of the long line as it is thrown out. To the free end of the buoy line is attached the second buoy. The method of "underrunning" a long line permits the removal of the fish from the hooks and rebaiting them in a single operation, thus saving a considerable amount of labor. "Underrunning" is sometimes performed on ground where fish are plentiful and when the weather is suitable for such operation. A long line intended to be "underrun" is set in the usual manner, with slight variation. A becket is made in the buoy line about 10 or 12 fathoms below the buoy. In the becket is bent a small line, which reaches to the bottom, and to the bottom end of this line is fastened a stone weighing about 6 pounds. The ground line of the trawl, instead of being fastened to the ring of the anchor is attached to the small line close to the stone. When thus set there is sufficient distance between the anchor on the buoy line and the stone on the small line to permit of the line being lifted without disturbing the anchor. In hauling, the buoy line is pulled up until the small line running to the anchor is reached, the stone is hauled up, and the end of the ground line is passed over the dory. One man unhooks the fish and the other baits the hooks. In this way the dory passes under the entire length of the line and the fish taken from it and the hooks baited in a single operation. The object of operating lines in the manner described is to keep them in one position during the time when fish are plentiful.

On sandy bottom the fish sometimes are eaten by sand fleas, and to prevent this glass balls attached to the ground line at frequent intervals keep the fish clear of the bottom, where the fleas are most numerous.

While the use of long lines by the *Vega's* crew was found to be quite successful, so far as catching fish was concerned, the difficulty of pairing off congenial fishermen and the finding of men

who were familiar with the operation of long lines proved too much of a handicap, and in the latter part of the season hand-lining was resorted to.

A very important advantage in the use of long lines is that the men will fish with them in much deeper water than they will with hand lines. The largest and best cod are found in the deeper waters, and it is from these that the owners would like to get the bulk of the catch; but when hand-lining the men either refuse openly to work in the deeper waters or else secretly neglect the fishing and bring in but few fish when the captain insists upon anchoring on the deeper portions of the banks.

The experience of the *Union Jack* in long-lining is described under the section devoted to shore stations.

For some years long lines were in general use by the station fishermen but were given up eventually because large quantities of gear and fish were lost because the men were unable to get out to the banks in stormy weather and because the fishing required more skill than was possessed by most of the green hands available.

As the ground upon which they could fish was somewhat limited for long lines, the fishermen first agreed among themselves as to how the ground should be apportioned. In setting the long line two men went in a dory, but in fishing it the work was done by one man, as the line was allowed to remain on the ground for at least a week and sometimes longer. Before setting the line the bottom was sounded carefully with a hand line in order to be sure of getting the right spot for fishing. An anchor and line with buoy attached was dropped overboard first, then the ground line was paid out in the direction agreed upon with the other fishermen, after which the other anchor and buoy line were set. The ground line was left sufficiently slack so that it could be hauled to the surface without disturbing the anchor, but not slack enough to permit of the line snarling. In fishing it, the fisherman went to the leeward buoy and hauled up the bight of the line until it lay across the bow of his dory; then, by hauling on this line they pulled the dory against the tide in the direction of the other anchor, the line passing across the bow of the dory so that the hooks that came in on one side were freed from fish, rebaited, and thrown over on the other side of the dory until the line was completely underrun or the dory filled with fish, when the line was thrown off again and the trawl left set as before. The ground line of these long lines was 9-thread manila, while the buoy lines were of 6-thread manila, commonly known as "dory rode." The gangings were of 6-pound lines, i. e., 12 lines of 25 fathoms each weighed 6 pounds. They were 22 inches in length and were attached to the ground line at intervals of 3 feet. The number of hooks used varied from 500 to more than 1,000, according to the number of tubs set.

During the season of 1913 the small power schooner *Union Jack*, with headquarters at the Pirate Cove station of the Union Fish Co., engaged in long-lining on the inshore banks of the Shumagin Islands, mainly in West Nagai Strait.

As it was the intention later in the season to use the *Union Jack* in gill-net fishing for cod from the deck of the vessel by means of a net lifter (described elsewhere in this report), the machine was

placed on board at the beginning of the season with the hope that it could be used in hauling long lines.

The process of tarring seemed to weaken the lines. Untarred lines were used for renewals and were found to be much stronger and more durable.

Both 32 and 20 pound cotton tarred lines were used for ground line, while the gangings were of 6-pound tarred lines. Experiment developed the fact that 20-pound lines were amply heavy and strong enough for the work, and that untarred cotton lines were more durable and stronger than the tarred lines used, the tarring seeming to weaken the line. In the last experiments the gangings were each

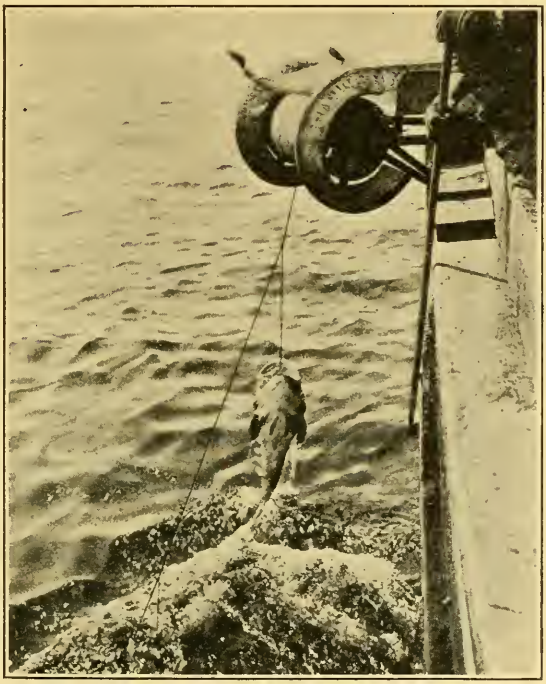

FIG. 9.—Cod trawl line hauled by means of net lifter on deck of vessels

about 5 feet long and were attached about 6 feet apart, this being necessary because of the high freeboard of the vessel.

Only a couple of skates of gear were rigged for experimental use with the machine. After being baited these skates were coiled on movable plank platforms about 5 feet long by 2½ feet wide. Placing one of these at the stern of the vessel an experienced man could pay out the line by means of two short sticks (a method followed by the Norwegians), in order to prevent the possibility of the hooks catching in a man's flesh or clothing, as fast as the vessel could steam. An anchor and buoy were at each end of the long line, which was set with the tide.

After the net had been down a couple of hours the vessel came up to the leeward buoy in order to haul against the tide. The buoy was

first hauled in by hand. The buoy line was then slipped under the fingers of the net lifter, the engine started, and the line reeled in at full speed. When the anchor appeared the machine was stopped, the anchor lifted inboard by hand, and the end of the line placed under the fingers and the machine started again. Of the crew one man ran the engine; one stood along the rail just aft of the machine with a long-handled gaff, ready to gaff cod that might break loose from the hooks; another stood just back of the machine itself and shook as many of the fish off the hooks as possible; while two men removed and killed the balance of the fish, coiled down the line as it came from the machine, and attended to other work.

The vessel used for the experiment was not well suited to the purpose because of its slow response to the rudder (a serious handicap, as it is necessary for the vessel to be kept well over the line at all times and thus relieve it as much as possible from strain) and the high freeboard, owing to which a number of fish were lost, because their weight caused them to break loose while traversing this long distance. Despite this, however, the experiment indicated clearly the value of the machine in hauling long lines from the deck of a suitable vessel.

As experienced fishermen were not available for carrying on power long-lining from the deck of the vessel, the crew trawled by hand from dories during the rest of the season and met with good success. In operating from dories the long lines were rigged in the same manner as on board the *Vega*.

Gill netting.—In the summer of 1913 the author conducted some experiments in gill netting for cod in the waters adjacent to Pirate Cove, in the Shumagin Islands, Alaska. No originality is claimed for this method, as for a number of years gill netting for cod has been carried on in Ipswich Bay, Mass., and at a few other places along the New England coast, while about 13 years ago some of the Great Lakes fishermen visited Gloucester with their steam tugs and engaged in gill netting for cod, haddock, and pollock on a large scale. For a number of years the Great Lakes fishermen have carried on important gill-net fisheries for lake herring, trout, and whitefish. Steam tugs have been employed almost universally, and from 5 to 10 miles of netting were set at one time. The use of this immense quantity of netting was made feasible by the employment of a patented power device, known as a net lifter, for hauling in the nets.

The net lifter is a circular machine fitted along the outer rim with a number of fingers. The mechanism that operates these fingers moves on tracks and is so arranged that the fingers take hold as they come opposite the rail of the vessel and let go when they have completed about two-thirds of one complete revolution from the point where they first gripped. By this means the net is grasped by the fingers as it comes aboard, and after being carried about two-thirds of the way around is released and allowed to drop on the deck. A framework extends from the lifter outboard and at the outer end is a roller, while a sheet-iron trough for the passage of the net and fish runs from the roller to and partly around the machine and rests upon the framework. The machine is operated either by a small gasoline engine or directly from the main engine.

The net lifter generally is set on the port side, forward of the fore rigging, although it will work about as well when set on the starboard side or when close aft of the fore rigging.

At my instance the Union Fish Co., of San Francisco, with its usual progressiveness, purchased the necessary number of gill nets for an experiment on a moderate scale, a net lifter, and a 4-horsepower Imperial engine to operate it.

The gill nets were 125 yards long each and were made of 12/3 cord linen. A specially made line was used for head, foot, and side lines. The nets were of 7½-inch stretch mesh and were 15 meshes deep. The floats, which were made of white cedar, were 2 inches by 5 inches

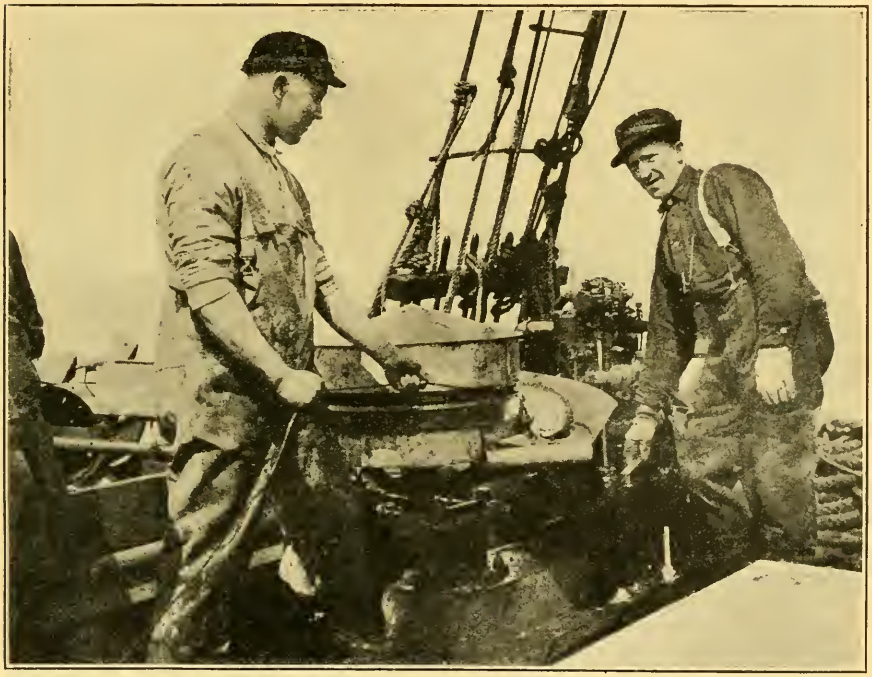

FIG. 10.—Machine used for hauling in cod trawls

and had been soaked a number of times in boiling linseed oil in order to make them waterproof. Fifty of these were used to the net and were hung from the cork line and not strung on. The leads, which were 3½ inches long with a diameter of thirteen-sixteenths inch, weighed 7 ounces each, were made to close on the line and not to be strung on and were set opposite the floats.

As the nets were primarily for use during the winter season, when the spawning cod are on the inshore banks, the work carried on during the summer was merely preliminary and mainly for the purpose of accustoming the men to use the nets.

Boxes with flaring tops (so that they would nest) were constructed, and in these the nets were stowed, with the lead line at one end and the cork line at the other; these boxes held about four nets each.

When ready to set the net the boxes were arranged on the after deck, and as the vessel steamed along the anchor, buoy, and buoy line were thrown overboard, and the nets were then paid out by two men, one handling the cork line and the other the lead line. Another man bent on a new net when the previous one had almost run out. After all had been set they were held and marked by another anchor and buoy. The nets were set across the tide and as nearly as possible in the shape of a crescent. While most of them were set on the bottom, a few were elevated slightly by means of glass floats. Almost invariably, however, the nets raised above the bottom caught no fish.

In hauling in the net, a great deal depends upon the captain. In order not to put too much strain upon the nets or the machine, the vessel should be kept as nearly as possible over the former, and in certain kinds of weather and at certain stages of the tides this requires careful maneuvering on the part of the navigator.

The nets were set out in the evening and were taken up at as early an hour in the morning as possible, as the flesh of the cod will discolor if the fish are not bled soon after they die. Steaming up to the first buoy, this was taken aboard. The buoy rope was then slipped under a couple of the raised fingers on the net lifter and the engine started. As soon as the fingers gripped the rope, no further handling was necessary except to coil it aft of the machine as it was reeled in at full speed. When the anchor appeared it was lifted aboard by hand and the head and foot lines of the net were then joined together, thus doubling the net over, and placed under the fingers and the engine started again. But few stops were necessary, and then only when a large skate was found in the net, as the cod, halibut, and other fish passed along the trough around the machine without any trouble. A man with a gaff was stationed just aft of the machine, and his duty was to gaff all fish insufficiently meshed and apt to fall out of the net as it was lifted from the water. Other men received the net from the machine, shook out the fish, and stowed the former back in the net boxes.

An odd feature of the experiment was the comparatively large number of halibut caught in the few nets set one day. In one haul with 10 nets, 180 cod and 60 halibut were taken, the halibut ranging in weight from 5 to 30 pounds. No halibut were taken in the other trials with gill nets, while none at all were taken in the course of the trials with long lines.

Ashore, the nets were run onto large reels, and here they were dried and mended with a minimum of expense. The reels were so nicely adjusted that a child could turn one, even when laden with four or five nets.

When in regular use, it is the intention to have the nets divided into three sets. One of these will be in the water, one will be aboard the vessel, while the other will be ashore. All mending and drying of nets will be done ashore, the fishermen having nothing to do with this part of the work.

This experiment was soon abandoned, solely because of the difficulty experienced in persuading the fishermen to take it up and handle it properly.

While the machine will work upon the codfish banks profitably, either with gill nets or line trawl, it is probable that in the near

future the machine will be used principally in the salmon and halibut fisheries of Alaska. With one of these machines placed upon the deck of a cannery tender, a crew of not more than five or six men could set out and haul in from 5 to 10 miles of gill netting in a working day, and do this in weather too rough for a Columbia River boat. The gill nets at present in use would have to be reduced in depth about one-half in order to work in the machine, and the work could then be carried on much more cheaply than is the case under present conditions, provided no legal obstacles were placed in the

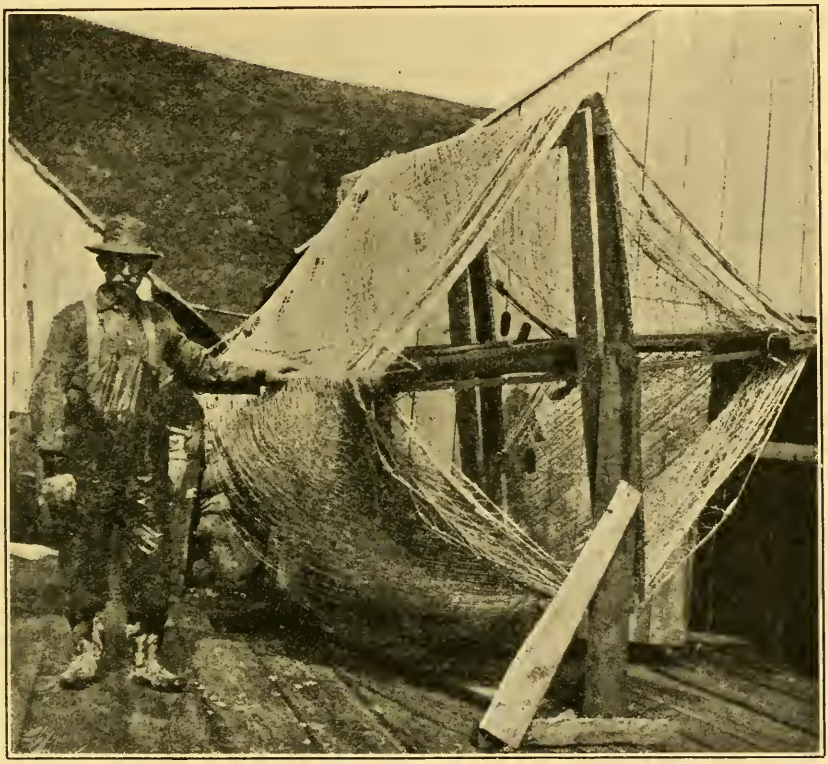

FIG. 11.—Cod gill nets on drying reel

way. With the use of a large power vessel gill netting could be carried on in the open bay or sea if the owners so desired.

If the lifter were used in the halibut fisheries, all the long-line fishing could be done from the deck of the vessel, and dories could be discarded. Fishing could be carried on with it at all times except during the more violent storms. Since the above was written a similar device for hauling in long lines has come into use on our halibut vessels.

Trawl nets.—In 1919 and 1920 tentative experiments were undertaken to test trawl nets on the cod banks, but these were unsuccessful at the time because of the rocky patches on the banks and because the local fishermen are either passively or actively against the introduc-

tion of any new and improved methods and would not give the nets a fair trial.

DRESSING THE FISH

As soon as enough fish accumulate on the deck the dress gang begins its work. The "throater" seizes the fish by the head with his left hand, places the back on the edge of a table or tub, and by means of a short knife with pointed end makes a cut in each side of the throat just behind the gills (the front of the throat has previously been cut by the fisherman in order to bleed the fish), and another slit is made from the belly to the vent. The "header" then receives the fish and presses it backward across the edge of the table or tub, which results in breaking off the head at the first vertebra. With his left hand he then opens the belly and tears out the viscera. The fish is then passed on to the "splitter," the most important member of the gang, who places the back of the fish against a cleat on a board, and by means of a short, heavy knife, rounded at the end and with the blade slightly curved flatwise, continues the split down the belly to near the end of the tail, taking care to keep near the backbone. At about three-fifths of the distance from the neck to the tail the backbone is cut across and is loosened, so that the operator can catch the end in his fingers. Grasping this with his left hand he cuts under it toward the head of the fish and separates the upper part of the backbone from the fish. In this operation the knife blade is kept close to the backbone to prevent loss of flesh, and a good splitter will drive the knife no deeper than is absolutely necessary, as otherwise the thick flesh at the back would be cut almost in two, thus spoiling the fish for middles. The sounds are not saved, and only rarely are the livers saved on the vessels.

Recently that wonderful machine, the "iron chink," used in the salmon canneries to cut off the head and tail of a salmon, remove the fins, split the fish down the belly, and remove the entrails, and then slime or clean the fish, was adapted for use in dressing and cleaning codfish. In addition to the operations noted above the machine removes the backbone and does the work better than the splitter can do it by hand, and, of course, at vastly greater speed. Several of these machines have been installed in plants on the Atlantic coast, where they have proved eminently satisfactory.

The fish are then passed to the "black skinner," who, with an old glove or a piece of bagging, rubs off the nape skins or membrane covering the napes, also any blood spots, and then drops the fish into a tub of salt water. Here lesser members of the gang, who are called "idlers," souse the fish until they are thoroughly clean, when they are removed and passed through a chute into the hold, where the "salters" receive them.

The salters lay the fish on their backs, with napes and tails alternating, with the exception of the top layer, which is turned back up. A liberal sprinkling of salt is thrown over each layer, an especially heavy portion being put on where the fish come in contact with partitions or the sides of the vessel. The kenches are about 4 feet deep and extend from side to side of the vessel and the full height of the hold. The first kench usually is started in the forward part of the hold, and the salter works toward the after part. As the

kenches settle additional fish are placed on top to keep the compartment full.

A great deal depends upon the thoroughness with which the work of salting is done, as it is important that every part of the fish shall receive a share. If the salting is well done, it is not often that the fish need to be rekenched; but if the salt is used too sparingly or is unevenly applied, souring may start, which necessitates moving whole kenches and resalting. Sometimes the effort is made on the Atlantic coast to salt a little slack in order to make the fish heavy on reaching port, with the result that the whole catch may be lost. Slack salting, owing to the length of the trips and the fact that the fishermen would not benefit because of the increased weight of the fish, is rarely ever attempted on this coast. As the fish lose their moisture from salting, it runs to the bottom of the hold and is pumped out. About 21 sacks of salt (weighing 100 pounds each) are used to 1,000 fish when in kench.

Soured fish have a peculiar odor, not very different from that of sauerkraut. Those accustomed to handling the fish become expert in recognizing this trouble and can pick out the infected fish instantly.

Much is said by the fishermen about the practice of dressing the cod on the banks and throwing the gurry overboard, and it is claimed that the gurry decays on the bottom and the taint drives the fish away. As sand fleas (amphipod custaceans) are very abundant on the inshore and offshore banks, these scavengers, together with sculpins and other bottom feeders, speedily remove every particle of edible meat from the gurry, thus preventing any possibility that the water may become polluted. Should a couple of days' stormy weather prevent fishing, the sand fleas will be found to have almost caught up with the accumulation of gurry, while at the seasonal stations, the usual large pile of gurry has been reduced to a comparatively small heap of bone absolutely cleaned of all flesh a month after the season closes.

SHORE-STATION METHODS

The methods followed by the shore stations are somewhat different from those in use on board the vessels.

The shore fishermen usually rise between 3 and 4 a. m. in summer and between 4 and 5 a. m. in winter. After breakfast the men row out to the near-by banks in their dories. From 9 to 12 they straggle in with varying numbers of cod, depending somewhat upon luck but mainly upon how well the fisherman knows the "good spots" and the persistency with which he has fished. The dories in use hold from 180 to 220 fish, depending upon their size. A dory containing 220 fish could be handled only in calm or fairly calm weather, as it would be so low in the water as to ship a sea at every lurch in rough weather.

Upon reaching the station the fish are pewed from the dory into a box fastened to the side of the wharf midway between the top and low water. From here the fish are pewed onto the dress-house floor (the dress house is either at the end of the wharf or midway of the same), while the agent or his representative keeps the tally as the fish are thrown upon the floor.

In the bunk house is hung a board ruled so as to show the name of each fisherman and the amount of his catch from day to day. As soon as all the boats are in the agent notes on this board the catch of each man for that day, which gives each man an opportunity to know just how he stands and to have any necessary corrections made.

Dinner is at 12 o'clock, and shortly after the fishermen gather at the dress house and, dividing themselves into as many dress gangs as their numbers will permit, begin the work of dressing. No special dress gangs are employed at the stations, as the dressing is considered to be a part of the fisherman's regular work.

That portion of the dress gang in the dress house generally is composed of a "throater," "header," "splitter," a "black skinner," a man to go over the fish and remove adhering backbones, clots of

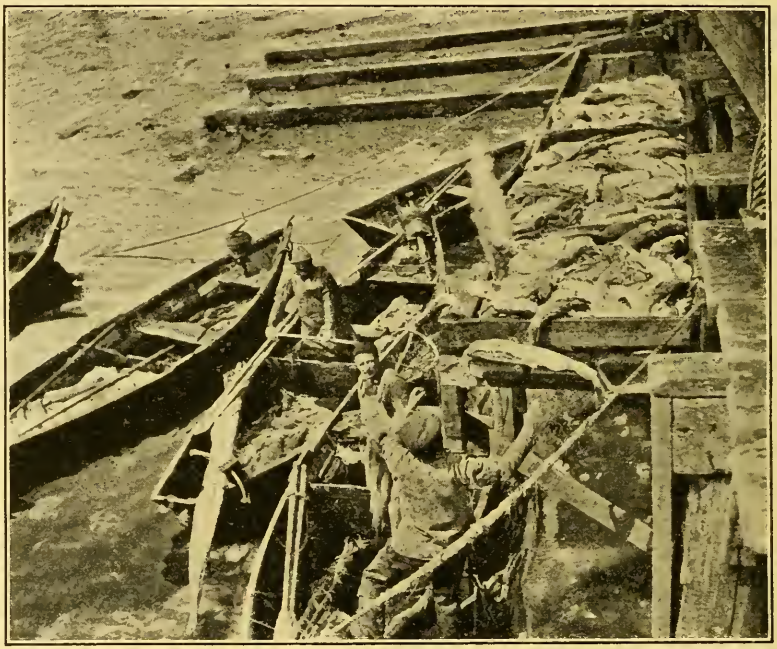

FIG. 12.—Landing the day's catch at the shore station

blood, portions of black skin, etc., left by those who previously had handled it, and a man to pew the fish into the throater's box. The duties of these men are about the same as on the vessels. Each dress gang is equipped with a box set up on legs and with a sloping grid-iron bottom, so that water, slime, etc., may pass out through the bottom. In this box the fish are placed with their heads toward the throater. Alongside and attached to the box is a table. The header stands at the end of the table next to the box, on the opposite side from the throater and splitter, and has in front of him a piece of iron fastened to the edge of the table, over which he breaks the backbone of the fish as they are passed to him. At the other end of the opposite side of the table stands the splitter. In the top of the table in front of him has been inserted a piece of wood about 15 inches long and about 10 inches wide. Into this has been driven a

sharpened nail, to which the fish are attached so that they may not slip away while he is splitting them. The board inset obviates the necessity of renewing the whole table top after the splitter has cut and chopped here for a short time.

Usually there are two or three gangs at a station, and in addition to the above there are usually two men who trundle the dressed fish in large wheelbarrows to the butt house, where two salters receive and salt them in the large tanks.

During the summer months the livers of the cod are saved and dumped into large casks just outside the dress house, this work being

FIG. 13.—Dories nested and dress gang finishing up the day's catch

done by the header. Here they are allowed to rot out. The oil gradually comes to the surface and at intervals is dipped out into barrels or drums. At present no attempt is made to prepare medicinal oil, although the Union Fish Co. had a plant for this purpose at the Pirate Cove station some years ago. As the healthy and diseased livers are used together, only oil suitable for use in the arts is rendered at present.

The offal passes through chutes into the water under the dress house, from whence it is either washed away, rots, or is devoured by gulls and sand fleas. At some stations the latter are so numerous that in a surprisingly short time the bones of the fish are polished clean.

The salting houses are long, low structures with but few windows, which leaves them usually in deep twilight. Generally they are arranged with two rows of square or round tanks, with a passage-way between them for the wheelbarrows to pass in and out. The large square tanks hold about 4,000 medium-sized fish, while the large round ones hold about 3,000. As a rule these tanks are made of redwood staves or planks held together with metal hoops or bolted together with iron bolts. At a few places small hogsheads are employed. These receptacles frequently are in use for years.

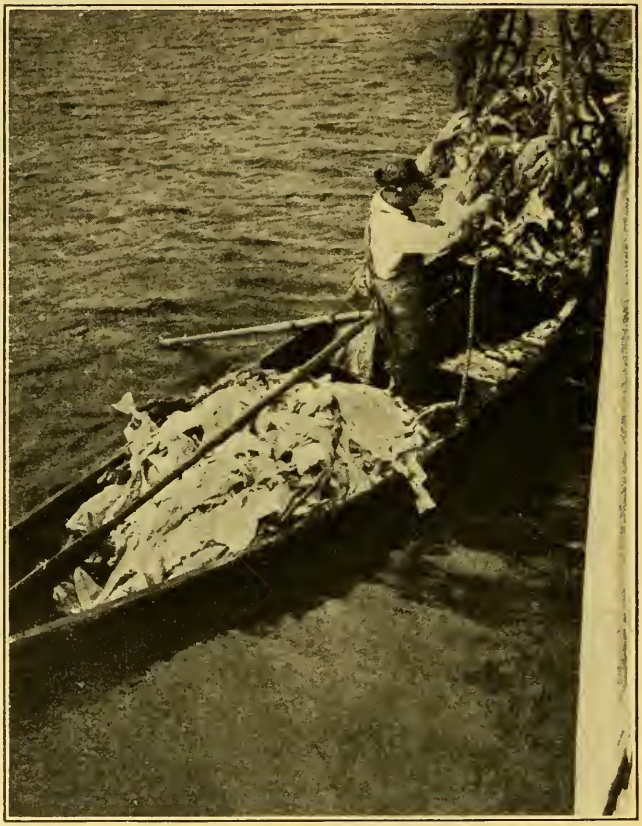

FIG. 14.—Loading codfish aboard the transporter by means of nets

Before the dressing begins each salter brings from the salt house about the number of bags of salt he expects to use. Usually this is figured on the basis of 17 sacks (holding 100 pounds each) to 1,000 fish. The quantity used varies, however, with the weather and the fatness of the fish.

The fish are placed carefully in the butts in layers, face or flesh side up. Salt is sprinkled over each layer, care being used to see that every part of the fish is covered. The layers are carried from 18 inches to 2 feet above the top of the butts so as to allow for the settling that will occur as the moisture is drawn from the fish. No pickle is necessary on these fish as they make their own. When the

fish have settled below the top of the butt, which they will do in a few days, several layers of new fish are added. In Alaska the pickle in the butts is kept at from 87° to 97°, salinometer test, the average being about 90°. As the climate in Alaska is nearly always cold and damp, there is but little danger of fish spoiling if ordinary care is used. Fish will keep indefinitely in strong pickle so long as they are covered with it. If kept for a long time the pickle must be replenished occasionally to repair the losses, particularly from leakage. At the stations the fish at the top of the butts are inspected every few days. When the pickle begins to weaken the top layer is turned back up and a few bags of salt laid on top. These press the fish down, and the salt in the bags dissolves much more slowly than if it were thrown loosely over the fish.

At a few stations where the salinometer is not used the agent uses a potato to determine when the pickle is strong enough. If the potato floats at the surface the pickle is strong enough for curing cod.

The pickle forms very rapidly in the early stages of the curing and the surplus is allowed to escape at intervals through a bunghole in the butt.

Care must be taken to see that the roof does not leak during heavy rains, as should fresh water drip into the butts the fish will become slimy.

Should the run vessel be delayed and a station become filled to its butt capacity, a space is cleared in the salt house and the fish taken from the first filled butts are kenched on the floor, a little salt being sprinkled between the layers and over the top. Every effort is made to hold them in the butts as long as practicable, as they retain their natural white color much better when in pickle, kenched fish usually acquiring a yellowish tinge.

When the station vessel arrives the pickle is allowed to run off the fish and they are pewed out into carts and wheeled along the dock to a point opposite the vessel's hatch, where they are dumped into a chute and pass thence into the hold. Here men receive and kench them in the same manner as on the fishing vessels, almost no salt being used, however, as the fish are already well cured and have a considerable quantity of salt adhering to them.

At stations where the vessels can not lie alongside the dock, owing to shoal water, the vessel is anchored in the bay or harbor and the fish are brought out to it in dories that are loaded from a chute rigged up at the outer end of the dock. When a dory is full it is rowed out alongside the vessel and the fish are pewed over the rail. As the vessel's rail is a considerable height from the surface of the water when she first begins loading, it is generally necessary to rig a stage about midway between the surface of the water and the top of the rail. The fish are then pewed onto this stage, whence one of the crew pews them over the rail onto the deck, and another man then pews them into the hold. This method is very expensive, as it requires a large number of men, is quite slow, and also injures the fish through excessive pewing.

In 1912 one company had square rope nets made similar to those used by cargo vessels in handling small packages. A small one is placed in the forward end of the dory and a larger one in the after end, space for the boatman to stand being left between the nets. The fish drop from the chute into these nets. When the dory arrives

alongside the vessel the cargo hook is lowered over the side. The four corners of the net have been drawn together at the top and these are slipped over the hook, the vessel's donkey engine started, the net with its contents lifted over the rail and lowered into the hold, where it is emptied by catching the hook in the meshes at the back of the net and starting the engine again. As the net comes up it is emptied, after which it is swung over the side and lowered into the dory, when the operation is repeated with the other net. By this method a vessel is loaded in about one-third the time previously required, while but few fish are lost alongside the vessel owing to carelessness in pewing. Another advantage is that it is not necessary to pew the fish after they are thrown into the carts.

There is a considerable loss of fish in passing them from the dock to the dory, especially in rough weather when the dory bobs up and down like a cork. The use of chutes with closed sides and built-in sections, so that they could be lengthened or shortened as the tide ebbed or flowed, would save a considerable part of the present wastage from this cause.

If the net method is not employed, the best way would be to have medium-sized scows for transporting the fish from the dock to the side of the vessel. With these the waste would be almost negligible, as they would be so much larger than the dories that practically no fish would be lost overboard while the scow was pitching and rolling in the swell alongside the dock; and owing to the greater weight and size of the scow the work of loading could be carried on in weather too rough for dories to work in.

WASTAGE IN THE INDUSTRY

There is much more waste in the Pacific fishery than in the Atlantic, due mainly to the different methods of arranging the fishing lay. In the Atlantic fishery every man has an interest in the catch and it is to his advantage to utilize every portion of the fish, thus increasing the total value of the fare, which means a larger share for himself in the final division. In the Pacific fishery the fishermen are paid a certain sum per thousand for fish running over a certain size and a smaller sum for fish under that size. On the vessels the fishermen have nothing to do with dressing the fish, which is done by a separate gang paid regular monthly wages. At the shore stations the fishermen dress their own fish and are paid a certain sum per thousand for all caught. As a result of this arrangement the Pacific crews resent doing more than merely catching and dressing the fish, and they even skimp the latter operation all they possibly can.

Livers and tongues.—As they receive no pecuniary benefit from the saving of livers and tongues, the fishermen naturally make no effort to do so unless compelled to by the owners. In dressing the fish at certain stations the header is expected to tear loose the liver and drop it into a bucket, which, when full, is dumped into the liver butt. Even at such stations, however, probably not one-fifth of the livers available are saved. At some stations and on certain vessels an extra boy is engaged whose business it is to cut out tongues, for which he is paid from $3.50 to $5 per barrel and his board.

Sounds.—Several times efforts have been made to cut out and save the sounds, but the men always have asked such a high price per hour for the work, and so few would be secured in an hour's time owing to the difficulty in cutting them loose and the general disinclination of the cutter to work, while their thinness made it necessary to cut out a large number in order to fill a barrel, that the cost of obtaining them was out of all proportion to the selling price.

Cod roe.—During the winter and spring the cod spawn in Alaska, and as large quantities are captured by the station fishermen at that

FIG. 15.—Native boy cutting out cod tongues

time cod roe is exceedingly abundant. The roe of the cod is an excellent food product, but except for a few served to the men in the mess houses no use is made of them. They could be preserved, either by pickling or freezing, and a possible market found for them in this country.

In the Atlantic fisheries large quantities are prepared as "rogue" and shipped to France, where it is used as bait in the sardine fisheries. In preparing "rogue" the roes should be soaked for some days in old brine and then packed in strong casks holding about 25 gallons each.

Heads and cheeks.—To many, a cod head, well cooked, is the choicest part of the fish, but unless one is at a shore station or aboard one of the vessels when fishing it is impossible to get one. If some one were to bring heads down to the coast States in brine doubtless he could build up quite a market for them. As nearly all of the nutriment is in the lower half of the head, a small band saw could be installed and the upper half of the head, which is bony and contains but little nutriment, cut off and thrown away and only the lower part, which contains the fleshy cheeks and the succulent tongue, saved. When glue and fertilizer plants are established at the stations, as will doubtless be done in the near future, the upper part of the head, which is rich in glue, could be used for this purpose.

Should it not be considered desirable to save the heads, the cheeks (a good-sized piece of choice flesh on each side of the head) could be cut out and preserved. Halibut cheeks, which are no more choice than cod cheeks, are always to be found in our larger coast fish markets.

Bones.—Fish bones are coming into quite general use by preparers of chicken food. These people grind up the fish bones, and, mixing them with other ingredients, obtain an excellent food for chickens. At present it does not pay to ship the bones, owing to their lightness as compared with their large bulk, but machines for grinding them could be introduced and the powder obtained shipped profitably.

Salt.—A large amount of salt is thrown away annually because of the belief amongst packers generally that salt once used in pickle, though not dissolved because of the excess employed, becomes exhausted. That this is not true can be demonstrated readily by dissolving it in water and testing it with a salinometer. While it might not be desirable to use it a second time in the salting tank, it could be washed and used in curing snappers and other fish that are to be marketed in a pickled condition.

LOSSES IN WEIGHT

There are but few data available on this coast showing the loss in weight in dressing and curing cod. The records of two typical vessels of the fleet for the years 1922 to 1925 show the following numbers of fish landed, their cured weight as landed at the home port, the average weight per cured fish, and the average dried weight and average round weight for the four years:

Year	Number of fish	Weight as landed, in pounds	Average weight as landed, in pounds
1922	324,440	1,409,875	4.345
1923	368,812	1,352,711	3.699
1924	408,778	1,580,771	3.898
1925	394,001	1,544,629	3.920
Average weight per fish as landed for the 4 years			3.965
Average round weight per fish for the 4 years			11.250

These fish had been dressed (head, entrails, and the greater part of the backbone removed) and salted in kenches in the holds for from two weeks to three months before being landed. All reports

available (and they are not very abundant) show a loss in weight in dressing of 45 to 55 per cent, while in curing before arrival at the home station the loss was about 17 per cent of the gross. In order to be conservative the loss in dressing has been placed at 50 per cent and the loss in kenching at 15 per cent of the gross, or 65 per cent altogether. The loss in drying on the flakes was about 5 per cent of the gross weight. This represents a total loss in weight from the round fish to the end of the flake drying (in which condition a considerable part of the Pacific coast catch is sold) of 70 per cent. Some of the by-products, such as tongues and livers, are utilized, however.

In preparing "boneless" fish (removing the skin, most of the bones, trimming, etc.) there is a loss of about 25 per cent from the flake-dried weight, while in preparing "absolutely boneless" (removing the skin, all the bones, trimmings, etc.) there is an additional loss of 5 per cent, making 30 per cent of the flake-dried weight. In preparing "boneless" and "absolutely boneless" fish the skins, bones, and trimmings are saved and disposed of to the glue makers.

A comparatively small part of the catch is hard dried for export, and the packers estimate that 150 pounds of dried fish are required to make 100 pounds hard dried.

PREPARING COD FOR MARKET

As soon as a fishing or station vessel reaches its home station the fish are landed and put into long troughs filled with water, where they are cleaned with brushes. They are then put into butts in the storage houses, backs down (except the top layer), salt being sprinkled between each layer, the amount used depending upon the degree and length of salting on the vessel. On top of the pile is placed about half a bushel of salt to strengthen the weak pickle that floats up to the surface. If the fish have been salted but lightly on the vessel one or two bags of salt are laid on top of the fish and the salt allowed to melt gradually. The fish remain in the butts under shelter until orders are received, which may be a year or more; in that case more salt is added from time to time, but the sooner they are used after the first few weeks the better, otherwise they have a tendency to turn yellow. Sunlight also will turn them yellow, so every effort is made to keep the storage house in deep shadow. The butts are either immense hogsheads or square tanks made of bolted timbers, and are used over and over again for years.

The curing of salt fish depends upon drying, and this is accomplished in three ways—by the use of salt, by pressure, or by exposure to the air either in the open air or in a drier. On this coast all three agents are employed.

When the fish are taken out of the butts they are piled in a kench or water-horsed to drain off part of the brine and to give the fish a smooth appearance. The fish are stacked face down, with the exception of the lowest layer in contact with the rack, in kenches about 4 feet high. If there is urgent demand for them they are left in this condition for 24 to 48 hours. If more time can be allowed they are repiled at the end of the first or second day, so that the fish on top may go to the bottom and be subjected to pressure

to squeeze out part of the water. If the weather is unfavorable for drying the kench is repiled every second or third day, and this may be continued for 10 days or more. With full-pickle fish, such as are prepared on this coast, it is not necessary to kench or water-horse so thoroughly as in the case of slack-salted or hard-dried fish.

From the water-horse the fish go to the flakes, which are of two kinds, stationary and canting, the former being the more common. The flake consists of a lattice bed about 8 feet wide, 30 inches high, and as long as the requirements may demand. The lattice used on this bed is made of triangular strips 1 inch on the base, placed about 3 inches apart. The fish therefore rest upon a sharp edge about every 4 inches, this giving the maximum circulation of air about the fish. The canting-flake frames, of which there are a number in use on this coast, are fixed only at the middle and to a horizontal axis, so that they can be turned at an angle with the horizon, in order to expose only the edge of the fish to the sun and to get the benefit of even a slight breeze. They are practical only in yards running north and south.

Rectangular boxes, with peaked roofs, known as "flake boxes," are used for covering the fish, when gathered together in small heaps, from dampness or rain. This box is generally 38 inches long, 22 inches wide, and 14 inches high, the whole being made of three-fourths-inch rough boards.

The fish are spread out carefully on the flakes with the face side up, and the drying is continued as long as may be necessary for the particular grade of fish. The full-pickle fish are dried for the shortest period, as they can not be skinned readily if too dry; and, furthermore, the trade seems to desire fish that are moist and not too hard, and these retain practically 50 per cent of their water. If the sun is fairly warm and there is a good breeze, the drying can be accomplished in about 10 hours as the minimum time, but this may be greatly increased with unfavorable weather conditions. Only one drying is usual for the full-cured fish.

Fish intended for Porto Rico or export usually are kenched directly from the vessel and not placed in butts. When needed they are dried for three days, "sweated" for two days, then dried again for two days. The object of the sweating is to bring the moisture out of the interior of the fish. The drying on the flakes removes the moisture from the surface and crystallizes the salt, but to get the moisture out of the center of the meat the fish must be piled in the kench, where the dry salt takes up some of the remaining moisture so that the second drying on the flakes has a greater effect. The export fish usually are dried sufficiently hard to withstand the pressure of the thumb in the thick part of the flesh without retaining the impression. The full-pickle fish lose about 9 per cent of their weight in drying on the flakes. When cured they retain about 50 per cent of their moisture, and the hard-dried from 25 to 30 per cent.

The sanitary conditions around a flake yard must be looked after carefully, as otherwise flies will breed and cause fly-blowing on the slack-salted fish.

Nearly all of the home stations on this coast have large artificial driers. These consist of inclosed rooms in which there are shelves of hot-water pipes, above which trays of fish are placed, and the air is made to circulate over them by means of a large fan. These dry

kilns are used chiefly in the drying of export fish. During foggy and damp weather and in winter when sunlight is rare they are used frequently.

After the fish have been dried they are carted to the storeroom and kenched until packed for shipment.

If the fish are to be boned and skinned they are taken to a separate room. Here the operator first cuts off the dorsal and ventral fins, then starts the skin at the napes and pulls it in toward the middle of the back and then toward the tail. If the fish has been cured properly the skin can be stripped off clean without tearing the flesh. The tail is then cut off, after which the fish is turned over and the nape bones removed with a small iron gaff called a "bone hooker."

FIG. 16.—Making cod bricks

The remaining portion of the backbone is cut out and the pectoral fins cut off. If it is to be put up as "absolutely boneless" the fish is passed to the bone pickers, who remove with forceps the ribs and any pieces of bone left in the body. If the fish are to be packed as so-called "boneless," then the fins only are cut off and the thick part of the backbone cut out closely, the small pieces of the fins, ribs, and backbone being allowed to remain.

The United States Department of Agriculture, in "Service and Regulatory Announcements No. 24," issued January 9, 1920, rules as follows in the matter of labeling codfish from which part or all of the bones have been removed, and it behooves all packers of codfish to study this closely:

Some manufacturers are placing on the market packages of codfish labeled as "boneless" from which only a few of the larger bones have been removed.

Other similar products, from which all or practically all the bones have been removed, are sold under such labelings as "absolutely boneless," "strictly boneless," and "no bones." Investigation by the bureau has shown that a very small part, if any, of the retail trade and consuming public is familiar with the distinction, and that a practically boneless fish is expected by them whenever the word "boneless" appears on the label.

The word "boneless" should be limited to the labeling of those products from which all or practically all the bones have been removed.

In making "bricks" or blocks the fish are cut to the desired size on a table made of blocks with openings between them at regular intervals. The fish, sometimes as many as eight or nine, are laid one on top of the other on the cutting table so that the best parts come between the openings. Then a long-bladed knife is driven through them and they are ready to be packed into bricks, etc. A trough, or miter box, also is used for securing the same result.

The pieces of fish are passed to girls, who sort them and weigh out exactly a pound or 2 pounds, whichever the weight of the brick is to be. Two good slices are selected to make the outside of the package and short or narrow strips to make up the middle part. The weighed fish is passed to the brickmaker, who selects first the piece that will make a whole side and an edge, and places it in the galvanized-iron mold; the smaller pieces are then put in, and lastly the remaining large piece to make a side. The selecting and placing of the pieces in such a way as to make the best appearing cake is quite a knack. The mold, which is 6 inches long by 3 inches wide and 3½ inches deep, is pressed tightly by foot or hand power, held for a few seconds, and then strings, which had previously been placed across the bottom of the mold in grooves left for the purpose, are tied around each end. The package is then completed by wrapping in paraffined or parchment paper with receipts and other matter printed on it. Some packers wrap in the parchment or paraffined paper and then inclose in a lithographed wrapper. There are several grades of bricks, depending upon the appearance and color of the fish, the choiceness of the pieces used, and the special curing to which the fish was originally subjected. Twenty-four 1-pound, twelve 2-pound, or twelve 3-pound bricks make a crate or case. The "boneless" fish put up in 5-pound boxes, but not pressed, run 12 to a crate.

Several forms of presses are used in this work, the most common consisting of a sliding box having two or three compartments, each of the size desired, and so arranged that a hand or foot lever forces a block down in one compartment at a time. The pressure remains while the fish are being placed in the second compartment, and when it is released the box is slid along until the second compartment comes under the press, when the brick in the first compartment is removed.

Shredded codfish, known as "desiccated codfish," "fibered codfish," "flaked codfish," and "skriggled codfish," is made up from the trimmings not otherwise used in packing the regular tablets, and is prepared on this coast by only one company. The material used is as good as any employed, but the pieces are too small to be used in the regular brick. They are run through a machine that tears the muscle into small fibrous bundles. In order to get this very fine and fluffy it may be necessary to press out part of the water after the first treatment and run it through the machine again, and then sift

it to free it from all particles of bone. The shredded fish is put up in 5 and 7 ounce cartons and jars, the latter being hermetically sealed in vacuum. Twenty-four boxes or jars make a crate.

A considerable quantity of skinned cod is put up in 100-pound cases. These are divided into "Large whole," "Extra large whole," and "Eastern style." These cases contain some of the finest of the whole cod cured, and the grade is fixed by the number of fish in the case. The last named are packed in eastern wood and are supposed to resemble most nearly the eastern fish of the same size and style of preparation.

The Porto Rican export, or hard-salted fish, are packed in drums, boxes, and bundles to suit the order, but there are regular drums

FIG. 17.—Cutting strips for the making of cod bricks

for 50, 100, 200, 300, and 448 pounds. The 448-pound drum is used very largely in the Porto Rican trade. The fish packed in drums are all well dried.

When placed in drums the fish are arranged carefully in circular fashion, with the flesh side up, until several layers have been put in, and then a layer is placed backs up. The fish are then well tamped with a heavy wooden tamper. Fish are again added and the tamping repeated at intervals. When the last fish are piled on the drum they will extend several inches above it, and a ratchet or a hydraulic press is necessary to force them down so that the head can be put in.

During the winter months a small business is done in preparing bacalao for the San Francisco trade. Usually this business is controlled by eastern packers who use the very small haddock in preparing it. Occasionally small haddock are not available from east-

ern waters during the winter season, and it is then that the Latin-speaking peoples of California fall back upon the local packers for their supplies. Small snappers, of which there is never a large supply on this coast, are used, and the fish are hard dried and then packed 100 pounds in a drum. It is fortunate that the business is not more extensive on this coast, as it means a heavy drain on the young cod, which, if allowed to live a year longer, would be much enhanced in value.

Large quantities of cod are sold after having been water-horsed and packed in bundles weighing 50 to 100 pounds. These fish are not skinned. A considerable trade in this grade of fish is had with the Hawaiian Islands.

Skinned fish are put up in strips and middles also. The strips consist of one-half the fish split down the middle and are cut to suit the trade—some left whole and some with more or less of the nape and thinner portion at the tail cut off in order to get heavy pieces. These are put up usually in 20 and 40 pound boxes. The middle is the whole fish after being skinned and the napes and tail cut off; how much of the napes and tail is cut off depends upon the number of middles permitted in a box of a certain size. They are quoted usually by the size—8 to 10 or 10 to 12 in a 40-pound box. They are also packed in 60-pound boxes. Frequently each individual fish is cut transversely the width of the box and folded over itself. Thick fish sometimes are cut transversely and each piece split and folded over in such a manner that the clean cut appears outside. Sometimes the fish are cut transversely across the fiber and tightly packed in boxes with the fiber running perpendicularly.

The trade in brine-salted codfish on the Pacific coast is small and is confined exclusively to the small fish or snappers. In pickling, the fish are dressed, split, washed, and salted in butts in the same manner as has been noted heretofore in the preparation of dry-salted cod. When shipment is to be made the fish are removed from the butts, cleaned with brushes, and placed in tight half barrels, flesh side up, except the top layer, which is placed backs up, the fish being bent to follow the curve of the half barrel. It is important that the fish be not repacked until thoroughly struck, otherwise the flesh will be marked with yellow spots caused by contact of the imperfectly cured fish with each other. Salt is placed at the bottom of the barrel and over each layer of fish, from one-half to three-quarters of a peck being used to each half barrel of fish. The barrel is then headed and strong brine added through the bunghole. About 38 medium-sized snappers are required to fill a half barrel. Most of these fish are sold to coasters plying up and down the coast and are fed to the crews.

The station fishermen frequently prepare a cod delicacy that they enjoy very much. Selecting a suitable cod stomach, the fisherman carefully cleans this inside and out. Several fresh, healthy cod livers are then picked out, chopped fine, and mixed with a little flour and vegetables; the stomachs are stuffed with this mixture, after which they are cooked like sausages.

Stockfish.—Of recent years a considerable business has developed in the preparation of stockfish. A number of small shore stations in the Shumagins and elsewhere, spend a considerable part of their

time on this work during the colder portion of the year, while a few individuals occasionally have put up varying quantities.

In preparing stockfish the fish are split in the regular way to a spot a little below the vent. The backbone is then removed and the fish split into two equal halves as far as the first cut extended. Snappers are sometimes merely gutted.

The drying yard comprises a network of wires running from crosspieces nailed onto uprights. The fish are hung over these wires, flesh side in, and supported by the undivided portion of the tail. Here they are allowed to cure in the sun and wind, no salt at all being used, sometimes for as long as six or seven weeks, the length of time depending upon how much moisture there is in the atmosphere. During long-continued rains the fish are stored under cover, but it does not hurt them to remain out during ordinary rains. When bone-dry the fish are stowed away in dry, cool houses, and when shipped are bound by wires into bales.

This work is carried on in winter, which is the only season when comparatively dry, cold weather is experienced in the Shumagins. In shipping and storing these fish great care must be exercised to see that they are not placed in a damp room, or that anything damp comes in contact with them, as in that event they will become slimy.

Fish prepared in this manner will keep for a much longer period than when prepared by any other method. It is much practiced by the Norwegians.

When desired for the table a sufficient number are put to soak in water and remain there four to five days, the water being changed every day. When of the desired softness the fish are put in fresh water with some lye and allowed to remain about 24 hours. The lye cuts the slime from the fish and gives it an added flavor.

Tongues.—Cod tongues are saved whenever possible. On the vessels one of the dress gang usually cuts them out, while at the stations some one other than a regular fisherman usually does this work. A cod's tongue is attached to the lower jaw, and when cut out includes all that part of the jaw lying inside the jawbone. When cutting tongues the operator takes hold of the fish by the back of the head, using the eyes for finger holds. As he lifts the fish by the head its mouth usually falls open, then with his other hand he cuts the tongue loose on the sides with a sharp knife, then cuts loose the lower end along the curving bone forming the back part of the lower jaw. The tongue is then hanging by a thin strip at the forward end of the jaw, from whence it is torn loose by the hand. The tongues are cured loosely in barrels with salt, and after being thoroughly struck are packed in barrels holding 200 pounds, which are headed, after which a strong brine is added through the bung. They are sold in these barrels or else repacked in half barrels, pails, and kits. Some are mixed with sounds and sold as tongues and sounds. As no sounds are saved on this coast, eastern sounds are employed in packing the latter.

Codfish tongues, especially when fresh, are considered a great delicacy. They are thoroughly washed in order to clean them, then dried with a clean cloth, rolled in bread or cracker crumbs, and fried the same as oysters. The salt tongues can be prepared in the same manner after having been soaked thoroughly in fresh water.

The packers never overstock with codfish tongues if it can be avoided, as in a year or two part of the tongue hardens, thus making it worthless as food.

Canning.—On the Atlantic coast a considerable quantity of cod is canned annually under the name of "codfish flakes." An even greater quantity of hake, haddock, and cod are canned together under the name of "fish flakes." The opportunity for canning cod is especially good on the Pacific coast. Several of the salmon canneries are located in close proximity to the cod banks, and as these plants already have the machinery and employees needed for carrying on this work in addition to the canning of salmon, cod could be canned much more cheaply than if a plant had to be erected especially for the work. As no other members of the Gadidæ other than the true cod are available on the Pacific coast for this work, the product could be sold under a cod label, which would enhance its value considerably. In 1916 the Pacific American Fisheries Co. began the canning of cod at its canneries along the Alaska Peninsula. Early in the season, before the salmon appeared, several purse-seine vessels were equipped with dories and hand lines and these fished on the North Pacific and Bering Sea banks. The fish were brought in fresh and canned. The following was the pack for the three years when canning was practiced:

Year and kind	Cases	Value
1916:		
½-pound flats	463	$1,389
1-pound flats	237	948
Total		2,337
1917:		
½-pound flats	567	2,339
1-pound flats	2,070	12,420
Total		14,759
1918:		
1-pound flats	2,336	14,175

In this experiment, as in most of the others undertaken in recent years on this coast, the packers followed too closely the methods in vogue in canning salmon, and as a result the product did not meet with the favor it probably would have had if other methods more suited to cod had been followed.

There is no doubt in the author's mind but that the canning of Pacific cod eventually will furnish an important consuming market for this excellent fish, and it is the intention of the author to take up immediately at the College of Fisheries, University of Washington, the problem of how best to can Pacific cod, and as soon as satisfactory results are obtained they will be made public.

Cod-liver oil.—At an early date in the fishery, oil was being extracted from the livers of cod. In 1866, 10,000 gallons were reported as having been rendered, which statement seems somewhat of an exaggeration when the then extent of the fishery is taken into account. In 1879 Lynde & Hough are reported as bringing to San Francisco 3,000 gallons of oil. In later years a small quantity was

prepared each season, the quantity depending upon the demand and price.

All the oil was prepared by rotting the livers in large vats or hogsheads, and the resulting product, after being strained, was shipped in this condition.

In 1899 the Alaska Codfish Co. installed a refining plant at its Kelleys Rock station, in Alaska, and operated it successfully until 100 barrels (iron-lined receptacles holding 20 gallons) had accumulated, when they were brought to San Francisco and the oil offered for sale to makers of emulsion of cod-liver oil. At that time the market was overloaded with this grade of oil and the best price offered was about what the container cost, so the oil was stored and the plant shut down. A few years later the market picked up and the oil was disposed of at $22 per barrel. In the meantime the company's oil maker had disappeared and the plant was so badly dilapidated through the action of the elements that the industry was not resumed.

Later the Union Fish Co. erected a plant at Pirate Cove, but after refining a small quantity at no profit to the company this plant was also shut down and has remained so ever since.

At present the small quantity rendered is shipped just as taken from the rotting tank, except that it is first strained.

Glue and fertilizer.—As early as 1893 a plant was started in California for the purpose of manufacturing glue from codfish skins and other refuse of the packing plants in the States. The material remaining after the glue had been extracted was prepared and sold as fertilizer. There are now two plants at Anacortes, Wash., and one in California that prepare glue in whole or in part from cod.

It is to be hoped that in the near future small plants for the manufacture of glue and fertilizer will be established at certain centrally located stations in Alaska, where the large quantity of heads, entrails, and spoiled fish can be utilized and not, as now, thrown into the water under the dress houses, where they pollute the water, while the bones remaining after the flesh has rotted away are gradually filling the smaller harbors.

USE OF PRESERVATIVES

In 1881 boracic acid was introduced as a preservative in the fish industry and was used continuously until 1907, when it was generally superseded by sodium benzoate. Boracic acid is employed but rarely on this coast at the present time, and when so employed it is on export fish. If this acid is used, it is applied to the fish when they are being shifted in the water-horse or to the outside of the completed codfish brick.

Sodium benzoate is almost solely the only preservative used on this coast. It is mixed with finely ground salt and applied by means of a powdering can, like a large pepper box. It is used upon the fish in the storeroom if the weather conditions demand it, but its principal use is upon the fish as they are being weighed out into tablets and bricks. This preservative is used chiefly during the warmer months. The amount used is not weighed but is dusted on to cover the whole surface, the effort being to apply from 0.3 to 0.4 per cent. When this preservative is used the package of fish bears

the following label or stamp: "Sprinkled with one-half of 1 per cent soda benzoate. To remove, soak out in fresh water."

Preservatives are never used upon fish shipped to near-by points or if the fish are to be consumed very shortly after being shipped. Its use is generally upon fish shipped abroad, or fish shipped considerable distances in this country during the summer months.

MARKET FOR PACIFIC COD

The development of the demand for Pacific cod has been one of slow growth against great obstacles. In the early days of the industry all of the catch was marketed on the coast, and as salt fish was scarce and in good demand, fairly good prices were obtained for an article which, in many instances, was only indifferently cured. The success of the pioneers led to a rapid expansion of the industry, with the result that the local market was soon overstocked and the curers had to look to the Middle Western and Eastern States and abroad for a market for the surplus.

At this period the eastern curers, and the large wholesale salt-fish houses scattered throughout the country who purchased their supplies from them, controlled the markets for cod throughout the United States, while all of the cod exported from this country went from New England. Naturally these curers, and the wholesalers dependent upon them, did not welcome the intrusion of Pacific cod, and while they were unable to prevent the loss of the greater part of their trade on the Pacific coast, they fought hard for the rest. Dealers and consumers were told in some instances that the fish prepared by this coast's curers were not cod, or that they were a very inferior grade of cod; that the fish would not keep, etc. That these misstatements had a wide dissemination and made a considerable impression is evidenced even to this day in the prejudice which is met in different sections of the country against Pacific cod.

Unfortunately, the Pacific coast producers, through ignorance, played right into the hands of their trade enemies when first invading the territory hitherto held by them alone. Some of the fish were poorly prepared and part of them were shipped across the continent during a season when the weather was warm, and as they had been stowed in ordinary box cars, the temperature of these corresponded to the weather, so that the fish arrived in the eastern market in very poor condition, thus disgusting the few dealers who had been willing to give them a trial. The shippers quickly discovered their error and afterwards restricted shipments for long distances to the colder months of the year and also used refrigerator cars. The damage had been done, however, and from then on it was slow and discouraging uphill work to extend the market for Pacific cod east of the Rocky Mountains.

The fight of the Pacific cod for admission into eastern markets is a typical example of how difficult it is to overcome a prejudice, no matter how insufficiently founded.

On the Pacific coast but one species of the Gadidæ, the true cod (*Gadus macrocephalus*), is to be found of a sufficient size for dry-salting, and as a result is the only species sold in any condition other than fresh. At the very time when the dealers were refusing Pacific cod, and for a number of years after, the vast majority of

them were purchasing from eastern curers hake, cusk, and pollock, closely related species to the true cod, but much cheaper, and, in the opinion of those best informed, much inferior to the true cod, and were selling these as true cod along with the cod itself. The pure food law compelled the dealers to sell the fish for what they really were, and as a result the market for the Pacific cod has been widening rapidly ever since.

Being shut off from Europe and the east coast of South and Central America by high freight rates and the great distance the fish had to travel, the Pacific dealers directed their efforts toward Mexico, the west coast of Central America, the islands of the Pacific, and Asia with most gratifying results. At one time a large business was done with Australia, until that Commonwealth enacted a stringent law prohibiting the use of preservatives on shipments of salt fish into that country. As the goods had to pass through the Tropics on their way to Australia, and the Australians are not accustomed to using hard-cured fish, heavy losses through fish spoiling resulted from this prohibition and the market there has been curtailed as a result.

Despite the natural and artificial handicaps under which the industry suffered, a considerable trade has been developed in the West Indies, and this was enlarged during the European war. The Norwegians, who formerly shipped large quantities to this section, have found a new market in Germany. While the close of the war forced trade largely back into old channels, many markets had tested the excellence of Pacific cod and continued to use them whenever possible. The opening of the Panama Canal also greatly aided in the expansion of the trade in this section of the world.

The Asian market undoubtedly in time will attain to large dimensions. At present, and for a number of years past, it has been widening steadily as the fish became better known and the means of transportation increased.

Hawaii consumes large quantities of cod, and the greater part comes from the Pacific coast. San Francisco dealers ship nearly all of the bundle fish (fish that have been water-horsed and put into bundles of 100 pounds each and bagged) and a considerable part of the cased cod, while the Puget Sound dealers ship mainly cased fish.

Mexico is rapidly developing into an excellent market for Pacific cod, mainly for cased fish that have been dried harder than for consumption nearer home.

The increase in steamship lines to South and Central America, due to the opening of the Panama Canal, will aid greatly in widening the markets for Pacific cod in that region of the world.

The demand on the part of the public for dried cod is not what it ought to be, and a good part of this lack of demand is due to the archaic methods of doing business prevalent not only in the Pacific cod industry but also in that of the Atlantic.

If the shippers of codfish were to copy somewhat the methods followed by the meat packers they would have less loss from spoilage, while the fish would present so much nicer an appearance that the demand for it would increase materially. The only difference between salted meat and salted fish is that the latter is less liable to spoil.

When shipping to the Atlantic seaboard the dealers usually select the season from November to March and load the fish in refrigerator cars. The latter are cooled but little during the shipment. In shipping lesser distances the fish usually are stowed in ordinary box cars. Sometimes these box cars are shunted onto sidetracks and held for days at a time, and should the temperature rise above 65° F. during this period and under these conditions reddening is apt to appear.

The better plan is to have cold-storage depots located in trade centers. The fish could be shipped in refrigerator cars to these depots frequently, where they could be put in storage. The retailers could then be encouraged to order the fish in small lots, say, enough to last for a week or 10 days, and thus they would always have on hand comparatively fresh fish.

In their eagerness, however, to do business the jobbers frequently overload the retailer, with the result that the fish dry out to such an extent that the salt crystallizes upon it and the fish presents an unattractive appearance, while if the temperature rises above a certain point reddening is apt to occur should conditions be ripe for it.

Grocery stores are the chief handlers of cod, and but few of them are properly equipped for doing this. It is but rarely that a customer who enters one of these stores will see dried cod on exhibition; or, if he does, it is usually whole fish jumbled up in a case and presenting an unattractive appearance. Usually the fish is kept in a back room or the cellar and is brought out only when the customer orders it. As many customers are in an uncertain frame of mind as to what they want when they enter a store, and usually decide after a glance over the visible stock, it follows naturally that but few ever order salt cod, and, owing to the extra labor involved in bringing the cod from the back room or cellar, the clerks rarely ever call the customer's attention to its existence.

If the retailer fitted up a small refrigerated show case with glass sides and top somewhere in the store proper, he could not only keep in this his dried cod, especially the bricks, tablets, middles, etc., which could be tastefully arranged on china trays, but could also display a number of other articles that require to be kept in a cool place and that usually are sold in grocery stores, such as smoked fish, pickled fish, etc.

With the fish displayed thus prominently before the customer, his attention is at once attracted to it, and he is much more liable to purchase it than if the product were kept out of sight and only produced when a customer called for it.

The greater part of the bricks and tablets are now wrapped in white parchment paper with the brand and a little lettering printed on it in a neutral tint. A few of the more progressive dealers wrap them in the parchment and then inclose the package in an ornately lithographed wrapper. The latter makes a very attractive appearance and undoubtedly aids in calling the attention of the consumer to the product, particularly if it is displayed as recommended above, as is the case in a few of the high-class delicatessen stores. An even better method would be to pack the bricks and tablets in lithographed cartons made to hold certain sizes. On one side recipes for cooking

and preparing the fish should be printed; if the fish is improperly prepared by a cook unfamiliar with it, those who partake of it are not likely to want it again.

COMPARATIVE ANALYSES OF PACIFIC AND ATLANTIC COD

Much has been said and written about the alleged superiority of Atlantic over Pacific cod. While there are a number of analyses of Atlantic cod extant, the same, unfortunately, is not true of the Pacific cod. The only one available is that made for the Robinson Fisheries Co., of Anacortes, Wash., and the subject was a sample of shredded Pacific cod. Fortunately, there is one analysis of Atlantic shredded cod with which it can be compared. The analyses follow:

Comparison of Pacific and Atlantic shredded codfish

	Pacific cod [1]	Atlantic cod [2]		Pacific cod [1]	Atlantic cod [2]
	Per cent	*Per cent*		*Per cent*	*Per cent*
Water	43.90	46.52	Phosphoric anhydride	0.69	----------
Protein (calc. from nitrogen)	37.19	30.85	Sulphuric anhydride	.07	----------
Protein (calc. from differences)	35.00	----------	Chlorine	11.37	----------
Fat	.73	.33	Fuel value per pound		
Ash	20.37	22.81	----------calories (calc.)	682	578

[1] Analysis made by Stillwell & Gladding, New York, N. Y.
[2] Foods and Their Adulteration, by Dr. Harvey W. Wiley, p. 126. Philadelphia, 1907.

REDDENING OF COD

A source of considerable expense and annoyance to the codfish packers is the occasional reddening of the fish. While not so common on the Pacific coast as on the Atlantic and European coasts, due to the much lower mean temperature during the warm months and possibly the grade of salt used, yet it does appear at times.

Codfish and some other salt-cured fish are subject to spoilage when exposed to a temperature above 65° F. The spoilage is manifested by the surface of the fish turning red. This is an old complaint on both coasts and in Europe, and has been increasingly expensive on the Atlantic coast, as the expansion of the industry has necessitated the marketing of greater and greater quantities of fish during the warm months of the year. It appears only on the dry-salted fish, as fish completely submerged in pickle seems to be immune so long as it is retained there.

The fist sign of redness appears when the dried fish are stored on the ground floor and before the skinning and packing are done, but frequently it may not appear until many days after the fish has been packed and shipped.

Reddening is essentially a surface infection. Except as it follows fissures in the muscles, cuts, or breaks where the air has free access, it does not appear below the surface. On the whole fish the favorite point of attack is near the backbone, and this is due to the greater thickness of flesh, which insures more moisture at all times. It is more often found upon the outside of the bricks or tablets. Sometimes the affected fish is of a pale, pink color, at other times a bright red.

Reddening of cod has been studied by a number of scientists.[17] Research has shown that it is due to bacterial activity. There is disagreement, however, as to whether it is caused by one or more organisms. On the other hand, all investigators who have recently studied the subject agree that the bacteria that cause reddening grow best in strong salt (even saturated) solutions. Fresh water kills them. A plentiful supply of air and moisture is necessary for growth. At 50° to 55° F. growth is very slow. With increasing temperatures, providing sufficient air and moisture are present, growth increases, taking place most rapidly between 120° and 140° F. The bacteria are killed when kept in dry air for 30 minutes at 248° F.

Experiments have shown definitely that the infection comes from the use of salt obtained from sea water by solar evaporation. Salt from underground mines is not infected. Examination has shown that in most establishments the tanks, tables, floors, walls, and other parts of the curing houses and rooms where the cured fish are handled are more or less infected with reddening bacteria.

The remedies suggested by Harrison and Kennedy[18] for diminishing and preventing reddening follow:

The most important point arising out of these experiments is the fact that the tropical or solar salts carry the red organism, and so long as they are used in their present form, red coloration of fish is bound to follow.

Curing establishments that use this salt, or have been using it, have their tanks, floors, storage places, puncheons, kench racks, carrying boxes, utensils, etc., impregnated or inoculated with the red organism.

Therefore, all measures taken to deal with this problem must provide for:

1. A supply of salt free from the red organism.

2. The destruction of the red organism in the curing factories wherever it has infected buildings, utensils, etc.

1. *Recommendations regarding salt.*—Mined salt of suitable size of grain should be used until a supply of solar salt free from the red organism can be secured.

Importers of solar salt might sterilize this product by kiln heating. A comparatively low dry heat is necessary—100° C. for 30 minutes.[19]

2. *Recommendations regarding cleaning of curing establishments.*—All curing establishments which have used solar or tropical salts should clean and disinfect thoroughly all material which has come into contact with salt or fish.

Steam, if available, may be used for this purpose. Puncheons, tanks, etc., should be steamed inside and out, also all utensils, racks, etc.

All parts of the factory that have become infected should be washed well in fresh water. This will have two results: The removal of salt from woodwork, thus preventing the organism from growing, and the fresh water causes the disintegration of the red organism, breaking it down into a slimy mass.

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[17] Preparation of the cod and other salt fish for the market, including a bacteriological study of the causes of reddening. By A. W. Bitting. United States Department of Agriculture Bulletin No. 133, 63 pp., illus. (1911). Washington.

Report of progress of biological inquiries. Report of the division of scientific inquiry for the fiscal year 1920. By R. E. Coker. Appendix II, Report of the Commissioner of Fisheries for 1920 (1921), pp. 27–28. Washington.

Red discoloration of cured codfish. By F. C. Harrison and Margaret E. Kennedy. Report 11, the Honorary Advisory Council for Scientific and Industrial Research (1922). Ottawa, Canada.

Red discoloration (so called "pink" or "pink eye") on dried salted fish. By P. C. Cloake. Department of Scientific and Industrial Research, Food Investigation Board, Special Report No. 18 (1923). London.

[18] Red discoloration of cured codfish. By F. C. Harrison and Margaret E. Kennedy. Report 11, the Honorary Advisory Council for Scientific and Industrial Research (1922). Ottawa, Canada.

[19] At least one other investigator (Cloake) does not believe 212° F. is sufficient to sterilize the salt in 30 minutes, and recommends 248° F. Undoubtedly a much higher temperature than either of these will prove more practical because of more rapid sterilization at the higher temperature. Salt can be heated to temperatures in excess of 1,000° F. without bad effect, if desired.

All places infected, and all utensils, may be washed in a disinfecting solution of 1 part sulphurous acid in 50 parts of water.

A good whitewash should be applied as soon as the cleaning up has been effected.

Care should be exercised to keep the premises and utensils clean, all refuse and offal should be frequently removed, and the floors scrubbed and washed often.

BROWN MOLD

Brown mold, which forms brown, frecklelike spots on partly dried fish, occurs but rarely on this coast. It occurs usually on old fish, but may be found on comparatively fresh fish also. The fungus affects both sides of the fish, even covering the fins and tail. When it is found on comparatively fresh fish, they are scrubbed with a brush in running water, after which they are powdered. But little attention is paid to this fungus by the packers.

JAPAN AS A COMPETITOR

For a number of years Japanese fishing vessels have been resorting to the Asian cod banks, located in Bering Sea, Sea of Okhotsk, Japan Sea, the waters of the Kurile Islands, and Hokaido, and the Yellow Sea. Before our San Francisco fleet (in 1910) stopped going to the Okhotsk Sea banks they reported seeing numerous Japanese schooners on those banks.

Trawl lines are used on the near-by banks. A 200-fathom main line, with 100 or more gangeons with hooks attached, makes a "basket," and each boat carries 14 to 15 such baskets. The bait used are herring, squid, flounder, salt sardines, and octopus, and the fishing season is usually from January to April.

The larger schooners—from 100 to 150 tons—operate mainly in the waters around the Kurile Islands and in Okhotsk Sea, and the vessels generally, as on the American side, leave the home port during the early part of May and return the latter part of October. Usually about 100 days are actually spent in fishing, the best period being during July and August. Hand lines are used by the fishermen and these usually are fished in 90 or less fathoms, two hooks being employed. Herring, mackerel, or codfish are used as bait.

The Okhotsk Sea fishermen salt their fish in the hold as our fishermen do. However, two methods of dressing are followed. In one the fish are split down the belly and the head is removed, as is the custom with our fishermen, while in the other the fish are split down the back, as is done by our mackerel fishermen, and the head is left on. These are called by the Japanese "open cod." Those split down the back are dried and packed in straw mats or in boxes for export to China, where a considerable market has been developed for them. The open cod, with head off, is usually put up during the winter months and sold largely in Japan.

Stockfish, or "stick cod," as it is known locally, is also prepared in the same way as in Alaska.

The home phases of the industry are centered largely in Hokkaido and Sakhalin Island, or Karafuto, as it is known in Japan.

The Japanese at first gave their attention to the supplying of other oriental markets with dry-salted cod and were measurably success-

ful, especially in China. They soon discovered, however, that the principal consumers of this excellent fish were Occidentals. A few small sample lots were shipped to American and other markets, but these proved unsatisfactory because of their unattractive appearance, due largely to wrong selection of fish to be used, the grade of salt selected, and poor methods of dressing and curing the product. The Japanese were quick to see what was wrong, and with their usual thoroughness sent out various trained men to study the methods followed in the producing countries and the likes and dislikes of the consuming markets. This was continued for a number of years and the product prepared by these men, or by the fishermen trained under them, slowly found its way into certain occidental markets.

The following table shows the importations into this country of dry-salted cod from Japan from 1912 to date:

Imports of cured and preserved cod from Japan, 1912 to 1922

	Pounds	Value		Pounds	Value
Fiscal year ending June 30—			Six months—		
1912	335	$14	1918 (July 1 to Dec. 31)	1,585,550	$107,185
1913	18	3	Calendar year—		
1914	1,060	26	1919	[1] 4,781,631	390,024
1915	868	57	1920	2,592,226	294,397
1916	5,223	232	1921	590,320	90,914
1917	69,432	4,570	1922	92,482	9,558
1918	190,554	17,511			

[1] Of these, 672,732 pounds, valued at $46,794, were from Russia in Asia.

The breaking out of the World War proved a golden opportunity for them. The combatants in Europe very quickly absorbed all of the European production, a large portion of which, especially from Norway, had previously found a market in the West Indies and South and Central America. A considerable part of the fish from Newfoundland, Canada, and the Atlantic seaboard of the United States, which previous to the outbreak of the war had also been marketed in the above sections, was attracted to Europe by the high prices. This led to a heavy demand for cod from the Pacific to supply the shortage created in South and Central America and the West Indies, and our industry enjoyed great prosperity from 1915 until the great slump came in 1921.

At the time when the war broke out salt codfish was on the free list, but it was difficult for foreign fishermen to ship fish because of the provisions in our law preventing a foreign fishing vessel from sailing direct from the fishing banks to one of our ports, selling its catch, outfitting for another trip, and then returning direct to the banks.

In April, 1918, in order to facilitate the importation of fish, the Secretary of Commerce issued an order suspending the operation of the law forbidding the landing of catches of foreign fishing vessels direct from the banks. The result was that Japanese fishing vessels were permitted to come here direct from the fishing banks (in a few instances the vessels caught their fish on the Alaska banks), market their catch, buy salt and other supplies, and return direct to the fishing banks. The Secretary's order was withdrawn on July 15, 1921. While the law was suspended the following Japanese fishing vessels landed cargoes as noted below:

Importations of cod from Japan

Vessels and importing points	Owner	Sailed from—	Date of arrival	Stock-fish, pounds	Dry-salted cod, number
1918					
At San Francisco:					
Nambo Maru	Japan Fisheries Co	Japan	Aug. 20		230,000
Tembo Maru	do	do	Nov. 5		78,000
Sobo Maru	do	do	Nov. 9		200,000
Ichikawa Maru	do	do	Nov. 26		220,000
Umbo Maru	do	do	Dec. 22	176,000	166,000
Total				176,000	894,000
1919					
At San Francisco:					
Nambo Maru	Pacific Trading Co	Japan	Jan. 24		184,000
Nippo Maru	do	do	Mar. 6		262,500
At Puget Sound:					
Sobo Maru	Japan Fisheries Co	do	Oct. 8		115,000
Nambo Maru	do	do	do		120,000
Ichikawa Maru	do	do	do		115,000
Fubo Maru	do	do	Oct. 23		216,000
Daibo Maru	do	do	Nov. 25		70,000
At Vancouver, B. C.:					
By regular steamers		do		630,500	
Total				630,500	1,082,500
1920					
At San Francisco:					
Masashige Maru	Pacific Trading Co	Japan	Nov. 25		92,000
At Puget Sound:					
Sobo Maru	Japan Fisheries Co	Okhotsk Sea	Oct. 24		156,000
Ichikawa Maru	do	do	Nov. 1		122,000
Nambo Maru	do	do	do		122,000
Okhotsk Maru	Royal Fish Co	do	Nov. 30		130,000
Total					622,000
Grand total				806,500	2,598,500

PACIFIC COD INDUSTRY IN 1924

Some differences will be found between the figures herein given for the cod industry of Alaska and the figures appearing in the report "Alaska Fishery and Fur-Seal Industries in 1924" (Bureau of Fisheries Document No. 992). This is because of the fact that certain items are included in this report that are not credited to the cod industry in the Alaska report cited above. The Alaska report includes only those fish actually landed in the Territory; also, there are credited to Alaska only those fishing vessels that were operated from shore stations, and the vessels engaged in transporting shore-station catches but that did not engage in offshore fishing. Later and more complete sources of information also were available in preparing the figures that appear hereinafter.

PERSONS EMPLOYED

The following table shows the number of persons employed in the various branches of the industry. Alaska leads in the total number by a slight margin over California. The latter State leads, however, in the number of fishermen and transporters. About 34 Indians were employed in Alaska. All others were whites.

Persons employed in the cod fisheries of the Pacific coast in 1924

How engaged	Alaska	Washington	California	Total
In vessel fisheries: Whites	39	180	219	438
In transporting: Whites	8		18	26
In shore and boat fisheries:				
Whites	222			222
Indians	17			17
Total	239			239
In shore work:				
Whites	13	65	65	143
Indians	17			17
Total	30	65	65	160
Total:				
Whites	282	245	302	829
Indians	34			34
Grand total	316	245	302	863

INVESTMENT

Ten sailing vessels and six power vessels were engaged in fishing, while two sailing vessels and nine power vessels were employed in transporting. One hundred and seven power vessels, each under 5 net tons, and 356 dories were employed in all branches of the fisheries. With the exception of a few trawl lines used in the Alaska vessel fishery, hand lines were employed. California leads in the total investment, followed by Alaska and Washington in the order named. The high value of the investment in Alaska is due to the number of shore stations located there.

Vessels, boats, apparatus, shore property, and cash capital employed in the cod fisheries of the Pacific coast in 1924

Designation	Alaska		Washington		California		Total	
	Number	Value	Number	Value	Number	Value	Number	Value
Vessels fishing:								
Sailing			5	$51,000	5	$59,726	10	$110,726
Tonnage			1,448		1,757		3,205	
Outfit				80,184		80,000		160,184
Power	5	$33,500			1	27,000	6	60,500
Tonnage	80				115		195	
Outfit		11,033				9,000		20,033
Vessels transporting:								
Sailing	1	2,600			1	15,253	2	17,853
Tonnage	14				281		295	
Outfit		150				3,000		3,150
Power	8	71,800			1	43,000	9	114,800
Tonnage	126				223		349	
Outfit		20,376				5,000		25,376
Launches under 5 tons	106	92,570			1	3,500	107	96,070
Boats	123	4,950	103	5,460	130	6,500	356	16,910
Apparatus:								
Vessel fisheries—								
Hand lines	570	1,075	1,440	1,703	1,500	3,700	3,510	6,478
Trawl lines	12	200					12	200
Shore fisheries—								
Hand lines	1,391	4,529					1,391	4,529
Shore and accessory property		129,704		145,600		115,000		390,304
Operating capital		20,376		58,100		46,500		124,976
Total		392,863		342,047		417,179		1,152,089

PRODUCTS

The total quantity of cod landed in 1924 amounted to 8,805,705 pounds, valued at $543,496. This represents 2,784,857 fish, a comparatively small production for this coast. As the companies prepare and market their own fish in a dried, boneless, or pickled condition, the ultimate returns received by the companies will be much larger than is shown in this table.

The vessel fisheries produced 7,155,520 pounds, valued at $433,963, while the shore fisheries produced 1,650,185 pounds, valued at $109,533. The frozen cod reported was landed by halibut vessels.

Washington leads in the total quantity produced and is second in value of same, while California is second in quantity produced and first in value of same.

Products of the cod fisheries of the Pacific coast in 1924

Fisheries	Alaska		Washington		California		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Vessel:								
Cod—								
Dry-salted	301,090	$14,530	3,700,791	$176,815	2,878,028	$223,512	6,879,909	$414,857
Pickled	220,260	17,070					220,260	17,070
Frozen	45,951	1,378					45,951	1,378
Tongues			9,400	658			9,400	658
Total	567,301	32,978	3,710,191	177,473	2,878,028	223,512	7,155,520	433,963
Shore:								
Cod—								
Dry-salted	1,609,560	103,598					1,609,560	103,598
Stockfish	39,300	5,869					39,300	5,869
Tongues	1,325	66					1,325	66
Total	1,650,185	109,533					1,650,185	109,533
Total:								
Cod—								
Dry-salted	1,910,650	118,128	3,700,791	176,815	2,878,028	223,512	8,489,469	518,455
Pickled	220,260	17,070					220,260	17,070
Frozen	45,951	1,378					45,951	1,378
Stockfish	39,300	5,869					39,300	5,869
Tongues	1,325	66	9,400	658			10,725	724
Total	2,217,486	142,511	3,710,191	177,473	2,878,028	223,512	8,805,705	543,496

SUMMARY OF CATCH

The following table gives a complete summary of all the codfish secured in the vessel and shore fisheries from the inception of the industry and carried to the home ports in Washington and California. No effort has been made to include the cod consumed locally in Alaska, which, in the aggregate, amounts to considerable, as it forms the principal article of diet along a considerable stretch of Alaska's coast line. This table shows that 72,706,620 fish were secured in the vessel fishery and 38,226,218 in the shore fishery, or a grand total of 110,932,838 fish.

Summary of cod catch of Alaska

Year	Vessel fishery	Shore fishery	Total	Year	Vessel fishery	Shore fishery	Total
	Number	*Number*	*Number*		*Number*	*Number*	*Number*
1863	7,100		7,100	1896	837,000		837,000
1864	54,500		54,500	1897	850,000	511,000	1,361,000
1865	225,000		225,000	1898	342,000	450,000	792,000
1866	724,000		724,000	1899	783,000	722,000	1,505,000
1867	943,400		943,400	1900	817,000	909,000	1,726,000
1868	580,000		580,000	1901	787,000	727,000	1,514,000
1869	1,032,000		1,032,000	1902	1,229,000	1,140,000	2,369,000
1870	1,467,000		1,467,000	1903	1,463,800	985,000	2,448,800
1871	926,000		926,000	1904	1,546,524	1,002,000	2,548,524
1872	305,000		305,000	1905	2,332,133	1,282,000	3,614,133
1873	563,000		563,000	1906	2,492,618	1,020,632	3,513,250
1874	369,000		369,000	1907	1,490,230	1,518,951	3,009,181
1875	362,000		362,000	1908	2,028,000	1,146,403	3,174,403
1876	814,000	30,000	844,000	1909	1,748,155	910,361	2,658,516
1877	779,000	101,000	880,000	1910	1,291,500	683,475	1,974,975
1878	902,000	227,000	1,127,000	1911	1,542,000	992,000	2,534,000
1879	1,301,000	198,000	1,499,000	1912	1,348,000	997,934	2,345,934
1880	1,002,000	201,000	1,203,000	1913	1,481,260	804,097	2,285,357
1881	907,000	154,000	1,061,000	1914	2,283,202	1,585,600	3,868,802
1882	1,038,000	203,000	1,241,000	1915	2,733,571	1,068,015	3,801,586
1883	1,485,000	235,000	1,720,000	1916	2,733,400	1,159,107	3,892,507
1884	1,373,000	249,000	1,622,000	1917	2,492,960	1,348,000	3,840,960
1885	988,000	386,000	1,374,000	1918	2,379,347	1,446,410	3,825,757
1886	800,000	383,000	1,183,000	1919	2,013,537	1,596,802	3,610,339
1887	830,000	299,000	1,126,000	1920	1,680,867	1,925,182	3,606,049
1888	674,000	372,000	1,046,000	1921	608,000	1,642,000	2,250,000
1889	327,000	489,000	816,000	1922	1,161,000	838,300	1,999,300
1890	365,000	773,000	1,138,000	1923	1,754,468	1,170,375	2,924,843
1891	583,000	662,000	1,245,000	1924	1,938,207	846,650	2,784,857
1892	775,000	700,000	1,475,000	1925	2,055,875	884,924	2,940,799
1893	666,000	660,000	1,326,000				
1894	698,000	305,000	1,003,000	Total	72,706,620	38,226,218	110,932,838
1895	765,000	286,000	1,051,000				

SUMMARY OF VESSEL-FISHING DATA

The following table shows, in summarized form, the available data covering the vessel fishery for cod on the Pacific coast from its inception in 1863 to 1925, inclusive. In this table is shown, by years, the number of vessels from the States fishing on the various grounds, and the catch made on each ground. As after 1909 none of the vessels visited the Okhotsk Sea, while a little later the vessels visiting the banks off the Alaska coast often fished in the same season on both the North Pacific and Bering Sea banks, it was decided to combine these last-named two areas under the head of North Pacific banks. Up to 1915 the Alaska local fleet was so small, and separate data were so difficult to gather, that they were combined with those of the shore-station catch. Since then, however, an effort has been made to separate this. The total catch of the fleet since 1863 amounts to 72,706,620.

Summary of vessel fishing, 1863 to 1925

CALIFORNIA VESSELS

Years	Number of vessels engaged				Total net tonnage	Number of fish caught			
	Okhotsk Sea	Bering Sea	North Pacific	Total		Okhotsk Sea	Bering Sea [1]	North Pacific	Total
1863	1			1	120	7,100			7,100
1864	1	1		2		50,000	4,500		54,500
1865	6		1	7	449	210,000		15,000	225,000
1866			3	18		588,000		136,000	724,000
1867				20					943,400
1868	7		3	10	1,502	377,000		203,000	580,000
1869				21					1,032,000
1870	12		10	22		1,027,000		440,000	1,467,000
1871	5		8	13		532,000		394,000	926,000
1872	2		4	6		130,000		175,500	305,500
1873	5		5	10		352,060		211,000	563,000
1874			7	7				369,000	369,000
1875			5	5	506			362,000	362,000
1876	3		8	11		333,000		481,000	814,000
1877	5		6	11		426,000		353,000	779,000
1878	4		6	10		651,000		251,000	902,000
1879	5		7	12	1,858	843,000		458,000	1,301,000
1880	6		1	7	1,441	915,000		87,000	1,002,000
1881	5		2	7	1,441	764,000		143,000	907,000
1882	5	2	6	13	2,260	712,000	132,000	194,000	1,038,000
1883	7	5	2	14	2,837	983,000	381,000	121,000	1,485,000
1884	11	3		14	3,222	1,007,000	366,000		1,373,000
1885	4	3	3	10	2,287	493,000	296,000	199,000	988,000
1886	4	2	2	8	1,939	428,000	239,000	133,000	800,000
1887	2	1	4	7	1,558	331,000	185,000	311,000	830,000
1888	2	2	2	6	1,391	311,000	294,000	69,000	674,000
1889	2			2	623	327,000			327,000
1890	2	1		3	715	317,000	48,000		365,000
1891	1	5		6	1,232	171,000	387,000		558,000
1892	1	4		5	1,335	125,000	487,000		612,000
1893	2	3	1	6	1,460	341,000	215,000		556,000
1894	1	4		5	1,393	169,000	420,000		589,000
1895	2	4		6	1,518	248,000	405,000		653,000
1896	1	5		6	1,512	125,000	493,000		618,000
1897		5		5	1,393		554,000		554,000
1898		3		3	780		292,000		292,000
1899		5		5	1,174		580,000		580,000
1900		6		6	1,305		623,000		623,000
1901		6		6	1,540		702,000		702,000
1902		9		9	2,034		933,000		933,000
1903	1	7		8	1,899	170,000	867,300		1,037,300
1904	1	5	1	7	1,939	223,000	770,000	69,200	1,062,200
1905	4	7		11	2,928	636,000	700,133		1,336,133
1906	5	6		11	3,237	692,000	786,000		1,478,000
1907	4	4		8	2,400	271,800	470,000		741,800
1908	3	4		7	2,259	420,000	490,000		910,000
1909	1	4		5	1,416	80,000	520,000		600,000
1910		3		3	1,074		380,000		380,000
1911		3		3	993		439,000		439,000
1912		4	1	5	1,554		525,000	139,000	664,000
1913		4	1	5	1,554		587,000	130,000	717,000
1914		5	1	6	1,783		781,202	150,000	931,202
1915		6	1	7	2,175		1,134,500	119,000	1,253,500
1916			4	4	1,695			1,127,000	1,127,000
1917			7	7	2,392			1,352,000	1,352,000
1918			6	6	2,034			1,053,000	1,053,000
1919			8	8	2,387			1,172,000	1,172,000
1920			11	11	2,597			1,007,000	1,007,000
1921			3	3	464			242,000	242,000
1922			4	4	1,116			462,000	462,000
1923			8	8	2,645			901,377	901,377
1924			6	6	1,872			857,647	857,647
1925			4	4	1,544			881,170	881,170
Total						15,785,900	16,486,635	14,767,894	49,018,829

[1] The catch in Bering Sea for the years 1916 to 1925 has been included with the catch in the North Pacific.

Summary of vessel fishing, 1863 to 1925—Continued

WASHINGTON VESSELS

Years	Number of vessels engaged				Total net tonnage	Number of fish caught			
	Okhotsk Sea	Bering Sea	North Pacific	Total		Okhotsk Sea	Bering Sea	North Pacific	Total
1891		1		1	142		25,000		25,000
1892		2		2	210		163,000		163,000
1893		1		1	142		110,000		110,000
1894		1		1	142		109,000		109,000
1895		1		1	142		112,000		112,000
1896		2		2	508		219,000		219,000
1897		3		3	361		296,000		296,000
1898		1		1	89		50,000		50,000
1899		2		2	286		203,000		203,000
1900		2		2	286		194,000		194,000
1901		1		1	142		85,000		85,000
1902		3		3	368		[2] 296,000		296,000
1903		3	1	4	490		[3] 331,500	95,000	426,500
1904		6		6	599		[4] 484,324		484,324
1905		9		10	1,610		[5] 996,000		996,000
1906		5	3	8	1,425		734,618	280,000	1,014,618
1907		5		5	974		748,430		748,430
1908		7	1	8	1,622		1,008,000	110,000	1,118,000
1909		8		8	1,622		1,148,155		1,148,155
1910		6		6	1,249		911,500		911,500
1911		7		7	1,484		1,103,000		1,103,000
1912		5	1	6	1,251		[6] 550,000	134,000	684,000
1913		5	1	6	1,604		624,260	140,000	764,260
1914		8	1	9	2,482		[7] 1,143,000	209,000	1,352,000
1915		7	1	8	2,084		1,220,571	154,000	1,374,571
1916			9	9	2,317			1,606,400	1,606,400
1917			9	9	2,247			1,323,633	1,323,633
1918			9	9	2,107			1,293,347	1,293,347
1919			6	6	1,619			821,000	821,000
1920			5	5	1,256			550,000	550,000
1921			3	3	658			366,000	366,000
1922			4	4	1,228			680,000	680,000
1923			4	4	1,228			707,000	707,000
1924			5	5	1,448			950,000	950,000
1925			6	6	1,838			1,100,671	1,100,671
Total							12,865,358	11,642,051	23,385,409

ALASKA VESSELS

1916									
1917			3	3	134			42,327	42,327
1918			2	2	25			33,000	33,000
1919			3	3	32			20,537	20,537
1920			8	8	76			123,867	123,867
1921									
1922			2	2	28			19,000	19,000
1923			5	5	90			146,091	146,091
1924			4	4	60			130,560	130,560
1925			4	4	180			74,034	74,034
Total								589,416	589,416

[2] Includes catch by British Columbia schooner Blakeley (144 tons), 107,000 fish.
[3] Includes catch by British Columbia schooner Blakeley (144 tons), 115,000 fish.
[4] Includes catch by British Columbia schooner Blakeley (144 tons), 100,000 fish.
[5] Includes catch by British Columbia schooner Blakeley (144 tons), 78,000 fish.
[6] Includes catch by schooner Albert Meyer (398 tons), British Columbia, 260 fish.
[7] Includes catch by schooner Albert Meyer (398 tons), British Columbia, 100,000 fish.

NOTE.—In addition 6 Alaska vessels, with total net tonnage of 167, caught in the North Pacific 105,500 fish. These data have been included in the "Recapitulation."

Summary of vessel fishing, 1863 to 1925—Continued

RECAPITULATION

Years	Vessels		Total number of fish caught	Years	Vessels		Total number of fish caught
	Total number	Total net tonnage			Total number	Total net tonnage	
1863	1	120	7,100	1896	8	2,020	837,000
1864	2		54,500	1897	7	1,754	850,000
1865	7	449	225,000	1898	2	866	342,000
1866	18		724,000	1899	7	1,460	783,000
1867	20		943,400	1900	7	1,591	817,000
1868	10	1,502	580,000	1901	7	1,682	787,000
1869	21		1,032,000	1902	12	2,402	1,229,000
1870	22		1,467,000	1903	12	2,389	1,463,800
1871	13		926,000	1904	13	2,538	1,546,524
1872	6		305,500	1905	21	4,538	2,332,133
1873	10		563,000	1906	19	4,662	2,492,618
1874	7		369,000	1907	13	3,374	1,490,230
1875	5	506	362,000	1908	15	3,881	2,028,000
1876	11		814,000	1909	13	3,038	1,748,155
1877	11		779,000	1910	9	2,323	1,291,500
1878	10		902,000	1911	10	2,477	1,542,000
1879	12	1,858	1,301,000	1912	10	2,805	1,348,000
1880	7	1,441	1,002,000	1913	11	3,158	1,481,260
1881	7	1,441	907,000	1914	15	4,265	2,283,202
1882	13	2,260	1,038,000	1915	21	4,426	2,628,071
1883	14	2,837	1,485,000	1916	13	4,012	2,733,400
1884	14	3,222	1,373,000	1917	16	4,076	2,492,960
1885	10	2,287	988,000	1918	17	4,166	2,379,347
1886	8	1,939	800,000	1919	17	4,038	2,013,537
1887	7	1,558	830,000	1920	24	3,929	1,680,867
1888	6	1,391	674,000	1921	6	1,122	608,000
1889	2	623	327,000	1922	10	2,372	1,161,000
1890	3	715	365,000	1923	17	3,963	1,754,468
1891	7	1,374	583,000	1924	15	3,380	1,938,207
1892	7	1,545	775,000	1925	14	3,562	2,055,875
1893	7	1,602	666,000				
1894	6	1,535	698,000	Total			72,706,620
1895	7	1,660	765,000				

DETAILED DATA OF THE FISHING FLEET FROM 1863 TO 1925

The table following shows in detail the operations of the cod-fishing fleet from the inception of the industry in 1863 to 1925, inclusive. The name, rig, and net tonnage of each vessel, the dates of her departure and return, on what ground she fished, and the number of fish taken are all shown.[20] No detailed data are available for 1866 and 1869, while the individual vessel data for 1867 and 1868 are incomplete. From 1863 to 1890, both inclusive, the data relate to California exclusively. Since 1915 vessels fishing on banks off the Alaska coast often fished also on banks in the Bering Sea. The statistics for recent years for these regions, therefore, have been combined under the head "Alaska banks." Owing to the variation in the weight of fish from the various grounds, and also the considerable variation in weight of fish from the same ground in different years, no effort has been made to show the weight of the catch, while the data on the prices realized are so fragmentary that this item also has been omitted, as it would be nothing but a guess at best.

[20] For the data covering the San Francisco fleet from 1870 to 1914, inclusive, the writer is indebted to the Union Fish Co. (formerly the McCollam Fishing & Trading Co.), of San Francisco, which placed its invaluable records at his disposal.

Operations of the cod fleet by years

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1863						
CALIFORNIA [1]						
Timandra [2]	Brig.	120			Okhotsk Sea	7,100
1864						
Timandra	Brig.	120			Okhotsk Sea	50,000
Alert	Sch.				Bering Sea	4,500
Total						54,500
1865						
Equity	Sch.	63			Okhotsk Sea	210,000
Flying Dart	Sch.	84			do	
H. L. Ruggles	Sch.	75			do	
J. D. Sanborn	Sch.	71			do	
Mary Cleveland	Sch.	91			do	
Taccon	Sch.	20			do	
Porpoise	Sch.	45	Mar. 27	July 7	Shumagin Islands [3]	15,000
Total		449				225,000
1867						
Sanborn	Sch.				Shumagin Islands	64,000
Porpoise	Sch.				do	36,000
Sarah Louise	Sch.				do	36,000
Total						136,000
1868						
Porpoise [4]	Sch.				Shumagin Islands	63,000
Mandrago	Sch.				do	85,000
Sanborn	Sch.				do	60,000
Total						208,000
1870						
Clara R. Sutill					Okhotsk Sea	92,000
Constitution	Bkn.	257			do	18,000
Carib					do	92,000
Domingo	Bark.				do	95,000
Florence					do	85,000
Gold Hunter	Bark.				do	125,000
Legal Tender	Bark.				do	125,000
Union					do	100,000
Francisco					do	91,000
Witch Queen					do	62,000
Alaska	Bark.				do	102,000
Shooting Star	Bark.				do	40,000
Arizona					Shumagin Islands	55,000
Ann Eliza					do	20,000
Daisy					do	20,000
J. H. Roscoe	Sch.	79			do	65,000
Mary Zephyr					do	35,000
Porpoise	Sch.				do	38,000
Romp					do	32,000
Sarah Louise	Sch.				do	35,000
Scotland					do	55,000
Wild Gazelle	Sch.	114			do	85,000
Total						1,467,000
1871						
Union					Okhotsk Sea	126,000
Legal Tender	Bark.				do	135,000
Gold Hunter	Bark.				do	125,000
Clara R. Sutill					do	66,000
Domingo	Bark.				do	80,000
Daisy					Shumagin Islands	15,000
Shooting Star					do	35,000
Alaska	Bark.				do	92,000
S. H. Merrill					do	85,000
Flying Mist					do	35,000
Scotland					do	46,000
Alfred Adams	Sch.	64			do	42,000
J. H. Roscoe	Sch.	79			do	44,000
Total						926,000

[1] From 1863 to 1890, inclusive, data relate to California exclusively.
[2] Trading voyage.
[3] First fare from the Shumagins.
[4] Made two trips.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1872						
Gold Hunter	Bark.				Okhotsk Sea	130,000
Scotland					do	
Legal Tender	Bark.				Shumagin Islands	25,000
J. H. Roscoe	Sch.	79			do	58,500
Wild Gazelle	Sch.	114			do	61,000
Flying Mist					do	31,000
Total						305,500
1873						
Gold Hunter	Bark.		Apr. 13		Okhotsk Sea	125,000
Clara R. Sutill			Apr. 26		do	87,000
Page	Sch.	125	Apr. 19			76,000
Energy	Bark.		Apr. 10			64,000
Domingo	Bark.		May 15			
Wild Gazelle	Sch.	108	Apr. 19		Shumagin Islands	89,000
Alfred Adams	Sch.	64	Mar. 10		do	40,000
Flying Mist			Mar. 7		do	28,000
Alfred Adams	Sch.	64	July 5		do	30,000
Flying Mist			July 15		do	24,000
Total						563,000
1874						
San Diego	Sch.	36	Apr. 12	July 22	Shumagin Islands	28,000
Energy	Bark.		Apr. 13	Aug. 23	do	80,000
Joseph Wooley	Sch.		Apr. 12	Sept. 5	do	90,000
Alfred Adams	Sch.	64	Apr. 15	Aug. 15	do	56,000
Wild Gazelle	Sch.	114	Apr. 23	Aug. 20	do	78,000
San Diego	Sch.			Oct. 18	do	22,000
Page	Sch.	125		Oct. 11		15,000
Total						369,000
1875						
Undaunted	Sch.	68	Mar. 15		Shumagin Islands	46,000
Alfred Adams	Sch.	64	Mar. 29	Aug. 20	do	56,000
Wild Gazelle	Sch.	108	Apr. 16	Sept. 3	do	93,000
Dashing Wave	Sch.	141	Apr. 18		do	95,000
Page	Sch.	125				72,000
Total		506				362,000
1876						
Alfred Adams	Sch.	64	Jan. 9	July 3	Shumagin Islands	62,000
Alaska	Sch.	32	Mar. 9	July 6	do	28,000
Do			July 19		do	70,000
Selma			Mar. 9	July 1	do	70,000
Page	Sch.	125	Apr. 1	Aug. 19	do	73,000
Energy	Bark.		Aug. 15	do	do	65,000
San Diego	Sch.	36		Aug. 10	do	19,000
Wild Gazelle	Sch.	114	Apr. 12	Sept. 20	do	94,000
Hesperian			Apr. 7	Oct. 11	Okhotsk Sea	150,000
Josephine	Brig.	207	Apr. 12	do	do	130,000
Constitution	Bkn.	257	June 20		do	53,000
Total						814,000
1877						
Page	Sch.	125	Apr. 17	Aug. 17	Okhotsk Sea	62,000
Constitution	Bkn.	257	Apr. 21	Sept. 14	do	133,000
Fremont	Bkn.	345	Apr. 22	do	do	208,000
Brontes			Apr. 25	Lost		
Alaska	Sch.	32	Mar. 25	Sept. 11	Shumagin Islands	16,000
J. H. Roscoe	Sch.	79	Apr. 28	Aug. 4	do	61,000
Energy	Bark.		do	Aug. 30	do	70,000
Alfred Adams	Sch.	64	Apr. 4	June 17	do	67,000
Do			June 29	Aug. 25	do	44,000
Wild Gazelle	Sch.	114	Apr. 6	Sept. 4	do	95,000
Pato [5]	Sch.	45	Mar. —		Okhotsk Sea	23,000
Total						779,000

[5] Sailed from Hongkong, China, and landed cargo at Portland, Oreg.; the only cargo of cod ever landed here.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1878						
General Miller	Sch.	108	May 18	Sept. 25	Shumagin Islands	23,000
J. H. Roscoe	Sch.	79	Apr. 9	Aug. 30	do	20,000
May Queen	Sch.		Apr. 3	Aug. 7	do	75,000
Sarah	Sch.	105	Mar. 29	Aug. 24	do	78,000
Three Sisters [6]	Sch.	62			do	35,000
Wild Gazelle	Sch.	114	Apr. 6	Aug. 30	do	20,000
Adelaide Cooper	Bark.	300	Apr. 16	Oct. 2	Okhotsk Sea	216,000
Constitution	Bkn.	257	Apr. 11	Sept. 12	do	140,000
Fremont	Bkn.	345	Apr. 20	Sept. 29	do	250,000
Page	Sch.	125	Apr. 9	Sept. 10	do	45,000
Total						902,000
1879						
Wild Gazelle	Sch.	114	Apr. 2	Sept. 20	Shumagin Islands	85,000
Sarah	Sch.	105	Mar. 16	Aug. 4	do	71,000
Undaunted	Sch.	68	Mar. 15	June 21	do	63,000
H. L. Tiernan	Sch.	145	May 3	Sept. 10	do	97,000
General Miller	Sch.	108	Apr. 3	Sept. 21	do	80,000
Alaska	Sch.	32	Mar. 11	Sept. 10	do	10,000
J. H. Roscoe	Sch.	79	Feb. 28	Aug. 1	do	52,000
Adelaide Cooper	Bark.	300		Sept. 28	Okhotsk Sea	225,000
Fremont	Bkn.	345		Oct. 1	do	240,000
Constitution	Bkn.	257		Sept. 21	do	205,000
Page	Sch.	125	May 13	Oct. 8	do	40,000
Glencoe	Brig.	169		Nov. 7	do	133,000
Total		1,847				1,301,000
1880						
Wild Gazelle	Sch.	114	Apr. 8	Aug. 23	Shumagin Islands	87,000
Arago	Sch.	176	May 2	Sept. 20	Okhotsk Sea	125,000
Page	Sch.	109	May 8	Sept. 4	do	60,000
Glencoe	Brig.	169	May 1	Oct. 28	do	120,000
Fremont	Bkn.	328	May 6	Oct. 10	do	220,000
Constitution	Bkn.	276	May 8	Oct. 28	do	165,000
San Luis	Bkn.	275	May 17	Oct. 4	do	225,000
Total		1,441				1,002,000
1881						
Wild Gazelle	Sch.	114	Apr. 1	Aug. 28	Shumagin Islands	75,000
Page	Sch.	109	Apr. 23	Sept. 12	do	68,000
Arago	Sch.	176	Apr. 27	Sept. 11	Okhotsk Sea	90,000
Constitution	Bkn.	276	do	Oct. 17	do	185,000
Glencoe	Brig.	169	Apr. 29	Oct. 15	do	103,000
Fremont	Bkn.	328	Apr. 30	Sept. 18	do	201,000
San Luis	Bkn.	275	May 6	Oct. 15	do	185,000
Total		1,441				907,000
1882						
Ariel	Sch.	94	Mar. 18	Aug. 18	Shumagin Islands	49,000
Page	Sch.	109	Mar. 20	Aug. 24	do	31,000
General Miller	Sch.	108	do	Lost	do	
H. L. Tiernan	Sch.	142	Apr. 5	Ashore	do	
Dashing Wave	Sch.	141	Apr. 29	Sept. 19	do	60,000
Adrianna	Sch.	95	May 8	July 6	do	54,000
Isabel	Sch.	175	May 12	Sept. 1	Bering Sea	50,000
Tropic Bird	Brig.	172	Apr. 28	Sept. 25	do	82,000
Arago	Sch.	176	Apr. 15	Sept. 28	Okhotsk Sea	111,000
San Luis	Bkn.	275	Apr. 29	Oct. 9	do	185,000
Glencoe	Brig.	169	May 4	Oct. 17	do	72,000
Fremont	Bkn.	328	May 6	Sept. 28	do	204,000
Constitution	Bkn.	276	May 13	Oct. 13	do	140,000
Total		2,260				1,038,000

[6] Lost.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1883						
W. H. Stevens	Sch.	139	Apr. 21	July 27	Shumagin Islands	77,000
Dashing Wave	Sch.	141	May 7	Sept. 21	do	44,000
John Hancock	Sch.	167	Mar. 29	Aug. 22	Bering Sea	75,000
Francis Alice	Sch.	125	do	do	do	60,000
Bonanza	Sch.	128	Apr. 14	do	do	52,000
Tropic Bird	Brig.	172	Mar. 29	do	do	89,000
Isabel	Sch.	175	Apr. 2	Sept. 19	do	105,000
Arago	Sch.	176	Apr. 16	Oct. 5	Okhotsk Sea	96,000
Hera	Sch.	369	Apr. 20	Oct. 19	do	188,000
San Luis	Bkn.	275	Apr. 24	Oct. 15	do	150,000
Constitution	Bkn.	276	do	Oct. 6	do	150,000
Glencoe	Brig.	169	Apr. 25	Oct. 27	do	95,000
Fremont	Bkn.	328	Apr. 28	Sept. 19	do	186,000
Una	Sch.	197	Apr. 30	Oct. 3	do	118,000
Total		2,837				1,485,000
1884						
Dashing Wave	Sch.	141	Mar. 25	Aug. 25	Bering Sea	85,000
John Hancock	Sch.	167	Mar. 23	July 27	do	96,000
Helen W. Almy	Bark.	298	Apr. 2	Sept. 5	do	185,000
Hera	Sch.	369	Apr. 9	Oct. 3	Okhotsk Sea	135,000
Arago	Sch.	176	Apr. 11	Oct. 7	do	80,000
Isabel	Sch.	175	Apr. 13	Oct. 4	do	90,000
W. H. Meyer	Brig.	256	Apr. 18	Oct. 9	do	90,000
Tropic Bird	Brig.	172	Apr. 20	Oct. 6	do	82,000
Jane A. Falkenburg	Bkn.	295	do	Oct. 3	do	136,000
San Luis	Bkn.	275	Apr. 26	do	do	90,000
Constitution	Bkn.	276	do	Oct. 6	do	104,000
Fremont	Bkn.	328	May 2	Oct. 1	do	118,000
Glencoe	Brig.	169	May 5	Oct. 27	do	42,000
Francis Alice	Sch.	125		Oct. 25	do	40,000
Total		3,222				1,373,000
1885						
Arago	Sch.	176	Mar. 27	Sept. 11	Shumagin Islands	50,000
John Hancock	Sch.	167	Apr. 1	Aug. 2	do	64,000
Isabel	Sch.	175	Apr. 18	Aug. 27	do	85,000
Helen W. Almy	Bark.	298	do	Sept. 5	Bering Sea	182,000
Constitution	Bkn.	276	Apr. 22	Oct. 9	Okhotsk Sea	120,000
Tropic Bird	Brig.	172	Apr. 25	Sept. 18	Bering Sea	79,000
Francis Alice	Sch.	125	Apr. 28	Aug. 10	do	35,000
San Luis	Bkn.	275	Apr. 30	Oct. 16	Okhotsk Sea	118,000
Fremont	Bkn.	328	May 2	Oct. 8	do	135,000
Jane A. Falkenburg	Bkn.	295	May 3	Sept. 25	do	120,000
Total		2,287				988,000
1886						
Isabel	Sch.	175	Apr. 1	Aug. 11	Shumagin Islands	92,000
Francis Alice	Sch.	125	Apr. 3	July 15	Bering Sea	69,000
John Hancock	Sch.	167	Apr. 13	Aug. 6	Shumagin Islands	41,000
Helen W. Almy	Bark.	298	do	Sept. 15	Bering Sea	170,000
Fremont	Bkn.	328	Apr. 23	Oct. 4	Okhotsk Sea	141,000
Constitution	Bkn.	276	May 4	Oct. 1	do	84,000
San Luis	Bkn.	275	May 9	Oct. 7	do	102,000
Jane A. Falkenburg	Bkn.	295	May 21	Oct. 5	do	101,000
Total		1,939				800,000
1887						
John Hancock	Sch.	167	Mar. 20	July 12	Shumagin Islands	76,000
Isabel	Sch.	175	Mar. 26	Aug. 25	do	80,000
Dashing Wave	Sch.	141	Apr. 6	Aug. 29	do	79,000
Arago	Sch.	176	Apr. 24	Sept. 4	do	76,000
Constitution	Bkn.	276	Apr. 12	Aug. 12	Bering Sea	185,000
Fremont	Bkn.	328	May 4	Sept. 19	Okhotsk Sea	180,000
Jane A. Falkenburg	Bkn.	295	May 29	Oct. 5	do	151,000
Total		1,558				827,000

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1888						
Dashing Wave	Sch.	141	Mar. 16	July 21	Shumagin Islands	69,000
Arago	Sch.	176	Apr. 12	Sept. 2	Bering Sea	103,000
Constitution	Bkn.	276	Apr. 25	Aug. 29	do	191,000
Fremont	Bkn.	328	May 1	Sept. 19	Okhotsk Sea	175,000
Jane A. Falkenburg	Bkn.	295	May 10	Sept. 23	do	136,000
Isabel	Sch.	175		[6]	Shumagin Islands	
Total		1,391				674,000
1889						
Fremont	Bkn.	328	May 6	Sept. 25	Okhotsk Sea	170,000
Jane A. Falkenburg	Sch.	295	May 23	do	do	157,000
Total		623				327,000
1890						
Vanderbilt	Sch.	92	Apr. 13	Aug. 4	Bering Sea	48,000
Jane A. Falkenburg	Sch.	295	May —	Oct. 3	Okhotsk Sea	140,000
Fremont	Bkn.	328	May 17	Oct. 6	do	177,000
Total		715				365,000
1891						
CALIFORNIA						
Francis Alice	Sch.	125	Jan. 11	July 7	Bering Sea	70,000
Dashing Wave	Sch.	141	Mar. 16	Apr. 16[6]		
Arago	Sch.	176	Apr. 16	Aug. 28	Bering Sea	87,000
Jane A. Falkenburg	Sch.	295	Apr. 25	Sept. 1	do	160,000
Fremont	Bkn.	328	May 6	Sept. 23	Okhotsk Sea	171,000
John Hancock	Sch.	167	June 10	Sept. 9	Bering Sea	70,000
Total		1,232				558,000
1891						
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	25,000
1892						
CALIFORNIA						
Arago	Sch.	176	Apr. 10	Aug. 31	Bering Sea	90,000
Jane A. Falkenburg	Sch.	295	Apr. 27	Sept. 12	do	152,000
Fremont	Sch.	328	Apr. 28	Sept. 22	do	175,000
John Hancock	Sch.	167	May 6	Aug. 31	do	70,000
Hera	Sch.	369	May 19	Oct. 11	Okhotsk Sea	125,000
Total		1,335				612,000
WASHINGTON						
Lizzie Colby	Sch.	142	Mar. 17	Aug. 30	Bering Sea	108,000
Moonlight	Sch.	68	Mar. 5	Aug. 20	do	55,000
Total		210				163,000
1893						
CALIFORNIA						
John Hancock	Sch.	167	Feb. 8	Mar. 7[6]		
Francis Alice	Sch.	125	Feb. 24		Shumagin Islands	
Arago	Sch.	176	Apr. 11	Aug. —	Bering Sea	90,000
Jane A. Falkenburg	Sch.	295	Apr. 20	Sept. 9	do	125,000
Hera	Sch.	369	Apr. 22	Sept. 26	Okhotsk Sea	166,000
Fremont	Sch.	328	Apr. 29	Sept. 10	do	175,000
Total		1,460				556,000
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	110,000

[6] Lost.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1894						
CALIFORNIA						
Arago	Sch.	176	Mar. 29	Sept. 6	Bering Sea	90,000
Fremont	Bkn.	328	Mar. 31	Aug. 26	do	180,000
Jane A. Falkenburg	Sch.	295	do	Aug. 27	do	105,000
Hera	Sch.	369	Apr. 19	Sept. 10	Okhotsk Sea	169,000
Uranus	Sch.	225	Apr. 12	Sept. 16	Shumagin Islands and Bering Sea.	45,000
Total		1,393				589,000
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	109,000
1895						
CALIFORNIA						
Fremont	Bkn.	328	Apr. 15	July 18	Bering Sea	159,000
Arago	Sch.	176	Apr. 17	July 20	Okhotsk Sea	89,000
Uranus	Sch.	225	Apr. 21	Aug. 11	Bering Sea	88,000
Jane A. Falkenburg	Sch.	295	Apr. 22	July 19	do	107,000
Hera	Sch.	369	Apr. 25	Sept. 17	Okhotsk Sea	159,000
Francis Alice	Sch.	125			Bering Sea	51,000
Total		1,518				653,000
WASHINGTON						
Lizzie Colby	Sch.	142	Apr. 18	Aug. 9	Bering Sea	112,000
1896						
CALIFORNIA						
Uranus	Sch.	225	Apr. 5	July 23	Bering Sea	81,000
La Ninfa	Sch.	119	Apr. 7	Sept. 2	do	50,000
Jane A. Falkenburg	Sch.	295	Apr. 11	Aug. 3	do	115,000
Fremont	Bkn.	328	Apr. 15	Aug. 5	do	167,000
Arago	Sch.	176	do	July 20	do	80,000
Hera	Sch.	369	Apr. 26	Sept. 9	Okhotsk Sea	125,000
Total		1,512				618,000
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	109,000
Emma F. Harriman [7]	Bark.	366	Apr. 8	Sept. 13	do	110,000
Total		508				219,000
1897						
CALIFORNIA						
Arago	Sch.	176	Mar. 30	July 15	Bering Sea	90,000
Fremont	Bkn.	328	Apr. 2	Sept. 8	do	167,000
Jane A. Falkenburg	Sch.	295	do	Sept. 9	do	124,000
Hera	Sch.	369	Apr. 4	Sept. 13	do	133,000
Uranus	Sch.	225	Apr. 26	Aug. 21	do	40,000
Total		1,393				554,000
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	114,000
Blakeley	Bgn.	144			do	100,000
Swan	Sch.	75			do	55,000
Total		361				269,000

[7] Cargo was taken to San Francisco and sold there.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1898						
CALIFORNIA						
Fremont	Bkn.	328	Apr. 5	Aug. 31	Bering Sea	152,000
Anna	Sch.	227		Oct. 2	do	95,000
Uranus	Sch.	225	May 9	Sept. 22	do	45,000
Total		780				292,000
WASHINGTON						
Lizzie S. Sorrenson	Sch.	89			Bering Sea	50,000
1899						
CALIFORNIA						
Anna	Sch.	227	Mar. 30	Aug. 16	Bering Sea	117,000
Fremont	Bkn.	328	Apr. 1	Sept. 17	do	157,000
Arago	Sch.	176	Apr. 2	Sept. 13	do	80,000
Uranus	Sch.	225	Apr. 5	Aug. 25	do	83,000
Czarina	Sch.	218	Apr. 19	Oct. 1	do	143,000
Total		1,174				580,000
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	93,000
Blakeley	Bkn.	144			do	110,000
Total		286				203,000
1900						
CALIFORNIA						
Stanley	Sch.	253	Apr. 3	Sept. 1	Bering Sea	154,000
Fremont	Bkn.	328	do	Aug. 30	do	160,000
Abbie M. Deering	Sch.	96	Apr. 10	July 1	do	45,000
Anna	Sch.	227	Apr. 9	Aug. 24	do	95,000
Arago	Sch.	176	Apr. 13	Sept. 18	do	80,000
Uranus	Sch.	225	Mar. 26	Sept. 13	do	89,000
Total		1,305				623,000
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	100,000
Blakeley	Bgn.	144			do	94,000
Total		286				194,000
1901						
CALIFORNIA						
Uranus	Sch.	225	Mar. 27	July 7	Bering Sea	53,000
Fremont	Bkn.	328	Apr. 2	Aug. 18	do	177,000
Harriet G	Brig.	188	Apr. 3	Sept. 7	do	51,000
Stanley	Sch.	253	Apr. 11	Sept. 27	do	195,000
City of Papeete	Bkn.	370	Apr. 13	Sept. 7	do	151,000
Arago	Sch.	176	Apr. 16	Sept. 11	do	75,000
Total		1,540				702,000
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	85,000

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1902						
CALIFORNIA						
Stanley	Sch.	253	Mar. 22	Aug. 25	Bering Sea	166,000
Fremont	Bkn.	328	Apr. 1	Aug. 18	do	183,000
Uranus	Sch.	225	do	Aug. 15	do	51,000
Arago	Sch.	176	Apr. 4	Sept. 28	do	72,000
Harriet G	Brig.	188	do	Aug. 26	do	135,000
City of Papeete	Bkn.	370	Apr. 11	Aug. 29	do	217,000
Mary and Ida	Sch.	174	do	Aug. 21	do	102,000
J. G. Wall	Sch.	93	June 15	Sept. 8	do	7,000
Anna [8]	Sch.	227				
Total		2,034				933,000
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	104,000
Carrier Dove	Sch.	82			do	85,000
Total		224				189,000
BRITISH COLUMBIA						
Blakeley	Bgn.	144			Bering Sea	107,000
1903						
CALIFORNIA						
Mary and Ida	Sch.	174	Mar. 20	Aug. 23	Bering Sea	105,000
Arago	Sch.	176	Mar. 22	July 29	do	75,000
Fremont	Bkn.	328	Mar. 28	Sept. 2	do	179,000
Uranus	Sch.	225	Apr. 1	Aug. 21	do	76,300
City of Papeete	Bkn.	370	do	Aug. 12	do	200,000
Harriet G	Brig.	188	Apr. 2	Aug. 29	do	112,000
Emma Claudina	Sch.	185	Apr. 9	do	do	120,000
Stanley	Sch.	253	Apr. 21	Sept. 18	Okhotsk Sea	170,000
Total		1,899				1,037,300
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	84,500
Carrier Dove	Sch.	82			North Pacific [9]	95,000
Nellie Colman	Sch.	122			Bering Sea	132,000
Total		346				311,500
BRITISH COLUMBIA						
Blakeley	Bgn.	144		Sept. 15	Bering Sea	115,000
1904						
CALIFORNIA						
Arago	Sch.	176	Mar. 31	July 13	Shumagin Islands	69,200
Uranus	Sch.	225	do	Sept. 12	Bering Sea	60,000
Harriet G	Brig.	188	do	Sept. 1	do	140,000
Stanley	Sch.	253	Apr. 3	Sept. 10	do	165,000
Fremont	Bkn.	328	Apr. 7	do	do	193,000
City of Papeete	Bkn.	370	Apr. 11	do	do	212,000
Metha Nelson	Sch.	399	May 15	Oct. 11	Okhotsk Sea	223,000
Total		1,939				1,062,200
WASHINGTON						
Lizzie Colby	Sch.	142			Bering Sea	98,000
Alice	Sch.	220			do	128,324
Ida May	Sch.	33			do	14,000
Nellie Colman	Sch.	122		July 27	do	97,000
Carrier Dove	Sch.	82		do	do	47,000
Total		599				384,324
BRITISH COLUMBIA						
Blakeley	Bgn.	144		Sept. —	Bering Sea	100,000

[8] Lost in Bering Sea.

[9] Virtually the same ground as the Shumagin Islands.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1905						
CALIFORNIA						
Zampa	Sch.	322	Mar. 30	Sept. 8	Bering Sea	125,133
Glen	Sch.	121	Apr. 8	Aug. 24	do	65,000
John F. Miller	Sch.	170	Apr. 1	Aug. 25	do	75,000
Harriet G	Sch.	188	Mar. 30	Sept. 3	do	110,000
Stanley	Sch.	253	Mar. 26	Sept. 5	do	135,000
Fremont	Bkn.	328	Mar. 30	Sept. 14	do	190,000
John D. Spreckles	Bkn.	253	May 5	Sept. 29	Okhotsk Sea	133,000
S. N. Castle	Bgn.	464	Apr. 27	Sept. 27	do	210,000
W. H. Dimond	Sch.	376	do	do	do	150,000
City of Papeete	Bkn.	370	do	Oct. 7	do	143,000
Pearl	Sch.	83	(6)		Bering Sea	
Total		2,928				1,336,133
WASHINGTON						
Harold Blekum	Sch.	185	Mar. 13	Aug. 23	Bering Sea	123,000
Ida May	Sch.	33	Apr. 20	July 5	do	10,000
Nellie Colman	Sch.	122	Apr. 18	Aug. 12	do	50,000
Carrier Dove	Sch.	82	Apr. 1	do	do	40,000
Joseph Russ	Sch.	235	Apr. 8	Aug. 31	do	164,000
Alice	Sch.	220	Apr. 1	Aug. 21	do	173,000
Fanny Dutard	Sch.	252	Apr. 15	Sept. 4	do	195,000
Lizzie Colby	Sch.	142	Apr. 10	Aug. 15	do	103,000
Falcon	Sch.	195	May 9	Sept. 1	do	60,000
Total		1,466				918,000
BRITISH COLUMBIA						
Blakeley	Bkn.	144	Apr. 15	Sept. 29	Bering Sea	78,000
1906						
CALIFORNIA						
W. H. Dimond	Sch.	376	Apr. 4	Oct. 3	Okhotsk Sea	140,000
Zampa	Sch.	322	Apr. 9	Oct. 10	Bering Sea	160,000
City of Papeete	Bkn.	370	Apr. 11	do	do	181,000
Fremont	Bkn.	328	Mar. 16	Sept. 9	Okhotsk Sea	159,000
Stanley	Sch.	253	Apr. 4	Sept. 2	Bering Sea	140,000
Harriet G	Brig.	188	Mar. 15	Sept. 4	Okhotsk Sea	141,000
John D. Spreckles	Sch.	253	Mar. 22	do	Bering Sea	80,000
S. N. Castle	Bkn.	464	Apr. 8	Sept. 24	Okhotsk Sea	219,000
Glen	Sch.	121	Mar. 25	Sept. 4	Bering Sea	85,000
Ottillie Fjord	Sch.	247	Mar. 28	Sept. 9	do	140,000
Dora Bluhm	Sch.	315	May 2	Sept. 11	Okhotsk Sea	33,000
Total		3,237				1,478,000
WASHINGTON						
Carrier Dove	Sch.	82	Apr. 3	Sept. 10	North Pacific	48,000
Fanny Dutard	Sch.	252	Apr. 10	Aug. 30	Bering Sea	198,000
Lizzie Colby	Sch.	142	Apr. 14	Aug. 23	do	107,000
Maid of Orleans	Sch.	171	Apr. 24	Sept. 10	North Pacific	120,000
Harold Blekum	Sch.	185	Mar. 10	Aug. 14	do	112,000
Fortuna	Sch.	138	Apr. 18	Aug. 4	Bering Sea	70,000
Joseph Russ	Sch.	235	Mar. 20	Aug. 19	do	197,007
Alice	Sch.	220	Mar. 27	Aug. 17	do	162,611
Total		1,425				1,014,618
1907						
CALIFORNIA						
City of Papeete	Bkn.	370	Apr. 10	Sept. 29	Bering Sea	120,000
Stanley	Sch.	253	Mar. 22	Aug. 31	Okhotsk Sea	140,000
Fremont	Bkn.	328	Apr. 24	Sept. 29	do	108,000
John D. Spreckles	Sch.	253	Apr. 10	July 22	do	5,800
S. N. Castle	Bkn.	464	Apr. 18	July 14	do	18,000
Ottillie Fjord	Sch.	247	Mar. 26	Sept. 14	Bering Sea	135,000
John F. Miller	Sch.	170	Apr. 7	Aug. 29	do	90,000
Dora Bluhm	Sch.	315	Apr. 14	Sept. 20	do	125,000
Total		2,400				741,800

[6] Lost.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1907—Continued						
WASHINGTON						
Fanny Dutard	Sch.	252	Apr. 26	Sept. 16	Bering Sea	180,000
Carrier Dove	Sch.	82	Mar. 20	do	do	98,500
Harold Blekum	Sch.	185	Mar. 19	Aug. 22	do	113,000
Alice	Sch.	220	Apr. 15	Sept. 2	do	165,000
Joseph Russ	Sch.	235	do	Aug. 22	do	191,930
Total		974				748,430
1908						
CALIFORNIA						
W. H. Dimond	Sch.	376	Apr. 9	Oct. 18	Bering Sea	138,000
City of Papeete	Bkn.	370	Mar. 21	Aug. 24	Okhotsk Sea	118,000
Stanley	Sch.	253	Mar. 13	Sept. 16	do	152,000
Fremont	Bkn.	328	Mar. 21	do	do	150,000
Ottillie Fjord	Sch.	247	Mar. 28	Sept. 4	Bering Sea	125,000
Dora Bluhm	Sch.	315	Apr. 18	Oct. 16	do	120,000
City of Papeete	Bkn.	370	Mar. 21	Aug. 24	do	107,000
Total		2,259				910,000
WASHINGTON						
Fanny Dutard	Sch.	252	Apr. 5	Sept. 6	Bering Sea	160,000
Harriet G	Brig.	188	Apr. 18	Sept. 15	do	115,000
Maid of Orleans	Sch.	171	Apr. 15	Aug. 26	do	102,000
Harold Blekum	Sch.	185	Mar. 31	Sept. 3	do	170,000
Vega	Sch.	233	Apr. 5	do	do	102,000
Fortuna	Sch.	138	Apr. 13	Aug. 11	North Pacific	110,000
Alice	Sch.	220	Mar. 28	Aug. 23	Bering Sea	165,000
Joseph Russ	Sch.	235	do	Aug. 24	do	194,000
Total		1,622				1,118,000
1909						
CALIFORNIA						
John D. Spreckles	Sch.	253	Mar. 18	Sept. 8	Bering Sea	115,000
City of Papeete	Bkn.	370	Apr. 15	Sept. 2	do	155,000
Czarina	Sch.	218	Mar. 25	Sept. 8	do	115,000
Ottillie Fjord	Sch.	247	Mar. 28	Sept. 5	do	135,000
Fremont	Bkn.	328	Apr. 14	Oct. 4	Okhotsk Sea	80,000
Total		1,416				600,000
WASHINGTON						
Fanny Dutard	Sch.	252	Apr. 8	Sept. 7	Bering Sea	170,000
Harriet G	Sch.	188	do	Sept. 13	do	122,000
Maid of Orleans	Sch.	171	do	Aug. 20	do	115,000
Harold Blekum	Sch.	185	Mar. 28	Aug. 13	do	110,000
Vega	Sch.	233	Apr. 8	Sept. 7	do	155,000
Fortuna	Sch.	138	Apr. 7	Aug. 16	do	102,000
Alice	Sch.	220	Apr. 8	do	do	170,000
Joseph Russ	Sch.	235	do	Aug. 24	do	204,155
Total		1,622				1,148,155
1910						
CALIFORNIA						
W. H. Dimond	Sch.	376	Mar. 3	Sept. 16	Bering Sea	150,000
City of Papeete	Bkn.	370	Mar. 26	Sept. 15	do	120,000
Fremont	Bkn.	328	Mar. 25	Oct. 1	do	110,000
Total		1,074				380,000
WASHINGTON						
Fanny Dutard	Sch.	252	Apr. 20	Sept. 5	Bering Sea	185,500
Alice	Sch.	220	Apr. 21	Sept. 15	do	175,000
Joseph Russ	Sch.	235	Apr. 17	Sept. 12	do	180,000
Maid of Orleans	Sch.	171	Apr. 15	Aug. 15	do	116,000
Vega	Sch.	233	Apr. 14	Sept. 15	do	150,000
Fortuna	Sch.	138	Apr. 15	Sept. 4	do	105,000
Total		1,249				911,500

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1911						
CALIFORNIA						
W. H. Dimond	Sch.	376	Mar. 28	Sept. 6	Bering Sea	176,000
City of Papeete	Bkn.	370	Mar. 25	Aug. 31	do	180,000
Ottillie Fjord	Sch.	247	Mar. 31	Sept. 7	do	83,000
Total		993				439,000
WASHINGTON						
Fanny Dutard	Sch.	252	Apr. 14	Aug. 23	Bering Sea	201,000
Alice	Sch.	220	Mar. 30	Sept. 13	do	170,000
Joseph Russ	Sch.	235	Apr. 1	Aug. 23	do	204,000
John A	Sch.	235	Apr. 20	Sept. 6	do	165,000
Fortuna	Sch.	138	Mar. 31	Aug. 10	do	130,000
Vega	Sch.	233	Apr. 11	Sept. 19	do	165,000
Maid of Orleans	Sch.	171	Apr. 15	Sept. 7	do	68,000
Total		1,484				1,103,000
1912						
CALIFORNIA						
Vega	Sch.	233	Apr. 18	Sept. 17	North Pacific	139,000
W. H. Dimond	Sch.	376	Mar. 25	Aug. 29	Bering Sea	180,000
City of Papeete	Sch.	370	Mar. 28	Aug. 23	do	180,000
Ottillie Fjord	Sch.	247	Mar. 23	Sept. 5	do	75,000
Galilee	Sch.	328	Mar. —	Sept. 19	do	90,000
Total		1,554				664,000
WASHINGTON						
Maid of Orleans	Sch.	171	Apr. 12	Aug. 26	Bering Sea	101,000
Fanny Dutard	Sch.	252	Apr. 10	Aug. 14	do	189,000
Alice	Sch.	220	Apr. 5	Sept. 8	do	171,000
Joseph Russ	Sch.	235	Apr. 7	Apr. 21[6]		
Fortuna	Sch.	138	Apr. 11	Sept. 17	Bering Sea	89,000
John A	Sch.	235	Apr. 12	Sept. 15	North Pacific	134,000
Total		1,251				684,000
1913						
CALIFORNIA						
Galilee	Sch.	328	Mar. 7	Sept. 9	Bering Sea	145,000
Vega	Sch.	233	Feb. 6	Sept. 14	North Pacific	130,000
William H. Dimond	Sch.	376	Mar. 19	Aug. 20	Bering Sea	160,000
City of Papeete	Bkn.	370	Mar. 13	Aug. 27	do	183,000
Ottillie Fjord	Sch.	247	Mar. 18	Aug. 26	do	99,000
Total		1,554				717,000
WASHINGTON						
Maid of Orleans	Sch.	171	Apr. 13	Sept. 10	Bering Sea	105,000
Fanny Dutard	Sch.	252	Apr. 11	do	do	195,000
Alice	Sch.	220	Mar. 27	Sept. 2	do	137,000
John A	Sch.	235	Apr. 5	Sept. 15	North Pacific	140,000
Chas. R. Wilson	Sch.	328	Apr. 2	Sept. 2	Bering Sea	187,000
Total		1,206				764,000
BRITISH COLUMBIA						
Albert Meyer	Sch.	398	Aug. —	Oct. 16	Bering Sea	260

[6] Lost.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1914						
CALIFORNIA						
Sequoia	Sch.	324	Mar. 21	Sept. 9	Bering Sea	152,000
Galilee	Sch.	328	Mar. 24	Sept. 12	do	166,000
Vega	Sch.	233	Mar. 17	Aug. 26	North Pacific	150,000
City of Papeete	Bkn.	370	Mar. 23	Sept. 3	Bering Sea	187,000
Glendale	Sch.	281	do	Sept. 6	do	155,202
Ottillie Fjord	Sch.	247	Mar. 18	Sept. 3	do	121,000
Total		1,783				931,202
WASHINGTON						
Azalea	Sch.	327	Apr. 6	Sept. 11	Bering Sea	212,000
Fanny Dutard	Sch.	252	Apr. 5	Sept. 15	do	172,000
Fortuna	Sch.	138	Apr. 2	Sept. 8	do	96,000
Alice	Sch.	220	Mar. 25	Sept. 15	do	171,000
Wawona	Sch.	413	Apr. 1	Sept. 11	do	240,000
John A	Sch.	235	Apr. 7	Sept. 13	do	100,000
Chas. R. Wilson	Sch.	328	Apr. 2	Sept. 7	North Pacific	209,000
Maid of Orleans	Sch.	171	Apr. 7	Sept. 13	Bering Sea	52,000
Total		2,084				1,252,000
BRITISH COLUMBIA						
Albert Meyer	Sch.	398	Mar. 23	Sept. 9	Bering Sea	100,000
1915						
CALIFORNIA						
Sequoia	Sch.	324	Mar. 16	Aug. 13	Bering Sea	228,500
Galilee	Sch.	328	Mar. 24	Sept. 5	do	195,000
Vega	Sch.	233	Mar. 17	Aug. 26	North Pacific	119,000
Maweema	Sch.	392	Mar. 25	Sept. 7	Bering Sea	235,000
City of Papeete	Sch.	370	Mar. 23	Aug. 19	do	195,000
Glendale	Sch.	281	Mar. 20	Aug. 13	do	161,000
Ottillie Fjord	Sch.	247	Mar. 19	Aug. 27	do	120,000
Total		2,175				1,253,500
WASHINGTON						
Azalea	Sch.	327	Apr. 12	Sept. 6	Bering Sea	206,000
Fanny Dutard	Sch.	252	Apr. 10	Sept. 4	do	188,000
Fortuna	Sch.	138	Mar. 23	Aug. 22	do	110,000
Alice	Sch.	220	Apr. 10	Sept. 6	do	167,248
Wawona	Sch.	413	Apr. 14	Aug. 21	do	258,323
John A	Sch.	235	Apr. 12	Sept. 30	North Pacific	154,000
Chas. R. Wilson	Sch.	328	Apr. 10	Sept. 4	Bering sea	181,000
Maid of Orleans	Sch.	171	Apr. 3	do	do	110,000
Total		2,084				1,374,571
ALASKA						
Highland Queen	Gas. s.	12	[10]		North Pacific	5,000
Challenge	Gas. s.	35			do	12,500
Silver Wave	Gas. s.	19			do	8,000
Miscellaneous power vessels	Gas. s.	101			do	80,000
Total		167				105,500

[10] Wrecked about Apr. 20.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1916						
CALIFORNIA						
City of Papeete	Sch.	370	Apr. 1	Sept. 4	Alaska banks	221,000
Glendale	Sch.	281	Mar. 30	do	do	201,000
Maweema	Sch.	392	Apr. 2	Sept. 8	do	275,000
Sequoia	Sch.	324	Apr. 4	Sept. 2	do	230,000
Galilee	Sch.	328	Apr. 8	Sept. 3	do	220,000
Total		1,695				1,127,000
WASHINGTON						
Azalea	Sch.	327	Apr. 16	Sept. 10	Alaska banks	227,000
Alice	Sch.	220	Mar. 26	Aug. 26	do	172,400
Chas. R. Wilson	Sch.	328	Apr. 7	Aug. 23	do	221,000
Fanny Dutard	Sch.	252	Apr. 16	Aug. 27	do	220,000
Fortuna	Sch.	138	Apr. 18	Sept. 13	do	97,000
John A	Sch.	235	Apr. 16	Sept. 22	do	168,000
Maid of Orleans	Sch.	171	Jan. 11	Sept. 9	do	125,000
Vega	Sch.	233	Apr. 3	Sept. 23	do	105,000
Wawona	Sch.	413	Apr. 4	Aug. 26	do	[11] 271,000
Total		2,317				1,606,400
Grand total		4,012				2,733,400
1917						
CALIFORNIA						
City of Papeete	Sch.	370	Apr. 7	Sept. 4	Alaska Banks	216,000
Galilee	Sch.	328	Apr. 10	Sept. 10	do	220,000
Glendale	Sch.	281	Apr. 8	Sept. 4	do	182,000
Maweema	Sch.	392	Apr. 14	Sept. 6	do	255,000
S. N. Castle	Sch.	464	Apr. 17	Sept. 5	do	103,000
Sequoia	Sch.	324	Apr. 7	Sept. 4	do	258,000
Vega	Sch.	233	Apr. 10	Sept. 3	do	118,000
Total		2,392				1,352,000
WASHINGTON						
Progress	Gas. s.	115	Mar. 3	July 10	Alaska banks	63,155
Do			Aug. 5	Nov. 25	do	12,000
Azalea	Sch.	327	Apr. 2	Sept. 17	do	216,000
Alice	Sch.	220	do	Sept. 2	do	154,478
Chas. R. Wilson	Sch.	328	Apr. 7	Aug. 28	do	185,000
Fanny Dutard	Sch.	252	May 1	Sept. 17	do	148,000
Harold Blekum	Sch.	185	Jan. 20 [12]			
John A	Sch.	235	Apr. 16	Sept. 16	Alaska banks	178,000
Maid of Orleans	Sch.	172	Jan. 10	Sept. 19	do	103,000
Wawona	Sch.	413	Apr. 10	Sept. 13	do	264,000
Total		2,247				1,323,633
ALASKA						
Chas. Brown	Sch.	64			Alaska banks	
Valdez	Gas. s.	10			do	
Hunter	Gas. s.	60			do	
Total		134				42,327
Grand total		4,773				2,717,960

[11] Catch landed at San Francisco.

[12] Wrecked Mar. 3.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1918						
CALIFORNIA						
City of Papeete	Sch.	370	Apr. 9	Aug. 27	Alaska banks	194,000
Glendale	Sch.	281	do	Sept. 2	do	178,000
Maweema	Sch.	392	Apr. 18	Sept. 22	do	207,000
Sequoia	Sch.	324	do	Aug. 18	do	180,000
Beulah	Sch.	339	Apr. 25	Sept. 17	do	154,000
Louise	Sch.	328	do	Oct. 7	do	140,000
Total		2,034				1,053,000
WASHINGTON						
Azalea	Sch.	237	Apr. 22	Sept. 22	Alaska banks	192,000
Alice	Sch.	220	Apr. 15	Sept. 8	do	120,657
John A	Sch.	235	Apr. 29	Sept. 17	do	141,000
Chas. R. Wilson	Sch.	328	Apr. 20	Sept. 6	do	165,000
Galilee	Sch.	328	Apr. 26[13]	Sept. 25	do	170,000
Maid of Orleans	Sch.	171	Apr. 20	Sept. 6	do	111,000
Wawona	Sch.	413	Apr. 22	Sept. 7	do	244,459
Progress	Gas.	115	Feb. 8	Sept. 29	do	125,000
Chas. Brown	Sch.	60			do	24,231
Total		2,107				1,293,347
ALASKA						
Alice	Gas. s.	15				18,000
Valdez	Gas. s.	10				15,000
Total		25				33,000
Grand total		4,166				2,379,347
1919						
CALIFORNIA						
City of Papeete	Sch.	370	Apr. 1	Sept. 1	Alaska banks	179,000
Glendale	Sch.	281	May 3	do	do	133,000
Maweema	Sch.	392	Apr. 7	do	do	217,000
Sequoia	Sch.	324	Mar. 30	Sept. 2	do	128,000
Galilee	Sch.	328	Apr. 3	Sept. 6	do	150,000
Louise	Sch.	328	Apr. 17	Sept. 17	do	145,000
Beulah	Sch.	339	Apr. 10	Sept. 8	do	200,000
America	Sch.	25			do	20,000
Total		2,387				1,172,000
WASHINGTON						
Fanny Dutard	Sch.	252	May 13	Sept. 14	Alaska banks	120,000
John A	Sch.	235	May 1	Sept. 12	do	150,000
Chas. R. Wilson	Sch.	328	May 13	Sept. 12	do	105,000
Maid of Orleans	Sch.	171	Apr. 16	Aug. 24	do	81,000
Alice	Sch.	220	Apr. 3	Sept. 9	do	132,000
Wawona	Sch.	413	Apr. 23	Sept. 11	do	233,000
Total		1,619				821,000
ALASKA						
Alice	Gas. s.	15			Alaska banks	
Flossie	Gas. s.	10			do	
Edith	Gas. s.	7			do	
Total		32				20,537
Grand total		4,038				2,013,537

[13] Sailed from San Francisco but landed catch on Puget Sound.

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1920						
CALIFORNIA						
City of Papeete	Sch.	370	Apr. 8	Aug. 27	Alaska banks	145,000
Maweema	Sch.	392	Apr. 11	Sept. 4	do	204,000
Glendale	Sch.	281	Apr. 15	do	do	116,000
Sequoia	Sch.	324	Mar. 28	Aug. 27	do	160,000
Galilee	Sch.	328	Apr. 6	Aug. 12	do	76,000
Louise	Sch.	328	Apr. 12	Aug. 27	do	145,000
Beulah	Sch.	339	Apr. 15	Aug. 24	do	72,000
Progress	Gas.	115		do	do	23,000
Charles Brown	Sch.	64		Sept. 15	do	27,000
Eunice	Gas.	35			do	21,000
Mary G	Gas.	21			do	18,000
Total		2,597				1,007,000
WASHINGTON						
Maid of Orleans	Sch.	171	Apr. 17	Sept. 14	Alaska banks	86,000
John A	Sch.	235	Apr. 20	Sept. 7	do	102,000
Wawona	Sch.	413	Apr. 15	Sept. 6	do	174,000
Alice	Sch.	220	Apr. 20	Sept. 12	do	103,000
Dora	S. s.	217	May 19	Aug. 20	do	85,000
Total		1,256				550,000
ALASKA						
Lister	Gas.	14				
Pilgrim	Gas.	5				
Northern King	Gas.	7				
Patmos	Gas.	16			Alaska banks	123,867
Edith	Gas.	7				
Buffalo	Gas.	17				
Nimrod	Gas.	5				
North Star	Gas.	5				
Total		76				123,867
Grand total		3,929				1,680,867
1921						
CALIFORNIA						
Louise	Sch.	328	May 5	Sept. 4	Alaska banks	194,000
Progress	Gas.	115			do	30,000
Mary G	Gas.	21			do	18,000
Total		464				242,000
WASHINGTON						
Maid of Orleans	Sch.	171	Apr. 23	Aug. 22	Alaska banks	105,000
John A	Sch.	235	Apr. 24	Aug. 29	do	103,000
Fanny Dutard	Sch.	252	May 10	Aug. 28	do	158,000
Total		658				366,000
Grand total		1,122				608,000
1922						
CALIFORNIA						
Louise	Sch.	328	Apr. 2	Sept. 16	Alaska banks	180,000
Progress	Gas.	115			do	25,000
Glendale	Sch.	281	Mar. 25	Aug. 10	do	150,000
Maweema	Sch.	392	Apr. 1	Sept. 1	do	107,000
Total		1,116				462,000
WASHINGTON						
John A	Sch.	235	Apr. 20	Sept. 11	Alaska banks	160,000
Chas. R. Wilson	Sch.	328	Apr. 19	do	do	164,000
Wawona	Sch.	413	Apr. 18	Aug. 27	do	183,000
Fanny Dutard	Sch.	252	Apr. 25	Sept. 17	do	173,000
Total		1,228				680,000

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1922—Continued						
ALASKA						
Northern King	Gas.	7			Alaska banks	9,000
Mary G	Gas.	21			do	10,000
Total		28				19,000
Grand total		2,372				1,161,000
1923						
CALIFORNIA						
Louise	Sch.	328	May 13	Sept. 17	Alaska banks	40,000
Beulah	Sch.	328	Apr. 29	do	do	156,000
Galilee	Sch.	339	Mar. 14	Aug. 25	do	189,377
Progress	Gas.	115			do	21,000
Maweema	Sch.	392	Apr. 15	Sept. 27	do	310,000
Glendale	Sch.	281	Apr. 8	Sept. 16	do	185,000
Bangor	Sch.	398			do	
S. N. Castle	Sch.	464			do	
Total		2,645				901,377
WASHINGTON						
Fanny Dutard	Sch.	252	Apr. 18	Sept. 11	Alaska banks	171,000
Wawona	Sch.	413	Apr. 11	Sept. 7	do	168,000
John A	Sch.	235	Apr. 10	Aug. 29	do	163,000
Chas. R. Wilson	Sch.	328	Apr. 8	Sept. 11	do	205,000
Total		1,228				707,000
ALASKA						
Brant	Gas.	8			Alaska banks	8,000
Hillside II	Gas.	28			do	6,961
San Jose	Gas.	14			do	43,000
Plover	Gas.	19			do	73,130
Mary G	Gas.	21			do	15,000
Total		90				146,091
Grand total		3,963				1,754,468
1924						
CALIFORNIA						
Maweema	Sch.	392	Apr. 2	Sept. 14	Alaska banks	170,000
City of Papeete	Sch.	370	Mar. 9	Sept. 5	do	220,000
Louise	Sch.	328	Feb. 16	Aug. 31	do	149,783
Galilee	Sch.	339	Mar. 18	Sept. 10	do	142,000
Beulah	Sch.	328	Mar. 21	Aug. 30	do	144,864
Progress	Gas.	115			do	31,000
Total		1,872				857,647
WASHINGTON						
John A	Sch.	235	Apr. 12	Aug. 25	Alaska banks	177,000
Chas. R. Wilson	Sch.	328	Apr. 14	Aug. 26	do	232,000
Fanny Dutard	Sch.	252	Apr. 24	Aug. 28	do	181,000
Alice	Sch.	220	Apr. 14	Aug. 25	do	135,000
Wawona	Sch.	413	Apr. 15	Aug. 17	do	225,000
Total		1,448				950,000
ALASKA						
Daisy	Gas.	18			Alaska banks	3,500
Brant	Gas.	9			do	7,020
San Jose	Gas.	14			do	65,000
Plover	Gas.	19			do	55,040
Total		60				130,560
Grand total		3,380				1,938,207

Operations of the cod fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Fishing grounds	Number of fish taken
1925						
CALIFORNIA						
Maweema	Sch.	392	Apr. 4	Aug. 25	Alaska banks	194,000
Wm. H. Smith	Sch.	496	Feb. 23	Aug. 29	do	283,653
Galilee	Sch.	328	Mar 5	Sept. 2	do	180,776
Louise	Sch.	328	Mar. 27	Aug. 29	do	222,741
Total		1,544				881,170
WASHINGTON						
Chas. R. Wilson	Sch.	328	Apr. 7	Aug. 22	Alaska banks	237,674
John A	Sch.	235	Apr. 8	Aug. 28	do	156,327
C. A. Thayer	Sch.	390	Apr. 26	Sept. 18	do	256,160
Fanny Dutard	Sch.	252	Apr. 22	Aug. 22	do	83,000
Alice	Sch.	220	Apr. 10	Aug. 19	do	138,268
Wawona	Sch.	413	do	Aug. 22	do	229,242
Total		1,838				1,100,671
ALASKA						
Progress	Gas.	115			Alaska banks	
Pirate	Gas.	30			do	
Mary G	Gas.	21			do	
San Jose	Gas.	14			do	
Total		180				74,034
Grand total		3,562				2,055,875

SUMMARY OF THE SHORE-STATION DATA

The following table shows, in a condensed form, the data relating to the vessels plying to and from the Alaska shore stations and the fish brought from thence to the home stations. These transporting vessels usually make several trips each year, and in some instances fishing vessels are utilized for this purpose when not engaged in fishing. The total fish transported represent the catches made at the various shore stations.

Summary of shore-station data

Year	Number of vessels	Net tonnage	Number of trips	Number of cod brought to California	Number of cod brought to Washington [1]	Total number from shore stations
1876	1	114	1	30,000		30,000
1877	1	114	1	101,000		101,000
1878	3	190	6	227,000		227,000
1879	1	64	4	198,000		198,000
1880	2	172	4	201,000		201,000
1881	1	64	3	154,000		154,000
1882	1	108	3	203,000		203,000
1883	2	245	4	235,000		235,000
1884	1	137	3	249,000		249,000
1885	2	278	4	386,000		386,000
1886	3	454	5	383,000		383,000
1887	1	137	3	299,000		299,000
1888	2	285	4	372,000		372,000
1889	4	823	7	489,000		489,000
1890	4	621	9	773,000		773,000
1891	4	624	7	662,000		662,000
1892	2	388	4	700,000		700,000

[1] Nearly all of the cod brought to Washington came on regular steamers, and the same is true of a small part of those brought to California.

Summary of shore-station data—Continued

Year	Number of vessels	Net tonnage	Number of trips	Number of cod brought to California	Number of cod brought to Washington	Total number from shore stations
1893	2	366	4	660,000		660,000
1894	1	218	2	305,000		305,000
1895	1	218	2	286,000		286,000
1896	1	125	1			No report.
1897	4	652	6	511,000		511,000
1898	6	930	9	450,000		450,000
1899	6	975	11	722,000		722,000
1900	5	898	9	909,000		909,000
1901	5	907	8	727,000		727,000
1902	6	1,080	11	1,140,000		1,140,000
1903	4	631	11	985,000		985,000
1904	6	1,100	10	959,000	43,000	1,002,000
1905	6	1,384	10	1,274,000	[2] 8,000	1,282,000
1906	11	2,117	15	890,632	130,000	1,020,632
1907	7	1,153	14	[3] 1,116,951	402,000	1,518,951
1908	9	2,281	12	994,403	152,000	1,146,403
1909	8	2,134	9	897,361	[4] 13,000	910,361
1910	3	724	7	680,600	[4] 2,875	683,475
1911	7	1,836	9	909,000	[5] 83,000	992,000
1912	4	1,040	7	960,984	[6] 36,950	997,934
1913	6	1,397	6	[6] 657,847	[6] 146,250	804,097
1914	6	1,465	11	1,481,000	[6] 104,600	1,585,600
1915	3	719	7	1,114,400	30,100	1,144,500
1916	4	1,187	6	1,014,500	144,607	1,159,107
1917	3	859	6	1,205,000	143,000	1,348,000
1918	3	859	5	825,268	621,142	1,446,410
1919	5	1,468	5	1,177,000	419,802	1,596,802
1920	6	2,098	6	1,224,000	701,182	1,925,182
1921	7	1,889	7	1,123,000	519,000	1,642,000
1922	2	593	3	648,000	190,300	838,300
1923	3	623	5	926,000	244,375	1,170,375
1924	3	504	3	545,000	301,650	846,650
1925	4	989	5	898,000	91,924	899,924
Total				33,788,946	4,528,757	38,317,703

[2] Schooner Nellie Colman, from Seattle, lost with 30 lives.
[3] Schooner Glen, from San Francisco, lost with 28,000 fish.
[4] Shipped on regular steamship lines.
[5] Eight thousand of these were shipped on regular steamers.
[6] Schooner John D. Spreckles, of San Francisco, lost with 145,000 cod aboard.

DETAILED OPERATIONS OF THE TRANSPORTING FLEET FROM 1876 TO 1925

The following table shows in detail the cod shipped from the shore fishing stations in Alaska from 1876, when the first station was established, to 1925, both inclusive. The name, rig, and tonnage of the transporting vessel is shown, together with the dates of departure from and arrival at the home station, also the number of cod brought.[21] From 1876 to 1903, both inclusive, the data relate exclusively to California.

[21] For the early data relating to the fleet of transporters owned and operated from San Francisco the writer is indebted to the very complete and accurate records kept by the Union Fish Co. (formerly the McCollam Fishing & Trading Co.), of San Francisco.

Operations of the transporting fleet by years

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1876					
CALIFORNIA [1]					
Wild Gazelle	Sch.	114	Oct. 18		30,000
1877					
Wild Gazelle	Sch.	114	Sept. 24	Nov. 18	101,000
1878					
Alaska	Sch.	32	Mar. 18	June 15	22,000
Do			June 24	Sept. 15	12,000
Alfred Adams	Sch.	64	Apr. 4	June 22	51,000
Do			July 9	Aug. 29	46,000
Do			Sept. 10	Nov. 9	51,000
Ariel	Sch.	94		June 25	45,000
Total					227,000
1879					
Alfred Adams	Sch.	64	Mar. 12	Apr. 25	56,000
Do			May 13	June 29	57,000
Do			July 11	Aug. 25	45,000
Do			Sept. 2	Oct. 14	40,000
Total					198,000
1880					
Alfred Adams	Sch.	64	Mar. 16	May 8	42,000
Do			May 17	June 25	52,000
Do			July 3	Aug. 16	45,000
Wild Gazelle	Sch.	108	Sept. 11	Oct. 23	62,000
Total					201,000
1881					
Alfred Adams	Sch.	64	Mar. 21	May 31	52,000
Do			June 7	July 19	51,000
Do			July 26	Sept. 18	51,000
Total					154,000
1882					
Wild Gazelle	Sch.	108	Mar. 18	May 16	60,000
Do			June 2	July 28	83,000
Do			Aug. 12	Oct. 2	60,000
Total					203,000
1883					
Wild Gazelle	Sch.	108	Mar. 20	June 14	85,000
Do			June 21	Aug. 3	90,000
Do			Aug. 15	[2]	
Czar	Sch.	137	Oct. 3	Nov. 10	60,000
Total					235,000
1884					
Czar	Sch.	137	Mar. 23	June 14	102,000
Do			June 25	Aug. 14	97,000
Do			Sept. 16	Nov. 5	50,000
Total					249,000
1885					
Czar	Sch.	137	Mar. 12	Apr. 20	68,000
Do			May 8	June 30	120,000
Do			July 19	Sept. 19	98,000
Dashing Wave	Sch.	141	Apr. 1	June 11	100,000
Total					386,000

[1] From 1876 to 1903, inclusive, the data relate to California exclusively.
[2] Lost Aug. 19.

Operations of the transporting fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1886					
Arago	Sch.	176	Jan. 7	Sept. 18	60,000
Dashing Wave	Sch.	141	Mar. 14	May 30	58,000
Czar	Sch.	137	Apr. 1–4	May 24	99,000
Do			June 13	Aug. 10	101,000
Do			Aug. 28	Oct. 10	65,000
Total					383,000
1887					
Czar	Sch.	137	Apr. 2	May 20	125,000
Do			June 11	Aug. 7	99,000
Do			Aug. 25	Oct. 15	75,000
Total					299,000
1888					
Czar	Sch.	137	Mar. 12	May 14	131,000
Do			June 3	Aug. 8	115,000
Do			Aug. 26	Oct. 31	55,000
Eliza Miller	Sch.	148	Aug. 30	Oct. 25	71,000
Total					372,000
1889					
Czar	Sch.	137	Feb. 11	Apr. 6	132,000
Do			May 2	June 25	127,000
Do			July 10	Sept. 1	66,000
Dashing Wave	Sch.	141	Mar. 21	June 28	95,000
Do			July 12	Oct. 8	
Arago	Sch.	176	Apr. 5	Aug. 21	65,000
Hera	Sch.	369			4,000
Total					489,000
1890					
Czar	Sch.	137	Feb. 10	Apr. 7	115,000
Do			Apr. 19	June 17	117,000
Do			June 29	Aug. 30	103,000
Do			Sept. 13	Nov. 12	45,000
Dashing Wave	Sch.	141	Mar. 12	May 26	80,000
Do			June 15	July 26	80,000
Do				Oct. 22	70,000
John Hancock	Sch.	167	Mar. 16	Aug. 19	45,000
Arago	Sch.	176	Mar. 22	Aug. 12	118,000
Total					773,000
1891					
John Hancock	Sch.	167	Jan. 7	May 31	85,000
Czar	Sch.	137	Feb. 12	Apr. 21	110,000
Do			May 5	July 3	122,000
Do			July 15	Sept. 1	130,000
Do			Sept. 13	Nov. 13	75,000
Blakeley	Bgn.	144	May 30	Aug. 21	90,000
Arago	Sch.	176	Sept. 10	Nov. 8	50,000
Total					662,000
1892					
Czarina	Sch.	218	Jan. 30	Apr. 17	210,000
Do			May 14	July 11	240,000
Do			Aug. 18	Oct. 31	100,000
John F. Miller	Sch.	170	Apr. 30	June 28	150,000
Total					700,000
1893					
Czarina	Sch.	218	Feb. 3	Apr. 28	240,000
Do			May 18	July 18	215,000
Do			Aug. 19	Oct. 27	75,000
Eliza Miller	Sch.	148	May 14		130,000
Total					660,000

Operations of the transporting fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1894					
Czarina	Sch.	218	Apr. 5	June 28	190,000
Do			Aug. 4	Oct. 10	115,000
Total					305,000
1895					
Czarina	Sch.	218	Mar. 7	May 18	126,000
Do			Aug. 4	Oct. 18	160,000
Total					286,000
1896					
Francis Alice	Sch.	125	Aug. 28		[3]
1897					
Eliza Miller	Sch.	148	Jan. 4	Feb. 17	77,000
Czarina	Sch.	218	Sept. 12 [4]	Apr. 26	118,000
Mary and Ida	Sch.	174	May 7	Sept. 9	90,000
Winchester	Sch.	112	May 25	Sept. 3	47,000
Czarina	Sch.	218	June 23	Sept. 8	144,000
Mary and Ida	Sch.	174	Feb. 4	Apr. 27	35,000
Total					511,000
1898					
Czarina	Sch.	218	Sept. 30 [5]	Mar. 7	17,000
Winchester	Sch.	112	Sept. 20 [5]	Mar. 10	101,000
Do			Mar. 24	June 17	30,000
Czarina	Sch.	218	Apr. 7	Sept. 7	118,000
Arago	Sch.	176	Oct. 3 [5]	Apr. 10	26,000
Francis Alice	Sch.	125		June 11	52,000
Mary and Ida	Sch.	174	Aug. —	Sept. 27	47,000
Francis Alice	Sch.	125	Sept. 29	Dec. 16	28,000
Winchester	Sch.	112	June 26	Oct. 31	31,000
Total					450,000
1899					
Winchester	Sch.	112	Jan. 3	Mar. 9	40,000
Arago	Sch.	176	Aug. 2 [6]	Jan. 20	25,000
Francis Alice	Sch.	125	Dec. 29 [6]	Feb. 25	61,000
Do			Mar. 11	June 5	78,000
Winchester	Sch.	112	Mar. 17	May 19	63,000
Czarina	Sch.	218	Sept. 28 [6]	Apr. 3	71,000
John F. Miller	Sch.	170	May 5	July 5	79,000
Winchester	Sch.	112	June 4	Aug. 1	36,000
Mary and Ida	Sch.	174	Oct. 30 [6]	July 28	75,000
Do			Aug. 25	Dec. 12	129,000
Francis Alice	Sch.	125	Oct. 21	Dec. 20	65,000
Total					722,000
1900					
Anna	Sch.	227	Jan. 6	Mar. 27	90,000
Czarina	Sch.	218	Jan. 17	Mar. 23	170,000
Mary and Ida	Sch.	174	Mar. 19	Aug. 2	106,000
Arago	Sch.	176	Oct. 12 [7]	Mar. 27	35,000
Czarina	Sch.	218	Apr. 11	June 28	192,000
Winchester	Sch.	112	Oct. 1 [7]	May 10	55,000
Do			May 23	Aug. 8	57,000
Czarina	Sch.	218	July 22	Oct. 20	123,000
Mary and Ida	Sch.	174	Aug. 21	Nov. 14	81,000
Total					909,000
1901					
Arago	Sch.	176	Oct 9 [8]	Mar. 21	31,000
Mary and Ida	Sch.	174	Mar. 24	Aug. 27	95,000
Winchester	Sch.	112	Apr. 7	June 26	85,000
Czarina	Sch.	218	Nov. 3 [8]	Apr. 15	165,000
Anna	Sch.	227	Nov. 21	[9]	
Czarina	Sch.	218	May 6	July 13	266,000
Winchester	Sch.	112	July 13	Sept. 15	85,000
Do			Oct. 8	Nov. 23	60,000
Total					727,000

[3] Catch not reported.
[4] 1896.
[5] 1897.
[6] 1898.
[7] 1899.
[8] 1900.
[9] Lost Company Harbor, Sannak Island, Mar. 3, 1901.

Operations of the transporting fleet by years—Continued

Name o fvessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1902					
Mary and Ida	Sch.	174	Sept. 29[10]	Jan 14	16,000
Pearl	Sch.	120	Feb. 2	May 15	60,000
Czarina	Sch.	218	Oct. 6[10]	Feb. 16	167,000
Arago	Sch.	176	Oct. 26[10]	Mar. 10	45,000
Czarina	Sch.	218	Mar. 16	May 29	208,000
Mary and Ida	Sch.	174	Feb. 5	Mar. 20	125,000
Pearl	Sch.	120	May 24	July 9	60,000
Czarina	Sch.	218	June 20	Aug. 25	208,000
Stanley	Sch.	253	Sept. 14	Nov. 11	112,000
Mary and Ida	Sch.	174	Sept. 16	Nov. 28	48,000
Viking	Sch.	139	----------	Aug. 1	91,000
Total					1,146,000
1903					
Pearl	Sch.	120	Dec. 7[11]	Jan. 28	18,000
Czarina	Sch.	218	Jan. 28	Mar. 30	135,000
Pearl	Sch.	120	Feb. 12	Mar. 26	22,000
Volante	Sch.	119	Mar. 10	June 6	150,000
Pearl	Sch.	120	Apr. 9	May 28	68,000
Czarina	Sch.	218	Apr. 12	July 18	192,000
Pearl	Sch.	120	June 5	July 26	66,000
Do	----------	----------	Aug. 11	Oct. 6	54,000
Czarina	Sch.	218	---do----	Nov. 9	180,000
Pearl	Sch.	120	Oct. 26	Dec. 28	30,000
Mary and Ida	Sch.	174	Sept. 30	Dec. 24	70,000
Total					985,000
1904					
CALIFORNIA					
Czarina	Sch.	218	Jan. 17	Mar. 24	144,000
Mary and Ida	Sch.	174	---do----	[12]	----------
Pearl	Sch.	120	Jan. 19	Mar. 24	55,000
John D. Spreckles	Sch.	253	Apr. 10	June 22	146,000
Pearl	Sch.	120	---do----	Aug. 10	38,000
Czarina	Sch.	218	Apr. 11	June 23	204,000
Do	----------	----------	July 22	Oct. 3	180,000
Pearl	Sch.	120	Sept. 27	Nov. 18	30,000
John D. Spreckles	Sch.	253	Aug. 11	Nov. 26	162,000
Total					959,000
WASHINGTON					
Carrier Dove	Sch.	82	----------	Feb. 20	43,000
1905					
CALIFORNIA					
Czarina	Sch.	218	Jan. 16	Mar. 19	125,000
Do	----------	----------	Apr. 1	July 18	163,000
Do	----------	----------	Aug. 17	Nov. 5	144,000
Annie Larsen	Sch.	326	Apr. 5	June 10	252,000
Stanley	Sch.	253	Oct. 23[13]	Jan. 29	205,000
Do	----------	----------	Oct. 10	----------	----------
John D. Spreckles	Sch.	253	Oct. 24	Dec. 1	----------
W. H. Dimond	Sch.	376	Jan. 18	Mar. 22	150,000
Zampa	Sch.	322	Oct. 12	----------	----------
Marion	Sch.	223	Apr. 1	June 18	145,000
Do	----------	----------	July 18	Sept. 24	90,000
John F. Miller	Sch.	170	Oct. 7	----------	----------
Glen	Sch.	121	Sept. 19	----------	----------
Total					1,274,000
WASHINGTON					
From Kodiak	----------	----------	July 10	Oct. 12	8,000
Nellie Colman	Sch.	122	Oct. 1	[14]	----------

[10] 1901.
[11] 1902.
[12] Lost on Unga Island Feb. 23, 1904; had 78,000 fish aboard.
[13] 1904.
[14] Wrecked.

Operations of the transporting fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1906					
CALIFORNIA					
Marion	Sch.	223	(15)	Mar. 12	20,000
Do			Mar. 19	(16)	
Czarina	Sch.	218	Feb. 26	July 19	153,349
Do			Aug. 13	Oct. 29	98,000
Stanley	Sch.	253	Oct. 10[17]	Mar. 10	63,000
Alpha	Sch.	274	Mar. 12	June 10	244,283
John F. Miller	Sch.	170	Oct. 7[17]	Mar. 17	25,000
Do			Apr. 8	July 5	84,000
Do			July 29	Sept. 30	40,000
Glen	Sch.	121	Sept. 19[17]	Mar. 8	5,000
Dora Bluhm	Sch.	315	May 2	Sept. 11	33,000
Newport	S. S.	149	July 4	Aug. 19	125,000
Total					890,632
WASHINGTON					
Maid of Orleans	Sch.	171		March	10,000
Ralph J. Long	Sch.	85	June 23	July 5	100,000
Fortuna	Sch.	138	(15)	Apr. 5	20,000
Total					130,000
1907					
CALIFORNIA					
W. H. Dimond	Sch.	376	Dec. —[18]	Jan. 18	103,000
Do			Mar. 20	June 4	292,000
Do			June 21	Oct. 2	60,000
Do			Oct. 31		
Hunter	Sch.	60	Sept. 20[18]	Sept. 30	50,000
Czarina	Sch.	218	Jan. 24	Mar. 27	130,000
Do			Apr. 20	July 19	177,665
Do			Aug. 22	Nov. 9	174,286
Rosie H	Sch.	69	(15)	June 27	45,000
Glen	Sch.	121	Apr. 13	June 10	85,000
Do			Aug. 25	(19)	
Total					1,116,951
WASHINGTON					
Maid of Orleans	Sch.	171	Apr. 2	July 30	98,000
Do			Aug. 29		169,000
Fortuna	Sch.	138	Mar. 15	May 15	40,000
Do			May 27	Oct. 1	95,000
Total					402,000
1908					
CALIFORNIA					
W. H. Dimond	Sch.	376	Jan. 28	Mar. 22	80,000
John D. Spreckles	Sch.	253	Mar. 13	June 20	205,000
Do			July 23	Oct. 19	80,000
Repeat	Sch.	410	Apr. 18	July 9	In ballast
City of Papeete	Bkn.	370	Oct. 9		
Czarina	Sch.	218	Dec. 12[20]	Mar. 7	92,903
Do			Apr. 2	July 11	186,500
Ivy	Sch.	135	Mar. 19	May 15	100,000
Ida McKay	Sch.	178	Apr. 6	June 18	150,000
Do			July 11	Sept. 22	100,000
John F. Miller	Sch.	170	Nov. 23[20]	(21)	
Total					994,403
WASHINGTON					
Maid of Orleans	Sch.	171		Mar. 8	65,000
Do			Sept. 24	Nov. 22	87,000
Total					152,000

[15] Wintered in the North.
[16] Lost Apr. 11, 1906.
[17] 1905.
[18] 1906.
[19] Lost Sept. 30, with 28,000 fish.
[20] 1907.
[21] Wrecked Jan. 8, 1908.

Operations of the transporting fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1909					
CALIFORNIA					
City of Papeete	Bkn.	370	Sept. 3	Oct. 29	155,000
John D. Spreckles	Sch.	253	Dec. 5[22]	Feb. 21	44,000
W. H. Dimond	Sch.	376	Mar. 15	May 12	105,000
Czarina	Sch.	218	Oct. 9[22]	Feb. 25	125,000
Stanley	Sch.	253	Apr. 26	June 25	272,361
Ida McKay	Sch.	178	Mar. 30	June 14	65,000
Dora Bluhm	Sch.	315	----------	July 8	85,000
Do	----------	----------	----------	Sept. 26	16,000
San Buena Ventura	Sch.	171	----------	Nov. —	30,000
Total	----------	----------	----------	----------	897,361
WASHINGTON					
Regular steamers	----------	----------	[23]	[23]	13,000
1910					
CALIFORNIA					
John D. Spreckles	Sch.	253	Nov.10[24]	Mar. 9	90,000
Do	----------	----------	Mar. 25	May 31	90,000
Do	----------	----------	June 13	Oct. 3	130,000
Stanley	Sch.	253	Oct.17[24]	[25]	----------
Czarina	Sch.	218	June 13	Aug. 16	120,600
Do	----------	----------	Apr. 7	May 31	160,000
Do	----------	----------	Oct. 7	Nov. 24	90,000
Total	----------	----------	----------	----------	680,600
WASHINGTON					
Regular steamers	----------	----------	[23]	[23]	2,875
1911					
CALIFORNIA					
John D. Spreckles	Sch.	253	Oct.31[26]	Mar. 17	131,000
Do	----------	----------	Apr. 9	June 20	169,000
Do	----------	----------	July 16	Sept. 25	103,000
City of Papeete	Bkn.	370	Oct. 4	Dec. 7	55,000
Galilee	Sch.	328	May 20	July 27	251,000
Czarina	Sch.	218	Jan. 15	[27]	----------
Sequoia	Sch.	324	Aug. 14	Oct. 10	200,000
Ottillie Fjord	Sch.	247	Sept. 25	Dec. 8	----------
Total	----------	----------	----------	----------	909,000
WASHINGTON					
Bender Bros	Sch.	96	Apr. 20	June 6	75,000
Regular steamers	----------	----------	[23]	[23]	8,000
Total	----------	----------	----------	----------	83,000
1912					
CALIFORNIA					
Vega	Sch.	233	Oct.20[28]	Jan. 17	152,000
Sequoia	Sch.	324	Mar. 31	July 1	276,984
John D. Spreckles	Sch.	253	Apr. 7	Apr. 27	150,000
Bertha Dolbeer	Sch.	230	Apr. 6	June 27	30,000
John D. Spreckles	Sch.	253	May 29	Aug. 29	135,000
Sequoia	Sch.	324	July 27	Oct. 6	210,000
Bertha Dolbeer	Sch.	230	----------	Nov. 17	7,000
Total	----------	----------	----------	----------	960,984
WASHINGTON					
Regular steamers	----------	----------	[23]	[23]	36,950

[22] 1908.
[23] Various dates.
[24] 1909.
[25] Wrecked Mar. 28, 1910.
[26] 1910.
[27] Lost Feb. 15, 1910.
[28] 1911.

Operations of the transporting fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1913					
CALIFORNIA					
Galilee	Sch.	328	Nov. 11[29]	Jan. 11	190,847
Sequoia	Sch.	324	Mar. 29	May 30	240,000
Golden State	Sch.	223	Aug. 15	Oct. 13	175,000
John D. Spreckles	Sch.	253	Jan. 25	[30]	
Bertha Dolbeer	Sch.	230	Mar. 8	July 28	52,000
Total					657,847
WASHINGTON					
Union Jack	Sch.	39		Oct. 29	20,000
Regular steamers			[23]	[23]	126,250
Total					146,250
1914					
CALIFORNIA[31]					
City of Papeete	Bktn.	370	Oct. 8[31]	Jan. 25	200,000
Do			Oct. 18	Dec. 21	45,000
Golden State	Sch.	223	Nov. 15[31]	Jan. 15	159,000
Do			Mar. 5	Apr. 20	199,420
Do			May 20	Aug. 4	194,000
Do			Oct. 15	Dec. 20	171,000
W. H. Dimond	Sch.	376	Jan. 9	Jan. 28[32]	
Allen A	Sch.	266	Mar. 3	May 27	240,000
Do			June 20	Nov. 2	200,000
Bertha Dolbeer	Sch.	230	Mar. 10	May 27	32,000
Do			July 18	Oct. 1	41,000
Total					1,481,420
WASHINGTON					
Independent stations, regular steamers			[23]	[23]	104,600
1915					
CALIFORNIA					
Golden State	Gas. s.	223	Feb. 21	Apr. 12	174,000
Do			May 6	July 1	230,000
Do			Oct. 19	Dec. 15	170,000
Allen A	Sch.	266	Feb. 18	June 2	267,400
Do			June 18	Aug. 15	193,000
Do			Sept. 6	Dec. 22	47,000
Bertha Dolbeer	Sch.	230	Mar. 13	June 2	33,000
Total					1,114,400
WASHINGTON					
Regular steamers			[23]	[23]	30,100
1916					
CALIFORNIA					
Golden State	Gas. s.	223	Jan. 18	Mar. 5	198,000
Do			Mar. 29	June 25	201,000
Do			July 26	Sept. 24	155,000
Galilee	Sch.	328	Oct. 29	Dec. 21	134,500
Allen A	Sch.	266	Jan. —	May 9	178,000
Do			May 28	Oct. 23	148,000
City of Papeete	Sch.	370	Oct. 29		
Total					1,014,500
WASHINGTON					
Regular steamers			[23]	[23]	144,607

[23] Various dates.
[29] 1912.
[30] Lost; had 145,000 fish aboard; all lost.
[31] 1913.
[32] Lost.

Operations of the transporting fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1917					
CALIFORNIA					
City of Papeete	Sch.	370	Oct. 29[33]	Jan. 3	160,000
Do			Oct. 25		
Allen A	Sch.	266	Mar. 21	July 8	288,000
Do			Aug. 22	Nov. 13	168,000
Golden State	Gas. s.	223	Mar. 10	May 15	227,000
Do			June 10	July 31	177,000
Do			Aug. 26	Oct. 30	185,000
Total					1,205,000
WASHINGTON					
Regular steamers			[23]	[23]	143,000
1918					
CALIFORNIA					
City of Papeete	Sch.	370	Oct. 25[34]	Feb. 14	26,000
Do			Oct. 18		
Allen A	Sch.	266	Feb. 15	May 17	223,000
Do			June 21	Sept. 22	195,000
Do			Oct. 30		
Golden State	Gas. s.	223	Mar. 5	May 7	172,000
Do			May 26	July 22	209,268
Do			Oct. 24		
Total					825,268
WASHINGTON					
Regular steamers			[23]	[23]	621,142
1919					
CALIFORNIA					
City of Papeete	Sch.	370	Oct. 18[35]	Mar. 6	206,000
Allen A [36]	Sch.	266	Oct. 30[35]		
Maweema	Sch.	392	Oct. 4		
Golden State	Gas. s.	223	Oct. 24[35]	Jan. 1	165,000
Do			Feb. 13	Apr. 23	165,000
Do			May 8	July 27	216,000
Do			Oct. 12	Oct. 25	200,000
Regular steamers			[23]	[23]	225,000
Total					1,177,000
WASHINGTON					
Dora	S. s.	217	Apr. 20	Sept. 5	65,000
Regular steamers			[23]	[23]	354,802
Total					419,808
1920					
CALIFORNIA					
Maweema	Sch.	392	Oct. 4[37]	Jan. 3	235,000
City of Papeete	Sch.	370	Oct. 13[37]	Jan. 29	235,000
S. N. Castle	Sch.	464	Feb. 29	June 5	186,000
Sequoia	Sch.	324	Aug. 28[37]	Jan. 2	256,000
Carolyn Frances	Sch.	325	Mar. 6	June 9	190,000
Golden State	Gas. s.	223	Jan. 20	Mar. 23	100,000
Do			Nov. 16		
By steamer			[23]	[23]	22,000
Total					1,224,000
WASHINGTON					
By steamers			[23]	[23]	701,182

[23] Various dates.
[33] 1916.
[34] 1917.
[35] 1918.
[36] Wrecked Apr. 3, 1919.
[37] 1919.

Operations of the transporting fleet by years—Continued

Name of vessel	Rig	Net tonnage	Date of sailing	Date of return	Number of fish brought
1921					
CALIFORNIA					
Maweema	Sch.	392	Mar. 21	June 17	336,000
City of Papeete	Sch.	370	July 23	Oct. 17	232,000
Golden State	Gas. s.	223	Nov. 16[38]	Feb. 24	235,000
Sequoia	Sch.	324	Apr. 16	July 23	210,000
Oregon	Gas. s.	269		Nov. 9	110,000
Total					1,123,000
WASHINGTON					
Oregon	Gas. s.	269		July 31	260,000
Iskum		42		Dec. 1	25,000
By steamers			[23]	[23]	234,000
Total					519,000
1922					
CALIFORNIA					
City of Papeete	Sch.	370	Mar. 26	Aug. 27	220,000
Golden State	Gas. s.	223	Nov. 11[39]	Feb. 1	200,000
Do			Mar. 23	May 25	228,000
Total					648,000
WASHINGTON					
By steamers			[23]	[23]	190,300
1923					
CALIFORNIA					
City of Papeete	Sch.	370	Mar. 23	Aug. 13	190,000
Golden State	Gas. s.	223	Feb. 18	Apr. 17	200,000
Do			May 18	July 14	193,000
Do			Aug. 11	Oct. 6	221,000
Pirate	Gas. s.	30		Sept. 29	122,000
Total					926,000
WASHINGTON					
By steamers			[23]	[23]	244,375
1924					
CALIFORNIA					
Glendale	Sch.	281	Sept. 17	Jan. 3[40]	156,000
Golden State	Gas. s.	223	Feb. 9	Sept. 12	209,000
Glendale	Sch.	281		Oct. 7	180,000
Total					545,000
WASHINGTON					
By steamers			[23]	[23]	301,650
1925					
CALIFORNIA					
Glendale	Sch.	281	Feb. 20	Aug. 14	156,000
Golden State	Gas. s.	223	Feb. 17	Apr. 10	193,000
Do			May 1	Aug. 30	250,000
City of Papeete	Sch.	370	May 26	Sept. 20	194,000
Progress	Gas. s.	115	[24]	Aug. 27	15,000
Total		989			808,000
WASHINGTON					
By steamers			[23]	[23]	91,924

[23] Various dates.
[24] 1909.
[38] 1920.
[39] 1921
[40] 1925.

DISASTERS TO THE FLEET

Operating as it does in far northern waters, where the dangers to navigation are numerous and the waters are very poorly surveyed and charted, it is a matter for congratulation that so few disasters have been recorded as occurring to the fleet. The following table, which is not claimed to be complete, shows the total wrecks of which it was possible to find a record. No account is taken of the many minor accidents to the fleet, of partial disablements, groundings, etc., some of which proved very costly to the owners, however.

Record of wrecks of codfish vessels from 1877 to 1925, inclusive

Name [1]	Owner and home port	Where wrecked	Date	Lives lost	Codfish lost
Brontes	——, San Francisco		1877		
Sarah	Lynde & Hough, San Francisco.		1879		
Nagay [2]	McCollam & Co., Alaska	Popof Island	Summer, 1880		
General Miller	N. Bichard, San Francisco		1882		
H. L. Tiernan	Lynde & Hough, San Francisco.	Shumagin Islands	1882		
Wild Gazelle	McCollam & Co., San Francisco.		Aug. 19, 1883		
Isabel	Hansen & Anderson, San Francisco.	Foundered at sea	1888	14	
Dashing Wave	Lynde & Hough, San Francisco.	Bering Sea	Apr. 16, 1891		
John Hancock	do		Mar. 7, 1893		
Anna	Alaska Codfish Co., San Francisco.	Bering Sea	1902		
Mary and Ida	do	Unga Island	Feb. 23, 1904		78, 000
Pearl	do		1905	30	
Nellie Colman	Seattle & Alaska Codfish Co., Seattle.	At sea	1905	30	
Pirate [2]	Union Fish Co., Alaska	Alaska	1906		
Marion	Alaska Codfish Co., San Francisco.	Sannak Island	Apr. 11, 1906		
Glen	Pacific States Trading Co., San Francisco.	Unimak Island	Sept. 30, 1907	1	28, 000
John F. Miller	do	do	Jan. 8, 1908	[3] 10	
Stanley	Union Fish Co., San Francisco.	Sannak Island	Mar. 28, 1910	4	
Czarina	do	Nagai Island	Feb. 15, 1911		
Joseph Russ	Robinson Fisheries Co., Anacortes, Wash.	Chirikof Island	Apr. 21, 1912	1	
John D. Spreckles	Alaska Codfish Co., San Francisco.	Run down off California coast.	Mar. 29, 1913	2	145, 000
W. H. Dimond	do	Bird Island	Feb. 3, 1914		
Nonpariel [2]	do	Shumagin Islands	1915		
Highland Queen		do	About Apr. 20		
Harold Blekum	Northern Fisheries Co., Anacortes, Wash.	Ugak Bay, Kodiak Island.	Mar. 3, 1917		
Hunter	do	Off Sutwik Island	Aug. 30, 1917		[4]
Allen A. [5]	Alaska Codfish Co., San Francisco.	Unga Island	Apr. 3, 1919		
Dora	Bering Sea Fisheries Co., Seattle.	Hardy Bay, Vancouver Island, B. C.	Dec. 20, 1920		

[1] All schooner rigged, except the Nonpariel, which was a power schooner, and the Dora, which was a steamer.
[2] Employed in station work.
[3] All frozen to death.
[4] Total cargo.
[5] Was subsequently hauled off and towed to Seattle for repairs, and finally sold

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value relating to the commercial phases of it. The Pacific Fisherman, of Seattle, Wash., contains many short articles and notes relating to the industry, only a few of the more important of which have been listed. The newspapers of San Francisco, Calif., and Seattle and Anacortes, Wash., also contain a number of references to the industry.

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