FLUCTUATIONS IN THE SUPPLY OF HERRING (CLUPEA PALLASII) IN SOUTHEASTERN ALASKA[1]

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INTRODUCTION

A knowledge of the changes in relative abundance of the herring populations at different times and on different fishing grounds is necessary if the herring fishery is so to be regulated as to produce an optimum yield. By optimum yield is meant the maximum yield that can be taken without endangering the supply and which allows the population to maintain that level of abundance that will permanently produce either the greatest quantity or the greatest value of fish. In a previous report (Rounsefell, 1930, pp. 305–309) an analysis of the total catch figures was made, but no definite conclusions concerning abundance were reached for southeastern Alaska. The trends of abundance depended on too many factors to be determined by such a simple method. Therefore it has been necessary to use more exact methods.

As shown previously (Rounsefell, 1930, p. 272) several populations of herring are being dealt with, each of which conceivably has its own trend of abundance and therefore deserves to be studied as a unit. It is difficult, however, to determine the abundance of a single race of herring from the data of a composite fishery. Assuming that this initial difficulty be overcome, the determination of the trend of relative annual abundance is still rendered difficult by variations in the numerical strength of the annual increments to the population which may cause temporary fluctuations in abundance (Rounsefell, 1930, p. 299; 1930a). Aside from their influence on the

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trend, a knowledge of these temporary fluctuations may be of great value, as their study may eventually enable the forecasting, a year or more in advance, of the size and quantity of herring to be expected.

In pointing out the difficulties created by the presence of races and of dominant year classes, no account was taken of the difficulty of determining the abundance in the first place. Usually, for example, no reliance can be placed upon the total catch as an index of abundance, as it is subject to marked variation from economic causes and seldom represents the same amount of fishing effort. Thus if any very definite conclusions concerning abundance are to be reached, data must be collected which will represent the catch in terms of fishing effort. This is not simple if the fishing conditions are changing. A fishery once carried on during the autumn, for example, may later be conducted during the summer, and it would be unwise to assume that similar amounts of effort should represent similar catches in the two seasons without a thorough knowledge of the facts. Changes in the unit of effort itself presents another obstacle. Thus gill nets may succeed purse seines, or vice versa, and even where the same type of gear is continuously employed, a few simple changes in the net or in its manner of use, or in the fishing boat, may greatly alter the efficiency of the unit of effort.

FACTORS OTHER THAN ABUNDANCE AFFECTING THE CATCH

CHANGES IN THE SEASON

During the early years of the herring industry in southeastern Alaska, fishing was largely conducted in the fall and winter months, chiefly because the fishermen did not understand the curing of the "feedy" summer herring. About 1910 the fishermen commenced impounding the herring, thus allowing them to clean themselves of the "feed" before being salted. In 1917 the United States Bureau of Fisheries introduced the Scotch method of curing herring. In this method the fish are carefully gutted. These improvements aided in the use of the summer herring, which, being very fat, make a superior pack. The fishery thus gradually changed from a fall and early winter fishery to a summer fishery before any regulations were applied.

EFFECT OF REGULATIONS

Since the enactment by Congress of the White law in 1924 the herring fisheries have been subject to regulation by the Secretary of Commerce. The seasons open to commercial fishing in the various areas have been defined and limitations placed upon the types of gear. The regulations that concern the herring fisheries of southeastern Alaska are as follows:

Under date of December 2, 1924.

Herring fishery.—(1) Unless otherwise specified, commercial fishing for herring is prohibited in all waters closed throughout the entire year to salmon fishing.

(2) Commercial fishing for herring is prohibited during the period from January 1 to May 31, both dates inclusive, and from September 16 to December 31, both dates inclusive, of each calendar year, with the following exceptions:

(*a*) Commercial fishing for herring may be conducted from March 15 to April 15, both dates inclusive, in waters in the vicinity of Sitka within a line from Halibut Point to Cape Burunof.

(*b*) Commercial fishing for herring may be conducted from December 15 to January 15, both dates inclusive, in the waters of Seward Passage and Ernest Sound.

(*c*) Commercial fishing for herring may be conducted from January 1 to February 15, both dates inclusive, in the waters of Clarence Strait within a radius of 3 statute miles of the town of Hadley,

Tongass Narrows, Cholmondeley Sound, and Behm Canal and its tributary waters west of Bell Island to a line from Caamano Point to Point Higgins.

(3) The closed seasons herein specified for herring fishing shall not apply to any boat taking not to exceed 60 barrels of herring in any calendar week in waters open to fishing.

(4) No one shall place, or cause to be placed, across the entrance to any lagoon or bay any net or other device which will prevent the free passage at all times of herring in and out of said lagoon or bay.

Closed waters of some importance to herring fishing:

Port Frederick, northern shore of Chichagof Island: All waters east of a line drawn from Inner Point Sophia to Game Point, and all waters south of 58° 4′ north latitude. A portion of the waters closed is in the central district.

Gambier Bay, east coast of Admiralty Island: All waters west of 134° west longitude.

Wilson Cove, southwestern shore of Admiralty Island: All waters within the cove.

Whitewater Bay, southwestern shore of Admiralty Island: All waters within a line drawn from Point Caution to Woody Point.

Chaik Bay, southwestern shore of Admiralty Island: All waters east of 134° 29′ west longitude.

Warm Spring Bay, eastern shore of Baranof Island: All waters within the bay.

Hanus Bay, northeast shore of Baranof Island: All waters in the bay south of a line drawn from Point Hanus to Point Moses.

Basket Bay, east coast of Chichagof Island: All waters within the bay.

Tenakee Inlet and Freshwater Bay: All waters within a line drawn from North Passage Point to South Passage Point.

Under date of January 28, 1925.

In the period from June 1 to October 1, both dates inclusive, commercial fishing for herring is prohibited in all waters closed throughout the year to salmon fishing. The waters of Kanalku Bay, Admiralty Island, are closed throughout the year to commercial fishing for herring.

Commercial fishing for herring is prohibited during the period from March 1 to April 30, both dates inclusive, of each calendar year, except that such fishing may be conducted from March 15 to April 15, both dates inclusive, in waters in the vicinity of Sitka within a line from Halibut Point to Cape Burunof.

Under date of February 17, 1925.

Commercial fishing for herring is permitted during the period from March 1 to March 20, 1925, both dates inclusive, provided that during this period such fishing shall not be conducted on the actual spawning grounds of herring.

Under date of March 18, 1925.

Commercial fishing for herring is permitted during the period from March 21 to March 31, 1925, both dates inclusive, provided that during this period such fishing shall not be conducted on the actual spawning grounds of herring.

Under date of December 5, 1925.

(1) During the period from June 1 to October 15, both dates inclusive, commercial fishing for herring is prohibited in all waters closed throughout the year to salmon fishing.

(2) Commercial fishing for herring is prohibited during the period from January 1 to May 31, both dates inclusive, and from October 15 to December 31, both dates inclusive, in each calendar year, with the following exceptions:

(*a*) Commercial fishing for herring may be conducted from March 15 to May 15, both dates inclusive, in waters in the vicinity of Sitka within a line from Halibut Point to Cape Burunof.

(*b*) Commercial fishing for herring may be conducted from January 1 to January 15, both dates inclusive, in the waters of Seward Passage and Ernest Sound.

(*c*) Commercial fishing for herring may be conducted from January 1 to February 15, both dates inclusive, in the waters of Clarence Strait within a radius of 3 statute miles of the town of Hadley, Tongass Narrows, Cholmondeley Sound, and Behm Canal and its tributary waters west of Bell Island to a line from Caamano Point to Point Higgins.

(3) The closed seasons herein specified for herring fishing shall not apply to any boat taking not to exceed 60 barrels of herring in any calendar week in waters open to fishing.

Additional waters closed to fishing:

Kelp Bay, east coast of Baranof Island: All waters in Middle Arm, and all waters in South Arm west of 134° 57′ west longitude.

Security Bay, northwest shore of Kuiu Island: All waters within 1,000 yards of all salmon streams.

Redfish Bay, southwest shore of Baranof Island: All waters above a true east and west line passing through the southern end of the Second Narrows.

Under date of December 22, 1926.

The closed seasons herein specified for commercial herring fishing shall not apply to the taking of herring for bait purposes in waters otherwise open to fishing.

Commercial fishing for herring, except for bait purposes, is prohibited from 6 o'clock postmeridian of Saturday of each week until 6 o'clock antemeridian of the Monday following.

Commercial fishing for herring, including bait fishing, by means of any purse seine more than 1,200 meshes in depth, more than 180 fathoms in length, or of mesh less than 1½ inches stretched measure between knots is prohibited: Provided, that any purse seine may have in addition a strip along the bottom not to exceed 30 meshes in depth and of mesh not less than 4 inches stretched measure between knots. No extension to any seine in the way of leads will be permitted.

Additional waters closed to fishing:

Port Banks, off Whale Bay, west coast of Baranof Island: All waters in Port Banks.

Under date of February 17, 1927.

Seines used in commercial fishing, including bait fishing, for herring in Klawak Harbor, within a true east and west line passing through the northern extremity of Klawak Island, shall not exceed 90 fathoms hung measure in length nor 500 meshes in depth. For the purpose of determining depths of such seines measurements will be upon the basis of 1½ inches stretched measure between knots. No such seine shall have a mesh of less than 1½ inches stretched measure between knots.

Under date of October 6, 1927.

Regulation No. 2 (defining season) is amended so as to permit commercial fishing for herring with gill nets not less than 2¼ inches stretched measure between knots from October 6 through December 31, 1927, both dates inclusive, in waters otherwise open to fishing.

Additional waters closed to fishing:

Little Port Walter, east coast of Baranof Island: All waters in Little Port Walter.

Under date of September 24, 1928.

Regulation No. 2 (defining season) is amended so as to permit commercial fishing for herring with gill nets not less than 2¼ inches stretched measure between knots from October 1 to December 31, 1928, both dates inclusive, in waters otherwise open to fishing.

Under date of December 18, 1928.

Commercial fishing for herring, including bait fishing, by means of any trap is prohibited.

No herring fishing boat shall carry or operate more than one seine of any description, and no additional net of any kind shall be carried on such boat. The carrying of any additional seine or net of any kind on a boat towed by any herring fishing boat is prohibited.

Although a number of regulations have been made it is obvious that only a few really have any serious limiting effect on the fishery. The restricting of the fishery to the four months from June to September, including as it does practically all of the period when the herring are fat enough to be profitably utilized for reduction, or for the best grades of Scotch cured herring, has almost no effect on the quantity of the catch. Likewise, the effect of the closure of several bays to salmon fishing (and therefore to herring fishing) has probably been negligible, as in nearly every case the closed areas were of slight importance for herring. The 36-hour weekly closed season, in effect since 1927, is a different matter. There is little doubt that it has had some effect on curtailing the catch. Whether this short closed period actually restricts the catch in proportion to its length is dubious, however, as the boats usually

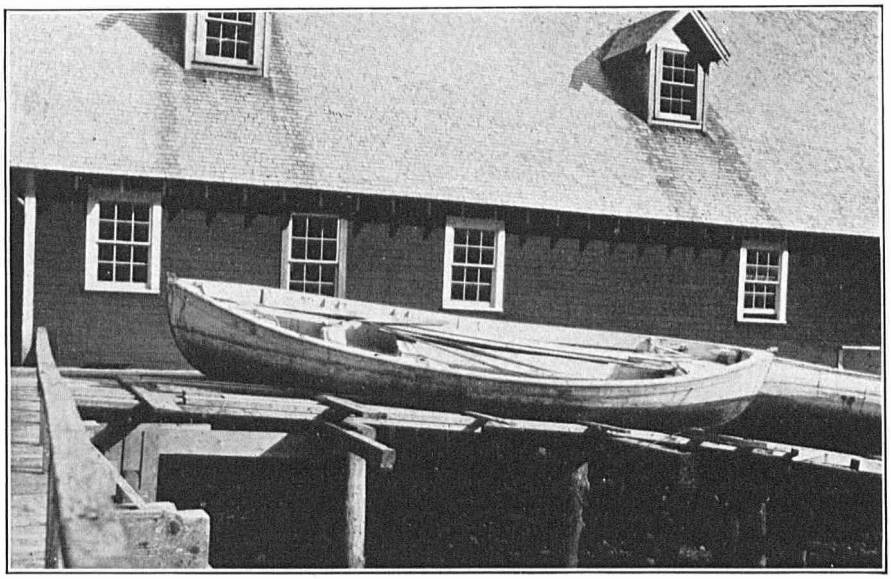

FIGURE 1.—A typical oar-propelled seine boat generally used during the early development of the herring fishery. A large steam or motor vessel towed or carried on davits two of these boats with half of the seine in each boat. When a school of fish was discovered the two seine boats were rowed around its opposite sides and the seine pursed by hand. This method was last used by the Big Port Walter plant in 1926. Taken at Big Port Walter in June, 1929

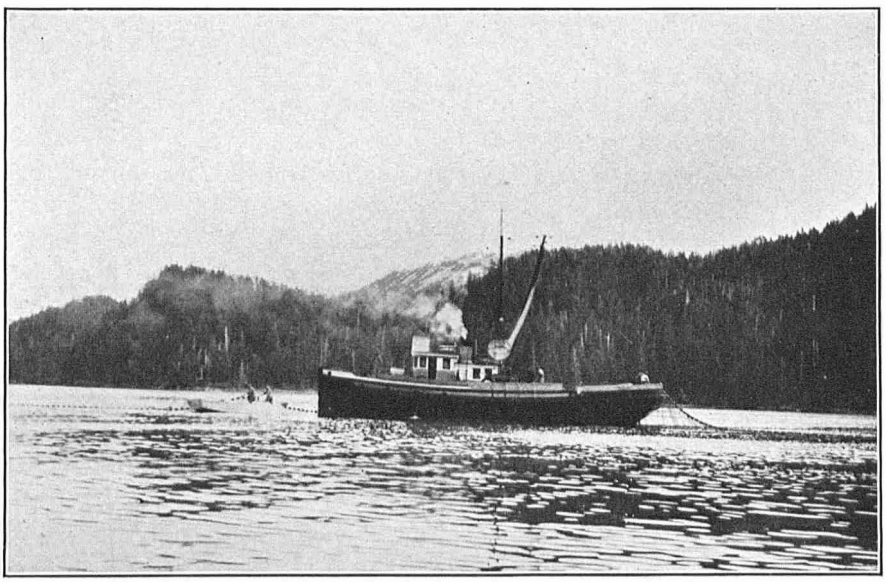

FIGURE 2.—The purse seine boat *Valencia*. This is a typical modern Diesel-powered vessel, 59 feet long with a 17-foot beam, 46 tons gross and 31 tons net, built in Tacoma in 1927, and equipped with a 90-horsepower Diesel engine. Taken at Big Port Walter in June, 1929

utilize it in prospecting for herring schools, running to distant grounds, or tanning their seines. Most of the restrictions on gear have been made more with the idea of safeguarding against possible abuses than as restrictions.

CHANGES IN THE UNIT OF FISHING EFFORT

CHANGES IN THE PURSE SEINE VESSELS

Of more importance in the study of abundance perhaps than the change in the fishing season has been the change in the unit of fishing effort. Thus the plant at Killisnoo employed, from 1882 to 1923, a Norwegian method of seining from oar-propelled seine boats (Rounsefell, 1930, p. 230). (See fig. 1.) Besides this method, beach seines were also used for a time by other operators. Soon after 1900 the first purse seines were employed for herring and so rapidly gained in favor that by 1927 the last Norwegian type of seine had disappeared.

No other methods of fishing have been of any importance in southeastern Alaska. The Killisnoo plant twice attempted to use traps but neither attempt was successful and their use is now prohibited. Gill nets are used, but chiefly by the salmon trollers as a means of obtaining very small quantities of bait.

As the purse seine has supplanted all other types of gear and has caught the bulk of the herring for many years, a study has been made of its changes in efficiency. This has been accomplished through a study of the purse-seine fleet rather than of the seine, which although it has changed somewhat in size, has not changed in shape or in method of use.

The purse-seine fleet has undergone a great change since 1922, which year marked the start of a tremendous expansion of the summer herring fishery. Since then there have been radical changes in the size and age of the vessels, the type of hulls, the horsepower relative to the size of the vessel, the type of engines, the increased use of the power seine roller, and in many less important features, all of which have added very materially to the effectiveness of the vessel as a fishing unit. In short, the unit of fishing effort—the purse-seine vessel—has changed so materially in the short space of eight years that comparisons between catches of earlier and later vessels are not valid without a knowledge of the effect of these changes.

Figure 3 shows the net tonnages of purse-seine vessels that have appeared in the fleet at some time from 1919 to 1929 plotted against the year in which they were built. It is apparent that there were two distinct periods marked by special activity in the building of these boats. The first, from 1917 to 1920, was undoubtedly due to the prosperity attending the World War. The second, from 1925 to 1928, was due to the phenomenal growth of the fish oil and meal industry. This second period of building is characterized by the adoption of the Diesel engine, which burns a very cheap semirefined oil, permitting the boats to make long trips at low cost and with less actual bulk of fuel than is the case with engines burning gasoline or distillate.

The vessels built at the beginning of the second period, in 1925, averaged 29.2 net tons as against 27.9 net tons in 1920, a slight increase. From then on the size increased rapidly, reaching an average of 41.3 net tons in 1928. The years 1927 and 1928 were poor seasons for the herring companies, resulting in the building of only three new boats in 1929. The two for which we have the tonnages average 36.5. Although this represents a decrease in size from 1928, the number is too small to give a significant average.

The size of the vessels of the fleet each year since 1923 is shown graphically in Figure 4, in which the boats are divided into four categories. Boats under 25 net

tons, comprising 60 per cent of the fleet in 1923, have entirely disappeared by 1929. Coincident with the fall of the group under 25 tons, the group from 25 to 29 tons rose from 26.5 per cent in 1923 to 39 per cent in 1925 and 1926, but in 1927 it commenced to decline, and in 1929 comprised but 22 per cent of the total. The group from 30 to 34 net tons, commencing at only 14 per cent in 1923, rose to over 37 per cent in 1926. Since then this group has declined to slightly over 27 per cent. Although boats of this tonnage still comprise 27 per cent of the fleet, the individual boats now in use are chiefly new Diesel boats built from 1925 to 1927, and the group is still increasing in efficiency through the loss of older boats and the acquisition of new. The most remarkable feature is the sudden appearance of the group composed of boats of 35 net tons and over—large, fast, high-powered vessels, well constructed and seaworthy. Appearing in 1925 and 1926 this group increased rapidly until by 1929 it included over 50 per cent of the fleet. (See fig. 2.)

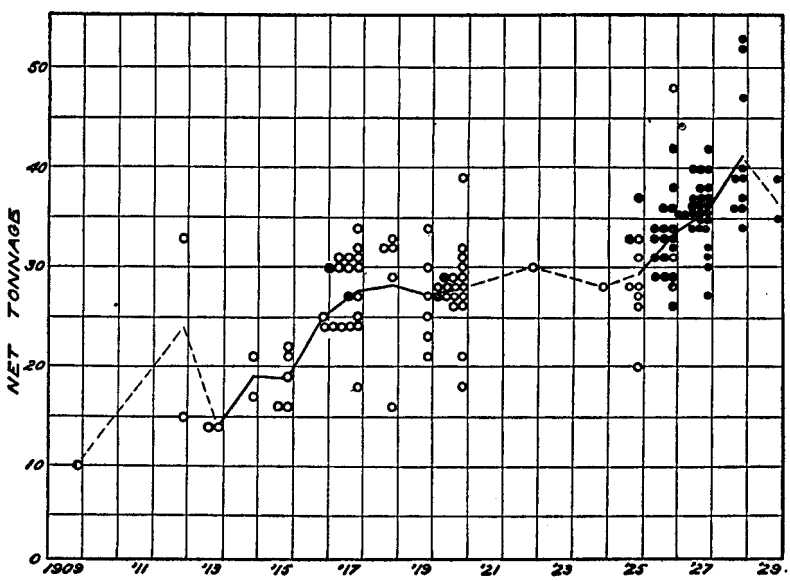

FIGURE 3.—The net tonnage plotted against the year when built for each of the purse-seine vessels that has appeared in the fleet at some time during the period from 1919 to 1929, inclusive. A circle indicates a vessel powered with a gasoline engine; a dot indicates a Diesel-powered vessel

A summation of these size changes is shown in Table 1, which gives the number of boats each year, the average net tonnage (of those of which the tonnage is known), and the calculated total net tonnage (derived by multiplying the average by the total number of boats). The percentages of boats the tonnages of which are known are also given—71.9 per cent, in 1925, being the smallest sample of the fleet used in obtaining the average tonnage. (See fig. 5.) This shows that our sample is probably entirely adequate to represent the fleet, except possibly in 1922 in which the numbers are so small that the chance for error is greatly increased. The rapid rise from an average of 23 net tons in 1922 to 34 net tons in 1929 is too great to be ignored.

TABLE 1.—*Purse seine fleet of southeastern Alaska*

Year	Number of boats	Number with tonnages known		Average net tonnage	Total net tonnage	Year	Number of boats	Number with tonnages known		Average net tonnage	Total net tonnage
		Actual	Per cent					Actual	Per cent		
1922	8	6	75.0	23.33	186.64	1926	48	48	100.0	28.42	1,364.16
1923	15	14	93.0	22.00	330.00	1927	70	69	98.6	30.65	2,145.50
1924	20	17	85.0	25.30	506.00	1928	65	64	98.5	33.34	2,167.34
1925	32	23	71.9	27.48	879.36	1929	56	55	98.2	33.71	1,887.76

In gaging the changes in efficiency of the individual boats of the fleet, it is extremely difficult to translate changes in size, speed, seaworthiness, age, etc., into terms of relative ability to deliver quantities of fish at the plant. In addition there is no assurance in comparing two types of vessels in 1929, for example, that precisely the same conditions held in 1922. In a year when fishing was conducted at a distance, speed and size might be the paramount factors; in outside waters seaworthiness would play a part; in years of scarcity, when each haul netted but few fish, the larger vessels might conceivably catch less than the smaller, because of greater difficulty in maneuvering.

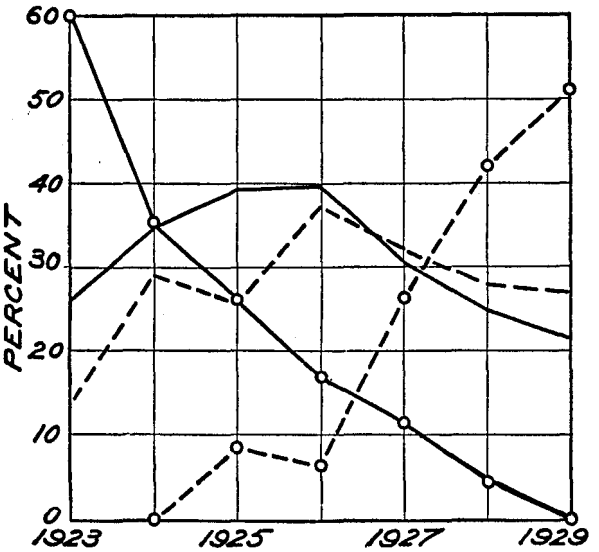

FIGURE 4.—Showing the percentages of the fleet included in different size categories from 1923 to 1929. Solid line with circles, less than 25 net tons; solid line without circles, 25 to 29 net tons, inclusive; dotted line without circles, 30 to 34 net tons, inclusive; dotted line with circles, over 34 net tons

In order to discover whether the efficiency of the vessel depends upon size, the total monthly catches have been correlated with the net tonnage of the vessel, the coefficient of correlation being calculated from ungrouped data. (Table 2.) An inspection of the table shows a great variation in the value of the coefficient of correlation. In only 6 out of 23 coefficients is the correlation significant. Of these 6, the significance of the negative coefficient based on only 9 pairs of items must be regarded as very doubtful.

TABLE 2.—*Correlation between net tonnage and total monthly catch of purse seine boats*

Month and year	Number of pairs of related items	Mean catch in barrels	Mean net tonnage	Pearsonian coefficient of correlation	Probable error of coefficient of correlation	Regression of catch on tonnage
NORTH [1]						
June, 1927	26	1,598	30.4	0.803	[2] 0.05	195.7
June, 1928	28	2,597	33.4	.427	[2] .10	49.2
June, 1929	18	3,112	35.2	−.218	.15	80.6
July, 1927	23	2,120	30.7	.211	.13	44.1
July, 1928	26	1,647	34.1	−.228	.13	21.0
July, 1929	18	1,674	35.2	−.157	.15	36.0
August, 1927	9	1,671	30.4	−.065	.22	10.0
August, 1928	23	1,398	35.0	−.355	.18	40.5
August, 1929	12	2,815	36.0	−.202	.19	64.2
September, 1928	9	2,022	38.4	−.615	[2] .14	71.8
September, 1929	5	4,894	35.4	−.626	.18	1,003.9
SOUTH [3]						
June, 1927	23	1,940	31.4	.193	.14	33.6
June, 1928	30	3,018	33.3	−.191	.12	36.5
June, 1929	30	2,672	33.3	−.075	.12	15.8
July, 1927	27	2,143	31.3	.059	.13	12.0
July, 1928	29	2,088	33.1	−.246	.12	32.8
July, 1929	29	1,440	33.4	−.178	.12	31.8
August, 1927	19	2,637	31.3	.412	.13	66.1
August, 1928	29	2,005	33.4	−.204	.12	32.4
August, 1929	34	3,710	33.1	.569	[2] .08	180.8
September, 1927	12	3,195	33.0	.469	.15	76.6
September, 1928	16	3,513	33.8	.688	[2] .09	134.6
September, 1929	34	5,344	33.1	.532	[2] .08	160.2

[1] Boats delivering to plants north of Point Ellis (Group II and III).
[2] Coefficient of correlation of probable statistical significance.
[3] Boats delivering to plants south of Point Ellis (Group I).

It appears that the changes in the values of the coefficients follow somewhat the same trend from year to year. However, a more careful inspection shows that such a conclusion is hardly justified. In the set of boats delivering to plants north of Point Ellis (Groups II and III, fig. 10) while the July and August values are quite similar, two of the June values are high and the third is low, so that no reliance can be placed on them. The values for September are based on too few items to be worthy of serious consideration. For those boats delivering to plants south of Point Ellis, it appears that there may be a significant correlation between size and catch during September, but the inconsistency of the August values makes it seem doubtful that any definite conclusions can be reached without more data.

For the set of boats north of Point Ellis there appears to be no correlation. For the set of boats south of Point Ellis there appears to be a larger coefficient of correlation with the larger catches. Table 2 shows that these larger catches were all made in August and September. This being the case it may be concluded that the reason the larger boats are more efficient at this time is principally because of their superior seaworthiness, for during the last part of August and in September the boats of this southern set fish chiefly around Cape Ommaney, where the weather is very adverse at this season of the year. If this correlation were due to the quantities of fish taken, then a similar correlation should appear in the set north of Point Ellis; but in the northern set of boats such a correlation does not appear, and in this set the larger quantities are not taken under as adverse conditions.

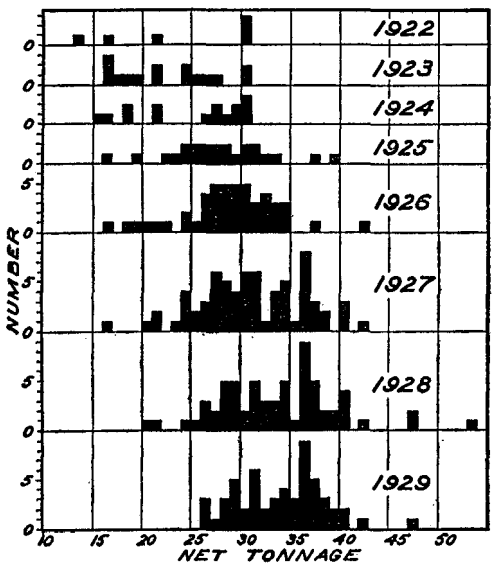

FIGURE 5.—Showing the net tonnage of every boat in the fleet for which the tonnage is known, each year from 1922 to 1929

A reason for the lack of a significant correlation between size of boat and monthly catch is suggested by Table 3 in which the daily catches are shown, during 1929, for the 4 smallest and the 4 largest vessels of the fleet. The 4 smallest vessels comprise 3 of 26 net tons and 1 of 27 net tons. The 4 largest vessels include 2 of 40, 1 of 42, and 1 of 47 net tons. Two features are of importance—one is the larger catches taken by the larger vessels, the other is the greater number of catches taken by the smaller vessels. Here is probably the answer to lack of correlation between size and total catch, the smaller vessels making up in number of catches for what the larger vessels gain by an occasional large catch.

It may be concluded from this study of the fleet that the differences in the efficiency of boats of different sizes are dependent upon too many factors to be analyzed easily, but upon the whole these differences are not sufficiently marked in the period from 1927 to 1929 to make it necessary to allow for them in an analysis of the catch per unit of fishing effort, and even though one so desired not enough is known at present to justify making such an allowance. This statement probably does not apply to the very small boats used extensively in the earlier years, especially before 1925, which certainly did not approach the recent boats in efficiency.

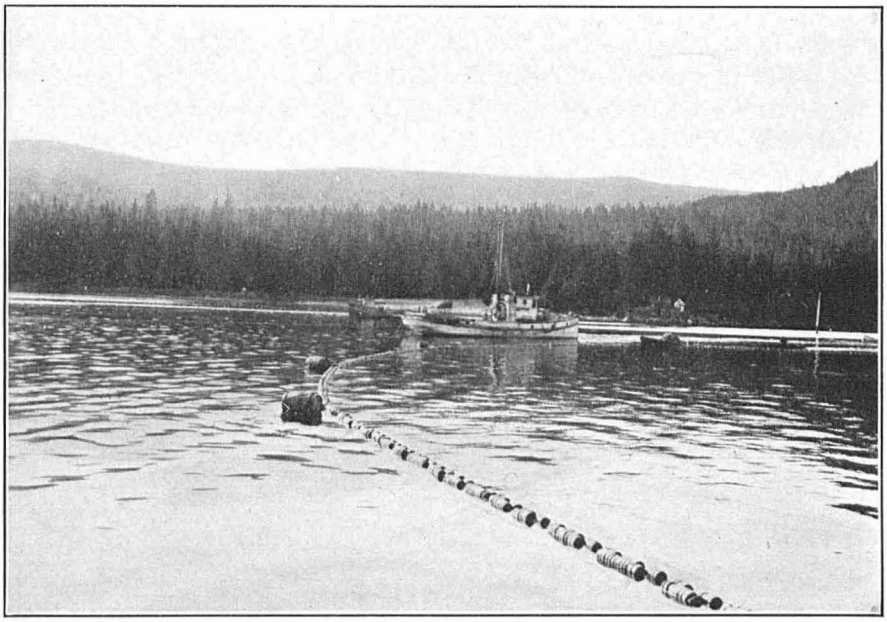

FIGURE 6.—Herring impounded at Auke Bay (area 20) to be used as fresh bait for halibut fishing. The net is set in a semicircle from the shore. Herring are often confined for a month or two in these pounds and caught as needed by a small pound seine used from a skiff. Such equipment is shown in the right center of the picture. Taken in June, 1929

FIGURE 7.—Herring saltery and reduction plant at Port Conclusion

CHANGES IN THE PURSE SEINES

Besides these changes in the boats there have been some slight changes in the purse seines. From about 170 fathoms in length a few years ago the seines gradually increased in length and depth, especially on the larger boats until some were over 200 fathoms in length. In 1926 (p. 18) a regulation was promulgated restricting seines to 180 fathoms in length and 1,230 meshes in depth. This decrease in length of a few of the larger seines is not of sufficient importance to be taken into consideration, but it may in the future serve as a restriction on the building of very large seine boats.

EFFECT OF IMPOUNDING ON THE UNIT OF EFFORT

The use of the purse-seine boat as a unit of fishing effort during the early years of the fishery is somewhat invalidated by the then prevailing practice of impounding (described in a previous report, Rounsefell, 1930, p. 231). For example the Pacific Fisherman for September, 1917, says that Alaska Herring & Sardine Co. at Little Port Walter reported enough herring impounded in the harbor to last them all season, and the Alaska-Pacific Herring Co. had approximately 12,000 barrels of herring impounded at Big Port Walter. (See fig. 6.)

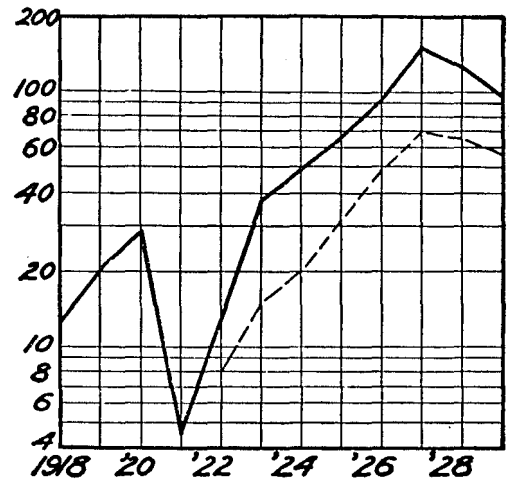

FIGURE 8.—Showing the combined capacity of all herring reduction plants (solid line), except the S. S. *Peralta* in 1927 and 1928, and the number of purse-seine boats (dotted line), plotted on a logarithmic (proportional) scale so that the slopes of the two curves are comparable (see text)

Since 1925 practically no impounding has been done in southeastern Alaska (exclusive of that for bait) except in Surprise Harbor. The change has probably been due largely to several causes—as the increased carrying capacity of the newer boats; the increase in the percentage of the catch taken in deeper water and around Cape Ommaney where impounding is impracticable; and the increase in the numbers of the fleet; which, taken together with the ever increasing cruising radius, make it highly inconvenient for each seine boat to have a towboat for impounding.

CAPACITY OF THE HERRING PLANTS

A knowledge of the variations in the capacity of the herring plants as determined by the sizes of herring needed and the quantity capable of being used is important to this study. Previous to the building of additional reduction plants in 1919, all of the herring companies (with the exception of Killisnoo) were limited in their use of herring to what they could salt or can. They fished only for herring of a size large enough to fulfill their requirements; consequently the catch per boat of this period would be in no way comparable to that of later years, even were one sure what type of gear was employed in every case.

The total capacity in tons of raw fish per hour of all of the reduction plants (except the S. S. *Peralta* in 1927 and 1928) and the number of boats fishing each year are shown in Figure 8. The two curves have been plotted on a logarithmic scale to show the relative changes. It is obvious that the relation between boats

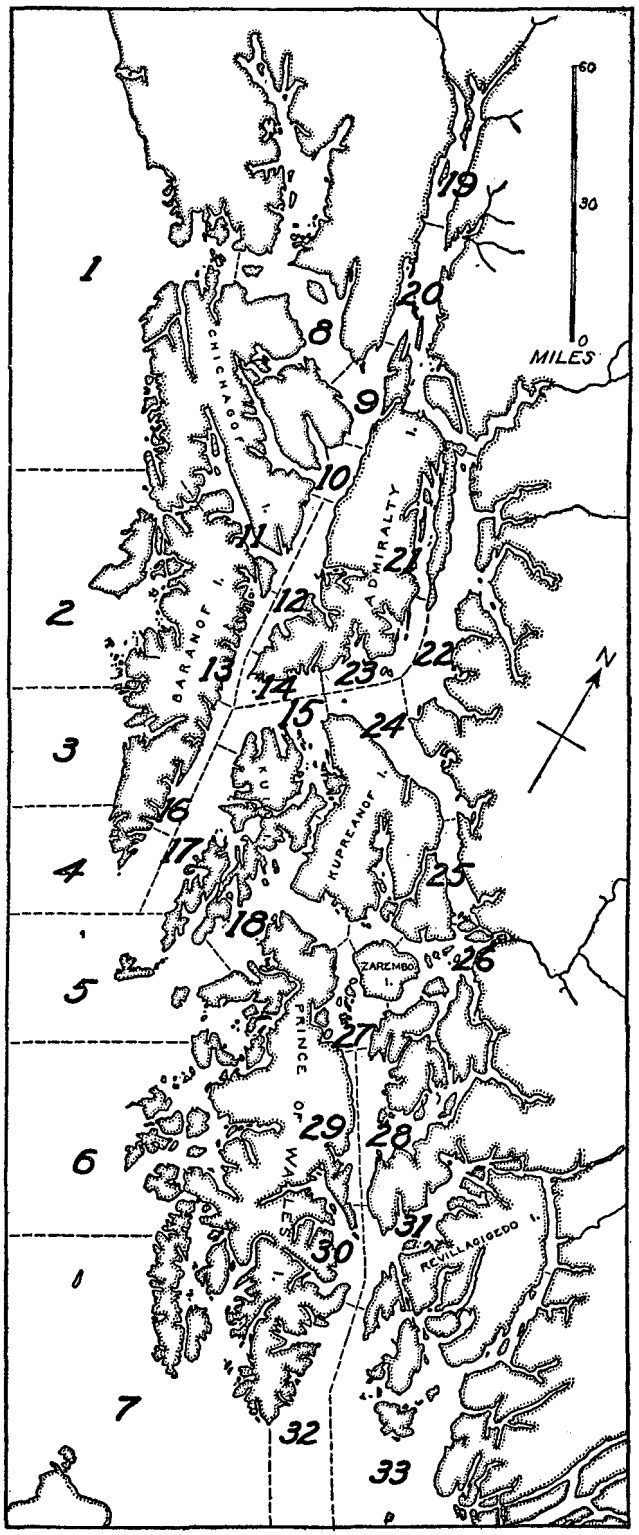

FIGURE 9.—Southeastern Alaska, showing the statistical areas used

and capacity has remained fairly constant. However, the capacity is based on the rated capacity of the press machinery. This machinery has been constantly improved, so that, whereas most of the presses of a few years ago could barely handle their rated capacity of raw fish, practically all of the newer presses (most of those now in use have been installed since 1926) can slightly exceed their rated capacity whenever occasion demands. When the installation of more efficient cookers, meal dryers, fish conveyors, etc., is considered, it can readily be comprehended that the rated capacity of the presses, our best measure of capacity, is too much in error to form an accurate basis of comparison from year to year.

All of these facts tend to show that the actual capacity of the reduction plants has increased more rapidly than the number of boats. If this be true it is self-evident that in the earlier years the plants were more apt to be confronted with an oversupply of fish. This to some extent invalidates comparisons between earlier and later years, since whenever the plants have an oversupply of herring the catch per boat fails as a measure of abundance. At such times the curve of abundance is abruptly truncated. The values obtained are minimum values, and there is no means of judging what the actual abundance may have been. Now if the capacity of the plants is raised, then at such times of great abundance the curve is truncated at a higher level; so that in making compar-

isons with earlier years it may appear that at times the fish reached a higher level of abundance than formerly, whereas the obviously higher level is but an artifact. This will, however, tend only to minimize any fall in the trend of abundance and, far from invalidating any fall which may be found to have occurred, will give it additional significance.

ANALYSIS OF CATCH RECORDS

The sources of the data herein employed are the same as those given in a previous report (Rounsefell, 1930, p. 303) and will not be repeated. In this report, however, the most use has been made of the daily catch records and not the production records, which were necessarily emphasized in the former analysis of the early years.

In analyzing the statistics for southeastern Alaska the whole region has been arbitrarily divided into 33 areas. (Fig. 9.) The boundaries between areas have been drawn as far as possible so as to pass through waters where little or no fishing occurs. This was done partly to avoid all confusion in assigning catches to their proper areas and partly so that each area would represent a natural fishing ground. By thus separating each natural fishing ground it was felt that the analysis would be more in confomity with what meager knowledge already exists concerning races (Rounsefell, 1930, p. 272), and any fluctuations due to the passage of dominant year classes might be more easily segregated and studied.

As a further refinement it was found advisable for purposes of analysis to divide the purse-seine boats into three groups according to the locations of the plants to which they delivered their catches. (Fig. 10.) Group I comprises boats delivering to plants south of Point Ellis. The boats of this group fish chiefly in area 4. Group II contains boats delivering to plants north of Point Ellis but south of Wilson Cove. These boats fish chiefly in areas 4 and 17, but are wider ranging than the boats of Group I. The boats of Group III, delivering to plants north of Wilson Cove, fish chiefly in the northern areas, especially 8, 9, and 20, and in the central Chatham Strait areas. One company maintains two plants—one located at Port Herbert in Group I, and the other located at Warm Springs Bay in Group II. The boats of this company delivered fish to either plant; therefore although they are used in studies of the combined groups, their data have not been used in the analysis of the individual groups.

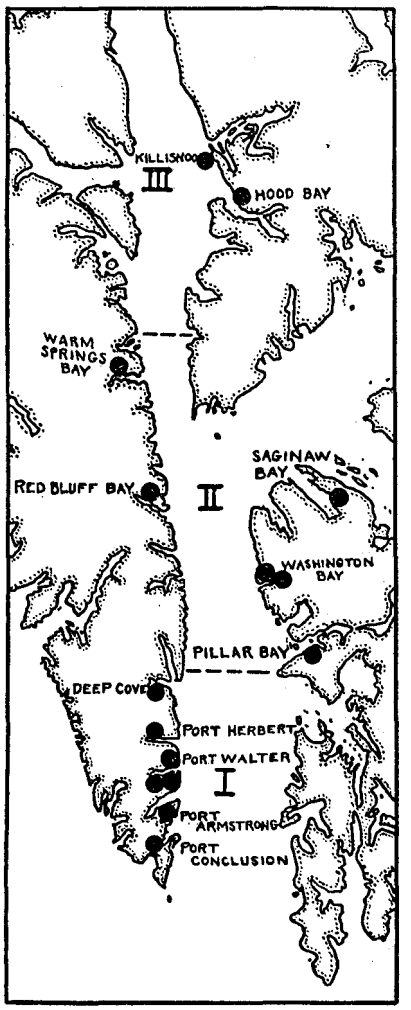

FIGURE 10.—Chatham Strait, showing the three groups into which the plants were divided for the statistical analysis

CHANGES IN AVERAGE SIZE OF CATCH

The average delivery per boat as a record of abundance is subject to the same criticism as that of the total catch or the catch per week, namely, that in times of

great abundance the carrying capacity of the boat limits the size of catch so that above a certain point it is impossible to measure the variations in abundance. (See fig. 11.) In Table 3 is given the daily catches of the four largest and four smallest purse-seine boats operating during 1929. It is obvious from the table that the average size of catch would tend to rise with an increase in the size of the vessels, tending to minimize any fall due to depletion, because the larger the boat the higher the level at which the curve of catch is truncated.

Another important factor to be considered is the shift in the fishing grounds. On new grounds the average size of catch may be expected to be larger than on older grounds. Thus the constant shift of the fishery to new grounds as the older are depleted has kept up the average size of catch, obscuring and minimizing any fall in abundance. For these various reasons any decline shown by this method must be regarded as a minimum decrease and can not be regarded as showing the actual extent of depletion.

TABLE 3.—*Frequency distributions of catches of the four smallest and the four largest purse-seine vessels of fleet in 1929*

Size of catch, in barrels	Small boat frequencies					Large boat frequencies				
	Individual boats				All boats	Individual boats				All boats
0 to 39	5	9	12	6	32	6	3	8	5	22
40 to 79	5	8	12	10	35	5	4	6	----	15
80 to 119	9	6	9	6	30	6	2	9	1	18
120 to 159	10	8	2	6	26	9	3	5	4	21
160 to 199	8	7	3	5	23	3	3	3	3	12
200 to 239	6	7	4	2	19	1	2	5	2	10
240 to 279	1	2	1	6	10	2	----	2	----	4
280 to 319	8	3	----	7	18	2	3	4	----	9
320 to 359	6	1	4	4	15	3	3	1	2	9
360 to 399	5	1	1	4	11	3	2	3	----	8
400 to 439	3	3	4	8	18	2	3	1	----	6
440 to 479	1	----	----	7	8	1	4	----	2	7
480 to 519	1	9	----	1	11	----	----	----	2	2
520 to 559	1	----	----	----	1	2	----	----	2	4
560 to 599	----	1	----	----	1	----	2	1	2	5
600 to 639	----	----	----	----	----	1	2	1	----	4
640 to 679	----	----	----	----	----	----	1	----	----	1
680 to 719	----	----	----	----	----	1	----	----	----	1
720 to 759	----	----	----	----	----	1	1	----	1	3
760 to 799	----	----	----	----	----	4	----	----	----	4
800 to 839	----	----	----	----	----	1	2	----	----	3
840 to 879	----	----	----	----	----	1	1	----	----	2
1,000 to 1,039	----	----	----	----	----	----	2	----	----	2
Total number of catches	69	65	52	72	258	54	43	49	[1]26	172
Net tonnage of boat	26	26	26	27	----	40	40	42	47	----

[1] First half of season only.

In determining the general abundance by the average size of the deliveries a standard average delivery for each date was obtained by the formula:

$$s = \frac{a_1 + a_2 + \ldots + a_n}{n},$$

in which a_1, a_2, etc., are the arithmetic means of the deliveries on the given date in different years and n is the number of years. A standard curve was then obtained by smoothing these standard averages by threes, thus obtaining a smoothed average for each date, designated by S, S_1, S_2, etc.

Each month in each year was next compared with that month's portion of the standard curve by the formula:

$$\log D = \frac{(\log a - \log S) + (\log a_1 - \log S_1) + \ldots + (\log a_N - \log S_N)}{N}$$

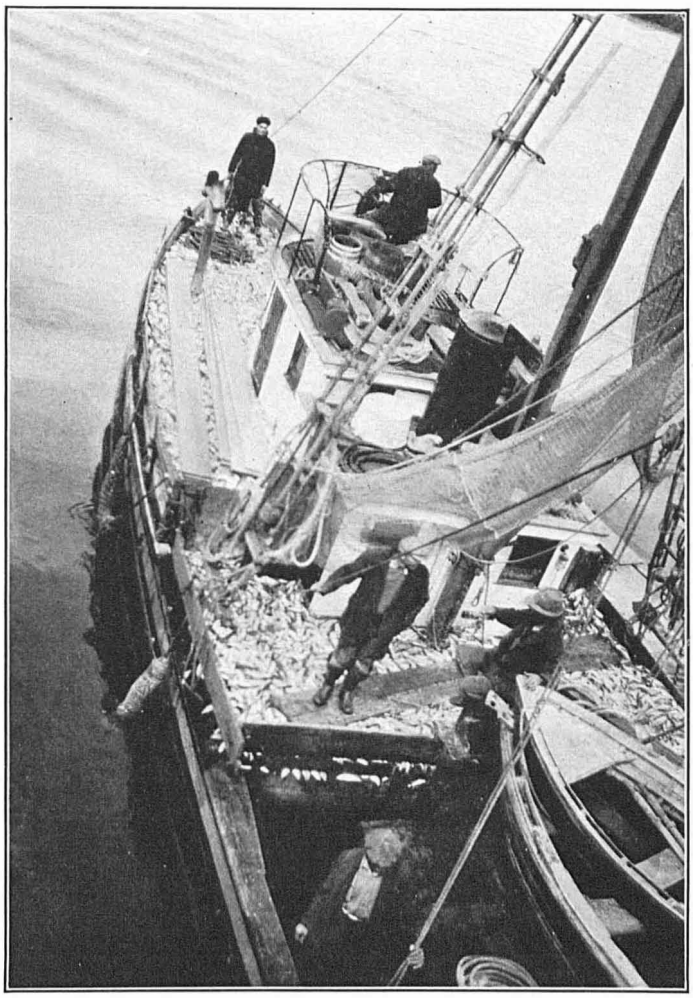

FIGURE 11.—The purse boat *Lemes II*, decks awash, at Pillar Bay, with a "deck load" of herring from Douglas Island (area 20). Note the outside setting wheel atop the wheelhouse. This is being installed on all of the new boats for quick and easy maneuvering while seining. Taken July, 1929

FIGURE 12.—Purse seine boats awaiting their turn to unload at New Port Walter. Taken June, 1929

in which a, a_1, etc., are the averages on various days, S, S_1, etc., are the standard averages, and N is the number of days. Thus D is, for the month in question, the geometric mean of the percentages that the averages (a, a_1, etc.) of the various days are of the corresponding values on the standard curve. The average for each month in 1928 has been called 100 per cent and the monthly averages of the other years expressed as percentages of this base.

TABLE 4.—*Comparisons of average daily catches of each year with a standard daily catch curve*

Month	Geometric means of the average daily catches expressed as percentages of the standard curve				Geometric means expressed as percentages of 1928 mean			
	1926	1927	1928	1929	1926	1927	1928	1929
GROUP I								
June	90.0	64.3	94.2	78.4	95.6	68.3	100	83.2
July	132.9	76.1	78.4	53.1	169.5	97.1	100	67.7
August	124.6	70.4	54.4	78.4	229.0	129.3	100	144.1
September	93.2	71.3	69.9	83.1	133.3	102.0	100	118.9
Total	110.8	70.4	72.9	64.0	152.0	96.6	100	87.8
GROUP II								
June	90.6	71.5	97.4	97.4	93.0	73.4	100	100.0
July	118.8	73.7	70.6	91.8	168.3	104.4	100	130.0
August	114.7	71.9	61.0	70.5	188.1	117.9	100	115.5
September	.....	61.6	58.2	121.6	.....	105.8	100	209.0
Total	109.8	70.4	71.0	93.1	154.6	99.2	100	131.1
GROUP III								
June	90.0	95.5	90.4	.....	99.6	105.6	100	.....
July	91.4	68.2	67.0	.....	136.4	101.8	100	.....
August	135.4	40.9	42.3	.....	321.0	97.0	100	.....
Total	101.7	64.0	68.1	.....	149.4	94.0	100	.....

The geometric mean has been used in preference to the arithmetic mean so as to give equal weight to the same relation deviations from the standard curve. Thus an increase of 100 per cent in a number should have the same weight as a decrease of 50 per cent—in one case the number is doubled, in the other it is halved. For example, the geometric mean of 200 per cent and 50 per cent (representing a 100 per cent increase and a 50 per cent decrease) is 100 per cent, but the arithmetic mean is 125 per cent. For a detailed discussion of the use of the geometric mean see Fisher (1922).

In comparing the curves in Figure 13 it should be noted that changing the geometric means of the percentages to percentages of the 1928 mean was done only for the purpose of putting all of the curves on the same basis for comparison. These curves give the rates of change and therefore the slopes of the various portions are directly comparable.

The month of June (fig. 13) maintains practically the same level of abundance, except in 1927 in which Groups I and II show June to be distinctly lower.

The abundance during the month of July shows a consistent drop from 1926 to 1927; 1927 and 1928 are practically the same. In 1929 Group I shows a further decline, but Group II shows an equally large increase. The only conclusion to be drawn is that 1926 shows the highest level of abundance in this month.

In the month of August it is clear that 1928 shows the least abundance, 1926 the most.

1926, in September, is but slightly higher than 1929 in Group I. Group II shows September at a very high level but this is probably an artifact, for in this group, since there was no fishing during September in 1926, the high 1929 year is compared to a standard curve considerably lower than would surely be the case were 1926 included.

The curves for the whole four months' period (fig. 13) show 1926 to be at a very high level of abundance; 1927 is at a very slightly lower level than 1928. In 1929 the Group I boats show a further decline, whereas the Group II boats show a large increase. This large increase probably is due in large part (as previously explained) to the lack of data for this group during September, 1926.

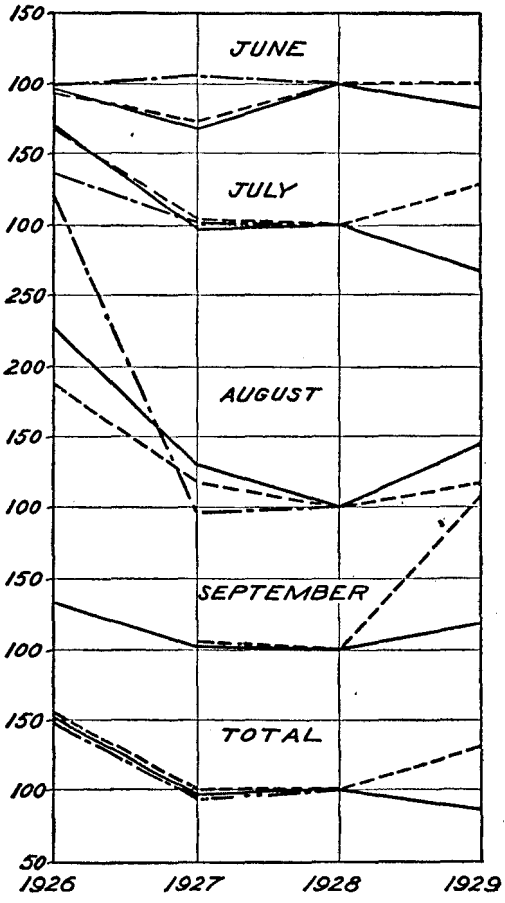

FIGURE 13.—Showing the geometric means (expressed as percentages of the 1928 mean) of the percentages that the average size of catch is of a standard curve (see text). Solid line, Group I; dotted line, Group II; broken line, Group III

From this analysis of the average size of the catches it must be concluded that 1926 shows a much higher level of abundance than the three succeeding years.

CHANGES IN NUMBER OF DELIVERIES

Another method used in this attempt to determine the general trend of abundance was a study of the number of deliveries made by each boat each week. This method entails certain errors. When the fishing is being conducted at a distance the number of deliveries will necessarily be small; while when fishing close to the plant the number of deliveries will usually be high, even though the catches may be small. During 1926 the number of deliveries each week has been multiplied by the factor 0.786, to make the data comparable to the following years in which there has been a 36-hour weekly closed season from 6 o'clock postmeridian Saturday to 6 o'clock antemeridian of the Monday following. These data were analyzed in the same manner as the daily deliveries, the average number of deliveries per week being assumed to be the average for each day within the week. Thus the standard average on each day consisted of the arithmetic average of the average number of deliveries per week of the four weeks that happened to include the particular day. The results of the computations are shown in Table 5.

TABLE 5.—*Comparisons of average number of deliveries per week of each year with a standard delivery curve*

Month	Geometric means of the average number of deliveries expressed as percentages of the standard curve				Geometric means expressed as percentages of 1928 mean			
	1926	1927	1928	1929	1926	1927	1928	1929
GROUP I								
June	94.4	79.4	92.4	126.5	102.1	85.9	100	136.9
July	121.5	81.2	94.7	76.8	128.3	85.7	100	81.1
August	96.6	85.8	90.8	84.0	106.4	94.5	100	92.5
September	81.3	85.5	83.8	127.5	97.0	102.0	100	152.1
Total	98.2	82.9	90.6	99.4	108.3	91.5	100	109.7
GROUP II								
June	71.4	83.6	108.6	137.7	66.1	77.4	100	127.5
July	108.3	96.0	101.6	86.8	106.6	94.5	100	85.4
August	91.6	88.1	97.2	74.0	94.2	90.6	100	76.2
September	.....	86.4	73.8	121.8	.....	117.1	100	165.0
Total	90.0	88.6	95.0	96.5	94.8	93.3	100	101.6
GROUP III								
June	119.3	55.4	100.5	.....	118.6	55.1	100	.....
July	129.4	82.5	86.6	.....	149.5	95.3	100	.....
August	111.6	104.8	75.0	.....	148.9	139.7	100	.....
Total	119.9	77.8	86.2	.....	139.1	90.3	100	.....

This method of analysis gives somewhat the same results as that in which the average size of the deliveries was used, as can readily be observed by comparing Figures 13 and 14. One marked difference occurs in the month of June in which the number of deliveries is highest in 1929. The two figures correspond quite closely in July, except for Group II in 1929, which has a high average size of catch and a low number of deliveries. The same is true in August for both the I and II groups. During August all of the groups have a high average size of catch in 1926, but the number of deliveries shows no rise in Groups I and II and only a moderate rise in Group III. The total curves for the two methods of analysis agree rather well, except that the number of deliveries in 1926 is not so high relatively as the average size of catch. This may be an artifact, however, caused by the failure of the factor 0.786, by which the 1926 data was multiplied, to give a true valuation of the change in number of deliveries caused by the lack of a weekly closed season in 1926.

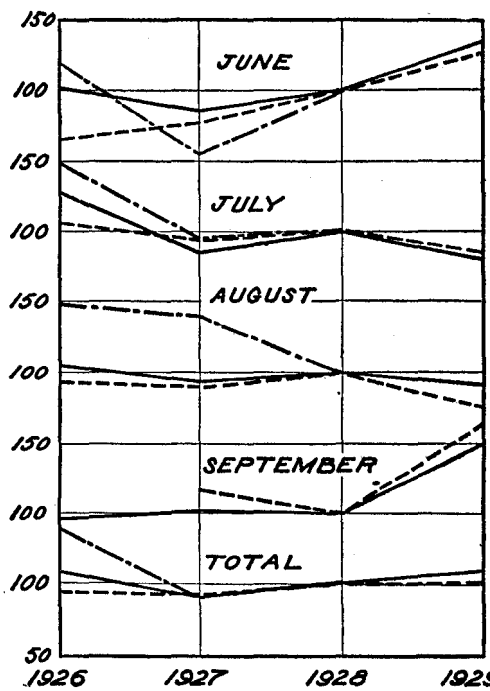

FIGURE 14.—Showing the geometric means (expressed as percentages of the 1928 mean) of the percentages that the average number of deliveries per boat per week is of a standard curve (see text). Solid line, Group I; dotted line, Group II; broken line, Group III

CHANGES IN AVERAGE WEEKLY CATCH

As explained above, the average size of catch and the average number of deliveries per week are both subject to certain errors. Thus when the fishing is being con-

ducted at a distance the average size of the catch usually will be large and the number of deliveries necessarily will be small. When fishing close to the plant the size of catch may be large or small, but the number of deliveries will usually be higher than when fishing distant grounds. The average total catch per boat per week, therefore, is probably a more trustworthy measure of abundance than either of the foregoing. However, one criticism applies to it that applies to the average size of catch, namely, that the shift in the fishing ground keeps the trend from showing the true decline in abundance, so that all decreases that are shown are minimum.

In studying the average weekly catch per boat the data were treated similarily to those of the average number of deliveries, the average catch per week being assumed to be the average for each day within the week. As with the study of the number of deliveries, all of the weekly averages previous to 1927 were multiplied by the factor 0.786 to allow for the 36-hour weekly closed season of recent years. The results of the computations are given in Table 6.

TABLE 6.—*Comparisons of weekly average catches per boat with a standard catch curve*

Month	Geometric means of the weekly average catches per boat expressed as percentages of the standard curve									Geometric means expressed as percentages of 1928 mean								
	1921	1922	1923	1924	1925	1926	1927	1928	1929	1921	1922	1923	1924	1925	1926	1927	1928	1929
GROUP I																		
June	64.3	99.0	112.0	106.7	124.6	92.3	61.6	84.5	80.2	76.1	117.1	132.6	126.3	147.4	109.2	72.9	100	91.9
July	68.2	83.4	88.8	81.2	59.7	75.8	64.1	99.2	32.5	68.8	84.1	89.6	81.9	60.2	76.1	64.6	100	32.8
August	32.8	61.9	61.3	78.6	120.7	135.9	71.0	64.0	95.2	51.2	96.7	95.8	122.8	188.5	212.2	110.9	100	148.7
September	----	44.1	66.9	54.0	26.6	104.3	84.8	82.5	165.0	----	53.5	81.1	65.5	32.3	126.4	102.8	100	200.0
Total	61.4	87.6	80.6	82.1	102.0	114.3	69.2	81.4	77.5	75.4	107.6	99.8	100.9	125.3	140.4	85.0	100	95.2
Number of boats	2	1	3	2	8	7	19	26	28	----	----	----	----	----	----	----	----	----
Average tonnage	14.0	30.0	24.0	28.5	25.5	30.4	31.7	33.1	33.4	----	----	----	----	----	----	----	----	----
GROUP II																		
June	----	----	----	----	----	83.9	63.9	106.5	122.8	----	----	----	----	----	79.1	60.2	100	115.8
July	----	----	----	----	----	136.0	85.6	82.0	81.4	----	----	----	----	----	165.9	104.4	100	99.3
August	----	----	----	----	----	101.2	60.0	70.1	54.8	----	----	----	----	----	144.4	85.6	100	78.2
September	----	----	----	----	----	----	82.8	46.7	163.1	----	----	----	----	----	----	177.3	100	349.2
Total	----	----	----	----	----	93.7	72.0	73.9	93.9	----	----	----	----	----	126.8	97.4	100	127.1
Number of boats	----	----	----	----	----	23	23	21	18	----	----	----	----	----	----	----	----	----
Average tonnage	----	----	----	----	----	27.8	30.7	31.1	35.2	----	----	----	----	----	----	----	----	----
GROUP III																		
June	----	----	----	221.5	110.3	37.2	43.7	46.7	----	----	----	----	474.3	236.2	79.6	93.6	100	----
July	----	----	----	176.6	144.9	78.6	32.2	41.1	----	----	----	----	429.9	352.7	191.3	78.2	100	----
August	----	----	----	127.0	87.8	110.0	46.5	36.5	----	----	----	----	348.0	240.6	301.4	127.4	100	----
Total	----	----	----	169.6	114.6	69.0	40.1	41.0	----	----	----	----	413.9	279.5	168.3	97.8	100	----
Number of boats	----	----	----	2	2	6	8	7	----	----	----	----	----	----	----	----	----	----
Average tonnage	----	----	----	31.5	30.5	28.0	30.1	32.5	----	----	----	----	----	----	----	----	----	----
ALL BOATS																		
June	----	----	----	----	----	89.6	74.7	105.0	109.8	----	----	----	----	----	85.3	71.1	100	104.5
July	----	----	----	----	----	157.3	82.8	83.8	67.1	----	----	----	----	----	187.7	98.8	100	80.1
August	----	----	----	----	----	116.1	61.7	63.4	85.8	----	----	----	----	----	183.1	97.3	100	135.4
September	----	----	----	----	----	76.7	71.7	57.5	131.6	----	----	----	----	----	133.4	124.7	100	229.0
Total	----	----	----	----	----	106.5	72.3	74.6	94.9	----	----	----	----	----	142.8	96.9	100	127.2
Number of boats	----	----	----	----	----	36	57	65	56	----	----	----	----	----	----	----	----	----
Average tonnage	----	----	----	----	----	28.3	31.1	33.3	33.7	----	----	----	----	----	----	----	----	----

Figure 15 gives the comparisons with the standard curve (fig. 16) for Group I. It will be noted at once that 1921 is low in every case, but this is not believed to indicate necessarily a lack of abundance for two reasons: First, because the two boats for which data are available in 1921 were exceedingly small (Table 6); second, because

1921 was a year in which the herring companies operated on a very restricted scale, owing to poor economic conditions (Rounsefell, 1930, p. 234). Disregarding 1921, June shows a higher level of abundance during the next four years than during the last four. July shows minor variations, but the general trend appears to maintain a level. August is characterized by a very sudden rise in 1925 and as sudden a drop in 1927. September fluctuates considerably but shows a very considerable rise, especially since 1925.

In the combined data it will be noted that whereas the curve for all of the months does not show a decline, the curve for the first three months, June to August, does appear to show a decrease. The reason for the difference between the two curves is the rise in September during the past few years. Although this September rise is undoubtedly valid, in comparing the various years it is better to eliminate the September data, for it is only within the last few years (possibly owing largely to the increase in size and seaworthiness of the fishing vessels) that the September fishing has been very successful. Of former years when autumn approached and no herring were to be had in the more sheltered bays in the lee of Cape Ommaney, the plants suspended operations for the season; but since the fishermen have learned to seine herring in the dangerous tide rips and high ocean swells around Cape Ommaney, the plants usually operate with success until the end of September. The high relative abundance of herring during this final run is indicated by Figure 16, which gives the standard curve for Group I.

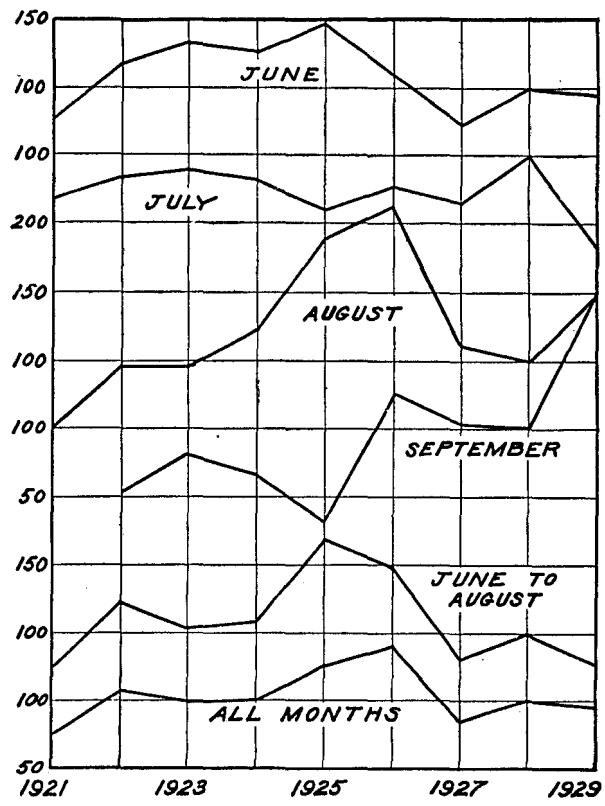

FIGURE 15.—Showing for Group I the geometric means (expressed as percentages of the 1928 mean) of the percentages that the average weekly catch per boat is of a standard curve (see text)

It must be concluded that Group I gives evidence of a slight decline in abundance during the period from June to August. The apparent increase during September is probably due in large part, if not wholly, to the changes in the efficiency of the fleet.

In Group II (figs. 17 and 18) the data cover only the past four years. June shows a considerable rise in 1928 and 1929 over the first two years. In both July and August the year 1926 is quite high, and the last three years are about equal. In September, 1929 is at such a high plane as to indicate great abundance, but this is doubtless due in part to the absence of data during September in 1926, since the high 1929 year is compared to a standard curve considerably lower than would surely be the case were 1926 included.

From the total curve it may be concluded that for Group II, 1926 was a year of greater abundance than 1927 and 1928; 1929 may have been a year of as great abundance as 1926, but this appearance in our curves is probably an artifact owing to lack of data during September, 1926.

In Group III (figs. 19 and 20) the data cover a 5-year period from 1924 to 1928, inclusive. The decline during all months is so tremendous as to leave no doubts concerning the validity of the decline in abundance and shows good cause why both of the plants in this group discontinued operations at the end of 1928. The only reason that 1928 did not show a further decline over 1927 is that in the latter year these plants extended their operations to distant areas, taking over 50 per cent of their catch in areas 8, 9, and 20. Why this group, alone, of the three under consideration should show such a tremendous decline is perhaps best explained by comparing Figure 20, giving the standard curve for this group, with Figures 16 and 18. Group III, as is shown, depends chiefly on the early portion of the season, taking practically nothing after mid-August, while Groups I and II obtain a very considerable portion of their season's catch after the middle of August. Another reason why Groups I and II have not declined so rapidly as Group III is found in their exploitation during

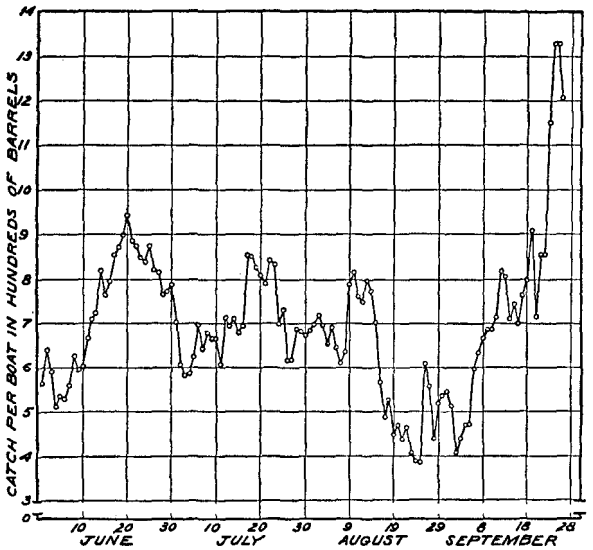

FIGURE 16.—The standard curve for average weekly catch per boat for Group I (see text)

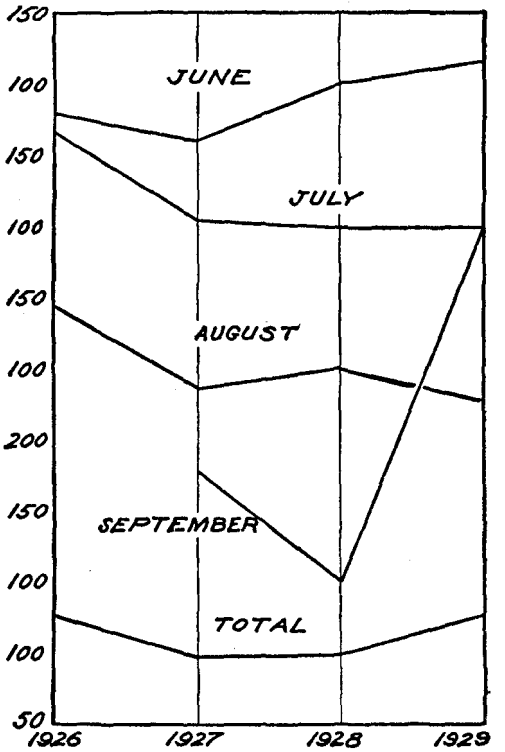

FIGURE 17.—Showing for Group II the geometric means (expressed as percentages of the 1928 mean) of the percentages that the average weekly catch per boat is of a standard curve (see text)

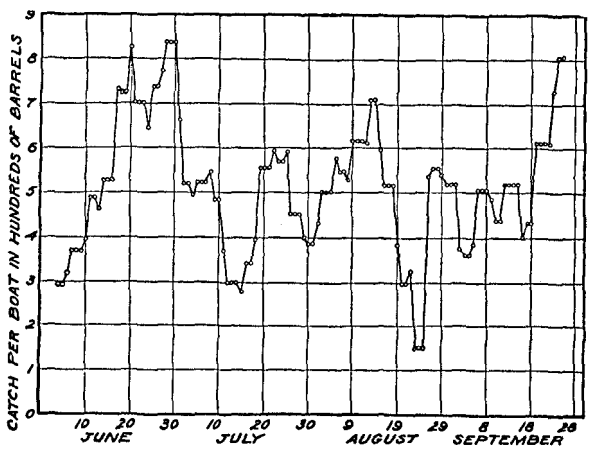

FIGURE 18.—The standard curve for average weekly catch per boat for Group II (see text)

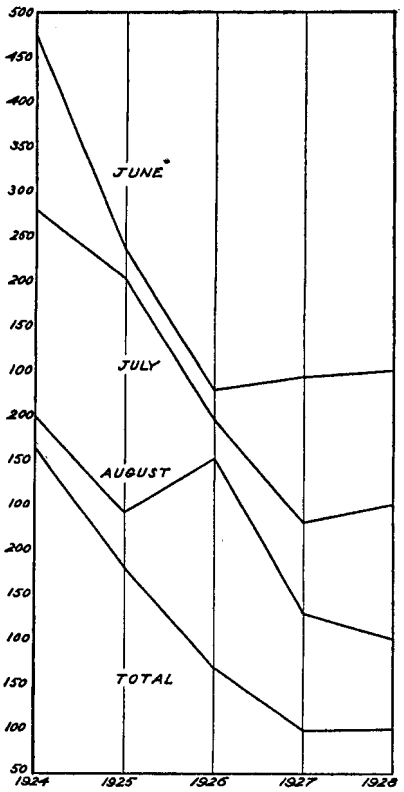

FIGURE 19.—Showing for Group III the geometric means (expressed as percentages of the 1928 mean) of the percentages that the average weekly catch per boat is of a standard curve (see text)

late years of area 6 during the month of June. The reasons for these differences in general trends of abundance will be discussed more fully below.

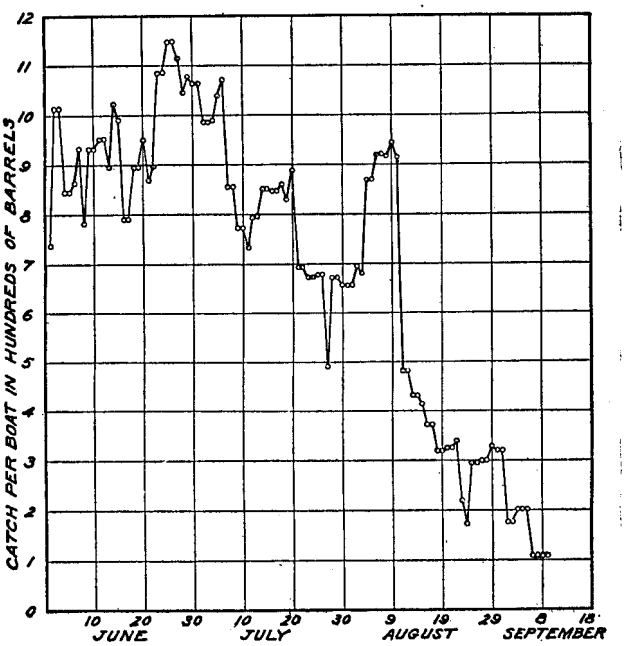

FIGURE 20.—The standard curve for average weekly catch per boat for Group III (see text)

LEVELS OF ABUNDANCE IN DIFFERENT AREAS

An attempt was made to discover whether the general trends of abundance indicated in the foregoing analyses were caused by general changes in the level of abundance in all areas fished or whether each area had its own level of abundance. In determining the abundance in an individual area it is not feasible to use either the catch per boat per week or the number of deliveries, as both depend chiefly on the relative abundance in other areas in which fish are being taken. Resort was made, therefore, to the average size of catch as it is to a larger extent free from the shortcomings of the other methods.

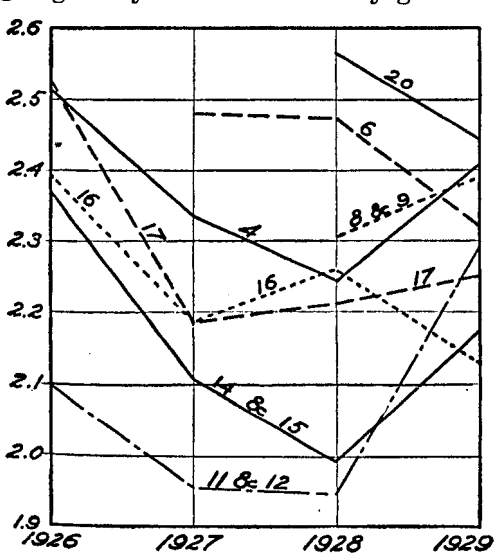

FIGURE 21.—Showing the logarithms of the actual catch (unweighted) in several statistical areas for different years (see fig. 9)

The simple computations involved are presented in Table 7 and Figure 21. Figure 21 reveals the striking fact that the general level of abundance in each area under consideration is in inverse order to the length of time during which it has been subject to exploitation on any scale. Areas 11 and 12 have been exploited since the founding of Killisnoo in 1882, and areas 14

and 15 were early exploited by the same company. Areas 4, 16, and 17 commenced to be intensively exploited about 1917. Area 6 was not fished intensively before 1927. No real effort was made to fish areas 8, 9, and 20 until 1928.

TABLE 7.—*Average size of catches in barrels in individual areas*

Area	Month	1926		1927		1928		1929	
		Average size of catch	Number of catches	Average size of catch	Number of catches	Average size of catch	Number of catches	Average size of catch	Number of catches
4	June	288.4	37	180.4	400	175.9	434	108.4	331
	July	298.1	43	262.2	226	167.9	387	123.3	133
	August	324.0	232	200.4	344	144.0	538	264.6	580
	September	368.3	71	307.0	109	195.3	477	346.9	666
	Total	325.8	383	216.7	1,079	175.7	1,776	255.5	1,776
6	June			435.5	4	301.7	180	210.3	27
	July			279.7	23	74.5	2	207.7	6
	August					223.0	1		
	Total			302.8	27	298.8	183	209.8	33
8 and 9	June					481.5	2	149.5	2
	July	75.0	2	280.0	1	139.4	8	292.0	25
	August			197.0	2	193.5	10	137.1	9
	September			83.0	2	204.0	3		
	Total	75.0	2	168.0	5	201.1	23	245.4	36
11 and 12	June	54.0	3			162.5	2		
	July	236.0	2	134.8	8	53.9	7	201.8	17
	August	138.3	3	60.5	12	69.9	13	168.3	4
	September	110.0	3			142.0	6		
	Total	125.4	11	90.2	20	88.0	28	195.4	21
14 and 15	June	203.7	7			70.0	1	152.9	22
	July	185.6	23	132.6	28	94.7	16	147.6	75
	August	263.5	50	116.8	15	105.1	12	124.5	2
	September	45.0	1						
	Total	233.5	81	127.1	43	98.1	29	148.3	99
16	June	182.5	4	166.9	29	226.7	78	95.2	36
	July	467.0	1	103.8	5	147.9	75	228.9	17
	August	261.0	3	17.0	1	128.6	15	127.4	22
	September					49.0	1		
	Total	247.5	8	153.6	35	182.0	169	135.0	75
17	June	65.5	2	182.0	22	243.5	2	228.6	364
	July	390.9	10	154.4	182	157.1	129	114.7	252
	August	337.2	90	125.8	29	173.0	53	129.8	25
	September	62.0	1	16.0	1	130.5	2		
	Total	334.5	103	153.4	234	162.3	186	179.9	641
20	June					383.0	44	278.7	27
	July					359.3	16	294.6	40
	August					184.3	3	191.0	8
	Total					367.5	63	277.8	75

The conclusion logically follows that the general trends of abundance previously presented do not give the true state of affairs in so far as particular areas are concerned. The fishery has not been confined, and as the abundance in the exploited areas commenced to decline the fishery pushed on to new areas. This process has been going on for so long a time that it can not be adequately shown within the space of a few years. Evidence showing such a shift has been published in a previous report (Rounsefell, 1930, p. 237).

DECLINE OF OLDER FISHING GROUNDS

That there has been an extensive shift in the fishing grounds is certain, but direct evidence bearing on the subject is scant. Moser (1899) mentions the Killisnoo plant operating 3 purse seines, 125 to 150 fathoms long, 12 fathoms deep, and ½-inch-mesh

stretched measure, in the lagoon at Kootznahoo Inlet (area 12). The Reverend Kashevaroff, curator of the Alaska Territorial Museum, told the author in an interview, "In 1894, 1895, and 1896 (when he observed the fishery) Chatham Strait was always full of herring off Danger Point. The Killisnoo fishermen lived at the lagoon and brought about 1,200 barrels of herring daily to the factory at Killisnoo." Capt. Elling Arentsen in 1924 compiled from the log books of the Killisnoo steamers a table giving the amounts taken (in round numbers) and the locations of the catches in various years from 1895 to 1915. His figures for Killisnoo lagoon are given in Table 8.

TABLE 8.—*Catches reported taken by the Killisnoo plant in Killisnoo lagoon in various years from 1895 to 1915*

Year	Catch in barrels	Year	Catch in barrels	Year	Catch in barrels	Year	Catch in barrels
1895	20,000	1900	20,000	1906	10,000	1912	10,000
1896	20,000	1903	15,000	1909	10,000	1913	9,000
1897	20,000	1904	15,000	1910	10,000	1914	8,000
1898	20,000	1905	15,000	1911	12,000	1915	5,000
1899	20,000						

These figures show a considerable decline in abundance in Kootznahoo Inlet. That such a decline has progressed much farther is indicated by the figures for the past four years in which the total catches in barrels for area 12 (which includes Kootznahoo Inlet) for all of the boats in southeastern Alaska were as follows: 1926, 1,379; 1927, 1,202; 1928, 1,475; and 1929, 2,179 barrels. Area 12 would appear to represent a case of extreme depletion.

The limits of the fishing grounds utilized by the Killisnoo plant up to 1911 are clearly defined in the following statement by Carl Spuhn, president of the company then operating Killisnoo (United States Senate, 1912):

> The fishing industry in Alaskan waters, whether it takes the form of the business of the salmon packer, the halibut fisher, or is confined to the industry as carried on by our company, must necessarily have some central point to which fish can be carried for preparation for market in any form, and from this central point the fishing must radiate. Necessarily, therefore, the territory covered by the fishermen, particularly in a business which utilizes the herring, is restricted in area. The territory covered by our operations includes a radius of from 40 to 50 miles north and south from Killisnoo, where the plant is located, and it embraces the waters surrounding Admiralty Island. Thus our operations extend up Chatham Strait along the west coast of Admiralty Island approximately as far as Funter Bay, thence across Chatham Strait to Icy Strait, and down the east coast of Chichagof and Baranof Islands to Prince Frederick Sound, and along the easterly coast of Admiralty Island to Seymour Canal. The Alaskan waters in and about Ketchikan, Wrangell, Juneau, Skagway, and Sitka, in southeastern Alaska, are not invaded by the fishing operations of this company, and they are too far distant from the located plant of the company to make possible any fishing by us in those waters.

As shown in a previous report (Rounsefell, 1930, Table 1, p. 237) the Killisnoo plant took 60 per cent of its 1927 catch around Cape Ommaney (area 4) and 53 per cent of its 1928 catch in Lynn Canal (Stephens Passage, area 20). In 1928 they also took 11 per cent from Sitka (area 2). All of these areas were considered too far away from the plant to be profitably fished as late as 1911.

In Seymour Canal (area 21) records are available of fishing as early as 1904. Quoting from Cobb (1906, p. 20):

> During the season of 1905 the Alaska Fish & Development Co., of Pleasant Bay, on Glass Peninsula, installed a fertilizer plant aboard a large hulk anchored in the bay, but they were unable

to get it in readiness to operate before the season closed. They put up a considerable quantity of salted herring, however. In 1904 this company operated a trap net for herring in the bay, but it was not set in 1905.

In the summary of Killisnoo catches prepared by Captain Arentsen (mentioned above), 10,000 barrels were taken in Seymour Canal in 1909 and in 1910; 5,000 barrels were taken in 1912 and again in 1913. The Alaska Pacific Herring Co. salted and fished in Seymour Canal in the fall of 1916. Donald R. Crawford (then an employee of the Bureau of Fisheries) says a saltery scow with either two or three seine boats fished in Seymour Canal in 1917. Harold Arentsen reports that Big Port Walter caught 2,700 barrels in 1920 and 1,500 in 1921, in Seymour Canal. These scattered references, however incomplete, indicate that Seymour Canal was a producer of herring for at least 18 years (1904 to 1921). The detailed catch records for every boat from 1926 to 1929 do not show a single catch from this area. Surely this absolute failure is indicative of severe depletion in area 21.

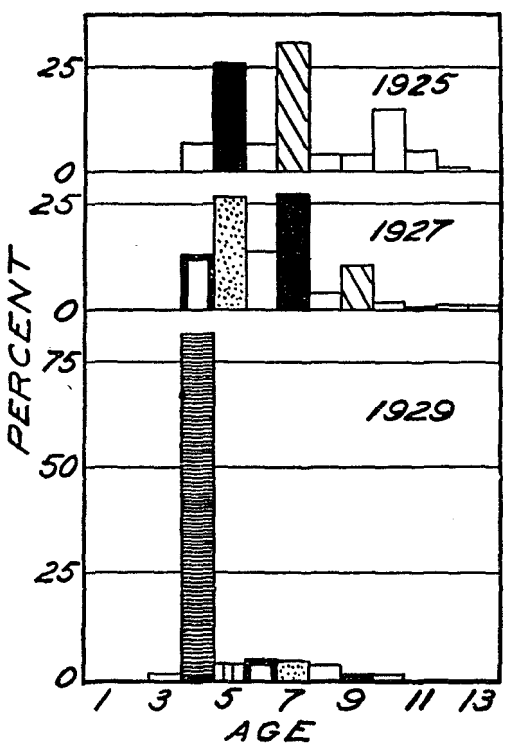

FIGURE 22.—Age histograms for herring from area 14 (Point Gardner) for 1925, 1927, and 1929

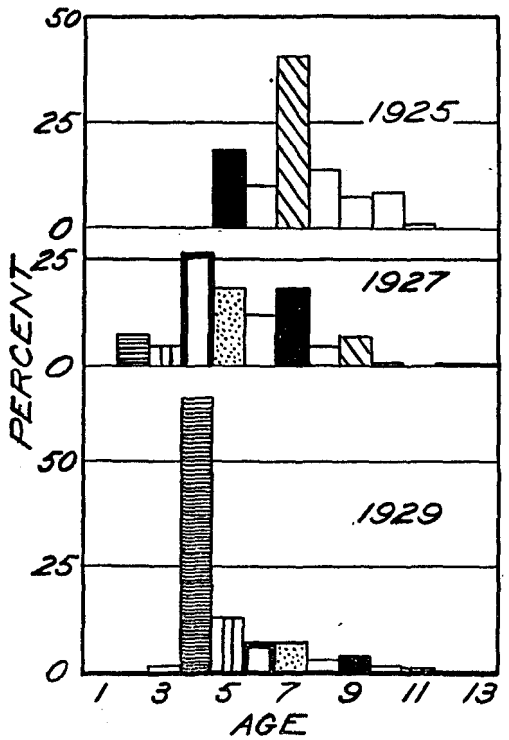

FIGURE 23.—Age histograms for herring from area 17 (Tebenkof Bay) for 1925, 1927, and 1929

BIOLOGICAL EVIDENCE OF DEPLETION

In determining the presence and extent of depletion, decreases in the trends of abundance, as shown above, although testifying to a decline, must be accepted with reservation (especially when the decline covers but a short period of years), unless biological evidence can be brought forth to show that the scarcity of herring is not a temporary phenomenon associated with some feature of the herring's life history, such as dominant year classes. For many of the areas that were once good producers of herring (such as 21, 23, and 24) the decline has been so pronounced that

it has not even been possible to obtain samples of herring from them. In such cases depletion is the only logical verdict.

Unfortunately the staff has been too small in the past to permit of adequate sampling throughout Alaska, so that in the southeastern district, previous to 1929, the only summer samples available are from a few of the areas for the years 1925 and 1927. Comparisons of the ages of the herring taken in these three years in areas 14 and 17 are shown in Figures 22 and 23. (See Table 9.) The passage of dominant year classes is apparent, but not so striking as the falling off of the older age groups in the later years.

TABLE 9.—*Age frequencies for areas 14 and 17*

Age	1925		1927		1929	
	Actual	Per cent	Actual	Per cent	Actual	Per cent
AREA 14						
1						
2						
3					3	1.5
4	7	7.0	22	12.8	162	81.4
5	26	26.0	46	26.7	7	3.5
6	7	7.0	24	14.0	9	4.5
7	31	31.0	47	27.3	8	4.0
8	4	4.0	7	4.1	6	3.0
9	4	4.0	18	10.5	2	1.0
10	15	15.0	3	1.7	2	1.0
11	5	5.0	1	.6		
12	1	1.0	2	1.2		
13			2	1.2		
Total	100		172		199	
AREA 17						
1						
2			25	7.4		
3			17	5.0	8	1.2
4			89	26.3	447	64.9
5	15	18.5	61	18.0	87	12.6
6	8	9.9	41	12.1	47	6.8
7	33	40.8	61	18.0	47	6.8
8	11	13.6	16	4.7	17	2.5
9	6	7.4	24	7.1	24	3.5
10	7	8.6	2	.6	7	1.0
11	1	1.2			5	.7
12			1	.3		
13			1	.3		
Total	81		338		689	

The relative lack of older age groups in 1929 might be due to either of two causes: (1) To a scarcity of older fish due to depletion, or (2) to an unusual abundance of younger fish. If the latter were true, then the population as a whole should be very numerous; so numerous that the ordinary number of older fish constitutes but a small portion of the stock. This hypothesis needs to be carefully examined. The average percentages of herring above 4 years of age in the two areas in 1925, 1927, and 1929 were 96.5, 72.7, and 25.5, respectively. In 1927 when the proportion of herring over 4 years of age was 72.7, the average size of catch in areas 14, 15, and 17 was 140.3 barrels; in 1929 when the proportion over 4 years of age was 25.5, the average catch in the two areas was 164.1 barrels, or an increase of 17 per cent. If the relative lack of older age groups was entirely caused by the abundance of the 4-year-old group, the catch might have been expected to have increased to an average of 400 barrels or an increase of 185 per cent, assuming in each case the actual numbers of herring over 4 years of age to have remained the same, as $\frac{72.7}{25.5}$ equals $\frac{400}{140.3}$.

Obviously the decline in the relative numbers of older fish as contrasted with younger fish has been caused chiefly by a great decrease in the numbers of older fish, and only in very small part by an increase in abundance of young fish, supporting the previous evidence of considerable overfishing.

CONCLUSIONS

(1) The general trend of abundance, as shown by the boats delivering to the plants south of Point Ellis (Group I) is slowly declining.

(2) The general trend of abundance, as shown by the boats delivering to the plants north of Point Ellis and south of Wilson Cove (Group II), was higher in 1926 than in the three succeeding years, of which 1929 was the best.

(3) The general trend of abundance, as shown by the boats delivering to the plants north of Wilson Cove (Group III), has fallen tremendously and steadily since 1924.

(4) The decrease in abundance in the individual areas is proceeding at a much faster rate than in the general trend, which is held up by the exploitation of new areas.

(5) The areas which have been exploited over a long period of time, for which data are available, as areas 12 and 21, have been depleted to the point of commercial extinction.

(6) The relative numbers of older fish show a very large decrease from 1925 to 1929.

(7) The decrease in relative numbers of older fish has not been caused (except perhaps to a very limited extent) by the influx of dominant year classes of younger fish. This decrease in relative numbers of older fish therefore supports and confirms the previous conclusions that the decreases in abundance are due to depletion.

(8) There are few areas remaining which the fishery is not now exploiting so that the general trend may be expected to continue to fall, perhaps at an accelerated rate, unless some remedial measures are applied.

RECOMMENDATIONS

FUNDAMENTAL CONSIDERATIONS

Certain general principles must be outlined before regulations can be framed to halt the course of depletion that is threatening the commercial extinction of the herring fisheries of southeastern Alaska. A clear picture must be gained of what has occurred.

An intensive fishery was maintained on the older and better known fishing grounds until they no longer produced sufficient raw material. Then the fishery sought new grounds, usually at a greater distance from the plant. If the older grounds had now been entirely abandoned, the situation might not have become so alarming. However, this did not occur. The fishermen continued to seek for herring on the old and well-known fishing grounds long after they had ceased to produce a fair return. In going to and returning from newer and more productive grounds they traversed and fished the older grounds. In periods of stormy weather or seasonal scarcity the older grounds, being nearer to the plants and usually more sheltered than the newer, were fished intensively. As a result of these conditions, each fishing ground, once depleted, remained depleted, without any chance to recover, long after it had ceased to be of any real value to the fishery. Thus it appears that regulations cur-

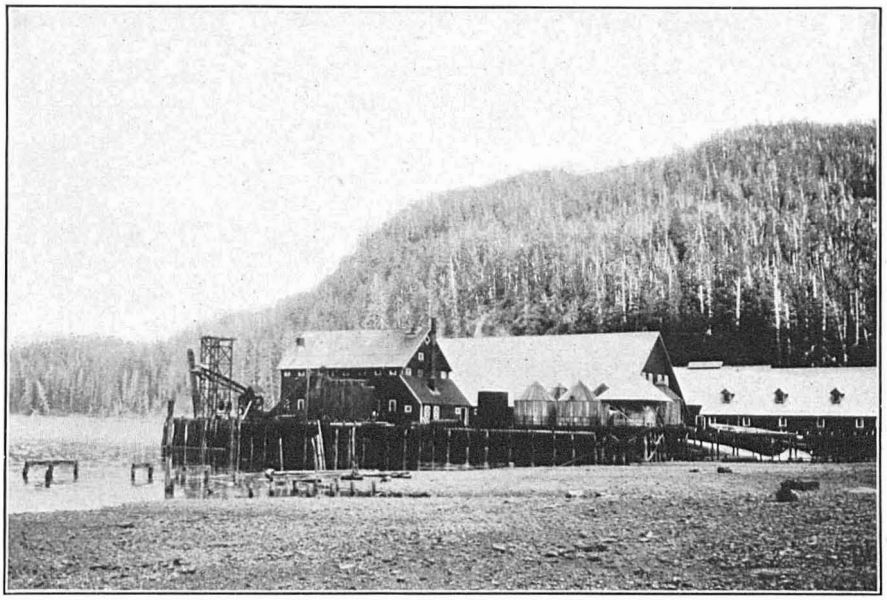

FIGURE 24.—Herring reduction plant and saltery at Big Port Walter. The unloading elevator is to the left, next to right is the reduction plant, the next building is the saltery and the one on the right is for storage of nets and equipment. Note the tanks for the storage of herring oil. The machinery in this plant is run wholly by water power, and water can be seen leaving the outlet of the pipe just to the right of the oil tanks. Taken June, 1929

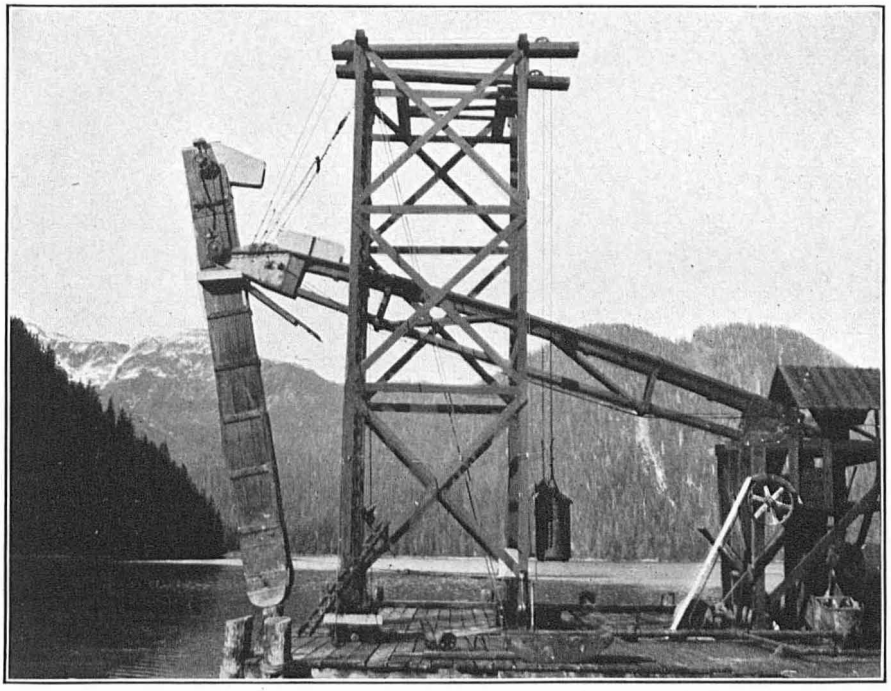

FIGURE 25.—Close-up of the endless-chain bucket fish elevator shown in Figure 24

tailing the fishing on these older grounds would be of the greatest benefit, since they would permit the rehabilitation of large areas once productive, and, at the same time, would not work a hardship on the present fishery, which obtains but a trifling amount from these depleted grounds.

In addition to the closure of the grounds showing the greatest depletion, a few of the newer grounds should be closed for a part of each season to prevent a repetition of what has occurred before. In selecting the portions of the season to close, attention must be paid to the time at which the herring are taken on each ground so as to prohibit fishing during a portion of this time and not during a time when no fish are expected to be running.

To relieve the newer fishing grounds of the additional strain that will be imposed upon them by the closure of some of the older grounds, it will be well to encourage fishing in a few of the more distant areas not so intensively fished at present.

SPECIFIC RECOMMENDATIONS

(1) That all commercial fishing for herring, including bait fishing, be prohibited for a period of five years in the waters of areas 11, 12, 13, 21, and 23. (See *A* and *B*, fig. 26.)

(2) That all commercial fishing for herring, including bait fishing, be prohibited in areas 14 and 15 (see *C*, fig. 26) except from August 1 to 31, inclusive.

(3) That all commercial fishing for herring, including bait fishing, be prohibited in area 17 (see *D*, fig. 26) during the month of July.

(4) That in areas 3, 4, and 16 (see *E*, fig. 26) the 36-hour weekly closed season be extended to 48 hours, from 12 o'clock noon on Saturday to 12 o'clock noon on Monday.

(5) That all commercial fishing for herring be prohibited in areas 19 and 20 (see *F*, fig. 26) prior to July 1 in each calendar year.

(6) That none of these recommendations shall prohibit the taking of bait by salmon trolling boats with the gear permitted by section 5 of the general regulations. (See Department of Commerce Circular No. 251, Laws and Regulations for Protection of Fisheries of Alaska.)

(7) That recommendations 2, 3, and 5 providing for longer closed seasons in certain areas shall not apply to the taking of herring for bait by boats of not more than 50 feet in length, as shown by official register.

(8) That none of these recommendations shall apply to the commercial use of gill nets of not less than 2¾-inch mesh stretched measure between knots from June 1 to December 31, both dates inclusive.

(9) That the use of herring of over 10½ inches in total length measured from the tip of the snout to the end of the tail fin for reduction purposes be regarded as wanton waste under section 8 of the act of June 26, 1906. Any wilful use or changes of gear, machinery, or handling so as to depreciate the value of herring as food shall be considered as an infringement of this regulation.

EXPLANATION OF SPECIFIC RECOMMENDATIONS

Recommendation 1 prohibiting fishing in areas 11, 12, 13, 21, and 23 (see *A* and *B*, fig. 26) for a period of five years is not as harsh as it might seem. These areas are so depleted that their closure will not curtail the catch more than 1 or 2, possibly as high as 5, per cent. (See Tables 10, 11, and 12.)

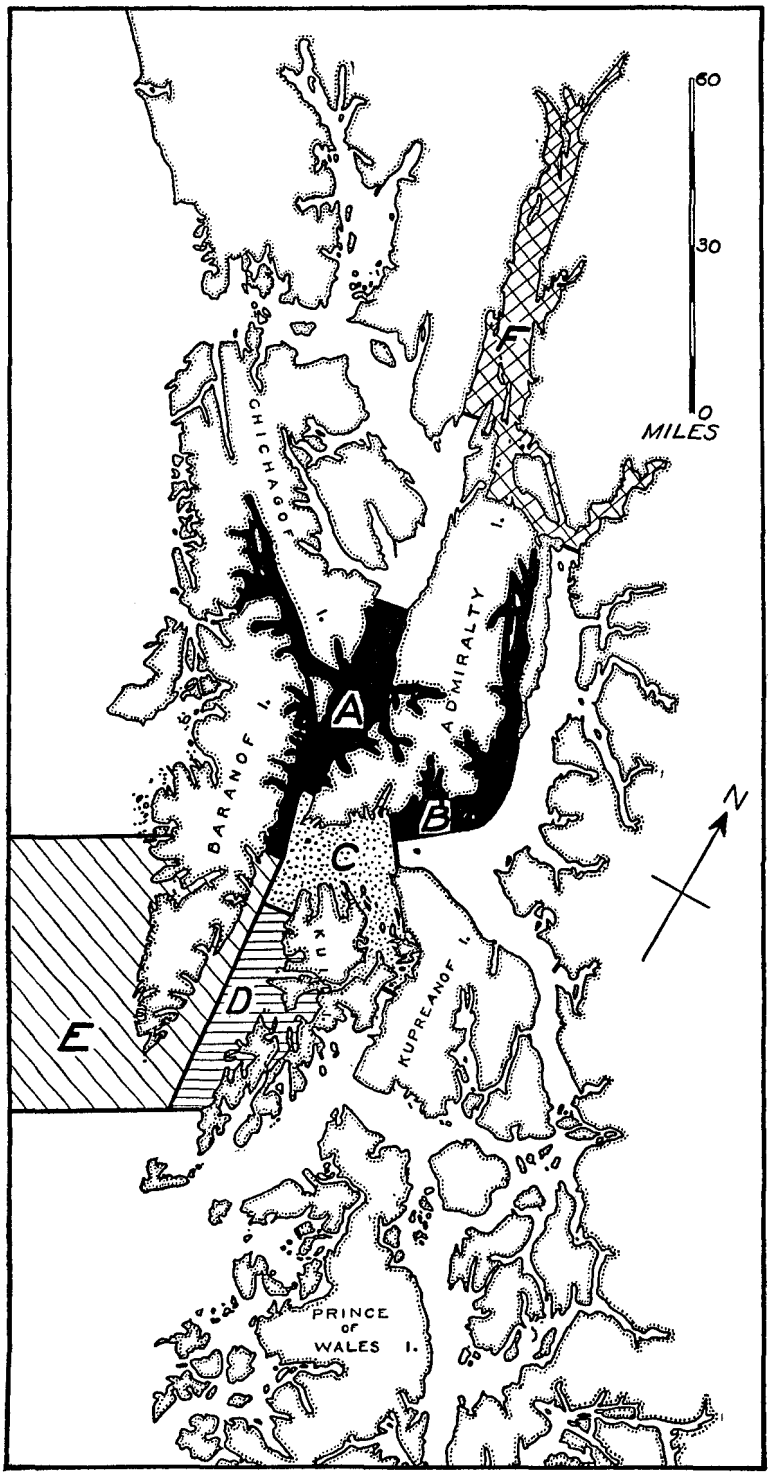

FIGURE 26.—Portion of southeastern Alaska, showing areas for which recommendations were made (see text)

It is hoped that by protecting this tiny remnant of a once numerous population that these areas may again become productive. Five years is entirely arbitrary. One should not entertain too optimistic hopes of restoring these areas to their former abundance in such a short period of time.

Recommendation 2 prohibiting fishing in areas 14 and 15 (see *C*, fig. 26) except during August is believed necessary. Tables 10, 11, and 12 show that entire closure of these areas would have but a trifling effect on the total catch. The proposed regulation would hardly more than halve the catch of these areas as the run occurs in July and August. As against fishing during July, it is felt that August is preferable as insuring a better quality of fish.

Recommendation 3 closing area 17 (see *D*, fig. 26) during July, may, in some years affect the total catch to the extent of 10 per cent. It would be better perhaps from the standpoint of quality of the fish to close this area during June instead of July, but on the other hand it is desirable to allow fishing in area 17 in June to counterbalance recommendation 5.

Recommendation 4 extending the weekly closed season in areas 3, 4, and 16 (see *E*, fig. 26) to 48 hours is chiefly for the purpose of stimulating fishing in distant areas in order to equalize the strain on all areas. It will have but a slight effect on the catch in the areas in question; but, as these areas do not show as pronounced a decline as some of the others, it is not believed expedient to impose a seasonal closed period.

Recommendation 5 extending the opening date in areas 19 and 20 (see *F*, fig. 26) from June 1 to July 1 is imposed for two reasons. One is that this area is subject to a considerable winter bait fishery, and it is felt that the use of herring for halibut bait ranks above its use for reduction. Another reason is that the herring taken in June in this area in the past are reported to be much smaller than those taken in July, and it is desirable to protect these smaller sizes whenever possible.

Recommendation 6 allowing salmon trollers to take small quantities of bait needs no explanation.

Recommendation 7 allowing the taking of bait in all but the permanently closed areas by boats of not over 50 feet official register length, takes cognizance of the fact that the use of herring for bait is of primary importance. Limiting the gear to boats of not more than 50 feet official register length will serve to prevent the large purse seiners of the reduction plants taking herring for reduction under the false plea of bait, and will thus make enforcement comparatively easy.

Recommendation 8 allowing the commercial use of gill nets of not less than 2¾-inch mesh, stretched measure, between knots from June 1 to December 31, both dates inclusive, in all areas, is designed to encourage this type of gear which is the least destructive to the herring population as it does not take the smaller sizes.

Recommendation 9 is especially aimed at stopping the tremendous waste of large fat herring from area 20 that have in the past been used chiefly for reduction.

DEFINITIONS OF AREAS FOR WHICH SPECIFIC RECOMMENDATIONS ARE MADE

Area A.—All waters of Chatham Strait, Peril Strait, and contiguous waters embraced within the following lines: A line running from a point on the west shore of Chatham Strait about 3 nautical miles south of South Passage Point, at 57° 42′ 30″ north latitude, thence easterly, to a point on the eastern shore of Chatham Strait in the vicinity of Marble Bluffs, at 57° 42′ north latitude. A line crossing Peril Strait about one-half nautical mile north of Rapids Point from a point at 57° 27′

30″ north latitude on the west shore, thence easterly, to a point at 57° 27′ 20″ north latitude on the east shore. A line running from a point on the east shore of Chatham Strait about 1¾ nautical miles south of Point Wilson at 57° 6′ 30″ north latitude, westerly 277°, to a point approximately in mid-channel, 2½ nautical miles from the first-mentioned point, thence bearing true south to a point approximately 2½ nautical miles true east from the light at the south entrance to Warm Spring Bay, thence southeasterly to a point 4 nautical miles true east of a point on the west shore of Chatham Strait at 56° 52′ 30″ north latitude, thence true west to the west shore of Chatham Strait at 56° 52′ 30″ north latitude.

Area B.—All waters contained in Seymour Canal, Gambier Bay, Pybus Bay, the adjoining waters of Frederick Sound, and all contiguous waters, within a line from the southernmost point of Point Hugh, at the entrance of Seymour Canal, southerly to the northwesternmost point of land on Acushla Island, thence southwesterly to a point midway between Cape Bendel, on the southeast shore of Frederick Sound, and a point on the northwest shore of Frederick Sound about three-quarters of a nautical mile east of Deepwater Point at 57° 10′ 20″ north latitude and 134° 13′ west longitude, thence northwesterly to the point mentioned on the northwest shore of Frederick Sound.

Area C.—All waters in Frederick Sound, Chatham Strait, Keku Strait, and contiguous waters embraced within the following lines: A line from Cape Bendel, on the southwest shore of Frederick Sound, to a point on the northwest shore of Frederick Sound about three-quarters of a nautical mile east of Deepwater Point at 57° 10′ 20″ north latitude and 134° 13′ west longitude. A line running from a point on the east shore of Chatham Strait about 1¾ nautical miles south of Point Wilson at 57° 6′ 30″ north latitude, westerly 277°, to a point, approximately in mid-channel, 2½ nautical miles from the first-mentioned point, thence bearing true south to a point approximately 2½ nautical miles true east from the light at the south entrance to Warm Spring Bay, thence southeasterly to a point 4 nautical miles true east of a point on the west shore of Chatham Strait at 56° 52′ 30″ north latitude, thence bearing southerly 173° to a point approximately 5½ nautical miles true west of a point on the east shore of Chatham Strait approximately 3 nautical miles north of the north entrance to Washington Bay at 56° 46′ 5″ north latitude, thence true east to the east shore of Chatham Strait. A line crossing Keku Strait, true east and west at 56° 41′ 30″ north latitude.

Area D.—All waters within Chatham Strait, Washington Bay, Bay of Pillars, Tebenkof Bay, Port Malmesbury, and contiguous waters within a line running true west from a point approximately 3 nautical miles north of the north entrance to Washington Bay on the east shore of Chatham Strait at 56° 46′ 5″ north latitude to a point approximately 5½ nautical miles west of said point and on a line bearing southerly 173° from a point 4 nautical miles true east of the west shore of Chatham Strait at 56° 52′ 30″ north latitude, thence bearing southerly 173° to a point approximately 5½ nautical miles south-southwest ½ west from Point Crowley light, thence running north-northeast ½ east to Point Crowley Light.

Area E.—All waters of Chatham Strait and contiguous waters along the east shore and south shore of Baranof Island and the waters of the Pacific Ocean and contiguous waters extending off the west shore of Baranof Island within the following lines: A line running from a point on the west shore of Chatham Strait at 56° 52′ 30″ north latitude to a point 4 nautical miles true east of the point of beginning, thence bearing 173° south to a point approximately 5½ nautical miles south-southwest ½ west from

Point Crowley Light, thence extending indefinitely south-southwest ½ west. A line extending indefinitely south-southwest ½ west from a point on the west shore of Baranof Island at 56° 46′ north latitude.

Area F.—All the waters of Lynn Canal, Stephens Passage, and contiguous waters within the following lines: A line from a point on the west shore of Lynn Canal at 58° 20′ north latitude to a point on the east shore of Lynn Canal at 58° 21′ north latitude. A line from Point Arden Light on the west shore of Stephens Passage to a point of land at approximately 58° 10′ 20″ north latitude on the east shore of Stephens Passage.

TABLE 10.—*Percentage of herring caught in each area each week by boats of Group I*

[Catches delivered to plants south of Point Ellis, Chatham Strait]

Week ending—	Areas														Actual number of barrels caught	Per cent of season's catch	Boats fishing	Per cent of season's catch taken by each boat	Per cent of season's catch weighted by number of boats fishing
	3	4	5	6	8	9	11	12	14	15	16	17	20	?					
1926																	*Number.*		
June 6		100.0													620	0.8	2	0.400	1.6
June 13		100.0													1,410	1.7	2	.850	3.4
June 20		100.0													3,607	4.4	2	2.200	8.7
June 27		100.0													2,647	3.2	2	1.600	6.4
July 4		100.0													1,123	1.4	2	.700	2.8
July 11		100.0													2,079	2.5	2	1.250	5.0
July 18		100.0													4,507	5.5	2	2.750	10.9
July 25		100.0													3,952	4.8	2	2.400	9.5
Aug. 1		100.0													2,033	2.5	3	.833	3.3
Aug. 8		62.5										37.5			6,277	7.6	7	1.086	4.3
Aug. 15		95.8										4.2			17,267	21.0	7	3.000	11.9
Aug. 22		100.0													7,536	9.2	7	1.314	5.2
Aug. 29		100.0													3,033	3.7	6	.617	2.4
Sept. 5		100.0													4,107	5.0	6	.833	3.3
Sept. 12		100.0													11,663	14.2	6	2.367	9.4
Sept. 19		100.0													9,066	11.0	5	2.200	8.7
Sept. 26		100.0													663	.8	2	.400	1.6
Sept. 30		100.0													652	.8	2	.400	1.6
1927																			
June 5		74.4									25.5				3,323	2.2	17	.129	2.0
June 12		90.5									3.6			5.9	8,676	5.8	18	.322	5.0
June 19	10.3	86.3												3.4	4,386	2.9	18	.162	2.5
June 26	14.4	76.0										0.9		8.6	14,049	9.4	19	.495	7.7
July 3		79.0		17.1								1.6		2.4	14,023	9.4	19	.495	7.7
July 10		77.0		14.5			3.6							4.9	15,271	10.2	19	.537	8.4
July 17		25.3		60.0					3.2			11.0		.4	5,404	3.6	19	.189	2.9
July 24		12.3								2.5		76.8		7.8	5,629	3.8	19	.200	3.1
July 31		.8	4.8									81.6		12.9	9,025	6.0	19	.316	4.9
Aug. 7		94.1										2.6		3.3	17,200	11.5	19	.606	9.4
Aug. 14		90.0												10.0	13,775	9.2	19	.484	7.5
Aug. 21		68.5										8.0		23.5	3,027	2.0	19	.105	1.6
Aug. 28		91.2									.3			8.5	6,355	4.2	17	.247	3.8
Sept. 4		100.0													2,500	1.7	12	.146	2.3
Sept. 11		100.0													2,294	1.5	10	.150	2.3
Sept. 18		100.0													9,545	6.4	9	.711	11.1
Sept. 25		100.0													15,312	10.2	9	1.133	17.6
1928																			
June 3											100.0				150	.1	26	.004	.1
June 10		79.5		17.9							2.5				6,736	2.8	26	.108	2.6
June 17		23.3		70.4							6.4				17,400	7.3	26	.281	6.8
June 24	.5	51.0		39.5							8.9				22,446	9.4	26	.362	8.7
July 1		64.1		5.2							30.8				28,815	12.1	26	.466	11.2
July 8		72.3		.2							27.5				15,185	6.4	26	.246	5.9
July 15	2.0	88.8							2.8		5.3	1.1			3,758	1.6	26	.062	1.5
July 22		61.3									20.7	18.0			15,713	6.6	26	.254	6.1
July 29		81.8									5.0	13.2			12,031	5.1	26	.196	4.7
Aug. 5		98.7									1.3				12,361	5.2	26	.200	4.8
Aug. 12		83.4							14.7		1.9				2,186	.9	26	.035	.8
Aug. 19		90.8										9.2			18,605	7.8	26	.300	7.2
Aug. 26		100.0													13,648	5.7	26	.219	5.3
Sept. 2		91.3									8.7				14,062	5.9	24	.246	5.9
Sept. 9		100.0													12,562	5.3	22	.241	5.8
Sept. 16		100.0													6,794	2.8	19	.147	3.5
Sept. 23		100.0													16,547	7.0	19	.369	8.9
Sept. 30		100.0													18,807	7.9	19	.416	10.0
1929																			
June 2	2.8	61.5									35.7				608	.2	28	.007	.2
June 9		87.6	2.6	1.4							3.2	1.7	3.5		9,453	2.6	28	.093	2.5
June 16		72.5	15.2	4.8							1.7	3.1	2.7		11,636	3.2	28	.114	3.1
June 23		11.1	28.3	1.0								59.6			27,011	7.4	28	.264	7.2
June 30		12.0	13.4	1.6								72.9			24,739	6.8	28	.243	6.6
July 7		3.6	.8								5.2	90.4			3,230	.9	28	.032	.9
July 14		63.1	3.1	.4				3.4	7.1			22.9			12,315	3.4	28	.121	3.3
July 21		24.8						3.1	7.4			64.8			1,990	.5	28	.018	.5
July 28		18.9			0.6	8.1	.6				18.8	50.4	2.6		14,948	4.1	28	.146	4.0
Aug. 4		57.8				6.8		1.3			6.6	27.6			13,395	3.7	28	.132	3.6
Aug. 11		97.3									2.5	.2			22,268	6.1	27	.226	6.2
Aug. 18		99.2				.8									19,906	5.4	27	.200	5.5
Aug. 25		100.0													2,861	.8	27	.030	.8
Sept. 1		100.0													50,884	13.9	27	.515	14.1
Sept. 8		100.0													28,431	7.8	27	.289	7.9
Sept. 15		100.0													32,492	8.9	27	.330	9.0
Sept. 22		100.0													23,922	6.5	27	.241	6.6
Sept. 29		100.0													63,846	17.5	27	.648	17.7
Sept. 30		100.0													1,638	.4	27	.015	.4
TOTAL																			
1926		96.3										3.7			82,242				
1927	1.7	77.4	.3	5.2			.4		.1	.1	.8	8.9		5.2	149,794				
1928	.1	77.9		10.0					.2		9.2	2.6			237,806				
1929		78.6	3.7	.4		.6		.2	.3		1.4	14.5	.3		365,573				
TOTAL, WEIGHTED BY BOATS FISHING																			
1926		97.9										2.1							
1927	1.4	81.2	.2	4.3			.3		.1	.1	.7	7.3		4.3					
1928	.1	79.3		9.3					.2		8.6	2.4							
1929		79.2	3.6	.4		.6		.2	.3		1.4	14.2	.3						

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TABLE 11.—*Percentage of herring caught in each area each week by boats of Group II*

[Catches delivered to plants north of Point Ellis and south of Wilson Cove]

Week ending—	Areas																		Actual number of barrels caught	Percent of season's catch	Boats fishing	Percent of season's catch taken by each boat	Per cent of season's catch weighted by number of boats fishing
	2	3	4	5	6	8	11	12	13	14	15	16	17	18	20	30	Chatham Strait	?					
1926																					*Number*		
June 13			96.8														3.2		1,346	1.6	2	0.800	7.0
June 20																	100.0		3,048	3.6	3	1.200	10.4
June 27																	100.0		1,124	1.3	3	.433	3.8
July 4																	100.0		2,156	2.5	3	.833	7.2
July 11																	100.0		2,598	3.0	3	1.000	8.7
July 18																	100.0		1,555	1.8	3	.600	5.2
July 25																	100.0		4,020	4.7	3	1.567	13.6
Aug. 1			10.0										26.5				63.5		3,837	4.5	6	.750	6.5
Aug. 8			23.1							1.7	2.1		48.0				20.6	4.5	19,701	23.0	20	1.150	10.0
Aug. 15			51.3							4.3	1.1	3.2	33.7				4.6	1.8	24,403	28.4	17	1.671	14.5
Aug. 22			79.8										19.7				.6		18,897	22.0	18	1.222	10.6
Aug. 29			97.4														2.6		3,029	3.5	19	.184	1.6
Sept. 5			100.0																50	.1	1	.100	.9
1927																							
June 5			52.6									42.4					5.1		3,184	2.8	22	.127	2.0
June 12		4.8	58.9									21.2					14.0	1.0	6,916	6.2	23	.270	4.3
June 19			81.8														18.2		4,435	3.9	23	.170	2.7
June 26		4.1	75.0									.2	8.8				12.0		13,686	12.2	23	.530	8.5
July 3			64.0									2.1	12.0	3.0			18.9		16,740	14.9	23	.648	10.4
July 10			82.7							.4							16.5	.3	14,245	12.7	23	.552	8.9
July 17			34.2	4.6	7.3					7.8		3.7	23.3				19.2		3,584	3.2	22	.145	2.3
July 24			17.1										58.2				24.8		7,821	7.0	21	.333	5.3
July 31													79.0				21.0		9,147	8.1	20	.405	6.5
Aug. 7			72.2										19.6				8.1		11,537	10.3	18	.572	9.2
Aug. 14			82.0							.2			2.5				15.3		10,311	9.2	18	.511	8.2
Aug. 21			93.2														6.8		1,670	1.5	17	.088	1.4
Aug. 28			86.2														13.8		2,825	2.5	14	.179	2.9
Sept. 4			35.1			15.1											35.6	14.1	1,024	.9	7	.130	2.1
Sept. 11			99.3			.7													1,565	1.4	6	.233	3.7
Sept. 18			98.9										1.1						1,503	1.3	3	.433	7.0
Sept. 25			100.0																2,066	1.8	2	.900	14.5
1928																							
June 3			12.9									87.1							310	.2	21	.010	.2
June 10			82.1		4.0							13.9							6,332	4.5	21	.214	4.3
June 17			21.6		66.6				2.1				3.1			3.7		2.9	14,231	10.0	21	.476	9.6
June 24			44.2		44.5										10.2	1.1			13,661	9.6	21	.457	9.2
July 1			53.0		16.6					.3		16.3			13.9				21,525	15.1	21	.719	14.5
July 8			73.1							10.0		14.0			2.9				9,673	6.8	21	.324	6.5
July 15			53.7		2.8					6.8		10.8	25.9						4,487	3.2	21	.152	3.1
July 22			27.1									7.6	65.3						9,859	6.9	21	.329	6.6
July 29	0.6		42.2							.7		1.5	55.0						7,781	5.5	21	.262	5.3
Aug. 5			78.0									2.7	19.4						6,679	4.7	21	.224	4.5
Aug. 12			41.6							.7	14.2	2.9	40.8						3,925	2.8	20	.140	2.8
Aug. 19			52.1	2.3	2.0					1.6			42.1						11,351	8.0	19	.421	8.5
Aug. 26			99.7										.3						5,009	3.5	19	.184	3.7
Sept. 2			99.8										.2						6,556	4.6	19	.242	4.9
Sept. 9			100.0																5,434	3.8	19	.200	4.0
Sept. 16			100.0																2,586	1.8	18	.100	2.0
Sept. 23			100.0																4,257	3.0	18	.167	3.4
Sept. 30			97.1										2.9						8,415	5.9	18	.328	6.6
1929																							
June 2			27.1									26.8	13.4		32.7				358	.2	18	.011	.2
June 9			30.9		1.6							21.2	17.5		28.9				6,295	3.9	18	.217	3.2
June 16			18.5		11.1						5.9	3.5	37.8		23.2				7,971	4.9	18	.272	4.0
June 23			3.1		8.0				1.8		3.1	3.1	74.0		6.9				22,710	14.1	18	.783	11.5
June 30			2.1							4.3	7.4		86.2						18,687	11.6	18	.644	9.4
July 7			3.1				9.6			5.5	20.8		48.9		12.1				5,853	3.6	18	.200	2.9
July 14					1.2	6.2	4.3			16.0	15.1	3.5	35.0		18.6				7,470	4.6	18	.256	3.8
July 21			1.7		18.6					2.0	1.8	1.0	1.6		73.1				5,948	3.7	18	.206	3.0
July 28			7.6			18.9		6.5		.5	2.4	4.7	12.3		47.0				8,582	5.3	18	.294	4.3
Aug. 4			33.6			10.9		14.9		.2	5.3		19.4		15.8				4,517	2.8	17	.165	2.4
Aug. 11			66.9									3.9	14.6		14.6				6,839	4.2	12	.350	5.1
Aug. 18			85.4			2.3		4.6							7.7				6,606	4.1	12	.342	5.0
Aug. 25			100.0																118	.1	12	.008	.1
Sept. 1			100.0																18,486	11.5	12	.958	14.0
Sept. 8			100.0																11,603	7.2	12	.600	8.8
Sept. 15			100.0																10,920	6.8	12	.567	8.3
Sept. 22			100.0																6,732	4.2	12	.350	5.1
Sept. 29			100.0																11,049	6.9	12	.575	8.4
Sept. 30			100.0																373	.2	12	.017	.2
TOTAL																							
1926			42.9							1.6	.8	.9	26.1				26.1	1.5	85,764				
1927		.8	63.2	.1	.2	.1				.3		3.0	16.4	.4			15.2	.2	112,259				
1928			60.5	.2	13.9				.2	1.1	.4	5.4	14.3		3.3	.5		.3	142,071				
1929			47.5		2.5	1.7	.5	1.0	.3	1.6	3.4	2.1	28.3		11.2				161,117				
TOTAL, WEIGHTED BY BOATS FISHING																							
1926			28.1							.8	.4	.5	13.5				56.1	.7					
1927		.6	70.9	.1	.2	.3				.2		2.1	12.8	.3			12.0	.4					
1928			61.3	.2	13.3				.2	1.1	.4	5.2	14.1		3.1	.5		.3					
1929			56.2		2.0	1.4	.4	.9	.2	1.3	2.7	1.8	23.2		9.5								

TABLE 12.—*Percentage of herring caught in each area each week by boats of Group III*

[Catches delivered to plants north of Wilson Cove]

Week ending—	Areas																	Actual number of barrels caught	Per cent of season's catch	Boats fishing	Per cent of season's catch taken by each boat	Per cent of season's catch weighted by number of boats fishing
	1	2	3	4	6	8	9	11	12	14	15	16	17	20	23	Chatham Strait	?					
1926																				*Number*		
June 6																	100.0	151	0.3	3	0.100	0.4
June 13				39.6					10.7								49.7	1,508	3.2	3	1.067	4.7
June 20				12.2							9.0	9.3					69.6	3,990	8.5	3	2.833	12.5
June 27										16.2	22.1	15.0	4.6				42.2	2,402	5.1	3	1.700	7.5
July 4						4.5	9.0			2.7	13.5		2.1				68.5	1,114	2.4	3	.800	3.5
July 11										9.1	22.1		21.8				47.2	2,086	4.4	3	1.467	6.5
July 18										25.9	20.4						53.7	3,270	6.9	3	2.300	10.1
July 25										26.2		17.2	20.2				36.4	2,713	5.7	3	1.900	8.4
Aug. 1									8.7	31.4	6.1		53.8					5,403	11.4	6	1.900	8.4
Aug. 8									1.5	79.7	4.1		10.9			3.8		8,067	17.1	7	2.444	10.8
Aug. 15	4.6			36.4					3.6	17.2			38.2					7,978	16.9	6	2.817	12.4
Aug. 22				69.0						22.2			8.7					6,294	13.3	6	2.217	9.8
Aug. 29				26.5						54.8			18.6					1,694	3.6	6	.600	2.6
Sept. 5									60.5	8.8			30.7					512	1.1	2	.550	2.4
Sept. 12									100.0									20		1		
1927																						
June 5				100.0														1,679	7.8	6	1.300	7.4
June 12				90.6								9.4						3,190	14.7	6	2.450	14.0
June 19				100.0														1,495	6.9	6	1.150	6.6
June 26				89.5								10.5						3,258	15.0	6	2.500	14.2
July 3				78.2									21.8					1,992	9.2	6	1.533	8.7
July 10				91.6						8.4								2,306	10.7	6	1.783	10.2
July 17				47.5	5.6					38.8		3.2	4.8					1,052	4.9	6	.817	4.7
July 24				9.4					6.5	79.0			5.1					1,326	6.1	6	1.017	5.8
July 31									30.6	48.2			21.2					1,473	6.8	6	1.133	6.5
Aug. 7				13.2						66.0	6.2		14.6					1,516	7.0	6	1.167	6.6
Aug. 14				41.6					28.0	30.4								1,164	5.4	5	1.080	6.2
Aug. 21				3.1		40.9		11.0	14.7	30.2								543	2.5	4	.625	3.6
Aug. 28			14.5			26.5			40.1	18.8								648	3.0	3	1.000	5.7
1928																						
June 3												100.0						98	.3	7	.043	.3
June 10				39.0				15.4				24.1			21.5			1,230	3.9	7	.557	3.6
June 17				86.9										13.1				1,973	6.2	7	.886	5.7
June 24				21.3	5.1									73.7				5,572	17.6	7	2.514	16.0
July 1								1.7						98.3				7,781	24.5	7	3.500	22.3
July 8								2.2	1.4					96.5				5,051	15.9	7	2.257	14.4
July 15	45.3	48.1				6.0				.6								1,847	5.8	6	.967	6.2
July 22	3.0	51.2				45.0			.7									1,763	5.6	6	.933	6.0
July 29		59.0				21.9			19.1									962	3.0	5	.600	3.8
Aug. 5		41.5					31.9		8.9	17.7								583	1.8	5	.360	2.3
Aug. 12						62.0		7.8	1.5	4.0				24.7				1,837	5.8	5	1.160	7.4
Aug. 19		14.1				26.4		24.1	18.5					16.8				588	1.9	5	.380	2.4
Aug. 26						35.3		15.7	49.0									674	2.1	5	.420	2.7
Sept. 2						51.8			48.2									742	2.3	5	.460	2.9
Sept. 9				6.1		44.5		16.2	33.2									1,000	3.2	5	.640	4.1
TOTAL																						
1926	.8			18.6		.1	.2		2.9	29.7	6.0	2.5	19.0			.7	19.4	47,202				
1927			.4	64.6	.3	1.8		.3	5.6	18.5	.4	3.1	5.0					21,642				
1928	2.8	8.5		10.9	.9	11.0	.6	3.1	4.7	.6		1.2		55.0	.8			31,701				
TOTAL, WEIGHTED BY BOATS FISHING																						
1926	.6			15.4		.2	.3		3.3	23.9	7.7	3.7	16.0			.4	28.5					
1927			.8	61.9	.3	3.0		.4	6.9	18.8	.4	3.0	4.8									
1928	3.0	9.6		10.0	.8	13.4	.7	3.5	5.8	.7		1.2		50.6	.8							

TABLE 13.—*Daily catches of herring from 1926 to 1929, inclusive, by boats of Group I and Group II*

BOATS OF GROUP I

[Catches delivered south of Point Ellis]

Day	1926			1927			1928			1929			Average delivery for four years unweighted	Average delivery for four years smoothed by threes
	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery		
	Number	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Barrels*	*Barrels*
June 1				771	3	257.00	43	1	43.00	608	15	40.53	146.84	
June 2				108	1	108.00	107	2	53.50				80.75	168.58
June 3				1,514	7	216.29				340	1	340.00	278.15	158.49
June 4				930	7	132.86				2,406	24	100.25	116.56	159.53
June 5	34	1	34.00				738	6	123.00	1,988	21	91.67	83.89	107.28
June 6	586	2	293.00	18	1	18.00	111	2	55.50	2,620	22	119.09	121.40	98.17
June 7				900	11	81.82	1,590	14	113.57	940	13	72.31	89.23	101.36
June 8	55	2	27.50	1,927	12	160.58	2,544	17	149.65	830	23	36.09	93.46	135.09
June 9	294	1	294.00	1,376	9	152.89	1,716	15	114.40	329	1	329.00	222.57	131.68
June 10	206	2	103.00	1,575	10	157.50	37	2	18.50	37	1	37.00	79.00	147.65
June 11				2,813	14	200.93	121	2	60.50	2,441	15	162.73	141.39	114.18
June 12	23	1	23.00	67	1	67.00	4,569	14	326.36	1,661	23	72.22	122.15	174.69
June 13	832	2	416.00	13	1	13.00	3,940	8	492.50	2,050	17	120.59	260.52	202.34
June 14	416	1	416.00				2,057	16	128.56	3,083	21	128.46	224.34	232.06
June 15	478	1	478.00	322	5	64.40	2,185	10	218.50	2,364	28	84.43	211.33	218.96
June 16	732	2	366.00	308	6	51.33	4,434	18	246.33				221.22	187.12
June 17	359	2	179.50	929	7	132.71	94	1	94.00	436	4	109.00	128.80	220.74
June 18	862	2	431.00	2,730	15	182.00	2,438	5	487.60	2,965	20	148.25	312.21	201.22
June 19	64	1	64.00	84	1	84.00	4,137	16	258.56	3,660	15	244.00	162.64	242.89
June 20	696	2	348.00	120	1	120.00	5,560	22	252.73	6,180	22	294.55	253.82	235.88
June 21	934	2	467.00	2,534	12	211.17	5,044	23	219.30	5,880	22	267.27	291.19	263.39
June 22	531	2	265.50	2,839	11	258.09	2,652	13	204.00	7,590	30	253.00	245.15	259.92
June 23	360	1	360.00	2,635	11	239.55	2,615	20	130.75				243.43	238.26
June 24	518	2	259.00	3,019	14	215.64				3,876	19	204.00	226.21	243.42
June 25	290	1	290.00	2,902	14	207.29	334	1	334.00	4,646	22	211.18	260.62	221.17
June 26							3,748	17	220.47	1,993	15	132.87	176.67	197.78
June 27	14	1	14.00				5,533	20	276.65	3,905	22	177.50	156.05	180.93
June 28				86	1	86.00	8,857	23	385.09	3,979	25	159.16	210.08	200.04
June 29				462	3	154.00	6,257	19	329.32	6,340	29	218.62	233.98	236.86
June 30				4,620	13	355.38	4,086	23	117.65				266.52	218.63
July 1	96	2	48.00	3,887	14	277.64				282	2	141.00	155.55	219.23
July 2	350	1	350.00	4,968	18	276.00	1,530	7	218.57	1,861	19	97.95	235.63	183.55
July 3	297	2	148.50				6,745	25	269.80	421	7	60.14	159.48	212.75
July 4	380	1	380.00	779	2	389.50	2,347	13	180.54	45	2	22.50	243.14	199.16
July 5				5,859	16	366.19	3,048	19	160.42	174	3	58.00	194.87	202.07
July 6	163	1	168.00	7,639	20	381.95	391	5	78.20	447	10	44.70	168.21	168.79
July 7				756	6	126.00	1,124	7	160.57				143.29	152.43
July 8	266	1	266.00	200	6	33.33				138	1	138.00	145.78	139.62
July 9	190	1	190.00	38	2	19.00				2,345	13	180.38	129.79	186.78
July 10	614	1	614.00				1,344	11	122.18	2,245	19	118.16	284.78	199.04
July 11	841	2	420.50				283	7	40.43	1,647	19	86.68	182.54	203.70
July 12				873	6	145.50	405	3	135.00	4,073	27	150.85	143.78	178.90
July 13	805	2	402.50	1,717	7	245.29	270	3	90.00	1,867	18	103.72	210.38	178.18
July 14	160	1	160.00	1,792	9	199.11	1,456	8	182.00				180.37	203.05
July 15	1,408	3	469.33	822	5	164.40				43	2	21.50	218.41	194.95
July 16	1,069	3	356.33	142	2	71.00	2,260	8	282.50	69	2	34.50	186.08	201.90
July 17	491	1	491.00	58	1	58.00	4,597	20	229.85	52	2	26.00	201.21	190.65
July 18	574	2	287.00	137	1	137.00	3,151	16	196.94	824	7	117.71	184.66	189.13
July 19	686	2	343.00	296	4	74.00	3,080	15	205.33	415	4	103.75	181.52	217.42
July 20	507	1	507.00	617	6	102.83	1,612	14	115.14	587	14	419.29	286.07	220.66
July 21	288	1	288.00	1,163	6	193.83	1,013	10	101.30				194.38	226.69
July 22	518	2	259.00	1,315	8	164.38				351	2	175.50	199.63	211.12
July 23	804	3	268.00	2,101	12	175.08	1,609	9	178.78	671	2	335.50	239.34	196.88
July 24	830	2	415.00				2,429	16	151.81	4,517	24	188.21	251.67	219.47
July 25	319	2	159.50	239	2	119.50	4,728	21	225.14	2,482	15	165.47	167.40	200.11
July 26				577	3	192.33	683	7	97.57	6,348	25	253.92	181.27	156.73
July 27	136	2	68.00	4,987	18	277.06	1,030	15	68.67	579	8	72.38	121.53	150.89
July 28	537	2	268.50	858	8	107.25	1,552	21	73.90				149.88	133.61
July 29				1,205	8	150.63				1,515	14	108.21	129.42	132.54
July 30	48	1	48.00	1,159	14	82.79	2,970	14	212.14	2,346	18	130.33	118.32	157.59
July 31	438	1	438.00				3,444	23	149.74	1,136	13	87.38	225.04	173.87
Aug. 1	874	4	218.50				2,825	22	128.41	3,756	20	187.80	178.24	179.03
Aug. 2	521	3	173.67	1,924	10	192.40	1,361	19	71.63	1,560	16	97.50	133.80	157.26
Aug. 3	1,366	5	273.20	283	3	94.33	873	7	124.71	3,082	21	146.76	159.75	141.71
Aug. 4	196	5	39.20	4,500	15	300.00	888	16	55.50				131.57	160.56
Aug. 5	1,023	5	204.60	4,949	17	291.12				678	9	75.33	190.35	199.01
Aug. 6	1,012	5	202.40	5,544	18	308.00				8,504	27	314.96	275.12	220.90
Aug. 7	780	2	390.00				41	1	41.00	3,696	23	160.70	197.23	210.52
Aug. 8	1,379	6	229.83	148	1	148.00	388	10	38.80	5,504	25	220.16	159.20	200.33
Aug. 9	2,817	6	469.50	4,402	16	175.13	650	5	130.00	1,450	14	103.57	244.55	202.86
Aug. 10	3,717	8	464.63	2,342	11	212.91	20	1	20.00	2,436	20	121.80	204.84	239.66
Aug. 11	2,113	6	352.17	979	10	97.90	1,076	3	358.67				269.58	235.51
Aug. 12	2,255	5	451.00	3,749	16	234.31	11	1	11.00				232.10	254.23
Aug. 13	1,536	4	384.00	2,155	10	215.50	543	2	271.50	3,981	23	173.09	261.02	277.13
Aug. 14	3,073	6	512.17				2,449	13	188.38	7,857	25	314.28	338.28	271.43
Aug. 15	1,756	5	351.20				3,839	23	166.91	1,142	9	126.89	215.00	269.11
Aug. 16	2,006	4	501.50	752	4	188.00	2,073	18	115.17	3,807	18	211.50	254.04	221.11
Aug. 17	1,845	5	369.00	747	6	124.50	1,502	15	100.13	3,119	17	183.47	194.23	238.80
Aug. 18	2,334	5	466.80	1,444	15	96.27	8,199	34	241.15				268.07	164.12
Aug. 19				30	1	30.00							30.00	130.56
Aug. 20	967	5	193.40	54	2	27.00				302	5	60.40	93.60	101.32
Aug. 21	384	1	384.00				3,213	22	146.05	11	1	11.00	180.35	117.65
Aug. 22							632	8	79.00				79.00	163.46
Aug. 23	887	4	221.75	2,906	14	207.57	3,311	20	165.55	1,646	5	329.20	231.02	145.23
Aug. 24	254	2	127.00	1,065	10	106.50	790	8	98.75	902	5	180.40	125.66	209.01
Aug. 25	526	1	526.00	1,093	10	109.30	5,624	32	175.75				270.35	153.56
Aug. 26	218	2	109.00	46	1	46.00	78	2	39.00				64.67	172.65
Aug. 27	952	5	190.40	1,245	10	124.50				3,041	13	233.92	182.94	167.63
Aug. 28	104	2	52.00				4,694	22	213.36	12,511	25	500.44	255.27	221.51
Aug. 29	92	2	46.00				928	7	132.57	9,507	19	500.37	226.31	202.04
Aug. 30				1,166	8	145.75	3,844	22	174.73	13,814	26	53.13	124.54	135.29
Aug. 31				59	3	19.67	1,241	13	95.46	11,975	24	49.90	55.01	88.91
Sept. 1				274	3	91.33	3,355	25	134.20	36	1	36.00	87.18	87.76
Sept. 2	42	1	42.00	673	4	168.25				153	1	153.00	121.08	112.19
Sept. 3				328	7	46.86				2,307	11	209.73	128.30	177.88
Sept. 4	1,082	2	541.00				4,372	20	218.60	839	9	93.22	284.27	233.58
Sept. 5	2,983	6	497.17				490	6	81.67	7,142	25	285.68	288.17	274.31
Sept. 6	1,374	4	343.50	1,603	6	267.17	3,230	20	161.50	5,056	22	229.82	250.50	263.39
Sept. 7	1,302	4	325.50	676	7	96.57	1,171	11	106.45	12,415	26	477.50	251.51	240.99
Sept. 8	2,614	6	435.67	15	1	15.00	3,299	19	173.63	519	2	259.50	220.95	280.95
Sept. 9	1,557	4	389.25							2,812	8	351.50	370.38	344.77
Sept. 10	2,236	5	447.20							11,846	27	438.74	442.97	378.33
Sept. 11	1,568	4	392.00				4,074	15	271.60	6,931	23	301.35	321.65	381.59
Sept. 12	1,012	3	337.33							9,728	23	422.96	380.15	282.63
Sept. 13	1,613	5	322.60	302	3	100.67				15	1	15.00	146.09	317.46
Sept. 14	2,051	4	512.75	3,411	9	379.00				1,160	3	386.67	426.14	349.08
Sept. 15	780	2	390.00				2,720	17	160.00				275.00	353.21
Sept. 16	362	1	362.00	2,840	8	355.00							358.50	310.63
Sept. 17	1,643	5	328.60	2,992	9	332.44	43	1	43.00	12,728	26	489.54	298.40	292.67
Sept. 18	1,900	5	380.00				2,322	11	211.09	1,301	18	72.28	221.12	269.31
Sept. 19	717	2	358.50							3,930	18	218.33	288.42	251.96

TABLE 13.—*Daily catches of herring from 1926 to 1929, inclusive, by boats of Group I and Group II*—Continued

BOATS OF GROUP I—Continued

Day	1926			1927			1928			1929			Average delivery for four years unweighted	Average delivery for four years smoothed by threes
	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery		
	Number	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Barrels*	*Barrels*
Sept. 20	308	2	154.00	4,242	9	471.33				2,615	23	113.70	246.34	301.50
Sept. 21				4,580	9	508.89	6,530	14	466.43	3,348	25	133.92	269.75	323.05
Sept. 22				1,595	7	227.86	7,652	16	478.25				353.06	341.85
Sept. 23	312	1	312.00	4,202	8	525.25				71	1	71.00	302.75	336.62
Sept. 24				693	3	231.00				13,835	29	477.07	354.04	376.77
Sept. 25							6,616	15	441.07	14,167	28	505.96	473.52	386.00
Sept. 26	43	1	43.00				5,321	12	443.42	13,127	26	504.88	330.43	376.79
Sept. 27							2,551	11	231.91	10,944	26	420.92	326.42	324.21
Sept. 28	62	1	62.00				3,172	8	396.50	10,755	22	488.86	315.79	308.06
Sept. 29	490	2	245.00				1,147	9	127.44	947	2	473.50	281.98	235.42
Sept. 30	100	1	100.00							1,638	14	117.00	108.50	

BOATS OF GROUP II

[Catches delivered Point Ellis to Wilson Cove]

June 1				188	2	94.00	105	1	105.00	241	6	40.17	79.72	
June 2				1,154	7	164.86	205	5	41.00	117	1	117.00	107.62	102.36
June 3				686	4	171.50				68	1	68.00	119.75	95.44
June 4				1,002	13	77.08	15	1	15.00	763	9	84.78	58.95	99.65
June 5				154	2	77.00	938	9	104.22	1,975	11	179.55	120.26	99.07
June 6				220	1	200.00	287	5	57.40	1,159	12	96.58	117.99	119.09
June 7				242	2	121.00	1,182	11	107.45	900	7	128.57	119.01	125.34
June 8				1,603	15	106.87	2,618	16	163.63	1,292	9	143.56	138.02	123.32
June 9	43	1	43.00	1,824	9	202.67	1,292	19	68.00	138	1	138.00	112.92	136.02
June 10				1,257	8	157.13							157.13	205.24
June 11	671	1	671.00	1,506	15	100.40				1,859	7	265.57	345.66	214.60
June 12				264	5	52.80	1,778	9	197.56	1,381	8	172.63	141.00	290.46
June 13	632	1	632.00				3,443	11	313.00	1,255	6	209.17	384.72	249.77
June 14	813	2	406.50	155	2	77.50	1,447	7	206.71	2,037	10	203.70	223.60	271.88
June 15	651	2	325.50	756	9	84.00	4,533	14	323.79	1,439	15	95.93	207.31	231.36
June 16	460	1	460.00	371	3	123.67	2,676	13	205.85				263.17	228.56
June 17	662	3	220.67	883	5	176.60	354	1	354.00	219	2	109.50	215.19	239.66
June 18	210	1	210.00	2,192	17	128.94	305	1	305.00	4,459	14	318.50	240.61	213.78
June 19	252	2	126.00	78	1	78.00	3,660	13	281.54	2,823	11	256.64	185.55	218.86
June 20				160	2	80.00	2,931	11	266.45	6,551	19	344.79	230.41	214.90
June 21	472	2	236.00	1,087	5	217.40	1,894	13	145.69	4,738	15	315.87	228.74	213.25
June 22	187	1	187.00	2,194	12	182.83	924	5	184.80	3,920	18	217.78	180.60	195.63
June 23	64	1	64.00	3,198	12	266.50	3,639	18	202.17				177.56	204.20
June 24				3,210	15	214.00	308	1	308.00	4,344	18	241.33	254.44	201.87
June 25	361	2	180.50	3,794	17	223.18	548	2	274.00	2,367	12	197.25	173.61	196.57
June 26	40	1	40.00	43	2	21.50	3,755	9	417.22	2,518	15	167.87	161.65	181.95
June 27				313	3	104.33	4,243	14	303.07	2,468	11	224.36	210.59	193.08
June 28	338	2	169.00	2,065	9	229.44	4,680	16	292.50	1,645	12	137.08	207.01	230.86
June 29	482	2	241.00	1,559	7	222.71	4,410	13	339.23	5,345	18	296.94	274.97	215.25
June 30	278	2	139.00	765	7	109.29	3,889	16	243.06				163.78	222.75

July 1	230	1	230.00	4,301	14	307.21				454	3	151.33	229.51	228.83
July 2	372	1	372.00	7,456	22	338.91	557	2	278.50	1,284	7	183.43	293.21	238.53
July 3	456	3	152.00	281	1	281.00	1,425	6	237.50	404	4	101.00	192.88	199.94
July 4							1,982	13	152.46	375	5	75.00	113.73	200.90
July 5				6,674	17	392.59	3,002	11	272.91	1,114	5	222.80	296.10	204.91
July 6	401	2	200.50	5,626	19	296.11	1,314	8	164.25	2,222	14	158.71	204.89	227.84
July 7	255	1	255.00	1,439	7	205.57	1,393	16	87.06				182.54	168.09
July 8	457	3	152.33	170	3	56.67				566	4	141.50	116.83	158.40
July 9	614	2	307.00	336	7	48.00				2,070	12	172.50	175.83	133.81
July 10	277	2	138.50				1,030	9	114.44	954	13	73.38	108.77	148.29
July 11	594	2	297.00	218	2	109.00	1,143	9	127.00	865	8	108.13	160.28	133.44
July 12	353	2	176.50	140	3	46.67	769	5	153.80	1,185	8	148.13	131.28	130.90
July 13	30	1	30.00	1,193	9	132.56	358	4	89.50	1,830	12	152.50	101.14	108.66
July 14				862	9	95.78	1,187	13	91.31				93.55	126.67
July 15	597	2	298.50	649	9	72.11							185.31	181.68
July 16	218	1	218.00	522	9	58.00	1,306	6	217.67	571	1	571.00	266.17	215.37
July 17							2,382	12	198.50	1,717	9	190.78	194.64	216.77
July 18	357	1	357.00	462	3	154.00	2,580	12	215.00	32	1	32.00	189.50	188.37
July 19	491	2	245.50	1,352	8	169.00	1,493	12	124.42	1,295	7	185.00	180.98	186.89
July 20	758	3	252.67	659	5	131.80	900	5	180.00	1,767	9	196.33	190.20	207.13
July 21	161	1	161.00	1,591	9	176.78	1,164	12	97.00	566	1	566.00	250.20	204.39
July 22	700	2	350.00	1,209	9	134.33	34	1	34.00				172.78	226.69
July 23	570	2	285.00	2,251	17	132.41	1,569	8	196.13	2,904	7	414.86	257.10	225.21
July 24	744	2	372.00	297	2	148.50	2,385	12	198.75	3,165	12	263.75	245.75	222.13
July 25	596	3	198.67	783	5	156.60	1,586	10	158.60	561	4	140.25	163.53	190.33
July 26	428	2	214.00	1,513	7	216.14	459	6	76.50	981	7	140.14	161.70	151.82
July 27	792	5	158.40	2,947	14	210.50	354	4	88.50	508	8	63.50	130.23	181.85
July 28				1,654	8	206.75	1,276	14	91.14	463	1	463.00	253.63	193.92
July 29	332	1	332.00	658	6	109.67	152	1	152.00				197.89	190.55
July 30	284	2	142.00	1,592	15	106.13	24	1	24.00	1,250	6	208.33	120.12	180.40
July 31	320	1	320.00				2,852	14	203.71	1,021	7	145.86	223.19	183.42
Aug. 1	1,681	5	336.20				1,353	10	135.30	1,195	8	149.38	206.96	195.36
Aug. 2	1,685	7	240.71	1,090	8	136.25	1,856	13	142.77	104	1	104.00	155.93	139.14
Aug. 3	3,246	9	360.67	1,226	9	136.22	16	1	16.00	947	9	105.22	154.53	163.50
Aug. 4	1,865	6	310.83	2,068	11	188.00	578	14	41.29				180.04	204.84
Aug. 5	3,168	10	316.80	3,061	12	255.08				1,072	4	268.00	279.96	244.97
Aug. 6	4,757	14	339.79	4,092	17	240.71				2,931	12	244.25	274.92	240.89
Aug. 7	2,864	11	260.36				414	3	138.00	525	5	105.00	167.79	196.12
Aug. 8	2,116	11	192.36				655	7	93.57	1,208	8	151.00	145.64	164.26
Aug. 9	1,536	5	307.20	2,397	10	239.70	712	8	89.00	163	2	81.50	179.35	157.19
Aug. 10	2,996	11	272.36	1,103	9	122.56	112	1	112.00	874	11	79.45	146.59	184.38
Aug. 11	3,997	12	333.08	2,008	7	286.86	2,006	9	222.89	66	1	66.00	227.21	185.92
Aug. 12	1,898	6	316.33	1,886	9	209.56	26	1	26.00				183.96	221.43
Aug. 13	5,709	17	335.82	2,917	13	224.38	873	4	218.25	1,638	7	234.00	253.11	224.20
Aug. 14	3,612	9	401.33				1,803	6	300.50	2,643	11	240.27	235.53	250.75
Aug. 15	4,655	13	358.08				2,475	12	206.25	1,359	6	226.50	263.61	238.33
Aug. 16	4,908	13	377.54	370	2	185.00	2,287	11	207.91	279	3	93.00	215.86	212.29
Aug. 17	4,369	13	336.08	285	6	47.50	961	6	160.17	687	8	85.88	157.41	197.80
Aug. 18	6,409	16	400.56	527	7	75.29	2,952	16	184.50				220.12	182.42
Aug. 19	1,424	5	284.80	164	3	54.67							169.74	175.59
Aug. 20	1,344	6	224.00	299	6	49.83							136.92	131.32
Aug. 21	32	1	32.00				1,431	8	178.88	51	1	51.00	87.29	332.58
Aug. 22	411	3	133.33				1,031	11	93.73				113.53	134.08
Aug. 23	1,339	7	191.29	1,720	8	215.00	792	4	198.00				201.43	135.47
Aug. 24	1,102	7	157.43	172	3	57.33	168	2	84.00	67	1	67.00	91.44	140.35
Aug. 25	316	2	158.00	731	7	104.43	1,587	13	122.08				128.17	118.87
Aug. 26	176	1	176.00							98	1	98.00	137.00	126.61
Aug. 27	96	1	96.00	227	3	75.67				517	3	172.33	114.67	176.36
Aug. 28							2,180	11	198.18	3,923	11	356.64	277.41	237.20
Aug. 29							1,145	7	163.57	4,279	9	475.44	319.51	260.93
Aug. 30	50	2	25.00	225	2	112.50	921	6	153.50	4,460	12	371.67	185.87	241.32
Aug. 31				281	2	140.50	487	6	81.17	5,209	12	434.08	218.58	190.31
Sept. 1				219	1	219.00	1,823	16	113.94				166.47	180.02
Sept. 2				155	1	155.00							155.00	140.90
Sept. 3				144	1	144.00	26	1	26.00	802	6	133.67	101.22	136.59

TABLE 13.—*Daily catches of herring from 1926 to 1929, inclusive, by boats of Group I and Group II*—Continued

BOATS OF GROUP II—Continued

Day	1926			1927			1928			1929			Average delivery for four years unweighted	Average delivery for four years smoothed by threes
	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery	Barrels caught	Deliveries	Average delivery		
	Number	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Number*	*Number*	*Barrels*	*Barrels*	*Barrels*
Sept. 4							1,258	9	139.78	502	3	167.33	153.56	142.54
Sept. 5							548	7	78.29	2,941	11	267.36	172.83	197.47
Sept. 6				1,067	3	355.67	1,107	8	138.38	2,432	8	304.00	266.02	239.22
Sept. 7							549	5	109.80	4,926	11	447.82	278.81	284.23
Sept. 8				486	1	486.00	1,946	15	129.73				307.87	270.14
Sept. 9				26	1	26.00				843	2	421.50	223.75	252.07
Sept. 10				11	1	11.00				4,382	10	438.20	224.60	237.61
Sept. 11							1,258	11	114.36	2,073	5	414.60	264.48	237.57
Sept. 12							269	4	67.25	3,040	8	380.00	223.63	173.62
Sept. 13				16	1	16.00	99	2	49.50				32.75	193.54
Sept. 14				715	2	357.50				582	2	291.00	324.25	159.00
Sept. 15							960	8	120.00				120.00	268.75
Sept. 16				362	1	362.00							362.00	298.72
Sept. 17				331	1	331.00				4,476	9	497.33	414.17	308.86
Sept. 18				54	1	54.00	251	1	251.00	585	4	146.25	150.42	234.61
Sept. 19							320	4	80.00	794	4	198.50	139.25	186.64
Sept. 20				794	2	397.00				574	4	143.50	270.25	252.56
Sept. 21				506	1	506.00	875	2	437.50	303	3	101.00	348.17	323.27
Sept. 22							2,811	8	351.38				351.38	337.02
Sept. 23				623	2	311.50							311.50	345.71
Sept. 24				143	2	71.50	468	1	468.00	2,333	4	583.25	374.25	365.32
Sept. 25							2,988	9	332.00	2,442	5	488.40	410.20	394.08
Sept. 26							1,964	6	327.33	1,873	4	468.25	397.79	383.33
Sept. 27							527	2	263.50	1,682	4	420.50	342.00	391.35
Sept. 28							2,273	7	324.71	2,719	5	543.80	434.26	273.75
Sept. 29							135	3	45.00				45.00	200.84
Sept. 30							60	1	60.00	373	2	186.50	123.25	

TABLE 14.—*Daily catches of herring from 1926 to 1928, inclusive, by boats of Group III*

[Catches delivered north of Wilson Cove]

Day	1926			1927			1928			Average delivery for three years unweighted	Average delivery for three years smoothed by threes
	Number of barrels caught	Number of deliveries	Average delivery	Number of barrels caught	Number of deliveries	Average delivery	Number of barrels caught	Number of deliveries	Average delivery		
June 1											
June 2				800	2	400.00	98	1	98.00	249.00	
June 3											
June 4				417	3	139.00				139.00	
June 5				462	2	231.00	105	1	105.00	168.00	143.50
June 6	151	1	151.00				192	2	96.00	123.50	124.39
June 7	51	1	51.00				337	3	112.33	81.67	151.14
June 8	343	2	171.50	1,300	4	325.00				248.25	175.20
June 9	185	1	185.00	506	2	253.00	596	4	149.00	195.67	221.96
June 10											234.23
June 11	332	2	166.00	1,317	3	439.00	640	3	213.33	272.78	153.14
June 12				67	2	33.50				33.50	172.01
June 13	597	2	298.50				242	2	121.00	209.75	170.51
June 14	975	2	487.50	180	1	180.00	412	3	137.33	268.28	224.12
June 15	921	3	307.00	200	1	200.00	76	1	76.00	194.33	216.95
June 16				276	1	276.00	603	6	100.50	188.25	238.03
June 17	663	2	331.50							331.50	261.54
June 18	640	2	320.00	839	4	209.75				264.88	318.03
June 19	421	1	421.00				1,472	5	294.40	357.70	304.53
June 20	370	2	185.00				397	1	397.00	291.00	342.30
June 21	363	1	363.00	397	1	397.00	1,873	5	374.60	378.20	332.33
June 22	420	1	420.00	672	3	224.00	1,018	3	339.33	327.78	302.10
June 23	360	2	180.00	234	1	234.00	374	2	187.00	200.33	252.44
June 24	619	3	206.33	787	3	262.33	438	2	219.00	229.22	259.84
June 25	530	2	265.00	970	3	323.33	923	2	461.50	349.98	300.62
June 26				198	1	198.00	1,342	3	447.33	322.67	304.22
June 27	110	1	110.00				1,110	3	370.00	240.00	277.67
June 28	307	2	153.50				1,936	5	387.20	270.35	322.12
June 29							456	1	456.00	456.00	323.59
June 30	150	1	150.00	1,238	5	247.60	2,014	6	335.67	244.42	321.31
July 1	527	2	263.50							263.50	221.31
July 2				468	3	156.00				156.00	216.44
July 3	130	2	65.00	286	1	286.00	2,369	7	338.43	229.81	192.91
July 4											232.66
July 5	45	1	45.00	852	2	426.00				235.50	267.74
July 6	97	2	48.50	483	1	483.00	1,842	5	368.40	299.97	278.19
July 7	970	3	323.33	588	2	294.00	840	3	280.00	299.11	225.69
July 8	34	1	34.00	122	1	122.00				78.00	157.45
July 9	60	1	60.00	261	2	130.50				95.25	86.63
July 10											171.50
July 11	880	2	440.00				111	2	55.50	247.75	298.04
July 12	510	2	255.00	534	3	178.00	612	1	612.00	348.33	308.19
July 13	870	2	435.00				666	3	222.00	328.50	276.28
July 14	374	2	187.00				234	2	117.00	152.00	241.72
July 15	678	2	339.00	342	2	171.00	224	1	224.00	244.67	180.78
July 16	98	1	98.00	176	4	44.00	295	1	295.00	145.67	207.45
July 17	320	2	160.00				608	2	304.00	232.00	223.39
July 18	420	1	420.00				330	2	165.00	292.50	211.28
July 19	69	1	69.00	74	2	37.00	222	1	222.00	109.33	237.00
July 20	667	2	333.50	636	2	318.00	276	1	276.00	309.17	184.83
July 21	312	1	312.00	80	1	80.00	32	2	16.00	136.00	207.72
July 22	300	1	300.00	56	1	56.00				178.00	173.83
July 23	638	2	319.00	480	5	96.00				207.50	176.00
July 24	241	1	241.00				44	1	44.00	142.50	164.78
July 25	486	2	243.00				137	3	45.67	144.34	143.42
July 26											184.40
July 27	1,112	4	278.00	419	3	139.67	767	3	255.67	224.45	181.67
July 28	1,082	3	360.67	42	1	42.00	14	1	14.00	138.89	185.73
July 29	370	2	185.00	608	3	202.67				193.84	165.60
July 30	742	3	247.33	404	5	80.80				164.07	238.89
July 31	1,435	4	358.75							358.75	284.61
Aug. 1	662	2	331.00							331.00	286.36
Aug. 2	883	3	294.33				133	3	44.33	169.33	262.74
Aug. 3	1,822	4	455.50	481	4	120.25				287.88	227.46
Aug. 4	1,805	5	361.00	329	2	164.50	450	3	150.00	225.17	263.77
Aug. 5	757	2	378.50	178	1	178.00				278.25	242.60
Aug. 6	1,267	4	316.75	528	4	132.00				224.38	241.79
Aug. 7	743	2	371.50				74	1	74.00	222.75	245.46
Aug. 8	790	4	197.50				762	2	381.00	289.25	338.50
Aug. 9	1,007	2	503.50							503.50	360.69
Aug. 10	850	2	425.00	771	3	257.00	372	2	186.00	289.33	334.20
Aug. 11	1,937	5	387.40	254	3	84.67	629	4	157.25	209.77	241.28
Aug. 12	795	2	397.50	52	1	52.00				224.75	199.34
Aug. 13	1,736	4	434.00	87	2	43.50	13	1	13.00	163.50	225.31
Aug. 14	863	3	287.67							287.67	189.98
Aug. 15	790	3	263.33	16	1	16.00	154	2	77.00	118.78	197.32
Aug. 16	1,652	4	413.00	44	1	44.00	199	2	99.50	185.50	151.93
Aug. 17	303	2	151.50							151.50	170.13
Aug. 18	1,941	5	388.20	58	1	58.00	222	3	74.00	173.40	207.63
Aug. 19	475	1	475.00	242	2	121.00				208.00	219.23
Aug. 20	1,558	5	311.60	183	3	61.00				186.30	242.15
Aug. 21											184.40

TABLE 14.—*Daily catches of herring from 1926 to 1928, inclusive, by boats of Group III*—Continued

Day	1926			1927			1928			Average delivery for three years unweighted	Average delivery for three years smoothed by threes
	Number of barrels caught	Number of deliveries	Average delivery	Number of barrels caught	Number of deliveries	Average delivery	Number of barrels caught	Number of deliveries	Average delivery		
Aug. 22	365	2	182.50							182.50	145.07
Aug. 23	901	4	225.25	122	2	61.00	110	3	36.67	107.64	166.71
Aug. 24							210	1	210.00	210.00	149.49
Aug. 25	283	2	141.50	266	2	133.00	354	3	118.00	130.83	134.61
Aug. 26				126	2	63.00				63.00	86.94
Aug. 27				134	2	67.00				67.00	113.33
Aug. 28	210	1	210.00							210.00	228.50
Aug. 29	300	1	300.00				217	2	108.50	408.50	309.25
Aug. 30											251.75
Aug. 31	95	1	95.00							95.00	104.63
Sept. 1	107	2	53.50				525	3	175.00	114.25	104.50
Sept. 2											149.63
Sept. 3							185	1	185.00	185.00	182.13
Sept. 4	160	1	160.00				397	2	198.50	179.25	171.42
Sept. 5	150	1	150.00							150.00	118.08
Sept. 6							25	1	25.00	25.00	85.33
Sept. 7	20	1	20.00				61	1	61.00	81.00	90.67
Sept. 8							332	2	166.00	166.00	

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