PREFACE.

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PREFACE.

The present investigation had its origin in the depression which has for many years affected all sections of the Herring Industry. This depression was the direct result of the War and is in marked contrast to the long spell of successful seasons which preceded it.

The decade 1904 - 1913 was a period of unexampled prosperity. Catches were unusually large, the quality was uniformly excellent and - thanks to the rapid mechanization of the fleet - the fish were landed earlier in the morning and therefore in better condition than ever before. The continental demand was expanding and prices rose. The home market for "cured" herrings, it is true, had fallen off somewhat but this was counter-balanced in some measure by the increase in the consumption of Kippered herrings. All sections of the trade benefited and a large amount of additional capital was attracted to the industry.

The outbreak of War in August, 1914 was a serious blow. The great Summer Fishery was then at its height and operations were instantly suspended. Most of the usual fishing grounds were closed by Admiralty orders, and, though these were afterwards relaxed to permit fishing in a restricted area, the risks were so great that the bulk of the fishermen preferred to lay up their boats.

The curers too were badly hit. Much of the June and July cure, it is true, had already been shipped to the continent but large stocks remained on this side, for which, with the German market completely closed and the Russian market practically so, it seemed absolutely impossible to find purchasers. Although these were ultimately disposed of, the curers almost without exception suffered heavy losses.

The situation was gradually eased by the enlistment of approximately two-thirds of the total personnel in the R.N.V.R. or other branches of the Forces, by the chartering of the bulk of the steam-drifters and larger motor-vessels for mine sweeping and other naval purposes and by further relaxation of the Admiralty restrictions which permitted the fishermen who were left to operate over a considerably wider area.

Owing to the increasing shortage of food, prices soared and those who participated in the fishery during the latter part of the War made enormous profits. In addition the Admirality granted most generous terms for the use of those vessels which had been commandeered, with the result that at the termination of hostilities most of the fishing communities were in a very flourishing condition.

High hopes were entertained for the future. It was confidently anticipated that, as the herrings had been granted a four years' respite, catches would be larger than ever and further that prices, if falling short of the 1918 level, would at any rate remain sufficiently high to provide fisherman and curer with an adequate return for the greatly increased costs of capture and cure. Neither of these hopes has been realized and this great national industry has been reduced to such dire straits that recovery must inevitably be slow.

In the following pages an attempt is made not only to investigate the causes of the present depression but to present a detailed description of the organization of the industry in so far as it applies to Scotland.

The/

The fullest use has been made throughout of the excellent Reports and Statistical Tables published annually by the Fishery Board for Scotland and in Chapter I of the ~~owrk~~ WORK of Hjort, Lea, Heincke and Jenkins together with THE Scientific Publications of the Fishery Board and the Ministry of Agriculture and Fisheries.

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CHAPTER I.

NATURAL HISTORY OF THE HERRING.

The herring is a pelagic fish, i.e. it lives and moves in the upper layers of the sea, and is only rarely found at a greater depth than 100 fathoms. It is the only ~~greatly~~ really important pelagic fish which frequents our shores. In the Northern Hemisphere it is found over a wide area, stretching from the White Sea in the North to the Bay of Biscay in the South, and from Scandinavia in the East to the coast of America in the West. It is not found in the Southern Hemisphere. Attempts have been made to transfer young herrings and herring spawn to Africa and Australia, but so far they have not been successful.

Considering its great economic importance it is curious how little we know about it. Compared with our knowledge of the salmon we may say that its life history is only beginning. This is due to several reasons, the chief of them being the difficulty of handling the herring without doing it serious injury. "A herring handled is a herring dead", is a common saying among fishermen. For this reason it is impossible to trace their migrations by marking the fish in the usual way. It is also exceedingly difficult to keep it in captivity a sufficient length of time for systematic observation, but in this connection the efforts of the Staff at the Marine Laboratory at Aberdeen have in recent years met with considerable success.

It is an alert nervous creature with its senses highly developed. It is believed that it avoids light, keeping to deeper water during strong sunshine and rising to the surface only at sundown or during fog. The contour of its body, steam-lined like a torpedo, is specially adapted for rapid motion, and on a calm night the shoals can be both heard and seen darting hither and thither at great speed near the surface of the water.

In view of its widespread distribution in waters of different temperature and salinity it is only natural to expect variation in its ~~nature and Structure~~. Several distinct races have been identified. Scotch herrings differ from Norwegian, Norwegian from Baltic, Baltic from Icelandic; and while subdivision is a matter of great difficulty calling for accurate measurements etc., it is easy to divide the genus into two main groups

---Autumn Spawners and Spring Spawners.

The/

The former live in the open sea in water of relatively high salinity. Off our Scottish coast they spawn at a depth of from 20 to 50 fathoms usually from mid-August to mid-September.

The latter prefer water of low salinity -- sometimes even fresh-- and for this reason frequent chiefly coastal waters, coming close inshore during February and March, and spawning usually in water about 10 fathoms deep.

Herring may and do of course spawn at any time throughout the year. Why then do they spawn at two main periods viz. Spring and Autumn? Has it to do with the bottom temperature? In Spring this is at a minimum, in Autumn at a maximum. Or is it because at these seasons there is a greater abundance of food for the young herrings than at other times? So far no satisfactory answer has been given. We know that they do spawn then, but we do not yet know the why and wherefore. It is now generally accepted among naturalists, however, that herring which once spawn in Autumn never spawn in Spring and vice versa, although fishermen may still be found who believe that the herring spawn twice and not once per annum. The actual time of spawning varies from district to district and from year to year. In our own country the Autumn spawning begins first in the Shetlands and is progressively later at the Southern Stations, finishing at Yarmouth and Lowestoft in November.

As the spawning season approaches, the fish mass themselves together in huge shoals which may be anything up to a dozen miles in length, half a dozen miles in breadth, and of unknown depth and density. The same grounds are selected each year and, as far as we know them, they are all characterized by the same features - comparatively shallow water with relatively high temperature, a clean firm bottom usually covered by stones, shingle, seaweed or very coarse sand. Fine sands or muds are avoided, no doubt for the reason that with strong currents the eggs would tend to get covered over and vivification would be retarded or prevented. No doubt, too, the existence of an abundant food supply for the herring post-larval is a potent factor in the choice of a suitable spawning ground. As a rule the grounds chosen for Spring and Autumn spawning are not the same, but the fact that that they are sometimes selected, says Dr. Bowman (Fisheries, Scotland, Sci. Invest. 1922, IV - April, 1923) suggests that two of the most potent factors determining the positions/

positions of spawning grounds are depth and nature of bottom.

As the fish are most economically caught when they are moving inshore in huge shoals for the purpose of spawning, the location of the actual spawning grounds is a matter of great commercial importance. Various methods have been tried to achieve this - none of them absolutely satisfactory in itself - but research is now being prosecuted along the following lines, and it is hoped the combined results will lead to an approximately accurate location of the grounds.

(1) Careful observation of the exact place where herrings are caught just on the point of spawning. For its success this method requires the intelligent cooperation of the fishermen and depends on their willingness to forward their observations regularly and systematically to those who are engaged in the research. It has this drawback however that it is impossible to say whether the fish at the time of capture are actually over or only near the spawning grounds.

(2) Examination of ordinary trawl nets for herring spawn. The chief difficulties here are (1) that no results can be got when the spawning ground lies within the area prohibited to trawling, and (2) that herring spawn is not often got adhering to an ordinary trawl net.

(3) Dredging for post-larval herrings. When larvae have been picked up soon after they have been hatched, it can safely be assumed that they are not far from the place where they were spawned and, even when they are got in a more advanced state, the grounds can be approximately located by making due allowance for drift.

(4) Collecting information from trawl-fishermen regarding those areas in which fish have been caught which have been feeding wholly or partly on herring spawn. The last is the method advocated by Dr. Bowman, the Director of Scientific Research under the Fishery Board for Scotland. He points out that haddock, cod, saithe, whiting etc. are attracted to the spawning grounds in large numbers evidently finding the spawn a highly pleasant and nutritious diet. Haddock in particular which have fed largely on herring spawn acquire for the time being a/

a characteristic appearance which causes them to be known as "spawny" haddocks and which makes their identification easy. From information collected from fishermen during 1921 and 1922 he has charted ~~them~~ known banks both for Spring and Autumn Spawnings with the following results:-

(1) Spring -- between Flannan Islands and Lewis: [Ballantrae Bank:] N. and N.W. of Butt of Lewis: between the Butt and Cape Wrath: off Loch Erriol: Solan Bank: West of Rousay and Westray: W. and S.W. of Muckle Flugga: East of Unst: off Sumburgh Head: East of Duncansby Head: N.N.E. of Buchan Ness: between May Island and Bass Rock: off St. Abbs Head.

(2) Autumn -- E. and W. sides of Orkney and Shetland: Solan Bank: between Strathy and Hoy: in Moray Firth N. to N.W. of Banff and E. of Duncansby Head: N.W. of Kinnaird Head to Montrose; offshore from Isle of May to Holy Isle.

His findings, he says, are necessarily incomplete because (1) he has no evidence from those areas where trawling is prohibited or where the ground is too rough to permit of trawling and (2) fishing for spawny haddocks throughout the year is practised with varying intensity, according to the condition of the market, and ~~that~~ therefore he has no evidence from certain areas at certain seasons. To the latter he attributes the fact that the Minch, both on the Hebridean and Mainland sides, does not figure on his chart, although there must be extensive spawning grounds in that area: to the former the absence of evidence from inshore grounds on the Moray Firth, although it is known that there are extensive spawning grounds from Pennan to Portknockie and from Berridale to Duncansby Head.

In the actual process of spawning no sexual connection takes place; the female remains practically stationary over the chosen spot keeping close to the ground and pressing out the roe, which comes away in a continuous ribbon - so close are the eggs to one another - and in the absence of any disturbing agencies it is piled on the shingle in a conical mass. Meanwhile the males are circling round above releasing the fertilizing milt. This also comes away in the form of short/

short ribbons but, as it sinks, it dissolves and the water assumes a cloudy, milky appearance. No attempt is made to fertilize the eggs as they leave the female: the male seems content to diffuse the sperm in the water just above the female. There, their responsibility ends and they do not try in any-way to guard the eggs from other fishes.

Naturalists differ as to the actual time taken by the spawning process: some hold with Widegren (Un. States Com. Rep. 1873-1875 part III) that the act is over in five or six hours: others contend that it takes much longer. No doubt it varies in individual cases but the bulk of a shoal is believed to spawn more or less simultaneously. Apparent differences in time are due to (1) differences in size of fish, the larger members spawning first. (2) the fact that different shoals frequent the same grounds in close succession and that a fresh shoal arrives as a "spent" one leaves, thus creating the impression that the same shoal is taking several weeks to spawn.

The number of eggs varies with the size of fish: 30,000 is usually taken as an average but it may vary from 20,000 to 50,000. Unlike the eggs of most other fishes they are heavier than water and sink to the bottom where they adhere to the shingle or sea-weed. In size they are about $\frac{1}{30}$" to $\frac{1}{20}$" in diameter ($\frac{1}{30}$" to $\frac{1}{20}$") and consist of three parts (1) the yolk on which the embryo feeds (2) an exceedingly tough, inelastic capsule and (3) a viscid covering which glues the egg to the ground and rapidly hardens on exposure. Fertilization takes place through a small opening in the capsule known as the micropyle. In view of the fact that the surrounding water is saturated with sperm the risks of non-fertilization are not particularly great, but it must be remembered that the spawn are not protected in any way from such marauders as cod and haddock which generally follow in the wake of a spawning shoal.

Their only safeguard is their number, but even this is small when compared with the spawn of other food fishes such as the ling, turbot, and cod, the eggs of which run into millions per annum. On the other hand, the fry enjoy a reasonable measure of protection in their comparative invisibility, resulting from their minuteness and transparency.

Many writers comment on the ~~excellence~~ EXCITEMENT which pervades the shoal during procreation. Ljungman (Un. States Comm. Rep. 1873 - 1875, Part VI), states that the herrings are in such a state of frenzy at this time that they are in constant and violent motion, jostling one another and having so little regard for their safety that they will rush blindly against the nets "seemingly with the intention of squeezing themselves into its meshes and this in such a furious style that they frequently push down the net entirely." Professor Cossar Ewart, who made a close study of the process both on Ballantrae Bank and in the acquarium at Rothesay, noticed no such excitement as long as the herrings were undisturbed (Fishery Board Rep. 1884, App.F.4). When, however, they were pursued by dog-fish or other enemies they darted about in great alarm, "rushing to and fro, often rubbing against each other and in the excitement unconsciously shedding their spawn on the way." This excitement was greatly increased when some of them were meshed. His conclusions is that "in all probability herrings, like most other creatures during the breeding season/

season, are less careful of their safety than under ordinary circumstances and are hence less easily disturbed: but even at this time, as experiments showed, they are quite alive to the necessity for protecting themselves."

The time taken by the embryo to develop varies greatly and seems to be entirely dependent on the temperature of the surrounding water. Bertram (Harvest of the Sea) "thinks" it takes on the average ten weeks, but that is certainly too long. Professor Allman was nearer the mark. In 1862 he succeeded in hatching herring ova obtained in March off Isle of May and from his observations thereon he concluded that the incubation probably continues during a period of 25 to 30 days (Report of Royal Commission on Operation of Acts relating to Trawling for Herring on Coast of Scotland 1862). This is the time given by Fulton for Spring herrings; for Autumn, he says incubation is over in 9 or 10 days. Cossar Ewart gives 18 to 22 days as the time, when the temperature is 41°F. to 44°F. and 8 to 10 days when it is 54°F. Dr. Meyer, acting for the German Commission of 1865, directed his attention to the effect of varying the temperature during the period of development. With a temperature of 53°F. and upwards, he found that the eggs hatched in about 8 days, but that about 40 days were required when the temperature was reduced to 38°F. Cold had a greater retarding influence immediately before the time of hatching than in the earlier stages, for eggs, which had been developing in water at 51.8°F. to 53.6°F. and which were within two days of hatching, took twelve days when introduced to water of 35.6°F.

This retardation of the development of the ova through a fall in temperature has been utilized in the so far fruitless attempts to transfer herrings to the Southern Seas. The water in the containers had to be kept at a sufficiently low temperature to prolong the period of incubation until the voyage was over, and it was hoped that, when they hatched out, the fry would get acclimatized to the changed conditions. Unfortunately, however, the ova died on the way but there seems to be no reason why the experiment should not succeed if sufficient trials be made. It is essential that the temperature should not rise above a certain maximum, otherwise hatching would take place too soon; on the other hand too low a temperature must also be avoided in case development should be totally arrested. This happened in Meyer's experiments when he reduced the temperature to 30·56°F. and he concluded from it that, as an excess of cold had this effect, the usual spawning grounds might in any year be rendered unsuitable by the approach of cold polar currents. It is possible that this may be one of the main factors in determining whether a season is favourable for spawning or not.

The duration of the incubation period seems to affect the length of the fry at birth - the longer the incubation, the larger the fry. For herrings hatched after 7 days, Kupffer gives 5·2 to 5·3 millimetres as the approximate length: Meyer 5·4 millimetres when development was rapid; 9 millimetres when development was prolonged: Hoffman gives 6·2 to 6·4 millimetres after an incubation period of 12 days. During incubation the embryo feeds on the yolk and, unless incubation has been slow, this is not all absorbed when the larva is born. What remains is carried in the yolk sac and furnishes food for a short time after birth. As a rule it is absorbed within a week but the exact time is disputed. Dr. Lebour says that larvae of 7-8 millimetres nearly always possess a yolk sac: those from 8-9 millimetres usually have one: it often persists in fry up to 10 millimetres long and traces of it can sometimes be recognized in fry of 12 millimetres. Hardy (Ministry of Agriculture and Fisheries Fish Investigation Series 11 Vol. 8 No 5 1925) on the other hand says that it is lost in the majority of cases by the time 8 millimetres is reached and that many larvae only 6·5 millimetres long have lost it. He holds that the time of losing it varies with the/

the district. At this period the fry bears no resemblance to the adult fish: the most noticeable features about it are its elongated, attenuated body and its extreme transparency.

Its rate of growth has been the subject of dispute for a long time: it is variously stated by naturalists of different countries and even naturalists of the same country are by no means in agreement on the matter. That there should be variation is only natural as the differences between herrings of different localities are often so marked as to constitute distinct "races", and in addition sea temperature and food supply vary considerably between district and district.

Dr. Meyer investigated the subject in 1878 on behalf of the German Commission. He was successful in rearing spawn dredged from Kiel Bay and he compared their growth with the growth of herrings reared under natural conditions in the Bay with the following results:-

Age from Impregnation	Length under Artificial Conditions	Length under Natural Conditions
1 month	10 - 11 millimetres	17 - 18 millimetres
2 months	17 - 19 "	34 - 36 "
3 "	30 - 35 "	45 - 50 "
4 "	48 - 54 "	55 - 61 "
5 "	65 - 70 "	65 - 72 "

As will be seen from the table, those reared artificially were, during the first four months, roughly a month behind those living under natural conditions but in the fifth month the leeway was made up. The length at the end of the first year he gives as 130 - 140 millimetres and it is difficult to reconcile this with the growth at the end of five months. These were summer months when growth was at a maximum, yet Meyer postulates the same amount of growth for the remaining months when the rate of growth must have fallen considerably. Either 65 - 70 millimetres at five months is too little or 130 - 140 millimetres at one year is too much - in all probability the latter.

Masterman measured a large number of young herrings taken from St. Andrews Bay and the results of his investigations are embodied in the following table* for (1) Spring (2) Autumn herrings. It will be seen that for the corresponding months his figures are much less than Meyer's for the larger German Fish.

* Life History of British Marine Food Fishes.

Age	Length for Spring Herrings.	Length for Autumn Herrings.
1 month	15 millimetres	14 millimetres
2 months	20 "	19 "
3 "	27 "	23 "
4 "	30 "	27 "
5 "	35 "	30 "
6 "	40 "	34 "
7 "	44 "	38 "
8 "	47 "	43 "
9 "	50 "	47•5 "
10 "	54 "	52 "
11 "	58 "	57 "
12 "	62 "	61 "
18 "	87 "	88 "
20 "	98 "	-- "
24 "	-- "	113 "

It will noticed that the Spring herrings grow more rapidly in the early stages than the Autumn but that at the end of twelve months they are practically the same. This is only natural. As has already been pointed out, the incubation period in Spring is much ~~larger~~ longer than in Autumn but on the other hand conditions in Spring are ~~much~~ more favourable for the growth of the young fry than in Autumn. The former are faced with a rising temperature speeding up growth, the latter with a falling temperature which retards it.

Masterman's figures are not of course a true index of growth distribution throughout the year: it must be remembered that they relate only to the first year of life, during the initial months of which, other things being equal, the growth tends to be much greater than during the remaining months. For the adult herring most of the growth takes place during the Summer. Lea writing of herrings three years old points out ✗ that 80% of the yeafs growth takes place during May, June, July and August, i.e. that during these four Summer months the herring grows four times as much as during the remaining eight. He mentions too that the rate of growth has reached its maximum long before sea temperature has become high (in June) and has dwindled considerably before the maximum is reached in August. It is thus evident that, while a rise in temperature is undoubtedly conducive to growth, it is not the only factor in promoting it. As will be shown later the herring does not feed uniformly throughout the year and it is probable that its greatest growth takes place during the periods of most intensive feeding.

✗ Publ. de Circ, No. 61, 1911.

Widegren and Sundevall give 7.5 centimetres as the approximate length at the end of the first year: Ekstrom 10 centimetres: Lungmann 12 centimetres and, as already stated, Meyer places it as high as 14 centimetres.

The same diversity of opinion exists regarding the later growth as will be seen from the following table.

Age in Years	1	2	3	4	5	6	7	8	9	10
Length in Centimetres as given by										
Hjort	8·8	12·7	18·1	22·3	26·3	28.6	30·1	31·1	31·8	32·4
Fulton	6	11·3	15·9	20	23·8	25·7				
Meek	9·8	18·3	22	24.1	25·5	26·6	27·5	28	28·7	29·1
Hodgson	8	16	20·5	23						
Jenkins	11·3-12·1	15·6-16.4	19-19·8	21·7-22·5	23·7-24·5					

If we discount the difference in length at the end of the first year, Hjort's and Fulton's figures approximate very closely. The rate of growth per annum is practically the same, the total growth from the second to the sixth year being in the former case 19·8 centimetres and in the latter 19·7 centimetres. Both are agreed too that apart from the first year the growth is fairly evenly distributed over the first five years but that in the sixth there is a rapid fall, and Hjort indicates that the rate of growt thereafter gradually dwindles.

Hodgson's and Meek's figures on the other hand show almost as great growth for the second year as for the first; but in the third year it is greatly diminished falling from 8·5 to 3·7 centimetres in the one case, and from 8 to 4·5 centimetres in the other.

Hodgson's and Jenkin's figures for the second, third and fourth years almost coincide with Fulton's for the third, fourth and fifth, as also do Meek's for the second and third with Hjort's for the third and fourth. In other words for earlier years, apart from the first, the lengths given by Meek, Hodgson and Jenkins for any year correspond with those of Hjort and Fulton for the following year.

The most noticeable feature, however, about both sets of figures is/

is the fact that according to Hjort and Fulton growth is carried uniformly over five years, whereas in Meek's and Hodgson's figures the maximum growth occurs in the first and second years falling rapidly during the third and fourth, in which year the rate of growth approximates to that given by Hjort and Fulton for the sixth.

Jenkin's figures also show a rapid reduction in the rate of growth in the second and subsequent years. This is not the case with most fishes, the growth in each of the years preceding maturity being usually fairly constant without any marked diminution, until maturity is reached when there is a rapid decline. Fulton is of the opinion that Jenkins jumped a year and that fish of 11 - 12 centimetres are more than a year old. If we assume this and treat Jenkin's figures for the first year as being true for the second and so on, it will be seen that they agree very closely with Fulton's.

In the same way opinions differ as to the age at which the herring reaches maturity: some writers have placed it as low as one year, others as high as six. The problem is certainly a difficult one as the herring spawns twice a year and the post-larval stages of one spawning are apt to get confused with that immediately preceding or succeeding. Huxley, Mitchell and Yarrell thought that maturity was reached at 18 months - rather an odd conclusion, as Dr. Fulton points out*, because the herrings spawned in the Spring of one year would then become the Autumn spawners of the next. The chief objection to it, however, is the fact that the Spring and Autumn spawning grounds are often widely separated and only in exceptional circumstances are the same grounds chosen for both spawnings. It is now generally accepted that herrings, which were spawned in Spring, themselves spawn in Spring and never in Autumn. Lungmann thought that three to four years was about the usual time of first spawning. Widegren, Boeck and Sundevall agreed with him. Nilsson. Malm and Sars thought this too short and favoured five to six years. Meyer on the other hand, working on the herrings of Kiel Bay, placed it not before the end of the second year. Jenkins for the same fish gives three years. Fulton says that the average size at first spawning is $9\frac{1}{4}$": some may spawn earlier from $8\frac{1}{4}$" to $8\frac{3}{4}$", others perhaps not until they are 10".

The writer has measured thousands of East Coast herrings and his observations agree with Fulton's. Of the smaller herrings with milt or roe fully developed, by far the largest number were $9\frac{1}{4}$ inches or over: a very much smaller number were between 9 inches and $9\frac{1}{4}$ inches: those betwee $8\frac{3}{4}$ inches and 9 inches were fewer still, while those less than $8\frac{3}{4}$ inches were exceedingly rare. The smallest fully ripe herring measured was just under $8\frac{1}{2}$ inches. If we translate Fulton's figures into his own estimate for rate of growth, we find that he favours five to six years as the age at which maturity is first reached.

It is evident therefore that there is nothing approaching unanimity among biologists either as to the rate of growth or as to the age at which maturity is reached: yet it is of the utmost economic importance that we should know both. So far no method of correlating age and size has been/

* Fishery Board Reports Part III. 1905.

been devised which meets with absolutely universal acceptance. That which has been most generally adopted in recent years is to utilize scale markings for determining not only the age at the time of capture but also the approximate length at any period in its life history.

If a scale be examined under the microscope it will be seen to consist of two totally different parts - the one featureless without special markings of any kind, the other striated and marked with concentric rings which are at first clearly defined but gradually get fainter and less distinct as we proceed further from the centre. It is thus divided into concentric bands - a broad transparent zone alternating with a narrow dark ring.

It is over a couple of centuries ago since Leeuwenhoek, the Dutch Naturalist, called attention to these markings but according to Dahl (Report on Norwegian Fishery of Marine Investigations Vol. 11. No. 6, Bergen) it was not until 1895 that F.A. Smitt connected them with the age of the fish. Since then the subject has attracted a great deal of attention among naturalists generally, and, in particular, the researches and writings of Professor Hjort and Mr. Einar Lea are the most noteworthy and authoritative on the subject.

It is claimed that these broad zones are the result of the greater Summer growth while the more clearly defined narrow rings are the result of the slower Winter growth, so that a light and a dark band taken together would correspond to a year's growth. If this be so, then the herring carries its birth certificate on its back and the shoal thereby can be split up into its component year groups. It is now admitted that the younger a herring is the fewer rings appear on the scales. Professor D'Arcy Thompson, the chief opponent of scale reading as applied to herrings, admits this, and admits further that the number of rings is a guide to the age of the fish but he refuses to accept it as a precise, infallible means of estimating age. He grants that there is no slight circumstantial evidence in its favour but he contends that it is only a theory which has never been proved and which is acceptable only so long as the conclusions to which it leads are themselves intrinsically acceptable. In his note to Miss Sherriff's monograph referred to in Appendix 1. he points out that the analogy of scale markings with the/

the ring growths on a tree - which we know to be annual growths - though obvious (A) is not complete. The tree is subject to a regular cycle of climatic and seasonal changes from which it has no escape: these he holds, must be greatly diminished in the sea and can and may be avoided by a fish of migratory habits. He points to the oyster shell as affording as good an analogy - yet the number there varies, as can be proved by segregating a brood of oysters and counting the rings annually. Normally they show the same number but some depart from the mean having more or less. Against this, however, must be set the fact that in the case of the salmon and the cod, where scale reading is an easier and a simpler matter, a ring definitely marks a year's growth.

Which view is correct? On the answer to this question depends our whole conception of the life history of the herring. If on the one hand scale markings are an infallible clue to age, then every shoal is a heterogeneous collection of herrings of all ages, spawned at different times which have come together we know not how. If on the other hand D'Arcy Thompson's view is correct that, while affording a rough and ready guide, scale markings are not to be taken as a definite or precise measure of age, but that like most things in organic nature they may vary on either side of a recognized mean, then to quote his own words we may regard the herring shoal as "one great family party, a vast company of fish all of an age, fish that were spawned together and that have ever since lived and swam and migrated together".

There is however this difficulty about the acceptance of this theory viz. that the variations from the normal are not always or even usually slight variations. It is not a case of the majority of the fish having say 8 rings and a small percentage having 7 or 9 rings. More often than not an approximately equal number of fish from the sample are spread over two or three adjacent ring classes and the remainder taper away on both sides - the variations extending often to 12 or more ring classes. Take as a concrete instance the following sample of 163 herrings caught in drift nets and examined by Hjort (Pub. de Circ. No. 53).

No. of Rings	3	4	5	6	7	8	9	10	11	12	13
" " Fish	22	21	7	11	36	33	10	5	8	5	5
Percentage of Sample	13·5	12·5	4·3	6·7	22·1	20·2	6·1	3·1	4·9	3·1	3·

It will be noticed that the greatest number in any ring class is 36 or 22·1% with 7 rings. This we must take as our normal number but an almost equal number (33 or 20·2%) have 8 rings: the numbers decline, extending to 13 ringers on the one side and 3 ringers on the other, but the numbers with 3 rings and 4 rings are each greater than the numbers with 5 and 6 taken together. The explanation of this no doubt lies in the fact that the years (1904, 1903) in which the three-ringers and four-ringers were spawned were particularly prolific - 1904 as a matter of fact was. In support of his own theory D'Arcy Thompson quotes (Nature Sept. 17th 1914) the following sample of 635 herrings examined by Hjort.

No. of Rings	2	3	4	5	6	7	8	9	10	11	12	13
Presumed year of Birth	1908	1907	1906	1905	1904	1903	1902	1901	1900	1899	1898	1897
Percentage of Fish	·2	8·4	14·2	21·3	18·9	14·3	9·3	5·7	5·5	1·3	·8	·3

21·3% have 5 rings, 18·9% have 6 and 14·2% , 14·3% ,~~and~~ 9·3% and 8·4% have 4, 7, 8 and 3 rings respectively. He holds that these herrings must be "of the same age and origin which vary as to the number of rings on their scales according to some law of variation". This would mean then that in the sample considered for a herring 5 years old there is practically an equal chance (1 in 5) of its having 5 or 6 rings, a 1 in 7 chance of its having 4 or 7, a 1 in 11 chance of its having 3 or 8 while 2 rings and 9 to 13 rings are not excluded. If this be so, could we say, then, that the rings are in any sense even a rough guide to the herring's age?

Hjort and Lea on the other hand state (Nature Nov. 5th 1914) that by an examination of small herrings they have proved that the formation of winter rings takes place through the winter, while the formation of summer belts commences in spring and continues through the autumn. The application of other methods for determining age groups,× they say, has tended to confirm their results, and, further, chance has furnished them with a convincing proof. They found that from 1907 onwards herrings with an abnormally small third summer belt predominated in the samples examined. This abnormality made them readily distinguishable and confusion with other groups was impossible. Now in 1907 these had only one summer belt outside the abnormal one: in 1908 they had two and so on until the winter of 1913-1914 when they had seven, proving that a summer belt was formed annually.

× See Appendix I

Lea goes further and contends that not only does the scale show the age of the herring but that it also gives an exact index of its size at any period of its life history - in other words that if the scale is magnified to equal the length of the fish at the time of capture, the size at any age can be got by measuring to the edge of the corresponding ring. This assumes that the growth of the scale is at all times [Studies in growth of herring Ur. Svenska Hydroy. Biolog. Kom.Skifter 1918] proportional to the growth of the fish. Molander denies this, "The growth relation" he says, "between fish and scales is characterized by a marked disproportionateness which is chiefly due to the fact that the scales do not grow until after the fish has attained a certain length and in addition to an antichronous undulating growth of fish and scale". The growth of the fish he holds to be relatively stronger during the earlier years, that of the scales during the later years. Meek (Scales of Herrings and their value as an aid to investigation-Rep. of Dove Marine Lab. 1916) states that, as the first winter is not shown as a ring on the scale, the actual size at two winters should be equal to the calculated length at the first winter ring and generally that the actual size at any number of winters is equal to the calculated length of the winter ring before that. The scale he states is not formed until the herring has reached the size of 4 centimetres and then it grows at a faster rate than the fish. This objection is a serious one and it seems clear that in estimating growth allowance must be made for the size of the fish before the scales appeared.

Assuming the correctness of the Norwegian Theory with Meek's modification what is its practical value? Is it of any use to us in foretelling when we may expect a good fishing at a particular locality and when a bad? Theoretically it should be. If for example we know that in a certain area, fish, say 5 years old are apt to predominate, and if we have a sure means of determining age and know that the fish which will be 5 years old in the following season were spawned in a good spawning year, then we can say that, other things being equal, there are prospects of a successful fishing. In practice, however, it cannot be said to have been a success.

As already stated herrings spawned on the Norwegian Coast in 1904 were easily recognizable by their abnormally small third summer belt. They were found to predominate in the samples of fat or mattie herrings in the years/

years 1907, 1908 and in a lesser degree 1909; also in the samples of large herrings from 1908 to 1914, and of spring or spawning herrings from 1908 to 1922. The year 1904 must therefore be taken as a remarkably prolific spawning year, for it produced a brood which persistently out-topped all other year classes for a period of over 15 years. We would naturally expect that any year in which the 1904 herrings predominated would yield an excellent fishing and that, the greater the predominance of these fish, the better the fishing would be : but the facts do not bear this out. In 1907 and 1908, 51·3% and 37·8% respectively of the samples of fat herrings examined were according to scale readings spawned in 1904, yet the catches in these years were only 501,000 and 616,000 hectolitres as compared with 1,140,000, 894,000, and 612,000 hectolitres in 1909, 1910, and 1911, when the 1904 class accounted for only 16·9%, 4·5% and 0% of the samples. Again in the case of spring herrings the 1904 year group predominated from 1908 to 1919 reaching its maximum of 77·3% in 1910 and we would expect specially good fishings in these years; this was not uniformly the case, as will be seen from the following figures:-

Year	1907	1908	1909	1910	1911	1912	1913	1914
% Age Proportion of 1904 Group	1·6	34·8	43·7	77·3	70	64·3	64·7	54·3
Catch in Thousands of Hectolitres	979	625	772	982	1054	937	1534	1121

The catch in 1907 was very much greater than in 1908, yet in the former year the 1904 class accounted for only 1·6% of the catch, while in the latter ~~it was~~ it was as high as 34·8%. Again in 1912 and 1913 the proportion of 1904 group was practically the same - 64·3% and 64·7% - for both years, yet the difference in catch amounted to close on 600,000 hectolitres. This year group reached its maximum proportion in 1910, yet the catch in that year was less than the catch for 1911, 1913 and 1914 and was approximately equal to that for 1907, in which year the 1904 group accounted for a very small percentage of the total.

Once the grand object of their life has been attained, the fish disappear from the spawning grounds with great rapidity. It is quite common at the end of a season for a large fleet to have huge catches of spent or spawning fish one night, and to find the same grounds absolutely barren the next. But where do they go? This is a question which though it has engaged attention for years has so far defied solution. Heincke (Naturgeschichte des Herings) points out that after spawning the herring seeks a place where it can get ample food to recuperate. He holds that there are three main periods in its life history (1) The feeding period - continuing for three or four months after spawning. This is the chief feeding time when the spent fish builds up muscle and lays in a large amount of fat. (2) The ripening period - during this time, lasting for six or seven months, the herring eats less and less., Its sexual organs increase at the expense of its body fat. (3) The spawning period - covering approximately two months during which feeding stops. It is possible, he says, that for a month after spawning it does not eat at all. This is not strictly true as spawning herrings are frequently found with their stomachs crammed with food and it is extremely doubtful if the spent fish abstain from feeding for any length of time.

The quest for food on the contrary seems to be the dominating factor in their lives immediately after spawning, just as the act of procreation was before it - but where does it lead them? Up to the middle of last century it was generally believed that after spawning the herring migrated to the Artic Circle, where it remained enjoying bounteous feeding until the next season for spawning arrived, when it again moved South in one huge shoal, which subsequently divided up into four smaller shoals - one taking the Coast of America, another that of Norway, while the remaining two took the East and West Coasts of Britain respectively. Such a theory had no foundation in fact, and arose simply from the imaginative credulity of the fishermen who sought no doubt for an explanation of (1) the disappearance of the shoals from inshore waters after spawning and (2) the fact that in general the herring fishing season is later the further South we go. Mitchell, Yarrell and Bertram ridicule it, the latter remarking that Mr. Pennant - who gave it publicity - was not content with the development of the myth but evidently felt constrained to give éclat to his invention by inditing a few moral remarks just by way of a tag. "Were we", he says,

says, "inclined to consider the migration of the herring in a moral light, we might reflect with veneration and awe on the mighty power which originally impressed on this useful body of His creatures the instinct that directs and points out the course that blesses and enriches these islands , which causes them at certain and invariable times to quit the vast polar depths and offer themselves to our expectant fleets".

There are so many absurdities in the theory that it is surprising it met with any credence at all - not to mention the fact that it was generally accepted for almost a century. No one had ever seen the huge concentration of herrings in the Arctic seas or witnessed the annual migrations therefrom. The fact that herrings were caught in certain districts at all seasons of the year, and the striking differences between different races were ignored. In one particular, however, Pennant was correct - viz:- in assigning the movement from the spawning grounds to the desire for food - his error lay in assuming that they went so far. Bertram states that the first authoritative refutation in this country came from Mr. Cleghorn of Wick in a paper which he read to the British Association in 1854. He stated that (1) the herring is a native of the waters in which it is found and never migrates. (2) Distinct races of herrings occur at different places.

Mitchell ("The Herring - Its Natural History") accepts this and stresses particularly the differences in size, shape and quality between herrings of different districts. He holds that they inhabit the seas adjacen to the coasts where they spawn and that after spawning they make for deeper water where they remain until the spawning season again approaches, while the fry continue near the spawning ground until they are of sufficient size to make for deeper water.

In spite of a considerable amount of research the problem remains today practically where Mitchell left it. Attempts have been made, especially in the lochs and firths of the West Coast, to trace the movements of shoals by marking herrings with a silk tag and then liberating them. The herrings of particular districts have been studied intensively, and their measurements, weight, and weight of reproductive organs carefully tabulated. As already stated, attempts have been made to locate the spawning grounds and to trace the movements of the young fish. No conclusive results have been obtained however, and the vagaries of the herring remain as much of a mystery as ever. It is contended that on the East Coast there are two main movements.

(1) Shoals of small herrings moving North in the spring and early summer.

(2) Shoals of larger herrings moving South in July and August, and, accompanying both, a general tendency to move inshore from East to West as the season advances.

A similar theory is advanced to explain the movements of the herring in Norwegian waters. Hjort ("Fluctuations in Great Fisheries of Northern Europe. Inter. Council XX 1914") holds that spawning takes place in the southern and warmer waters of the coast and that the larval and the post-larval herring are carried North by ocean currents - chiefly the Norwegian branch of the Gulf Stream. These remain for five or six years in Northern waters and then move South to join the shoals of older fish. Such movements he says, take place with considerable regularity and the fact that the quality is much more mixed in the North - with a far greater preponderance of young fish - lends colour to his theory.

With regard to our own fisheries, it is true that at the beginning of th season the Orkney and Shetland herrings are more mature than the East Coast, and that those caught in both districts in May and early June are very much smaller and inferior in quality to the rich full herrings caught later in the season. No really substantial evidence has been produced however to show that these smaller herrings do come from the South, although it would certainly be a fascinating theory to think that the smaller fish moved North to recruit the South moving battalions of spawning fish.

The most striking feature in the movements of the shoals during the last fifty years has been their avoidance of the inshore grounds. This is true not only of the East Coast but of the North and West Coast Fisheries as well. Prior to that time it was quite usual for large shoals to come within a few hundred yards of the shore, so much so that - as older fishermen relate - in some of our East Coast Ports good catches were often obtained by the simple expedient of stretching a net across the mouth of a cave or narrow inlet. It is still true that as the season advances and the period of spawning approaches the shoals move closer inshore, but it is seldom that they come so close in as was their wont in former days. Some fishermen attribute this to a change in the temperature and salinity of the sea in the immediate neighbourhood of the coast, others lay the blame at the door of the larger sail-boats and latterly of the steam and motor drifters, which do/

do not need to wait the arrival of the shoals in the inshore waters but are enabled by their greater sea-worthiness and speed to go long distances offshore to meet them. This, they hold, breaks up the shoals and destroys all possibility of an inshore fishing.

It is not an adequate solution of the problem, however. Inshore fishings, though much less frequent, have not been unknown since the advent of the steam drifters, and even within a very short period herrings change from offshore to inshore grounds without any change in the character of the fleet pursuing them. For instance in 1900 most of the East Coast catc came from the Moray Firth, the offshore grounds being practicaally deserted; in 1901 practically the same fleet operated, yet exactly the reverse was the case. No doubt the drifters do break up the shoals to some extent but they are not wholly responsible for the desertion of the inshore waters. Most probably the explanation is to be found in changes in the hydrographic conditions e.g. temperature and salinity, and change of currents affecting the food supplies which for a longer or shorter period may be directly or indirectly responsible for driving the shoals away.

On the West Coast of Scotland the movements of the shoals are much more erratic than on the East: no one can say where or when they will appear or how long they will stay. The loch that is teeming ~~the~~ one year may be deserted the next - one inlet may afford a rich harvest and a neighbouring one a few miles away be absolutely barren. At the close of ~~last~~ 1926 ~~year~~ for example there were dense shoals in Loch Striven while Loch Ridden was practically blank - the year before the reverse was the case. One day the fish are on the Kintyre Coast, the next without any apparent change in the conditions they are on the Arran Coast. Areas that have been deserted for years are suddenly revisited and, it may be, as suddenly forsaken. So far as the Clyde Fisheries are concerned, only one point in the year's operations is admitted as fixed beyond dispute - the presence of the shoals on the spawning grounds off Ballantrae in February and March. Where they have come from or where they go to after spawning is hotly contested by the fishermen themselves. The most popular view is that they are the same herrings as are present in ~~the~~ Loch Fyne from June to December or January. It is said that after spawning they make for the loch either by way of Kilbrennan Sound , the Sound of Bute or the Kyles of Bute, and that they feed either in the loch or its neighbourhood until the/

the spawning instinct is on them again, when they move South usually by way of Kilbrennan Sound to the Ballantrae Bank. This is of course only a theory. Several years ago the Scientific Staff of the Fishery Board for Scotland attempted to test it by marking Loch Fyne herrings with a silk tag and then releasing them but no conclusive results were obtained. Many of the fishermen ridicule it . They point to the years when no herrings are caught in Kilbrennan Sound: that is incontestable, but it does not mean of course that the herrings are not there. It is true too that the length of their stay is variable, that in some years they are to be found in greater or less numbers practically every month in the twelve, whereas in others they are present for a few weeks and then suddenly disappear. But as far as the theory of their migration is concerned, the important point is whether or not they are present in the Sound during January or February or March, and it is seldom indeed that they are not to be found during one or other of these months.

The Food of the Herring.

At all stages of its life history the herring shows itself a dainty feeder. It is peculiarly adapted for indulging its fastidiousness in this direction, for by means of a sort of ~~safety~~ safety valve in its air bladder it can readily adjust itself to changes of depth, and can thus frequent those layers which proffer the choicest and most abundant food.

This for the most part consists of plankton - those minute forms of plant and animal life which are carried hither and thither throughout the ocean by tides and currents and which form the ultimate source of all marine life. The plankton is exceedingly widespread but it varies in character and quantity accordingly to the intensity of sunlight and the temperature and salinity of the water. Thus it is less abundant in the winter than at ~~any~~ other seasons. The life of the herring is inseparably connected with it. It furnishes its only food during the first three months of its development, and a scarcity of plankton or the absence in it of the species usually taken by the herring may spell ruin for the shoal to be. For a long time it was thought that the act of feeding was almost involuntary - that as the herring swam open-mouthed through the sea, it drew in the plankton-bearing water and its gill-rakers filtered it and automatically retained the food required. The modern view, however, is that the food is selected and taken by a definite act of capture; and certainly the predominance of certain species in the stomachs of herrings to the exclusion of other species, also present in the plankton, lends colour to this theory.

Immediately after birth, of course, the yolk-sac is its chief food and Dr Lebour points out (Jour. Mar. Biol. Ass. XII 3) that feeding begins even before the yolk-sac is entirely absorbed, diatoms, larval gastropods and the eggs and young of small crustaceans being taken.

These with the adult copepods constitute its main food until it is about 12 millimetres in length, after which no plant life is taken, the diet being restricted chiefly to copepods until metamorphosis takes place and a stomach is formed - usually at about 40 to 45 millimetres. The copepods taken vary with the district and the season, depending of course on their abundance or scarcity in the plankton, but pseudocalanus and temora seem to be the most favoured.

Immediately after metamorphosis and during the "whitebait" atage, its choice becomes more varied and is extended to all kinds of small crustacea and later on to young post-larval fish.

At the adult stage it is generally agreed that feeding follows a regular cycle-rising to a maximum a few months before spawning, then diminishing as the spawning season approaches, at which time practically no food is taken. Its taste, though still refined, is much more extensive. It retains its early partiality for crustaceans - chiefly copepods, schizopods, amphipods and decapod larvae - but it also preys on young sand-eels, young haddocks and gobies and even on its own eggs and fry. Pteropods are sometimes taken but they are believed to have a harmful effect - at any rate herrings which have fed largely on them are usually in a very soft condition and when cured deteriorate very rapidly.

Enemies of the Herring.

The Herring has many enemies besides man. It is constantly pursued by all kinds of fishes - whales, porpoises, cod, ling, saithe, haddock, dog-fish, etc., Even from the air it is not immune, for gulls and gannets are usually in close attendance waiting vigilantly for its appearance at the surface.

For a long time whales and porpoises were looked upon as its most destructive enemies. This was no doubt due to their frequent spectacular appearances when they pursued the shoals so close inshore that the ebbing tide occasionally left them stranded on the beach. During the last fifty years, however, their visits to Scottish Waters have been much less frequent and fishermen nowadays are inclined rather to welcome their appearance - as indicating the presence of herring in the vicinity.

Cod, ling, saithe, etc., work far greater havoc. It is quite common to find half-a-dozen herrings undigested in the stomach of a cod at the time of capture, and, when we think of the numbers of these, we wonder that any herrings at all are left for man! Allowing only a very moderate daily ration to each, the Royal Commission of 1862 (on Trawling for Herrings in Scottish Waters) concluded that cod, ling and hake must, at the minimum, consume 12 times more herrings than the total yearly catch for the Scottish, English, Irish, Dutch, French and Norwegian Fleets.

Fishermen regard dog-fish as the greatest pest. They destroy as many fish as they eat and pursue the shoals with such fury that they dash against the nets and make huge rents in them. This causes panic among the herrings and breaks up the shoals. So destructive are they, that fishermen, when they find them present in force, prefer to give up fishing altogether rather than endanger their nets and gear.

Gulls and gannets are also very destructive. They appear to find the herring such a delicacy that they are not content with hunting the shoals at sea but carry their pursuit to the holds of the drifters, the wharves, sometimes even to the curing yards. In the middle of last century Captain Macdonald of the fishing cruiser "Vigilant", made an interesting estimate of the number of herrings destroyed annually by Scottish Gannets. He estimated that there were not less than 10,000 gannets on Ailsa Craig and he allowed them six herrings a day i.e. almost 22,000,000 per annum. He assumed that for every gannet on Ailsa Craig there were at least fifty in the rest of Scotland and thus arrived at over a thousand million - roughly a million crans* - as the yearly toll of herrings by Scottish Gannets.

* Cran = 3½ Cwts.

CHAPTER II.

GENERAL PROGRESS OF THE INDUSTRY.

The herring fishery is by far the most important branch of our sea fisheries. It is not like the trawling industry in the hands of a few large combines and confined to a few large ports: it is prosecuted by large numbers of fishermen, curers, kipperers, etc., who are the owners of their own boats, stations, etc., and carry on their own business on a large or small scale as their capital or credit will permit. Thirty or forty years ago practically every village on the Scottish coast had its share in the industry and though in more recent years it has tended to get centralized, the prosperity of a large number of towns and villages is still entirely dependent on it.

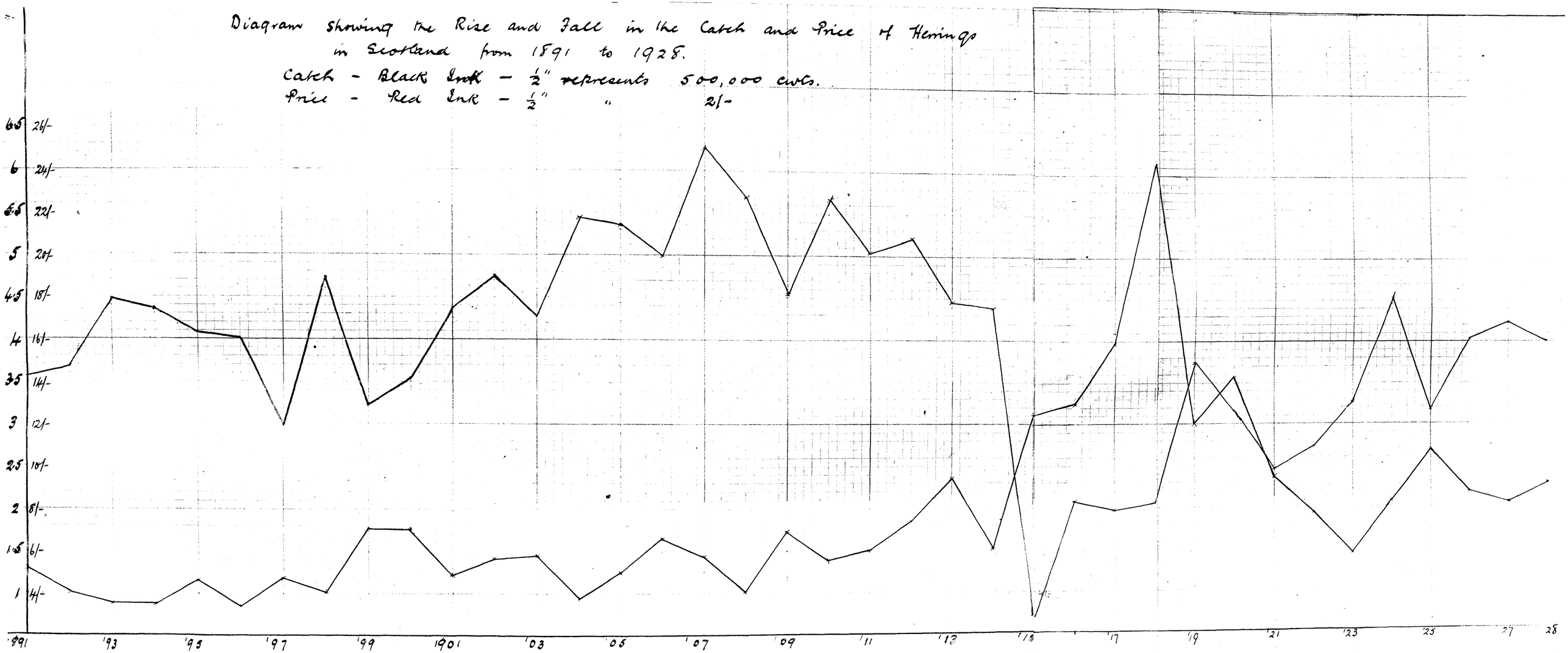
It accounts for more than half of the total quantity of fish landed in Scottish waters but, as it is a relatively cheap fish, it does not bulk so large in the total value. From 1900 to 1914 the average annual yield of all kinds of sea fish was 7, 646, 717 cwts. valued at £2,864,482; and of herrings 4,925,983 cwts. valued at £1,458,226 i.e. 65% and 51% of the totals respectively.

From 1908 onwards owing to increased takes of white fish the herring bulked less in the total catch, but, as there was a brisk demand on the continental markets, the price rose relatively to that of white fish, and in the year preceding the war it constituted only 57% of the total catch but 52% of the total value. All the fisheries were adversely affected by the war, the average annual catch during the war years being just about a third of the normal, but, as food was scarce, prices soared and the total value was slightly over the pre-war figure. With an average annual yield of 1,705,840 cwts. valued at £1,340,881 the herring maintained its position as regards quantity but lost it as regards value, the percentages being 56 and 36 respectively. This fall was due to (1) the abnormally high prices paid at home for all kinds of white fish and (2) the closure of the usual continental markets for cured herrings and the difficulty of finding new ones. Since the war, the prices of all kinds of fish have fallen considerably but the difficulty of marketing cured herrings is still with us, and consequently, as the following figures will show, the value of the herring fishery as compared with other fisheries has depreciated.

Diagram showing the Rise and Fall in the Catch and Price of Herrings in Scotland from 1891 to 1928.

Catch - Black Ink - ½" represents 500,000 cwts.

Price - Red Ink - ½" " 2/-



During the last ~~three~~ five years however, although it is still passing through trying times, it has shown signs of recovery relative to the other fisheries, both quantity and quality being on the upgrade.

		All kinds	Herrings	Page
Average landings in thousands of cwts.	1919 to 1923—	5,701	3,063	54
	1924 to 1926—	6,390	3,902	61
	1924 to 1928 —	6,762	4,120	61
Average value in thousands of pounds.	1919 to 1923—	5,075	1,526	30
	1924 to 1926—	4,586	1,777	39
	1924 to 1928 —	4,514	1,983	40

Such fluctuations in yield are of course common to all fisheries and to all countries. But, when we think of the uncertain and erratic movements of the herring, the surprising thing about the Scottish Herring Fishery is that violent fluctuations in the total yield for the country as a whole are comparatively rare. As the graph opposite will show, it has ~~had~~ of course had its yearly ups and downs but it has never been a complete failure like the Norwegian Fishery. This is to a large extent accounted for by the fact that it is prosecuted in different districts and at different seasons and comparative failure in one district is often compensated by good fishings in other districts.

Such variations as do occur in the annual catch must not—as is so often done—be ascribed entirely to the abundance or scarcity of the fish—although of course that is generally the main cause. Other factors must also be considered—duration of fishing, number of boats engaged, number of trips per week, extent of netting used, etc. The total yield depends on the intensity with which the fishing is prosecuted and that in turn depends on the prices obtainable for the green article, which is determined largely by the state of the Continental Market for cured fish.

This in large measure explains the most striking features in the supply curve on the opposite page—the steady growth from 1900 to 1914, the sharp decline during the war and the very partial recovery since.

The following table gives (1) the average total catch (in thousands of cwts.), (2) the average total value (in thousands of pounds) (3) the average price per cwt. for various periods before, during and after the war.

	Catch.	Value.	Price.
1891—1895	4028	840	4/2
1896—1900	3694	951	5/2
1900—1904	4465	1185	5/3¾
1905—1909	5361	1502	5/7¼
1910—1914	4952	1687	6/9¾
1915—1918	1706	1473	17/3½
1919—1924	3304	1582	9/7
1925	3188	1733	10/10
1926	4014	1731	8/8
1924	4235	1746	8/3
1928	4004	1820	9/1

Only once before 1900 had the total catch reached 4½ million cwts.—in 1898, when 4,703,641 cwts. were landed—but from 1901 to 1914 there were only four seasons when the catch fell below this total and on these never by more than a quarter of a million cwts., while the average from 1905 to 1914 is well over it and that from 1900 to 1904 only a very little under it. For the nine years from 1904 to 1912 the average was actually 5,351,686 cwts. the high water mark being reached in 1907 when 6,253,341 cwts. were landed.

1900—1914 was therefore a period of great expansion. The adoption of steam revolutionized the industry. With their greater mobility, their independence of storms and calms and their ability to go much further afield in the pursuit of the shoals, steam drifters secured catches far in excess of the largest sail boats. So remarkable were their earnings that sail boats were scrapped and steam drifters acquired. The steam drifter fleet increased with alarming rapidity: in 1899 there were only 44 Scottish owned drifters but by 1914 their number had increased to 981. The fishery was prosecuted more intensively than ever before.

The continental demand for cured fish was generally firm and in spite of the greatly increased landings prices were well maintained. The averages, particularly from 1910 to 1914, are above those ruling in the nineties—in fact only once in the nineties was the lowest average price (1900 to 1904) exceeded.

As will be seen from the graph, the price responded fairly closely

to the supply, a rise in supply causing a fall in price and ~~vice~~ rice versa. In 1902 and 1912 however the price rose with the supply but in these years continental conditions were specially favourable, the markets being clear of previous stocks, the price of other foodstuffs relatively high and the weather cool and favourable for transport: in addition the fish were unusually firm so that curing for export commenced at the beginning of the season. In 1914 on the other hand there was a fall in supply and price; Continental buyers had lost so heavily on the early fish bought in 1912 and 1913 that they resolved to hold off immature fish and, as a result, many boats did not start fishing until well into June, and, when they did start, the prospect of a rupture between Russia and Germany adversely affected prices.

The maximum price up to the war was reached in 1913 when for the first time in the history of the fishery the aggregate value exceeded £2,000,000 and the price per cwt. rose to 9/4½ as compared with 7/4½ in 1912. This was a most exceptional price for herrings in pre-war days. Practically the same causes operated as in 1912, but in addition fish were abnormally scarce at Wick, Orkney and Shetland and curers who had as usual made extensive preparations at these places were so eager to get their normal supply that they bade up against one another and prices soared. The year 1913 should not therefore—as is frequently the case—be cited as a typical pre-war year for post war comparisons.

The effect of the war is shown in the diagram by the rapid fall in the catch and rise in the price curve. Owing to the withdrawal of men and vessels for naval service and the restrictions imposed by the Admiralty, confining fishing, practically to the Minch and the Clyde, the catch in 1915 was the lowest recorded for over a century, and, despite the loss of the German Market and the almost total closure of the Russian Market, the price rose to 12/6¾ per cwt. During the following year the initial stringency of the regulations on fishing was relaxed to permit operations not only on the West Coast and in Shetland waters but also in certain areas of the East Coast as well, and in consequence the catch rose to two million cwts. and remained at that level for the rest of the war. In view of the shortage of food supplies at home curing for export was discouraged and every attempt was made to beat up the home demand with

the result that the price rose until in 1918 it stood at 24/7 per cwt.— an increase of 400% on the pre-war price.

With the cessation of hostilities and the demobilization of men and vessels, hopes ran high in all sections of the industry of seasons of unprecedented prosperity. The herring had been granted four years of comparative respite from the pursuit of man and it was felt that their numbers must have multiplied enormously: record fishings were predicted and the trade generally was optimistic that prices would remain at a sufficiently high level to cover the increased costs of production and leave a reasonable margin for the fisherman, curer, etc. The supply price curves and the figures given above show that these hopes have not been realized. If we except the year 1924 when the catch was just over the relatively poor returns of 1913 and 1914, the quantity landed in any year from 1918 to 1926 has been considerably less than for the poorest year from 1901 to 1914, the average being roughly 2/3rds. of the pre-war catch—that too with a fleet which in point of numbers has been well up to pre-war strength. The prices obtained for the fish ~~extract~~ ex boat have it is true—with the exception of 1923—been generally above pre-war prices but the increase of approximately 50% is not proportionate to the rise in THE price of labour boats and gear and many fishermen have been forced into other trades while others have been brought to the verge of poverty.

This stagnation is of course the legacy of the war. Over 70% of the total catch was FORMERLY cured for export to Russia and Germany, but immediately after the war these countries were in such a state of political and industrial chaos that trade with them became an exceedingly risky and speculative business. Besides, their purchasing power was greatly reduced and instead of Scotch herrings being the cheapest and most wholesome food they could obtain, cheaper substitutes were available, with the result that the demand for herrings fell off. In view of the difficulty of finding new markets and of obtaining adequate prices in the old ones, curers were not prepared to pay sufficiently high prices for the green article to afford a reasonable margin of profit to the fisherman. So precarious in fact was the position in 1919 and 1920—with the exchanges in a constant state of flux—that private trading became an impossibility and the industry would

have suffered a total collapse but for the intervention of the Government with a "guarantee" scheme to purchase all unsold stocks of cured fish up to a maximum of 400,000 barrels in 1919 and a total cost of £1,800,000 in 1920. (See Appendix II).

In the former year with demobilization practically completed and the release of all the vessels commandeered for war service, the catch, although still remaining far short of normal seasons, appreciated by fully 80% on the 1918 figure but the price fell from 24/7 to 11/11¾ so that the total value was actually 12% less than for the previous year. Under the guarantee scheme of 1919 no minimum price was stipulated for the fish ex boat but in 1920, 45/- per cran was fixed as the price to be paid for all fish to be sold under the guarantee. This afforded some measure of ~~prosecution~~ protection to the fisherman and the price of the green article rose slightly but, as the terms of the guarantee were not decided until June, operations were late in starting and the aggregate catch declined.

There was a further decline in 1921 due partly to the scarcity of fish, partly to a late start because of the coal strike, but, owing to the call for economy in national expenditure, no guarantee scheme was forthcoming and the price also fell—from 14/3 to 9/6 per cwt. With a rise in the catch and the continued closure of the Russian Market and the generally poor quality of the fish, this fall continued during the next two years and in 1923 the minimum post war price of 5/9 per cwt was reached—~~a~~ sixpence below the average for the decade preceding the war—and less than a fourth of the 1918 price. Working costs had also diminished but in nothing like the same proportion, and for all sections of the trade ~~and in~~ 1923 ~~it~~ was the blackest year ever experienced.

The following year stands out by contrast. From the beginning of the season fish were plentiful and of better quality, and, when Russian buyers appeared, prices soared, bringing the aggregate value to just double that for 1923. The quantity landed was the highest since the war, being just over the 1913 catch, and the price was roughly 2/- per cwt over the pre-war average. The fishermen thus had an excellent year but the curers were not so fortunate. The Continental demand fell off and at the end of the year large stocks were still unsold.

This had its repercussion on the following season. The winter

fishery was conducted on a greatly reduced scale and by mutual agreement among curers and fishermen the commencement of the Summer Fishery was delayed until 23rd. June. When it did commence herrings were exceedingly scarce, so that the aggregate yield fell back approximately to that of 1923. The quality was also poor--small, badly nourished fish--but owing to the shortage in supply curers forced the prices up on one another to a level higher than the state of the continental market warranted.

The year 1926 was a striking instance of the bad luck which has dogged the industry since the war. Fish were plentiful and of good quality but what gave promise of being a most successful year was ruined by the protacted coal strike, which, besides restricting the activities of the steam drifter fleet, increased their working costs to such an extent that most of them were thrown back to the financial stringency of 1923.

Although conditions improved somewhat in 1927, the success achieved could only be described as moderate and was quite inadequate to repair the damage caused by the industrial upheavals of 1926. The West Coast Summer Fishery and the Winter Fisheries on the Clyde and North West Lochs were extraordinarily successful and all sections of the industry, fortunate enough to be operating in these districts, reaped a rich harvest. The East Coast, Shetland and East Anglian Fisheries, on the other hand, were attended with only moderate success, and most of those who participated were only just ~~only~~ able to clear their expenses. Except at Shetland, herrings were fairly plentiful but the East Coast Fishery was brought to a premature close through the sudden disappearance of the shoals, and operations at Yarmouth and Lowestoft were frequently interupted by adverse weather conditions. In all three districts, too, there was a tremendous preponderance of small undeveloped fish. This in fact had been characteristic of all the fisheries since 1920 - "shots" frequently working out at 500 or 600 more fish to the cran (3½ cwts) than before the war.

This fall off in size is evidenced by the Branding Returns of the Fishery Board for Scotland. For the decade preceding the war 17% of the total barrels branded were Large Fulls and 35% Fulls. Since the war these have shrunk to 1% for Large Fulls and 15% for Fulls.

By some fishermen this was attributed not to the scarcity of large herrings but to the unsatisfactory state of their nets. Owing to the succession of poor fishings, these had not been replaced as often as was customary before the war and the meshes had contracted so much with usage, that the larger fish, they said, could not get their heads far enough into them to be securely meshed.xx The majority of fishermen, however, contended that the bigger fish were not there to be caught and pointed to the fact that the few boats, which were fortunate enough to possess a fleet of new nets, were not catching better sized fish than the others.

This view was completely vindicated last year (1928). Little replacement of gear had taken place, yet the herrings were well up to the pre-war standard in point of size, and their quality was so exceptionally good that it is doubtful if it has ever been excelled. As a consequence the price rose from 8/3 to 9/1 per cwt. Supplies were plentiful too on all the usual grounds (with the exception of the N.W. Lochs) and, as the continental demand remained firm throughout the year, curers had no difficulty in disposing of their stocks. The year's results were the most successful since 1913 and all sections of the trade benefited.

xxx So prevalent was the opinion that the fish were unusually small that for a time old nets were in greater demand than new and fetched prices far in excess of their real value.

It must not be assumed, however, that the industry is back to its pre-war prosperity. Its success is largely dependent on the continental market and, as will be shown later, this is still very much restricted compared with pre-war days. As a matter of fact our catching power - despite outworn boats and gear - is more than sufficient to meet the existing demand; and last year in order to prevent the German and Polish markets from becoming overstocked, it was deemed expedient not only to refrain from curing early, immature herrings in May and June but also to stop the East Anglian Fishery a fortnight before the usual time, although large shoals of excellent fish were still on the grounds.

Our present yearly production is 4,000,000 cwts., just 80% of what it was from 1910 to 1914. Its value lies between £1,700,000 and £1,800,000 compared with £1,687,000 for the same period.

CHAPTER III.

SEASONS OF CAPTURE.

While it is true that herrings are caught somewhere round the Scottish Coast practically every day of the year, the fishery proper is seasonal, varying considerably in intensity from month to month and following a more or less definite sequence, dependent on the time of spawning in the various districts. As the fish are then massed together in huge shoals they are captured most easily and economically: in addition their food value is then at its highest. Consequently the fishery reaches its greatest activity a month or so before spawning commences, and, as the "shotten" fish are much less valuable commercially, it terminates abruptly soon after spawning begins.

The following table gives (1) the average catch per month for the past seven years in thousands of cwts and (2) the percentage of the year's total for each month in the same period

	Jan.	Feb.	March	April	May	June
Average Catch	253	261	68	17	92	487
%	7.7	7.9	2.1	.5	2.8	14.8

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Average Catch	1,080	702	90	41	63	133	3,287
%	32.9	21.4	2.7	1.2	1.9	4	

July is therefore by far the most productive month, April the least, operations being practically suspended from the middle of March to the first week in May. October and November are also very lean months; the majority of the larger boats are then engaged at Yarmouth and Lowestoft and, so far as Scottish Waters are concerned, the fishery is largely confined to the Clyde Area and the lochs adjoining the Minch.

The bulk of the catch is landed during the two main seasons (1) June, July, and August which together account for 69% of the year's total and (2) December, January and February with 19.6%. The former, known as the Great Summer Fishery, proceeds the Autumn spawning (mid August to Mid September), the latter or Winter Fishery prededes the spring spawning (February or early March).

In the excellent statistical tables published annually by the Fishery Board for Scotland the returns are given under three headings

(1) Winter Fishery from 1st January to 31st March

(2) Early Summer Fishery from 1st April to 30th June

(3) Great Summer Fishery from 1st July to 31st Dec.

This classification though convenient is not satisfactory or strictly accurate. The Great Summer Fishery finishes in the end of August or the beginning of September but all the fish caught in the remaining months of the year are included with it in one return. It is thus overweighted to the extent of at least 7% of the year's total. The Winter Fishery, on the other hand, begins before 1st January, usually about the end of November, so that its productivity is underestimated by about 4%. The Early Summer Fishery is really continuous with the Great Summer Fishery and should not be separated from it but, as will be explained later, it is convenient to regard them separately for statistical purposes.

The Winter Fishery.

The development of the Winter Fishery is of comparatively recent origin. When the fleet was entirely driven by sail, fishing in the winter months was ↓ owing to the severity of the weather - usually confined to the more sheltered waters of the lochs and firths and was prosecuted almost exclusively for bait or for home consumption. The great expansion which has taken place since the beginning of the present century is due almost entirely to the introduction of the steam drifter, which with its better sea-going qualities can follow the shoals a long distance from land even in the severe weather which is so prevalent in the winter round our coasts. The owners of these more costly vessels were unwilling to let them lie idle, and, while some fitted them out for long-lining, others - owing to the rapid development of trawling and consequent decline in lining - preferred to engage in the herring fishery during the winter months.

In 1898 the total landings for all Scottish Districts in January, February, and March was 91,314 cwts. or 1.9% of the year's catch. Three times this amount was landed in 1900, four times in 1901 and five times in 1902. From 1900 to 1914 the average was 412,624 cwts. while in 1913 and 1914 the catch was actually 627,197 cwts. and 863,958 cwts. respectively - 14.1% and 19.7% of the total catch. During the war the Winter Fishery was less adversely affected than the Summer Fishery, the average for the post-war years has remained approximately at the war-time level - 553,000 cwts. or 16.4% of the average total catch for the same period, ~~value~~.

[the average being 555,000 cwts. - 12.4% of the average total, although it has been subject to violent fluctuations since

The fishery is prosecuted usually from the middle of December to the middle of March but it often finishes a week or two before this - either because of adverse weather or the early arrival on the English Market of the usually plentiful Norwegian Winter Herrings with which our own have to compete. Most of the catch is landed in January and February but occasionally December is a very prolific month. At Stornoway for example in 1926 the December catch exceeded by 60,000 cwts. the combined totals for January, February and March.

Operations take place simultaneously in four distinct districts.

(1) The Minch and off the North Coast.

(2) The Firth of Forth.

(3) The Firth of Clyde.

(4) North West Coast of Shetland.

The Minch and North Coast.

This is by far the most important branch of our Winter Fisheries, the quantity landed at Stornoway and Wick alone easily exceeding the catches of all the other districts put together. It does not, however, attract anything like the full complement of the Scottish Herring Fleet: owing to the rough weather which usually prevails in the winter months and the long distances of the fishing grounds from the ports of landing, only steam drifters and the largest and most powerful class of motor boat can participate. It is seldom that the latter number more than a score but as a rule from 150 to 200 drifters are engaged - roughly one fifth of the whole drifter fleet. Practically all of them belong to East Coast Ports and it is quite usual for them to carry both nets and long lines so that if the herring fishery is a failure they may devote themselves to lining.

Operations extend from Dunnet Head to the Butt of Lewis and from the Butt to the island of Mull. On the North Coast the grounds most regularly fished are Loch Erribol and Murkle Bay but the ~~field~~ fleet working from Wick and Scrabster frequently go as far afield as the open waters between Cape Wrath and the Butt of Lewis. On the West it might be said that the whole of the Minch is one vast herring pond. Sometimes the shoals are ~~treated~~ located on the mainland side, sometimes on the Lewis Side: one season they enter the lochs and firths with which the West Coast is honeycombed, the next, they keep to the more open waters of the Minch. Their appearances in the lochs of Ross and Sutherland are notoriously erratic. Those most frequently visited are Inchard, Laxford, Loch Broom, Little Loch Broom, and Loch Carron, Loch Glendhu and Loch Cairnbawn, but no one can predict when or where they will appear or how long they will stay.

The uncertainty which marks the fishery in these lochs can be gauged from the fact that for the Loch Broom District, the catch in 1908 (169,925 cwts.) exceeded the combined landings of the next six years while the 1905 catch (146,052 cwts.) ~~catch~~ almost equalled the total for the previous five years. The amount landed in December 1926 was actually greater than the combined totals for 1920 to 1925. Yet in 1927 the catch was three times as great as for 1926 - reaching the record total of 240,457 cwts. Of the Skye Lochs the most important so far as the herring fishery is concerned are Snizort, Dunvegan and Bracadale.

On the west side of the Minch the shoals seem to keep more to the open waters but as a rule they come close inshore between Tiumpan Head and the Butt (particularly at Tolsta Bay) and they are often found in one or other of the lochs - chiefly Erisort in Lewis and Skiport, Eynort and Boisdale in South Uist. On the Atlantic side Loch Roag - well known for its herring fishery before 1750 - is now seldom visited. According to Mitchell, the shoals left the loch in that year and did not return till 1790 [They were there every winter until 1794] when they again left and did not return ~~untill 18~~ for 32 years ~~after~~. Since 1850 their appearances have been so very irregular that the loch is now seldom fished. In fact the only grounds now worked west of Lewis lie between the Butt ~~and the Butt~~ and the Flannan Islands, where extensive spawning grounds were discovered at the beginning of the present century. The chief offshore grounds however are those between Cape Wrath and the Butt: these are regularly fished not only by the boats operating from Stornoway but by the Wick and Scrabster fleets as well.

The greatest drawback to the fishery in this district is the lack of a good rail service. For a coastline of over 200 miles - from Thurso to Kyle of Lochalsh - there is not a single railhead and such fish as are landed at any of the fine natural harbours which abound on the West Coast of Ross and Sutherland must be dispatched by motor transport - usually only the mail cars are available, which are quite inadequate having no special facilities for carrying fish whatever. With such a perishable article of food the delay involved - to say nothing of the increased cost of carriage - is disastrous. Boats fishing in this region either dispose of their fish to "Klondykers" or other carrying steamers or themselves land them at Mallaig or Kyle, which sprang into prominence as a fishing centre during the war but has fallen off somewhat since. These are the only railhead ports on the West of Sutherland, Ross, and Invernesshire, and, although they are unfavourably situated for the North West grounds, a large quantity of fish is landed at them for dispatch to the home markets. The prices prevailing there are often high enough to tempt those boats which are working on the Lewis side to cross the Minch and land their catches on the mainland. Practically all the fish caught in the Skye Lochs is landed at these ports but the Mallaig fleet often works off ~~the~~ Coll Banks as far South as Kerryvore. Most of the boats fishing here, however, prefer to land their catches at Oban, the only other railhead port on the West Coast. Some of the Oban fleet operate off the North West Coast of Ireland and, in spite of the distance, land their catches at Oban. Little curing takes place at these three ports: the bulk of the catch is distributed to the home market fresh or kippered.

German vessels, capable of holding up to 1,000 crans, which buy direct from the fishing fleet and, whenever a sufficient supply has been obtained, make for Altona etc. to dispose of their cargo either for consumption fresh or to the tinning factories.

Stornoway is of course the natural centre of the West Coast Fishery, being readily accessible from all parts of the Minch and from the Nothern and Atlantic grounds as well. So far as the home market is concerned, however, it is greatly handicapped by its remote and isolated position compared with the railhead ports on the mainland. Yet in spite of this it has long held the premier position as the chief centre of the West Coast Winter Fishery. Its tremendous development within comparatively recent years may be guaged from the fact that the catch for the months of January, February and March 1912 (366,524 cwts.) was approximately eighteen times that of 1896 (21,820). It so happened that the growth of the Winter Fishery synchronized with a marked decline in the Early Summer Fishery and popular opinion locally attributed the latter to the former, with the result that repeated attempts have been made to curtail the Winter Fishery in the hope that the Summer Fishery might be restored to its former prosperity. That the intensive prosecution of the Winter Fishery should injure the shoals and adversely affect the Summer Fishery is of course absurd, as the Winter spawners are totally distinct from the Summer spawners; but the following statistics would at first sight appear to lend colour to the theory.

	Average Catch in Jan. Feb. March (thousands of cwts.)	Average Catch in April, May, June (thousands of cwts)
1894 - 1899	17	236
1900 - 1905	115	122
1906 - 1914	183	63
1919 - 1926	133	39
1927	170	50
1928	143	99

It will be noticed that there has been a complete turn-over as between Winter and Summer Catch but that the total catch - except for the post-war years - has been practically constant. Any curtailment of the Winter Fishing on the lines proposed in the opening years of the present century would therefore have been an exceedingly serious matter for Stornoway. At present an agitation is afoot to secure a close time between 15th February and 10th May, but, as the industry is practically dormant from the middle of March to the end of April, any gain that would be secured would be more than counterbalanced by restricting activities during February which is sometimes a very prolific month, although it must be admitted that the fish caught in February - usually on the Scourie Grounds and in Broad Bay - are very often of such inferior quality as scarcely to repay the trouble of taking them.

Although Wick has had a Winter Fishery for a much longer time than Stornoway it must now yield pride of place to its Western rival. Fishing in the winter months began at Wick in 1863 and from then until the nineties large quantities of herring were landed in the opening months of the year from the inshore grounds of the Moray Firth. Gradually, however, the shoals deserted these grounds and as a consequence the Wick Winter Fishery ** dwindled, until in 1911 and 1912 only 3,717 and 2,691 cwts. were landed. In 1913 and 1914 there was a welcome revival. Large shoals were located off the North Coast of Sutherland and in the Orkney Waters, and the landings * amounted to 47,000 and 162,000 cwts. the previous record for a Winter Fishery being 63,000 cwts.

** *

All the figures quoted include the landings at Scrabster the small port near Thurso.

During the war the fishery was practically suspended but since then it has been prosecuted with increased vigour, the average catch (January, February, and March) for the past nine years being 113,000 cwts. So heavy were the landings in 1920, 1921, and 1924 that the railways found the greatest difficulty in coping with the consignments for the home markets and, as prices were adversely affected, some of the drifters preferred to land their catches at Buckie and Fraserburgh.

The prices obtained in the North-West Fishery fluctuate considerably, depending (1) on the quality of the fish, which as a general rule is inferior to that of the East Coast Summer Herring and (2) on the state of the Continental Markets. If these are free of the Great Summer and English Cure, a considerable proportion - sometimes two-thirds - of the Winter Catch is cured gutted for export. When, however, the foreign markets are overstocked, little curing is done, and, as the kipperers and freshers cannot absorb the whole supply, prices tend to fall. There is meantime such a glut in the German and Polish markets - in consequence of the huge landings on the East Coast and at Yarmouth and Lowestoft - that the importers in Danzig, Riga, Stettin and Königsberg have intimated that they will not purchase any winter cure until they have disposed of their stocks on hand, with the result that the Winter Fishery is being prosecuted on a very small scale and the prices obtained have been insufficient to remunerate the fishermen for their labour and the heavy wear and tear to their boats and gear. Since 1920 prices have varied enormously - from 2/- per cwt. to £2 per cwt. - the average being 8/6 per cwt. The presence of the Klondykers in the district during the three

The Firth of Forth.

The so-called Firth of Forth Winter Fishery commences usually towards the end of December and continues to the end of March - sometimes well into April. Up to the nineties this fishing was almost entirely confined to the Firth itself, the shoals often coming so close inshore that huge catches were made by anchored nets. The most prolific grounds were between Queensferry and Inchkeith and from Crail and Anstruther to the Isle of May. Gradually, however, the fleet followed the shoals farther afield and from mid-February to the end of the season the best takes were secured off Dunbar. Nowadays operations are regularly conducted from the Fifeshire to the Berwickshire Coast, including of course the Firth itself, but it is seldom that the shoals come so close inshore as was their wont.

Although 1914 was a record year - 143,000cwts.(£47,000) being landed - the fishery had been steadily declining in the years immediately preceding the war. No steam drifters took part in it - only local motor and sailing vessels. Since the war however it has been prosecuted with greater intensity by a fleet of approximately 160 boats, a dozen or so of which are propelled by steam. The average catch from 1920 to 1927 was 73,500 cwts., which realised £36,500 - roughly £160 gross per boat. The fishery therfore cannot be called remunerative for the fishermen but it affords them employment at a time when they would otherwise be idle.

The chief centres and ports of landing are Anstruther, Leith and Eyemouth. At the latter port this fishery is of comparatively little importance compared with the summer fishery but at both the former ports it is the chief - practically the only - fishery for the year, most of the local boats fishing from other ports in June July and August.

Only a small proportion of the catch is cured gutted Most of it is kippered or disposed of fresh - either at home or abroad. As early as 1899 an enterprising Anstruther curer tried the experiment of sending to Germany consignments of fresh herrings packed in salt and ice. The venture proved a success and was continued. In a sense, this was the beginning of Klondyking and during the past three seasons a considerable amount of the catch has been sold direct to Klondykers.

The Firth of Clyde

Although the Firth of Clyde Fishery reaches its maximum intensity in the winter months it cannot be called a Winter Fishery, for, as the following figures will show, operations are conducted in different parts of the district throughout the whole year, and it is therefore inexpedient to endeavour to split it up into definite seasons.

Average Catch (in thousands of cwts.) from 1920 to 1927.

Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
45	25	12	6.5	10	16	21	30	30	39	52	73	359.5

In pre-war days as a general rule only local vessels participated, but in recent years the fishery has been so productive that motor vessels have been attracted from other districts in Scotland and from Ireland as well, and in the closing months of the year a fleet of from 250 to 300 vessels is at work.

For the most part the seine net is used in preference to the drift net as the grounds fished are so confined. When the former was first introduced, it was most unpopular with the local fishermen but the prejudice against it has gradually disappeared, and it is now regarded as the most effective means of capture in the Clyde Area, so much so, that visiting crews who have been accustomed only to drift net fishing generally adopt the seine and hire a local fisherman for the season to aid them in using it.

For a couple of decades prior to the war, the Clyde fishery was on the wane: the Loch Fyne Fishery was a total failure for a succession of years and the herrings were not frequenting the other lochs in their former numbers. Increased attention too was being paid to the East Coast and Orkney and Shetland Fisheries, and the

Clyde Area suffered in consequence. Besides, in view of the poor returns which were being secured, many of the fishermen gave up fishing and took posts on yachts or enlisted in the Mercantile Marine so that the number of locally owned boats declined. The result is seen in the following figures:-

Average yearly catch from--

1896 to 1900,	240,971 cwts,	- 6.5%	of average total catch for Scotland.
1901 " 1905,	225,515 "	- 4.6%	" " " " " "
1906 " 1910,	173, 419 "	- 3.2%	" " " " " "
1911 " 1913,	169,571 "	- 3.5%	" " " " " "
1915 " 1918,	154,570 "	- 9%	" " " " " "
1920 " 1927,	360,434 "	-10.5%	" " " " " "
1928	419,602 "	-10·5%	" " " " " "

The great increase in the total catch for the post war years is almost wholly attributable to the excellent fishings obtained at Rothesay in 1925, 1926 ~~and~~ 1928, 1927, and to the revival of the Loch Fyne Fishery. Since 1920 the Clyde has contributed 10.4% of the total value of the Scottish catch, the average price being 9/- as compared with 9/1 for the whole of Scotland. In consequence, the local fishermen - in marked contrast with their brethren on the East Coast - have enjoyed a spell of prosperity unexampled even in the eighties when the Clyde Fishery was particularly remunerative.

The fishery is prosecuted in five distinct districts, (1) Inverary (Upper and Lower Loch Fyne - October, November, December), (2) Rothesay (Kyles of Bute, Loch Striven and Loch Riddon - October, November, December, January), (3) Campbeltown (Kilbrennan Sound - June, July, August, September), (4) Ballantrae (Ayrshire Coast - January, February, March), (5) Greenock (upper reaches of Firth - June, July, August, September).

INVERARY DISTRICT.

The Loch Fyne Fishery is perhaps the finest illustration we have of the erratic and capricious behaviour of the herring. The chart in Appendix Y shows the annual catch from 1900 to 1928 and reveals the fluctuations through which the industry in this district has passed during the last thirty years. Only once from 1904 to 1918 does the catch reach a total of 10,000 crans: yet from 1854 to 1904 there were only four years - 1872, 1873, 1874, and 1878 - in which the total yield fell short of that figure. From 1904 to 1918 the average catch was 4,320 crans as contrasted with 26,590 crans for the previous 40 years.

Such a falling off in the fishery, continued over so many years, spelt ruin for a large number of fishermen and it was only natural that they should formulate theories to explain the disappearance of the herrings. At first the February-March fishing on the Ballantrae Bank was blamed: they held that it was detrimental to their fishing to have the shoals disturbed while spawning and they complained too of the havoc done by the use of seine nets. This theory got completely knocked on the head by the fact that for several years owing to very adverse weather there was practically no fishing on Ballantrae Bank, yet the Loch Fyne Fishery showed no improvement. On several occasions large shoals were located during May and June in the lower Loch but they either never penetrated to the upper loch or, if they did, they kept to the deeper water, where the seiners could not get at them, and after a short stay migrated South - usually in July or early August, when the season closed in the lean years as contrasted with December in more prosperous days.

In vestigations were carried on by the Scientific Staff of the Fishery Board for Scotland for several years prior to the outbreak of the war but no satisfactory explanation was forthcomming and the movements of the herring in this area are as much a mystery as ever.

In 1920 and 1921, as the chart will show, they reappeared in something approaching their former numbers, then fell away again for the next two years but in 1924, 1925, 1926 were present in greater profusion than ever, the catch in 1925 being easily the record for the district. To a certain extent the increased totals for 1925 and 1926 are attributable to the activities of the Klondykers and Curers. In former years the catch was disposed of chiefly to the Glasgow Buying Steamers and, as these had to leave very early in the morning to catch the market, the boats had also to stop fishing early - irrespective of how great or how small their catch might be. But in 1925 and 1926 Klondykers and Curers were on the ~~short~~ spot all day and therefore the fishermen could fish as long as they liked in the assurance of finding a market at whatever hour they ~~landed~~ hauled their nets.

One striking feature of this fishery recently has been the very mixed character of the catch. Up to 1923 the fish were uniformly large, but since then the quality has deteriorated, small herrings of 3" to 6" in length being mixed with the large ~~grill~~ full fish to such an extent that before a catch could be marketed the fish had to be specially selected, and many crews, rather that face the trouble of such a a selection, discarded their seine net and resorted to drift nets, which of course allow the smaller fish to escape.

The reason for such a fall off in quality seems to lie in this that two distinct shoals visit the loch within a short period - first a shoal of small sized fish in August or September, and, about a month or six weeks later, a shoal of much larger fish. As a rule the former left the loch before the latter arrived but since 1923 for some unaccountable reason they appear to have stayed on and have got hopelessly mixed up with the larger herrings. During the year 1923 alone it is estimated that no less than 6,000 crans were quite unmarketable and were dumped in the loch.

This habit of selecting the catch has given rise to much ill-feeling between the fishermen - not only in the Loch Fyne District but throughout the whole Clyde area - and the Glasgow buyers. The former contend that the process has been carried too far and that good medium sized herrings are often rejected: they further accuse the buyers of combining, with the object of controlling or limiting th the price. The latter hold that selection is necessary with seine caught herrings and that only those which are so small as to be unmarketable are rejected. Even the Klondykers, they say, have had to resort to selection, the smaller fish being accepted only when they are in a hurry to make up a cargo.

The fishermen are convinced that they have a grievance and seem determined to protect themselves against combined action on the part of the wholesalers. Various suggestions have been made.

(1) To form a union of Clyde Fishermen to combat any attempt at combined action on the part of the wholesalers.

(2) To boycott any wholesaler who is a member of a combine by refusing to sell to him.

(3) To do away with the floating market and to arrange for the conveyance of the catch to selected ports, all fish then to be sold by auction.

(4) To stop fishing for a week or two whenever prices fall below a certain level.

The last two proposals are excessively drastic. The present system of the wholesalers sending their own buying steamers to the grounds and taking delivery of the catch direct from the boats is - in view of the geographical situation of the grounds with respect to Glasgow and other railhead centres - undoubtedly the most efficient and economical method. Much time would be lost if the boats were themselves to make for the markets and at present there is little likelihood of the fishermen being able to organize and maintain a fleet of carrying vessels at their own expense: nor would the establishment of such a service - if it were a practical proposition - necessarily lessen the prevailing discontent - most probably it would increase it. In the event of a dispute as to the marketability of a catch, who would decide whether it was worth while conveying it to the market or not? The solution of the problem seems to lie rather in the establishment of a joint board - equally composed of fishermen and wholesalers with an independent chairman - to which all cases of alleged unfair dealing could be referred. Without doubt both parties have some right on their side and, if they met periodically in conference, they would get to know and appreciate one another's difficulties and an amicable settlement of their grievances would be more easily arrived at.

Rothesay District.

Owing to its situation, with respect to the other Clyde Ports Rothesay's success as a herring centre is dependent on the presence of shoals in the Kyles of Bute, Lochs Riddon and Striven or Rothesay Bay, from the Kyles to Toward Point. Half a century ago the appearance of shoals in these waters was a yearly occurrence, and at that time Rothesay was an important centre of the industry in the Clyde Area and regularly attracted buyers and curers from all parts of the country. In the early seventies however the herrings forsook these waters and for the next thirty years such catches as were landed at Rothesay were secured either in the upper Part of Kilbrennan Sound or in the Sound of Bute from Inchmarnock Island down the East Side of Arran to the Island of Pladda. They revisited their former haunts in 1902, 1903 and again in 1919, when moderately good catches were made, but during the past ~~three~~ four years they have been present in the Kyles and Loch Striven in such shoals that all previous records have been broken and Rothesay has once again blossomed out as an important herring port, the landings from 1925 to 1927 (790, 000 cwts) ~~the~~ being actually in excess of the total landings for the previous thirty years (780,000 cwts). In 1928 the high water mark was reached with a catch of 331,682 cwts.

The bulk of the catch has been taken from Loch Striven but the shoals have been struck in the Kyles and also close inshore in Rothesay Bay-- ~~hardly~~ BARELY a quarter of a mile from the pier. Many of the local fishermen attribute this to the cleansing of Rothesay Bay consequent on the introduction of a new sewage system whereby all the sewage is carried into the open waters of the Firth. In this connection it is interesting to reflect that just over twenty years ago the Clyde Trust proposed to dump the dredgings from the shallow waters of the Clyde into Loch Striven. The Fishery Board for Scotland opposed the proposal ~~on~~ on the ground that Loch

The Board carried the day and its policy has been amply vindicated by the prolific catches of the last few years.

Unfortunately the quality has been very variable, small fish being unduly predominant, but in spite of that a considerable amount of curing has been done chiefly on improvised stances along the esplanade. The bulk of the catch however has been freshed, the Klondykers taking the bigger share, the remainder - as in former years - being sold for home consumption and conveyed by steamer to Craigendoran, Greenock, Wemyss Bay or Fairlie for dispatch by rail to the various Wholesale Markets. Some Kippering has been done and occasional consignments have been dispatched to Aberdeen for tinning purposes.

Campbeltown District.

If the theory commonly held by Clyde Fishermen be correct - that the herring on leaving Loch Fyne in the end of the year make for the spawning grounds on Ballantrae Bank via Kilbrennan Sound, and return by the same route in April and May - then Campbeltown ought to have two distinct fishings practically at its door, (1) in December, January and early February, and (2)from April or May onwards until the shoals again work their way into Lower Loch Fyne. As a matter of fact, the summer fishing in the Sound - which begins in the end of April or early in May and lasts usually until September - is without doubt the best in the year's operations, June, July and August being the most prolific months; but on the other hand, the Winter Fishery in the Sound has, in recent years, been more often a failure than a success, the catches in December and January (when theoretically the shoals should be in the Sound) being little in excess of the other winter months. The huge fishings during the past few seasons in the Kyles of Bute would seem to indicate rather that the Loch Fyne herrings move South via the Sound of Bute and return to Loch Fyne by ~~the~~ Kilbrennan Sound.

The figures given in Appendix VI are not exactly conclusive, as the fleet fishing from Campbeltown move further afield than those fishing from any other Clyde Port. Herrings are landed there in every month of the year, but they are not all caught in Kilbrennan Sound. Operations, it is true, are usually confined to the Sound - sometimes on the Kintyre side from Skipness to Sanda Island (generally between Campbeltown Loch and Cour Bay), sometimes on the Arran side especially in

In former days, when the Islay Fishery was at its height, the Campbeltown fleet fished in Islay waters and returned home for the disposal of their catch. These grounds became very unproductive in 1895, only 12,000 crans being caught by a fleet above normal strength, as contrasted with 50,000 crans previously. In the following year the fishery was blank, and, although Campbeltown fishermen have repeatedly tried these waters since then, they have met with no success.

Because of the fact that operations are regularly conducted over a wide area, the annual catch shows less variation than for any other Clyde Port. There have been the usual ups and downs, of course, but these have never been very extreme. The average annual post-war catch (74,000 cwts.), however, shows a falling off from pre-war days (average for 1891 to 1914, 93,000 cwts.) due to the fact that the resuscitation of the Loch Fyne and Kyles Fisheries has been attracting the fleet from the home waters.

Practically all the catch is disposed of fresh: very little kippering is done and since the ~~war~~ war the amount cured has steadily declined, the quality often - especially in the spring months when the herrings are in a spent condition - being totally unfit for curing. In 1927 only 142 barrels were cured as compared with 5140 in 1913.

Ballantrae District.

As a rule, the craft from this district do not confine their operations to any particular locality, but follow the shoals to all parts of the Clyde Area. The quantity of fish landed within the district (Appendix V) therefore gives but slight indication of the success or failure of the local fleet. There is however a special season in which practically all the local fishermen engage and many from the other Clyde Districts as well. This season opens at Stranraer in the beginning of the year when herrings are usually to be found in Loch Ryan. In the end of January or the beginning of February, Ballantrae Bank, where the shoals mass for a brief spawning season, becomes the locus of operations for an increased fleet. Fishing continues there generally until the end of March when the season ends and the boats disperse. Some of them, however, operate slightly ~~farther~~ farther north along the Ayrshire Coast - generally from Ayr Bay to Girvan - during the months of April and May, but this fishing is not of much account, the quality being usually very inferior. In the summer months fishing is carried on, first close inshore just off Ayr, then in the open waters between Ayrshire and Arran and finally on the Arran side of the Channel. Very few boats participate in this fishing, and the landings are almost infinitesimal. In the closing months of the year most of the local fleet are ~~enjoyed~~ engaged either in the Loch Fyne or Kyles of Bute Fisheries.

Owing to the fact that operations in this district are carried on in comparatively open waters, the winter fishing is often interrupted by adverse weather and consequently there are marked fluctuations in the annual catch.

That the herrings are usually present is proved by the movements of the gulls and gannets from Ailsa Craig, and by the spawn which is found adhering to the cod nets, but owing to the rough seas the fishermen cannot get at them. On the whole the fishery has been prosecuted more intensively during the past ten years than for a couple of decades prior to the war, the average annual catches being 57,000 cwts. and 20,000 cwts. respectively.

The quality is very variable. In some seasons fine full herrings are obtained for several weeks before "spents" appear: in others almost from the commencement of the season catches are mixed, herrings "running with spawn" being found. As a rule, however, they meet with a ready market for consumption fresh. Little kippering is done and no curing for foreign export. A score or two of barrels are cured annually for home use.

The catch is landed at Ayr, Girvan, Stranraer and Dunure and conveyed thence by train or motor lorry to the wholesale markets.

Greenock District.

The Greenock District includes the stretch of coast line from Saltcoats up to Glasgow, the chief ports of landing being Saltcoats, Ardrossan, Fairlie, Largs and Greenock. Half a century ago herrings were regularly found in Loch Long and the Gairloch and as far up the river as Cardross and Bowling. In these days the herring industry in this region was in a comparatively flourishing condition but the visits of the shoals to the upper reaches of the firth became less and less frequent and ~~the fi~~ the fishery gradually dwindled. Various reasons were given at the time--(1) that the Kintyre Fleet commenced fishing too early and broke up the shoals. (2) that the seine net destroyed young fish and consequently depleted the future stock of mature fish (3) that the otter trawling between Arran and Ailsa Craig broke up the shoals. Whatever the true reason be, the fact remains that only on very rare occasions do the herrings penetrate to the top of the firth and the meagre catches which are made - less than 6000 cwts per annum since the war-- are made along the Ayrshire Coast by a mere handful of boats. Practically all the catch is disposed of fresh.

Orkney and Shetland.

The Winter Fishery in the Orkneys and Shetlands dates from the opening years of the present century. Before then any herrings captured during the winter months were used for bait but in 1902 a definite attempt was made to establish a regular fishery during January, February and March. It met with little success, the average catch until 1909 being just over 3000 cwts. From 1910 to 1914 it was prosecuted with greater intensity and the catch rose to 25,000 cwts. Since the war, however, it has fallen away again, the average catch since 1920 being just over 6000 cwts. of approximately £2000 in value. The Orkney Winter Fishery is defunct and operatioms in Shetland are confined to a few local vessels fishing on the N.W. Coast off Ramna Stacks and Flugga.

The Early Summer Fishery.

In point of fact there is now no separate Early Summer Fishery. What is commonly known as such is really continuous with and part of the Great Summer Fishery, and it would be idle to regard them separately, were it not that the former is of comparatively recent growth and has given rise to one of the greatest problems connected with the industry.

In the Fishery Board Statictics the Early Fishery includes all landings from 1st April to ~~1st~~ 30th June. Little fishing takes place in April, however, the catch seldom exceeding 12,000 cwts. for the whole of Scotland. The fishery proper begins about of middle of May - in the Minch, the Orkneys and Shetlands and occasionally at the East Coast Ports. Since the war the average landings in May have been approximately 80,000 cwts, much more activity is shown in June. By the middle of the month the whole of the great Summer Fleet - roughly 1800 vessels - is engaged and the catch is usually in the neighbourhood of half a million cwts. Since 1920 the April - June fishing has contributed 19% by quantity a nd 17% by value of the total Scottish Catch, compared with 32% and 26% for the decade preceding the war.

The chief centres of the fishery are (1) Stornoway (the Minch and adjacent lochs) (2) Barra (chiefly Castlebay Loch Boisdale and Loch Skipport) (3) Fort William (Argyleshire lochs and open waters off Mull) (4) ~~Stornoway~~ STRONSAY (chiefly grounds to the East of Orkneys).

Up to 1906 Stromness on the West Side was the "early" port but in that year the shoals left the western grounds and the fishery moved to Stronsay which then became the centre for both the early and late fishings. ~~Three~~ three years ago an attempt was made to revive Stromness as an early port but the venture proved unsuccessful.

(5) Lerwick* (grounds to the East of Shetlands)

(6) Wick, Fraserburgh and Peterhead (North Sea and Moray Firth).

Of the total average yearly catch since the war - 646,000 cwts. - Shetland contributes 291,000 cwts: Wick 66,000 cwts: Stornoway 42,000 cwts: Fraserburgh 64,000 cwts: Peterhead 61,000 cwts: Fort William 34,000 cwts: Orkney 28,000 cwts and Barra 14,000 cwts.

There is a marked difference in the quality of the fish caught in the different districts. The average prices for the past eight years have been:-

East Coast.	West Coast.	Orkney and Shetland.
8/1 per cwt.	12/6 per cwt.	6/1 per cwt.

The higher price on the West Coast is due to the superior quality of the fish; but the difference in the price between Shetland and the East Coast must not be attributed to any marked inferiority in the quality but rather to the fact that operations usually commence in Shetland Waters earlier than on the East Coast; and the May herrings - which fetch a much smaller price than the June herrings - bulk more largely in the total and so depress the average price for the season. As a matter of fact the early Shetland fish a re, as a general rule, superior to the East Coast, being larger, fatter and more mature.

The West Coast Catch in May and June - and particularly at Castlebay and other Barra Waters - is remarkable chiefly for the preponderance of "matjes" - i.e. herrings which have reached the transition stage when all the fat has gone to the muscle and none to the milt or roe which are just about to develop. Because of their very oily nature these must preforce be lightly cured, and nowadays the term "matje" applies as much to a light cure as to the stage of development of the fish.

* Formerly the early fishing was confined to West and North West Stations - St. Magnus Bay, Scalloway and Baltasound-but from 1906 onwards the western grounds became less prolific and the fishing got centralized on the East Side with Lerwick as the chief port.

Before the war these were much esteemed and eagerly sought after by the better classes in Russia but since the war the chief purchaser has been America, where they command higher prices than the best of the East Coast Cure.

The development of the early fishery during the past quarter of a century has been phenomenal. Prior to 1906 it was more distinctively an Orkney and Shetland and West Coast Fishery, but, from 1906 to the outbreak of the war, the East Coast Ports assumed a more prominent position. The following figures give the average catch (in thousands of cwts.) at (1) the East Coast Ports (2) Orkney and Shetland (3) the West Coast since 1896 with the percentages of the total catch secured by each district.

	(1)	(2)	(3)	Total
1896-1900	82 (11%)	325 (44%)	336 (45%)	743
1901-1905	157 (17%)	414 (53%)	233 (30%)	784
1905-1909	584 (47%)	438 (35%)	255 (18%)	1,246
1910-1914	971 (47%)	894 (44%)	185 (9%)	2,050
1919-1927	221 (34%)	297 (46%)	128 (20%)	646
1928	280 (35%)	320 (40%)	204 (25%)	804

It will be seen (1) that in less than twenty years the fishery practically trebled itself and (2) that the East Coast's contribution to the total increased from 11% (1896-1900) to 47% (1910-1914) while in the same period the West Coast fell from 45% to 9%. This expansion synchronizes with and is in a large measure due to the growth of the Steam Drifter Fleet. Rather than have these costly vessels lying idle, the Owners commenced what was really the Great Summer Fishery earlier and earlier each year, until in some seasons drifters were actually fishing from East Coast Ports in the end of April - fully two months earlier than was customary in the nineties. Circumstances favoured them: the Continental Market for cured herrings and the home market for fresh and kippered herrings were both expanding so that at first there was little difficulty in finding a market for fish, which were admittedly vastly inferior to the rich, full herrings of July and August.

In a sense too the transfer from sail to steam was responsible for the change in the locus of the industry from the West Coast to the East Coast. Most of the steam vessels are owned by East Coast Fishermen and the bulk of them are engaged in Shetland or East Coast Waters during July or August, the Minch then being comparatively unproductive. It was only natural that as far as possible they should fish from the same ports during May and June, and so the tendency was to neglect the Minch in the earlier months as well and concentrate on the East Coast grounds.

Another factor which adversely affected the West Coast was the tremendous development of the Shetland Fisheries in the nineties. Prior to that time operations during May and June had been practically confined to the Minch and adjacent lochs, but, when the early fishing commenced in the Shetlands, many boats forsook Stornoway altogether, while others put in a very short season there before proceeding North. The persistence of the "Engagement" * system at the early Shetland Stations until 1909 aggravated the situation, for in most of the agreements it was stipulated that fishing should commence during the first week in June. As a consequence the full fleet operated at Stornoway for a very short season - from the middle to the end of May, - only a small proportion remaining to take part in the June and July fishings. During the past few years, however, there has been a greater tendency to stay on, and last season the Minch Fishery was so productive in the later months that the fleet actually reached its maximum strength - 387 - in the end of August.

* See Chapter IV.

As the statistics quoted above indicate, the position of the West Coast relatively to the other centres has improved considerably since the war. The whole fishery has shrunk to a third of what it was from 1910 to 1914 but - owing to the superior quality of the fish - the decline on the West Coast has been much less pronounced than in the Orkney and Shetland and East Coast Districts.

The general shrinkage in the quantity landed has been due not so much to scarcity of fish as to the fact that the fishery has been prosecuted less intensively than before the war, the majority of the fleet having ~~involuntarily~~ voluntarily refrained from commencing operations until the beginning of June. With Russian buyers out of the market, the normal yield of the June-August and Yarmouth and Lowestoft Fisheries is sufficient to satisfy the demands of foreign consumers for British cure, and, as the May fish are much inferior in quality and fetch a much smaller price when cured, importers have found it increasingly difficult to get rid of their May - early June stocks and serious losses have been incurred, huge quantities having deteriorated so rapidly as to become totally unfit for human food. This of course has had its reprecussion on the fishermen and prices have repeatedly fallen so low as to make fishing very unremunerative.

The difficulty in disposing of the catch and consequent fall in price is not entirely a post war development. It manifested itself for a few seasons prior to the war, and, while all sections of the trade agreed that it was a mistake to flood the continental markets with an inferior article, they were by no means agreed as to the best way of stopping the abuse.

Exporters and curers advocated a close time at Orkney and Shetland and East Coast Stations until the second week in June: kipperers and freshers ~~continued~~ contended that the proposed suspension of fishing would inflict great hardships on them: the fishermen were divided - on the one hand they realised that, if there was any risk of over-production, the early fishing ought to be curtailed, on the other they were unwilling to have their boats lying idle when fish were on the grounds. Voluntary close times - usually to the end of the first week in June - were proposed and agreed to among the fishermen themselves but as a rule a minority - generally of Shetland and English Fishermen - ignored the agreement and the "close time" ended.

Similar proposals have been made every year since the ~~year~~ war. In 1919 the Scottish Fishermen's Association recommended that fishing should not commence until 15th June and exporters and curers have consistently urged the fishermen to honour this agreement: but, while some districts have been loyal, others have openly disregarded it and these early fish continue to be caught and what is worse - continue to find their way to the foreign markets.

Realizing that voluntary close times were ineffective the Scottish Steam Drifters Association, the Scottish Herring Curers' Association and the British Herring Exporters' Association decided at a meeting held in Yarmouth on the 12th November 1927 that a compulsory close time was necessary and that the Fishery Board for Scotland should be approached with a view to obtaining the necessary statutory power to enable it to fix dates for commencing the summer fishing at the different ports of Scotland, such dates to be fixed in the early spring of each year after consultation with representatives of all the parties interested.

Without giving any specific reasons for their decision, but taking the view, no doubt, that a close time would be an injustice to some branches of the industry, the Fishery Board vetoed the proposal.

This demand for a statutory close time was no new thing. As early as 1860 the Glasgow Fisheurers petitioned Parliament to have a close time decreed for the West of Scotland, ostensibly on the ground that the herring was being overfished, really, as Chater says (Fishery Laws And Legislation, William Clowes & Son 1884), with the object of enhancing the price of the summer fish by checking the supply caught in spring. As a result of their representations an Act was passed (23 & 24 Vict. c 92) which forbad fishing for herrings from 1st January to 20th May between Cape Wrath and Ardnamurchan Point and from 1st January to 31st May between Ardnamurchan Point and the Mull of Galloway. This Act was so strictly enforced that fishermen were not allowed to catch herrings even for bait, and the mere fact of finding scales on the bottom of a boat was sufficient to secure a conviction. Great poverty resulted not only among the herring fishermen but among the cod fishermen as well, who, of course, required herring for bait. Two Royal Commissions (1862 & 1864) were appointed to investigate the situation and in 1865 (28 & 29 Vict. c 22) the close time was reduced to the period between 1st February and 1st May and limited to the western seas between Ardnamurchan Point and Mull of Galloway and later by the Act 1868 (31 & 32 Vict. c 45) was further restricted to the territorial waters between these points.

Since then the need for a close time on the West Coast has been frequently advocated. In 1900 it was proposed to close the whole of the West Coast from 1st January ~~to the~~ 10th May.

This was vetoed but it was voluntarily agreed to observe a close time in the Minch from 10th April to 10th May and, although it has always been unpopular with the Stornoway Authorities, this is still usually observed. Two years ago it was proposed to extend the period of closure from 15th February to 10th May but the opposition was so strong that nothing came of it.

In more recent times, however, attention has been largely focussed on the desirability of curtailing the East Coast Fishery and, as has already been stated, the movement culminated in an unsuccessful petition to the Fishery Board that the date of commencing operations should be determined each spring and should be made compulsory for all fishermen.

Much can be said both for and against a statutory closure in May and early June. The curers commonly base their case on the following arguments -

(1) The market for cured herrings is limited and, it is very difficult to create new markets. Russia, the largest market of all, is lost and, until it is recovered or fresh outlets developed, there is bound to be overproduction. It is advisable therefore to cut off the supply of the lowest grades i.e. the May and early June catch.

(2) Supplies of early fish destroy the demand and undermine the quotations for the larger fish. Consumers who have sampled the earlier stuff are chary of buying the later until their superior quality is proved.

(3) The Norwegian herrings cannot compete with mature British herrings., but they can ~~do~~ and do compete with the lean early fish. The consumer is apt to think that the Scotch fish are no better than the Norwegian, and great harm is done to the reputation of the Scotch Cure. It is therefore in the best interests of the trade that the supply of inferior fish should be cut off and, as voluntary agreement has failed to achieve it, a close time should be enforced by legal enactment.

The freshers, kipperers, tinning-firms - and many of the fishermen too - are on the other hand opposed to compulsory measures of any kind. They contend that -

(1) Owing to the uncertain movements of the herring it is difficult, if not impossible, to make a forecast with regard either to quantity or quality. It would be useless therefore to fix a definite date for a period of years. The date would have to be decided annually, after consultation with all sections of the trade, and the deciding factors would be (1) the state of the market (2) the probable maturity of the fish. So far as the latter is concerned it would at best be a plunge in the dark, for no body of experts can decide in the spring what the quality of the herrings will be in early summer.

(2) The same date would not be equitable for all ports. As the herring matures earlier at Shetland than on the East Coast, operations ought to commence earlier at Lerwick than at Fraserburgh and Peterhead. Different starting dates therefore would have to be fixed at each port, but in practice this would break down, as drifters would tend to congregate at the early ports and desert the later.

(3) The Shetland fishermen contend that if Shetland waters are to be closed, Stornoway waters should also be closed, for the early West Coast, Shetland Herrings are as good as those caught in the Minch. It is true that the Shetland "matjes" are sometimes very good but it is extremely doubtful if they are on a par with those caught in the Minch. The latter are as a rule in first rate condition from the middle to the end of May.

(4) In the absence of international agreement a statutory close time could not be made obligatory on fishing vessels of other nationalities except within territorial waters and a closure of our own fisheries would therefore make it easier for the foreigner to compete.

(5) Although a close time might benefit exporters and curers, it would inflict hardships on the other sections of the trade. The early fish are quite suitable for freshing, kippering and tinning and, so long as there is a legitimate demand for <u>some</u> of the catch, it would be an unwarrantable interference with individual freedom to cut off the <u>whole</u> catch.

No doubt the last objection carried considerable weight with the Fishery Board when it refused to accede to the curers' and exporters' request.

The only valid argument that has been advanced in favour of a close time is that the supply of cured herrings on the continental markets is meantime in excess of the demand. The remedy therefore, would appear to lie in the hands of the curers and exporters themselves - for the former to refrain from curing early fish or alternatively for the latter to refuse to deal in them. No general embargo on the capture of herrings is required.

The freshing, kippering, and tinning firms can absorb only a very small proportion of the daily catch, so that if the curers ceased to buy, the fishermen would find it impossible to sell their catch and would be compelled to stop fishing. A close time could therefore be effected by voluntary agreement among the curers themselves. If, however, voluntary measures prove ineffective, then an appeal should be made to the Fishery Board to secure the necessary legislation making it illegal either to export herrings cured on the East Coast or at Orkney and Shetland before a fixed date, or (alternatively) to cure herrings in these districts before a fixed date - the date in both cases to be determined annually after consultation with the Curers, Exporters and Fishermen.

THE GREAT SUMMER FISHERY.

Although the Winter Fishery sometimes affords a useful augmentation to their income, the Great Summer Fishery is undoubtedly the mainstay of the Scottish Herring Fishermen. On its success or failure depends the well-being not only of those diregtly engaged in it - fishermen, curers, kipperers, freshers, coopers, gutters etc.- but also of the merchants and tradesmen in a large number of towns and villages round the coast, for which it is the chief - sometimes the only industry.

When the season is at its height, practically all the larger herring drifters in the country are engaged - generally about 1800 craft, excluding the Clyde Skiffs which confine their activities almost entirely to the Firth and the lochs adjoining. More than 16,000 fishermen are employed in landing the catch and 10,000 to 11,000 in curing, packing and dispatching. During July and August alone 54% of the total Scottish Catch is landed - approximately 1,500,000 cwts.

As has already been stated, the distinction between the Early and Great Summer Fisheries is purely arbitrary: there is now no break between them. For statistical purposes however the Great Summer Fishery is regarded as extending from 1st. July to 31st. December, although in reality it is confined to July, August and part of September. Sometimes it ends abruptly in the third or fourth week of August but more often it continues to the first or second week of September, its duration depending almost entirely on the quality of the catch. Whenever spent or shotten fish make their appearance in considerable quantities, the price falls rapidly and the season terminates.

Up to the middle of the 18th. century the fishery was prosecuted on a very small scale at practically every village round the Scottish Coast, the catch being cured almost exclusively for home consumption. With the exception of regular consignments

dispatched from Glasgow and Stornoway to Ireland, little or no export trade was done.

Its development on a systematic basis for commercial purposes really began at Wick in 1786, when the British Fisheries Society was formed. Under its fostering care the Wick Fishery increased with great rapidity. By 1800 over 200 boats were regularly engaged during July and August - chiefly to supply the Irish Market. In 1835 the fleet had increased to ~~1830~~ 830, in 1850 to 1000 and in 1860 to over 1100. Thereafter the numbers began to decline owing to the growth of Fraserburgh, Peterhead and other southern stations.

The development of the fishery at these places, though it came later, was no less rapid. The Act of 1808 was really the foundation on which the industry at the East Coast Ports was built. This Act put the Bounty System on a new and sounder basis and at the same time provided for the appointment of Fishery Officers - full time officials to reside in the various fishery districts and to supervise and give advice on the method of cure. The effect of the new regulations was soon evident: the industry throve as never before. Insignificant seaside hamlets were galvanized into new life and increased rapidly in numbers and prosperity. Fraserburgh was the first to spring into prominence. In 1815 its total cure was only 5562 barrels: by 1818 this had increased to 24,398 barrels and the fishery had become sufficiently established to entice some of the Caithness Crews from Wick and Lybster in the latter part of the season. The neighbouring port of Banff also shot ahead at this time and for a few years ran Fraserburgh hard as the second herring port in Scotland, Wick of course being then supreme. Fraserburgh however was destined to outdistance both. In 1835 its fleet had increased to 266 boats: in 1850 to 300: in 1870 to 450 and in 1880 to 840. In 1863 with a catch of 106,000 crans it took precedence over Wick for the first time and- so far as the Summer Fishery is concerned - it has maintained that position ever since.

As early as 1816 seven stations were curing for the new brand - Lerwick, Wick, Lybster, Helmsdale , Fraserburgh, Burntisland. and Leith - and other stations followed soon afterwards. Every year saw more and more boats built and more and more capital attracted to the curing and kippering trades. The rapid growth of the fishery on the East Coast can be guaged from the fact that in the decade from 1811 to 1821 the number of barrels cured increased from 9,000 to 342,000, whereas for the same period the West Coast remained practically stationary(81 000 - 90,000 barrels)

The statistics given in Appendix IV show the general progress of the industry during the last century at both East and West Coasts, but the following are interesting as showing its widespread character in the eighties and the relative importance of the various stations--

Quantity landed in crans at:-

	1878	1879	1880	1881	1882
Wick	84,248	63,094	113,186	55,542	69,926
Lybster and Clyth	6,910	9,240	12,371	15,231	1,626
Forse	282	620	592	219	28
Latheronwheel	512	790	637	1,237	78
Dunbeath	1,502	2,800	1,056	1,802	504
Helmsdale	7,600	10,855	10,285	13,783	3,920
Portmahomack	858	1,391	1,790	1,515	1,376
Burghead and Hopeman	1,122	3,009	5,200	3,090	2,328
Lossiemouth	819	4,896	7,600	3,800	2,544
Buckie District	2,864	3,832	12,413	7,173	7,680
Portsoy	4,935	4,670	6,950	5,600	4,650
Whitehills	1,102	1,610	1,667	840	1,174
Banff	250	1,360	1,913	1,606	3,030
Macduff	4,756	7,384	8,530	5,538	9,762
Gardenstown	4,058	7,007	6,915	7, 685	4,387
Fraserburgh	175,820	105,037	218,504	132,613	139,50

Peterhead/

	1878	1879	1880	1881	1882
Peterhead	122,456	83,200	177,300	124,800	124,185
Aberdeen	69,231	36,400	78,810	78,657	80,253
Stonehaven *				19,355	15,910
Montrose District	26,758	30,048	54,091	26,012	28,839
Anstruther District	3,975	6,490	7,840	3,660	3,145
Leith to Dunbar	1,500	5,460	4,600	4,110	2,722
Eyemouth District	25,407	52,149	48,715	59,486	59,825
Orkney	14,722	8,364	16,142	14,418	16,166
Shetland	6,240	6,700	38,700	46,250	102,000
Lewis and Barra	50,670	60,000	94,500	41,100	45,240

* Stonehaven up to 1880 was included in Montrose District.

The process of centralization which has been such a feature of the Summer Fishery in more recent times had already set in and fishermen were tending more and more to forsake the smaller creeks in favour of the big centres. Lybster for example, which from 1835 to 1855 cured 33,500 barrels annually, fell to 17,000 barrels in 1880 and to 1900 barrels in 1882. Doubtless centralization would have been even more rapid in the seventies but for the system of "engagements" which had been in vogue since the beginning of the century. Under it at the end of one fishing the curers "engaged" boats to fish for them at the next fishing, specifying of course the place where the catch was to be landed, the quantity to be taken and the price. No matter how small the station, the fisherman could be sure of his market and the curer of a guaranteed supply. This proved the saving of the smaller creeks. In the eighties however owing to large takes of immature fish, the curers lost heavily on their engagements and in 1886 the sale of herrings by auction was first introduced. This immediately altered the position. The curers, no longer assured of a guaranteed supply at the smaller stations, were unwilling to make costly preparations for curing fish which might never be landed and so they tended more and more to confine their activities to the larger centres. In the same way the fishermen preferred to land their catches at those ports, where of course there was a larger demand and the prospect of a higher price.

There were other contributory factors as well. In the first place boats were constantly increasing in size and the smaller harbours, which had a sufficient depth of water for vessels of 30 feet keel, were quite inadequate for the larger "fifies" and "zulus" of the nineties and the still larger steam vessels which revolutionized the industry from 1900 to 1914. In the second place freshing and kippering were on the increase and the availability of suitable transport facilities became of prime importance. At most of the smaller creeks these were either non-existent or so inconvenient as to be utterly useless. The consequence was that the fishery instead of being scattered over a large number of small ports tended to get centralized at such places as Fraserburgh, Peterhead, Wick and Lerwick.

During July and August the population at these centres almost doubled itself. In addition to the large influx of buyers, gutters, coopers, labourers and carters, the fishermen generally brought their wives and families with them. The available accommodation was taxed to the utmost, sheds, barns and lofts being freely utilized. Overcrowding was general and sanitary arrangements few, but the townspeople did not object: such inconveniences were easily lost sight of in the greatly increased volume of trade which the yearly visitations brought to the town. In these days of steam however, the wives and families are as a rule left in their native villages. The modern drifter has ample sleeping and cooking accommodation and most of the visiting crews live on board. Owing to the increased travelling facilities by rail and road, many of them are able to go home at the week-ends and a large proportion of their earnings are spent in their native villages--to the detriment of merchants and tradesmen at the larger centres.

While centralization attacked the smaller creeks first and caused them in time to disappear completely as herring ports, some larger centres, which had played an important part in the industry during the seventies and eighties, were by no means immune. The

following statistics show how some of these have decayed during the past thirty years. They flourished as long as the fishery was prosecuted close inshore, but, whenever the fleet began to ~~move~~ pursue the shoals a considerable distance from land, other ports were found to be more conveniently situated for the most prolific grounds. The boats which formerly fished from Montrose, Stonehaven and Aberdeen concentrated at Fraserburgh and Peterhead, while the Cromarty, Helmsdale and Lybster fleet went to Wick or Lerwick.

	No. of Boats Fishing	Fishermen and Boys	Curers and Buyers	Coopers	Gutters and Packers	Labourers	Catch (cwts.)
			MONTROSE				
1896	143	891	15	94	720	48	136,969
1913	64	456	4	32	190	29	12,857
1928	--	--	--	--	--	--	--
			STONEHAVEN				
1896	56	350	8	29	180	26	47,152
1913	13	78	5	8	66	2	1,330
1928	--	--	--	--	--	--	--
			ABERDEEN				
1896	400	2750	55	238	2430	689	454,807
1913	231	2060	43	120	1845	640	269,167
1928	22	194	22	8	390	90	27,330
			CROMARTY				
1896	28	168	1	5	81	8	12,109
1913	5	19				2	194
1928	8	32	2	-	-	1	126
			HELMSDALE				
1896	107	687	10	55	367	29	60,707
1913 *	2	13					301
1928	xx 13	54	3	3	15	2	2,822
			LYBSTER				
1896	55	345	7	23	198	3	35,128
1913 *	10	50	1	3	15		1,971
1928	xx 18	86	2	2	15	2	1,352

xx These figures are higher than in normal years. They are maximum figures and refer to a particularly heavy day's arrivals.

The chief centres of the Fishery are (I) East Coast---Fraserburgh, Wick, Peterhead, and, to a very much smaller extent, Eyemouth, Aberdeen, Bugkie, Banff and Findhorn. (2) Orkney and Shetland---Lerwick, Stronsay, and Baltasound.(3) West Coast---Stornoway, Barra and Fort-William (Oban & Mallaig).

Since the war the East Coast has accounted for approximately 55% of the catch: Orkney and Shetland for 30% and the West Coast for 15%, the corresponding pre-war figures (1900--1913) being 56%, 33%, and 11%. The relative rise of the West Coast is due to the fact that the July-August fishing at Stornoway during the last few years has been prosecuted more intensively than usual, fish being plentiful in the Minch and of good quality. In fact the 1927 catch during July, August and September (341,000cwts.) was just a little short of the Fraserburgh catch for the same period (368,000) and the year's total of 775,000cwts. was far in excess of Fraserburgh's (426,000cwts.)

The relative importance of the various stations is shown in Appendices V & VI. Lerwick is now supreme. It is conveniently situated for the very rich grounds which lie to the East of the Islands: these mature earlier than the grounds farther South, and vessels which commence fishing there in May and June are tempted, other things being equal, to remain during July and August. It has an excellent harbour with splendid landing facilities and a suffic--ient depth of water at all tides for the largest make of herring drifter. The difficulties which assail the fishermen in reaching the harbour and discharging their catch at some of the mainland stations are non-existent at Lerwick. As a consequence it attracts a larger fleet than any other port in Scotland. As many as 500 drifters are engaged at the height of the season and fully 7000 people are employed--roughly 4500 in fishing and 2500 in curing, packing etc. Since the war it has accounted for just over 22% of the total catch for Scotland.

Its rise has been one of the most remarkable features of the industry in modern times. In the seventies it was of little

or no importance as a herring centre. The Dutch "Busses", which in the ~~nineties~~ thirties cured 40,000 to 50,000 barrels annually, had ceased to come in anything approaching their former numbers and the fishery was practically confined (1) to the local crofter fishermen, who for the most part preferred "lining", and (2) to a few Orkney and Caithness Crews who regarded it mainly as a side line during the off-season in their own fisheries.

From 1870 to 1879 the average annual cure was only 3,000 barrels and this insignificant total was actually spread over six stations :- Lerwick, Sandbay, Levenwick, Southwick, Whalsay, and Scalloway.

In the eighties however a remarkable development set in. The grounds to the East of the islands were found to be teeming with herrings and many of the larger close hatched boats, which were rapidly displacing the small half-deckers at the Moray Firth Ports, were tempted to risk the long voyage to fish in Shetland Waters. The fleet steadily increased and their efforts were crowned with such success that in 1897 Shetland took precedence over Fraserburgh as the chief herring centre in Scotland. Although it fell off somewhat the following year, it regained the premier position in 1899 and, apart from the war years, has retained it ever since. The record catch (~~2,381,666~~ 2,260,420 cwts.) of 1905 was just a little short of the combined total for all the East Coast Ports (2,381,666 cwts.)

The fishery is now localized at Lerwick - ~~and in a lesser degree Baltasound~~ - such places as Hillswick, Hoswick etc. being little heard of, although at one time they enjoyed a fair measure of importance.

The Orkney District too shared in this development, though to a much smaller extent. Its history closely resembles that of Shetland. The Dutch were the pioneers but, as the 19th century advanced, their activities in Orkney waters waned, and by the middle of the century only local and Caithness boats took part in the

fishery. From 1865 to 1875 the average annual catch was 14 335 cwts. This was more than doubled in the nineties and from 1900 onwards steadily increased until, for the four years preceding the war, it reached the excellent average of 120,000 crans. Operations were completely suspended during the war, and, after hostilities ceased, the Orkney Fishery was much slower in recovering than most of the other centres. Since 1923 however there has been a welcome improvement but the fishery has never been prosecuted with the same intensity or success as from 1910 to 1913.

Stronsay is now practically the only centre. Such stations as St. Margaret's Hope, Burray, Cara, Hoxa and St. Mary's, which flourished - in a minor key, it is true - during the eighties, had by 1900 almost completely faded out of the industry, and Stronsay had established itself as the chief centre. About this time Stromness came into the picture as an early West Side Station. It developed rapidly until 1906, when for no apparent reason the shoals deserted the Western Grounds, and its decline was even more rapid than its rise. These grounds have been tried repeatedly since then but with little success.

Fortunately instances of the herring forsaking the usual grounds over a lengthly period of time are comparatively rare in the case of the East Coast Fishery - much more so than in the lochs and firths of the West Coast. It may be of course that their rarity is more apparent than real. The fleet does not confine itself to particular areas to the exclusion of all others as in the loch fisheries. Usually the known grounds are tried first, but, if these are found to be barren, the fleet scatters - sometimes over a very wide area - until some boat is fortunate enough to strike a shoal and the others then congregate in the vicinity until some more prolific ground is discovered.

This no doubt explains the absence of extreme fluctuations in the Great Summer Fishery. As the following figures

will show, it has had its ups and downs but these have never been excessively extreme, although of course they have often been sufficient to play havoc with the calculations of the curers and exporters. Complete failure is unknown.

Average annual catch (in thousands of cwts.)

1899	East Coast.	Orkney & Shetland.	West Coast.	Total.
99-1903.	1,740	882	396	3,018
04-1908.	2,152	1578	246	3,976
09-1913.	1 645	812	330	2,781
19-1927.	1,116	578	568	2,262
1928.	1,194	711	436	2,340

The post-war returns show the most striking variation. There is no doubt that for some reason or other herrings have been less plentiful since 1919 than they were in the decade prior to the war but at the same time we must not lose sight of the fact that for a variety of reasons - loss of markets, old and worn nets, coal strikes - the fishery has not been prosecuted with the same intensity as before.

On the other hand the record landings from 1904 to 1908 were undoubtedly due to the presence of an abnormal number of large shoals; for during the next few years, a fleet of at least equal catching power was continuously engaged, yet the total yield fell off by a third, returning almost to the 1899 to 1903 average.

So far as the magnitude of the catch is concerned, the season of 1921 is the most unfortunate (apart from the war years) that the industry has experienced for over thirty years. Although the fleet was well up to pre-war strength, only 1,500,000 cwts. were landed - a marked contrast to the record yield of 1907 (4,250,000 cwts.) The scarcity of herrings was generally attributed to a remarkable invasion of the herring grounds by a species of salp (salpa fusiformis). This belongs to the jelly-fish tribe and does not as a rule frequent the North Sea. Its usual habitat is the Atlantic but occasionally, when the temperature of the

water is slightly above normal, it invades the herring areas with disastrous results to the fisheries. Similar invasions took place in 1905 and 1920. In the former year salps were found in abundance in the Moray Firth and herrings were exceedingly scarce, although at the same time excellent catches were got off Orkney, Shetland and the East Coast of Aberdeenshire, which areas were free from them. In 1920 and 1921 they were so widespread that the nets got clogged with them and hung almost perpendicularly in the water: in both years catches were very light. So far no one has been able to determine whether the salps are directly responsible for driving the herrings away or whether they cause a dearth of those crustacea on which the herring usually feeds. It is significant that, when salps are found, those organisms are scarce. Or it may be that the hydrographical conditions are favourable to salps but unfavourable to herrings.

East Anglian Fishery.

Although this is an English Fishery, Scottish Fishermen have played such an important part in its development during the last fifty years that no account of the Scottish Seasons would be complete without some reference to it.

Up to the middle of last century it was prosecuted chiefly by local and Dutch "Busses". These were vessels of considerable size, capable of holding forty to fifty lasts[x] of herrings. They did not land their catch daily as herring drifters do today, but remained at sea for several days on end and cured the fish as they were caught, returning to port only when their full complement was secured.

Under these conditions Scottish Fishermen took little or no part in the fishery. When however the larger type of sailing drifter was introduced, they came more into the picture and the number of boats participating steadily increased. By the nineties a fleet of 600 vessels was regularly employed.

The following figures show (1) the average number of Scottish Drifters employed (2) the quantity (in thousands of cwts.) landed by them and the percentage of the total English Catch (3) the value (in thousands of pounds sterling) and the percentage of the total.

	(1)	(2)	(3)
1900-1904.	1010	1218 (42%)	255 (28%)
1905-1909.	1263	1582 (41%)	445 (36%)
1910-1913.	1140	1965 (37%)	618 (36%)
1919-1927.	945	1569 (36%)	720 (38%)
1928	835	1569 (38%)	682 (40%)

The fishery extends from the first or second week in October to the end of November or the beginning of December and is prosecuted almost entirely from Yarmouth and Lowestoft. This means a very long voyage for the Moray Firth Fleet and considerably increases the season's expenses. The surprising thing is that so few of them take advantage of the September Fishery at Blyth, Shields,

[x] A "last" is 13,200 fish—approximately 10 crans.

Scarborough or Hull on their way south. The herrings caught off these ports are, it is true, softer and oilier than the firm Yarmouth and Lowestoft herrings but they are excellent, when consumed fresh or kippered, and would undoubtedly command a fair price. Most of the fleet however prefer to spend the month of September at their home ports making preparations for the East Anglian Fishery proper, and only a small minority even trouble to shoot their nets on the southward voyage.

As the fishery is confined to the winter months, interruptions through adverse weather are much more frequent than in the Great Summer Fishery---especially when the grounds are at a considerable distance offshore---and the wear and tear of nets and other gear is usually very much greater.

Most of the catch is cured for Continental Consumption, only a small proportion being made into kippers or bloaters or disposed of fresh or tinned. The condition of the foreign market is therefore practically the all determining factor in price, and, as the fishery follows close on the heels of the Great Summer Fishery, ~~the~~ its success or failure--so far as the fishermen are concerned--is apt to depend on whether herrings have been scarce or plentiful in the summer. This repercussion reached its climax last November when operations were entirely suspended at the height of the season, because the Great Summer Cure and the October East Anglian Cure were more than sufficient to satisfy the Continental Demand until July, when the first of the Great Summer Consignments arrive.

In spite of these drawbacks however Scottish Fishermen look on the Autumn Voyage as second only to the Great Summer Fishery, their gross earnings being usually in the neighbourhood of £700 to £800 (roughly two thirds of the Great Summer) for approximately eight weeks' fishing.

Irish and Manx Fisheries.

Ireland has no fishery to compare with the Great Summer or East Anglian Fisheries. Nevertheless operations are conducted at different places round the coast from April to December on a sufficiently extensive scale to attract a considerable number of Scottish and English Drifters.

There is an early fishing, from April to June, at Buncrana** on the North Coast and at Kinsale and Dunmore on the South Coast. The chief Irish Fishery, however, begins towards the end of August and continues to December: it is almost entirely inshore along the coast of Down, Louth and Meath, the chief centres being Howth, Ardglass, Balbriggan and Kilkeel. The Manx Fishery commences earlier, usually in June, and lasts to September, the bulk of the catch being landed towards the end of the season. Port St. Mary, Peel and Douglas are the centres.

It cannot be said that the Scottish Fishermen generally have at any time regarded either fishing as an important part of the year's routine. The tendency rather has been to work in a few weeks in Irish waters either before the Great Summer Fishery or between it and the East Anglian. The introduction of the steam drifter with its greater mobility facilitated this, and from 1900 to 1913 Scottish vessels took a larger share in the fishery than ever before. The following statistics show (1) the average number of Scottish vessels participating (2) their average catch in thousands of cwts. (3) the average value in thousands of pounds sterling.

**Buncrana also has a Winter Fishery.

	(1)	(2)	(3)
1900-1904.	164	47	16
1905-1909.	327	75	36
1910-1913.	213	156	45
1920-1924.	21	16	11
1925-1928.	209	170	100

The most striking feature is the marked decline in the five years immediately succeeding the war. Running costs were then so high that the fishermen confined themselves largely to the Scottish and English Fisheries and laid up their boats at the off seasons or else went in for long lining. As a consequence the Irish Fisheries were neglected and Scotland's share in the Irish Catch fell from 26% for the decade preceding the war to 8% from 1920 to 1924. Individual boats however were more successful, grossing on the average £520 as against £210 (1910-1913) and £110 (1905-1909). During the last few years the fishery has attracted a much larger fleet, drawn chiefly from Buckie and Findhorn. Their landings both as regards quantity and value have exceeded the best of the pre-war years. The year 1927 constituted a record, 273 vessels landing 280,000 cwts. valued at £142,500.

CHAPTER IV.

METHOD OF CAPTURE.

Nets.

The various methods of capture are differentiated not so much by the kind of vessel engaged as by the type of net employed. It seems advisable, therefore, before we trace the evolution of the modern drifter from the undecked boat of the fifties, to discuss the structure of the nets and the different ways in which they are operated.

They are of three kinds (1) Drift Nets (2) Seine Nets (3) Trawl Nets. In addition to these, Trammel or Set Nets were at one time employed, but latterly thay have become practically obsolete and are now to be found only on the Ballantrae Bank, and on a very small scale at Leith, Montrose and Loch Broom.

(1) Drift Nets.

The Drift Net, so called because it is not towed or trawled but allowed to drift with the tide, is by far the most efficient. It is in fact the only method by which herrings swimming at or near the surface can be caught in the open sea at any distance from land. It is exclusively used in the East Coast, Orkney and Shetland and Hebridean Fisheries; and in the Clyde Estuary and the Firth of Forth some boats use it in preference to the Herring Seine. Last year 108,000,000 square yards of drift netting were used by the Scottish Fleet as against 2,700,000 of Seine Netting. This marks a decrease of 105,000,000 square yards on the 1913 fleet and of 48,000,000 square yards on the 1900 fleet. In the same period the extent of Seine Netting used has increased by 900,000 square yards.

The requisites of a good net are that it should be (1) durable (2) invisible (3) capable of retaining the fish (4) of suitable strength and mesh to capture large herrings and let immature fish escape (5) of such a texture that the fish may be easily shaken out and may be little damaged in the process.

Up to the middle of last century drift nets were home made. When the fisherman was at sea, his wife and family were busily engaged making nets to replace those which were old and worn, and at the end of a fishing the fisherman himself assisted at weaving and mounting them. The only material used then was hempen twine.

About 1840 however a machine was invented for net making and a factory was opened at Musselburgh. From that time net making as a home industry dwindled, but repairs are still executed at home.

Soon after 1850 cotton nets appeared. These, though less durable and more liable to shrink than hempen nets, were much lighter and cheaper, and boats could carry many more of them. At a time when hauling was done by hand they were also very much more easily manipulated. They were soon universally adopted and are still in general use to-day. Their chief drawback is their lack of durability. Nets used at both summer and winter fisheries are rarely serviceable after five or six years, and, unless they are carefully looked after, they may shrink in mesh so much as to be useless long before then.

To preserve them they used to be steeped or "barked" in a solution of oak or larch bark - sometimes in tar, although this tended to make them sticky and clogged the meshes - and they were spread out to dry every week. Barking by these methods took three or four days. In 1848, however, cutch (an extract from the Eastern catechu) was tried, and proved so successful that it is still used.

It involves a great saving of time as a "fleet" can be barked in a few hours and the process need not be repeated oftener than once a month. The cutch gets into the fibres of the cotton and toughens it, rendering it less liable to injury from the action of salt water. With cutch, drying, though desirable, is not absolutely necessary and it is seldom nowadays that one sees the old familiar sight of every piece of common land at our herring ports strewn with nets, impregnating the country side with their odours.

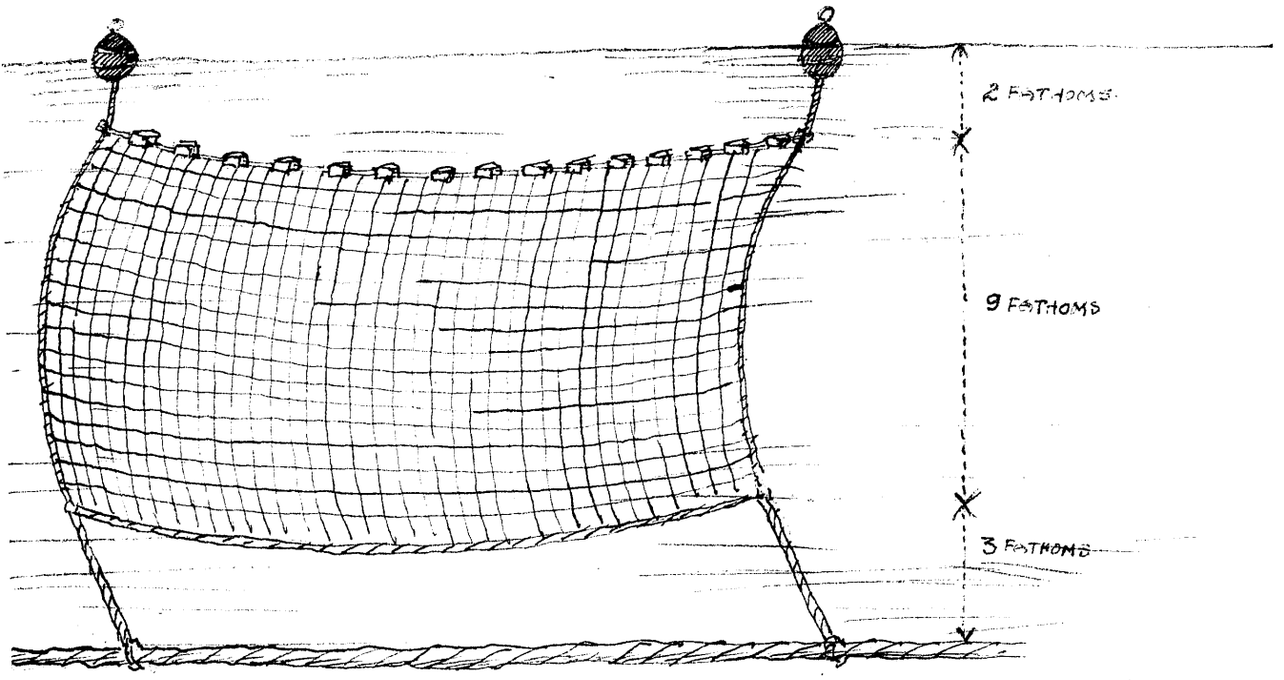
In order to render the nets more invisible in winter, alum is sometimes used instead of cutch. This gives them a greyish white appearance but its use is practically confined to the smaller craft of the Firth of Forth.

Nets made of ramie - a substance used in China and Japan for cordage - were in 1905 and 1906 tried alongside old and new cotton nets but with most unsatisfactory results. In the first place despite frequent barkings they got pulpy and gave way at the knots. Tannic acid was tried as a preservative instead of cutch but they still remained far too soft and absorbent. Besides, the herrings got so firmly fixed in the meshes that it was almost impossible to shake them out and many were destroyed in the process. The use of ramie therefore never really got beyond the experimental stage.

In a new net the meshes number 32 to 34 to the yard but old nets through shrinkage may have as many ~~meshes~~ MESHES as 40 to the yard. The size of mesh was a bone of contention in the trade during the greater part of last century. Fishermen were using nets of very small mesh and were

catching such immature fish that it was found advisable to fix the size of mesh by statute and in 1808 it was enacted (48 Geo. lll c 110) that the mesh should be not less than one inch from knot to knot. Endless difficulties ensued chiefly with the sprat fishermen, and, after three Government Commissions had investigated the matter, the regulation was repealed in 1868 (30 & 31 Vict. c 52). Since then there have been no restrictions on the size of mesh and it is well that it is so; for in such a matter legal enactment is difficult, and fishermen might quite unwittingly become law breakers. Far better that it should be left to their own good sense, for they know by experience that too small a mesh does not pay, as the larger and more valuable fish cannot get their heads far enough in to be securely meshed.

Each net as it comes from the factory is 55 yards in length by 18 yards in breadth. When in use, it is gathered in to a length of approximately 30 yards so that there is some "give" when the fish strike it. A boat carries anything from 60 to 100 of these, and, when they are joined together, they are known as a train or fleet of nets and extend for a distance of one or two miles from the boat. To the top of each are fixed at regular intervals a series of corks to assist in keeping it afloat, and at the bottom it is attached by "stoppers" (ropes approximately six yards long) to a very strong manilla rope called the "messenger" or "leader" which stretches the full length of the fleet. Between each pair of nets a buoy floats on the surface, attached to the top of the net by buoy ropes, the length of which determines the depth at which the fleet will float. As a rule they are kept at a length of six to nine feet. The net thus hangs in the water in the following manner and forms a more or less perpendicular wall in the sea.



As the herrings swim against it, they push their heads into the meshes. This presses the gill covers against the neck of the fish and, when it opens them again to breathe, the mesh slips into the gill openings and the fish can get neither forward nor back.

This method of using drift nets was introduced in the nineties, and was a complete reversal of the existing practice. Hitherto the main (or "back") rope joining the nets had been at the top, and at the foot were sinkers to make the nets hang vertically in the water. The severing of this rope by a passing steamer imperilled the whole fleet of nets. Trawlers were frequent offenders and it is said, that foreign trawlers dragged behind them a sharp instrument, popularly known as the "devil", for the purpose of cutting through any drift nets which fouled their trawl. The matter was taken up at the Fisheries Convention, held at the Hague in 1882 and attended by the chief European Powers, and it was unanimously agreed that the use of such instruments should be prohibited. At the same time legislation was introduced in this country compelling drifters to show lights when fishing, and restricting the movements of trawlers on grounds where such fishing was in progress.

The transfer of the main connection from the top of the net to the bottom did much to lessen the damage when the nets were fouled, but it did not meet with unqualified approval from the fishermen themselves. The chief objection was that only feeding herrings were caught and that the larger herrings passed under the net. This, however, could easily have been obviated by lengthening the buoy ropes: the Dutch were, and still are, in the habit of varying the length of their buoy ropes in accordance with the depth at which the herrings are swimming, but Scotch Fishermen prefer to stick to buoy ropes of two to three fathoms, because (1) when the nets are set deeper in the water, they are more difficult to haul, and (2) if boats fishing near each other are using buoy ropes of different lengths, the chances of fouling are greatly increased, as the nets, being set at different depths, do not drift at the same speed.

Fouling is more common when boats are fishing inshore, as neighbouring boats are frequently within a quarter of a mile of eacgh (EACH) other: offshore they keep farther apart - usually from half a mile to a mile.

When preparing to fish, the boat sails with the wind and the nets are shot over the starboard side, sufficient steam being kept up to prevent the nets from fouling the propeller. The leader is fed out through the "cage" to insure a fair lead; two men haul out the nets, a third ties the stoppers, and a fourth hauls up the buoys. The operation of launching the whole fleet takes about half an hour. Lights are then shown to indicate that the boat is fishing, and the watch is set. Steam is shut off and both boat and nets drift with the wind and tide; but, as the drift of the boat is greater than the drift of the nets, the latter are kept taut, so that several boats can fish near each other with their nets parallel.

Night is the time invariably chosen for drift net fishing. It is then that the herrings rise to the upper layers of the water in their search for food, and of course the nets are then much more invisible than in the day-time. They rise best when the sea is not too calm but is ruffled by a fair breeze; and the fishermen hold that the best time for a "rise" is just before or just after sunset. Consequently the usual time for shooting the nets is an hour before sun-down. The length of time they are left in the water varies; usually on the East Coast they are hauled about 1 a.m.-afterwards, as the season advances, a little later. Sometimes they are hauled earlier, if a change of wind occurs or if an examination of the nets nearest the boat reveals that a shoal has been struck and the nets are full. They are hauled over the bow and against the wind, and, as they come aboard, the stoppers are untied and the process of removing the fish from the nets begins and is continued on the homeward voyage. When all the fish have been shaken out, the nets are folded and placed in readiness for the next trip. Care is taken to protect the catch from sun and rain, as both are very injurious to the fish.

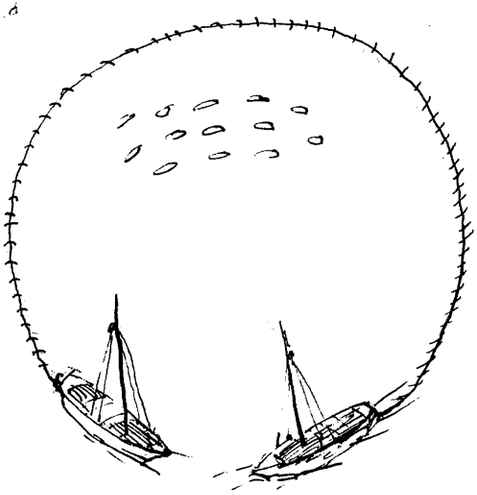
(2) SEINE NETS.

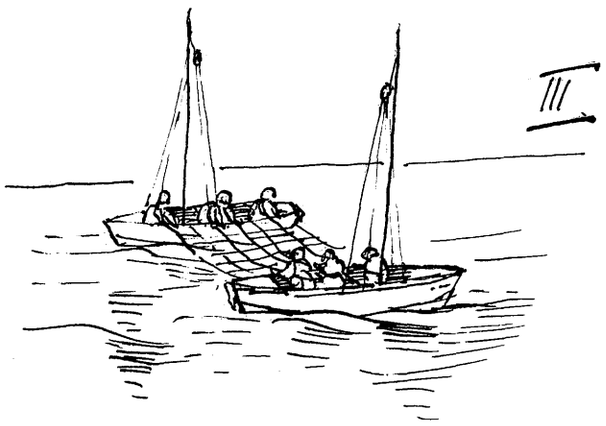
The net may be of any size varying with the depth of water usually fished or with the size of boats or the number of crew engaged. Half a century ago, when boats were small and propelled by sails, a net was usually from 60—80 yards in length: but to-day, as bought from the factory unmounted, it measures 280 yards in length and 28 yards in depth. It is mounted on two ropes the upper or "head" rope being of 12 thread 1 strand manilla and the foot or "sole" rope of 24 thread 1 strand manilla. When mounted, it is brought in or "bagged" to 200 yards by 10 yards deep.

It consists of 3 parts, the two end pieces being made of lighter material and wider mesh than the centre piece or belly which is usually of 15 ply cotton. In the centre of the belly and on its upper side is the heaviest and strongest section of the net, as this has to bear the greatest load in the process of hauling, the fish being gradually worked into this portion. Up to two years ago, the meshes were usually 33 or 34 to the yard, but since then the tendency has been to extend the meshes to 28 to 32 to the yard, so as to eliminate the quantities of small herrings which have been such a feature of the catch in the Clyde Area in recent years.

The net is strengthened by 2 gable ropes of 12 thread 1 strand manilla. It is kept afloat by 400 corks set at equal distances on the "head" rope and is weighted by 200 lead rings of ¾lb. each strung along the "sole" rope; these cause the net to sink rapidly and keep the sole down when the net is being hauled on board. Three or four ordinary skin buoys are attached by buoy ropes to the head rope to help in keeping the net afloat; one of them being always placed exactly at the centre of the net thus enabling the fishermen to know where the bag or heavy piece of the net is. A sweep line of 50 fathoms 24 thread manilla is attached to assist in hauling.

The cost of the net in 1913 was £33. During the war it rose to as much as £140. Nowadays it costs from £60 to £67 according to the price of the settings.





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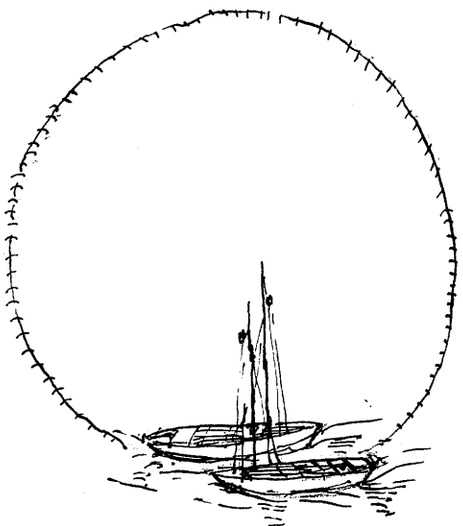

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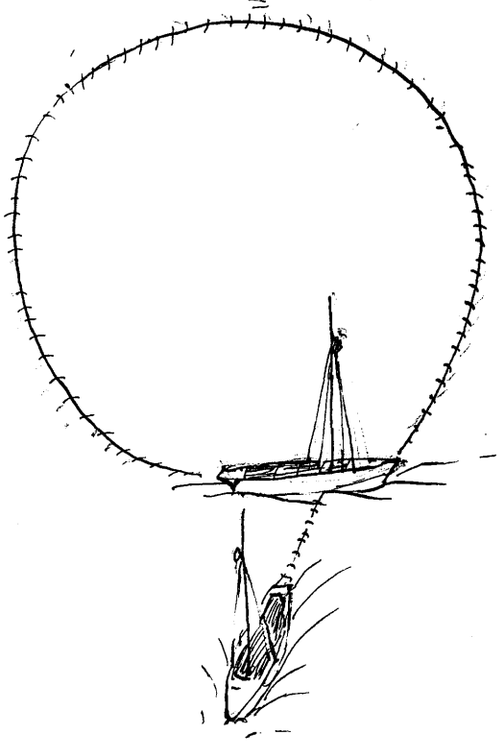

II

often very irregular and partial, some boats having large shots and neighbouring boats being practically blank.

The Seine Net is the oldest of which we have any record. References to it occur in the writings of Classical Greece and it is frequently mentioned in the Scriptures of the New Testament. When exactly it was introduced to Scotland is uncertain, but it was in

sufficiently general use by the middle of the 19th century to warrant its prohibition in the Herring Fisheries Act of 1851 (14 & 15 Vict c 26) the main object of which was to protect the Drift Net Fishermen. Serious RIOTS ensued but the restriction was not removed until 1868, and since then it has been used alongside the /7 drift net in the Clyde Area and the Firth of Forth. For a long time it was exceedingly unpopular, the general opinion being that it broke up the shoals and was therefore detrimental to drift net fishing. During the past twenty years, however, much of the initial prejudice has been overcome and it is now admitted that it is more suitable for confined waters than the drift net. The Clyde fishermen prefer it, as it takes so long to shake the fish from drift nets that the buying steamers frequently have their complement from the seiners before the drifters are ready to deliver their catches.

WHERE TO SHOOT.

Fishermen have for long looked on the presence of aquatic birds, such as gulls or gannets, or of whales, porpoises, dolphins and dogfish which are known to prey on the herring, as indicating that shoals are present in the neighbourhood and they invariably shoot their nets near the spot where these are sighted. The absence of such signs however must not be taken as indicating that no shoals are there: in fact it is seldom in actual practice that such clear signposts await the skipper in his search for suitable grounds. More often than not the nets are shot at random in places where herrings have been found in previous years or where good "shots" have been secured by other boats at the time. On the East Coast the crew scans the surface carefully for (1) any traces of the oily phosphorescence—"gleams" or "flame" they call it—which comes from the minute organisms on which the herring feeds, or (2) for air bubbles rising to the surface—"putting up" is the usual expression—which is a sure sign that herrings are on the spot.

The efficient skipper, however, does not rely exclusively on such adventitious signs as these. He studies the sea floor and familiarizes himself with its contours. He endeavours to ascertain the location of clean banks on which the herring likes to spawn and shoots his nets over or near them, making the necessary allowances for drift owing to wind or tide.

For many years the Fishery Board for Scotland has been alive to the necessity for assisting fishermen to ~~break~~ LOCATE the shoals and its system of dispatching daily telegrams between the fishing ports has been most helpful. These are publicly exhibited in the fish markets about noon each day and give for each port.

(1) Number of arrivals.

(2) Average catch per boat.

(3) Quality of fish.

(4) Range of prices.

(5) Position of chief fishing grounds.

(6) State of wind and weather.

The fleet is thus put in possession before it sails of accurate information as to where the best catches were obtained the previous day and ~~consideration~~ CONCENTRATION takes place on these grounds.

THREE ~~[redacted]~~ years AGO the services of "Wireless" were enlisted in this connection and daily bulletins were issued by the Aberdeen Station on similar lines to the Fishery Board Telegrams. The experiment however did not find favour with the fishermen themselves, their objection being that such information could be intercepted by foreign vessels which, in the event of large shoals being encountered, would be enticed to these grounds and so brought into competition with themselves. Comparatively few sets were therefore installed by the home fleet.

In 1922 and again in 1924, ~~an airship was~~ flying boats were lent by the ~~Admiralty~~ Air Ministry to the Fishery Board to test the possibility of locating herring shoals from the air. Similar experiments had previously been made in America (1919) and France (1921) with a fair amount of success. Several flights were made over the Moray Firth on grounds where herrings were being caught at the time but in no case could it be said that the flights were successful. On the East Coast the shore slopes too rapidly to make observation easy, and it was found that the maximum range of visibility was only six or seven fathoms — ~~The bottom~~ and that, when the wind rose and the sea became disturbed, it was very much less. The BOTTOM consisting mostly of grey sand — did not afford a suitable background for locating the shoals, as only the dark backs of the herrings were visible from a height and these became merged in the colour of the sea floor and were quite indistinguishable from it. Where boats were fishing, only the nets nearest the boats were visible due no doubt to the fact that through the DRAW of the boat they were more inclined to the vertical than those farther out. Visibility was best when the sun was highest: but herrings rise only spasmodically during the day-time, and even then it was difficult to distinguish them from clouds reflected in the water. At Sunset and Dawn shoals rising to feed were observed, but at both periods they could easily be confused with wavelets dancing on the surface. All the signs commonly associated with the presence of herrings were SEEN ~~sun~~ -- oily patches -- predatory birds and fishes - but of the herrings themselves scarcely a trace.

(3) TRAWL NETS.

Trawling for herrings by ordinary steam trawlers was first attempted in this country during the opening years of the present century. Milford Haven fishermen were the pioneers in the experiment and they met with such a considerable measure of success that their lead was soon followed by some Fleetwood boats. It was not till 1908 however that Scotch Fishermen entered the field and since then trawling has been regularly prosecuted by them, but never on a large scale and usually with very indifferent success. So far as the total catch for Scotland is concerned, the trawl is practically negligible as an instrument of capture compared with the drift or seine net. The following figures give (1) the aggregate catch (2) the aggregate value of trawled herrings landed in Scotland for the years 1913, 1920 and 1921 to 1926.

1913	12106 cwts.	£ 6628
1920	41415 cwts.	£40429
1921-1926 (average)	6468 cwts.	£ 4020
1924	1715 "	£ 994
1928	8034 "	£4380

The net originally used was the ordinary otter trawl, used for the capture of demersal fish, with the meshes laced to prevent the herrings escaping. The Germans introduced a special design with lighter trawl boards and a piece of finer netting in the "cod end" and this has been adopted by most of our own trawlers.

Operations are carried on in daylight usually from 10 a.m. to 4 p.m. but it is believed that the heaviest catches are got about noon. Trawling at night is a very uncertain business as the herrings rise to the surface whenever darkness sets in. At a depth of 60 fathoms or over, it is practically never attended with success: in more shallow water however catches are frequently as heavy as those obtained in the daytime.

When trawling, the vessel steams at full speed and, as the herring is a rapid swimmer, the faster the vessel the better the catch. The drags usually last from two to four hours but, when a big shoal is struck, they are of much shorter duration-anything from half and hour to an hour.

At first trawling was confined to the West Coast, the grounds usually fished stretching from Barra Head to the North West of Ireland. The failure of these in 1909 and 1910 induced skippers to try the East Coast and good catches were obtained on the Fladden Grounds—about 120 to 130 miles off Aberdeen—and later on in the season off the famous Dogger Bank. Both East and West Grounds are now regularly fished, Aberdeen and Hull being the chief ports of call for the former and Fleetwood for the latter. Some skippers however prefer to run their catches direct to Altona, where as a rule higher prices are obtainable: but the Germans themselves are by no means inactive in this field and their vessels not only fish the North Sea Grounds to supply their own markets but some of them in recent years have operated from Fleetwood on the Atlantic Grounds as well—much to the discomfiture of local trawlers.

Owing to the net being dragged through the water the meshes tend to close and fish of all sizes are captured. This is the basis of the complaints frequently levelled by drift net fishermen against trawling that (1) herrings too small to be marketable are captured and must be thrown overboard and (2) as trawling takes place over or near spawning grounds, incalculable damage is done to the eggs and fry. On the other hand very large fish are captured— larger than those commonly caught in drift nets, working out in some cases at 600 to 700 fish to the cran. This has been particularly noticeable since the war—owing to the preponderance of "mattie" herrings in the drift net catches—and in many quarters it is used as an argument against the efficiency of the drift net. Some fishermen even have the temerity to assert that the trawl will ultimately displace the drift net. This is of course absurd.

Trawling has been practised for close on thirty years, yet the quantity of trawled herrings landed is merely an infinitesimal part of the total catch. Had it been a really effective method of capture it would have been much more widely adopted to-day. The chief obstacle to its development is the fact that trawled herrings are totally unfit for curing. Through being dragged through the water they lose their scales and present a dull discoloured appearance, resembling "drowned" herrings.

This does not in the least affect their suitability for consumption fresh or for their conversion into kippers or reds, but, when they are cured and packed tightly in a barrel, the absence of the scales causes them to stick together and they soon deteriorate, becoming discoloured at the bone and giving off a sour, offensive smell.
In this connection it is significant that Germany, depending as she does entirely on this country and on Norway for her cured herrings, has developed trawling (for kippers, marinades, etc.) to the exclusion of the drift net, whereas Norway, our greatest competitor in curing, has left trawling severely alone and concentrated on the development of her seine net fisheries.

Boats.

The past fifty years have witnessed tremendous developments in the vessels used for the capture of herrings. Up to 1870 they were very small, seldom exceeding 35 feet in length and 12 feet in breadth. They carried two masts and were propelled entirely by sails or oars. Practically all of them were undecked and the crew were exposed to the rigours of all kinds of weathers. Theirs was a hard life, the only concession to their physical comforts being the "pot" in which the "scummer" XX boy prepared their tea. They carried anything from a dozen up to forty nets according to the size of the boat.

Gradually half decked boats made their appearance with a small covering at the bow in which the crew could shelter when their labours permitted. All the rest was open with side-planks only, and the catch was therefore still exposed and deteriorated rapidly, when subjected to heavy rain or excessive sun-heat. Such boats as these could not of course range far from land in search of shoals: they had to wait until the fish came inshore, and in seasons when they were not accommodating enough to do so, catches were light and earnings small. Their great merit lay in their cheapness—a fair average price being £90.

Close on the heels of the half decker came the full decked boat with closed hatches for the protection of the catch and comfortable forecastle with bunks and cooking stove for the comfort of the crew.

XX So called because he scummed or retrieved the herrings which fell over the side of the boat in the process of hauling the nets: these were sold with the rest of the catch or privately. This was his only payment, and buyers, as a rule, out of their good nature paid a few shillings more a cran to the scummer boy than for the rest of the "shot" ~~shoal~~. Scummed herrings are now the property of the engineer and the fireman.

These were of larger and stronger build than the open or half decked boats and varied in size of keel from 40 feet up to 70 feet, the newer models being larger and better equipped than those they displaced. Three main types were built:

(1) The Scaffa with a very short keel in comparison with the overhead length. It was very useful in confined waters as it could turn very easily. Its great disadvantage lay in the fact that a heavy sail made it top heavy.

(2) The Zulu of much the same type with stern cut away and bow almost upright. It had a greater hold of the water and what it lost in turning it gained in stability.

(3) The Fifie in which both bow and stern were almost vertical. They were held to be the most seaworthy especially in adverse weather.

These carried anything up to 80 nets and the crew varied in number from five men and a boy in the smaller boats to seven men and a boy in those of 60 feet keel and over. The only labour saving device adopted up to 1895 was the "iron man", a hand capstan used for hauling the nets, discharging the fish, setting the mast, hoisting the sails and weighing anchor. In that year the steam capstan was introduced and while the more progressive fishermen immediately recognized its usefulness and had it installed, a large number delayed for a year or two before adopting it. The chief obstacle to its installation was its price—about £80, the cost of a boat 30 years before—but by 1900, except in a few districts, it was universally adopted. At the close of the century first class boats of 60 to 70 feet keel cost from £700 to £800. In their equipment they presented a marked contrast to the half deckers of the sixties, being fitted with steam capstan, cabin, fore-castle, safety rail, tow rope, net and salt store, etc.. This improvement in the character of the fleet is a striking testimony not only to the success of the fishery in the nineties but to the resource and enterprise of the fishermen themselves whose aim it was to secure boats of sufficient equipment and power to enable them to proceed farther and farther to sea in pursuit of the shoals which of late had not come so close inshore as had been their wont.

They were still at the mercy of calms and adverse winds however, and, though steam tugs were utilized in towing a short distance (the fleet) from the harbour, it was felt that boats should themselves be fitted with some auxiliary motive power to render them less dependent on the weather and to enable them to prosecute the fishery over the ever widening area in which herrings were being found. Steam had already been successfully applied to trawlers and long liners, and as early as the eighties its practicability had been discussed for drift net fishing but nothing came of it until 1896. In that year a steam liner was fitted out for drift netting and fished from Wick with 70 nets but the venture was not successful. Two years later however an enterprising Wick fisherman had a steam drifter built at a cost of £1700, capable of doing 8-9 knots per hour, and in 1899 this boat grossed £2500, so that, after clearing expenses, the owner got a dividend of 40%. Such success induced other fishermen to follow suit and in the next two years 53 new drifters were built at an average cost of £2200. These boats were extraordinarily successful—averaging from £600 to £1500 for the Great Summer Fishery and £400 to £700 for the Winter Fishing at Yarmouth and Lowestoft—and demonstrated clearly that the steam drifter has for fishing enormous advantages compared with the old sailer.

(1) Greater reliability: it is independent of calms and head winds and can fish in all kinds of weather. It is therefore particularly advantageous for the winter fishings.

(2) Greater mobility: it can make more trips per week than the sailer and can follow the shoals farther afield, and yet be able to land fish from distant grounds earlier and in better condition: the risk of overday's herrings is practically eliminated and the return to port effected with a punctuality which enables fish trains to be run. It can visit known prolific grounds in the teeth of a strong wind and can (within limits) select the most profitable port to land them. For sailers 30 to 40 miles offshore was considered a great distance. Steam drifters now regularly fish 60 to 90 miles from land

(3) It can land its fish early in the morning when herrings are fresher and therefore stiffer. Fewer fish are thus required to fill the ¼cran basket—the measure thus favouring the fisherman.

(4) It can manoeuvre into congested harbours and against adverse currents, and can secure the best berths and thus get early discharge of its catch.

(5) The costs of towage are eliminated.

(6) It is much easier to handle than the sailer and involves less labour for the crew.

What was not sufficiently realized at the time was that the early steam drifters were so few in number that they were not actually competing with one another but with the sailing drifters only, and that they were then reaping advantages which would disappear in part when the whole fleet was propelled by steam.

In spite of the high initial costs the steam drifter fleet grew at an enormous rate. In 1899 there were 44 on the register, mostly long liners (gross tonnage 944, value £82,780): by 1904 there were 204. In 1907 and 1908, 234 and 118 were added, and, when war broke out, the Scottish Fleet numbered 981 (gross tonnage 31,377, value £2,205,783 exclusive of gear). Of these about 20 - 30 were employed at line fishing, but some of the others were engaged partly in herring fishing and partly in long lining.

The transformation from sail to steam would have been even more rapid, had it not been for the difficulties of disposing of the old sail boats. These numbered approximately 7000 and a third of them were boats of the first class (over 45ft. keel) which had cost from £600 to £800 and were still in excellent condition. Many of them were disposed of at a fraction of their value, and others, which could not find purchasers, were scrapped. The change in the character of the fleet from 1900 - 1914 is illustrated by the following figures which give the percentage of total catch secured by (1) steam, (2) sail.

	Steam	Sail
1900	1	99
	31	69

During these years constant improvements were being effected in the drifter fleet and there was great emulation among the fishermen to secure larger, speedier and better equipped boats. Those built just before the war were from 85—90 ft. in length, 18—20 ft. in breadth, 9—10 ft. in depth, drawing 10 ft. of water empty and 11 ft. with catch. They were equipped with 2 masts and sails, which could be used to assist or relieve the engines. They were lit by electricity or acetylene gas, had an engine power of 250 horse power and could attain a speed of 10 knots. They carried 80-110 nets and were capable of landing from 250 to 300 crans of fish. The crew numbered 9 or 10, 6 or 7 fishermen, and engineer, a fireman and a cook. They were built either of wood or steel, and opinions were divided as to which was the more efficient. The wooden drifter was cheaper costing from £500-£600 less than the steel, and it was claimed that, besides having better sea going qualities, it afforded greater comfort to the crew: the steel drifter was held to be more serviceable for entering crowded harbours, as, in the event of collisions, it was less easily damaged than the wooden boat.

The chief objection to both was the initial cost and the high working expenses. The first steam drifter had been built for £1700 but by 1903, £2400 was a common price for a wooden boat and £3000 for a steel. In 1913 this had increased to £3000 and £3500: the latter in fact was quite a common price but better equipped drifters cost as much as £4000.

The fishermen had not sufficient capital to procure such costly vessels for themselves and the services of capitalists on shore had to be enlisted. It was not a difficult matter either for a fisherman of industrious habits to raise the necessary capital for the purchase of a steam drifter: merchants, tradesmen, fish-salesmen etc., at the fishing ports were aware of the enormous profits which had been earned by the early drifters and they were easily persuaded to risk their savings in what promised to be a profitable investment. Small companies too were floated for supplying boats to fishermen who could not procure them for themselves. This was an entirely new development in the industry: in former sailing days the boat was

Invariably the property of the skipper and his family, but a steam drifter might now belong to several people whose share in the profits was proportionate to the capital they had subscribed. As a general rule one or more of the fishermen had a share in their drifter, the capitalist taking the view that this made for increased efficiency and security.

As already stated, the growth of the steam drifter fleet was the main factor in altering the locus of the fishery from almost every town and village on the East Coast to a few large centres such as Lerwick, Wick, Fraserburgh and Peterhead. Adequate accommodation was necessary to enable boats to discharge their fish as speedily as possible, and many harbours, which had afforded safe and easy anchorage for the small sailing boat, were found to be totally inadequate for the steam drifter, bothe through lack of docking space and depth of water. Even the larger ports were compelled to extend their accommodation, and large harbour improvement schemes were undertaken at Wick, Buckie, Fraserburgh and Peterhead, the capital necessary being raised partly by Treasury Grants, partly by loans on the security of the town and harbour rates. The Fishery Board for Scotland were early aware of the difficulties which would arise and were instrumental in getting assistance from the Development Commissioners for the extension and improvement of several harbours along the coast. Up to 1928 the following grants and loans had been made.

Eyemouth/

	Grants.	Loans.	Total.
/Eyemouth	£1,633	£10,567	£12,200
Stonehaven	6,500	7,000	13,500
Cairnbulg, Aberdeenshire	1,750	1,750	3,500
Fraserburgh	22,000	51,250	73,250
Gardenstown, Banffshire	4,000	4,000	8,000
Macduff	15,500	45, 500	61,000
Cullen	2,300	2,300	4,600
Portknockie	12,500	...	12,500
Findochty	11,500	...	11,500
Buckie*	8,000	96,250	104,250
Lossiemouth	2,000	10,000	12,000
Nairn	14,000	...	14,000
Cromarty	750	1,500	2,250
Wick	. .	64,025	64,025
Whitehall (Stronsay)	10,000	...	10,000
Lerwick	9,000	...	9,000
Ullapool**	2,000	1,850	3,850
Girvan	4,500	...	4,500
	£127,933	£295,992	£423,925

* In addition to the grants and loans shown above, a grant of £33,000 was made by the Treasury.

** In addition a grant of £1,500 and loans amounting to £1,850 were made from the funds of the Department of Agriculture for Scotland.

In addition grants amounting to £160,696 have been made from the Fishery Board's Funds since 1882.

Nothing that the Fishery Board could do, however, could stay the centralising process which had begun. The steam drifter could hunt the shoals over a wide area and land its fish practically where it wished. What more natural than that it should select the large centres where competition among buyers was keenest? Again, repairs had to be executed at a port where there were pontoon docks and marine engineers and these were to be found only at the larger centres. Drifters, therefore, had often to be laid up at long distances from their home ports and the cost of repairs was considerably augmented by high dock charges and travelling expenses. To obviate these, fishermen tended to leave the smaller villages and establish themselves in the larger centres, with the result that many of the former have become seriously depopulated.

The wholesale manner in which fishermen were scrapping their sail boats and investing in steam drifters was viewed with alarm by many who foresaw the risk of the industry becoming over-capitalized. The ordinary working expenses were so high—in some years amounting to 60% and seldom falling below 30% of the gross earnings—that for a season of 12 to 14 weeks it was necessary to gross £1000 to obtain a reasonable return. This was easily attainable in such profitable years as 1905 and 1906, but many wondered what would happen in a lean year of poor catches and poor prices. It was felt that some cheaper method of propulsion was necessary—involving less initial outlay and smaller running expenses.

In 1897 a motor engine had been installed in a boat in Germany and in 1902 a German Firm had placed an oil engine on the market at a cost of £400, capable of giving 6 knots in ordinary weather. The advantages of such engines were immediately realized by the Fishery Board for Scotland, who endeavoured to dissuade fishermen from disposing of their sail boats and advocated instead that they should be fitted with motor power. At their instigation, two first class sailing boats had motor engines installed, and it was found that a speed of 6½ knots was obtainable in calm weather and that as much as 9 or 10 knots could be got in a wind, which unaided would have driven them at 5 knots. Unfortunately—no doubt through ignorance and careless handling—these proved very unreliable and the experiment was not favourably received, so much so that during the next five years only four motor propelled boats were added to the register. In the year 1908 however small catches coincided with poor prices and the profits of steam drifters were swallowed up in meeting working expenses. This temporarily arrested the construction of steam boats and stimulated the demand for the installation of motor power in existing sail boats. As a consequence motors were installed in 57 boats during 1909, 25 of which were 45 ft. keel or over. These proved much more reliable than the earlier models, and, while it was realized that they could not have the speed or flexibility of the steam drifter, or the same power to weather gales or storms, their

comparative cheapness - £1200-£1500 as against £3500 - their smaller running expenses and their ease of management and control (no engineer being necessary) induced many fishermen to go in for them. The following table shows the growth of the motor fleet from 1908 to 1914.

	45 keel & over	30-45ft	18-30ft	Under 18ft	Total
1908	10	1	7		18
1909	35	3	30	7	75
1910	56	1	90	9	156
1911	75	4	144	10	233
1912	81	15	244	16	356
1913	102	80	313	28	523
1914	152	113	397	32	694

These were fitted with engines varying from 7½ h.p.(costing £70) in the smaller skiffs to 70 h.p.(costing £600) in the larger first class boats. They were started on petrol and run on paraffin and the smallest type of boat could run for an hour on less than 3d. of paraffin, while a 50 h.p. engine could be worked at about 2/- per hour.

In the case of the smaller boats, such as are used in the Clyde Area, motor power was from the outset an unqualified success. These fish for the most part in sheltered lochs and straits and the fishing grounds are never far from the port of landing. For them motor power supplied all that was desired. It gave them all the advantages with none of the drawbacks of steam, and it was at once evident that sail boats of 18ft to 45ft keel were doomed and that motor boats had come to stay. As the above figures show, their numbers increased from 8 to 510 in the course of six years.

With the larger East Coast drifter, however, motor power was not so successful and prior to the war it was not regarded as a serious competitor to steam. The chief objections to it were (1) that it could not work the capstan, (2) that it could not rival steam either for speed or endurance and (3) that there was great wear and tear. Its real function however was not to supersede the sails but merely to be <u>auxiliary</u> to them; and it was most unfortunate that fishermen failed to appreciate this, for they vied with one another in getting more and more powerful engines in their efforts to attain the same speed as the average steam driven boat. The little extra which was

obtained did not compensate for the extra initial cost or the increased running expenses which the larger engines entailed. The manufacturers of these did their utmost to stimulate the demand and not only supplied them on very easy terms but allowed instalments to lie over when fishings were unprofitable. They were still viewed with suspicion however by the majority of East Coast fishermen and the increase in the price of paraffin (from 5d. in 1909 to 8d. in 1912) did not tend to increase their popularity. Only 21 first class motor boats were added to the register in 1913 and 50 in 1914 (both including sailing drifters which had been adapted) as against 60 and 97 steam drifters respectively. So keen in fact was the demand for steam, that builders were unable to cope with it and second hand steam boats were actually being bought at considerably more than their original cost.

The composition of the Scottish Fleet (Excluding steam and sailing trawlers) in 1914 was as follows, the corresponding figures for 1900 being appended for comparison:—

NUMBER OF VESSELS IN 1914.

	Over 45ft keel.	30-45ft.	18-30ft.	Under 18ft.	Total.	Gross Tonn.	Gross Value.
Steam	981	-	-	-	981	31377	£2,205,783.
Motor	152	113	397	32	694	10555	£202,181.
Sail	1180	320	1949	2910	6359	63446	£373,568
Total	2313	433	2346	2942	8034	105378	£2,781,532.

NUMBER OF VESSELS IN 1900.

Steam	70	-	-	-	70	1865	£145,490
Motor	-	-	-	-	-	-	-
Sail	2228	1474	3332	3869	10903	108019	£828,702.
Total	2298	1474	3332	3869	10973	109884	£974,192.

It is impossible to give statistics exclusively for the herring fishery, as the same boats (with the exception of those under 18ft keel, which are used only for hand lining) follow the herring fishery and

long lining (or seine netting) for white fish at different periods of the year according to the state of the markets and the inclinations of skipper and crew.

It will be seen that the fleet of 1914 presents a marked contrast to that of 1900, the most noticeable features being (1) the centralization of capture in fewer boats of larger size, so that, though the number of boats has decreased by approximately 3000, their gross tonnage remains almost constant, (2) the development of the steam drifter fleet and in less degree of the motor drifter, and the marked decline in the number of sail boats, particularly those of the largest classes ~~and~~ and (3) the huge increase in the capital involved, which has almost tripled itself in the space of fourteen years. The value of the gear used - nets, bush ropes, buoy ropes and stoppers - has not increased in anything like the same proportion the total value in 1914 being £769,193 as against £648,020 for 1900.

The bulk of the fleet was owned on the East Coast - 99% of the steam boats and practically all the larger motors and sailers - the smaller craft belonging chiefly to West Coast Districts. The comparatively unimportant port of Buckie owned more than 25% of the largest class of vessel, being followed in succession by Fraserburgh, Anstruther, Findhorn and Banff. To the same ports belonged more than 75% of the steam drifter fleet, Buckie again leading with close on one third of the total. [That it is advisable to make a digression at this point to see how the war affected not only the fleet but the fishermen themselves]

The outbreak of war completely paralysed the industry. The Admiralty immediately issued orders restricting the movements of fishing vessels round the whole coast and prohibiting fishing in the North Sea except within sight of land. Though these regulations were afterwards relaxed as the situation improved, it was generally recognized throughout the trade that, so long as the German Market was closed and the only avenues into Russia were via Archangel or across Norway and Sweden, it would be impossible to market anything approaching the normal catch and that operations on a pre-war scale - even if the naval restrictions and the attendant risks were removed - would be doomed to failure. In addition, it was pointed out by the Admiralty that fishing even in the permitted areas would be attended with the gravest danger and

must be entirely at the fisherman's own risk, without any prospect of compensation for damage to or loss of boats or gear or for personal injury or loss of life.

As a consequence 32,000 Scottish Fishermen (22,000 of whom were engaged wholly or partly at the herring fishery) were thrown out of employment, and with them of course were involved all those-approximately 50,000-who were employed in curing, kippering, tinning and the subsidiary industries of box-making, net-making, etc. In addition their boats and gear were rendered useless and, as practically all their savings were invested in these, they had no reserves to fall back on, and for the majority the prospect was exceedingly gloomy.

All branches of the trade almost instinctively looked to the Fishery Board for guidance, and it was exceedingly fortunate that there was in existence a department with such a wide and intimate knowledge of the Fishery, on whose judgment and equity the fullest reliance could be placed. At the instigation of the Board, meetings were held from time to time at the principal ports to discuss what should be done to meet the crisis. A census was taken of (1) the numbers employed in the various branches of the industry and in the subsidiary trades and (2) the financial position of those whose capital was tied up in boats and gear, in order that everything possible might be done to secure their financial stability.

The situation was eased considerably by (1) the call for volunteers for the Navy and the Army and (2) the Admiralty hiring and later commandeering the steam drifters and larger motor boats for use as mine-weepers or decoy ships or in locating submarines. At the outbreak of war only a comparatively small proportion of fishermen were in enrolled in the Navy or Army Reserve, but, whenever the steam drifters were requisitioned to combat the submarine menace, their crews hastened "to join up" in order that they might have the opportunity of manning their own boats. By the end of 1915 upwards of 1000 steam vessels (700 of which were drifters) had been taken over. These were manned by approximately 10,000 fishermen whose intimate knowledge of the coast was of inestimable value to the country: in addition another 7000 were serving in other branches of the Navy or in the Army. Before hostilities had concluded 1148 steam vessels (846 drifters) and 72 motor boats had been taken over by the

Admiralty and approximately 22,000 fishermen had enlisted in one or other of the services.

The bulk of the men came forward voluntarily, but after the introduction of conscription a special section (Section Y) of the Royal Naval Volunteer Reserve was formed for fishermen, and the Fishery Board rendered valuable service by holding the balance between the Recruiting Officers and the claims of the Fishery. No one could be called up from Section Y without the consent of the Board and everyone so enrolled had the right of appeal to the Board. As Commander Jones, the Chairman of the Fishery Board, points out in his Monograph on Fisheries ("Rural Scotland during the War", Oxford University Press)——"The objects which it was sought to attain were (1) to reserve the key men (for whom no substitutes could be obtained), (2) to ensure that the most efficient boats - as food producers - still available, should be able to continue at work and (3) to prevent the extinction of any fishing community by the withdrawal of all its fit men. Lists of men on the roster for service were furnished to the Admiralty as required and the system worked very smoothly. No efficient fishing vessel left unchartered was laid up for lack of a crew after the system was inaugurated - though that stage had almost been reached when hostilities terminated - while the requirements of the navy were fully met." At the same time as the demand for recruits and vessels was increasing, the problem of providing an adequate supply of food for the civil population and the fighting services was becoming increasingly difficult, and it was imperative that all available sources of food supply should be fully utilised. Every encouragement was given to fishermen to continue fishing: the areas in which operations might be carried on were extended: a government scheme of insuring vessels against loss or damage was introduced and the fishery officers at the various ports were entrusted with the task of endeavouring to form crews for those fishing vessels which had not been commandeered for naval service. In addition, owing to the scarcity of food, the price of all kinds of fish appreciated rapidly: herrings rose steadily from 6/1½ in 1914 to 24/7 per cwt. in 1918. This was sufficient to call forth the activities of the whole fishing population: sail boats, which had been laid aside as useless in 1913, were brought into service again, and as steam vessels were unobtainable

the demand for motor engines increased by leaps and bounds. Even these were difficult to obtain owing to the ever growing ~~needs~~ demands for munitions and various forms of mechanical transport. Representations however were made by the Fishery Board to the Ministry of Munitions, and it was agreed to regard the claims of fishing vessels for motor engines as of Class B priority, and later, when the supply was still unequal to the demand, they were raised to Class A priority. As a consequence the number of motor boats of all kinds (exclusive of those on war service) increased from 655 in 1915 to 1337 in 1918, of which 348 (compared with 90 in 1915) were vessels of the largest class.

The composition of the Scottish fleet actually engaged in fishing during the war years is shown in the following table.

Number of vessels.

	over 45ft. keel	between 30 & 45 feet	between 18 & 30 feet	less than 18ft.	Total
1915					
Steam	208	-	-	-	208
Motor	90	142	391	32	655
Sail	163	143	1028	2237	3571
	461	285	1419	2269	4434
1916					
Steam	196	-	-	-	196
Motor	209	180	426	44	859
Sail	353	129	943	2033	3458
	758	309	1369	2077	4513
1917					
Steam	155	-	-	-	155
Motor	271	231	556	65	1123
Sail	317	100	860	1890	3167
	743	331	1416	1955	4445
1918					
Steam	124	-	-	-	124
Motor	348	239	673	77	1337
Sail	268	103	832	1803	3006
	740	342	1505	1880	4467

Those belonging to the two smallest classes were engaged almost exclusively in lining: the larger boats 30 feet keel and over were engaged partly in lining and partly in fishing for herrings. It will be noticed that (1) the number of steam drifters fishing steadily declined as more and more were withdrawn for mine-sweeping etc. (2) the greatest increase is shown in vessels of the largest class. Of these the number propelled by sail rose rapidly in 1916 (discarded boats being hurriedly brought into use) and then declined somewhat in 1917 and 1918 as motor engines were installed in them. (3) the decline in the number of sailers of all sizes is more than counter-balanced by the vast increase in the number of motor drifters, the bulk of which were sail boats converted.

This in fact was the most striking effect of the war so far as the fleet was concerned, but in most quarters it was regarded as a temporary expedient. The bulk of the fishermen, as has been stated, had never looked with favour on the installation of motor power in the largest type of herring drifter, but under the stress of war conditions they were compelled to sink their prejudices and adopt the only means of propulsion available. This proved quite satisfactory so long as the majority of the steam vessels were on service but it was confidently predicted that, once the latter were released from naval duty, the shortcomings of motor power would again be emphasized. In point of fact, however, the motor fleet continued to increase during 1919 and 1920 and in the former year their earnings compared very favourably with the earnings of the steam vessels.

During 1920, however, the grounds fished were at a considerable distance ~~from~~ offshore and, while the average steam drifter could do five trips a week, the most powerful of the motor vessels could seldom manage more than four. In addition, as they were invariably later in reaching the market (their average speed being 6 - 8 knots as compared with 8 - 10 knots for the steam drifter) they could not command such high prices for their catch. As a consequence the demand for them immediately slackened, and during ~~1922~~ 1921 and 1922 vessels of the largest class, which a few years previously had been eagerly sought after at double their original price, were disposed of in many cases at less than the cost of their engines.

Within the past five years, however, the attitude of the fishermen towards motor power has completely changed. Most of them admit that steam is the surest and most reliable method of propulsion, but experience has taught them that it is far too costly for modern conditions. As will be shown later, the closure of the Russian Market and the difficulty of finding fresh outlets for cured herrings make it impossible for the curers to pay prices commensurate with the increased costs of boats, gear, coals, oil, wages, etc., and the fishermen have had such poor returns for their labours that the vast majority of them have been ~~forced to give up fishing being~~ unable to replace and many of them have been forced to give up fishing altogether, outworn boats and gear. The fleet is therefore for the most part in an exceedingly old and unsatisfactory condition.

Practically all the steam drifters were built before the War; some have already been scrapped and during the next few years many more will become totally unfit for further service. What is going to replace them ? The fishermen themselves have not the capital to build new steam vessels, as these cost from £4500 to £6000, and the industry is meantime in such a stagnant condition that there is little likelihood of its attracting capital from other sources. Only 26 vessels of the largest class (over 45 feet keel) and 139 of the second class (30 -45 feet keel) have been constructed sinces 1922, and it is significant that of these only 1 was propelled by steam.

A reversion to the ordinary type of motor drifter, however, will not solve the fisherman's problems. It is a well known fact that, in spite of the lower initial costs, smaller working expenses and the saving of a ~~fisherman's~~ fireman's wages, motor boats have not paid for several years, and it seems clear that some cheaper method of propulsion must be devised, if we are to sell our herrings at a sufficiently low figure to recapture our foreign markets.

Attention has recently been focussed on the advisability of utilizing some type of ~~coal~~ semi-diesel engine. This is run on crude oil which costs only eightpence per gallon, as compared with elevenpence for paraffin, and in addition it consumes much less fuel than the ordinary marine motor engine. Three years ago a Buckie vessel (48 feet keel, 57 feet overall, 15 feet beam) was fitted with a semi-diesel engine (48 h.p.) and the results have been very satisfactory.

Its average fuel consumption has worked out at £3 ~~pounds~~ per week compared with £7 for a paraffin motor and ~~£7~~ £11 for a steam drifter of similar size. Although it has been found quite serviceable for our own Great Summer and Winter Fisheries, such a vessel is much too small to weather the gales which must be faced at Yarmouth and Lowestoft, and it has been suggested that a boat of 60 ft.keel 70 ft., overall, 16½ ft., beam with a semi-diesel engine of 72 horse power is the absolute minimum for the East Anglian Fisheries. This would cost about £2500 and the fuel consumption would not exceed 2/- per hour - less than half the running costs of a steam vessel of similar size and speed.

The fishermen are quite prepared to transfer from steam to oil but unfortunately most of them are exceedingly loath to return to the smaller type of vessel with its cramped quarters and its fickleness during a storm. They would like a vessel of at least 80ft. B.P. with a minimum speed of eight knots. This would require a 100 B.H.P. engine and the total cost would not fall far short of £5000, although a steam driven vessel of similar dimensions with 220 I.H.P. engine capable of attaining 9 knots would cost fully £6000. The average life of both vessels would be about the same - 25 to 30 years with careful handling - but the running expenses of the former would be much less - approximately 2/3 as against 5/4 per hour, taking oil at £4 and coal at 30/- per ton. The huge initial outlay is meantime an insuperable obstacle.

The present composition of the fleet (excluding steam trawlers) is as follows -

	Over 45 ft.	30-45ft	18-30ft	Under 18ft	Total	Tonnage	Value
Steam	863[x]	-	-	-	863	31,769	£1,315,334
Motor[xx]	304	432	978	220	1934	23,346	407,026
Sail	71	34	575	2425	3105	8,624	41,239
	1238	466	1553	2645	5902[2]	63,739	£1,763,599

These figures show a decline in tonnage of 41,639 and in value of £1,017,933 from 1914. So far as numbers are concerned, the decline is most marked in sailing drifters of the largest class - from 1180 to 71. In fact for the herring fishery the latter are now practically a negligible quantity. Steam vessels have fallen from 981 to 863 but motor vessels have risen from 152 to 304 (over 45 feet) and from 113 to 432 (30-45 feet). There is still a keen demand for the smaller sized motor vessel and within the past seven years their numbers have increased from 367 to 432: in the same period, however, motors over 45 feet keel have fallen from 498 to 304.

Considering the vast increase in the cost of boats, nets, ropes, etc., since the war, one would expect that the present value of the fleet would be considerably greater than it was in 1914. This is not so, however. Tonnage and value have decreased proportionally - by 39% and 37% respectively - and the estimated value of gear (£858,833) is practically the same as it was then (£849,766). The most striking evidence of the old and outworn condition of boats and gear is afforded by the steam drifter fleet. 82% of these were built prior to the war and 41% are over 20 years old.

43 of these are used for long lining or mussel dredging.

925 motor vessels (tonnage 17,555) are used chiefly in herring fishing: 1,009 (tonnage 5,791) in white fishing.

For practically equal tonnage their present value is £890,449 less than in 1914 - a decrease of 40%. They are rapidly reaching the stage at which the repairs demanded by the Insurance Companies before the policies are renewed, are more than the condition of the boats warrants or the fishermen themselves can afford.

Share System.

Share System.

A system of profit sharing has for long been the general practice in Scottish Herring Drifters. It dates back to the old sailing days when boat and gear were the exclusive property of the skipper and his family. The labour for working the boat was provided by hired fishermen from the West Coast, who did not receive a fixed wage but were paid a certain proportion of the nett profits. The scheme originated in the desire of the skipper to shift some of the risk inseparable from his calling and to protect himself as far as possible against loss in the event of the fishing proving a failure.

Settlements took place at the end of each season: all the expenses of working the boat were deducted from the gross earnings and the remainder was devided into twelve shares each of the hired hands receiving one share. If the food of the crew was paid for out ~~one~~ of the gross earnings, the share per man was $\frac{I}{13}$ instead of $\frac{I}{12}$. The "scummer" boy originally had no wages but was allowed to sell privately all the fish which he scummed. Latterly however he received 9d a £I off the nett profits.

This system gave such general satisfaction that it was universally adopted in steam drifters with of course the necessary modifications to meet the altered conditions. From the gross earnings were deducted all running expenses — cost of coals, cran and harbour dues, fish-salesmen's commission, cost of water, salt, baskets and engine room stores. The remainder was then divided equally between (I) the owners of the boat (2) the owners of the nets (3) the crew of six, exclusive of engineer, firemen and cook. These received a fixed wage which was paid by the boat, the nets and the crew respectively. After a few years this was modified to favour the crew and the owners of the boat, and in most districts both the engineer's and the cook's wages became a direct charge on the gross earnings but the fireman still continued to be paid from the nets' share. Many drifters-mostly from the Fraserburgh district-follow this practice but the bulk of the Peterhead, Buckie and Lowestoft boats deduct from the gross earnings not only the fireman's

wages but also the cost of carting and barking the nets, which formerly was charged to the nets' account. The cost of food is in some cases paid for directly by the crew; in others it is taken from the gross and a proportionate rebate made to the share owners.

Where the cost of food, cartage and cutch is paid for out of the gross earnings, £2 for insurance is also paid from the gross for each week that the vessel is actually fishing. Sometimes the employment of an extra man is necessary-especially for winter fishings-and his share is usually deducted from the gross.

With regard to the actual scale of division, in practically all districts equal shares are now allocated to boat, nets and crew. The old Fifeshire system of giving 4/10th to the boat and 3/10th each to the nets and the crew is now obsolete, but in many Aberdeenshire boats the boat and crew each get 6/17ths and the nets 5/17ths of the nett profits.

From the boat's share are met all the expenses necessary for maintaining it in a seaworthy condition—painting, repairs, dock dues, pontoon dues, engineer's and fireman's shore pay when the boat is laid up, also the cost of insurance and the fee for managing boat's affairs.

The nets share has to bear the cost of repairing and renewing the nets, the cost of cartage and cutch, and, as has been already stated, in some cases the fireman's wages and food.

Scummed herrings are now the perquisite of the engineer and the fireman, but "stocker"—the proceeds of any mackerel caught in the nets—is shared equally by the whole crew.

In the case of motor drifters the method of division originally adopted was slightly different. Running expenses such as harbour dues, cran dues, commission, oil, coals, salt and baskets were, as in the case of the steam boats, deducted from the gross earnings and the remainder was divided into four shares one of which went to the boat, the others being divided equally between the owners of the nets and the crew of six. The cost of food and the cook's wages were paid from the crew's share and the cost of cutch, cartage, etc., from the nets share. Conditions varied slightly from district to district, and even between boats belonging to the same district. At Eyemouth for instance the boat got 5/19 and the crew and nets 7/19 each; at Buckie the boat and the nets got ¼ each and the crew ½; at Fraserburgh some boats worked on the basis of ¼ to the boat and ¾ divided equally between the nets and the crew, while others gave ¼ to the boat 6/16 to the crew, 1/- per £1 of nett profits to the cook, and the remainder went to the owners of the nets. In recent years many motor boats have been working larger fleets of nets and an extra fisherman has been found necessary. In such, the cost of the food and the cook's wages and sometimes part of the cost of cutch and cartage as well are deducted from the gross earnings; and of the remainder ¼ goes to the boat, 7/16 to the crew and 5/16 to the nets. In the Eyemouth District <u>all</u> expenses are paid from the gross, and of the remainder, five shares go to the boat, five to the nets and seven or eight to the crew according to whether there are seven or eight men in the boat. In some other districts the cost of food is paid directly from the gross earnings, but the owners of the boat are compensated by allowing a sum—equivalent to the loss on boat's share through this item—to rank as a charge for insurance on gross profits.

In the Clyde Area motor boats, using the Seine net, fish in pairs and carry a crew of four or five men according to the size of the boat. The usual method of division is to divide the profits into 12 shares, two of which go to the boats, two to the nets and one to each member of both crew In the case of the larger boats the crew get 10/14, the boats 1/14 each, and the nets 1/14 each.

The method of division in both steam and motor boats is shown in the balance sheets in Appendix 8.

More endurance and skill are required in the capture of herrings today than ever before, and it is therefore exceedingly important that the crew should regard themselves not in the position of hired servants but as partners in the enterprise. It is impossible of course in such a calling to fix definite hours of labour: every man must work when there is work to be done irrespective of how LONG he has been on duty. Under ordinary wage conditions this would give rise to constant friction but under the present profit sharing system such friction seldom arises. The crew are dependant — in greater or less degree — on the success of their boat and their interest and enthusiasm are thereby stimulated: self interest alone demands hard and efficient and unsparing service. Thus it is that the modern fisherman is not content merely with acquiring the necessary technical skill for handling his craft and shooting the nets, but strives also to make himself familiar with such matters as the contour of the sea FLOOR and the natural history of the herring, and particularly those factors which influence its migrations. When ashore he IS constantly on the alert for news of where big shots have been caught and at what ports the highest prices are obtainable. It is in his interest — as much as the owner's — that the boat and gear should be kept in a thoroughly satisfactory condition, and that the catch should be expeditiously discharged and everything put in readiness for another trip as soon as possible. More CARE is taken in handling the fish both when clearing the nets and discharging the catch than would be the case if the crew were mere wage earners.

The system ALSO encourages thrift among the fishing population. Each man's share depends not only on his labour but on the amount of capital he can subscribe towards the boat or gear: and, as a general rule, any money saved is invested in one or the other. On the East Coast it is no un-common thing for a fisherman to mortgage his dwelling house in order that he may have the necessary capital to acquire a share in the boat.

One inherent weakness of the system is that no provision is made for a period of apprenticeship. Without any special training a youth of sixteen or seventeen is placed on an equal footing—so far as his labour is concerned—with fishermen of long experience and great skill. In the sail boat days the "scummer" boy was really serving his apprenticeship and it would be an advantage to the modern drifter if arrangements were made for an apprenticeship of two or three years duration, one condition of which should be attendance at the special fishermens' classes which are held in most Continuation Schools at the fishing centres.

It seems absurd that the owner of a steam drifter costing £5000 to £6000 should get only an equal share of the profits with the owners of nets costing £500 to £600, but it must be remembered that:--

(1) At least two fleets of nets are necessary in case one fleet is lost.

(2) The life of a net, when used at summer and winter fishings, is approximately five years as against twenty-five years for the average boat.

(3) Nets are frequently ruined through being fouled by other boats or destroyed by dog fish.

(4) They are often lost either through storms or weight of fish.

(5) They are not insurable against loss.

During recent years there has been a tendency to reduce the nets' share—in steam drifters with respect to both boat and crew and in motor drifters with respect to the crew only. Some owners too insist that the crew shall supply the nets in proportion to their share in the boat, with the result that inequalities between the boat's share and the nets' share are levelled up.

If the capital invested in boat or gear is increased (or decreased) all the partners benefit (or suffer) proportionately. Take for example two boats A and B, A costing £1000 more than ~~the gear of~~ B and the gear of A costing £100 more than the gear of B. This extra capital is paid for by the owners of the boat and the

nets respectively but they each get only 1/3 of the extra profits which their additional outlay brings: the remainder is divided among those who have contributed nothing to it. Members of the crew of A (not possessing shares in both boat and gear) thus have a differential advantage over the crew of B, as they share in the extra profits resulting from the extra investment of £1000 in the boat and £100 in the nets.

So too, if the owners of a boat adopted a cheeseparing policy and did not perform the repairs necessary for keeping it in a thoroughly efficient state, the crew would not get a fair return for their labour, as compared with other crews serving in better equipped boats. This is usually guarded against by giving the skipper full control of the boat during the fishing season: he (generally with other members of the crew) has a share in both boat and nets, and he can be depended on to see that all defects are put right. Besides, Insurance Companies insist in their policies on the right of periodic inspection by qualified marine engineers: and, if the repairs, which they recommend, are not carried out, they repudiate further liability. When a boat is laid up for repairs, its earnings of course cease, and the crew and the owners of the nets suffer as well as the owners of the boat. Those serving in a new boat have therefore an advantage over the crew of an old boat, as the latter is more liable to break down.

Again it will be noticed that there is considerable variation in the allocation of the profits. The share which goes to the boat is practically the same for all districts, but there are substantial differences in the amounts allocated to the nets and the crew. In the Buckie district for example the crew of a motor boat used to get $\frac{1}{2}$ of profits: at the same time Fraserburgh and Eyemouth crews got $\frac{3}{8}$ and 7/19 respectively. Today some crews get $\frac{3}{8}$, some 7/16, others 7/17 or 8/18 according as there are seven or eight in the crew. The differences however are more apparent than real, as most of the crew have shares in the nets, and what they lose on their labour share they make on their nets' share and

vice versa. But the nets are not shared equally by <u>all</u> the crew—some members have none at all—and therefore inequalities are bound to occur. The arrangements operative in each boat are of course the result of mutual agreement between boat owners, net owners and crew, and, though varations are common, complaints or disputes regarding them are exceedingly rare. In fact it is astonishing that a system so apparently haphazard and so devoid of uniformity could give such general satisfaction and promote such industrial peace. The dark days since the war have been sufficiently testing and the system has worked smoothly.

Fishermen's Earnings

Fishermens' Earnings.

The gross earnings per boat have increased only by a very small amount since before the war. For the past five years steam vessels have averaged £1300 at the Great Summer and £900 at the East Anglian Fishery compared with £1000 and £700 from 1909 - 1913, and motor vessels £900 and £500 compared with £700 and £350. The average catch per boat is practically the same as in pre-war days, and the increase in gross earnings is wholly due to the rise in price - from 6/10 per cwt. (1910 - 1914) to 8/11 (1924 - 1928).

This increase in price is entirely disproportionate to the increase which has taken place in capital costs and working expenses. For the five years preceding the war the latter amounted to 35% of the gross earnings at the Great Summer Fishery and 25% of the gross earnings at the English Fishery - or on an average approximately 30% for the year. Appendices give the balance sheets of certain steam drifters and motor boats (all chosen at random and brought to an average for each year) for 1912 - 1913 and 1921 - 1928. These show that for the past five years the percentage of gross earnings absorbed by working expenses is 40% for steam vessels and 29% for motor vessels, excluding charges for food, cutch, cartage and insurance, which are paid either in whole or in part from the gross in the case of motor vessels but are charged separately to the boat's, nets' or labour shares in steam drifters. When allowance is made for the increase in the price of green herrings-approximately 30%-it will be seen that working expenses have increased by close on 70% since 1914.

These averages are inflated by the unusually heavy earnings in 1924 - £1400 for steam and £960 for motor vessels. In normal seasons the averages would be nearer £800 and £400 respectively.

The following table gives the wages of engineer, fireman and cook for (1) 1910 - 1914 and (2) 1924 - 1928, also the prices of nets, ropes etc. during the same periods and in each case the percentage increase -

	1910 - 1914.	1924 - 1928.	Increase per cen
Engineer	35/- plus food	50/- plus food	43
Fireman	25/- "	40/- "	60
Cook	20/- "	35/- "	75
Coals*	17/- to 18/- per ton	32/- to 38/- per ton	100
Paraffin*	6d. per gallon	1/- per gallon	100
Nets	56/- per net	96/- per net	71
Cutch	36/- per cwt.	65/- per cwt.	80
Bush Rope	£8 - £11 per coil	£12 - £15 per coil	50
Buoy Rope	1/6 each	1/9 each	16
Stopper	3/- each	3/6 each	16
Baskets	5/6 each	7/6 each	36

The harbour and landing dues have also increased considerably since the war. These are fixed by the local Harbour Authority (subject to the approval of the Fishery Board for Scotland) and vary slightly from port to port. The following are the dues payable at Peterhead with corresponding figures for 1913 -

	1928	1913	Increase per cent.
Composition Dues	£3 0 0	£1 13 4	
Lifeboat	6	6	
Harbour Lights	1 4	1 4	
Drinking Water	2 6	2 6	
Total	£3 4 4	£1 17 8	71
Landing Dues	4d. per £1	2½d. per cran	100
Casual Calls -			
If Landing	5/- per visit	4/- per visit	25
If Windbound	2/6 "	2/6 "	-

* At Aberdeenshire Ports.

A vessel paying the composition rate has the right to come and go daily during June, July, August and September. At Fraserburgh this rate is levied on the tonnage of the boat- 2/6 per ton (1/6 in 1913); the charge for casual visits is 5/- (3/4 in 1913), if landing; and 3/6 (2/6 in 1913), if windbound; the landing dues are 5d. per £1 (4d. per cran in 1913).

Insurance costs are a heavy charge. These were formerly paid off the boat's share but in recent years - especially in motor drifters - they have been paid partly from the gross partly by the owners of the boat. For steam drifters the premium is graduated according to the age of the vessel - for vessels less than five years old, from £2 4/- per £100 for four months to £3 - 10/- per £100 for twelve months; for vessels fifteen to twenty years old, from £3 - 10 - 6 per £100 for four months to £5 - 5/- per £100 for twelve months. This covers all sea risks including fire and ~~water~~ WAR. In the case of motor boats of the largest class, the premium varies from £4 - 10/- per £100 for four months to £5 10/- per £100 for twelve months (sea risk); and from £3-14 - 6 per £100 for four months to £4 10/- per £100 for twelve months (fire risk).

All the above charges are detailed and averaged in Appendices IX & X, and the shares allocated to boats, nets and labour are brought out.

Steam Vessels.

When allowance is made for Depreciation, Insurance and Maintenance Expenses, it will be seen that the owners of the boats concerned sustained losses in 1921, 1922, 1923, 1925, 1926, and 1927 and that the average nett profit in 1924 and 1928 was very much less than in 1912 and 1913.

Since 1921 the average labour share per man has been £65 compared with £104 in 1912 and 1913 for approximately thirty weeks work per annum. Out of this, food@ expenses, amounting to £25 to £30 have to be met.

After deductions have been made for fireman's wages, cutch and carting, the average nets' share since 1921 has been £300. The owners of the nets have to bear the cost of replacements, repairs, bush rope, buoy ropes etc. In pre-war days this amounted to £350 on an average, and, as these have appreciated very considerably in price since then, it can be easily seen why the fishermen in recent years have found it impossible to keep their gear up to the former level of efficiency.

Motor Vessels.

In 1921, 1922, 1923, 1925, and 1926 an average loss was sustained of £80 per boat. In 1924 and 1928 the average gain was £51 and £23 respectively.

The labour and nets' share per man (assuming that each contributed an equal number of nets) was £72. The expenses of upkeep are slightly less than in the average steam drifter, but the return obtained is quite inadequate to recompense the fishermen for their labour and the use of their nets. It should be noted, however, that many of the boats considered were, during 1922, 1923 and 1925, laid up for a considerable part of the year owing to the unremunerative nature of the fishings.

The effect of these disastrous seasons is revealed in the decline in the number of fishermen. This decline, it is true, had manifested itself in the nineties of the last century, consequent on the development of trawling and the introduction of the larger unit in the herring fishery, the numberof resident fisherman falling from 48,296 in 1882 to 34,300 in 1900. From then till the war the numbers were/

were/ well maintained despite the growth of the steam and later of the motor fleet. In 1913 there were 33,823 resident fishermen, 32,678 of whom were regularly employed and 1,145 partially employed. By 1922 these had shrunk to 28,794 and ~~the~~ last year (1928) to 25,043 - 3,067 at trawling (an increase of eleven since 1913), approximately 16,000 at the herring fishery and the remainder at lining. Some have emigrated, some have found employment in other spheres. Most of those who remain are very much worse off financially than they were before the war: many through lack of capital have been compelled to give up their shares in boat and gear and some skippers even have been reduced to the position of hired labourers.

The usual remedy suggested is state aid for the fishermen, either in the form of loans or grants, to enable them to replace outworn boats and gear. This has already been tried, first in 1919 and again in 1924: in both cases it resulted in failure.**

In 1919 the Fishery Board for Scotland obtained £13,200 from the Development Commissioners for the purpose of assisting fishermen to secure new boats. It was stipulated that these must conform to specifications laid down by the Board, and further that the machinery of Cooperative Fishery Societies should be used in transferring the boats to the fishermen. No such societies existed in Scotland, however, and the attempts to form them proved unsuccessful, the innate individualism of the Scottish Fishermen being too strong to be overcome by the arguments put forward in favour of the cooperative idea. Representations were made in 1920 that the conditions were too rigid, and the Board was empowered to grant loans to enable fishermen,

** Fishery Board Reports 1920-1928.

1) to acquire new motor boats built according to approved specifications arranged between the boat-builders and themselves.

2) to instal motor engines in the existing sailing-boats.

3) to purchase efficient second-hand motor boats on the understanding that loans for this purpose would be made only in exceptional circumstances.

In all cases it was stipulated that the fishermen themselves should contribute a substantial proportion of the cost.

Applications were less numerous than was expected. Owing to the depressed condition of the industry and the high prices of boats, engines and gear, the majority of the fishermen felt that the obligations involved were too heavy; and most of those who applied for assistance were unable to comply with the requirement that they themselves must contribute. Loans were advanced in only eight cases, amounting in all to £1,835, over boats and engines costing £2,575, and the scheme was discontinued in 1921.

The second scheme differed from the first in that its object was not to increase the fleet but to provide nets ropes etc. A sum of £150,000 was placed at the disposal of the Fishery Board for this purpose, and the following scheme was put into operation in June 1924 -

1) Loans were to be confined to fishermen who satisfied the Board that they were unable from their own resources to provide the nets they required.

2) The provision of new nets was limited to a maximum of ten in any one case.

3) Loan was not to exceed 50% of the cost, except that in the case of younger men, who, owing to absence on war service or to the circumstances of the industry since the war, had had no opportunity of acquiring the nucleus of an outfit, the limit might be increased to 75%.

4) Loans were to be subject to interest of 5% per annum on the amount outstanding and were to be repayable within a period of three years: the minimum payment in any season was to be 20% of the earnings from the share of the fishing gear for that season.

The conditions were far too severe to make a wide appeal and the scheme was closed down on 31st March 1925. Only 263 applications were made and of these 174 were granted, amounting in all to the comparatively trifling sum of £5,440. Up to the end of 1928 £4.928 had been repaid in respect of principal together with the sum of £502 as interest on the amounts outstanding. In 135 cases the loans have been repaid in full; in the remainder it is recognised that, with a few exceptions, the failures to repay the loans promptly have been due to lack of success at the fishings.

Under present conditions state assistance on these or similar lines cannot be of much use. In the first place the fishermen are still in such an impoverished condition that it is exceedingly doubtful if many of them could face the obligations which would inevitably underlie any Government Loan unless the

terms were exceptionally easy. And further the fishermen themselves are not slow to admit that the present catching power - in spite of old boats and gear - is more than sufficient to meet the existing demands. What the industry requires is not grants or loans but additional outlets for the catch, and it is clear that the Russian Market must be reopened before any measures adopted to set the industry on its feet ~~cannot~~ CAN be more than palliative.

On the other hand many drifters must inevitably go on the scrap heap during the next few years, and, unless assistance is forthcoming, they cannot be replaced. Once Russia comes in again as an extensive buyer, the fleet must be kept up to at least its present strength and state aid would then be both necessary and justifiable. The fishermen too would be much less chary about accepting loans than they have been in the past.

In one respect, however, immediate state aid would confer inestimable benefits on all sections of the industry. Most of the smaller harbours, which at one time were hives of industry during the Summer Season, have for many years been neglected by the larger drifters - owing to lack of water and berthing accommodation - and have been allowed to fall into such disrepair that only the smallest vessels can use them. Their annual revenue has shrunk so much that it is now insufficient to meet the interest on the debt contracted when they were built, and every year adds to the burdens which the Harbour or Local Authority has to bear. Nor are the larger harbours, more directly concerned with the herring fishery, immune. As the following figures will show, Lerwick, Stornoway and Peterhead are alone able to meet their debt charges out of current revenue.

Harbour	Total Debt.	Annual Debt Charges	Net Ordinary Revenue available for debt charges.
Peterhead	£154,881	£9,163	£9,700
Fraserburgh	308,517	21,071	10,084
Wick	168,400	10,661	6,271
Buckie	174, 283	9,889	4,891
Macduff	100,257	4,931	970
Lerwick	43,839	2,717	3,463
Stornoway	2,203	958	5,601
Orkney Harbours Commissioners	20,512	2,864	3,260
Eyemouth	9,138	994	- 134
Anstruther	6,650	962	149
St. Monance	2,000	84	135
Stonehaven	28,784	773	85
Cairnbulg	1,633	136	---
Gardenstown	4,571	134	114
Cullen	3,345	283	- 189
Portknockie	11,516	~~571~~ 751	431
Findochty	10,126	453	-3
Nairn	9,818	829	- 120
Cromarty	4,053	172	141
Brownies Taing	4,231	162	15
Ullapool	4,341	138	27
Girvan	18,359	1,127	322

The financial straits in which the larger herring ports find themselves are almost entirely a legacy of the war. Some of them had their revenue completely cut off through the closure of the adjacent waters by Admiralty orders, and all of them suffered by the calling up of the drifters and larger motor boats for mine sweeping and other purposes. As little or nothing was coming in, it was impossible to meet the usual debt charges-either in repayment of principal or in interest on the loans outstanding-and these were allowed to accumulate, so that at the conclusion of hostilities most of the ports were faced with a burden of debt very much heavier than in 1914. Owing to the succession of poor fishings, conditions have grown steadily worse and it is imperative that something should be done to relieve them, at least of that part of their obligations which were incurred during the war through circumstances over which they had no control.

It seems absolutely incontrovertible, then, that the fishermen will never get back to their pre-war prosperity until (1) the demand for herrings increases sufficiently to enable a price to be paid commensurate with the increased cost of capture and (2) government grants - or loans on very easy terms - are forthcoming to repair the wastage of the last ten years. In the meantime, however, they could reduce their working costs somewhat by forming cooperative societies at the larger centres for the purchase of coal, oil, engine room stores, nets, ropes, buoys etc. At present these are purchased either from ordinary retailers or from fishsalesmen, who run ship-chandlery stores in conjunction with their other business, and in both cases of course the ordinary retailer's price is charged.

In the matter of coaling, an interesting experiment was recently tried at Peterhead. Instead of coaling from shore, as is usually done, an Aberdeen firm anchored a hulk in the harbour and supplied coal direct to the drifters. A saving of 2/- to 3/- per ton was effected thereby but the innovation did not commend itself to the Harbour Authorities and the local merchants, and it was no doubt due to their influence that it was discontinued.

Marketing of the Catch.

Marketing of the Catch.

During the greater part of the 19th century the modern method of selling the catch by auction was unknown. What was called the "engagement" system was in universal operation at all the ports and the catch was actually sold eight or nine months before it was caught.

At the end of each season the curers "engaged" boats to fish for them during the following season under agreed terms. The details of the agreement varied from season to season and from station to station - depending, too, on the size of the boat, the quality of the gear and the competance of the skipper and crew - but the general principle was the same for all districts. The following is a typical agreement for the eighties.

> "We the undersigned crew of herring fishermen, ~~having~~ having a good boat and proper fleets of nets in our possession, hereby agree diligently and faithfully to prosecute the herring fishing for you at Peterhead and deliver to you all herring we catch as per agreement during herring fishing season 1882 commencing on the 8th July at 12 shillings per cran, till 16th July, and from that date until eight weeks, at the rate of 20 shillings per cran for two hundred crans, and 14 shillings for all crans afterwards. All the herrings to be delivered in good order and condition, before 11 p.m. of the day after which we leave the harbour for the fishing grounds."
>
> "Besides the above rates per cran we receive £40 as bounty and earnest. You supply net ground and cartage of fish and nets. All herrings not up to terms of agreement we will offer you at what they are worth."

It will be noticed that the season is split up into two parts - a very short spell from 8th to 16th July and a period of eight weeks commencing 17th July - the underlying idea being that the fish caught before 17th July were inferior both in size and quality to those caught afterwards. This differentiation did not appear until the eighties; it was only then that the so called "early" fishing commenced and the curer had the clause inserted to protect himself against a supply of what we would now call "mattie" herrings.

If he so desired it, the boats which he had engaged were bound to fish for him for the full period of eight weeks whether they had completed their complement or not: but, if the complement was delivered before the eight weeks were up, he usually had the option of taking the further catch at a lower price (as above) or refusing it altogether.

The terms of engagement for any season were determined by the success or failure of the previous season. Twenty shillings per cran for a complement of two hundred crans plus "bounty" was the usual figure for East Coast Ports from 1869 onwards, but before then the rate fluctuated considerably and gave rise to no little bitterness between curers and fishermen. The 1850 fishery in particular almost resulted in a complete deadlock. Owing to the prolific catch of 1849 curers lost heavily on their engagements and refused to pay the customary rate of 11/- to 12/- a cran for the following season. The fishermen held out for a time but eventually they were compelled to accept 9/-. During the next few years, however, the pendulum swung in their favour and the price steadily rose from 10/9 in 1851 to 21/- plus bounty in 1858.

During the sixties it fell back to 14/- but, as already stated, it rose again to £1 per cran plus bounty in 1869 and remained at that level until the "engagement" system became practically obsolete.

The bounty also varied considerably. If the continental demand was brisk and cured prices remained high, the fishermen could look forward to a good bounty for the next fishing. In the fifties and sixties bounties were generally low - usually in the region of £5 plus a fairly liberal supply of whisky - but they commenced to rise in the seventies, £20 to £30 being then a normal figure. By 1883 a good skipper and a first ~~crew and~~ class boat could command as much as £60 to £70, while smaller boats or less competent skippers got from £40 to £50.

The number of boats engaged depended on the size of the port and the financial standing of the curer. At Fraserburgh, Wick and Peterhead for instance individual firms engaged anything from 3 to 60 boats. The latter, involving as it did an expenditure of £3,000 to £4,000 in bounty and at least £12,000 in fish, was an exceptional number for a single station. Most of the curers, however, had from 10 to 30 boats.

It is at once apparent that the system was unduly and needlessly speculative. Apart altogether from the custom of giving a bounty, it was exceedingly risky business for the curer to buy herrings in advance without the least notion of what the quality would be like or how the market would stand. He staked everything on (1) [illegible] A reasonably early fishing to ensure that his complement would be full fish - spents always appearing before the period of engagement was up.

(2) Uniformity in quality at the various ports round the coast - or rather that his fish would at least be up to normal quality (3) a total catch which fell short of what the continental market could absorb.

The last was ~~a~~ the rock on which many a curer split. No provision was made for ~~a~~ the possibility of an over-supply. The individual curer could of course stop curing, the moment he had taken delivery of his "complements", but, if his fellow curers continued buying when the markets showed signs of becoming overstocked, the mischief had been done and could not be repaired. The curers were well aware that the market was restricted, and they ought by mutual agreement to have stopped buying, whenever the season's cure reached the total that the foreign markets ~~cured~~ COULD normally CONSUME. That, under the system then in vogue, was the only way in which they could have received a reasonable measure of protection for themselves.

Some of them adopted another plan. They went in for what was known in the trade as "blank selling" i.e. they contracted months ahead ~~of~~ to supply a foreign dealer with a stipulated number of barrels at a stipulated price. This in a measure was a corrective and shifted some of the risk on to the shoulders of the wholesale merchants abroad, but unfortunately all the curers could not find such accomodation. The majority of them "consigned" their cure to commission agents in Germany and Russia, who disposed of it to the inland merchants for as much as it would fetch. The prices fluctuated violently with the supply, and many an afflicent curer was reduced to absolute penury by a season or two of large catches and poor quality.

The worst feature of the engagement system, however, was the bounty, It was paid whenever the agreement was signed, the object, BEING no doubt to provide the crew with sufficient means during the winter to have their boat and gear in a thoroughly serviceable condition for the next fishing. As it had no relation to the amount of fish actually delivered but was paid whether the boat delivered her full complement or not, it was utterly unsound in principle and increased the risks which the curer had to face. Suppose for instance two boats A and B each received £60 in bounty and that A delivered its full complement of 200 crans at £1 per cran, whereas B only delivered 120 crans. In the first case the cost per cran to the curer would be $\frac{60 + 200}{200}$ i.e. £1 - 6/- : in the second $\frac{60 + 120}{120}$ i.e. £1 - 10/-. If a payment in advance was necessary, this should have been in the nature of a loan and should have been deducted from the earnings of the boat in the following season.

For a long time the curers were as staunch upholders of engagements as the fishermen. Many of them were curing at several ports simultaneously and they had to make their arrangements weal ahead with regard to the disposal of their staff of coopers and gutters and their stocks of barrels and salt. They would have incurred serious loss, if they had made elaborate preparations at Lerwick, say, when the bulk of the catch was landed at Fraserburgh; and, as it ~~were~~ WAS impossible for them to ~~foresee~~ foretell the strength of the fleet fishing from each port, they ~~intended~~ contended that they required some machinery to ensure that a suitable supply of fish would be available at the ports where they had made preparations for curing them.

The "engagement" system provided this, and, had it been adequately safeguarded against the accidents of over-supply and indifferent quality, it would have worked equitably and smoothly.

It so happened that during the seasons 1884, 1885, and 1886 oversupply and poor quality were conjoined. Prices on the continent fell so low that little margin of profit was left for the curers and many of them actually incurred loss on every barrel sold. The weakness of the "engagement" system was exposed, and those curers who had "weathered" the crisis determined to scrap it and introduce in its place the English System of selling the catch daily by auction. The change was by no means welcomed by the fishermen, many of whom held out against it for several seasons, refusing to sell their fish except by private bargain. Gradually, however, it became clear that sale by auction had come to stay and by 1895 engagements except at a few outlying ports* had become obsolete.

*Engagements persisted longer at Baltasound than at any other centre. In the early years of the present century the fishery there was exceedingly prolific and the curers engaged boats to supply a given quantity of herrings per week at 14/- to 16/- per cran. Once the weekly complement was delivered, they got the remainder practically at any price they were prepared to give. About 1907, however, steam drifters arrived on the scene and refused to engage. In spite of that they got much better prices than the sail boats, and the latter, realizing that they were being exploited by the curers, refused to enter into further engagements. By 1909 they had disappeared entirely.

With this change a new group of officials came into being. The fishsalesmen have played a much more important part in the development of the trade than the name would appear to indicate. They have proved of inestimable service to the fishermen and all the initial prejudice against them has disappeared. Besides undertaking the primary function of selling the fish, they have ~~fallen~~ TAKEN over the management of the boat's accounts and have relieved the skipper and crew of all commercial transactions, for which many of them are totally unfitted. They collect all monies, pay all accounts, perform the settling up which takes place at the end of each season and prepare and issue a yearly balance sheet to all who have a share either in the boat or the gear. The commission charged by them is 9d per £1 on all sales, but of this they hand 2d per £1 to the curer by way of discount, when he pays his weekly bill.

The catch is sold by sample and, in view of the rapidity with which herrings deteriorate, all complaints as to disconformity of "shot" to sample must be made within one hour of the boat being berthed ready to give delivery.

In the event of a dispute occurring, the buyer must pay the original price for all herrings delivered before the complaint was made - including those loaded into kits or barrels at the boatside but not removed to the curing yard. If he can come to an agreement with the skipper as to a suitable reduction for the remainder of the catch, then he has the first claim to them: if, however, they fail to agree, the fish are again exposed for auction. In either event the last five crans delivered prior to rejection are paid for at the reduced price.

If a "shot" turns out larger than was stated at the time of sale, the buyer must take 10% more in case of "shots" estimated at 50 crans or less, and in the case of larger "shots" 10% on the first 50 crans and 5% on the remainder.

Transactions are practically on a cash basis. Accounts for the previous week's purchases are presented by the fish-salesmen every Monday: if they are paid on or before Wednesday discount at the rate of 2d per £1 is allowed: if they are not paid before Saturday, no more fish is sold to the defaulting buyer until payment is made.

The regulations governing all sales are drawn up by the Herring Salesmen's Association and are submitted to the Herring Curer's Association for approval. They are the same for all centres and as a rule give general satisfaction to all sections of the trade.

CHAPTER V.

FRESHING.

FRESHING.

During the seasons large consignments of fresh herrings are dispatched daily from the herring ports to Billingsgate, Birmingham, Glasgow, Liverpool and other large industrial centres. In view of their extreme perishability it is essential that as short a time as possible should elapse between capture and consumption. In this respect the great Scottish Herring Centres are at a disadvantage: they are all at a considerable distance from the main distributing inland markets and consignments must be prepared for transport at an early hour of the day - before 11 a.m. at the Aberdeenshire Ports - if they are to catch the markets the following morning. "Freshers", therefore, as the wholesale merchants at the ports are called, do not wait until the usual sales by auction begin, but commence work whenever the first drifters arrive - often as early as 5 a. m. - purchasing their supplies by private bargain to ensure that their complement for the day will be ready in time for the departure of the train. As the fish are then in better condition than later in the day, the prices paid are, as a general rule, slightly higher than the average daily price.

The fish are packed in strong flat boxes about 2½ ft. long by 15" wide by 6" deep, bound with iron bands - each capable of holding about 3½ stone of fish. Packing takes place at the boatside, the fish being discharged direct from the boat to the boxes.

Owing to the fact that herrings caught by drift nets generally have their stomachs full, deterioration is much more rapid than in white fish. This might be got over by gutting them before they are packed. Unfortunately time does not permit of this at the Scottish Ports but it is quite practicable at Yarmouth and Lowestoft.

Torn or unsuitable fish are rejected and a liberal supply of ice is mixed with the fish and on the top and bottom of each box. They are then allowed to settle, care being taken not to expose them too long to the sun's rays, as this causes rapid deterioration. The lids are then nailed on, the labels affixed and the boxes are conveyed to the station by motor lorries. The whole process is carried through most expeditiously, and surprisingly little congestion occurs on the piers.

Most of the supply is consigned to salesmen in the inland markets who sell the fish on a commission basis and immediately notify the port wholesaler by telegram what his consignment has realized, at the same time advising him what the prospects of the market are likely to be the following day. Some of the wholesalers however run retail businesses as well and buy only to supply their own shops.

As this section of the industry is closely dependent on the provision of aadequate transport facilities, it might be expected that the extension of the railway system to the more remote districts, the provision of a better and speedier service with the larger centres and the later development of motor transport on such a colossal scale would have resulted in a greatly increased consumption of herrings throughout the country. This, however, as the following figures will show has not been realized.

Period.	Amount Consumed Fresh. (1000 cwts)	Percentage of Scottish Catch.	Price per cwt.
1891-1895.	754	19	4/2
1896-1899.	526	14	5/3
1900-1904.	720	16	5/3¾
1905-1909.	553	10	5/7¼
1910-1914.	404	8	6/9¼
1915-1918.	598	33	17/3¼
1919-1923.	624	20	9/7
1924-1928	350	9	8/11

It will be seen that there was a sharp decline in consumption from 1896 to 1899. This was attributable partly to the rise in wholesale prices at the port, partly to the increased takes of white fish, consequent on the great development of trawling which was then taking place. Much of the lost ground was recovered during the next five years, but from 1905 to the outbreak of war the amount consumed fresh steadily declined until in 1913 only 204,000 cwts. were disposed of in this way - approximately 4.6% of the total catch. The scarcity of food during the war years caused people to turn more and more to the despised herring and in 1918 over a million cwts. were consumed fresh. Since then however the demand has fallen away and the average consumption during the past five years is the smallest recorded for half a century.

It is not that as a nation we are eating less fish, for, as is shown in the Report of the Imperial Economic Committee (Fish, 1927), the quantity of fish (demersal, pelagic and canned) consumed per head of population has, apart from the war years, remained practically stationary since 1910, varying from 39.9 lbs. (1910-1913) to 39.3 lbs. (1919-1922) to 40.3 lbs. (1923-1926). But, whereas the consumption of demersal fish has risen from 28.9 lbs. (1910-1913) to 31.5 lbs. (1923-1926), and of canned fish from 1.4 lbs. to 2 lbs. per person, the consumption of herrings - fresh, kippered and bloatered - has decreased from 9.6 lbs. to 6.8 lbs. in the same period.

This is to be regretted, as the herring is undoubtedly one of the cheapest and most nutritious of foods. The following table[xx] gives the calorie value per pound of various common articles of diet.

	C. V. per lb.		C. V. per lb.
Butter.	3577	Beef.	623
Cheese.	1303	Halibut.	565
Bread.	1128	Potatoes.	369
Salmon.	950	Haddock.	335
Turbot.	885	Cod.	325
Eggs.	739	Milk.	322
Herring.	660	Flounder.	290
Mackerel.	645	Apples.	238

The calorie value depends on the amount of fat, protein, carbohydrates etc., and it is unfortunate that Atwater and Bryant, from whose analyses the above table was compiled, do not specify the stage of development of the herrings they examined or the locality where they were captured. The fat content varies con--siderably from district to district, and in herrings of the same district according to the stage of maturity. West Coast fish for example are usually fatter and oilier than East Coast fish. If we adopt Dr. Wemyss Fulton's analyses for the latter, we get the following fuel values--

Matties.	1040	Fulls.	777
Mat-fulls	953	Spents.	693

So far as Scottish Herrings are concerned, therefore, Atwater and Bryant's figure seems unduly small.

One striking feature is the relatively high fuel value of "spents", which are commonly regarded as vastly inferior to full herrings. The prejudice against them is due to their lack of fat but the protein content must also be considered, and it is evident from the above figures that, so far as the muscle is concerned (i.e. excluding the roe or milt) they are only a little

[xx] Hutchison, "Food and the Principles of Dietetics", Arnold.

less nutritive than full fish. The herring is at its best, not when it is full, as is generally supposed, but when it has reached the mattie state - i.e. when the fat has all gone to the muscle and none of it has been utilized in the formation of milt or roe.

The herring, too, has remarkable therapeutic properties Besides being rich in Vitamin A (which is found in the fats and oils of all fishes) and in Vitamin B (which is found in most natural foods but is particularly abundant in the fats and oils of animals and in the liver, kidneys and other glandular organs), recent researches by Professor E.V. McCollom have shown it to contain the exceedingly rare Vitamin D. This is found only in the most minute quantities in most ordinary foods. Animal and vegetable fats for instance are entirely lacking in it, but the liver oil of fish generally and especially the oil of cod, herring and salmon has been proved to supply it in abundance. It is supposed to have similar effects to "ultra-violet" treatment and is of inestimable value in the cure of rickets or in fact in any "case" where blood tests reveal a deficiency of calcium. The latter cannot in itself be absorbed into the blood, but, when it is combined with Vitamin D, it can be readily assimilated. It is customary therefore, when giving injections of calcium, either to prescribe cod liver oil or to include in the patient's dietary herrings or kippers, which contain not only Vitamin D but also a considerable proportion of calcium in the easily edible soft bones.

The decline in the amount consumed cannot, therefore, be attributed to any deficiency in dietetic properties: nor is it due to any failure in the supply, for it is more difficult

than ever to find markets for all the herrings caught. What then is the reason? To a certain extent the fastidiousness of the modern housewife is to blame. She may regard fish of some kind as a necessary part of the weekly menu, but she wishes to purchase it in as convenient a form as possible, without giving herself the trouble of splitting and cleaning it. Her choice is thereby restricted to those classes of fish which can be sold in the form of fillets or cuts ready for cooking. Unfortunately the herring does not lend itself readily to such labour-saving devices,** and the trouble and smell it entails in cooking tend to exclude it from those houses where the dining-room is in close proximity to the kitchen, if not the kitchen itself.

Many housewives too scarcely ever trouble to cook fish at all but depend almost exclusively on the fried-fish shops for their supplies. These latter have multiplied so enormously during the past twenty years--their number in Scotland and England is estimated at from 26,000 to 30,000 -- that they account for fully 40% of all the white fish landed in British Ports. Owing to its very oily nature the herring is most unsuitable for this class of business, with the result that many homes which formerly were in the habit of consuming herrings but have now come to rely on the fried-fish shops, have lost the taste for them.

** A machine has recently been invented capable of removing almost all the bones in the herring, at the rate of about 2,500 fish per hour.

In certain sections of the Press the fall off in consumption has been attributed to an alleged unwarrantable increase in the retail price, and accusations of profiteering have been levelled at wholesalers and retailers alike. "Why" it is asked, "should the public pay 5d. or 6d. a lb. for herrings when the catcher receives only a 1d. a lb. or less?" It must be admitted that the cost of fish is very much higher than it was in pre-war days, and further that it is much higher relatively than the cost of other articles of food. The index numbers published monthly by the Ministry of Labour show that from 1924 to 1928 the retail price of fish was on the average 113% higher than in 1914 as compared with 64% for all other foodstuffs, the corresponding figures for 1919 to 1923 being 117% and 110% respectively. Thus, while food-prices generally have fallen 46% since 1923, fish prices have fallen by only 4%. The latest issue of the Ministry of Labour Gazette gives the following average percentage increases (as at 1st March 1929) in the retail prices of some of the commoner articles of food over the corresponding prices in July 1914.

	British Beef	Frozen Beef	Bacon	Bread	Fish
Ribs	68%	42%	49%	49%	120%
Thin Flank	39%	14%			

The increase in food prices generally is given as 57% so that, compared with 1914, fish is still relatively twice as dear as the other articles of food consumed in ordinary households.

No separate figures are given for herrings; but the Food Council in its report on fish (published 18th Nov. 1927) estimated that the increase in the general level of price for herrings, kippers and bloaters was approximately 125% - 12% more than for white fish. Since then there has been no appreciable fall in price.

What is the cause of this apparently extortionate increase? Are prices being deliberately inflated and, if so, who are responsible?

The fishermen are often blamed. It is alleged that they habitually throw their catches overboard with the deliberate intention of keeping prices high. That they do so occasionally, because they cannot find a purchaser, is unfortunately only too true, but it is absurd to suggest that this is a regular practice. As was shown in Chap. 4, all the herring drifters work on a share system and no skipper or owner could jettison the catch without the consent of the crew. It is in their interest that the catch should be sold - however small the price - and although "dumping" has taken place in recent years, it has been exceedingly rare, and cannot be regarded seriously as a factor in raising the price.

In fact it can be easily proved that the fishermen is entirely innocent of any charge of profiteering. His catch is sold in the open market, the prices he gets are published daily and accurate statistics of catch and price are compiled weekly by the Fishery Board for Scotland. Even if he had any reasons for concealment, it would be impossible for him to do so . The following are the prices at the boat for (1) herrings, (2) all white fish and (3) some of the commoner varieties of white fish landed at Scottish Ports for (1) 1909 to 1913 and (2) 1924 to 1928.

Price per cwt.

	1909-1913	1924-1928	Increase Per cent
Herring	7/-	8/11	27
All White Fish	10/-	21/11	117.5
Cod & Codling	8/5	19/-	134.0
Ling	6/2	11/3	82.4
Haddock	11/5	20/-	76.1
Whiting	8/5	14/8	74.3
Skate	4/10	13/3	174.1

The disparity between herring prices and white fish prices is apparent. The former have appreciated by 27% - which, as already stated, is insufficient to remunerative the catcher - the latter by 117.5%, so that, although the retail price of herrings has increased by a greater margin than the retail price of ~~the~~ white fish, the herring fishermen receives a very much smaller share of that increase than the trawl or line fisherman.

It is not so easy, however, to exonerate the other ~~partiesmers~~ PARTNERS in the distributive process. Either some or all of them are making larger profits from herrings than from white fish, or else the excess is being swallowed up in the increased cost of carriage, cartage, etc.

The Food Council made exhaustive enquiries into the profits of port wholesalers, inland market salesmen and ~~retail~~ retailers. They examined 45 trading accounts received from 25 port wholesalers, 59 accounts from 30 inland salesmen and 103 accounts from 56 separate retail businesses covering 534 shops. Their conclusion was that in no case was there any grounds for the accusation of undue profiteering. They assessed the average nett profits as follows :-

Port Wholesalers	1.8% on turnover	£799 per annum
Inland Salesmen	1.7% " "	£879 " "
Retailers	4.5% " "	£451 " "

As was to be expected, considerable variations occured - from 2.1% (or £916) loss to 6.3% (or £2700) profit and from 4.7% (£406) loss to 6.1% (or £1432) profit in case of port wholesalers and inland salesmen respectively. For retailers the average varied from 2.8% (or £101) for businesses with less than £100 a week overturn to 5.3% (or £1334) for businesses with £400 a week overturn or more.

The latter, they point out, is undoubtedly a very exceptional turnover in the fish trade and the shops in question represent unusually large businesses working in exceptionally favourable situations. They cannot be taken as representative of the trade as a whole either in regard to turnover or profits. They are of opinion that retail profits should be judged rather from shops turning over (1) £100 or less per week (annual nett profit £101 or 2.8%] (2) £100 to £200 per week (annual nett profit £366 or 4.7%). These cannot be considered excessive but it must be remembered they cover transactions in all kinds of fish and do ~~therefore~~ not therefore prove that only normal profits are being made from the sale of herrings.

From an analysis of the accounts submitted to them the Food Council drew up a cost structure showing the oncosts at the various stages of distribution along the most lenghty route between the catcher and the consumer— i.e. with the inland market salesman acting also as inland wholesale merchant. As a starting point, they took 5/- per stone as a fair average price for fish at the boat — as a matter of fact it is much too high -- and added thereto the average expenses and profits of (1) the port wholesaler (2) the inland market salesman (3) the retailer. If we accept their estimates as accurate and allow at each stage the same absolute (as distinct from percentage) costs and profits for handling a stone of herrings costing 1/1½d. as for handling a stone of white fish costing 5/-, we get the following cost structure for herrings:-

	Fish (all kinds)	% of cost to sale price	Herrings	% of cost to sale price
Price paid BY PORT WHOLESALER.	5/-	----	1/1½	----
(1)Average cost of carriage and cartage, on sale price	5¼	----	5¼	----
(2)Ice, salt, boxes, etc.	1¼	----	1¼	----
(3)Telephone, telegrams, postages.	1	----	1	----
(4)Labour, rent, rates and other expenses.	2¾	4.	2¾	10.1
(5)Management or proprietor's or partners' salaries for management.	¾	1.1	¾	2.4
(6)Net profit.	1¼	1.8	1¼	4.6
	6/0¾		2/1	
Wastage	1¼	2.0	1¼	5.5
Price paid BY INLAND MARKET SALESMAN.	6/1¾		2/3¼	
(1)Average cost of carriage and cartage, on sale price.	1¼	----	1¼	----
(2)Labour, rent, rates, and other expenses.	5	6	5	14
(3)Management or proprietor's or partners' salaries for management.	¾	1	¾	2.1
(4)Net profit.	1¼	1.7	1¼	4.1
	6/10¾		3/0	
Wastage	¼	.5	¼	.7
Price paid BY RETAILER	6/11		3/0¼	
(1)Wages and salaries, on sale price.	9¾	9	9¾	15.5
(2)Rent and rates.	1¾	1.6	1¾	2.8
(3)Office and other expenses.	6¼	5.7	6	10
(4)Management or proprietor's or partners' salaries for management.	2¼	2.4	2¼	4.
(5)Net profit.	4¾	4.4	4¾	7.5
	9/-		5/1½	
Wastage	1/4½	15%*	1¼	2%*
Price paid BY CONSUMER	10/4½		5/2¾	

*As herrings are sold before being headed or gutted, the allowance for wastage has been reduced from 15% to 2%.

This cost structure is unduly high. It is clear that the cost of carriage, cartage, ice, boxes, salt and postages will be as great in conveying and selling a stone of herrings as a stone of turbot, but the expenses allowed above for labour, rent, rates, management and nett profit are very excessive. When expressed in percentages on sale price, they give much higher rates than were revealed in the trading accounts examined by the Food Council.

In the case of the retailer for instance, wages and salaries are 15.5% of sale price instead of 9%: rent and rates 2.8% instead of 1.6%: office and other expenses 10% instead of 5.7%; management 4% instead of 2.4%: net profit 7.5% instead of 4.4%. Yet in spite of these excess profits and allowances, herrings could be retailed at 4½d. per lb.

If, however, we allow for herrings only the same percentage rates of profit, management, etc., as those allowed by the Food Council for all kinds of fish, the cost structure would be reduced as follows :-

Price paid to Port Wholesaler	from 2/3¼ to 2/-
Price paid to Inland Salesman	from 3/0⅝ to 2/5
Price paid to Retailer	From 5/2⅝ to 3/3

So far as Scottish wholesale merchants are concerned, however, the expenses quoted above are inaccurate in two repects. In the first place - and this applies to English Ports as well - the allowance of 1½d. per stone for ice and boxes is too small. The latter cost 1/- to 1/2 each and their average life is two to three trips. As they contain 3½ stones of fish, the cost of boxes alone works out at 1¼ to 2d. per stone, so that with ice the allowance under this head would be approximately twopence. In the second place THE CHIEF SCOTTISH HERRING PORTS are situated at such long distances from the big inland markets that 5½d. per stone for carriage and cartage is quite inadequate. For instance the cheapest rates (consignments over three tons) from Fraserburgh, Peterhead and Aberdeen to Billingsgate, Manchester, and Birmingham are 4/6 per cwt (6¾d. per stone) compared with 1/10, 3/5, 3/-, respectively from Great Yarmouth Owing to the difficulty of making up ~~those~~ three ton consignments, a large amount is dispatched at the higher rate of 5/8 per cwt - i.e. 8½d. per stone - so that 9d. per stone for carriage and cartage would seem a fair allowance in the latter case and a most generous one in the former.

Both items would ~~find~~ bring the price received by ~~W~~wholesaler, inland salesman and retailer to 2/4½, 2/9½, 3/7½ respectively.

This would enable herrings to be retailed at 3.1 pence per lb. but it is seldom during the last few years that the price has fallen so low as this. It varies greatly according to supply and quality - from 4d. to 10d. per lb., the commonest range being 5d. to 7d. i.e. 400% to 600% higher than the price paid to the catcher.

Of this increase only 10¾d. per stone - roughly ¾d. per lb. - is accounted for by the cost of carriage and cartage, yet the rise in price is generally attributed by all sections of the trade to the prevalence of the unduly high railway rates. These were doubled in 1920 but were subsequently reduced, and for over five years they have remained at a level of 50% above per-war rates. It is difficult therefore to see haw an increase of 125% in price can logically be attributed to a 50% increase in railway rates. That they are propartionately greater for herrings than for white fish must be admitted because (1) the herring is relatively a very cheap fish and (2) owing to its extreme perishability more ice is required, the carriage of which must be paid for at the same rate as the fish. Nevertheless there is little justification for the sweeping charges which have been made.

It is absurd to suggest, as is frequently done, that, because all the ice has melted away long before the journey to the inland market is completed, a corresponding rebate in the railway rate should be made. The greater the distance of course the greater is the amount of ice required, and wholesalers at Wick, Fraserburgh, Peterhead, etc., find the cost of conveying the ice a serious matter - very much in excess of the cost of the ice itself.

The provision of proper refrigator vans would remove this difficulty and at the same time confer a benefit on the trade and the public generally by ensuring that the fish would reach the inland markets in much better condition than is possible at present.

There is more substance in the complaint that (1) the fixing of one cwt. as the minimum for the special fish rate and (2) the charge of a higher rate for parcels under three tons' weight are detrimental to the best interests of the trade. In the first case wholesalers and retailers contend that a lowering of this minimum would increase consumption among hotels, board-ing houses etc. : the Railway Companies on the other hand point out that small parcels require as much handling as big ones, that in their opinion the ordinary parcel rate is reasonable for consignments under one cwt. and that it was, in point of fact, held to be so by the Railway Rates Tribunal. With regard to the second complaint, differential rates are not in universal operation, but as a rule the cheaper rate is provided between the herring ports and most of the larger industrial centres. That the latter rate exists at all is really a concession by the Railway Companies, although traders are apt to regard it as the normal rate. In order to get the benefit of it, consignors sometimes unite and consign all their parcels through one of their number to a con-tractor or agent at the inland market, who for a small commission distributes the fish among the different salesmen. A saving of approximately 25% can be effected in this way.

In spite of such criticisms as these, it must be admit-ted that the service provided by the Railway Companies for the conveyance of fish is efficient, speedy and reliable. Where the amount of traffic does not permit of special fish trains being run, consignments are conveyed by ordinary passenger trains without any increase in the rate and it is surprising, considering the huge quantities conveyed and the great perishability of the fish, how few consignments are condemned

at the inland markets as unfit for human consumption. The service is at least as efficient as it was before the war and the 50% increase in rates cannot - in view of the increased costs - be considered unreasdnable.

Who then is responsible? The port wholesaler repudiates any suggestion of profiteering. He contends that the average annual price is no index of the price which he pays; for in the first place he must get his supply as early in the morning as possible and therefore must pay a little more than the prices which prevail later in the day for the same class of fish, and in the second place he buys only the best quality of fish, as small herrings are practically unsaleable and the inland retailers will not stock them. This however is only partly true. There is no doubt that when herrings are scarce he must pay high prices -- sometimes, though this is most exceptional, as much as£5 per cran -- if he is to supply his customers; but on the other hand he frequently buys at considerably less than the average annual price. For instance the bulk of the small, cheap herrings caught in the Kyles of Bute and Loch Striven from November to January are consumed fresh; and again in May and early June, when the East Coast herrings are small and unsuitable for curing, prices fall so low that the majority of the boats refrain from fishing. Yet what herrings are landed in these months are eagerly sought after by "freshers", and, as a matter of fact, the latter have been among the bitterest opponents of any proposal to postpone the commencement of the season until the fish are larger and more mature.

From its nature his business must be highly speculative. He is dealing in an article of extreme perishability and he cannot hold up supplies even for a day until the market improves. He must sell irrespective of the prices ruling and consequently

frequently suffers loss on his consignments. He gets advice daily from the inland salesmen as to what the demand is likely to be but he has nothing to guide him as to the probable supply. Herrings may be scarce and dear in one place and on the same morning other ports may be experiencing a glut. If he is buying at the former port he is bound to lose.

Many "freshers" allege that they are victimized by the inland salesmen and that the wholesale prices shown at Billingsgate and other markets are higher than what they actually receive. Such victimization is made possible by the fact that salesmen do two kinds of business (1) as salesmen on a commission basis (2) as inland wholesale merchants. Most of the herring supply is consigned for sale on commission, and, it is alleged, the salesmen first sell the fish at a low price to themselves and then later in the morning resell it at a profit to the retailers, and further that they do not return to the port wholesaler the actual price received but the price which they have agreed on as being fair for the day.

Incredible as such charges seem, the representatives of the salesmen, who were examined by the Food Council, admitted that both were true, but maintained that, in order to obtain better prices for their clients, it was sometimes advisable to split up consignments and they were then compelled to take over the balance themselves: further that it was in the interest of the sender that they should return higher prices when low prices were ruling - "in case he might be discouraged"! - corresponding adjustments being made when prices were high. They claimed that their methods were absolutely fair and that over a long period the sender received the equivalent of the actual market prices. Any sender who was dissatisfied could change his salesman, but as a matter of fact enquiries had shown them that complaints were rare except from casual senders.

The Food Council however were convinced that dissatisfaction was general -- how could it be otherwise ? -- and were of opinion that, even when salesmen were restricting their business to sale on commission, profits were being made much in excess of the usual rate of 5%, one firm frankly confessing that it did not regard "commission" in the generally accepted commercial sense.

They recommended that "the London Fish Trade Association and the other associations of inland market salesmen should so revise their rules as to make it clear that their members are expected to return actual sale prices when they are selling on commission, since there is evidence that the present system can be and sometimes is abused. Further, those port wholesalers who are convinced of the need for reform in this direction can meet the situation themselves by establishing-either severally or jointly-their own sale agents in the inland markets, and any such application for permission to establish a stall in the wholesale market should be given favourable consideration by the market authority concerned".

In spite, however, of the prevalence of such loose and hap-hazard methods, the wholesale prices at Billingsgate do not show any marked discrepancy with the prices which, according to the cost structure, ought to be paid by the retailer. Violent fluctuations even within a very short period are to be expected, but these correspond closely with the rise and fall of prices at the ports, so that, although at any given time the wholesale price appears excessive, yet, when averaged out over a long period, it approximates closely to the price arrived at in the cost structure. The average for the past twelve months (so far as ascertainable) has been 3/1 per stone , the corresponding figure on the cost structure being 2/9½ per stone. The difference works out at a farthing per lb. but under present conditions

it is impossible to say whether this goes to the inland salesman or to the port wholesaler.

If then the costs of carriage cannot be deemed excessive and wholesalers and inland salesmen are not making extravagant profits, the only possible inference is that the retailer is charging fivepence to sevenpence per lb. for an article which should be sold on the average at 3½d per lb.

It is difficult however to see how this can be possible. The retail trade is essentially individualistic, with an almost entire absence of rings or price fixing agreements. Each shop is a law to itself and prices vary considerably not only between district and district but between different shops in the same district. As competition operates freely, it would seem inevitable that the dearer shop should bring down its prices to the level of its nearest competitors, but unfortunately this is not so. Every housewife knows that the quality of fish varies and cannot be determined on inspection, and many of them imagine that, because herrings cost a penny per pound more in one shop than another, they must be of superior quality. As a consequence retailers can charge practically what they like (within limits) and justify themselves to the layman by claiming for their goods a superiority which is as often fictitious as real.

Nevertheless the public are convinced that they are being exploited. It is commonly supposed that the average ret--ailer deliberately restricts his supplies in order to keep up the price. To a limited extent this is true. No other retail business so habitually disappoints its customers by confessing that the article asked for is sold out,. Yet most fishmongers have a very accurate knowledge of the quantity they are likely to sell each day, but, because of its perishability, they delib--erately buy rather less than this in case any is left on their hands.

A more convincing explanation is that, when fish prices

were controlled during the war, a very high margin of profit had to be allowed to ensure that losses would not be incurred during periods of scarcity. Retailers thus got used to a fixed selling price, which, as it had no relation to the buying price, gave them reasonable profits when herrings were very scarce but most extravagant profits when herrings were plentiful; and they have never, it would appear, returned to the system of adjusting their prices from day to day to correspond with the fluctuations in port and market prices. In fact they have , as a rule, only a very hazy notion of the extent by which their prices have increased since 1914. In answer to a questionnaire, issued by the Food Council, some admitted that prices had increased by 100% or more, others denied it. The Glasgow Fishmongers' Association claimed that the increase was not more than 60%, while some associations placed it as low as 50%. (Report by the Food Council on Fish Prices, 1927, page 19.) Satisfactory investigation on this point is impossible, as the majority of retailers have destroyed their pre-war books and the records which survive show that up to 1914 herrings were sold by number, the various entries specifying neither weight nor quality.

The defence usually put forward by the retailer is that his price cannot conform to the fluctuations in prices at the ports because (1) the latter refer to all grades of herrings whereas the "fresher" buys only the best and habitually pays more than the current market price for them and (2) only the best of the herrings which reach the inland market are sold over the counter, the poorer grades being disposed of by hawkers. It is true that hawkers do not as a rule deal in the best grades, but at the same time it must be remembered that they are much less numerous than they were in pre-war days and therefore fishmongers' prices ought

to reflect more closely the changes in wholesale prices than they did in 1914. Moreover, as has been stated already, the bulk of the catch is cured gutted and it is a well known fact that early herrings, which are too soft for curing, are disposed of cheap to "freshers", so that it is more than doubtful if herrings consumed fresh cost as much as herrings bought for cure.

The majority of fishmongers contend that it is exceed-ingly difficult to keep pace with the rapidly fluctuating wholesale prices and that ~~it is~~ in their own and the public interest they must attempt some measure of stabilization, because either a very high or a very low price would result in a diminished demand, the public being very suspicious of cheap fish and imagining that, because they are cheap, they cannot be good. Owing however to the violent fluctuations in supply and quality, any attempt at stabilization cannot be wholly satisfactory and must inevitably result in prices which are normally higher than they ought to be, because the fishmonger himself fixes the price and he "naturally chooses a level which will protect him against unforeseen and extreme fluctuations in the prices which he has to pay for his supplies on the wholesale market. It must also be borne in mind that the retailers' costs consist not only of the wholesale price of fish but also of standing charges such as wages and rent, which remain unchanged for months or years. The effect of these standing charges is to stabilize a part of the retail price, irrespective of fluctuations in wholesale prices, and this, in conjunction with the inclination to avoid frequent changes in retail prices, is probably the reason why the index number of the Ministry of Labour for retail fish prices during the present year does not fully reflect the variation which, according to the index number for wholesale fish prices prepared by the Board of Trade, have occurred in certain months."[xx]

[xx] Report by the Food Council on Fish, 1927, page 18.

During the past decade the decline in our home consumption has been thrown into relief by the increased difficulty of finding markets for the cured article abroad, and the cry is often raised that a tariff should be imposed on all imported fish and all landings by foreign vessels until such time as we can absorb our own supplies. It is true that foreign vessels are allowed to land their catches in this country without paying duty, whereas British vessels landing in foreign ports are taxed, but it is exceedingly questionable whether such a tariff would have any beneficial results for a number of years. In the case of white fish, foreign trawlers compete with our own on a big scale but there is no evidence that their combined landings are habitually in excess of the demand; in fact their activities are rather to be welcomed, as they regularize the supply and so have a stabil-izing effect on price. The imposition of a tariff therefore would tend to raise the price to the consumer over a considerable period - until in fact our own trawling fleet had so increased in numbers as to be capable of landing our present supplies. So far as herrings are concerned, however, competition is practically confined to a few German Trawlers operating from Fleetwood, and, although they occasionally upset the forecasts of "freshers" working at Scottish ports, their catches are relatively so small as to be almost negligible. Compared too with white and canned fish, our imports of herrings (both fresh and kippered) are on an exceedingly small scale, amounting to approximately £400,000 - just over 4% of the total imported fish consumed annually in the country. The bulk of these come from Norway and are landed in the months of March and April when our own fisheries are in abeyance. Except that occasionally they bring our West Coast Fishery to a premature close, they do not seriously compete with

the home catch and a tariff would consequently have little effect.

Another suggestion which has frequently been made in recent years is that the trade should embark on an extensive publicity scheme for the purpose of bringing before the public the highly nutritive qualities of fish in general and the herring in particular. With this object in view the Fish Trade National Propaganda Association and the Federation of British Wholesale Merchants were formed last year. The former issued a booklet of economical fish recipes which was distributed free by retail fishmongers: the latter have endeavoured to stimulate interest among all sections of the trade and to persuade them that the scheme is worthy of their support.

A similar campaign was started in Berlin three years ago. By means of articles in the press, public lectures, wireless talks and free cookery demonstrations the value of fish as a food was brought home to the citizens and the amount consumed per head of population has steadily increased.

The chief difficulty in such a policy is to convince all sections of the trade of its advisability and to get them to contribute towards its cost. Individual action by one or two sections is useless - all must unite and bear their share of the cost. This might be apportioned as a graded percentage on sale prices at each stage of the distributive process.

No amount of publicity will suffice however unless (1) the quality is uniformly good and (2) the retailer brings his price down to a more reasonable level. In this connection it would be advisable if the pre-war practice of selling by number were restored. The housewife would then know exactly how far her purchase would go round.

CHAPTER VI.

"CURING".

DESCRIPTION OF GUTTING & PACKING.

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As the herring fishery is seasonal and the harvest is reaped in a comparatively limited period, the landings are habitually far in excess of the possibility of immediate consumption. Some means of preservation must therefore be adopted to keep the demand uniform and to maintain the price. As has been shown, only 9% of the catch is consumed fresh. About 14% is "Klondyked" and the remainder is cured in some form or other.

In the trade, however, the term "curing" has a restricted meaning. It is technically used to denote the process of preserving the fish by gutting them and packing them drysalted in kegs or barrels. This process has been practised for centuries and has undergone little change. Its discovery is generally attributed to a Dutchman - William Beuckelsz of Biervelt who lived in the latter part of the 14th century. Up to his time the only known methods of curing herrings had been to dry them in the sun or to steep them in brine. Drysalting was a great improvement on these; the fish remained firmer, kept longer and retained better their original quality and flavour. The Dutch were the first to exploit the new process and it is said that it was mainly owing to this that they were enabled to reach a position of outstanding pre-eminence in the herring trade of the 15th century.

It is still by far the commonest way of preserving herrings. Its chief advantages are (1) that it is the cheapest method of cure (2) that large supplies can be handled at one time. (3) that herrings so preserved will, if properly cared for, keep longer than any other method, timming alone excepted.

The salt, however, penetrates right to the bone of the fish and the taste for them is somewhat difficult to acquire. They deteriorate rapidly too when exposed to excessive heat, and unless they are very heavily cured, it is useless exporting them to warm climates. For these reasons the market for them has been always very limited. Nevertheless in pre-war days from 75% to 80% of the total catch was cured and, although the Continental market has been considerably curtailed since the war, approximately 65% is still disposed of in this way.

The following figures** give the average (annual) cure (in thousands of barrels) for various periods since 1810 →

	East Coast	West Coast	TOTAL
1810 - 1814	10	64	74
1815 - 1819	151	72	223
1850 - 1859	390	75	465
1880 - 1889	1018	102	1120
1890 - 1899	1103	138	1241
1900 - 1914	1577	144	1721
1915 - 1918	122	67	189
1919 - 1923	664	78	742
1924 - 1928	966	216	1182

These reveal the tremendous development of the industry on the East Coast in the opening years of last century, the continuous growth up to 1914, the complete paralysis of the war years which brought the volume of trade back to where it was a century before, the semi stagnation of the first five post war years and the partial recovery since, to which, it will be noted, the West Coast has contributed on a scale unparalleled before.

** In "seastick" state i.e. before herrings have pined. 125 barrels of seasticks = 100 barrels finally cured.

We have still a great deal of leeway to make up, however. Our total cure for the decade since the war is actually less than it was for the five years 1904 - 1908 and is just a little greater than that for 1909 -1913. At present we are curing roughly two - thirds of our pre-war cure, and yet the most difficult problem the curers have to face is to find markets for this greatly reduced supply.

The shrinkage in the volume of trade has resulted in large numbers leaving the industry for other vocations. Since 1913 the number of coopers and gutters employed has fallen from 2479 and 12,872 to 1,668 and 9835, while the number of "stations" has been reduced from 776 to 638. These figures include kippering and freshing as well. Many firms do all three kinds of business and it is therefore impossible to separate them for statistical purposes. Pickle curing, however, accounts for a approximately two-thirds of the total personnel. At present 243 individual firms are prosecuting this branch of the trade at 368 separate stations.

Up to the middle of last century little or no technical skill was required for curing. Anyone could cure provided he had the necessary capital, and besides, so great was the demand that practically any cure would sell. Operations were accordingly carried on in a very rough, hap-hazard fashion, frequently under most unsatisfactory and insanitary conditions. Curing yards - apart from cooperage and store accommodation - were entirely open, and the herrings were at the mercy of the sun and rain, both in the highest degree detrimental to the fish. As the floors were the bare earth, satisfactory drainage was impossible and the stench of brine and decaying offal permeated the country for miles around. The townsfolk did not object, for their living depended on the success of the fishing, and it was considered only right and proper that no obstacles should be placed in the curers' way. In most fishing villages curing was permitted on the piers and open spaces, and stacks of barrels were allowed to lie in the streets until such time as they would be required for shipment to the continent.

Although such conditions are by no means obsolete, especially in the smaller, more remote villages, curing is now conducted in a much more orderly, sanitary fashion. Every precaution is taken to protect the fish from adverse weather conditions. The gutting-shed is completely covered and is fitted with a concrete floor, sloping back from the farlands, with a channel and several drains to take away the blood and brine. After gutting has ceased for the day, the offal[x] is stored in barrels and removed to another part of the yard, the shed is thoroughly cleansed and no putrefying matter is allowed to remain over night.

[x] This used to be disposed of to neighbouring farmers for manure at 1/- to 1/6 per barrel. The Gut Factories now get most of it at the price of the cartage.

Owing chiefly to the vigilance and guidance of the Fishery Board's Officers, the general level of curing has improved enormously within the past fifty years, and considerable care and skill are now required to bring the cure up to the standard necessary for the official brand. The modern curer must know his job. In the first place, he must be a good buyer-i.e. he must be able merely by glancing at a sample of fish to guage what proportion are likely to turn out Large Fulls, Fulls, Mat Fulls etc.. He must have a sound and intimate knowledge of every stage in the process of curing, and must be able to vary his cure according to (1) the nature of the fish and (2) the tastes of the consumers in those countries to which he wishes to export. Above all, he must choose his coopers and gutters with great discrimination, for on them largely depends the excellence of the selection and cure.

It is of the utmost importance that the fish should be gutted and packed as soon after capture as possible. The maximum time allowed under the Fishery Board Regulations is 24 hours. In the days of the old sail boats, which were often becalmed and did not reach port until late in the evening, this was by no means easy, but nowadays the fleet returns to port in the morning or early afternoon, and it is seldom that the curing staffs cannot cope with the daily catch within the statutory time. Even so, the greatest dispatch is necessary and within a few minutes of a "shot" being purchased, the buyers' kits are at the boat-side ready for the delivery of the fish. Before the war, carts holding four crans were used to convey the fish to the yard but it was found that the fish were considerably jostled in transit and the use of half or quarter cran kits is now universal. Most of the larger firms own a fleet of motor lorries but the smaller firms have to rely on hired conveyances.

The herrings are discharged direct from the kits to the farlands. These are long rectangular troughs, two or three feet ~~wide~~ high and six or nine feet wide, usually extending the whole length of the yard and opening out on to the street. Even when ~~they~~ THE HERRINGS are to be gutted immediately, the coopers in attendance give them a liberal sprinkling of rough coarse grained salt to prevent deterioration.

The gutting and packing are done exclusively by women. They work in crews of three, two of them removing the gut and the third packing. As a rule, one packer cannot keep pace with two gutters, and at suitable intervals all three engage in packing. A crew will gut and pack, on an average, from 2½ to 3 barrels in an hour, but a really expert crew can manage 4 barrels i.e. from 3500 to 4000 fish.

The gutters stand alongside the farlands, on the side away from the street. Beside them in the farlands they have each a ~~tub~~ gut "cog" and behind them several "carrying tubs" corresponding to the different selections for cure. The extraction of the gut may be, and was once done by hand but nowadays a knife, about 6½" in length with a blade 2¼" long is invariably used.

The herring is held slackly in the left hand, the belly into the palm of the hand and the thumb and fingers on either side pointing towards the back. The point of the knife is inserted through the gills and turned sharply round, cutting the fish on both sides without cutting the entrails which are to be removed. At the same time the hand is pulled rapidly outwards (away from the herring's belly) and upwards (over its head) and the whole of the entrails and gills will be removed. They come away more easily if the gutter squeeges the belly with her left hand, but the pressure must be very slight, otherwise some of the milt or roe will be squeezed out and remain hanging at the breast of the fish. Care must be taken not to tear the body more than is absolutely necessary: if the job be neatly done, the opening should just be sufficient to allow the passage of the gut. With a flick of her right hand the gutter sends the entrails to the gut cog, while the fish is thrown with her left into the carrying tub for which its length and maturity fit it. The selection is done automatically. She seldom looks at the fish but knows instinctively by its "feel" what category it should ~~belong to or~~ be classed under. The whole operation is performed with incredible swiftness and wonderful dexterity and accuracy.

When the carrying tubs are full, they are emptied into a large tub - known as the "rousing tub" - each crew having as many of these tubs as they are selections. The packer there "rouses" the herrings with salt, turning them over and over to make sure that every herring comes into contact with it. When they are thoroughly roused, ~~shee~~ she then ~~beings~~ proceeds to pack them.

This requires considerable practice and skill, as it is essential that each layer should be as tight as possible, otherwise the fish would jostle and injure each other. The fish are first laid on their backs, a single herring - often called the "head herring" - is placed close to the side of the barrel, two herrings are placed against it with their tails inward, another herring is placed in the middle, then two, and so on until the tier is complete. Salt is sprinkled over it, and the process is repeated for the second and successive tiers, the only difference being that the herrings in alternate tiers are set at right angles to each other.

The amount of salt used for each tier depends on the size and nature of the fish, the market they are destined for and the length of time they are expected to keep. Large herrings require more salt than small: soft, oily herrings will not absorb as much as hard firm herrings. This is the reason for the light matje cure that is given to the large early West Coast fish. Some countries too prefer a much lighter cure than others. Poland on the whole prefers a light cure: Germany a hard cure. Russia in pre war days took both - the light cure for the wealthier classes and the hard cure for the peasants. Canada and the United States take a very light cure.

After the barrel has been filled, a few extra tiers are added and the cover of the barrel is laid loosely on the top. This is to allow for shrinkage, and barrels left in this state are known as "upsets". On the following day tiers are added or removed, as need be, and the tops of the barrels driven home. They are then laid on their sides for the prescribed period of pining, during which time they are known as "sea-sticks".

Branding

BRANDING.

Cured herrings have the distinction of being the only article of food exported from this country, the quality of which is guaranteed by the Government as being up to a certain recognised standard. Such a guarantee is not essential for export. Curers may use it or not as they think best: some of them of sufficient standing and reputation in the trade prefer to use their own trade marks, taking care that the quality of their fish and the method of packing and curing are at least as high as the standard demanded by the Fishery Board, but, when a curer desires it, he may request to have his fish examined by one of the Fishery Board's officers, and, in the event of their being satisfactory as regards quantity, quality, packing, selection and cure, each barrel is branded on the bilge and stencilled on the head end with a mark in the form of a crown, showing that the herrings are of Scottish Cure and stating the selection, the year of cure (and in the case of matties the month of cure) and the initials of the examining officer. XX

The brand, as it is known to-day, was a development of the old Bounty System introduced in 1808. The bounty-first of 4/- then of 2/- per barrel - was payable, only after each barrel had received the official brand to show that the cure conformed to the regulations, and, when the bounty was discontinued in 1830, it was felt by the Government and the curers alike that the trade in cured herrings was not sufficiently established to dispense with some form of Government Guarantee and the brand was continued, its use being now compulsory in the case of all herrings intended for export.

XX See Appendix XI

Its retention caused a great deal of controversy. Many argued that, if it was justifiable and expedient in the case of the herring industry, it should be extended to other industries as well. The curers pleaded that no other industry was in the same position as theirs, that practically all their trade was with other countries and that a guarantee was essential to give the lesser known members of the trade a chance of competing in foreign markets with those, whose reputation was already established and whose name was a sufficient guarantee for the quality of their fish and the excellence of their cure.

As no fee was charged and the expenditure involved was met from public funds, the Treasury in 1848 instructed Sir John Lefevre to conduct an investigation into the advisability of continuing the brand, and he reported that "the system of authenticating the quality of goods by the agency of a Government officer is objectional in principle" but that in his opinion the abolition of the brand might have serious consequences on the continental market, leading possibly to its "derangement and contraction". He recommended that those curers who wanted the brand should not be deprived of it, but, if it really benefited them, they should be prepared to pay for it: those who did not wish it could use their own trade marks, and the prospect of saving the fee would, he held, tend to raise the general standard of cure and induce a larger number of curers to become trade-markers. This recommendation, excellent as it undoubtedly was, did not at first find favour, and its adoption was delayed until 1859. In that year the Treasury again proposed to abolish the brand, but the oppostion of the Scottish curers was so strong that another Commission was appointed and the result of their investigations was that Sir John Lefevre's proposals were upheld and a fee of fourpence per barrel and twopence per half barrel was imposed.

Further commissions were appointed in 1866 and 1870. The former condemned the brand, the latter considered it was inadvisable to abolish it. Finally the matter came before a Select Committee of the House of Commons in 1881 and after evidence had been taken from curers, exporters, etc., the following recommendations were adopted -

(1) That the existing regulations as to measures and barrels should be continued.

(2) That the existing system of branding should be continued

(3) That the surplus of the brand fees should be appropriated to improve piers and harbours, and a portion of it should be allocated to the extension of telegraphic communication to remote fishery districts.

(4) That the functions of the Board at Edinburgh should be extended so as to take cognisance of everything relating to the coast and deep-sea fisheries of Scotland.

(5) That the Board's Branding Officers and Cruiser should be made available for Scientific Investigations similar to those carried on in America.

(6) That the Secretaries of Legations abroad should be requested to furnish the Fishery Board with an annual report giving information on these scientific investigations.

These regulations have been altered from time to time since then to meet the varying needs of the trade. The chief changes have been in the different selections recognised for the brand. In 1881 (excluding the Repack brand) there were four (1) Fulls, (2) Matties, (3) Spents, (4) Mixed. By 1890 these had been altered to Large Full, Full, Mat Full, Spent, Mixed, for fish not less than 11¼", 10¼", 9¼", 10¼". 9¼" respectively. In 1895 the "Mixed" brand was abolished and the "Mattie" brand reintroduced. No further changes took place until 1908 when Spents over 10¼" became eligible for a separate brand - Large Spents.

The most important change however, took place in 1913. Up to that time herrings for the Large Full, Full and ~~Mathes~~ Mat Full Brands had to be full of milt or roe: empty fish, although they were of the requisite size, were rejected. This caused great dissatisfaction among the branding curers, and in 1912 the Peterhead Fish Trade Association petitioned the Fishery Board either (1) to admit empty maturing herrings to these brands or (2) to provide additional brands to enable them to compete with the Trade Markers, who habitually mixed empty herrings with their fulls. Their complaint was justified, as the average "shot" consists of a mixture of full and empty fish, and, if only full fish were to be admitted to the Full Brands, they would either have to be scrupulously careful in avoiding "mixed" shots or else they would be left with a large number of barrels of larger sized empty fish which they could not dispose of at a reasonable price. Some curers indeed tried to get rid of them as matties.

As a result of the representations which were made, the Fishery Board accepted the second proposal and introduced a new selection called the "Filling" Brand for fish which were large enough for the Full or Large Full Brands, but which were only "filling" or maturing and therefore could not be classified as "full". In addition, to prevent curers presenting larger sized empty fish as Matties, a maximum length (for the MATTIE BRAND) of 10¼" was imposed, so that only fish between 9" and 10¼" were eligible.

In view of the tendency which had been growing in recent years to commence the East Coast fishing in the end of May or the ~~1st~~ beginning of June, authorization was also given for the branding of Matties taken not earlier than 1st June (instead of 1st July for Shetland and 10th July for Orkney and the East Coast) but the month of cure and (until 1st July) the week of cure had to be shown on the stencil on the top end. In addition, because of the rapid deterioration of these early fish and the need for careful handling of the barrels after cure, it was explicitly stated that the brand for early Matties was a guarantee of quality only at the time of examination and that such fish should be consumed as early as possible.

Owing to the war these regulations did not get a fair trial, but in 1913, which was a normal branding year, there was little demand for the new "filling" Brand, only 7,723 barrels out of a total of 246,604 being so branded. The specification of the week of cure too in the case of Matties caused dissatisfaction. Curers complained that it hampered trade in Matties, as they had to keep different weeks' cures separate on consigning them to the Continent.

As a consequence the regulations were ~~re[illegible]d~~ revised immediately after the war. The discredited "Filling" Brand was dropped in 1919 and the board reverted to the first proposal made by the Peterhead Association in 1912 viz.- that well developed herrings, ~~were~~ whether full of milt or roe or not, shall be eligible for the Large Full, Full, and Mat. Full Brands, if they are not less than 11¼", 10¼" and 9½" respectively.

The date limit for Matties was abolished and only the month of cure instead of the week of cure was to be shown on the stencil. The curers thus received greater freedom than ever before, and there was a risk that they would work to the minimum and brand only the empty fish in their respective categories, keeping the full fish separate for the purpose of securing specially high prices. German Importers complained that this was being done and that the standard of ~~the~~ Crown Branded Large Fulls, Fulls, and Mat. Fulls had gone down, the empty fish actually predominating in the so-called "full" selections.

This led to further revision in 1926. The "Filling" Brand was ~~resuscitated~~ resuscitated for herrings not less than 10½" and non-full herrings were excluded from the Large Full and Full Selections. It was still permissible, however, to include them for the "Mat-Full" Brand. In addition, the Spent Brand, for which there had been little demand, was abolished and the minimum length for Large Spents was reduced from 10½" to 10".

Complaints similar to those lodged against the Full Brand from 1920 to 1925 were now lodged against the Mat-Full Brand: Continential Buyers complained that Mat-Full selections contained an undue proportion of empty fish and they approached the Board's Continental Inspector with a view to bringing the regulations for the Mat-Full Brand into line with the altered regulations for the ~~Mat-Full~~ Large Full and Full Brands.

The Fishery Board first asked for the opinions of the curers in writing, and thereafter convened a meeting of delegates from all the herring ports, and, although the curers opposed any changes on the lines suggested by the importers, the Board thought it advisable to alter their regulations, introducing a new Brand (Medium) for non-full fish of Mat-full size and reserving the Mat-full Brand for Herrings actually ~~free~~ full of milt or roe. These alterations came into force in 1928 and the selections ~~not~~ now approved for branding are as follows:-

Large Full - For herrings full of milt or roe, not less that 11½" in extreme length.

FULL - For herrings full of milt or roe, not less than 10¼" in extreme length.

Filling - For Herrings "maturing" or "filling", not less than 10¼" In extreme length.

Mat. Full - For herrings full of milt or roe, not less than 9¼" in extreme length.

Medium - For herrings "maturing" or "filling", not less than 9⅛" in extreme length. Provided that long gut has been removed

(~~Mattie~~) - in herrings caught before 31st July.

Mattie - For Mattie herrings i.e. fat herrings with roe or milt undeveloped, not less than 9" in extreme length, provided that the long gut has been removed in herrings caught before 31st July instead of 14th July as formerly. The pining period to be not less than eight clear days - instead of six as formerly.

Large Spent - For "spent or shotten" herrings (i.e. herrings which have spawned), not less than 10" in extreme length.

Winter - For herrings branded between 1st November and 1st April.

Repack - For herrings of good quality rejected in the first instance through defects in the selection, packing, gutting or salting, but presented again after original defects have been ~~remied~~ remedied: also for herrings already branded but found afterwards to be requiring repacking.

On the whole the alterations have not been favourably received by the curers. The extension of the pining period for Matties has met with their approval, (the exporters advocating fourteen days), but opinion is divided as to the advisability of removing the long gut in all Matties and Mediums caught before the 31st July. Many curers complain of the extra work involved to the gutters and of the risk of injury to the fish. These young herrings are very tender, especially at the beginning of the season, and the removal of the long gut is apt to damage them, but as a rule gutters are so expert in wielding their knives that only an infinitesimal number of herrings are broken or torn in the process. On the other hand there is no doubt that the presence of the long gut in young fish is conducive to rapid deterioration and it is a fact that quantities of early herrings have putrefied so quickly on the continent that they have had to be sent to the manure works. Such an occurrence is apt to bring the Scottish Cure into disrepute, and, in view of the increased competition which we have to face from Continental rivals, any measure which will make the herrings keep better is to be commended and, if, as the Fishery Board Experts allege, the removal of the long gut will do that, than the extension of the date will be in the best interests of curers and importers alike.

It is against the changes in the Mat-Full Brand that the criticism of the curers is chiefly levelled. They hold that the change is unnecessary; that so far from Crown Branded Mat-Fulls being in disfavour on the continent during 1926 and 1927, they were actually commanding higher prices than the best Trade Mark Mat-Fulls and were much easier to dispose of than Yarmouth and Lowestoft Mat-Fulls which were full of Milt and Roe.

They hold too that the reduction in the minimum length from 9⅛ to 9½", while giving more so called Mat-Fulls, will lead to reduced prices for that grade and that the lack of uniformity in selection - the range of size varying from 9¼" to 10¼" - will hamper trade in them. In some quarters the suggestion has been made to reduce the minimum size for Fulls to 10". This would lessen the range for Mat-Fulls and make dealing in them easier, and at the same time it would increase the number of Fulls, the supply of which - in view of the uniformly smaller-sized fish caught since the war - has been totally unequal to the demand.

It is of course premature to estimate what the effect of the new Medium Brand will be. Except for size it is exactly analogous to the Filling Brand and, unless more advantage is taken of it than of the latter, its institution will not justify the extra labour involved in making the selection. The general opinion in the trade is that there are too many selections already: but it must be remembered that the primary object of the Fishery Board was not to increase the number of selections but to confine the Full Brands to ~~Fine~~ Full Fish: the institution of ~~other~~ further Brands for the rejected fish was only ~~official~~ logical, and curers can make use of them or not as they desire. The proportion of "Medium" Cure which will be presented for the Brand will depend largely on the state of the market: the danger is that in a good year, when supplies of Fulls are plentiful, the curers will be left with their "Mediums" on their hands and find it difficult to dispose of them at a reasonable price.

The arrangements made by the Board for inspection and branding work smoothly and give general satisfaction.

The duties are carried out by the Boards Officers. ~~Number of officers~~ - two Inspectors, fourteen 1st Class and seventeen 2nd Class Officers. These are not stationed at the herring ports all the year but are transferred there from their winter stations for the season. With a view to widening their experience and securing uniformity in the standard of the brand, officers are as a rule distributed among the branding stations in strict rotation. Their expenses are met out of the branding fees, and, after the other expenses involved in branding have been met, the remainder is allocated to the Harbour Improvement Fund.

The curer who desires branding must first present to the Fishery Office nearest his yard a "Request" note, stating the number of barrels to be presented and the amount of fees deposited, and declaring that the cure has been in conformity with the regulations, that none of the herrings have ever before been presented for branding and further that any barrels branded shall not in any way be interfered with except in the presence of a Fishery Officer.

The penalties prescribed (55 Geo III Cap 94 and Wm IV Cap 54) are for a false declaration, a fine not less than £10 or more than £20, and for fraudulent branding, a fine not exceeding £50 or imprisonment for a period not exceeding six months, together with the forfeiture of the instruments and the barrels so branded with their contents.

The branding officer must satisfy himself not only that the herrings are of good quality but also that the barrels containing them are of the regulation size (26⅔ gallons imperial measure - for half barrels 13⅓ gallons), well made, properly hooped and thoroughly tight.

He does not of course examine every barrel in the presented parcel. The number to be opened is left to his own discretion, provided that he examines at least 10% in parcels of 100 or less, 8% in parcels of 100 to 200 and 7% in parcels over 200. As far as possible, he selects for examination the work of different packers and different dates of cure, and examines top and bottom alternately.

If defects are observed in the quality of the fish or the method of cure, then the brand is refused absolutely: but if herrings of good quality are rejected through faults in selection, packing, gutting or salting, the curer may present them again for the Repack Brand after the defects have been removed. The actual branding must be done in the officer's presence and the number branded must be checked by him. Those barrels which he has actually examined are distinguished from the others by having a double brand affixed towards the end opened. If any barrels have been rejected, the fees for such are immediately returned to the curer.

Branding is almost exclusively confined to the East Coast and the Orkney and Shetland Fisheries. An occasional parcel is branded on the West Coast but as a rule West Coast Herrings, being fatter and oilier than East Coast Fish, receive a lighter cure and are trade-marked for early consumption. In England too the brand has never caught on: it was introduced by the Herring Fishery Branding Act of 1913 but apart from the years 1919 and 1920, when the scheme of Government Purchase was operative, it has never been favourably received by the English Curers, and since 1924 it has been in abey--ance.

The following figures give (1) the average number of barrels cured gutted (per annum) on the East Coast, Orkney and Shetland (2) the average number of barrels branded for the same districts and (3) the percentage of branded to cured for various periods from 1859.

	(1) (In 1000s of Barrels)	(2)	(3)
1859.	309	159	51%
1869.	395	246	62%
1879.	564	342	61%
1891-1900.	1096	395	36%
1901-1908.	1666	417	25%
1909-1913.	1636	247	15%
1919-1926.	791	227	29%
1927-1928.	909	257	28%

In 1859, when the fee was first introduced, approximately half the cure was branded, and the results were so satisfactory that the proportion branded steadily increased until in the seventies and early eighties almost two-thirds of the cure was presented. In the meantime however, as Sir John Lefevre had foreseen, progressive curers had been building up a reputation on the Continental Markets, and in the eighties the fruit of their enterprise appeared, when, by guaranteeing their own cure and providing rebates in the event of justifiable complaints, they were enabled to dispense entirely with the brand and sell their fish on the strength of their own trade-mark. Thus, as more and more curers began to "trade-mark", the percentage of branded to cured declined until for the five years preceding the war only 15% was branded. During the war, branding was of course entirely suspended, but since 1919 the brand has been extensively used, and although the total number of barrels branded shows a decrease on pre-war figures, the proportion of branded to cured has greatly increased. This is due partly to the change in personnel among the curers and exporters, partly to the very mixed quality of the catches - both giving prominence to the advantages of a recognised uniform system of grading.

The brand is of great service to young curers: it enables them to compete in Continental Markets with those who have been longer in the trade and have established a connection with foreign buyers. It is thus an incentive to coopers to acquire some capital

and cure for themselves: it provides them with a standard at which they must aim and an independent expert judgment on the quality of their cure, and it assists them in marketing their fish. Before unbranded herrings are sold, frequent inspections by prospective buyers may be necessary; this, besides creating trouble for the curer and his coopers, is exceedingly bad for the fish. No such inspections are necessary with branded herrings; they are regularly bought and sold simply on the strength of the brand.

The brand is frequently criticized on the ground that it hampers progress by demanding uniformity in packing and cure, and that the average curer is thereby discouraged from trying new methods of "doing up" his fish. Such criticism is absurd. The Fishery Board are thoroughly conversant with all aspects of the trade: they not only keep in touch with the production and marketing of cured herrings at home but each year they send one of their inspectors to the Continent to get the views of the importers and to investigate any complaints that may be made. They are out to secure what is in the best interests of the trade, and, as has already been shown, they are not slow to alter their regulations, if altered circumstances on the Continental Market demand it. Moreover no curer is compelled to brand: if he is dissatisfied with the regulations and thinks he has discovered some improvement on them, he is at liberty to put it into practice and offer his goods under his own trade-mark.

Another common complaint is that it is difficult for a limited number of officers to examine every parcel thoroughly, that some are more exacting than others and that consequently there are variations in the quality of the fish bearing the same brand. It is impossible of course to get absolute uniformity in the standard of the inspecting officers - it would indeed be idle to expect it - but every precaution is taken to reduce the possibility of variation to a minimum. The regulations are clearly defined, the officers are

themselves practical men, and each of them knows that his professional reputation is at stake and depends on his powers of interpreting these regulations with strict impartiality. Any barrel can be traced back to the officer who brands it, and, if complaints are made, his judgment is liable to be reviewed by the Inspecting Officer.

A further criticism frequently made against the brand is that, although it is a guarantee of quality, no compensation is paid to the importer, who, having bought on the strength of the brand, finds that the herrings are not up to the recognised standard. The Fishery Board state explicitly that the brand is a guarantee of quality only at the time of examination, and it would be absurd to expect the Board to accept responsibility for the state of the fish at some subsequent date, as it has no control over the treatment they will receive before, during and after shipment. In this connection the suggestion is sometimes made that the branding officers should be stationed abroad and that the fish should be inspected after shipment. Such a proposal is absolutely impracticable. The curers nowadays almost invariably sell their cure on this side: to postpone branding would hamper dealing and make frequent inspections necessary. Complications too would arise with rejected barrels, as it would be difficult to decide when the damage was done and who was responsible. The disposal of these at a reasonable price would depend on the supply of branded fish: most probably the curers concerned would suffer considerable losses.

Although such criticisms are occasionally made, the brand has successfully stood the test of time and is still held in great repute by all sections of the trade. It has been instrumental in bringing the Scottish Cure to a standard of excellence unequalled by any of our Continental rivals; and it is no small tribute to the Fishery Board that Holland has endeavoured to revive her languishing export trade by the introduction of a similar guarantee. The greatest

proof of its usefulness, however, is the fact that, in spite of the fee, Scottish Curers have made extensive use of it for seventy years.

Coopers and Gutters

Conditions of Service

Coopers and Gutters.

Conditions of Service.

COOPERS.

The cooper's duties are of a twofold character. During the fishing seasons, he takes charge of the practical side of curing. He supervises the work of the gutters and packers, assists at rousing, filling-up, pickling, branding etc. and is responsible for keeping the yard clean and the plant in good order. In the off-seasons on the other hand - if he is fortunate enough to be in employment at all - his work consists exclusively of barrel-making. This was at one time a very important part of his duties, but since the advent of the machine-made barrel in 1900 it has shrunk into comparative insignificance. In fact it is doubtful if any barrels would now be made by hand, were it not that many of the curers prefer to keep on their coopers all the year round rather than run the risk of losing their services during the fishings. Barrel--making is the only work to which they can set them at such times, but there is no doubt that barrels can be obtained more cheaply from the factory than they can be made in the yard cooperage.

Even under the most favourable conditions barrel-making is very hard work, but it is far easier today than it was thirty years ago. Staves were then very roughly cut and had to be dressed and shaped by hand. No machinery existed for rounding the heads and bottoms. The cooper had to do this for himself, and a very slow and laborious job it was. Small wonder that an expert could seldom make more than twenty four barrels per week. Most cooperages, however, are now equipped with machinery for dressing staves and rounding ends; and the modern cooper can turn out from thirty to forty barrels per week.

His lot too during the fishings has improved considerably. Before the war it could truthfully be said that his work was never done. He had no fixed hours: after the day's work was supposedly finished, he was expected to remain in or near the yard on the offchance of a shot coming in. For this he received no extra pay

and curers frequently trespassed on the good nature of their coopers. Since 1919, however, the conditions of work and rates of wages have been fixed annually by mutual agreement between the Coopers' Branch of the Workers' Union and the Scottish Herring Curers' Association. The following are the regulations at present in vogue--

Fishing Stations.
Minimum Rates.[xx]

Coopers employed at home station	£3-5/. per wk.
Coopers sent from home & living in bothies (fire, light and cook supplied)	£3-10/ per wk.
Coopers sent from home & in lodgings	£4 per wk.

Overtime.

Working week to consist of 56 hours. Overtime to be paid for at the rate of 1/5½ per hour.

Barrel-Making.

Whole barrels (jointed staves & finished ends supplied)	1/3
Half do. do.	1/1
Whole do. made with iron hoops	1/1
Half do. do.	/11
(Maximum - 45 whole & 52 half per week.)	
Dressing staves - whole barrels	3½
do. half do.	3
Rounding ends - whole do.	3½
do. half do.	3
Hooping whole barrels	5½
do. half do.	5
do. whole do. with iron hoops	3½
do. half do. do.	3

Allowances.

Where barrels are cleaned, a charge to be made of 1½ per whole and 1/3 per half barrel. For bending and steeping hoops ½ per barrel. For rivetting and tarring iron hoops, ¼ per hoop.

Time Work.

Flat rate of 1/2 per hour.

[xx] Before the war the usual wage was from 30/- to 35/- for time work, with no extras for stations away from home, and from 9d. to 1/- per barrel with staves dressed and jointed and finished ends supplied.

GUTTERS.

Gutting is exclusively a seasonal occupation. The principal seasons are the Great Summer Fishery (June to August) and the East Anglian Fishery (October to the beginning of December). At the former practically all the gutters find employment; at the latter usually about 50%. A very much smaller number is required at the West Coast Winter and Early Summer Fisheries, so that the vast majority are employed for only three or five months in the year.

Many of them come from crofts in Sutherland, Rossshire and the Western Isles; and, when the season finishes, they return to agricultural work. East Coast Gutters, however, are not so fortunately situated. Practically the sole employment open to them in the "off" seasons is domestic service and in recent years only a very small proportion of them have been successful in getting placed. Many married women "go to the gutting" during the summer in order to supplement the family income. As a rule, they take posts only at or near their homes, unless their husbands happen to be in the trade and family circumstances make it easy for them to migrate.

They work in crews of three and engagements are generally made a month or two before the fishing is due to commence. The number engaged by any curer will of course depend on the number of barrels he expects to cure. It is never easy even for a big firm to forecast this with anything approaching accuracy, but it is absolutely impossible for a small curer to do it. He cannot therefore engage his crews beforehand but must depend on the labour which he can from time to time pick up locally as occasion demands. The latter are paid on a slightly higher scale than engaged crews - usually 1/3 per barrel gutted and packed and 6d. per hour for "filling up".

Engaged crews get 1/- per barrel and 4d. per hour for time work but in addition they get a lump sum for each season, commonly

known as "arles", and, when working away from home, a weekly wage as well. At Fraserburgh, Peterhead and Wick the usual rates are £3 per crew of "arles" plus 10/- each per week; at Lerwick, £3 plus 15/-; at Yarmouth and Lowestoft 30/- (the season being shorter) plus 17/6. For crews working at home, it is usual to give £12 of "arles" per crew and no weekly wage.

The total earnings will of course depend on the quantity of herrings cured, but for a season of ten weeks the above would give the following guaranteed minima per person - Fraserburgh, Peterhead and Wick £6; Lerwick £8-10/-; Home Crews £4; Yarmouth and Lowestoft (eight weeks) £7-10/-. Last year the average earnings per person worked out at £19 for the Great Summer Fishery, £18 for the East Anglian, £4 for the Scottish Winter Fishing, compared with £19, £14 and £7 in 1927 and £11, £10 and £4 in 1913.

This system of payment has been in operation for over seventy years and has worked smoothly and satisfactorily. The only real trouble that has ever arisen was a strike by the East Coast and Shetland gutters during the summer of 1914. Up to that time the rates paid had for long been 30/- per crew of "arles", 8/- per person per week, 8d. per barrel gutted and packed, 3d. per hour for filling up, and, for crews living at home, from £4 to £6 of "arles" in lieu of a regular weekly wage. Most of the crews were dissatisfied with these terms, but they had contracted to accept them for the whole of the Summer Fishery and therefore had no justification for striking. The curers, however, were helpless owing to the perishable nature of the fish, and were forced to con-cede the gutters' demand for 20/- extra "arles" per crew. Compared with the rates operative half a century before, they had little cause for complaint. In the sixties gutters received 1/- of "arles", 6d. per barrel gutted and packed, and 1d. per hour for time work. The wages of coopers were on a similar scale - 10/-

to 12/- per week for making four barrels a day, and 15/- per week during the fishing season, with a barrel or half-barrel of broken herrings - locally called "torn-bellies" - as a perquisite.

In these days too work was carried on under conditions which would not be tolerated to-day. More often than not the yards were uncovered and, rain or shine, the gutters had to toil on , frequently right through the night, until the day's catch was cured. The nature of their work did not make for cleanliness, and in the quarters allotted to them they seldom had adequate washing facilities. They were usually housed in lofts in or near the curing yards. Overcrowding was general and sanitary arrangements few. The curers were not entirely to blame. During the season the population at the herring centres swelled enormously and it was no easy matter to find accommodation for the women workers. To build additional houses, which would be in use for only nine or ten weeks in the year, seemed needless expense and they made shift with their lofts, which in the winter were used for storing barrels and in the summer were placed at the disposal of the gutters. In most places the same practice obtains to-day, but the lofts are now properly equipped and fitted with suitable washing and lavatory accommodation. In the yards too hot and cold water must be available and First Aid Boxes are insisted on by the Home Office Herring Curing Welfare Order, which came into force on 1st. October 1927.

Cost of Cure.

Cost of Cure - Present Condition of the Industry.

Curing does not involve a heavy initial outlay for buildings or plant. Compared with the annual overturn, the amount of fixed capital in the industry is small, the estimated value of all the Scottish stations (plant included) being only £500,000.

If we exclude the purchase price of the green herring, the heaviest items in the curer's budget are (1) barrels (2) labour (3) salt. The increase in coopers' and gutters' wages since 1913 has already been dealt with. The price of barrels and salt also shows a substantial increase in the same period. Both items are liable to considerable variations during the fishing season according to the stocks on hand and the amount of the catch. In pre-war days these variations were from 3/- to 5/- in the case of barrels and from 18/- to 30/- per ton in the case of salt. The contract prices of both, however, - i.e. before the season opened - were generally in the neighbourhood of 3/3 and 18/6 respectively. By 1919 these had risen ~~from and~~ to 10/6 and 45/-. Since then they have steadily fallen to their present level - 5/3 each for ~~the~~ barrels and 35/- per ton for salt. They are still well above pre-war prices, and, together with the increased wages' bill, are mainly responsible for the high cost of cure prevailing to-day.

This varies little from station to station. It is practically uniform for Fraserburgh, Peterhead, Wick, and Lerwick. The saving effected at the great Shetland Centre in the form of cartage is balanced by the increased freightage and the steamer fares for coopers and gutters.

On the next page is given the estimated cost of cure at Lerwick for a firm employing six coopers and ten crews of gutters in a season of ten weeks duration. The cost varies from 15/1¾ per barrel, when 3,000 barrels ARE CURED, to 12/9 per barrel, when 5,000 barrels are cured. In the latter case a fuller use is made of the workers and the less ~~cure~~ do such fixed charges as arles, weekly wages and travelling expenses bulk in the total.

For purposes of comparison a similar estimate is given for the year 1909 - 1913. A cure of 5,000 barrels is postulated, as the average output per crew was then 500. Since the war, however, the output (1) per station (2) per crew has fallen and we are nearer the mark in taking 13/7¼ (400 barrels per crew) instead of 12/9 (500 barrels per crew) as the average cost of cure under present conditions.

Estimated Cost of Cure on an "out" station – e.g. Lerwick – with six Coopers and ten Crews of Women in a season of ten weeks' duration.

	With an estimatdd cure of					1913.
	5,000 Brls.	4,500 Brls.	4,000 Brls.	3,500 Brls.	3,000 Brls.	5,000 Brls.
Barrel	5 3	5 3	5 3	5 3	5 3	3 3
Salt. (1 ton at 35/- per ton to cure 25 barrels)	1 5	1 5	1 5	1 5	1 5	10½
Crew's Arles at 60/- plus 5/- expenses.	1½	1¾	2	2¼	2½	¾
Gutting at 1/- per barrel.	1 3	1 3	1 3	1 3	1 3	10
Time Work at 4d. per hour.	3	3	3	3	3	3
Women's Weekly Wages at 45/- per crew.	10¾	1 0	1 1½	1 3½	1 6	5½
Coopers' " " at 70/- to 90/- including overtime.	1 1	1 1½	1 2½	1 4½	1 6	6
Railway & Steamer Fares at £12 per crew & £3 per Cooper.	6¾	7½	8	9½	11	
Cartage in Lerwick. nil.						6
Boating.	4	4	4	4	5	
Freights, Marine Insurance, Cartage and Shore Dues.	10	1 0	1 0½	1 2	1 4	4
Rent and Taxes at £80.	3¾	4¼	4¾	5½	6½	2
Repairs, Fire & Government Insurances, Miscellaneous.	5¼	5½	6	6¾	7¾	3
Total.	12 9	13 2½	13 7¼	14 4	15 1¾	7. 5¾
For every week over ten added.	2¼	2½	2¾	3	3½	

Cartage = 9d. per barrel. Freight from 5½d. to 7½d.

The "outcome" i.e. the number of barrels realized per 100 crans varies from 120 barrels at the beginning of the season to 130 barrels when the fish are in prime condition. If we assume that all the herrings cured are in prime condition (which strictly SPEAKING we are not justified in doing, as large quantities of June and early July herrings have been cured in recent years), we find that the cost of the fish per barrel* works out at 18/10 for the five years 1909-1913 (average price 24/6 per cran) and 24/- for 1924-1928 (average price 31/3 per cran). Thus the average cost of a barrel of herrings immediately after cure is for both periods 26/3¾ and 37/7¼ respectively.

The subsequent oncosts depend on the method of marketing adopted. Up to the eighties of last century the general rule was to consign the season's cure to commission agents abroad, who disposed of the herrings to buyers in the interior and remitted to the curers the price obtained less commission and expenses. Many of the curers, however, indulged in "blank-selling" - i.e. they contracted with continental buyers, months before the fishing commenced, to supply a stipulated number of barrels at a fixed rate. This, as was pointed out in Chap. 4, was in a sense correlated IVE to the "engaging system" which was then universally prevalent. The unduly speculative nature of both systems was revealed in the disastrous seasons of 1884 to 1886. Many curers were hopelessly ruined and those who survived the crisis for the most part adopted safer though less spectacular methods of marketing.

* It should really be slightly higher, as (1) with the early stuff the average outcome would be less than 130 barrels per 100 crans and (2) the average prices quoted are for all herrings landed. Most curers cannot touch the cheap early fish which are eagerly sought after by freshers and tinning firms. Their average price per cran would therefore be higher than 24/6 and 31/3 - probably by 6d. per cran.

The herring exporter appeared who bought direct from the curers and sold to the importers or dealers in the interior. Many of the commission agents adopted the new role of buyers on this side - some as exporters only, others combining export and import and selling direct to the inland dealers.

The merits of the change were soon apparent. It shifted the risk, which the curers were ill able to bear, on to the shoulders of a body of experts who were thoroughly conversant with conditions abroad. These have had a steadying effect on the market and since their ~~apparent~~ ADVENT fluctuations in price have been much less violent than before.

The ~~fisherman~~ CURER of to-da y practically confines himself to selling his cure on this side. Very little consigning is done except in the case of matjes, which by reason of their light cure are put in cold storage on the other side and sold from ~~their~~ THE after inspection by dealers.

Two prices are generally quoted - F.O.B.(free on board) and C.I.F. (cost, insurance, freight#). In the former case the curer pays cartage from yard to pier (3d. per barrel), harbour dues (3d. to 5d. per barrel according to port) and quay labour (5/- per 100 barrels). In the latter he is responsible for all the F.O.B. charges plus the cost of freight and insurance. The freightage depends of course on the condition of the freight market. From the East Coast Ports to St#ettin it varies from 1/7 to 2/2 per barrel - 1/9 being the usual figure, although a spasmodic shipper might have to pay a little more. The insurance premiums vary from 2/- per £100 for Hamburg to 3/4 per £100 for the Lower Baltic Ports.

If we neglect freightage and insurance, and add the other mea oncosts to the cost of the fish and cure, we find that the cost per barrel F.O.B. from 1924-1928 was 38/6¾ as compared with 27/1¼ for 1909-1913. The sum is made up as follows -

	1924-1928			1909-1913		
Cost of Herrings per barrel	£1	4	0	£0	18	10
Cost of Cure		13	7¼		7	5¾
Branding Dues			4			4
Cartage			3			2
Harbour Dues			4			3
Quay Labour			½			½
Cost per barrel F.O.B.	£1	18	6¾	£1	7	1¼

Now the average price realized by the curer depends on

(1) the proportion of ~~the~~ Large Fulls, Fulls, Mat-fulls etc., realized from the "shots" he has purchased. For the periods we are considering these worked out as follows -

	1924-1928	1909-1913
Large Fulls	.2%	14%
Fulls	12.5%	42%
Mat-fulls	31.0%	16%
Matties	54.0%	17%
Large Spents	2.3%	11%

(N.B. the preponderance of smaller sized grades from 1924-1928)

(2) the prices quoted for these selections on the continental markets. These vary considerably from time to time according to the supplies THAT ARE forthcoming.

The present quotations are Large Fulls, 70/- to 75/-; Fulls, 58/- to 60/-; Mat-fulls, 50/- to 54/-; Matties, 38/- to 40/-; Large Spents, 26/- to 28/-; the corresponding quotations for 1909-1913 being 37/6, 33/6, 32/-, 28/-, 22/-. Since 1924 the average price realized for all grades has been 42/- as compared with 31/4 from 1909 to 1913.

The curer's profit in recent years has therefore been 3/5¼ per barrel (8.2%), whereas from 1909-1913 it was 4/2¾ per barrel (13.5%). In neither case is any allowance made for (1) wastage (2) ~~wastage the ease~~ the lower outcome from the early cure (3) the fact that curers pay slightly more than the average annual price for their fish (4) management costs. Most of the smaller curers are their own managers but the larger firms cure at several stations simultaneously and have experienced managers in charge. When deductions under these heads are made, it is evident that the nett profit per barrel is small - considerably less that it was before the war. This combined with a reduced output per station - conseguent on smaller catches and restricted markets - has resulted in trying and difficult times for the curers.

Most of them lost heavily on their 1914 cure through the closure of the German Market and the impossibility of using the ordinary channels of export into Russia, and, because of the complete or partial suspension of their businesses during the war years, they were compelled to make continuous inroads on their capital, with the result that by the time the war ended their resources were considerably depleted.

"As a result of the persistent efforts of the curers and the exporters, 75% of the total cure had found its way abroad before the close of the year, chiefly to Russia, the routes still available after the closing of the Baltic Ports being (1) the sea passage to Archangel, up to the date when this would be blocked with ice, and from Archangel by a single narrow gauge railway to Vologda (2) the sea route to Trondhjem, and thence by railway over Norway and Sweden to Tornea, on the Russian Border, where 20 miles of road had to be traversed before goods could be plawed on a Russian Railway and (3) the sea passage to Bergen and thence by rail to Gefle and the railway ferry to Finland. The expenses, in respect of freight etc., on the two latter routes were very heavy and militated largely against any prospect of developing trade through these channels, while, as regards Archangel, the services of an ice-breaker had to be requisitioned in order to keep the route open as long as possible"
(Rural Scotland during the War. Monograph on Fisheries by David T. Jones C.B.E.: Oxford University Press.)

The subsequent years have done little to rehabilitate their fortunes and few of them have met with more than moderate success. The larger firms have weathered the storm better than the smaller, as they enjoy many advantages denied to the latter.

In the first place it is seldom that all the centres are uniformly successful. The large firm does not confine its activities to any particular centre and the losses at one centre are frequently compensated by the gains at another. Further, if catches are light and prices high, the large firm can transfer its staff - in whole or in part - to another station where more favourable conditions obtain. This is an extreme measure, which, if frequently adopted, would considerably increase the cost of cure. Nevertheless it sometimes pays to do it rather than have a large number of coopers and gutters lying idle. In this connection the "engaging system" had great advantages. Under it every curer, large or small, could be sure of his boats and reasonably sure of his quota, but nowadays he may make elaborate preparations at a centre, only to find that the majority of the fleet are fishing elsewhere. This happened two years ago, when an attempt was made to revive Stromness as a herring port. Several curers set up stations and laid in stocks of barrels and salt, but the boats remained just over a week.

Again, the large firm buys fish at all times of the day, and therefore generally buys at THE average daily price. The smaller curer on the other hand may buy cheap or dear, as prices frequently fluctuate between morning and afternoon, not necessarily through any change in quality but because of the foreigh market quotations and THE landings at other ports.

With their larger staffs too - some employ 40 crews capable of curing 1000 to 1200 crans daily - the big firms can take full advantage of a fall in price and ease off again when fish are dear.

They score over the smaller firms also in the matter of marketing, for they can hold on to their stocks for a longer period when the foreign quotations are unfavourable. The latter are often badly handicapped in this direction through lack of capital. They must settle their accounts with the fishsalesmen within a week of purchase, and may have to lie out of their money for a considerable time according to the arrangements they make with the exporters. These as a rule pay either on shipment or delivery abroad, but in either event the curers' capital is tied up for the whole of the pining period at least. This may seem a small matter, but the banks are much less accom modating than they used to be, and it sometimes happens that the smaller curers are forced to sell at a loss in order to get the ready money to enable them to carry on.

By cooperative action they could avail themselves of some of the economies of large scale production - notably in the purchase of barrels and salt* and in marketing the cure - but, like their brethren the fishermen, they are notoriously individualistic and the idea of cooperation is anathema to them. Nevertheless circumstances forced them to combine during the East Anglian Fishing of 1924 and again last year.

*Most of the larger firms buy a whole cargo of salt at a time, and some of them run small barrel factories to supply their own needs.

On THE former occasion the foreign demand was very keen and prices soared. The curers held on to their stocks in the hope that the market would rise still further. Instead, it fell so low that losses were being incurred on every barrel sold. To protect themselves they formed the "herring combine" for the purpose of marketing the unsold stocks, and so successfully did they regulate the supply with the demand that all stocks were disposed of at a small margin of profit. ~~They~~ Last winter they did not allow matters to drift so far. Very heavy landings were made during the ~~first~~ OPENING weeks of the fishery, and by the end of October it became clear that there was a danger of overstocking the market. Rather than risk such an impasse, the curers voluntarily agreed to discontinue curing after the 8th of November, and subsequent events showed that their decision was a wise one. In view of the success which has attended their united action on these occasions, it seems regrettable that they will not form permanent associations at the chief herring centres for the purchase of barrels, salt, etc.

It would be idle to pretend of course that such cooperation would restore the trade to its pre-war prosperity. The trouble is too deep seated, and, at the most, combined action would BE only palliative. The curer is held in a vice between the fisherman and the exporter. He must pay the former a sufficiently high price to make it worth his while to continue fishing and he must ultimately accept what the latter is prepared to offer. The market for cured herrings has never been a wide one, and, in proportion to the present productive power of the industry, it has never been more restricted than it is today.

Markets

M A R K E T S.

Our export trade in cured herrings is of comparatively recent origin. We were competing, it is true, in no small measure with the Dutch Busses during the latter half of the eighteen century, but most of the cure was used for home consumption and little or nothing was done in the way of export. The Act of 1808, which regularized the Bounty System and brought the Fishery Officer into being, may be said to be the foundation on which our modern export trade was built. From then onwards the standard of cure improved enormously, and, as Appendix XIII will show, our exports steadily increased.

In these early years our principal markets were (1) Ireland (2) the West Indies - to feed the slaves on the sugar plantations - and (3)(to a very much smaller extent) France, Germany and Belgium. In 1833, however, slavery was abolished in the West Indies and the emancipated slaves studiously avoided a diet which was so strongly reminiscent of their servitude, with the result that the West Indian market was entirely lost to us. This was a serious matter for the curing trade, as the West Indies took from 50,000 to 60,000 barrels yearly - about a third of our total exports.

The consumption in Ireland had meantime been steadily growing but the curers realized that the Irish demand would never be great enough to absorb the total cure. They turned, therefore, to the continent and endeavoured to extend the existing markets and find new ones.

For several years they met with only indifferent success, but, largely as a result of Peel's Free Trade Policy, the demand increased very rapidly in the forties and within a decade our continental trade had multiplied five-fold.

Unfortunately, just as the continental market began to develop, the Irish Trade suffered a serious set-back. A succession of poor harvests, culminating in the potato famine of 1845, threw the country into such dire poverty that many families were forced to emigrate, and the majority of those who remained could not afford what had hitherto been almost their staple diet. The market fell away, at first rapidly, then more gradually, until in 1900 the number of barrels imported from Scotland was 4500 - less than 4% of the average importation from 1831 to 1840. Although it revived somewhat during the next decade, it has never approached ~~the~~ its former magnitude and since the war it has to all extents and purposes been non-existent, the total imports for the last five years being only 4236 barrels.

The loss of what had been the mainstay of the export trade was soon forgotten, however, in the tremendous development which the continental market underwent from 1850 onwards. This development was due partly to the extention of canal and railway transport in Central Europe, which enabled herrings to reach the more remote parts of the interior, partly to the enterprise of the curers and the improvements they effected in their selection, pickling and packing, which won for the Scottish Cure a reputation that has ever since remained unrivalled by the Norwegian, Dutch and German products.

Its progress is traced in Appendix XIII but the phenonenal expansion can be guaged from the fact that the exports from 1901 to 1910 were ten times greater than those of 1841 to 1850 and more than forty times greater than those of 1811 to 1820. By 1860, 96% of our total export trade was with the continent and this high percentage was maintained, practically without variation, until the outbreak of the war. It was almost entirely confined to Germany and Russia, other European countries accounting for only a negligible quantity, generally less than 1% of the total.

The following are the average annual exports of Scottish Cure to Germany and Russia from 1889 to 1913 -

	Germany (1000's of barrels)	Russia (1000's of barrels)
1889 to 1893	755	157
1894 to 1898	879	226
1899 to 1903	865	234
1904 to 1908	1053	497
1909 to 1913	762	666

It would appear therefore that Germany was the principal consumer, but, it must be remembered, these figures relate to direct exports only and a considerable proportion of the German importation-from 1903 to 1913 approximately half - was reexported (chiefly from Danzig and Königsberg) to Russia and, in a lesser degree, to Austria, Hungary and Roumania.

For over half a century, however, Germany remained our most important market.

The Russian peasants could not afford to buy British herrings and had to rest content with the cheaper Norwegian cure or with the products of their own fisheries,* while the wealthier classes preferred the higher grades of Norwegian light cure to our own more heavily salted cure. Thus, although they took all the "matjes" which we could supply, their consumption of East Coast and later Shetland herrings was for many years very much smaller than Germany's. In 1903, however, our curers went in for lighter salting and the Russian demand increased by leaps and bounds until the German market was quite eclipsed. For the five years preceding the war Russia imported, either directly or indirectly through Germany, 75% of our total Continental exports. No douht the vast extension of the railway system which took place between 1904 and 1913 had much to do with the increase in consumption, as it facilitated and cheapened distribution especially in the eastern districts. Nevertheless the increase is most surprising in view of the general poverty of the peasant population and the increasing prices at which Scottish herrings were retailed in the interior. For instance at Odessa - a large consuming centre - 65/- was quite a normal price for a barrel of fulls, which cost 42/- C.I.F. at Libau, the subsequent oncosts, exclusive of retailer's profits, being 13/- duty, 6/- freight, 4/- storage, commission, etc.

* Chiefly Astrakhan herrings. These are very large (13" to 16") very dark in colour and of a somewhat strong, harsh, flavour.

THE RUSSIAN MARKET

The extent to which the British cure had captured, is revealed in the following statistics for the year 1913, relating to Leningrad, Libau and Riga, the chief distributing centres in Russia, which together accounted for fully 95% of the total imports.

	Leningrad	Libau	Riga
	(in 1000's of barrels)		
from Scotland	276	221	104
" England	64	246	111
" Norway	20	31	54
" Sweden	3	18	-
" Holland	+	-	1

Of Germany's total imports for 1913, 66% came from Great Britain, 26% from Holland and 8% from Norway, so that, when war broke out, we were supplying considerably more than half of the Russian and German demand, and these countries together were absorbing fully 95% of the total British cure.

The war therefore practically brought the trade to a standstill. For four years the German market was completely closed, and, although a channel remained open into Russia via Archangel, the quantity exported - apart from 1916 when 285,000 barrels were sent to Russia - was relatively very small. Exporting was in fact discouraged by the Government. As much of the catch was kippered and freshed as the home market could absorb, and the remainder had perforce to be cured. As other food commodities became scarcer, the home consumption increased and the quantity cured was correspondingly reduced.

The following table shows the trend of affairs -

Quantity	Freshed cwts. (1000's)	Kippered cwts. (1000's)	Bloaters or Reds cwts. (1000's)	Tinned cwts. (1000's)	Cured Gutted barrels (1000's)	Cured Ungutted barrels (1000's)
1914	372	400	31	105	1134	13
1915	220	183	20	13	60	3
1916	442	548	22	79	344	31
1917	667	655	46	60	193	25
1918	1065	899	77	61	31	46

Mr Jones, Chairman of THE Fishery Board for Scotland, sums up the situation in the following terms.*

"The quantity cured may be regarded as the surplus remaining after meeting the effective demand for fresh and kippered fish, AND as there was considerable difficulty in finding a market, and any cessation of operations would have had a serious effect on the fishing on a whole, the Cured Fish Committee, appointed by the Food Controller to acquire, control, and distribute stocks of cured fish, formulated a scheme for the export of half of the winter cure and for THE taking over by the Government, at certain fixed prices, of the balance of the winter cure and of the whole of the summer cure. This scheme was accepted by the trade and resulted in a substantial reserve of cured herrings being formed, and as a result of the general food situation and propaganda conducted by the Government Departments and the trade associations and private traders concerned, there was a substantial increase in the home consumption of cured herrings. Part of this consumption represented supplies to prisoners of war, but undoubtedly the ordinary civilian consumption was much greater than in normal times."

* "Rural Scotland during the War" - Monograph on Scottish Fisheries. - Oxford University Press.

What was ~~a~~ loss to us was gain to those countries which remained neutral. The Norwegian, Swedish and Dutch Fisheries all profited enormously from a situation which reduced the fishing fleets of Britain and Germany to comparative inactivity. Her own deep sea fisheries in abeyance, Germany was more dependant than ever on outside supplies, and we ourselves towards the end of the war were forced to make extensive purchases in Norway and Sweden. By 1916 Norway's export trade in pickled herrings (169,000 metric tons) was twice as great as it was in 1913 (83,000 metric tons) and, as she was very conveniently situated for the German Market, the bulk of this increased export - 55% compared with 33% in 1913 - went into Germany. During 1917 and 1918 the trade with Germany was considerably restricted owing to the blockade which our navy imposed on the German seaboard, and in the latter year the exports to Germany were only one half of what they had been in 1916. By this time, however, we ourselves were buying from Norway, so that, despite the partial loss of the German market, her exports for 1918 remained at the 1916 level.

Although she was not immune from the general trade depression resulting from the war, through a combination of circumstances Norway suffered less than the other herring ~~providing~~ PRODUCING countries. In the first place she had tapped a wider market in Germany during the war than she had ever done before, and, as money was scarce, the comparative cheapness of her herrings induced many German retailers to continue ~~re~~stocking them, even ~~then~~ after the admittedly superior British herrings were again available. Thus in spite of the fact that she held heavy stocks at the end of the war, which had been previously purchased by Germany but had never been delivered, she was able to sell in addition some 700,000 barrels which WE had ~~been~~ bought in 1918 and resold to the Norwegian Government early in 1919.

As a result, her exports to Germany for 1919 reached the unprecedented total of 150,000 metric tons. Besides, unlike most other countries, she has traded with Russia almost without interruption since the war. This has been largely due to the help of the Government. In the beginning of 1918 it had assumed full control of the export trade and had guaranteed definate prices to the curers and the fishermen, giving subsidies where necessary for the replacement of boats and gear. These efforts had been very successful, but, when the war ended and Britain was again competing on the Continental market, the Norwegian exporters found considerable difficulty in finding an outlet for their supplies. The all important ~~subsidies~~ Russian Market was practically closed to them. The rapidly depreciating currency and the apparent impossibility of getting reasonable security made private trading with that country exceedingly difficult, so the Government again came to the rescue and shouldered two thirds of the risk of all credit sales with Russia. This has been of inestimable value to the Norwegian Herring Industry and as a consequence the export trade with Russia - apart from 1926 when no government guarantee was forthcoming - has been on a larger scale than it was before the war. (See Appendix XIV)

She has not, however, had the same success in the German market. In the face of British competition she has proved quite unable to retain the advantages which she held in 1919 and 1920. Her trade with Germany has fallen away so much that in 1928 her exports to that country totalled only 19,000 metric tons - just a seventh of what they were in 1919.

Our own export trade with Germany since the war has, on the other hand, steadily increased. It began under the worst possible auspices.

As already stated, the German market in 1919 was flooded with Norwegian herrings, and the German Government - partly with the object of controlling prices, partly to prevent British herrings from competing with the stocks already purchased - had formed a Herring Buying Association and entrusted it with full control of the herring imports. This made it exceedingly difficult for British exporters to market the cure and contributed in no small measure to the failure of the Government Guarantee Schemes of 1919 and 1920 (See Appendix II). In the meantime, with the exchange in a constant state of flux, private trading was becoming more and more difficult but no further Government assistance was forthcoming. As a result, the exports from Scotland to Germany from 1919 to 1923 averaged only 235,000 barrels. Since the stabilization of the currency, however, they have increased rapidly and are now almost double what they were in 1923.

Russia on the other hand, has remained almost entirely closed to us. Such purchases as she has made from time to time have been insignificant compared with the pre-war demand, and so far from benefiting the trade have rather been harmful, in that they have frequently had an unsettling effect on the market and have launched the curers on a wave of optimism which has occasionally resulted in extravagant prices being paid for the green fish.

As will be explained later when we consider the more important markets individually, it is impossible to assess accurately to what extent the consumption has declined in Germany, Soviet Russia and each of the dissociated states (taken separately) but the importance of these markets and the decline in their collective demand is shown on the following table -

Average Exports to (in Thousands of Barrels)	Germany & Russia	Other European Contries	Continental	All Countries.
1909-1913	1428	4	1432	1583[2]
1919-1923	487*	64	551	612
1924-1928	872*	32	904	950

The percentage of the total exports which went to Germany and Russia in the three periods specified is 94, 80 and 92, and, so far as the continental market is concerned, the decline in our export trade is wholly attributable to these countries.

* Including Poland, Latvia, Esthonia and Finland.

Russia

RUSSIA.

Territorilly Russia of today is very much smaller than it was in 1914. Poland, Latvia, Finland, Esthonia and Lithuania - comprising a population of close on 70,000,000 - have been granted their independence and recognized as separate states. In estimating therefore the extent to which Russia is responsible for the decline in our exports, we must take account of the trade which has been done with those states since 1919. It is impossible to get separate statistics for them for the period before the war, but it is believed that they have in recent years increased their consumption of herrings, whereas the market for the remainder of pre-war Russia has practically disappeared.

From 1909 to 1913 we exported on an average direct to Russia and Germany 666,000 and 762,000 barrels respectively. Allowing that 50% of the latter were reexported to Russia - some of the German dealers place it as high as 55% - we get 1,047,000 barrels as the average annual consumption of Scotch herrings in Russia - approximately 73% of our total export.

The following are the average annual exports to Soviet Russia and the dissociated states since the war -

	1919-1923	1924-1928
Soviet Russia	998	38,793
Poland	123,802	211,614
Lithuania	5,526	1,811
Latvia	70,645	130,046
Esthonia	21,935	36,316
Finland	28,821	38,150
Total	251,727	456,730

Exclusive therefore of any re-exports from Germany - the bulk of them formerly went to Poland - the demand for Scotch herrings in pre-war Russia has declined by 795,000 barrels (1919-1923) and by 590,000 barrels (1924-1928). If we include the East Anglian exports as well, the average annual deficit (1924-1928) is approximately 900,000 barrels. There seems little prospect at present of such a deficit being made up, even if ordinary trading relations were resumed.

In the first place less fish is being consumed per head than in 1913. This may be due in part to the decline in power of the Greek Church. Formerly almost half of the Russian Calendar were holy days, when all animal food was forbidden. Fish was then in great demand, and herrings, because of their cheapness, bulked large in this compulsory diet. It seems more probable, however, that the decline is due to the fact that herrings are now relatively dear compared with other foodstuffs. The following were the retail prices current at Moscow in April 1928.

Herrings.

Don	1/1 to 1/5 per lb.	Bread (brown)	1½ per lb.
Murmansk	10d. to 11d. per lb.	" (white)	2½ per lb.
Vladivostock	8d. per lb.	Butter	2/9 per lb.
Astrakhan	6d. per lb.	Eggs	2d. to 2½d. each
Port Petrovsk	5d. per lb.	Meat	11d. per lb.
Norwegian	4d. per lb.	Potatoes	1d. per lb.

In the second place the Russians are doing their utmost to develop their own fisheries. These are being worked more intensively than ever before, and their annual yield is now so great that of all the herrings consumed in the country fully 80% are caught in home waters, the remainder being imported from Norway and to a small extent from Germany and Iceland. The following table shows the extent of U.S.S.R. home production -

Don	43,000 barrels
Vladivostock	360,000 barrels
Astrakhan	1,000,000 "
Port Petrovosk	1,140,000 "
Murmansk	71,000 "

All these are of fairly good size and flavour - except the Murmansk herrings which are very bitter - and command high prices within Russia itself. They are very much inferior, however, to British herrings and could not compete with them on even terms.

Her imports from all sources during the past five years have been on a meagre scale - from 250,000 to 300,000 barrels annually, valued at approximately £300,000 - but the agents of the CENTROSOJOUS (The All Russian Central Union of Cooperative Societies, who are the sole importers of foreign fish) declare that, excluding her home production, Russia is capable of taking herrings to the value of from £1,000,000 to £1,600,000 annually and that they would like at least 60% of this total - i.e. 300,000 to 380,000 barrels to be of Scottish or East Anglian cure.

Such a demand, limited though it is compared with pre-war days, would do much to rehabilitate the fortunes of the curing trade and the question naturally arises "why do they not take them?"

So far as the British Government is concerned no obstacles have been placed in their way. Diplomatic relations, it is true, have been severed,** but Russia is as free to buy herrings in this country as ever she was, provided she is able and willing to pay for them.

** Since the above was written, diplomatic relations have been renewed

Her chief difficulty is lack of capital. As a result of the war and the revolution, her savings have been destroyed, and her political condition since then has been far too unstable to attract fresh capital from abroad. So great in fact is her financial stringency that individual firms are precluded from all dealings abroad, unless they have received a licence from the government, and even then they must get a written undertaking from the Soviet bank that it will provide sufficient foreign currency - at the date when the bills fall due - to meet the cost of any goods to be imported. As this bank is under the direct control of the Minister of Finance and as all the money required for foreign trade must pass through it, the Government can control the extent and nature of all imports.

These are graded according to their importance from the national point of view, raw materials, machinery etc. coming first, and it is only after the more vital needs of the nation have been met that sanction is given for the importation of articles of secondary importance. Unfortunately herrings do not rank high on this priority list, and whether they will be purchased or not depends on the amount of foreign currency available, after the more essential imports have been budgeted for.

Her trade with this country leaves her, as the following statistics* show, with a considerable credit balance.

	1926	1927	1928
Exports to Russia	£5,858,257	£4,508,880	£2,715,987
Re-exports to Russia	£8,543,109	£6,780,895	£2,084,762
	£14,401,366	£11,289,775	£4,800,749
Imports from Russia	£24,130,217	£21,051,633	£21,548,237
Balance in Russia's favour	£9,728,851,	£9,761,858,	£16,747,488.

* Board of Trade Journal - January 1929.

The balance for 1928 is sufficient to supply her with all the herrings she requires for a period of twenty years, but the Soviet are using it to purchase other articles and commodities which are more essential for the furtherance and development of her own industries; and the huge drop in our exports to Russia, since the severance of diplomatic relations, would seem to indicate that she means to buy as little of these in this country as she possibly can.

It is not therefore a question of the length of credit that can be given. The Scottish Wholesale Cooperative Society and several curers have offered credit for periods varying from one to three years, which should be ample in view of the fact that stocks would be cleared within six to nine months of purchase, but both Arcos and Centrosojous and individual firms as well have declared this to be useless. Their difficulty is that, whatever their own resourses may be, they cannot guarantee that they will meet their bills when they fall due, unless either the Soviet Bank gives its sanction to their purchases or alternatively they can float a long dated loan abroad sufficient to meet their needs. As a way out of the impasse, our curers offered to establish their own agents in Russia, who would take over all the importers' risks and sell direct to the wholesale merchants in the interior, but the Soviet categorically refused to sanction it.

The Norwegian curers experienced exactly the same difficulties in 1926. Through lack of credit facilities the Russian market was practically closed to them, but the Government came to their assistance and gave a guarantee in respect of credit sales to Russia up to a maximum of 75% of the invoice value of all fish sold, the limits of guarantee being 2,000,000 Kroner (£110,000) for dried and salted white fish, and 800,000 Kroner (£44,000) for cured herrings. Prices were fixed at 15 Kroner per barrel for spring herrings and 17 Kroner per Barrel for large herrings, plus 6% for discount/

discount/ing bills. Little advantage was taken of the guarantee for white fish but the guarantee for herrings was fully utilized in 1927 and 1928, the exports for both years being 25,310 tons and 30,619 tons respectively, as compared with 981 tons in 1926.

These Norwegian herrings are of very inferior quality to our own, and there is not the slightest doubt that the Russians would prefer British herrings costing double the price, but they cannot and will not get them until the Soviet remove the embargo they have placed on them. This they have indicated they will not do, until diplomatic relations are resumed with this country. Even then the extent of their purchases will depend on the excess of their exports over more necessary imports, unless they can float a long dated loan in London sufficient to cover their purchases. It seems clear that the country which advances the loan will get the trade, and, as the Russian Market is absolutely vital to the prosperity of the industry, it is to be hoped that the necessary financial assistance will soon be forthcoming either through the ordinary channels of the London money market or by Governmental intervention in the way of an extension of our Export Credit Facilities.

Poland.

POLAND.

Poland is essentially an agricultural country. Of her population of thirty millions, fully 65% are engaged on the land. Her fisheries are by comparison of little importance- her total fleet consisting of 108 small motor drifters and 782 small sailing drifters. Strenuous efforts have recently beem made to foster them - chiefly in the way of state assistance to fishermen - but the shortness of her seaboard (about 90 miles) is an almost insuperable barrier, She possesses, it is true, many inland lakes and rivers which are believed to produce over 20,000 tons of salmon, trout, carp, etc annually, but her sea-fisheries proper, although they have appreciated by 800 tons during the past five years, are still relatively un-productive. The total catch for 1928 - chiefly Baltic herrings and sprats-was only 2321 tons, less than 3% of the sea fish consumed.

No statistics are available to show the extent of consumption before the war but importers and dealers estimate it at 8 lbs. per head of population - i.e. a total of 750,000 barrels, the bulk of which were of British capture. During the war importation from this country was entirely suspended, and at the conclusion of hostilities the peasants were in such an impoverished condition that they could not afford to purchase our herrings at the greatly enhanced prices, which the high costs of production entailed. Besides, other food-stuffs - butter, eggs, meat, etc - were both plentiful and cheap; as a consequence, the consumption in 1919 & 1920 was less than 4 lbs. per head.

During the past eight years, however, the Poles have worked hard to achieve industrial stability: the war-wastage has been made up, the railway systems have been extended - especially in eastern districts - transport is cheap and the natural resources of the country are being fully exploited. With the general improvement in the economic situation, the consumption of herrings has increased enormously - by 130% since 1925 - and, as Appendix XVI will show, Poland is now little behind Germany as our chief purchaser. From 1924 to 1928 the imports from Great Britain averaged 59,000 tons (420,000 barrels) annually, compared with 35,000 tons (252,000 barrels) for 1921 to 1923. Of these Scotland supplied 29,000 tons (211,000 barrels) and 17,000 tons (124,000 barrels) respectively. For the same period her imports from Norway were 3555 metric tons× annually: those from Holland were practically negligible.

In 1925 the importation of herrings became subject to state control. For several years the trade balance had been so unfavourable that the Government was compelled to regulate the extent of their imports and a "Quota" system was introduced with regard to goods which might be classed as of secondary importance. Imports up to a certain definite amount in each class were sanctioned and a "Quota" allowed to each country with which Poland had a trade agreement. Before any cured herrings could be admitted, therefore, a licence had to be obtained from the Polish Authorities and each consignment had to be accompanied by a certificate signed by a resident Polish Consul showing the country of origin.

× 1 metric ton = ·984 tons

~~country of origin~~. This arrangement was greatly facilitated by the fact that Germany was excluded. Although fresh herrings were admitted free of duty from that country - partly for consumption fresh, partly for smoking - the importation of cured herrings was entirely prohibited. All supplies, therefore, (with the exception of very small consignments brought overland from Latvia by rail) had to come in through Danzig* and it was a comparatively easy matter to regulate the licences with the Danzig merchants and at the same time to keep a check on the supplies from each exporting country. Nevertheless considerable dislocation resulted during the first year, and the port dealers, in the absence of any definite information as to what the quota was likely to be, held off buying during the greater part of the summer and autumn with the RESULT ~~regard~~ that supplies from Scotland fell off by 130,000 barrels. Similar difficulties occurred in 1927 when the quota allowed to this country was reduced and it was announced that a definite proportion of the quota must be delivered every three months. This ~~total~~ took no account of the seasonal nature of our fisheries and would have resulted in holding up stocks for a longer period than was expedient either in the interests of producer or consumer. Representations were immediately made to the Polish Government and they not only increased the British Quota but modified their regulations with regard to the time of delivery so as to meet the wishes of the British curers and exporters. In the beginning of the following year they abolished them altogether and it was confidently expected that a large increase in consumption would ensue.

* 90% of the Danzig imports go to Poland. The remainder is consumed in Danzig itself and in East Prussia.

Unfortunately this HAS ~~abs~~ not been realized. Imports from Britain increased from 74,600 tons in 1927 to 76,100 tons in 1928 but imports from Norway fell from 5435 to 1663 metric tons.

For both years the consumption was approximately 5½ LBS. ~~lbs~~ per head of population, so that it is still short of the estimated pre-war consumption by 2½ lbs per head - roughly 200,000 barrels - and it seems exceedingly doubtful if under present conditions the leeway will ever be made up. Many families lost the TASTE ~~task~~ for salt herrings during the war and have never acquired it again. To many others the present prices are prohibitive, for, although herrings were once the cheapest food procurable, they are now relatively dear. The cost of living in Poland is only 20% more than it was in 1913. Clothing costs twice as much as it did then, but foodstuffs generally are little if anything above pre-war prices. Herrings however have appreciated by 250% to 350%. AT ~~An~~ Warsaw, Lodz, Katowice and Posen, the chief herring consuming centres, British Matties, Mediums and Matfulls are retailed at from 15 to 25 grosz[xx] (¾d. to 1½d.) per fish; and matjes, which are consumed largely by the better classes, at 30 to 60 grosz (1½d. to 3d.), the corresponding pre-war prices being 6 to 9 grosz and 10 to 15 grosz respectively. Polish Baltic herrings are much cheaper and can be obtained usually for 10 grosz per fish.

This rise in price is due partly to the increased costs of capture and cure, partly to the heavy oncosts after the fish reach Danzig. These amount to approximately 17/- or 18/- per barrel for most districts in the interior. Of this sum 3/- is for quay dues, insurance, commission etc: 1/6 to 3/- for transport charges to the interior: 10/- for duty: 1/- for manipulation fee:- 1/- to 2/- for other cleaning expenses.

xx 100 grosz - 1 zloty. 43.38 zloty - £1

British curers and exporters are satisfied that the Danzig dealers and the Polish wholesale merchants and retailers are not making unreasonable profits, but they hold that trade is being severely hampered by the excessively high import duty. This amounts to 15 zloty per 100 Kilogrammes plus a manipulation fee equal to 10% of the duty, calculated on the gross weight after deduction of the exterior packing. A rebate of two thirds of the duty is allowed in the case of very large herrings of which not more than sixty go to 10 kilogrammes. This concession helps the Norwegian Trade enormously but it is of little use to British Exporters, as our largest HERRINGS are too small to benefit by it. The smaller grades of Norwegian herrings, however, are at a disadvantage, as the same duty is levied as for British herrings of twice their value. A reduction of the duty to the lower level would bring it into line with the German import duty and would undoubtedly do much to increase the consumption.

In 1927 the Polish Government attempted to float an Anglo-Polish Company for the capture and cure of Scottish herrings for the Polish market. The capital was to consist of 250,000, 8% Preference £1 shares, 51% of which were to be held in Poland and 49% in Britain; and of 100,000 ordinary shares, 70,000 of which were to be allotted to the Polish Government and 30,000 to the private promoters of the company. It was proposed (1) to build six steam drifters to be manned at first by Scottish and Polish fishermen and afterwards, as they became more expert, by Polish fishermen alone. (2) to take over the stations plant etc. of a large British curing firm. (3) to purchase a steamer for transporting the cured article to Poland. (4) to build refrigerators at Gdynia (the new Polish port on the Gulf of Danzig) for storing matje and other light cured herrings, as these are preferred by most classes in Poland to harder cured fish.

The Government were to subsidize the scheme to the extent of £35,000 per annum for a period of 25 years, the subsidy to be allocated as follows- £20,000 for interest on £250,000 at 8%, £10,000 sinking fund, £5,000 directors' fees, travelling expenses etc. In addition they promised to provide a market for the cure by bringing pressure to bear on the Cooperative Societies and the Salt Dealers. The latter invariably deal in herrings as well, and, as licences are required in Poland for the sale of salt, it was proposed to renew these only on condition that the holders took a proportionate amount of cured herrings. The scheme thus provided for all stages in the capture, cure and distibution of the fish but the capital proposed was insufficient and it met with little support in this country.

.Underlying it was a political dodge - the creation of a mercantile marine and navy for Poland with Gdynia as the base. This part is still in process of construction: the naval harbour is finished and the commercial harbour is expected to be ready early in 1930. Accomodation will be provided for thirty large vessels, and, once suitable stores and refrigerators are erected, a large proportion of the Danzig herring traffic will be diverted to Gdynia.

Germany

GERMANY.

Germany is the greatest herring consuming nation in the world. She consumes over a third of the total produce of all the European Fisheries. Fresh and salted herrings are most in demand, but a considerable quantity of fresh herrings- both home caught and imported - are done up as Roll-Mops and Bismarcks - i.e. seasoned with gherkins, peppercorns, coriander, thyme and vinegar and preserved in tins or glass jars. These are popular with all classes and have a ready sale. Herrings tinned, after being cooked in olive oil or tomato sauce, have come into favour within recent years - particularly in the larger towns - and the quantity so treated is steadily increasing. Smoked herrings are also in demand, and kilns have now been erected not only at the importing centres but at several places in the interior (chiefly Silesia and East Prussia). When fresh herrings are not available for this purpose, salted herrings are used.

Germany's own herring fisheries are by no means inconsiderable. They were totally eclipsed during the war but have since recovered to such an extent that their annual yield is now practically back to the pre-war level. In 1927 the total catch was 56.8 million Kilogrammes compared with 59.5 in 1913 and 9.4 in 1919.

In addition, she imports about 140,000 tons of fresh herrings annually. Fully 75% of these come from Great Britain and Norway. So far as this country is concerned, the bulk of the freshing trade was, in pre-war times, confined to the East Anglian Fishery, but during the past five years Scotland has contributed a much larger share than formerly. This has been due to the growth of "Klondyking" which is/

is now a regular feature not only of the East Coast and Shetland Seasons but of the West Coast and Loch Fishings as well. The following table shows the quantity (in crans) exported fresh from Scotland for 1913 and 1921 - 1928.

1913.	15,643.	1925.	78,723.
1921.	15,543.	1926.	154,977.
1922.	26,422.	1927.	193,685.
1923.	14,796.	1928.	141,040.
1924.	50,722.		

The bulk of her imports, however, consist of cured herrings. Of these she consumes from 1,000,000 to 1,200,000 barrels annually - more than a third of the total European Cure (See Appendix XII). As already stated, Norway had captured this market during the war and was able to hold it, with a diminishing measure of success, it is true, until 1923. Since then, however, Great Britain has again taken precedence as the chief exporting nation. The following statistics show the position since 1920.

	Scotland (Barrels)	Great Britain (Tons)	Norway. (Metric Tons)	Holland. (Metric Tons)
1913.	672,700.	199,850	23,550	78,046
1920.	37,700	73,400	311,400	19,800
1921.	381,400	126,500	145,500	39,300
1922.	263,500	66,500	74,250	3,900
1923.	276,200	73,850	89,068	17,962
1924.	493,500	120,050	40,250	43,456
1925.	378,100	102,050	34,664	32,302
1926.	420,200	101,800	32,533	36,271
1927.	401,400	99,600	23,381	-
1928.	384,200	97,200	19,188	-

It will be observed (1) that the imports from Norway have steadily declined since the "peak" year of 1920 and are now just under the pre-war level (2) that the imports from Great Britain, Holland and Scotland (taken separately) are approximately half of what they were in 1913 (3) that the imports from Great Britain and Holland declined in 1922 and 1923 and rose again in 1924. This was due to the depreciation in the value of the mark. In December 1921, it stood at 300 to £1 sterling: by December 1923, it had fallen to 18,000,000,000. This rapid fall made trading with Germany very difficult. (4) that the exports of all three countries show a decline from 1924 to 1925 which has never been made up. This is wholly attributable to the prohibition by the Polish Government of all imports of cured herrings from Germany. Prior to 1925 considerable quantities were re-exported to Poland but in January of that year a tariff war broke out between the two countries and since then no re-exports have taken place.

Approximately half the imports in pre-war days were re-exported, and this makes accurate comparison between the present and the pre-war consumption impossible. From 1909 to 1913, Germany bought from us on an average 190,000 tons (Scotland 790,000 barrels) per annum. If we assume that 50% were re-exported, this would give 95,000 tons (Scotland 395,000 barrels) as the pre-war consumption of British herrings within the country. From 1921 to 1924 it is estimated that 20% to 25% of the total importation were re-exported/

but since 1925, with the Polish market closed, little re-exporting has been done and practically the whole of our exports have been consumed within the country. These have remained fairly steady at 100,000 tons (Scotland 396,000 barrels), so that the consumption appears to be well up to the pre-war level - this too in spite of the great increase that has taken place in "Klondyking".

The prices at which herrings are retailed vary considerably from district to district according to the distance and freight from the importing centre. The following are the extremes of prices (in pfennigs) which have been ruling for the past three years together with corresponding figures for 1913.

	La Fulls	Fulls	Mat-fulls	Matties	Matjes
1926-1928	20-25	15-20	10-16	2-25 (normal 6-10)	12-35 (normal 25-35)
1913	11-15	9-12	5-7	2-6	10-20

Food prices generally have appreciated by 50% to 60% so that herrings would appear to be relatively dear. They do not, however, compare unfavourably with the increases which have taken place in the price of white fish, as will be seen from the following table which gives the retail prices (in pfennigs per lb.) of certain kinds of white fish at Chemnitz and Leipzig in 1911, 1913 1927, and 1928.

Chemnitz.	1913	1927	1928
Cod	20-25	50	60
Haddock	25-40	55	60
Halibut	80-100	130	150
Leipzig	**1911**	**1927**	**1928**
Cod	30	65	80
Haddock	30-40	70	90
Plaice	40-50	90	100
Saithe	25	55	60

The chief importing centres are Stettin, Hamburg, and Königsberg.

Stettin has the largest trade. It deals chiefly in the highest grades of herrings - Large Fulls, Fulls, Matfulls, and, to a much smaller extent, Matjes. The matje trade has never been very extensive at Stettin (Berlin and the South German towns getting most of their supplies from Hamburg) but attempts are now being made to develop it, and, with this end in view, the herring wharf has been covered in for a distance of a quarter of a mile and additional cold storage accommodation has been provided in close proximity to it.

Breslau and Berlin, the two greatest inland markets in Germany, get most of their supplies from Stettin. Except in very warm weather these are conveyed by barges up the Oder to Breslau and by the Oder, Elbe, Finow Canal and the river Havel to Berlin. The charges for water transport (2/5 and 1/6 per barrel respectively) are much less than by rail (6/- and 2/6).

The extent of the trade done at Stettin is shown in the following table of imports:-

	1928 Barrels	1927 Barrels	1926 Barrels	1925 Barrels	1912 Barrels
British	355,788	345,370	403,857	377,074	409,069
Scandinavian	95,280	114,166	153,183	168,380	131,506
Dutch	1,535	4,548	6,261	3,186	60,825
German	3,577	3,060	931	1,840	14,367
Sweden	-	318	1,938	401	9,302
	456,180	467,462	566,170	550,881	625,069

(Average from Great Britain 1908-1912 - 380,000 barrels)

Hamburg together with Stettin accounts for 80% of the total ~~cure~~ IMPORTS from Great Britain. It does a large trade in all grades of herrings and is easily the greatest distributing centre on the continent for matjes. To foster this branch of the trade, the discharging quays have been roofed in and extensive cold stores have been built. Most of the matje trade is with South Germany but in recent years the demand has been increasing elswhere.

The chief inland markets supplied from Hamburg are Leipzig, Dresden, Halle, Chemnitz, Zwickau, Magdeburg and Berlin, the transport charges by rail varying from 3/6 to 6/6 per barrel and by water from 2/- to 2/6 per barrel.

Königsberg before the war ranked with Stettin and Hamburg in the extent of ~~the~~ ITS herring trade, fully half a million barrels being imported annually. Most of these went to Russia, although the oncosts in the way of freight, commission, ~~cet~~ ETC., amounted to £1 per barrel. With the Soviet and Polish markets closed, the trade is but a tithe of what it was, the total import from all countries being only 100,000 to 120,000 barrels annually. Most of these go to East Prussia, Lithuania and Roumania where they are usually smoked before being consumed. The cheaper grades of herrings are most in demand - chiefly mat-fulls, matties and scents. The market for matjes is very small and seldom exceeds 4,000 barrels but dealers are of the opinion that this trade is capable of considerable expansion especially in East Prussia. Because of their comparative cheapness Dutch and German herrings are in greater demand than formerly.

Practically all the herrings exported from this country were at one time consigned to agents at the larger ports for sale on commission, but nowadays this practice is almost entirely confined to matjes, which because of their light cure deteriorate very rapidly, thus necessitating inspection at the importing centres before purchase. The bulk of the harder cured herrings are sold to German importers before they leave the country. These in turn sell them to the Port Wholesalers who do two kinds of business - (1) they buy on their own account and resell to the inland wholesalers or direct to the retailers (2) they buy <u>for</u> the inland wholesale merchants on a commission basis. The inland wholesale merchants are usually general dealers who supply the retail shops with all kinds of foodstuffs. Many of the larger retailers, however, cut out the middle-men and procure their stocks direct from the curers or exporters.

It is difficult to trace the various oncosts in the shape of profits, costs of handling, freightage, to the interior etc., The expenses of transhipment* amount to from eightpence to tenpence per barrel (sixpence for quay expenses and twopence to fourpence for coopering pickling and supervision of transhipment): the brokers' fee varies from 1% to 2% and a discount of 1% is usually allowed to the buyer. These are borne by the exporter and amount as a rule to 1/8 to 2/6 per barrel.

* Fishery Board Report 1928 page 25.

The following table gives (1) the C.I.F. Prices per barrel at Stettin and (2) the Importers' Selling Prices exclusive of duty -

(1) Week ending 15th. September, 1928

	C.I.F. Prices at Stettin.	Importers' Selling Prices
Crown Fulls.	66/- to 67/-	72/- to 74/-
" Matfulls.	59/- to 60/-	63/- to 65/-
" Medium.	45/- to 46/-	49/- to 51/-
" Mattie.	45/6 to 46/6	49/- to 51/-

(2) Week ending 22nd. September, 1928

Crown Fulls.	66/- to 67/-	70/- to 72/-
" Mat-fulls.	58/- to 60/-	61/- to 63/-
" Medium.	45/- to 46/-	48/- to 50/-
" Mattie.	45/6 to 46/6	48/- to 50/-

The difference between the two sets of prices ranges from 2/6 to 7/- per barrel. If we deduct transhipment charges brokers' fees and discount to buyer, we find that the importers' profits vary from 10d. to 4/6 per barrel.

Allowing a profit of 10% to the inland wholesale merchant and averaging the transport charges from the port to the interior at 4/-, we find that the price paid by the retailer is made up as follows:-

	Crown Fulls. Per Barrel.	Crown Matfulls. Per Barrel.
Importers' selling price at importing port	73/-	63/-
Duty	3/-	3/-
Transport charges, (say)	4/-	4/-
Cost of Handling, Storage and delivery	1/-	1/-
Interior Wholesaler's profit 10%	7/3	6/3
Retailer's Buying Price	88/3	77/3

A barrel of Fulls contains 750 fish and a barrel of Mat-fulls 850 fish, so that the retailer's buying price would work out at 12 pfennigs and 9 pfennigs per herring. The selling price, as has been shown above, varies considerably, but it is most often round about 18 pfennigs in the case of Fulls and 13 pfennigs in the case of Mat-fulls* - i.e. an increase of 50% on the purchase price, practically identical with the increase brought out by the Food Council from an examination of British retailers' accounts. Out of this the retailer has to pay wages and salaries of staff, rent, rates, office expenses, etc., These would be considerably less than for a corresponding shop in this country and the retailer's profit would consequently be greater than that shown in the Food Council's Cost Structure for the British Retailer (4.4%). In most cases it would be as high as 10%.

However, the oncosts be distributed, the fact remains that from the time of transhipment a barrel of herrings practically doubles in price before it reaches the consumer in the interior.

* 132/- and 108/- per barrel respectively.

OTHER MARKETS.

(1) In Europe.

The following table shows the extent of our export trade with other European Countries -

Average Annual Export (in thousands of barrels) from Scotland to

	HOLLAND	SWEDEN	NORWAY	BELGIUM	FRANCE	ROUMANIA.
1909-1013	3	1	-	-	-	-
1919-1923	10	18	2.5	12	9.5	9
1924- 1928	17	8	2	3.5	1	-

Exclusive, therefore, of Pre-War Russia and Germany our exports to the continent have actually increased since 1914 - by 60,000 barrels from 1919 - 1923 and by 28,000 barrels from 1924 - 1928. These figures, however, relate to direct exports only: the countries of central Europe have always obtained the bulk of their supplies through Germany or Danzig, and, as no reliable statistics are available showing the extent of this re-export trade, it is impossible to say definitely whether the consumption of British Herrings in these countries is up to the pre-war level or not.

So far as the cured article is concerned, Austria, Hungary and Czecho-Slovakia do not import more than 10,000 barrels between them. The latter country, it is true, has a few tinning factories just over the frontier from Germany, and fresh and salted herrings from Britain and Norway are used. The Norwegian fish are preferred however because of their cheapness, and it is doubtful if the total importation from Britain would exceed 5,000 barrels per annum.

Roumania accounts for approximately 50,000 barrels. Occasionally parcels are sent direct to Galatz but as a rule supplies are got from Danzig - and to a smaller extent from Stettin and Königsberg. In Bulgaria and the other Baltic States "tinned" or "reds" are preferred and there seems to be little hope of British Pickled Herrings ever competing successfully with the cheaper salt fish imported from Russia and Asia Minor. Italy at present imports from 3,000 to 4,000 tons (pickled, smoked and tinned) chiefly from Yarmouth and Lowestoft. Attempts have been made, and are in fact still being made, to increase this market but so far they have met with no success. The difficulties in the way are not by any means peculiar to Italy but are common to all the countries of Southern Europe. Owing to the warm climate a light cure is of little use. If the fish are to keep, they must be heavily pickled; and the saltier they are the less palatable are they to the inhabitants and the more difficult is their adoption as a regular article of diet. Besides, the high cost of production and freightage do not permit the fish to be sold at a low enough figure to compete with other foodstuffs, and, so long as these remain at the present level, the prospect of an increased market is exceedingly remote.

(2) Out of Europe.

For the same reasons South America, South Africa, Australia, New Zealand, India and China can be left out of account as potential markets. To prevent deterioration the herrings would have to be placed in cold storage during the voyage and after landing, and these items, together with the need for more substantial barrels, would increase the already high costs of production and freightage to such an extent that competition with other articles of food/

food/ would be impossible. In most of these countries meat and vegetables are so cheap that fish is regarded as a luxury and only a small proportion of the middle and lower classes include it as a regular part of the daily menu. As a consequence the supplies of dried and salted fish obtained locally, together with the imports of tinned salmon, herring, sardines, etc from Canada, Great Britain and Norway, are sufficient to meet the existing demands, and it does not seem possible to stimulate to any extent the market for pickled herrings. China, it is true, is already a large consumer. Her supplies, however, are either home-produced or imported from British Columbia and are obtainable at much less cost than would be possible for British herrings.

The United States of America and Canada are the only countries outside Europe where the market is capable of considerable extension. At present this trade is practically confined to high class West Coast Matjes for the Jewish and Scotch immigrants, but dealers are of the opinion that the cheaper grades would also meet with a ready sale among the poorer classes of both nationalities.

During the past five years their combined imports from Scotland have averaged 35,000 barrels compared with 53,000 barrels for 1919 - 1923 and 83,000 barrels for 1909 - 1913. This decline is due partly to the increased supply of Canadian Herrings (approximately 125,000 tons per annum). Most of the British Columbian Catch is tinned or pickled for export, but the bulk of the East Coast Fish are consumed at home or exported to the States where they can easily undersell the/

the/ European Product. In quality, however, they are vastly inferior, and there is no doubt that in the Eastern States of both ~~both~~ countfies first grade British Herrings would be much preferred. Dealers in Canada insist on the need for smaller containers than whole or half barrels, and, so far as this market is concerned, curers should resort to barrels one quarter or one eighth of the present size.

CHAPTER VII.

KIPPERING, TINNING AND REDS.

KIPPERING.

In contra-distinction to pickled herrings the bulk of the Kippers produced in this country are consumed at home. The chief reason for this is that the Kipper is not as a rule sufficiently salted or smoked to keep fresh for more than three or four days in summer and ten days in winter. While it is more durable, therefore, than the fresh herring or the bloater, it is not meant to be kept for any length of time and should be consumed as soon after production as possible. Kippers intended for export to Egypt, South Africa and Australia - a very small proportion of the total - are much more heavily salted and smoked than is customary for home consumption, and even they must be kept in cold storage during the whole of the voyage.

Although Kippering is prosecuted fairly extensively at Glasgow, Leith and all the principal herring ports,** the percentage of the total catch so treated is relatively small. For a few years prior to the war it varied from 9% to 10%: during the War Years it reached 25% and would have undoubtedly have been greater but for the difficulty of obtaining suitable fuel for smoking purposes: from 1919 to 1923 it averaged 23% (due to the large amounts kippered in 1919 and 1920) and since 1924 just a little under 12%. The following figures give the annual average output of all Scottish Stations for various periods since 1890.

** About 150 firms are engaged during the seasons at approximately 170 separate stations - exclusive of curing firms which go in for Kippering on a small scale when the fish are unsuitable for pickling.

1890 - 1899	57,000 crans.
1900 - 1906	89,000 "
1907 - 1914	123,000 "
1915 - 1918	124,000 "
1919 - 1923	212,000 "
1924 - 1928	152,000 "

Prior to the War Eyemouth was the Chief Kippering centre in Scotland: then came Peterhead, Fraserburgh, Stornoway, Glasgow and Aberdeen. Since 1925, however, Glasgow has contributed 25% of the total; Aberdeen and Stornoway 11% each; Peterhead 10%; Wick 9%; Fraserburgh 8%; Leith 7%; Eyemouth 4%.

The most striking feature in the demand during recent years has been the increasing preference - particularly among London buyers - for extra large rich fish. Consumers have grown accustomed to the big Norwegian Kippers which flood the markets in March and April and they look for fish of similar size at other seasons as well. These cannot be got in any quantities at the East Coast Ports** and consequently the demand for West Coast Kippers has appreciated considerably. This no doubt explains the rapid growth of Mallaig as a Kippering Centre. During the past three years it has contributed fully 10% of the total production, its annual output (16,000 crans) being now roughly five times what it was in 1925 (3,100 crans).

** East Coast Merchants as a rule send their largest Grades to the London Market and the remainder to the Midlands.

Kippering does not call for a heavy outlay on buildings and plant. The usual "station" consists of (1) a splitting shed (2) from four to eight SINGLE kilns or two to four double kilns (3) a packing shed (4) a small store for boxwood, chips etc. (5) sufficient ground space for a few barrels of offal. The approximate cost of such an establishment including equipment would vary from £800 to £1,500 according to the site, the number of Kilns and the nature of the materials used. It must be remembered, however, that the season is a very short one and therefore all charges under the head of fixed capital must be spread over a period which rarely exceeds 15 weeks.

When the fish reach the yard, they are discharged from the kits on to a large bench which occupies one side of the splitting shed. At intervals along this bench stand the women whose duty it is to split the herrings and remove the entrails. The splitting is done with a knife similar to that used for gutting. The point of the knife is inserted in the back as close to the back-bone as possible and the fish slit from head to tail. It is then opened up and the gills etc. removed. No selection takes place at this point as in gutting.

As a rule all the bones are left in, but some firms have been in the habit of removing the backbone and selling the product as "boneless" Kippers - in spite of the fact that none of the really troublesome bones, those of the breast and stomach, have been extracted. A German Firm, however, has recently placed a machine on the market, which not only splits and guts the herring but removes almost all the bones - so that a practically boneless kipper is now a reality. Up to the present only a few British Firms have ~~been~~/ had these machines installed but the results have been

been very satisfactory, and, owing to the saving in labour costs, the machines pay themselves and involve no increase in the price charged to the consumers.

After they have been split and gutted, the herrings are thoroughly washed and are then transferred to the pickling tub. The strength of the pickle and the length of time the herrings are left in it depend on (1) the nature of the fish - soft oily herrings do not absorb the salt so readily as hard firm herrings - and (2) the length of time they are expected to keep. Two tons of salt are sufficient for 100 crans if the pickle is changed twice a week (as in summer) but from two and a half to three tons are necessary if it is changed only once. For the home market twenty to thirty minutes is considered adequate but herrings designed for export to a warm climate are usually left in the pickle for about forty minutes.

It is of the utmost importance that the pickle should be kept thoroughly fresh as the least trace of sourness is imparted to the fish. Most firms nowadays mix with their pickle a vegetable dye called "Annato". This is absolutely harmless and does not in any way affect the flavour or quality of the kipper, but it considerably improves its appearance, giving the back a deep golden colour. Unfortunately there is an increasing tendency to regard it as a substitute for smoking - i.e. to use a lot of dye and little smoke. Kippers so cured are, it is true, appreciated by some consumers, but they do not keep as well as the harder smoked article and lack its distinctive flavour. As they cannot readily be distinguished from it, and have no distinctive marks of any kind on the boxes, they are apt in some markets to damage the reputation of the ordinary hard smoked kipper.

After being removed from the pickling tub the herrings are put in troughs to allow the brine to drain off. They are then hung on tenters (strips of wood about four feet long, having sixteen or eighteen hooks on each side) with their backs next to the wood and the tenter hooks piercing the heads. The tenters are hung inside the kiln, care being taken to see that it is "drawing" properly and that the smoke can circulate freely round all the tenters. The most suitable fuel is undoubtedly oak chips and dust but as this is rather expensive - costing 25/- per ton (exclusive of carriage) compared with 18/- per ton for ordinary white wood - most firms use birch or white wood, either alone or mixed with oak shavings. Three or four fires are lit in each kiln (six or eight in a double kiln) and liberally coated with sawdust to prevent the flames escaping and scorching the fish. "Smokers" are in constant attendance and at frequent intervals the doors are opened and more sawdust added, as it is imperative that the maximum amount of smoke should be obtained without raising the temperature of the Kiln further than is absolutely necessary. The process takes about six hours and three or four relays of fires may be necessary before the fish are suitably browned.

The lower tiers are cooked first, and, whenever they attain the requisite colour, the tenters are taken down and placed on racks in the packing shed to allow the fish to cool. It is important that they should be absolutely cold before they are packed, otherwise they deteriorate rapidly. They are then divided out into various selections - Firsts, Seconds etc. - and packed in boxes containing approximately one stone of fish.

The number of boxes obtained from a cran of herrings varies with the season of the year and the quality of the fish. At the beginning of the season the gut is proportion-

ately large compared with the muscle of the fish and at the/

the/ end of the season milt and roe are present, which are also in a measure waste.** The number of boxes depends also on the hardness of the cure, as the heavier the smoking, the drier are the herrings and more are required to fill the box.*** The usual average is 18 to the cran (19 in the case of heavily dyed, lightly smoked kippers) but the number may vary from 16 to 21 although the latter is most exceptional.

On the assumption that 18 boxes go to the cran, the average price of the green article per box would be 1/8¾ for the past five years (31/3 per cran), as compared with 1/4¼ for 1909 - 1913 (24/6 per cran).

For the same periods the cost of cure has risen from 10/- - 13/- per cran to 18/- - 22/- per cran, the variations being due to differences in the quality of fish and station of cure. Both sets of prices are for the finished article in one stone boxes, on rail at the port of cure.

** The milt and roe are generally disposed of as offal. At Yarmouth and Lowestoft the milt is sometimes done up in boxes and sold at from 1/- to 5/- per box. This is usually possible only in the middle of the season, as at the beginning it is too greasy and at the end too watery.

*** Each box contains from 15 to 40 pairs. Large trawled herrings (such as are landed at Fleetwood and Milford-haven) give 15 - 16 pairs, small matties (East Coast early fish) 35 - 40 pairs. The average for good quality kippers may be taken as 25 pairs per box.

The rise in wage rates and price of boxes is chiefly responsible for this increase. The latter cost £13 per 1,000 - approximately 3¼d. each - compared with £7 pre-war. Women's wages have risen from 18/- to 30/- per week (Glasgow 32/-): men's from 25/- - 30/- to 50/- - 60/- for day work and from 30/- - 35/- to 65/- - 80/- for night work. A woman can split and gut from 1½ to 3 crans per day according to the quality of the fish, and, as a rule, four day-men, a smoker and a boy are required to keep pace with a staff of twelve women.

The following figures give the cost of cure at the Aberdeenshire Ports -

Box	3¼d.
Turnings	2
Cartage	1
Rent etc.	¼
Women's Wages	4
Men's "	2
Total	1/0½

This may be taken as a fair average for all the Scottish Ports. It is slightly greater at Glasgow, however, owing to higher wages, rent and taxes, and is generally reckoned at 8/- per case containing 6¾ stones - i.e. approximately 1/2 per stone. Except for their own market, Glasgow firms are therefore at a disadvantage, but they enjoy a slight concession in railway rates denied to the other Scottish centres. In addition to the usual flat rates of 5/8 per cwt. and 4/6 per cwt for lots over three tons, Glasgow has a special one ton rate to London of 4/11 per cwt. For lots of less than one ton or more than three tons, however, the carriage from Glasgow to London is the same as from Wick and Thurso. If we take 15 lbs as the gross weight per/

/box, the cost of carriage to London is 9d. per box on the higher rate and 7¼d. on the lower.

Adopting the former and allowing the same percentage rates of profit as were considered fair by the Food Council (See page 157) we get the following Cost Structure for Kippers.

Price of green fish per stone box		1/3¾
Add Port Wholesaler's Expenses and Profit and Wastage.		
Cost of Cure and Cartage to Station		1/0½
Carriage to Inland Market		9
Cartage from station and porterage		1
Management or proprietor's salary for Management	(1.1%)	1¼
Nett Profit	(1.8%)	
Wastage	2%	1
Price paid to Port Wholesaler by Inland Salesman		3/9½
Add Inland Salesman's Expenses and Profit		
Carriage and Cartage	(2.3%)	1¾
Labour, Rent, Rates and other expenses	(6%)	5
Management or proprietor's salary for Management	(1%)	1½
Net Profit	(1.7%)	
Wastage		¼
Inland Market Sale Price		4/6
Add Retailer's Expenses, Profit and Wastage		
Wages and Salaries	(9%)	6¼
Rent and Rates	(1.6%)	1
Office and other expenses	(5.7%)	4
Management or proprietor's Salary For management	(2.4%)	1¾
Nett Profit	(4.4%)	3¼
Wastage	(2%)	1½
Price Paid By Consumer		5/11¾

This cost structure is drawn up for the most lengthy and expensive route between the catcher and the consumer i.e. with the inland salesman acting as a wholesale merchant: it also allows for carriage at the higher rate.

Yet in spite of these it would enable kippers to be retailed at the very low average price of 5¼d. per lb.

Most inland market business, however, is conducted on a commission basis, the usual rate charged being 5%, except at Glasgow where it is 7½%. If we cut out the wholesale merchant's expenses and profits therefore, the cost structure would be as follows -

Price of green fish per stone box.	1/8¾
Add Port wholesaler's Expenses, Profit and Wastage.	
Cost of cure and Cartage to Station	1/0½
Carriage to Inland Market	9
Cartage from Station and Porterage	1
Cost of Management plus Nett Profit	1¼
Wastage	1
Commission at 5%	2¼
Price paid by Retailer	3/11¾
Add Retailers Expenses, Profit and Wastage.	
plus Cartage	1/3½
Price paid by Consumer	5/3¼

This works out at 4.52d. per lb. which would allow kippers to be retailed at 4¾d. per lb. The retail price, however, never - even with the smallest and poorest grades-falls as low as this. As a rule it varies from 5d. to 8d. per pair or 8d. to 1/- per lb. It would be absurd to suggest that all kippers should be retailed at 4¾d per lb. - the price of the large rich West Coast Fish for instance is sometimes as high as 3/6 per stone - yet it is clear that there is gross profiteering somewhere. As in the case of fresh herrings the port-wholesaler can ~~supply~~ safely be exonerated.

The following were the current prices at Billingsgate during June and July of last year for Peterhead and Mallaig kippers:-

	Peterhead Mediums.	Mallaig Firsts.
June	4/6 - 3/- (Average 3/6)	5/- - 4/- (Average 4/9)
July	3/6 - 3/- (Average 3/3)	5/- - 4/- (Average 4/3).

The former were bought at from 33/- to 40/- per cran, the latter at 40/- to 65/-. In both cases the wholesale Prices were inadequate and most firms suffered heavy losses. The books of one firm revealed a profit for the year ending December 1927 of £473 on an overturn of £97,566.

For the reasons given in Chapter V, it is impossible to apportion the blame between the Inland Salesman (or Wholesaler) and the Retailer with anything approaching accuracy. The business methods of the former are exceedingly loose and haphazard and the prices received by the Kipperer are often at variance with current market prices. These variations, however, - substantial as they sometimes are, frequently amounting to 6d. or 1/- per box - are not sufficient to account for the great disparity between the retail price as reached in the cost structure and those actually charged to the consumer, and it seems indisputable that retail fishmongers, so far at any rate as the sale of fresh herrings and kippers is concerned, are making grossly excessive profits.

TINNING.

Tinning is undoubtedly the most satisfactory method of preserving herrings. It removes many of the difficulties which lie in the way of marketing the pickled or kippered article; for, if the tinning has been properly done, the fish will keep fresh in any climate for years, and in point of fact the bulk of the "tinned" trade is with those countries to which it is practically impossible, for climatic reasons, to export any other form of cure. In the second place the tins are small, containing usually from ½ lb. to 2 lbs. of fish, and are, therefore, of very convenient size for the average household. Moreover they can be done up in a much more attractive and appetising fashion than is possible with pickled herrings or kippers. British firms, it is true, have a lot to learn from their German rivals in this respect, as the latter use a wide variety of seasonings - olive oil, vinegar, tomato sauce, gherkins, bay-leaves, peppercorns, mustard seed, coriander, thyme, etc., - whereas in this country olive oil and tomato sauce are to all intents and purposes the only condiments used. Nevertheless the British product in this somewhat restricted field is immeasurably superior to the German and can outsell it in any market.

Unfortunately it is by far the most expensive method of cure and the circumstances of the industry make it exceedingly improbable that the costs of production will - at any rate for a considerable time - be substantially reduced.

The inherent difficulty is that, while extensive buildings and elaborate machinery are required, the supply of herrings is confined to a very limited period, with the result that a large amount of capital is lying idle for the greater part of the year and a year's interest and depreciation charges must be budgeted for in a season of from eight to twelve weeks' duration**.

Various expedients have been tried to get over this difficulty. During the off-seasons some firms utilize their plant for tinning (1) other kinds of fish - sprats, haddocks, crabs, cod-roe, etc., - whatever happen to be in season. (2) other kinds of food - meat, vegetables, soups, pastes, etc. Others bring supplies of herrings from distant ports by rail, road, or water whenever the home supplies fail. For instance during the "gluts" AT Rothesay in November and December of 1927 and 1928 Aberdeen and Peterhead firms brought supplies by rail from Greenock and Wemyss Bay, ~~and~~ the cheapness of the fish balanc~~ed~~ING the cost of transport. (13/- per cran).

A few years ago the experiment was tried of chartering a steam drifter to convey West Coast winter herrings to Aberdeen, but unfortunately bad weather and high prices coincide~~d~~ and the venture was so unremunerative that it has never been repeated.

** It must not be assumed that factories work regularly and at full pressure throughout the season. Herrings frequently rise in price beyond the level at which it is profitable to tin them. Small to medium fish are the most suitable both as regards size and price, and, so long as these are plentiful and cheap, the factories are busy. The occasional "glut" is the tinning firm's opportunity.

It is a striking fact, however, that, in order to keep their factories going, the German import fresh herrings from this country and are able to make it pay, so that it does not seem impracticable for the Aberdeenshire Firms to unite in chartering a trawler to "Klondyke" for them during the West Coast and East Anglian Fisheries.

It is clear therefore that the cost of production depends to a very large extent on the use that is made of the fixed capital during the off-seasons for herrings, and, as this varies considerably not only between individual firms but also in the same firm from year to year, the cost of production is, within certain limits, in a constant state of flux. Before the war it varied from 18/- to 27/- per cran: within the past five years its range has been 35/- to 50/- per cran. The usual wholesale prices are 5¾, 5½ and 9¼ per ½ lb, 1 lb. and 2 lb. tin.

Tinning in Scotland is now confined to a few firms operating at Aberdeen, Peterhead and Fraserburgh, and the actual amount so treated is exceedingly small - usually just under 2% of the total catch.

An attempt was made by Lord Leverhulme soon after the war to start a tinning factory at Stornoway, his idea being that plentiful supplies of fish would be available not only during the summer months, as at the Aberdeenshire stations, but during the greater part of the winter as well. Stornoway, however, was most unsuitable geographically for such a venture. Its remote situation resulted in high transport charges. It was difficult to obtain suitable labour locally during the fishing season - most of the men being then engaged in some other branch of the fishery - and it was impossible to import it.

Besides, ~~these~~ prices were consistently much too high for tinning.

The following figures give the average number of crans tinned in Scotland per annum -

1890 - 1899	15,600
1900 - 1906	23,700
1907 - 1914	33,100
1915 - 1918	15,900
1919 - 1923	23,200
1924 - 1928	28,600

In spite therefore of the great increase in the price of the green article the amount tinned is well up to pre-war production. The decline from 1915 - 1918 is attributable to (1) the increase in the price (2) the fact that most of the factories were engaged in producing rations for the troops.

The first step in the process of tinning is the removal of the head, tail and gut - popularly known in the trade as "nobbing". This is done exclusively by women. After they have been "nobbed", the herrings are thoroughly washed either by hand in a large open tub or in a special washing machine, which is fitted with brushes and sprays and can perform the work more speedily and effectively than is possible by hand. They ~~can~~ ARE then ~~be~~ dry-salted or pickled for six to seven hours, according~~ly~~ to the quality of the fish, and again thoroughly washed and allowed to drip. They are now ready to be packed in the tins. The women who do the packing usually work in crews of five: one weighs out the fish, two pack, the fourth pours in the oil or tomato sauce and the fifth places the lids on the tins and arranges THEM on trays ready for transference to the "spinning" room.

The lids are "spun" on to the tins by a machine which in the hands of a skilled operator can perform the operation with remarkable rapidity. (1,000 to 1,200 per hour) The tins are then taken to the "bath" house to be cooked; a hole is bored either in the top or the side of the tin to allow the air to escape; the trays are inserted in huge ovens or "baths" and left to cook for half-an-hour. By this time all the air is driven out, and, while the steam is still issuing from them, the holes are soldered up. The tins are afterwards replaced in the ovens and brought to a very high temperature to prevent anything in the mature of botulism. Each tin is carefully tested to make sure that it is airtight. It is then lacquered, labelled and wrapped.

Considerable improvements have recently been effected in the type of the machinery used. In one factory the herrings are actually touched by hand on only three occasions in the whole process of tinning. This is made possible by a series of moving bands so timed as to conform to the speed of the workers. When a herring has been nobbed it is placed on a band which takes it to the washing machine and pickling tub. From there it is conveyed by another band to the "filling" shed and run along at a convenient height over one of the tables for the worker to grasp it. Above each table are two other belts moving in opposite directions. The top one carries empty tins which are fed to it from a chute in the "die" room, the lower conveys the full tin to the women, who pour in the sauce and place the lid in position and ultimately carries it away to feed one of the spinning machines.

Within the past year an entirely new machine has been placed on the market which is likely to revolutionize the whole process of tinning. It differs from the old machinery in this that the tins are seamed under a vacuum and the air extracted just as the closing operation takes place. This obviates the necessity of piercing and soldering and thus results in a saving of labour and material.

The tins are made of tinplate which is really sheet steel coated with tin. It is lacquered on one side to prevent the acid of the fish from eating through the tin and corroding the steel. Although the machinery is very expensive, all the firms cut their own tins and lids. These differ in shape and size according to requirements: some are plain, others are coated with rubber round the rim and a rubber band round the lid. A modern machine can turn out about 8,000 tins daily.

Little technical skill is required. Those factories which work for only a few months in the year depend almost exclusively on casual labour and few even of those which keep going all the year round are able to retain their workers, unless they employ them also at smoking or curing other kinds of fish, whichever happens to be profitable at the time.

They are run partly on piece price partly on time wages according to the nature of the work. These have gone up by close on 100% since 1914. The usual pre-war rates were 5d. to 7d. per hour for male workers and 3d. to 4d. per hour for females over 18 years of age: today they stand at 1/- to 1/3 and 7d. to 8d. respectively, with an/

/an increase of 25% for any overtime after a ten hours' day. The following are the current piece-rates.

Nobbing	2d. per quarter cran basket.
Filling	3½d. per 100 1 lb. tins, 3d. per 100 ½ lb. tins for each crew of four or five operating.
Lacquering	4d. per gross.
Wrapping	3d. per gross.
Broggers	2/2 per 1000 tins and 1/1 per hour waiting time.

Although our consumption of imported tinned fish - salmon, sardines, bristling, etc., - is approximately two lbs., per head of population per annum, amounting in all to close on 40,000 tons or more than seven times the total Scottish output, it is a regrettable fact that less than 10% of the herrings tinned in this country are consumed at home. This cannot be due to the price; it varies from 7d. per lb. to 1/- per lb. according to quality and is therefore much cheaper than all other kinds of tinned fish. It may be due in part to the availability of fairly regular supplies of fresh herrings and kippers, but the chief reason undoubtedly is the ignorance of the average housewife that tinned herrings are so excellent - and in many cases that they are tinned at all. Much may therefore be done by ~~this~~ way of advertisement to beat up the home consumption.

Abroad, the chief markets are Australia, South Africa, India and New Zealand. In all these countries there is a big demand for tinned fish of various kinds, and there is no doubt that the market is capable of considerable extension. Unfortunately, however, the British product has to compete not only with Canadian and Dutch herrings but also with Norwegian sardines and bris/tling and with Californian Pilchards.

These - especially the Canadian product - captured the market during the war, and, as they can be retailed at considerably less cost than our own herrings, there seems at present to be little prospect of displacing them

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RED HERRINGS.

Red herrings differ from kippers in two respects (1) they are neither split nor gutted. (2) they are subjected to far harder salting and smoking and are consequently much less liable to deterioration.

The process of cure is, however, in some ways very similar. The herrings are first thoroughly "roused" and put into barrels or else into large vats, about three yards square, situated usually below the floor of the curing shed. About one ton of salt is required to cure ten crans, and the greatest care must be taken to see that sufficient pickle is generated to cover the fish. If barrels are used, they must be filled up and "tighted" after two or three days, and then left to pine for at least ten days. There is no definite time for pickling: it may take weeks or months according to the convenience of the curer.

On being removed from the pickle, the herrings are "spitted" through the mouth and gill covers on spits about four feet long and are then steeped in water for a day or two, the water being changed at least three times in the process. They must be thoroughly dried either in the Kiln or preferably in the open air, and they are then ready for smoking. This may take anything from a fortnight to six weeks according to the hardness of the cure desired. The fires are not kept constantly burning, otherwise the fish would be scorched: they are usually lit each night and just allowed to burn themselves out. When smoking is complete, the fish are/

are/ left to cool for a few days and are then packed in stone boxes or in barrels - the former usually for the home market, the latter for export.

Compared with curing and kippering, the trade in reds has never been large and it is now considerably less than it was for the decade ~~duri~~ preceeding the war. Aberdeen is the chief centre with an average annual cure of 3,500 crans. Small quantities are cured at Glasgow, Leith, Anstruther, Eyemouth and occasionally Fraserburgh.

The following figures show the average annual cure (in crans) since 1890.

1890 - 1899	3,700
1900 - 1906	11,000
1907 - 1914	8,100
1915 - 1918	12,700
1919 - 1923	9,600
1924 - 1928	5,400

So far as the home market is concerned the red herring has never been really popular. Its chief recomendation is its durability, and this no doubt explained the fairly extensive demand which existed for it in the country districts up to the seventies of last century. As transport facilities improved, however, it was ousted by the fresh herring and the kipper, and the home consumption is now almost negligible.

The chief markets are Egypt, Greece, Italy and other Mediterranean countries, but, owing to the increase in the cost of production, the demand has shrunk to a half of what it was before the war. So long as prices remain at their present level, there is little prospect of recovery.

CHAPTER VIII.

THE FUTURE OF THE INDUSTRY.

All went well so long as catches were large and prices high but the war and its aftermath has brought a full realization of the fears expressed by the experts of the Fishery Board for Scotland as early as 1903 - that there was a risk of the means of capture becoming overcapitalized and that fishermen would have been well advised to consider a cheaper method of propulsion, as for example the installation of oil engines in the existing sail-boats. Under the stress of war conditions this was given effect to, but even the cheaper motor vessels have been found too costly and experiments are meantime being conducted with the semi-diesel engine which, as it can be run on crude oil is much less expensive than the paraffin motor. (Pages 102 121

Since 1919 the average yearly catch has been approximat ly 70% of what it was for the decade preceeding the war and the average price 50% more than that obtaining for the same period: during the past five years the catch has risen to 80% but the price has remained at 50%. The total value of the catch has therefore appreciated by 5% for the past ten years and by 16% for the past five. Yet, despite the almost total extinction of the sailer, the catching power of the fleet would be close on 90% of what it was in 1914.

Capital costs have been almost doubled and working expenses have increased by approximately 70%, so that the fishermen have not been receiving an adequate return for their efforts (Appendices 9&10). Many have been compelled to leave the industry altogether, others, through inability to find the necessary capital for the repair of boat and gear, as required under the Share System (Pages 122 - 128), have had to take posts as hired labourers on their other boats. (Pages 129 - 133).

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So far as the larger vessels are concerned, building has been practically suspended since 1921 and the bulk of the fleet is in an exceedingly old and outworn condition. The nets are even in worse state. These have an average life of about five years but the fishery has been so unproductive that the fishermen have not the capital to effect the necessary repairs and renewals.

Repeated attempts have been made to secure assistance from the Government but up to the present they have met with little or no success. Loans, it is true, were granted in 1919 and 1924 but the obligations were so heavy and the fishermen so impoverished that no advantage was taken of them, and, as the catching power of the fleet is more than sufficient to meet the existing demands, in the present condition of the industry any loan scheme would meet with a similar fate, unless the interest charged be very much lower than any Government is likely to offer.

What is required is not Government assistance, whether in the form of loans or grants, but a wider market for the cured article, and, until this is secured, any relief measures can at the most be only palliative. (Pages 133 - 136)

In one respect however immediate State aid is advisable. Most of the smaller harbours have been allowed to fall into decay and many of the larger ones are unable to meet the interest charges on the debt contracted when they were made. This E/R present financial difficulties are largely due to the loss of revenue during the war and it seems only reasonable that the Treasury should come to their assistance. (Pages 136 -137).

At/

At the same time a reduction in working costs could be effected if the fishermen would form cooperative societies at the chief herring ports for the purchase of coal, oil, nets, ropes etc. They are, however, so essentially individualistic that cooperative action on the lines suggested is anathema to them. (Page 138).

(2) Curers.

Owing to the complete or partial suspension of their business during the war most of the curers suffered very heavy losses, from which through a succession of unfortunate seasons they have not yet recovered. In fact many of them are deeper in the mire to-day than they were in 1918, especially the smaller firms which through lack of capital are unable to practise many economics enjoyed by their larger brethren. (Pages 205 -207).

The trouble is that they are dealing in a commodity for which there is a very restricted demand. Before the war practically the only outlets for cured herrings were Germany and Russia and these countries between them imported fully 95% of the total cure. (Pages 209 - 218).

As Germany reexported about 50% of her imports to Russia, it is difficult to compare the present German consumption with that of 1913, but importers and dealers estimate that it is well up to the pre-war level - this too in spite of the fact that herrings are now, relatively dear, the price almost doubling itself between the port and the consumer. (Pages 231 - 239).

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In Russia, on the other hand, there has been a marked falling off. The dissociated states, it is true, are still taking a substantial amount but in the U.S.S.R. itself the demand is practically nil. This is due, partly to the fact that the Soviet are doing their utmost to develop their own fisheries, partly to the diminished consumption of fish consequent on the decline in power of the Greek Church, but it is nevertheless indisputable that Russia could take - and would take - a large amount of British cure - the Centrosojous estimate it at 300,000 - 380,000 barrels - if the State Bank would sanction the purchase, or alternatively if they could float a sufficiently long dated loan in London to cover the amount. In her trade with this country she has a substantial credit balance, more than sufficient to buy all the herrings she could possibly consume for many years, but her imports are graded in order of national importance and unfortunately herrings are far down the list. It has been repeatedly alleged that the rupture in diplomatic relations was mainly responsible for the diminution in trade. This obstacle has now been removed and it is to be hoped that Russia will again appear as a buyer on a large scale. (Pages 219-230).

Next to Germany Poland is meantime our best customer but even in Poland the demand is short of what it was in 1913. Many of the inhabitants have lost the taste for salt herrings, many more cannot afford them. Instead of being the cheapest, most nutritious food available, they are now relatively dear, the retail price having appreciated by 250% to 300% since the War, whereas other food prices are practically at the pre-war level. This apparently extortionate increase in price is due partly to the higher costs of production, partly to the heavy oncosts - amounting to 17/- to 18/- per barrel - after the fish reach Danzig. (Pages 225-230).

So far as other countries are concerned, the amount consumed has slightly increased but our total exports to these countries are still relatively infinitesimal, and, except in Canada and the United States, there is little prospect of expansion. (Pages 240-243).

This stagnation of the market has had its repercussion on the prices received by the curers which are not commensurate with the increased cost of fish and cure. The former has averaged 24/- per barrel (1924-1928) as against 18/10 (1909-1913): the latter 13/7¼ as against 7/5¾. For the same periods the average profits per barrel have been 3/5¼ and 4/2¾ respectively. Nor do these take any account of wastage, management costs or the lower "outcome" from the early cure. (Pages 198-208).

(3) FRESHING.

Although the general food shortage during the War gave a considerable fillip to the consumption of fresh herrings and although the transport facilities are on a more adequate scale than ever before, the amount consumed in the country today is the smallest recorded for over half a century

It is not that as a nation we are eating less fish (page 149) or that there is any shortage in the supply (page 152). The main reasons are (1) the fastidiousness of the average housewife which rebels at the trouble of gutting and cleaning the fish, no less than at the smell which it entails in cooking (page 152), and (2) the extravagant prices at which herrings are now retailed.

An analysis of the various oncosts has been given (pages 153-168) which exonerates from any charge of profiteering not only the fisherman and the port-wholesaler but the inland wholesale merchant as well (although his business methods have been questioned) and throws the blame on the retailer, who, at any rate so far as herrings are concerned, must be making exhorbitant profits.

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A tariff on all foreign landings has been suggested, but this would not do much to help the consumption of home caught fish, as the bulk of the foreign landings take place in March and April when our own fisheries are practically in abeyance. (page 167).

What is required rather is (1) a reduction in the retail price and (2) an extensive publicity scheme to make the public more conversant with the excellent nutritive qualities of the herring. (page 168).

(4) KIPPERING.

So far as the home market is concerned, the kipper is perhaps the most popular form of cure. Unfortunately, however, it will not keep fresh for more than a week to ten days and consequently only a small proportion of the catch is so cured. (page 244).

During the War and for a few years after it the amount consumed steadily increased, and, although in recent years it has fallen short of the 1919-1923 average it is still well above the pre-war consumption. (page 245).

Yet it cannot be said that the kippering firms have enjoyed much success. On the whole they have been more fortunate than the curers but the preference of the public for large kippers has compelled them to deal chiefly in the largest grades of fish for which correspondingly high prices must be paid. In addition the cost of cure has risen by 70% to 80% above the pre-war figure. On the other hand the prices at the inland wholesale markets, while they fluctuate very considerably and are on the whole well above pre-war prices, have not generally remained at a sufficiently high level to leave the kipperer with a reasonable margin of profit (pages 249-253).

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A cost structure similar to that for fresh herrings has been drawn up which shows that the onus of profiteering rests largely on the shoulders of the retailer. (pages 251-252).

(5) TINNING.

Although tinning is without doubt the most satisfactory method of cure, the quantity tinned is exceedingly small - less in fact that 2% of the total catch - and of this less than 10% is consumed at home.

The chief difficulty in this branch of the industry is that a large amount of fixed capital is necessary and the seasonal nature of the fishery makes it impossible to use this for more than two months or so in the year, unless other kinds of food are tinned or herrings are brought from distant ports in the off-seasons. (pages 254-256).

The costs of production have therefore always been high relative to the value of the fish and certainly never higher than they have been for the past ten years. In spite of that, however, tinned herrings can be retailed at less than most other kinds of tinned fish and it is most regrettable that consumption is on such a small scale. (pages 256 & 259).

The chief markets are Australia, South Africa, India, New Zealand and there is no doubt that all of them are capable of considerable expansion. (page 260).

(6) REDS.

At one time there was a considerable demand for red herrings in most Mediterranean Countries but latterly, on account of the increase in price, this demand has shrunk to half of what it was. The home market too is infinitesimal, and it seems clear that this method of cure will soon become obsolete. (pages 262-263).

The crux of the industry is on the one hand, high costs of production and, on the other, a restricted market both at home and abroad, due partly to the lack of taste for herrings, partly to the high retail price, partly to the disappearance of Soviet Russia from the market.

At present there is little immediate prospect of any substantial reduction in the costs of capture and cure. The steam drifter and the paraffin motor have been found too costly for modern conditions and the semi-diesel engine, in so far as the larger vessels are concerned, has scarcely got beyond the experimental stage. Even if it turns out the success it is claimed to be, the fishermen will require several very successful seasons before they find the necessary capital to invest in it.

The present fleet, old and outworn though it is, is more than sufficient to meet the existing demand. As already stated, close times have been advocated to prevent the markets being flooded with inferior fish, but the salvation of the industry will never be secured through an artificial restriction in the supply.

So far as the home market is concerned, much might be done by an extensive publicity scheme to popularize not only fresh herrings but tinned and kippered herrings as well. An extensive increase in the demand, however, cannot be looked for until the retail price is substantially reduced.

The reentry of Russia to the market would help matters considerably but in the other Continental countries the price is so high relative to other articles of food that many families which formerly consumed salted herrings are resorting to cheaper and more convenient substitutes. If the

cured/

cured article could be marketed at a sufficiently low price to undersell these, all might yet be well, but with the present high costs of capture and cure that is impossible.

The only hope for the industry seems to be the discovery and adoption of some alternative method of cure which will render the fish more palatable and at the same time allow them to be cured in large quantities at no increase of cost. The excessive amount of salt used is the chief stumbling block in the present cure and the taste is most difficult to acquire. If some other preservative could be found which would preserve the fish for six months or a year and yet enable them to retain the full flavour of the fresh herring or kipper, it seems indisputable that the present markets could be enlarged and new ones tapped. It affords a fertile field for scientific research.

APPENDICES.

1. Methods of Determining Age of Herring.
2. Government Guarantee Schemes 1919 and 1920.
3. European Production.
4. Average Yearly Catch - East Coast, West Coast, Orkney and Shetland.
5. Average Yearly Catch - Individual Districts.
6. Average Monthly Catch - Individual Districts.
7. Fluctuations in Loch Fyne Fishery 1900-1928.
8. Specimen Balance Sheets for Steam Drifter and Motor Drifter 1913 and 1924.
9. Average Earnings and Expenses of Steam Drifters.
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11. Copy of Official Crown Brand and Stencil.
12. Total European Cure.
13. Herrings (cured gutted) exported from Scotland.
14. Herrings (cured gutted) exported from Norway and Holland.
15. German Imports - Fresh Herrings and Sprats.
16. Exports from Great Britain (cured or salted) to the Continent.
17. Import Duties on Herrings - Germany. Russia, Poland etc.
18. Disposal of the Offal.

Appendix I

Appendix I.

Methods of Determining the Age of the Herring.

The process of determining the age of the herring from the scale markings has already been described in Chapter I.

A second method consists in utilizing the otoliths or ear-stones. These are contained in cavities situated one on each side of the head and behind the eyes. They are three in number but one of them is larger than the other two and more regular in shape. It is this which is used in determining age. It is composed almost entirely of calcareous matter which has been laid down in layers - more or less well defined and of varying density, thus giving rise to a series of light and dark bands. As in the case of scale markings it is contended that a light and dark band together correspond to a year's growth and afford a sure means of ascertaining the age of the fish. But we have no proof of this: it is merely a theory which in the case of certain fishes gives results which agree very closely with those obtained by other methods. The unfortunate thing is, that in the herring the otoliths is usually very irregular in shape and the lines are often most indistinct, so that we cannot get such definite readings as we do in the case say, of the plaice, where the ear-stones are symmetrical and the lines clear and well defined. In addition, as with the scales, pseudo-rings appear and complicate matters.

A Third Method.

A third method consists in examining a large number of individuals from the same shoal and tabulating their lengths. It is then possible to divide them into groups according to measurement, and deductions as to age may be made therefrom. The delimitation of the groups is sometimes difficult - particularly in the case of older herrings, where of course growth is much slower than in the younger groups and consequently overlapping may occur. Nor does the difficulty stop there; for, when the groups have been determined, we have to pick out the group which are spawning for the

first time and grade the others from it. But how are we to assign a particular group to a particular year? If the shoal consists of fish all more or less of the same size, how can we say that they were spawned in 1925 and not 1926? Or again supposing there were two or more groups, can we say with certainty that only a year separates them? At the most all that this method can show us is the degree of homogeneity in the shoal - how far the members of it deviate from one normal size. As a means of age - determination it is too uncertain and speculative.

A Fourth Method.

A fourth method combines scale-groupings and size-groupings. It consists in grading unselected individuals from a catch both as regards (1) Scale markings and (2) size, and subjecting them to mathematical investigation to see if their distribution from both standpoints shows normal or abnormal variation. This method of attacking the problem has been recently adopted by Miss C.W.M. Sherriff*, and, although she confesses that her investigations have been too limited in scope for a final pronouncement on the subject, she states that in her opinion the mathematical analysis, so far as it has gone, "favours the hypothesis that a random sample is homogeneous".

* "The Mathematical Analysis of Random Samples of Herrings" [Fishery Board for Scotland, Scientific Investigation. 1922.]

Her method consists of plotting on squared paper the number of fish for each (a) length, (b) number of rings (separately) and then endeavouring to find two known probability curves which correspond to them. Exact correspondence is not to be looked for, but it should be close, for on the degree of approximation between the selected curve and the observed values depends the success - or failure - of the investigation. The closemess of fit can ~~be closely~~ easily be estimated by measuring the difference in area between the two curves. The equations of the probability curves are known and from them we can calculate the number of fish which theoretically should be ~~formed~~ found of any given length or any given number of rings in the sample under examination. The following is her analysis of the first sample examined by her.

Length in Cms.	21	22	23	24	25	26	27	28	29	30
No. of Fish. (Actual)	1	0	1	11	24	37	52	69	68	27
No. of Fish. (Calculated)	.1	.9	3.6	9.8	20.9	36.7	~~54~~ 54.8	68.2	65.5	32

No. of Rings.	4	5	6	7	8	9	10	11	12	13	14	15	16
No. of Fish. (A)	5	32	46	49	51	40	29	18	11	5	2	1	1
No. of Fish. (C)	6.9	28.1	46.3	53.1	49.5	~~38~~ 38.9	~~38~~ 38.9	27.3	17.3	9.9	4.9	2.2	.9	-

It will be seen that the calculated values agree very closely with the observed, and that the correspondence gets closer as we approached the mean. This indicates that the sample is homogeneous, and that the distribution shows normal variation about the mode or turning-point - i.e. the length (or number of rings) which gives theoretically the maximum number of fish. But all samples are not homogeneous - two or more shoals may have combined. Each may originally have been a uniform assemblage but a sample taken after the union would in general contain fish from both (or more) shoals. It is impossible by the aid of mathematics alone to separate them into their original groupings but an approximate result may be obtained. Take the following sample caught North of the Butt of Lewis on 27th May 1919.

Length in Cms.	24	25	26	27	28	29	30	31	32
No. of Fish.	4	21	23	41	39	53	37	7	1

No. of Rings.	2	3	4	5	6	7	8	9	10
No. of Fish.	6	61	46	37	54	15	5	0	2

Here there is abnormal variation. The numbers of fish cannot be grouped round a single mode and no probability curve can be found to fit even approximately the given values: Miss Sheriff holds that there has been a mixture or junction of two shoals and she endeavours to divide the sample up into its original groups- A belonging to one shoal, and B to the second.

Her selection is as follows:-

Length in cms.	24	25	26	27	28	29	30	31	32
Group A.	4	21	23	41	16	6	2		
Group B.					23	47	35	7	1

No. of Rings.	2	3	4	5	6	7	8	9	10
Group A.	6	61	42	4					
Group B.			4	33	54	15	5	0	2

She does not of course profess that her sub-division is correct but she shows that it gives an approximation in each case to two probability curves corresponding to two homogeneous shoals from which the sample came. "A very different thing", she says, "from the hypothesis that the sample is made up of nine different year groups." She recognizes the limitations of her investigation, however, and suggests that "for the future three random samples should be taken from the shoal and carefully measured etc., by different operat~~ions~~ors. ~~From~~ For the same shoal we would then have three equations of length and three equations of rings. By such an examination we

would be able to estimate the worth of the examination of a random sample from any shoal."

Appendix II

APPENDIX. II

Government Guarantee Schemes 1919 and 1920.

(Report on Sea Fisheries - Ministry of Agriculture & Fisheries (1919-1923))

The conditions of the herring fishery are such that the fishermen cannot regulate their catches and, however much the fishing fleets are reduced, there must always be times when the amount caught is greater than the home markets can absorb. This surplus would be wasted unless the curers were there to take it. The fishermen could not and would not go to sea and run the risk of losing their coal and gear in catching herrings for which they could obtain no adequate price.

Prior to the war the ~~herring~~ curing business had been conducted practically on a cash basis. A certain amount of capital was necessary to meet the initial expenses - for coopers' and gutters' wages and for the purchase of barrels, salt and herrings - but, as soon as the herrings were cured, they were exported, and in a very short time the curers received the proceeds, which they then turned over for the purchase and cure of more herrings.

In 1919 this ready-money business was impossible owing to the chaotic condition of Central Europe and the curers could not get rid of their stocks unless they were prepared to give fairly lengthy credit. Their capital, however, could not stand it. It was only able to finance operations for a comparatively short time and it was obvious that if it was locked up for a long period in the form of credits to foreign countries, the curing industry would come to a standstill and the fishermen would be compelled to give up fishing, as there would be no market for the catch.

The circumstances were so exceptional that an appeal to the Government was deemed inevitable, and in the spring of 1919 the Government agreed to take over from the curers not more than 400,000 barrels of the Great Summer Cure, at a price which would cover the cost of fish and cure, provided that the former did not exceed 35/- per cran. If the amount paid to the fishermen was less than this, the amount paid to the curer was reduced proportionately. In effect there was a maximum price to fish but no minimum, the latter being considered unnecessary, as it was thought that the curers would be quite willing to pay the full 35/- per cran to the fishermen. ~~The~~ In practice, however, it worked out differently and , in times of heavy catches, the prices dropped. The average price for the Scottish Season was only 29/3 per cran and many boats fished at a loss. The amount purchased by the Government was 229,000 barrels.

In response to appeals from the fishermen, the form of the guarantee was altered for the East Anglian Fishery. The curers were guaranteed 66/6 per barrel up to a maximum of 600,000 barrels but no curer was allowed to take advantage of the guarantee unless he could show that he had paid 45/- per cran** not only for all herrings sold under the guarantee but for all the herrings which he had purchased for curing.

To assist in controlling the scheme recourse was had to the Defence of the Realm Act and a regulation was made prohibiting any person from engaging in curing without a licence, a condition of such licence being that the holder should pay 45/- per cran for all herrings purchased for curing.

** An increase of 10/- per cran over the Scottish Price to meet the higher cost of living and the extra price of coal, oil and other gear.

The administration of the guarantee was placed in the hands of a body styled the "Herring Fisheries Executive Committee", consisting of representatives of all branches of the trade and presided over by a nominee of the Government.

The fishing commenced under the most difficult circumstances; the railway strike had just come to an end and there was a shortage of coal, salt and other materials. The most serious difficulty, however, was that the catching power was in excess of the curing power so that there was a great risk of more herrings being landed than could be cured, when prices would inevitably tumble down and the guarantee become inoperative.

In order to prevent this, the Executive Committee made arrangements for stopping the fishing when the amount of fish landed became too great to be absorbed. The rationing of coal supplies had been placed in its hands, and it arranged that any vessel which did not remain in port when called on to do so would have its supplies of coal withdrawn. Fortunately such intervention was seldom necessary and the scheme, so far as the fishermen and curers were concerned, was a thorough success.

The amount purchased by the Government was 325,900 barrels but considerable difficulty was experienced in disposing of them. Germany was then the only country capable of absorbing large stocks and the German Government had taken control of the importation of cured herrings and placed it in the hands of an organization known as the Reichsfischversorgung.

This body purchased a large proportion of the Scottish Cure on terms of two years' credit and about 260,000 barrels of the East Anglian Cure on terms of three to five years' credit.

The Scottish Purchases resulted in a profit of £233,904, the East Anglian in a loss of £111,683, the reason for such a disparity being that the Scotch Fish were cheaper seeing that the curers had paid less than 35/- per cran, Whereas the English Cure was taken over at a fixed price.

The Government were most unwilling to renew the subsidy for the following year but all sections of the industry pressed for it, and ultimately it was agreed to provide a subsidy limited to £3,000,000 of which not more than £1,800,000 was to be expended on the Summer Fishery and the residue on the English Autumn Fishery. A scheme was formulated similar in all respects to the previous scheme, except that the Government were entitled to take half the profits on any herrings sold outside the guarantee.

During the Summer Fishery the catch was smaller than usual and only 449,000 barrels were offered to the Government instead of 570,000 barrels, as estimated. A larger amount than was anticipated was therefore available for the English Fishery. This was ~~extremely~~ seriously interrupted by the coal strike - drifters receiving at first 50% and latterly 25% of their normal consumption - but large shoals were ~~tre~~ located close inshore and the weather throughout the whole fishery remained unusually fine, so that the effects of the coal shortage were less disastrous than they would otherwise have been. Of the season's cure 535,000 barrels were taken over by the Government.

Marketing difficulties were, however, even greater than before. The financial situation in Central Europe was worse than in 1919 and in addition the food shortage was not so acute. As a consequence the demand for herrings decreased. All the stocks purchased were ultimately cleared, however, but heavy losses were sustained - £641,135 in the case of the Scottish Fishery and £1,150,000 in the East Anglian.

Appendix No. IV

Average Yearly Catch (in thousands of cwts.) and value (in thousands of pounds sterling) for East Coast, Orkney and Shetland and West Coast.

	East Coast.				Orkney and Shetland				West Coast				All Scotland		
	Catch	% age	Value	% age	Catch	% age	Value	% age	Catch	% age	Value	% age	Catch	Value	Price per cwt.
1896–1900	2,085	57	547	58	813	22	189	20	772	21	208	22	3670	944	5/2
1900–1904	2,263	51	622	53	1458	32	323	27	745	17	240	20	4466	1185	5/3¾
1905–1909	2,803	52	739	49	1870	36	566	38	701	13	201	13	5374	1506	5/7¼
1910–1914	2,553	52	854	51	1598	32	564	33	800	16	269	16	4951	1687	6/9¾
1915–1918	596	35	494	34	196	11	96	6	914	54	885	60	1706	1474	17/3¼
1919–1924	1615	49	766	49	841	26	296	19	847	26	521	33	3303	1583	9/7
1925–1927	1454	38	669	38	954	25	455	24	1394	37	645	37	3812	1756	9/1¼
1928	1653	41	740	41	1034	26	373	20	1317	33	707	39	4004	1820	9/1

Appendix V

Average Yearly Catch by Districts 1896 - 1928.

(in 1000's of cwts.)

	1896-1900	1901-1905	1906-1910	1910-1913	1919-1926	1927-1928
Eyemouth	75	98	158	118	54	51
Leith	17	25	22	12	30	29
Anstruther	76	164	117	75	39	74
Montrose	76	71	49	34	1	1
Stonehaven	26	21	17	8	0	0
Aberdeen	250	262	405	260	39	25
Peterhead	395	479	788	713	332	498
Fraserburgh	598	701	834	676	477	468
Banff	57	41	33	25	26	32
Buckie	86	58	36	35	51	52
Findhorn	75	30	32	34	27	8
Cromarty	7	1	1	0	1	1
Helmsdale	50	6	1	0	1	2
Lybster	34	10	5	2	1	1
Wick	265	453	447	523	473	412
Orkney	121	139	188	420	156	196
Shetland	692	1569	1593	1159	732	736
Stornoway	332	288	262	322	328	703
Barra	38	74	153	97	43	85
Loch Broom	33	51	69	16	17	135
Loch Carron & Skye	103	53	36	62	45	25
Fort William	26	11	22	95	166	165
Campbeltown	97	93	76	109	74	37
Inverary	122	63	19	7	118	27
Rothesay	10	46	30	11	91	311
Ballantrae	10	19	25	32	52	42
Greenock	2	5	24	11	7	4
All Scotland	3667	4829	5442	4896	3440	4120

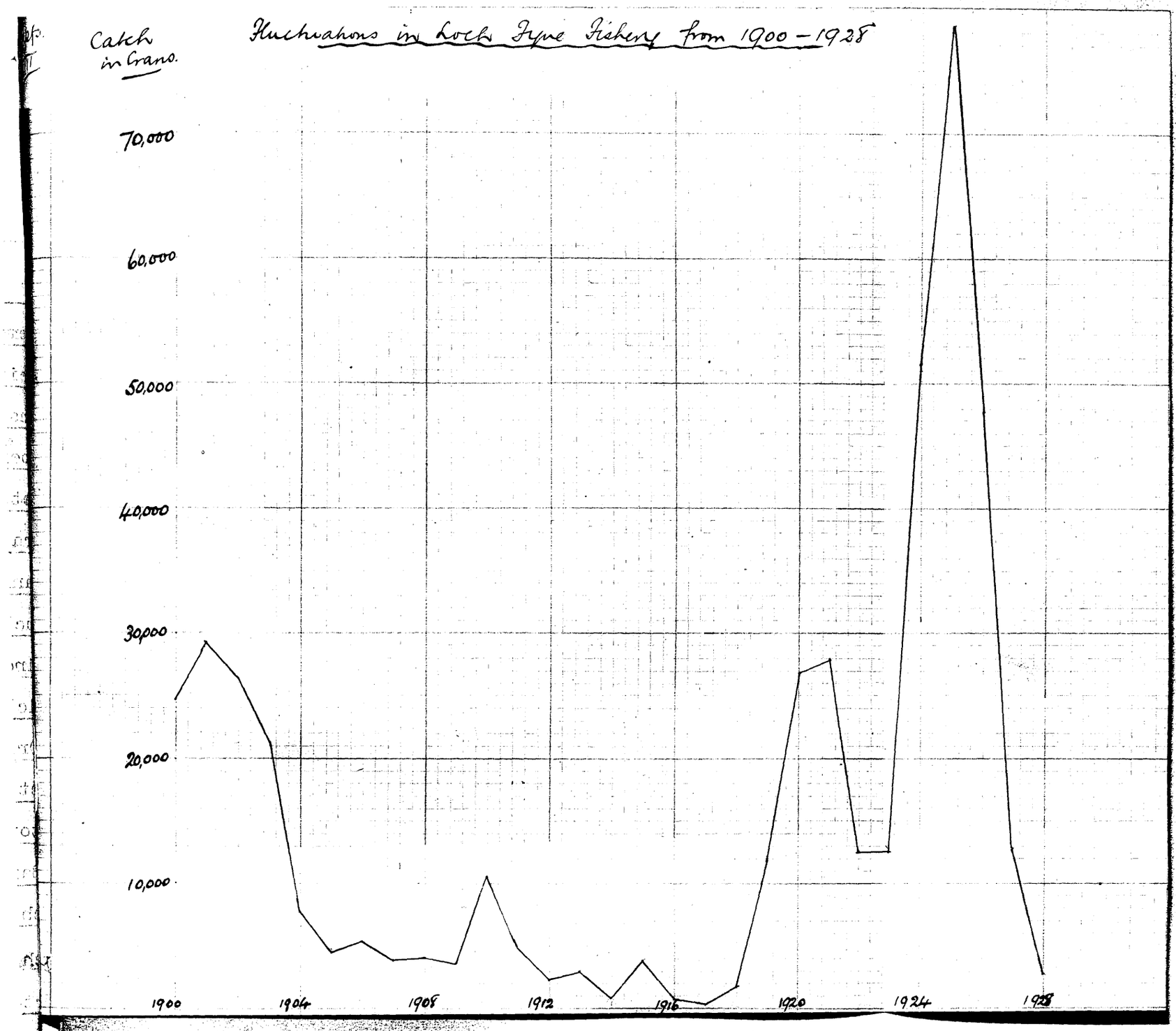
Appendix II

Average Monthly Catch from 1920 - 1927.

(in thousands of cwts.)

	Jan.	Feb.	Mar.	Apr.	May.	June	Jly.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.
Lemouth	2	5	3	-	3	5	10	20	5	-	-	-	53.
Leith	9	10	5	1	-	-	-	-	-	-	-	4	31.
Anstruther	6	15	19	1	-	-	-	2	-	-	-	-	43.
Aberdeen	1	1	2	1	3	3	6	11	6	-	-	-	34.
Peterhead	3	6	3	-	2	59	152	99	13	-	-	-	337.
Fraserburgh	5	6	1	-	1	63	212	132	9	-	-	-	429.
Banff	1	1	-	-	1	4	12	9	-	-	-	-	28.
Buckie	9	7	1	-	-	4	16	9	-	-	-	1	47.
Findhorn	4	2	1	-	-	-	4	3	-	2	2	1	19.
Wick	49	54	6	-	6	60	171	103	12	1	1	9	472.
Orkney	-	-	-	-	1	27	109	43	-	-	-	-	130.
Shetland	-	2	4	1	29	261	317	128	5	-	-	-	747.
Stornoway	61	63	5	-	9	33	70	57	13	2	17	55	385.
Barra	1	1	-	-	2	12	17	18	1	-	-	1	53
Loch Broom	12	8	2	-	-	-	-	-	-	-	3	18	43
Loch Carron& Skye	9	4	-	-	-	1	-	1	3	2	4	7	31
Fort-William	27	25	4	2	16	16	14	13	5	1	6	13	142.
Camp beltown	5	4	3	3	5	10	12	15	10	4	1	1	73.
Inverary	6	1	-	-	-	3	6	9	12	24	26	31	118.
Rothesay	24	4	-	-	-	1	1	5	7	10	23	39	114.
Greenock	-	-	-	-	-	1	1	1	1	-	1	1	6.
Ba llantrae	10	16	8	3	3	3	1	1	1	1	1	2	50
	244	235	67	12	81	566	1131	679	103	47	85	183	3439

Montrose, Stonehaven, Cromarty, Helmsdale, Lybster, yearly average less than 1,000 cwts.


Fluctuations in Loch Fyne Fishery from 1900–1928
Catch in Crans.
70,000
60,000
50,000
40,000
30,000
20,000
10,000
1900
1904
1908
1912
1916
1920
1924
1928

Appendix VIII

Appendix VIII

~~COPY~~.

Specimen Copy of Balance Sheet of Steam Drifter for the year 1913.

Expenses:-	£.	s.	d.		£.	s.	d.
Coal	386.	9.	10	Gross Earnings	£2760.	4.	0
Commission	137.	19.	11	Expenses	713.	16.	7
Engineer	76.	6.	3		£2046.	7.	5
Dues & Water	40.	7.	7.				
Cook	42.	3.	10	Ship's Share (1/3)	682.	2.	5
Oil, Paraffin, Stores &c.	30.	9.	2	Maintenance	166.	9.	11
	£713.	16.	7	Insurance (£69. 11. 6) less rebate	53.	12.	6
				Depreciation	112.	0.	0
				Profit on Ship's Share	£ 350.	0.	0
				Nets Share (1/3rd)	682.	2.	5
				Renewals & Upkeep of Nets	261.	0.	0
				Fireman's Wages	49.	4.	5
				Profit on Net's Share	£ 371.	18.	7
				Crew's Share (1/3rd) To be divided into 6 shares.	£ 682.	2.	5

Note:- In 1913 Engineer and Cook's Wages are charged to Expenses Account, while Fireman's wages were paid from nets share.

Crew paid cook's food. Outlay for food divided into 8 shares each member of crew except cook being responsible for one-eighth of total food bill.

~~COPY.~~

Specimen Copy of Balance Sheet of Steam Drifter for the year 1924.

Expenses:-	£.	s.	d.
Coal	635.	8.	1
Commission	170.	9.	7
Engineer)			
Fireman)	280.	18.	9
Cook)			
Dues & Water	89.	11.	0
Oil, Paraffin, Stores &c.	37.	2.	4
Sundries	17.	7.	11
Extra Man's Share ..	163.	16.	8
	£1394.	14.	4

Gross Earnings	£4179.	17.	8
Gross Expenses	1394.	14.	4
	£2785.	3.	4

Ship's share (6/17ths of £2785. 3. 4).....	£ 983.	0.	0
Maintenance.....	269.	7.	10
Insurance (£60. 12/- less rebate).....	52.	4.	0
Depreciation.....	90.	0.	0
Profit on Ship's share ...	£ 571.	8.	2
Nets Share (5/17ths of £2785. 3. 4.).....	819.	3.	4
Upkeep & Renewals of nets.....	£ 639.	13.	7
Profit on Nets Share	£ 179.	4.	9
Crew's Share (6/17ths of £2785. 3. 4)..... Divided into 6 shares).	£ 983.	0.	0

Note:- Crew now consists of 10 men as compared with 9 men in 1913, the extra hand being a fisherman. Extra hand's wages charged to and paid from Expenses Account.

This vessel met with more than average success. The consumption of coal was under the average by approximately 10%.

Specimen Copy of Balance for Motor Drifter for Years 1913 and 1924.

	1913. Summer Fishing.	1913. East Anglian Fishing.	1924 Summer Fishing.	1924. East Anglian Fishing.
Gross Earnings.	£492 : 10 : 0	£272 : 13: 3	£781 : 8 : 3	£803 : 0 ; 10
Harbour Dues.	4 : 6 : 6	2 : 13: 6	6 : 3 :10	5 :10 : 8
Commission.	18 : 9 : 3	13 : 11: 7	29 : 6 : 3	40 :14 : 10
Oil.	35 : 4 :11	23 : 14: 2	106 :12 : 9	70 :16 : 8
Coals.	6 : 9 : 0	3 : 15: 4	13 : 6 :11	7 :11 : 9
Salt.	1 : 6 : 6	-	-	-
Cran Dues.	4 : 12 :11	3 : 6: 3	16 :15 :10	8 : 1 : 9
Baskets.	0 : 13 : 4	0 : 13: 4	0 :14 : 0	1 : 1 : 0
Fares (hired hands)	-	-	6 :10 : 0	-
Insurance.	-	-	12 : 0 : 0	10 : 0 : 0
Cutch & Cartage.	-	-	10 : 8 : 6	10 : 0 : 0
Food.	-	-	53 : 1 : 8	38 : 1 : 6
Cook's Wages	-	-	25 : 0 : 0	35 :12 : 0
NETT EARNINGS	£421 : 7 : 7	£221 : 19 : 1	£501 : 8 : 6	£545 : 3 : 2
Division of Nett Earnings.				
Boat's Share	¼ share.	¼ share.	¼ share.	¼ share.
Hired Hands.	1/15 Share (6 men)	1/15 Share (6 men)	1/16 Share (7 men)	1/16 Share (7 men
Cook's Share.	1/- per £. Balance of net earnings.	1/- per £. Balance of net earnings.	- Balance of net earnings.	- Balance of net earnings
Nets Share.				

The boat's insurance for 1913 amounted to £25 : 10/-, and for 1924 it was £70. In the latter year, as the above statement shows, part of the insurance on the boat was paid off the gross earnings.

Appendix IX

STEAM DRIFTERS

AVERAGE EARNINGS AND EXPENSES

Year	No. of Boats	Gross Earnings	Expenses paid off Gross									Share =1/3	Labour Share per Man	Expenses off Boat's Share				Expenses off Net's Share
			Commission	Landing Dues	Harbour Dues	Water. Baskets Etc.	Coal	Engine Room Stores	Engineer	Cook	Extra Man			Insurance	Depreciation	Other Expenses	Total	Fireman Cutch Carting
1912	7	2134	83	25	22	16	325	32	76	42	-	505	84	70	112	160	342	74
1913	6	3040	114	26	12	18	492	26	82	38	-	744	124	75	112	180	367	68
1921																		
1921	8	2364	105	37	15	40	617	49	112	67	49	411	68	95	166	300	561	120
1922	8	1435	59	36	11	23	400	33	65	41	12	252	42	80	111	175	366	72
1923	8	1440	61	28	13	35	465	38	74	46	19	220	37	74	112	190	326	78
1924	11	2816	121	43	11	49	558	37	90	56	87	588	98	66	114	239	419	98
1925	14	2095	89	32	17	45	413	50	84	53	74	413	69	55	115	287	437	90
1926	14	1900	80	29	14	41	612	32	78	51	32	310	52	71	111	232	414	85
1927	12	2131	91	27	20	38	638	34	90	60	15	373	62	70	140	230	440	64
1928	9	2823	113	39	17	41	540	42	90	60	50	544	91	90	108	215	423	97

Appendix X

MOTOR DRIFTERS.

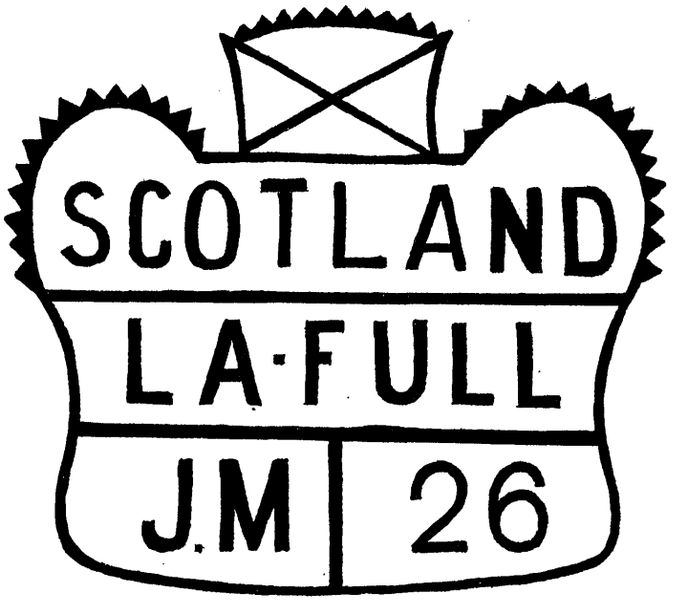
AVERAGE EARNINGS AND EXPENSES.

Year.	No. of Boats	Gross Earnings.	Expenses - paid off Gross.										Boat's Share	Crew's Share	Expenses off Boat's Share
			Commission	Landing Dues.	Harbour Dues.	Water Baskets etc.	Coal	Oil	Food	Dutch and Carting	Insur. off Gross.	Cook			
1921	12	1306	53	35	15	16	33	468	145	31	-	-	128	382	285
1922	12	937	37	22	11	12	20	335	75	17	-	-	127	381	203
1923	5	762	31	11	14	10	24	216	112	17	-	-	82	246	161
1924	8	1834	79	29	11	28	31	285	128	20	36	-	297	891	246
1925	8	916	37	15	12	19	21	196	94	19	21	-	120	360	164
1926	17	1332	62	18	12	24	25	303	83	26	22	25	183	549	245
1928	4*	2169	97	17	33	42	27	413	195	44	48	55	243	731	222

*These were lining for part of the year. The earnings include the proceeds of line fishing. Additional expenses amounting to £122 were incurred for bait.

Appendix XI

I. CROWN BRAND.



II. OFFICIAL STENCIL

APPENDIX XII

HERRINGS CURED.

(in thousands of barrels).

	1913	1925	1926	1927	1928
Scotland	1285	708	955	965	960
East Anglia	1200	581	445	518	634
Germany	365	104	152	182	256
Holland	785	310	422	466	520
Scandinavia	568	1014	505	388	518
Iceland	-	336	150	362	264
Europe	4203	3053	2629	2881	3152

Total Production	1910	4,148,000	barrels
	1911	3,774,000	"
	1912	3,623,000	"

----oOo----

Appendix XIII

Herrings (cured gutted) Exported from Scotland.

	To Continent	To Ireland	To England	To Places out of Europe	Total.	
Average Yearly Exports in 1000s of barrels.						
1811-1820	33	52		54	139	
1821-1830	36	100		74	210	
1831-1840	53	131		48	232	
1841-1850	146	124		5	275	
1851-1860	256	84		1	341	
1861-1870	360	53		2	415	
1871-1880	604	26		2	632	
1881-1890	896	32		4	932	
1891-1900	1007	19		29	1055	
1901-1910	1469	13	1x	60	1543	xRe-exported for the most part
1911-1913	1381	2	3x:	91	1477	
1919-1923	551	1	7x	53	612	
1924-1928	904	1	10x:	35	950	

	1919 - 1923	1924 - 1928	
To Germany	235	415	
Poland	124	212	
Latvia	71	130	
U.S.S.R.	1	39	
Finland	29	38	
Esthonia	22	37	
Holland	10	17	
Sweden	18	8	
Belgium	12	3	
Lithuania	6	2	
Norway	2	2	
France	9	1	
Roumania	11	-xx	xx: Supplied
Denmark	1	-	chiefly
U.S.A.	53	31	through
Canada		4	Danzig.

Appendix XIV

Norwegian and Dutch Herring Fisheries.

Export of Pickled Herrings

I. Norway	1913 Metric Ton	1923 Metric Ton	1924 Metric Ton	1925 Metric Ton	1926 Metric Ton	1927 Metric Ton	1928 Metric Ton
To Russia	-	19,584	24,195	9,774	981	25,311	30,619
" Latvia	-	810	419	23	4	49	1
" Poland	-	3,610	3,890	1,253	5,535	5,435	1,663
" Danzig	-	-	-	-	-	-	2,766
" Germany	23,550	89,068	~~34,664~~ 40,250	~~32,533~~ 34,664	~~23,381~~ 32,533	~~19,188~~ 23,381	~~40,250~~ 19,188
TOTAL	82,565	150,311	103,225	96,526	84,572	87,661	82,415
II. Holland							
To Poland	-	127	868	126	75	-*	-*
" Germany	78,046	17,926	43,456	32,302	36,271	-*	-*
TOTAL	108,707	45,352	69,462	53,712	60,722	-*	-*

* figure not available.

APPENDIX XV

German Herring Imports.

Fresh Herrings and Sprats.

6

Year	Imports from				
	Great Britain	Norway	Sweden	Denmark	Holland
	(in millions of Kilogrammes (1000 metric tons))				
1912	42.4	30.2	43.9	14.5	1.3
1913	49.3	37.2	28.6	12.4	1.9
1920	18.8	20.9	5.6	4.5	22.7
1921	13.3	22.4	18.9	8.2	4.2
1922	10.7	28.6	2.5	2.1	1.5
1923	17.0	40.7	6.0	2.9	1.6
1924	30.8	51.2	16.5	3.5	2.3
1925	42.1	51.7	12.5	7.9	3.6
1926	58.0	56.7	14.0	5.3	7.0
1927	59.1	46.0	13.4	7.8	6.4
1928	58.3	46.8	12.5	9.9	9.8

Appendix XVI

Exports of Herrings (Cured or Salted) from Great Britain to the Continent.

	1913.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.
				(In thousands of cwts)					
Germany.	3997	2530	1331	1477	2401	2041	2036	1992	1944
Poland.		638	596	888	1009	658	1206	1492	1524
U.S.S.R.		149	92	14	807	195	12	213	102
Lithuania				30		9	28	36	44
Latvia.		104	244	675	754	489	579	661	800
Esthonia.		407	151	241	183	131	144	110	124
Finland.		72	167	144	165	156	132	130	143
Total. (Germany, Poland & Russia)	7562	3900	2581	3469	5319	3679	4137	4624	4681
Norway.	38	3	11	13	31	12	6	7	4
Sweden.	8	59	33	91	30	2	56	10	8
Denmark.	1	1	3		2	2	30	3	
Holland.		24	36	136	306	308	219	189	108
Belgium.		113	161	174	158	189	139	155	172
France.		106	102	20	6	13	51	3	13
Total.	7610	4206	2927	3903	5852	4205	4638	4991	4986

Appendix XVII

Import Duties on Herrings.

Extracts from Tariffs furnished by the Department of Overseas Trade.

GERMANY.

Fresh or frozen.	Free.
Salted:-	
(a) In whole, half, quarter or half-quarter casks.	3 marks per cask.
Prepared, except as above, and not in hermetically sealed containers:-	
(a) Dried, salted or otherwise simply prepared without vinegar, oil or spices.	3 marks per 100 kilogs. net.
(b) Simply, prepared with vinegar, oil or spices.	12 marks per 100 kilogs. net.

POLAND.

Fresh and frozen	2 zloty per 100 kilogs.
Marinated, preserved in oil, stuffed or otherwise prepared, not in air-tight receptacles.	584.80 zloty per 100 kilogs. (including weight of immediate receptacle).
Salted.	15 zloty per 100 kilogs.
Smoked.	26 zloty per 100 kilogs.
Slightly cooked, red herring.	65 zloty per 100 kilogs.

NOTES 1. A duty calculated on gross weight after deduction of exterior packing. A rebate of two-thirds of the duty is allowed on salted herrings, of which not more than 60 go to 10 kilogrammes. 2. There is a manipulation fee in each case amounting to 10% of the Customs duty.

RUSSIA (Soviet).

Fresh or frozen.	60 roubles per 100 kilogs.
Dried, salted or smoked.	9 roubles per 100 kilogs.

NOTE. Imports of salted or dried herrings through Murmansk enter at a lower rate. These particulars are the latest available.

FINLAND.

Fresh, salted or dried.	1 Finnish mark per kilog. net.
Cured or smoked, except those in hermetically sealed containers.	3 Finnish marks per kilog. net. (in the case of cured: gross)

ESTONIA.

Fresh.	1.02 gold francs per kilog. gross.

NOTE. If imported unpacked, there is an additional 20% on the duty.

Smoked and salted, and all kinds of dried fish.	0.03 gold francs per kilog. gross.
Pickled, preserved in oil, and otherwise preserved.	5.70 gold francs per kilog. gross.

NOTE. One gold franc equals 73 Estonian cents.

LATVIA.

Fresh or frozen.	2 lats per kilog. gross.
Salted	Free
Smoked or dried.	1.20 lats per kilog. gross.
Packed in oil, or otherwise preserved.	3 lats per kilog. gross.

NOTE. On goods liable to duty there is an additional "Chancery" tax of 0.15 lats per every 10 lats of Customs duty. There is also a weight due in all cases of 0.16 lats per 100 kilogs.

LITHUANIA.

Fresh.	1 lit per kilog. gross.
Salted, in barrels, each up to 164 kilogs. in weight.	8 lits per cont'n'r.
Salted, in half-barrels up to 82 kilogs. in weight.	5 lits per cont'n'r.
Salted or otherwise packed.	0.10 lits per kilog. gross.
Smoked.	0.10 lits per kilog. gross.
Preserved, not in hermetically sealed containers.	1.0 lits per kilog.

NETHERLANDS.

Fish, fresh or cured, except in tins, bottles, etc., containing 1200 grammes or less.	Free.

BELGUIM.

Fresh or frozen	Free.
Simply dried, smoked or salted, imported otherwise than in boxes, jars, crusts or other similiar packing.	Free.
Preserved, other than simply fried, smoked or salted, imported otherwise than in boxes, jars, crusts or other similar packing.	20 francs per 100 kilogs. gross.
Preserved, in any manner, imported in boxes, jars, crusts and other similar packing.	40 francs per 100 kilogs. net.

NOTE. A "taxe de transmission" is levied in each case at the time of import. This is fixed at 2%, calculated on the landed value, including the amount of duty, if any.

FRANCE.

Dried, salted or smoked.	25.50 francs per 100 kilogs. gross.

NOTE. A turnover tax of 2% of the duty-paid value is also imposed.

ROUMANIA.

Herrings of any size, salted, or brined.	19.00 gold lei per 100 kilogs.

(1. When paid in paper currency the above rate has to be increased 40 times.

2. A port tax of ½% ad valorem is also imposed.

3. A turnover tax is imposed of 30 paper lei per 100 kilogs.)

UNITED STATES.

Fresh sea Herrings.	Free.
Frozen or packed in ice.	1 cent. per lb.
Smoked, skinned, or boned.	2½ cents. per lb.
Dried, salted or not.	1¼ cents. per lb.
Pickled or salted, whether or not boned, when in bulk or in immediate containers, weighing with the contents more than 15 lbs. each.	1 cent. per lb. net.

AUSTRALIA.

Fresh, smoked or dried (but not salted) or preserved by cold process-	
British preferential tariff.	1d. per lb.
General tariff.	1½d. per lb.

CANADA.

Fresh -	
British preferential tariff.	½ cent. per lb.
Intermediate tariff.	¾ cent. per lb.
General tariff.	1 cent. per lb.
Pickled or salted	
British preferential tariff	3½ cents. per 100 lbs.
Intermediate tariff	45 cents. per 100 lbs.
General tariff	50 cents. per 100 lbs.

CANADA (cont.)

Smoked or boneless:-

British Preferential tariff	½ cent. per lb.
Intermediate tariff	¾ cent. per lb.
General tariff	1 cent. per lb.

Dried:-

British Preferential tariff.	½ cent. per lb.
Intermediate tariff	¾ cent. per lb.
General tariff	1 cent. per lb.

NOTES. Should the duty under the preferential tariff represent more than 15% ad valorem, a deduction of 10% thereof is allowed. The intermediate tariff applies to the products of countries as specifically nominated by Order in Council. Such countries include France and Belgium. The general tariff applies to the United States among other countries.

Appendix XVIII

Disposal of the Offal.

Forty years ago herring offal was either thrown into the sea or given away to farmers for manuring their fields. Some of it is still disposed of in this way - especially at those stations which are too far from a Guano Factory to make the conveyance worth while - but, as factories have now been erected at all the principal herring ports - Fraserburgh, Peterhead, Wick, Lerwick, Stronsay, Bressay etc.- most of the offal is now utilized in the manufacture of oil and guano. The former is used for making soap, the latter for fertilizing and feeding purposes. On an average 100 tons of offal will yield 35 - 40 tons of oil and 5 - 6 tons of guano.

Unfortunately herring offal cannot be made into fish-meal. Offal suitable for this purpose realizes from 20/- to 60/- per ton, according to the station and the season of the year, but herring offal is usually given away by the curers, Kippers etc. merely for the price of cartage.

It is first allowed to drain and a certain amount of oil is collected without any pressure being applied. It is then put into a huge cylindrical condenser and thoroughly boiled, much of the salt being deposited in the process. After being cooled, it is put into bags which are flattened out and placed on trays. Compression is then applied and the oil is collected in tanks.

The residue in the bags is now a rough, brown, earthly-like substance, consisting of all the solid parts of the offal. This in turn is put into a concentrator where it is reduced

to a fine meal. This is fish guano and contains Ammonium Sulphate, Albumenoids and a small percentage of oil.

The oil, as it leaves the condenser, is much darker in colour than the natural oil from the herring. It is thoroughly washed and cleaned, until it is of an amber colour, in which state it is sent to the refiners.
