
REPORT
ON THE
**STATISTICS OF THE ABERDEEN TRAWL-
FISHERY, 1901-1906,**

WITH SPECIAL REFERENCE TO THE
COD, HADDOCK, AND OTHER "ROUND FISHES."

BY
D'ARCY WENTWORTH THOMPSON.

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The statistics set forth in the foregoing tables for the years 1904-6, and in the corresponding tables for 1901-3 printed in our former volume, require to be summarised and illustrated in various ways before we can make use of the information they contain. In our former Report (1902-3, p. 344) the methods of dealing with such statistics were in part discussed, and now that we have information in hand for six consecutive years, it is time to deal with the matter at greater length. Our tables tell us in the first place the amount of trawling done and the quantity of each sort of fish obtained, by a large fleet of vessels, month by month in various areas of the sea ; and in the next place, when these quantities are reduced to averages, we are told the average quantity in cwts. of each sort of fish caught in each area per hundred hours' trawling. These averages become instructive when we compare one with another, and we can do so in various ways. Firstly, *for any given time*, we may compare the average catch of a particular fish in one area with another, and so gain an insight into the *local distribution* or local differences in abundance of the fish over various parts of the sea : and we can do so for any particular month, season or year, or, in a more general way, by adding together the results of the months and years, we may arrive at an estimate of the general average distribution of any one fish over all parts of the sea. Secondly, *for any given place or area*, we may compare the average catch of a particular fish at one time or season with another, and so learn its *seasonal fluctuations*, its seasons of scarcity and of abundance : and continuing this investigation over several consecutive years, we learn how far this seasonal fluctuation is a regularly repeated thing, and how far it has been subject to variations, in time and quantity, from year to year.

Our statistics are by no means uniform. The Aberdeen trawlers resort in large numbers to some parts of the sea, in small numbers to others, and there are large areas of the North Sea in which they never fish : we must therefore look to the co-operation of our international colleagues to supplement the information that we ourselves obtain. Furthermore, while there are certain areas where our vessels fish at all seasons of the year, there are others, for instance towards the north and north-east, to which they only go at certain periods of the year, and yet again there are other areas where, though fishing goes on more or less at all seasons, yet owing to the small and varying number of vessels engaged, there are here and there many blanks in our statistics ; yet again there are areas, especially on the west and north-west coasts, to which the Aberdeen boats now resort in numbers, but where fishing was scanty or unknown five or six years ago when our statistical work began. It follows that there are certain areas concerning which we can speak with great confidence, inasmuch as we have consecutive information regarding them, month by month, for several consecutive years : others of which we have much useful knowledge, but marred here and there by gaps : and again there are other areas for which our statistics are but fragmentary and must be used with great circumspection.

It is important to consider, especially in cases where our information is imperfect and fragmentary, how far we shall be justified in throwing together into a single average the results of several separate years : for to do this is apparently, if not obviously, convenient in order to get (for instance) a single general view of the seasonal fluctuations. To

answer the question fully we should have to enter somewhat deeply into the theory of statistics, but it must suffice to point out now that the method has its dangers as well as its advantages. If the results of the several years are in fair agreement one with another, a combination of them all will display more clearly the common underlying truth; but, on the other hand, if there be essential differences between one year and another, then the composite result may be such as never actually occurs. Suppose, for instance, that a large migration of fish takes place into a certain area once a year, but that in one year this migration happens to take place a few months earlier than in another: then if we combine, without further question, the results for these two years, we shall apparently have evidence (which is of course incorrect) of a double migration at two separate seasons of the year. Many other and similar instances might easily be furnished of the fallacies into which too hasty combination or 'slumping' of our results may easily lead us. The lesson to be learned is two-fold: firstly, that we must not draw deductions from composite averages without scrutinising them in the light of the individual numbers on which they are based, this scrutiny being all the more obligatory the fewer the individual numbers are; secondly, that we must distinguish with as much care as possible between the values of our several results, some of which are, as it were, "nails in a sure place," while others are of the nature of surmises, resting on insufficient proof. It follows from all this that a full and complete discussion of our statistics, even in the case of a single fish, would be a very lengthy matter. In this paper only the main results are brought together, as briefly as possible, and a certain number of curves are shown in illustration of some of the most important or best ascertained facts.

Our information is most copious and least interrupted in respect to the areas off the east coast of Scotland (XXIII, XXIX), around the Pentland Firth (XVII) and eastward thereof (XVIII, XIX), and around Shetland (X): it is somewhat less abundant from the north-west of Scotland (C, D), from Orkney eastward across the North Sea (XIII, XIV, XV, XVI), eastward from Aberdeen over the Witch Ground (XXIV, XXV) and also from the Faroe and Iceland fishing-grounds. From other areas, to the north, east and south of those just mentioned, we have in some cases a good deal of information regarding particular facts or particular periods, but not enough to give us a clear and convincing picture of the whole course of the fishery.

THE COD. (*Gadus morrhua*.)

In our statistics a distinction is made between Cod and Codling, as is done in the market itself, where the latter are sold by the cwt. in boxes while the former are exposed for sale singly or in small lots. The two classes overlap to some extent, but those fish are usually classed as Cod which measure over 25 inches long (65 cm.), or thereby.

The Cod landed at Aberdeen are about 35 inches in length (89 cm.), as a mean size.* About one-tenth are below 29 inches (73 cm.), and one-tenth are over 5 feet long (102 cm.). One half of the whole lie between 32 and 38 inches (80 and 97 cm.). The largest Cod reported are from most districts about 4 feet long, but this size is greatly exceeded by some from the West Coast areas, especially about St Kilda, from which the largest of all measured 5 feet 5 inches (166 cm.); very large fish come also at times from Iceland.

The fish grouped as Codling are very variable in size, and smaller fish are landed from the near grounds off the East Coast of Scotland than from elsewhere. The mean size of the East Coast fish is just about a foot long (31 cm.), while the mean size from other North Sea grounds is rather over 16 inches (42 cm.). One-half of the East Coast fish lie between 11 and 15 inches, and one-half of the other North Sea fish between 14 and 20 inches. One-tenth of the East Coast fish are below $10\frac{1}{4}$ inches (26 cm.), and one-tenth above $18\frac{1}{2}$ inches (47 cm.); while one-tenth of the other North Sea fish are below 12 inches (31 cm.), and one-tenth above 25 inches (64 cm.). Roughly speaking, nearly all the fish over 2 feet long (60 cm.) are classed as Cod, and nearly all below as Codling.

The sizes and probable ages of the Cod and Codling at different seasons and on the various fishing-grounds will be discussed, with other fishes, in another Report: but we shall meanwhile see that the seasonal fluctuations of the large and small fish exhibit notable differences.

* The average here given is what statisticians call the *Median*, and implies that an equal number of fish are above and below this measurement.

At the outset it is worth while to try to obtain an estimate of the average catch of fish over all our areas and taking all seasons together ; and the result is shown for Cod and Codling in the accompanying charts (Figs. 1 and 3). It must be borne in mind, as has been already said, that for some of the areas we have all too little information, but nevertheless the results for most areas rest on a sound basis, and the whole is worth something as a first approximation.

The average catch of Cod by Aberdeen trawlers in all parts of the North Sea where they habitually work (say north of 55°N.) during the years 1901-6 was somewhere about 24 cwt. per 100 hours' fishing. This quantity is greatly exceeded off the north and north-west of Scotland, where in the neighbourhood of the Orkneys the average catch was about 50 cwts., westward of the Orkneys in the neighbourhood of Rona, Sule Skerry and Cape Wrath from 75 to 80 cwts., and further west about the Lewes over 100 cwts. These quantities are again greatly exceeded at Faroe (165 cwts.) and Iceland (688 cwts.). Over the North Sea itself the average quantities vary comparatively little, but they are high at Shetland (38 cwts.), off the mouth of the Skagerrack (31 cwts.). They would seem to be least off the East Coast of Scotland, off the coast of Denmark, and also (though here information is defective) to the north-east, towards the deep water of the Norwegian Channel.

The mean catch of Codling by Aberdeen trawlers would appear to be about 14 cwts. per 100 hours' fishing in the North Sea, and about twice as great or more off the north-west coast of Scotland. The numbers at Iceland and at Faroe are again much greater than for any of our home waters, and at Faroe we reach the high average of 164 cwts. The numbers at Iceland are much less than at Faroe, viz. 44 cwts., but this is probably in part, if not wholly, to be accounted for by the fact that the trawlers making the more distant voyages do so in quest of the larger fish, and neglect or throw overboard great quantities of small.

The numbers in the neighbourhood of the Fisher Bank would seem to be less than on most other parts of the North Sea, but on the whole the differences in different parts of the sea are neither great nor regular enough to carry much weight.

What is here spoken of as the mean catch for the North Sea areas is not the total catch divided by the total number of hours' fishing, for what would give an undue predominance to those areas in which the fishing is chiefly carried on. It is the mean of the several averages arrived at for the different areas, that is to say of the number shown

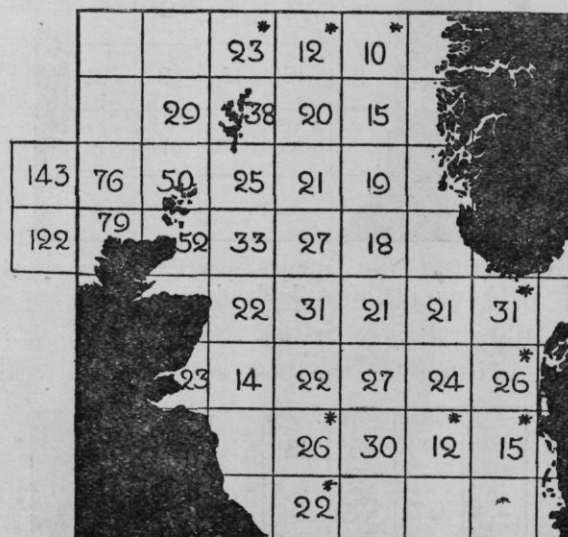


FIG. 1.—Chart showing mean catch of COD in cwts., per 100 hours' trawling, in various areas : 1901-6, [Faroe 166 cwts., Iceland 688 cwts.] From areas marked with an * our information is very defective and relates to less than six months of the year.

in Fig. 1. It is an attempt to represent approximately what may be called the *mean density* over our part of the North Sea.

In Fig. 2 are shown the average catches of Cod in what is on the average the *best month* of the year, that month, however, being by no means the same for all parts of the map. The numbers are, of course, all higher than in Fig. 1, but their distribution is not very different. The contrast is still more marked than in the former diagram between the North Sea grounds and those of the north-west coast, as well as between these and Faroe and Iceland, at the last of which we have catches of nearly 1,800 cwts. per 100 hours' fishing. The average catch on the North Sea grounds at what is in each case the best season of the year is probably somewhat over 40 cwts. per 100 hours' trawling, so

that the catch at Iceland in the season exceeds that number forty-fold. Among the facts to be learned from the inspection of Fig. 2 is the presence of Cod in unusual abundance

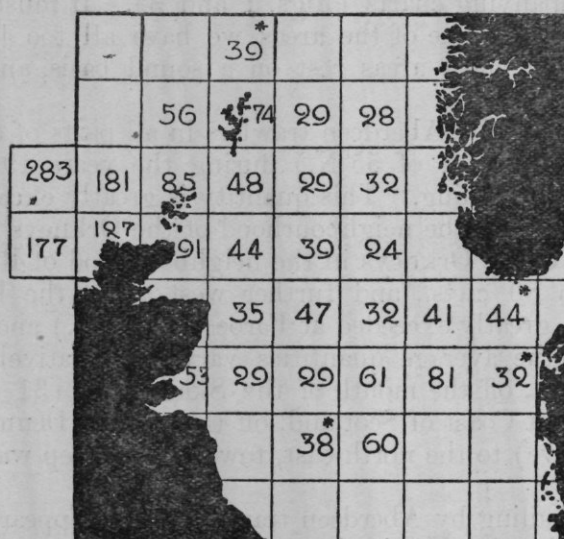


FIG. 2.—Mean catch of COD, in cwts., per 100 hours' trawling, 1901-6, during what is on the average the best month of the year for each area, [Faroe 644 cwts., Iceland 1792 cwts.].

at certain seasons in the southern part of the North Sea, in the neighbourhood of the Dogger and southern parts of the Fisher Bank.

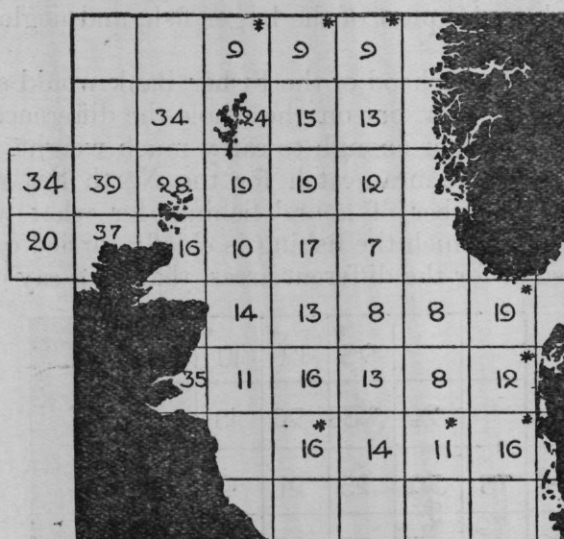


FIG. 3.—Mean catch of CODLING, in cwts., per 100 hours' trawling, 1901-6, [Faroe 164 cwts., Iceland 44 cwts.].

A similar chart for Codling (Fig. 4) shows a distribution not dissimilar to that of Fig. 2, and indicates a mean catch for the best season of the year of about 30 cwts. for

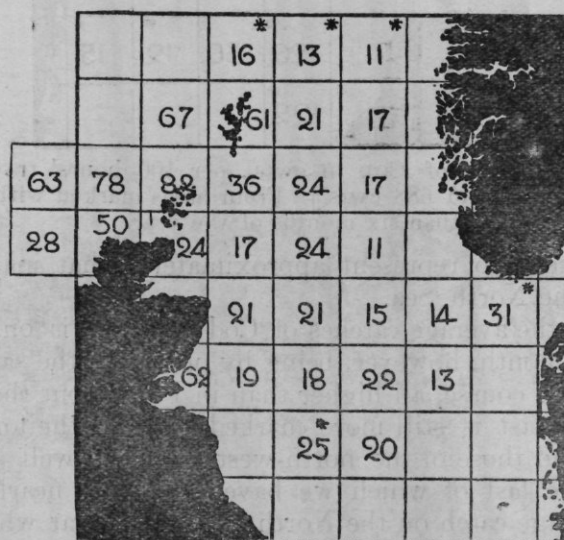


FIG. 4.—Mean catch of CODLING, in cwts., per 100 hours' trawling, during what is on the average the best month for each area, 1901-6, [Faroe 213 cwts., Iceland 44 cwts.].

the North Sea, 60 cwts. for the North-west coast, or in each case about double of the mean monthly catch. It will be seen that in the Shetland areas the numbers are high, and more comparable to those of the areas to the westward than to the North Sea areas. In the North Sea we have a high figure for area XXVIII, immediately off the Firths of Forth and Tay : but while it is undoubted that large shoals of Codling resort at times to these inshore waters, our statistics from this area are too scanty to form a trustworthy basis of comparison.

Let us now proceed to inspect the average catches of Cod and Codling month by month in each separate area, commencing with those areas for which we have the best and most ample information. We can best examine and compare our statistical data by drawing them in the form of curves, as has been already explained in the introduction to our statistics published in our former volume. The curves are easily drawn from the figures given in the tables, and we must be content to illustrate them in limited number.*

Fig. 5 shows the successive monthly averages of Cod (as usual, in cwts. per 100 hours' fishing) for area XXIX, off the east coast of Scotland, south of Aberdeen and

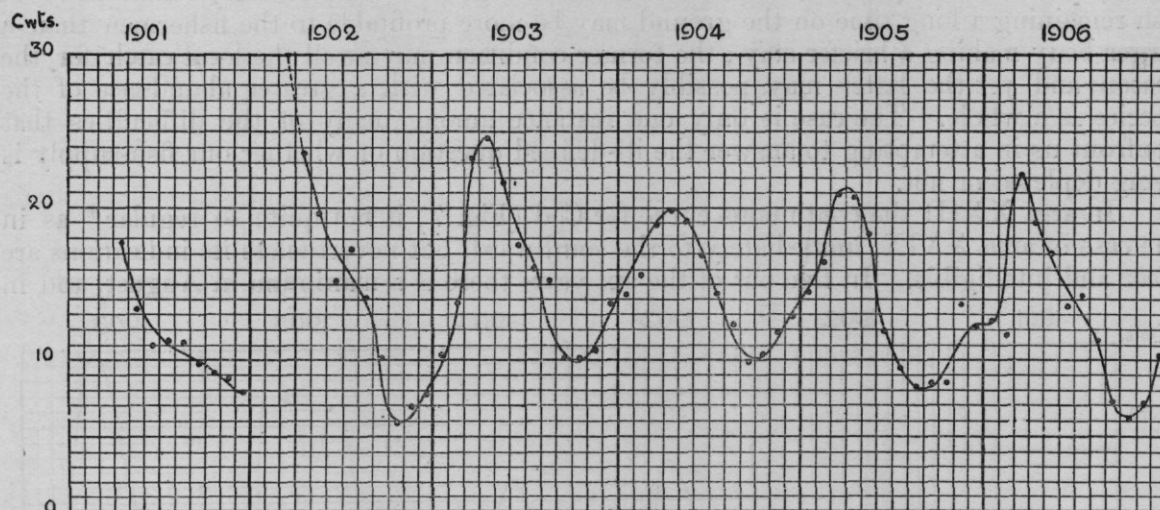


FIG. 5.—Mean monthly catches of COD, in cwts., per 100 hours' trawling, in area XXIX, 1901-6, (smoothed curve).

eastward to the meridian of 0° . The statistics are complete, save for a slight break in the beginning of 1902.

It will be seen at a glance that the seasonal fluctuations recur from year to year with remarkable regularity. Year by year the maximum is attained about March or April, and year by year the minimum is reached in October or November ; there is no striking difference between one year and another in regard to this seasonal phenomenon. It is in

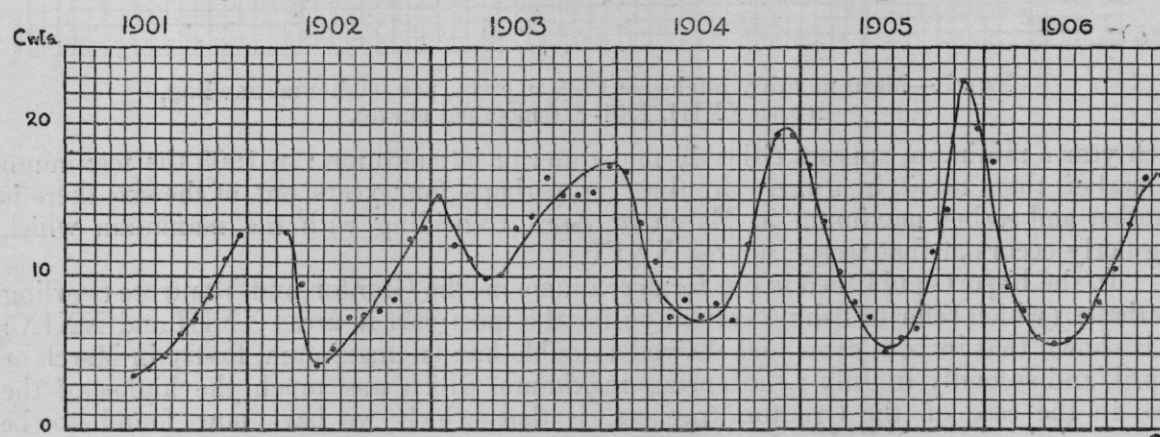


FIG. 6.—Mean monthly catches of CODLING, in cwts., per 100 hours' trawling, in area XXIX, 1901-6, (smoothed curve).

* The curves here drawn have been in all cases (unless it is otherwise stated) not drawn directly from the monthly averages recorded in the Tables, but have been smoothed by combining with each monthly average that for the immediately preceding and following months. The point on the curve corresponding, for instance, to February of a particular year represents the mean of the average catches for January, February and March. In the drawings the space occupied by each year is divided into twelve columns for the respective months.

the next place evident that there has been no such thing as a decrease of Cod upon this area from year to year. The highest maximum, it is true, is apparently that of 1902, but so is the lowest minimum: and for the last three years the curve is remarkably uniform, with apparently a very slight rise of maximum and latterly a fall of minimum from year to year.

The next figure (Fig. 6) shows a similar curve for Codling on the same area. It is not quite so regular as the curve for Cod; but nevertheless it shows on the whole the steady recurrence of an annual wave, with a winter maximum in (or within a month of) December, and a spring or summer minimum that comes within a month or two of May. A slight peculiarity is to be noticed in 1903, in which year the Codling were less scarce than usual at the season of the usual minimum, and more plentiful than usual in August, when the curve rises into a small secondary maximum. There is again no sign of a falling off from year to year, but in this case rather an indication of a slow increase in the supply.

A study of this curve reminds us that in speaking of increase or decrease of fish from year to year we are apt to confuse two different things. A comparatively small body of fish remaining a long time on the ground may be more profitable to the fishermen than a larger body making a briefer stay; the former condition may swell the local catch for the season, and yet the latter may possibly be associated with a greater abundance of the species as a whole. The case is only one instance among many of the difficulties that confront us in attempting to answer the ill-defined question of whether our fish-supply is being depleted or not.

In area XXIII the continuous curve for Cod (Fig. 7) is not quite so regular* as in the case of area XXIX, immediately to the southward, but nevertheless its indications are clear and intelligible. In five out of the six years there is a maximum in August, and in

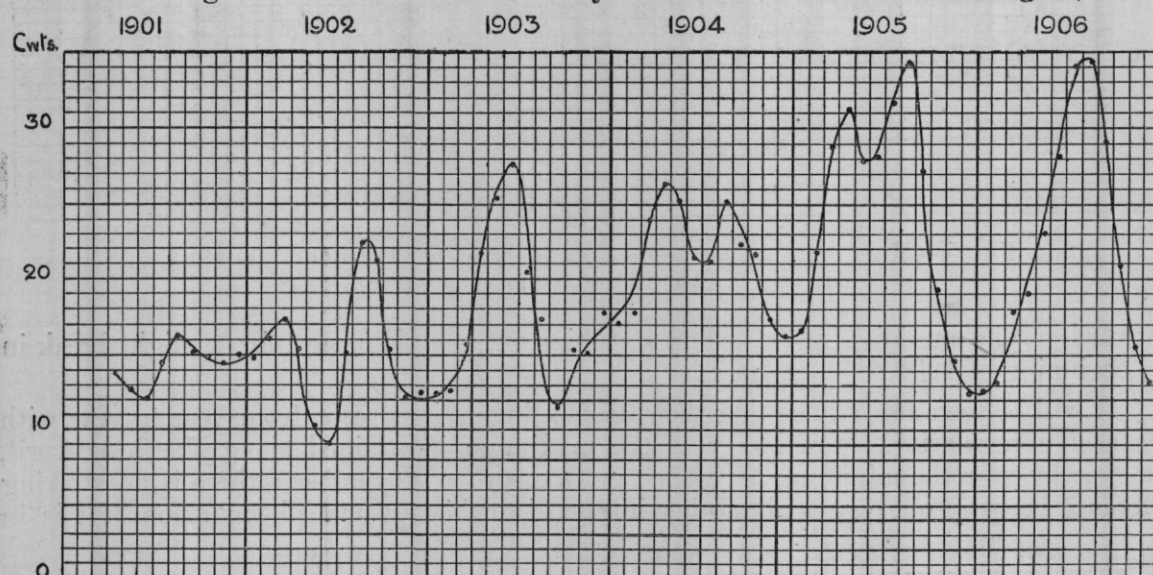


FIG. 7.—Mean monthly catches of COD, in cwts., per 100 hours' trawling, in area XXIII, 1901-6, (smoothed curve).

each year a minimum appears either in midwinter or late autumn: in 1903 the maximum is earlier than usual, in June. In three or perhaps four years out of the six, there is another and earlier maximum in March or April, coinciding with the maximum which regularly occurs at that season in area XXIX.

In the Reports published in our former volume on the Granton and Montrose trawling statistics (which refer to fishing carried on for the most part in areas XXIII and XXIX) it is shown that in both cases Cod showed a double annual maximum, firstly in March or April, and secondly in July; the spring maximum, which was much the higher of the two in the case of the Granton trawlers, is that which we have now found to be characteristic of area XXIX; the summer maximum which was the higher at Montrose, is that which we find to be on the whole characteristic of the more northern area XXIII.

* We may note at the same time that area XXIX is a much more uniform area than XXIII, the former being entirely within the 50 fathom line, while the latter goes beyond it into much deeper water; in other words our areas are chosen for reasons of topographical convenience, and do not coincide with areas of depth or similarity of other physical conditions. We have frequent opportunities of noticing that our results are clearer and simpler in the case of certain areas than in others, and are clearest and simplest in those areas where the physical conditions are most constant throughout.

The curve for Codling in area XXIII (Fig. 8) is somewhat irregular for the year 1904, but otherwise shows a very regular wave, which comes to a maximum towards the

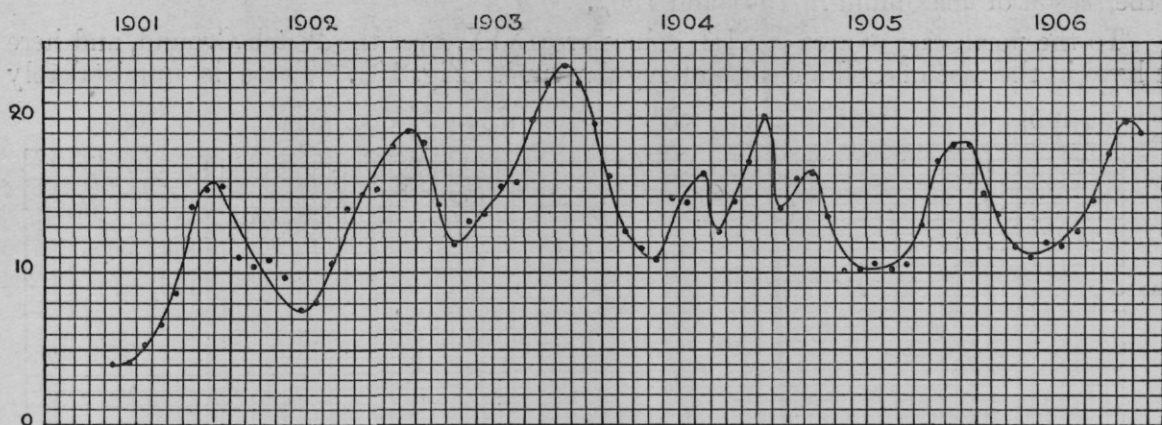


FIG. 8.—Mean monthly catches of CODLING, in cwt., per 100 hours' trawling, in area XXIII, 1901-6, (smoothed curve).

end of the year about October-December, and falls rapidly to a less clearly defined minimum in spring and early summer. There is an indication of steady increase of Codling in this area during the years 1901-1903, the last-named being the best of the whole series; from 1904 to 1906 the average has remained steady.

If we compare the results shown for our two first areas, XXIII and XXIX, we see that in both of them Cod and Codling differ from one another in their season of abundance: that in both of them Cod come on the whole to a maximum in spring and summer, and in both of them Codling are most plentiful in winter. A closer comparison will show that in respect of Codling there is little or no difference in period of maximum shown for the two areas, but that in the case of Cod the maximum is earlier in the year by two or three months in area XXIX than in area XXIII. Another difference is also apparent: the curve for area XXIX is very smooth and regular, while in area XXIII we have for four out of the six years more or less clear indications of a double cusp, or double maximum. This is probably an indication of a real tendency to a double maximum, of which the explanation probably is that area XXIII shares in an early spring migration, characteristic of the east coast of Scotland, and also in a summer one which we shall find to be characteristic of Shetland and other northern regions. To this question we shall afterwards return.

Figure 9 is a curve of a different kind, showing the percentage (by weight) of "Cod" in the total catch of Cod and Codling for area XXIX. It will be observed that this

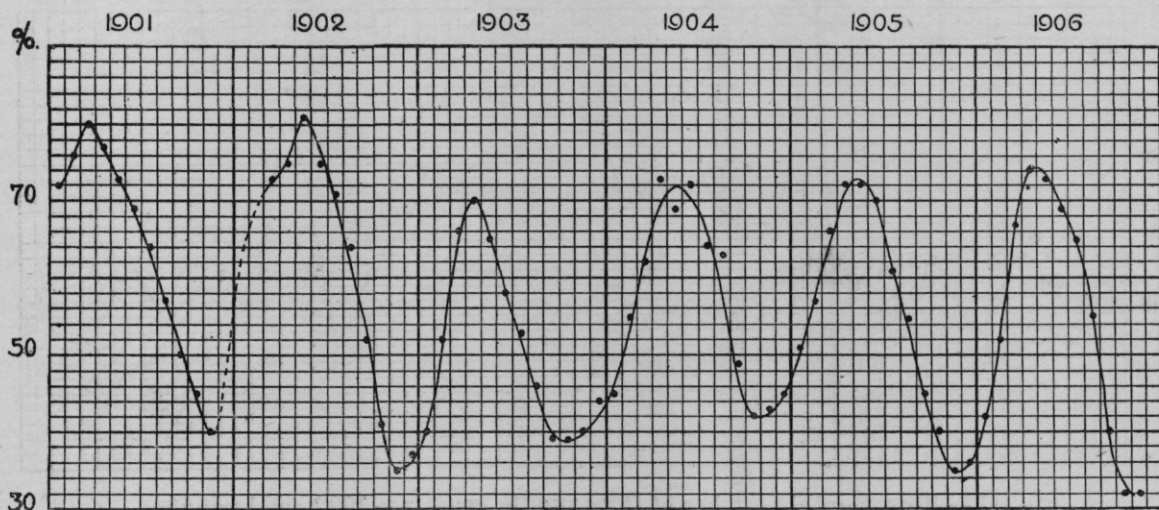


FIG. 9.—Monthly percentages of COD in total catch of COD and CODLING, in area XXIX, 1901-6.

curve is a very smooth and regular one, the proportion of Cod being regularly at its highest about the month of April, and its lowest in or near the month of November. This result tallies precisely with that set forth in the preceding Figure, which showed that an immigration of Cod to this area took place in spring, and of Codling in winter. The mean proportion of Cod to the total catch of Cod and Codling in this area is

about 55 per cent. by weight. It will also be noticed that the relative proportions are very constant indeed during the six years, the proportion of Cod being just a little higher at the season of maximum in 1901 and 1902.

To the north-east of area XXIII, comes area XIX, over the Witch Ground, and here we have in the case of Cod a clear and regular curve (Fig. 10). There is unmistakably

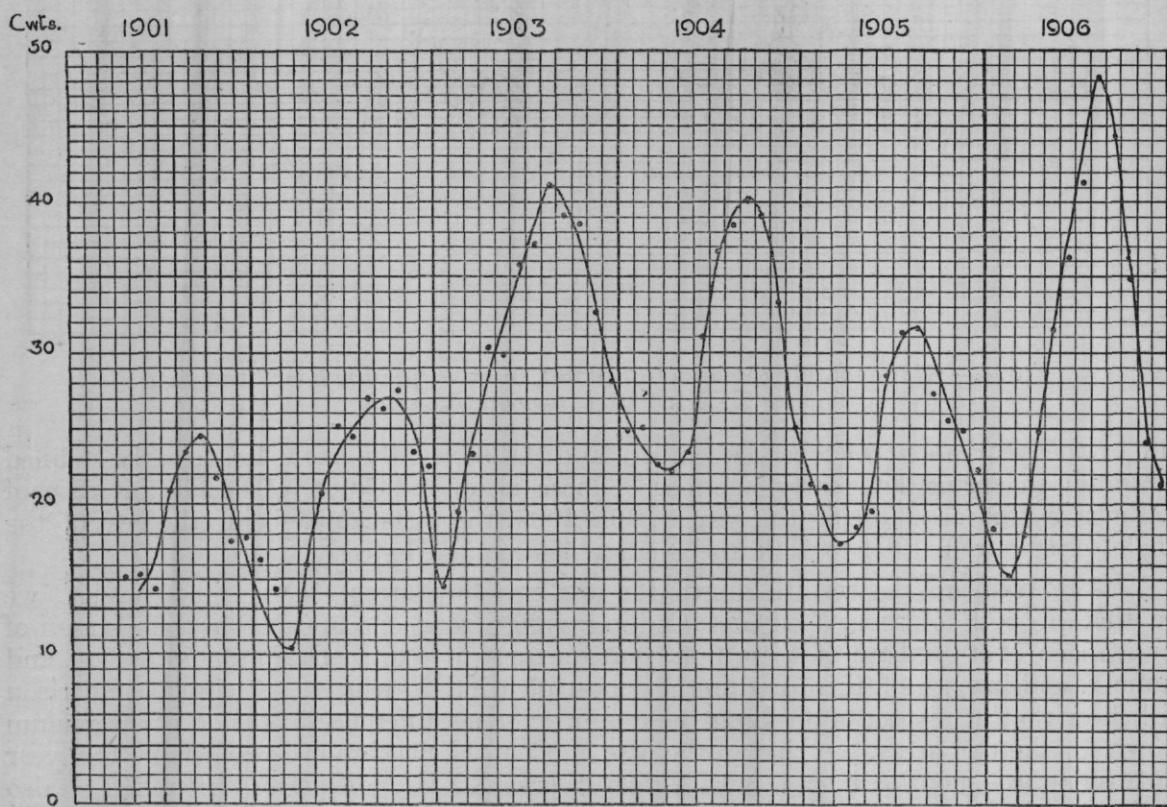


FIG. 10.—Mean monthly catches of COD, in cwts., per 100 hours' trawling, in area XIX, 1901-6, (smoothed curve).

a single annual maximum, occurring about August or September, and an annual minimum in early spring. The number of Cod increased from 1901 to 1903, fell off in 1905, and increased again in 1906. On the same ground Codling gives a less satisfactory curve (Fig. 11), but there is a pretty regular indication of a summer maximum at varying

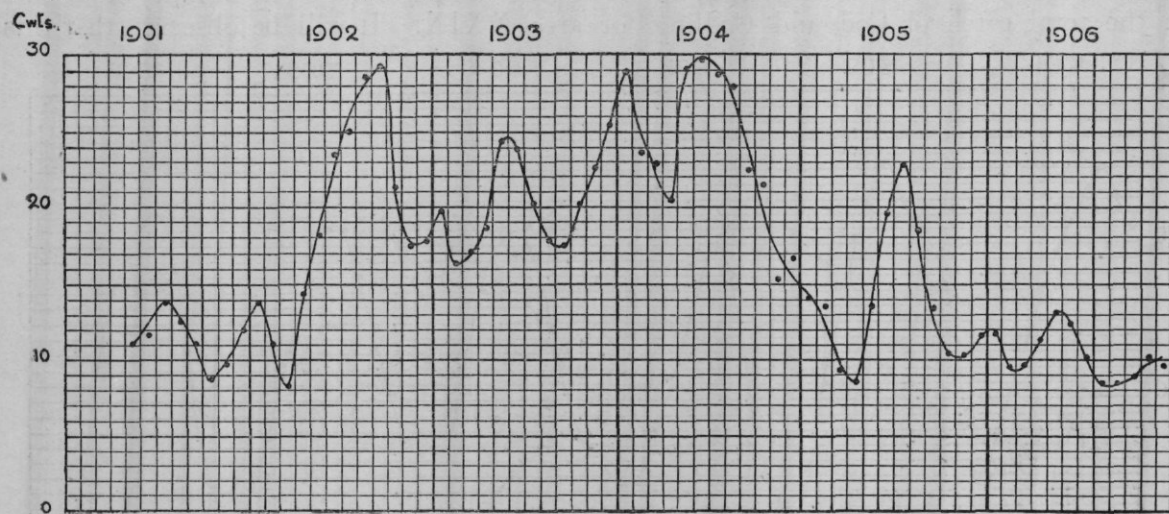


FIG. 11.—Mean monthly catches of CODLING, in cwts., per 100 hours' trawling, in area XIX, 1901-6, (smoothed curve).

dates between May and August or September; and there is also an indication of a less important increase (large in 1904) about the month of January. On these areas the statistics show an abundance of Codling from 1902 to 1904, and a great diminution in 1906. During the years of abundance the average catch was nearly twice as great as on the areas already discussed.

For the Shetland area (X) we have very little information for the years 1901 to 1903, but from 1904 to 1906 we have evidence of a high maximum for Cod recurring about June (Fig. 12). In 1906 there was a secondary maximum in January. The

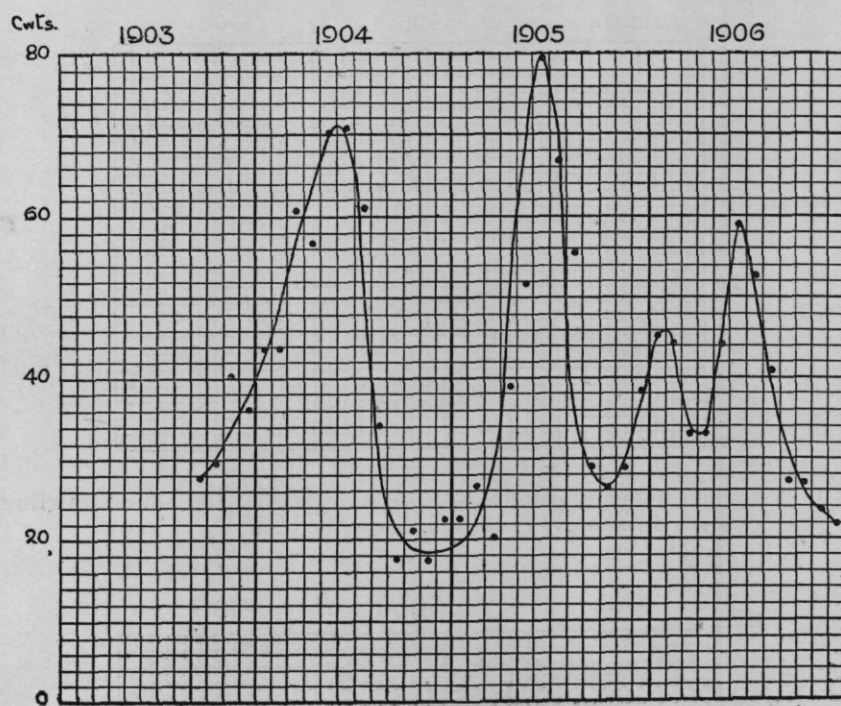


FIG. 12.—Mean monthly catches of COD, in cwts., per 100 hours' trawling, in area X, 1903-6, (smoothed curve).

curve for Codling (Fig. 13) is in this area very similar to that for Cod, the maximum being also in summer-time, about a month later than for the large fish. South-east of Shetland,

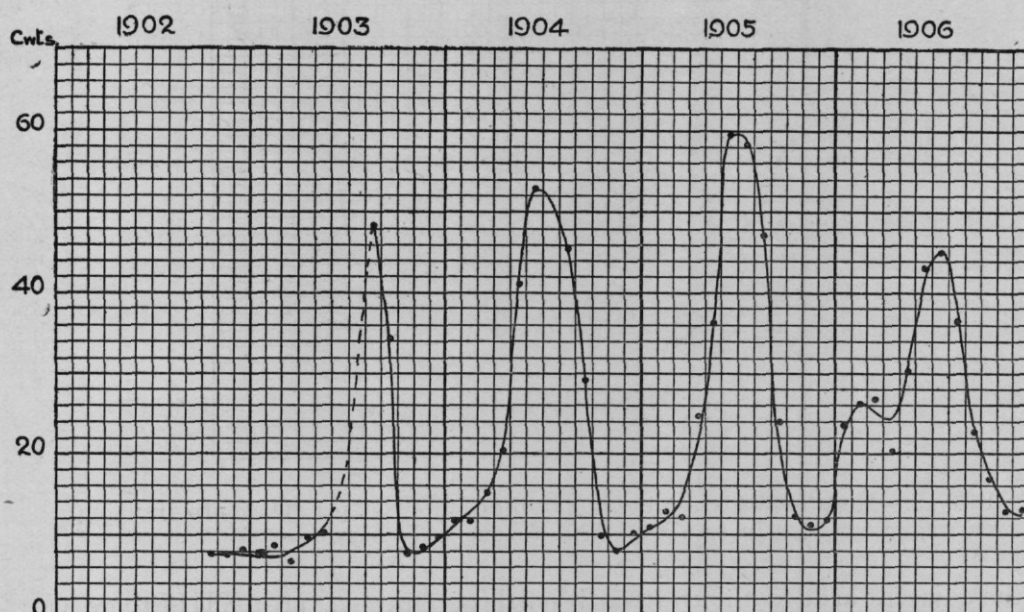


FIG. 13.—Mean monthly catches of CODLING, in cwts., per 100 hours' trawling, in area X, 1902-6, (smoothed curve).

over Bressay Shoal in area XV, we have again a regular curve, though it is marred by several blanks in our information. There is clear evidence of an annual maximum in summer, from July to August or September, with a minimum about March. The time of maximum is a little later than in the Shetland areas. Codling here also reach their maximum about the same time.

Eastward of Shetland, in area XI, we have evidence (in spite of some breaks in the series) of an annual maximum in Cod about August, and fairly good evidence also of a maximum of Codling about January.

In the Fair Isle region, area XIV, we have again a well-marked maximum of Cod about July (Fig. 14). Codling show here a similar maximum about July or August, and also a fairly well-marked secondary maximum about January (Fig. 15).

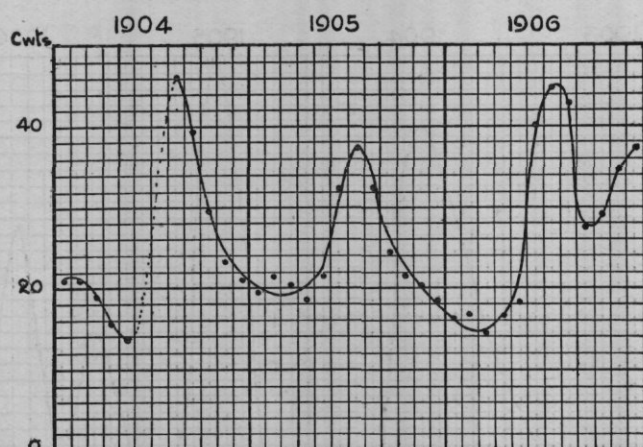


FIG. 14.—Mean monthly catches of COD, in cwts., per 100 hours' trawling, in area XIV, 1904-6, (smoothed curve).

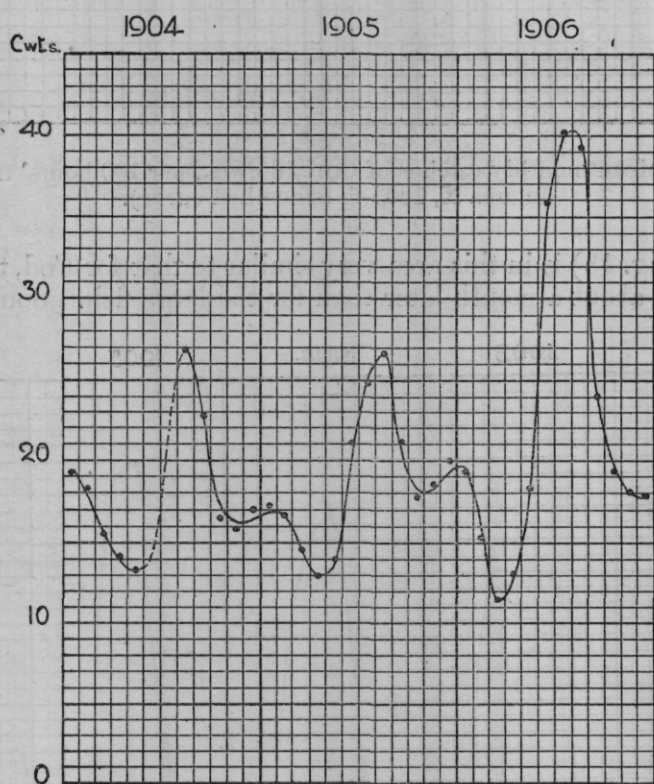


FIG. 15.—Mean monthly catches of CODLING, in cwts., per 100 hours' trawling, in area XIV, 1904-6, (smoothed curve).

In the adjacent area to the westward, north of Orkney, (area XIII) there is a very different period of maximum for Cod, namely about the month of January (Fig. 16); and the maximum attained at this season was much higher in 1905 than in either the preceding or succeeding year. There is also an indication of a maximum in summer about June and July, followed by a minimum in late autumn; and this summer maximum was very high in 1906, when it overtopped the maximum of the preceding winter. Here again we seem to have in this double maximum the intermixed effect of two different phenomena characteristic of regions on either side of that with which we are dealing. The winter maximum is characteristic, as we shall immediately show, of regions further to the west or south-west, while the summer maximum is due, so to speak, to a share in that great migration of Cod which produces the well-marked maximum at Shetland in July. The normal maximum for Codling in this area is clearly in autumn, about September, and there is an equally clear minimum in February and March (Fig. 17).

The curve for Codling in area XIII deserves a moment's attention, as an instance of the care that must at times be taken to guard against an erroneous conclusion. In the

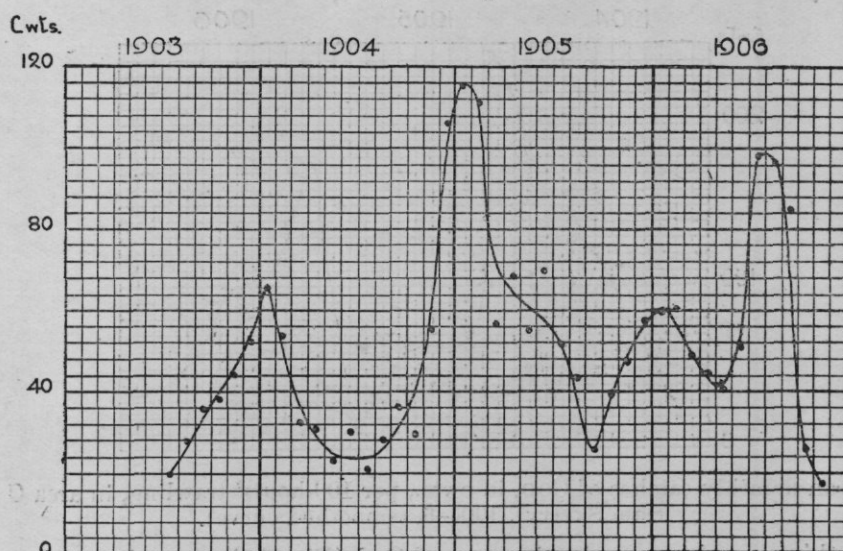


FIG. 16.—Mean monthly catches of COD, in cwts., per 100 hours' trawling, in area XIII, 1903-6, (smoothed curve).

four years to which it refers there is regularly a maximum in September or October for each of the four years to which our statistics refer; but there is present at the same time a high maximum in the spring of 1904, of which no trace occurs in other years. On

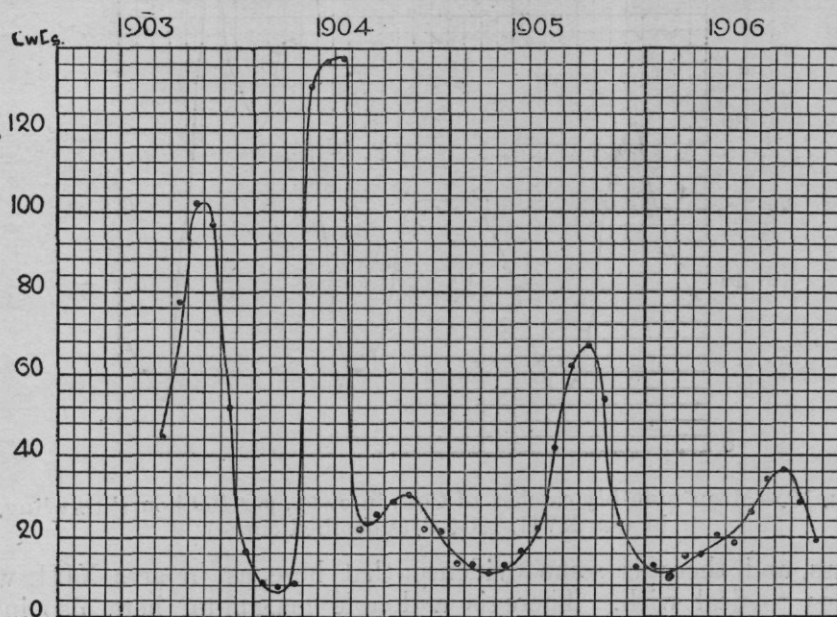


FIG. 17.—Mean monthly catches of CODLING, in cwts., per 100 hours' trawling, in area XIII, 1903-6, (smoothed curve).

reference to the original statistics we find that this cusp in 1904 is wholly due to two boats fishing during forty hours in May of that year, and we can accordingly give little weight to this apparent exception to the general course of phenomena.

In area C, which includes principally the now important fishing grounds of Rona and Sule Skerry (the northern parts of the area being little fished), the maximum for Cod (Fig. 18) is well-marked in January, while for Codling there is a double maximum, the larger about January or February, and a smaller in June or July.

In area D, including Cape Wrath and the Minch, our statistics are not very copious, but they are sufficient to show a maximum for Cod about March, and for Codling a double maximum about January and July. Further to the westward, off the Butt of Lewis, we have again some evidence of a maximum of Cod about February.

fishing, during the height of which all other fishing tends to be relaxed or abandoned ; we cannot therefore make from them the negative assertion that at certain times (during the

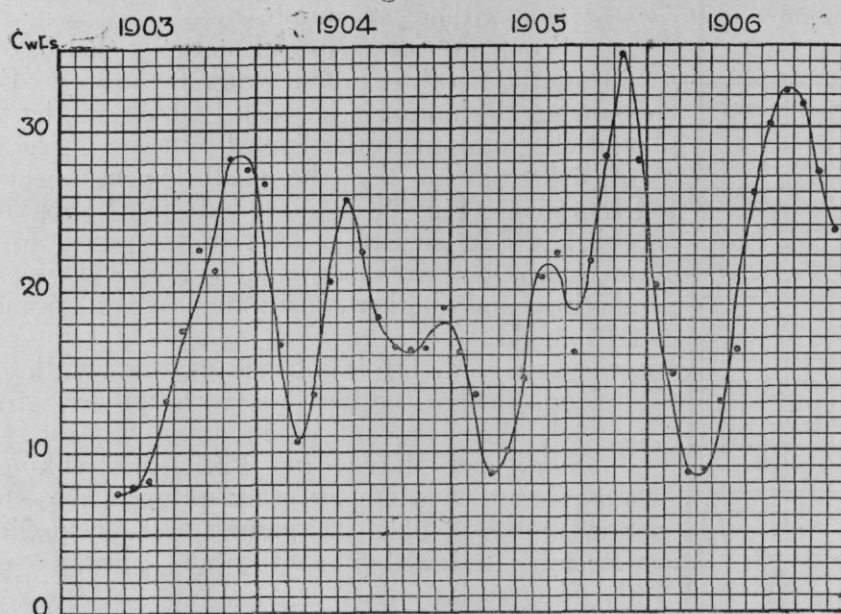


FIG. 20.—Mean monthly catches of CODLING, in cwts., per 100 hours' trawling, in area XVII, 1903-6, (smoothed curve).

Herring fishing) Cod or other fish are absent, but only use them for their indications of certain seasons when Cod are plentiful. Another weak point is that Cod and Codling are now included together, but we take it that the large Cod predominate in bulk, and that the statistical results refer mainly to them.

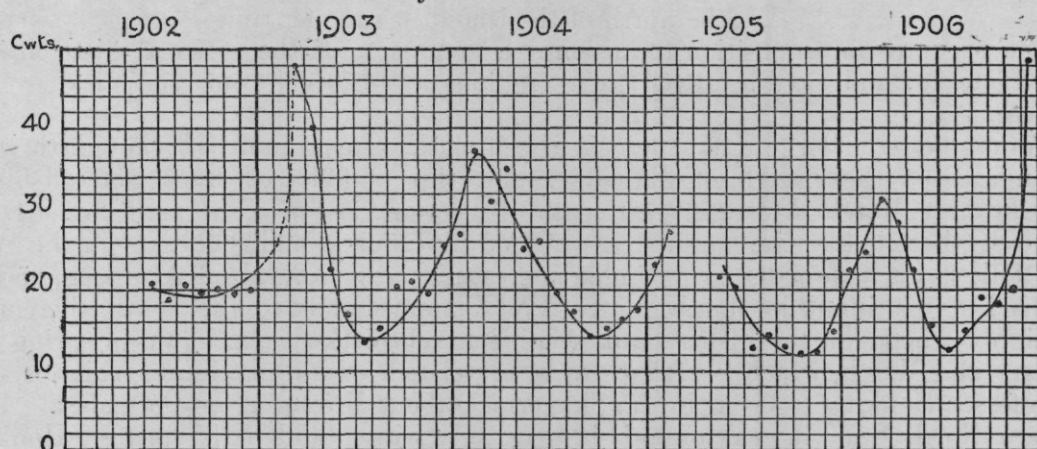


FIG. 21.—Mean monthly catches of COD, in cwts., per 100 hours' trawling, in area XXV, 1902-6, (smoothed curve).

In Table I are shown the average monthly landings of Cod (including Codling) at the various Scottish centres during the 20 years 1886-1905. Looking at the east coast stations, we see a maximum in January, well defined at Banff and Cromarty, and a maximum in February at Buckie, Findhorn, Helmsdale, Lybster, and Wick. Further

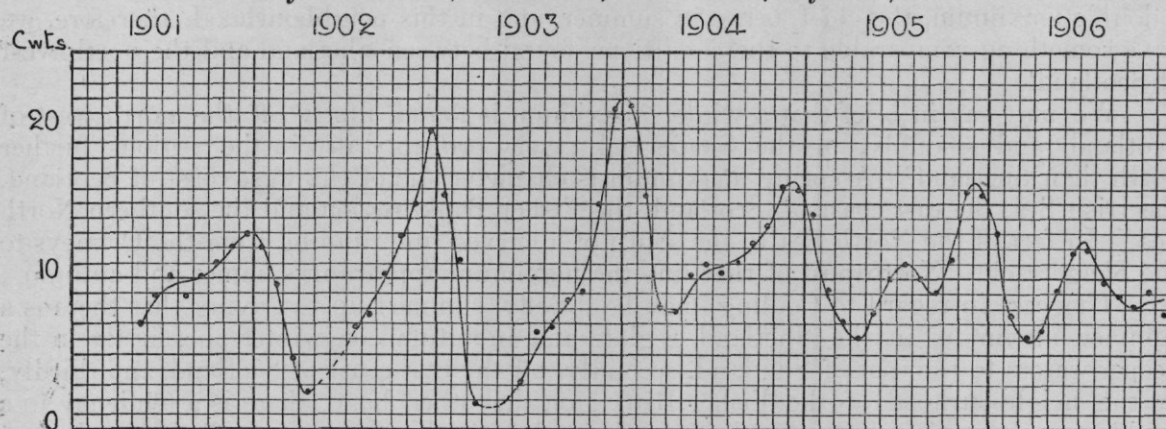


FIG. 22.—Mean monthly catches of CODLING, in cwts., per 100 hours' trawling, in area XVIII, 1901-6, (smoothed curve).

south on the east coast the maximum, or the principal maximum, is usually in May. Looking at the west coast areas we find a maximum in February at Stornoway, and in March at every other west coast station, without exception.

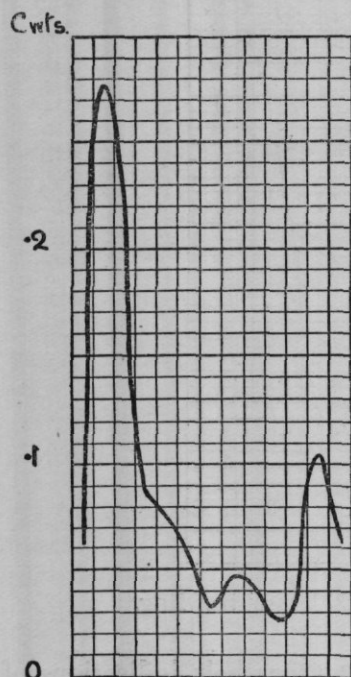


FIG. 23.—Mean monthly catches of COD, by Small-Line boats at Helmsdale, (Moray Firth), 1904-6.

From a series of special statistics that have been taken during the last three or four years at the Moray Firth stations, showing the numbers of boats fishing in the Moray Firth, and the total quantities landed by them of the various sorts of fish, we see that the small-line fishing at Cromarty, Helmsdale (Fig. 28), and Banff shows a maximum of Cod either in February or at least in the period from December to March, but the maximum is overshadowed at Wick by another and higher maximum which occurs later on (Table II).

Lastly, Mr. Holt informs us that on the east coast of Ireland, though the trawlers catch no very great quantities of cod, there are indications there of a maximum about February and March, and Professor Henking shows us a maximum in winter or early spring in the southern North Sea, and a double maximum, first about November and December followed by another and greater one in June, in the Skagerrack.

At Faeroe there is an extremely well-defined maximum for Cod in March, and at Iceland one in April. But it must be remembered that the maxima indicated in these latter curves refer only to grounds frequented by our trawlers. We know from other sources that at Faeroe there is a Cod fishery conducted near the islands by small boats in winter; and we know also that at Iceland the Cod move round to the north of the island in summer time.

We are now in a position to attempt a summary of the seasonal distribution of Cod (Plate I), and Codling over those regions from which our statistics are most complete.

As regards the large Cod there is a well-marked maximum off the north-west of Scotland about the month of January; and this is followed by a good fishing in February and March down the west coast of Scotland as far as the Irish Sea. On the east coast there is likewise an increase of Cod in January and February in the Moray Firth, followed a little later by a similar increase in area XXIII off Aberdeen, and by a well-marked maximum in March in area XXIX immediately to the south thereof. In the neighbourhood of the Fisher Bank there is a well-marked maximum in spring about February and March, which is perhaps to be correlated with a maximum which is shown by Professor Henking to occur in the Skagerrack about November or December. In the southern North Sea the maximum is in general in winter and early spring (Henking). An opposite condition to that of the north-west coast is found in Shetland, where the Cod fishing is at its best about the month of June. In the other northern areas we have everywhere evidence of a maximum in summer and early autumn. This summer influx of Cod is shared in by the line fishers from Wick; its influence is apparent together with that of the winter maximum at Orkney (area XIII), and it appears in August as far south as Aberdeen, where it is present together with the spring maximum of March, which is the one characteristic of the east coast in general. In the Skagerrack there is also a double maximum, the chief being in summer, and in this neighbourhood, therefore, we have something comparable to the conditions found between Shetland and the north-west of Scotland.

We may say in brief that a winter maximum is found, firstly off the north-west of Scotland, and secondly, in the Skagerrack; very probably also in the regions further north than Shetland. A spring maximum is characteristic of the west coast of Scotland, the Irish Sea, the east coast of Scotland, the Fisher Bank region and the southern North Sea. In fact of the North Sea to the south of a curved line running from the Orkneys to the Skagerrack. Northward of that line the maximum appears in summer and autumn.

The case in regard to Codling may be briefly summed up by saying that there is a summer maximum in the Shetland region, and an autumn or winter one, firstly in the deeper waters to the east of Shetland, secondly, off the east coast of Scotland, and thirdly, in the neighbourhood of the Fisher Bank; on the other hand there is a tendency to a double maximum in summer and again about the month of January off the north-west and north-east coasts of Scotland and in the areas to the southward of Shetland.

TABLE I.—Average Monthly Catch of Cod in cwts. at the undermentioned ports for the twenty years, 1886–1905.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
Eyemouth ...	617	522	400	359	235	109	89	65	52	314	389	612	3,763
Leith ...	4,437	4,612	5,451	7,495	7,327	5,754	3,468	2,855	2,691	3,030	3,652	4,678	55,450
Anstruther ...	2,939	2,819	1,950	4,176	9,276	5,004	2,290	2,252	208	579	1,022	2,169	34,684
Montrose ...	2,172	1,760	1,791	2,086	3,190	2,675	1,049	813	1,932	1,393	1,842	2,274	22,977
Stonehaven ...	610	409	368	890	1,434	858	70	61	219	507	506	598	6,530
Aberdeen ...	8,515	9,338	11,032	13,547	20,293	17,735	12,457	10,170	9,067	8,909	9,558	10,641	141,262
Peterhead ...	2,022	1,578	1,176	2,747	4,255	1,149	146	87	92	457	980	1,634	16,323
Fraserburgh ...	1,424	1,583	1,154	1,148	1,907	578	280	230	297	417	630	963	10,611
Banff ...	1,097	1,034	869	628	349	242	127	109	298	496	622	933	6,809
Buckie ...	2,038	3,608	3,197	1,219	298	226	56	25	186	302	433	756	12,294
Findhorn ...	1,279	2,467	2,064	751	279	212	126	92	152	226	351	662	8,661
Cromarty ...	434	384	396	241	244	277	93	72	127	196	277	421	3,162
Helmsdale ...	844	930	907	389	210	172	112	109	109	206	251	464	4,703
Lybster ...	421	551	519	139	132	117	109	121	116	121	142	237	2,725
Wick ...	4,518	7,858	4,769	1,769	1,893	2,143	1,701	1,962	1,037	1,273	1,305	1,472	31,700
Orkney ...	1,277	2,015	2,089	3,264	5,822	6,288	3,952	2,694	2,304	3,025	1,339	1,033	35,102
Shetland ...	466	775	3,075	5,178	12,051	8,735	8,718	3,335	10,015	4,068	1,094	847	58,357
Stornoway ...	738	3,640	3,215	1,543	1,312	1,500	540	309	167	188	233	377	13,762
Barra ...	55	204	465	462	201	187	333	166	136	91	33	35	2,368
Loch Broom ...	267	1,139	3,064	1,946	369	247	155	160	138	120	118	200	7,923
Loch Carron ...	324	591	776	303	130	107	112	84	83	92	83	128	2,813
Fort William ...	100	405	1,063	636	260	238	169	164	102	94	65	81	3,377
Campbeltown ...	209	513	1,154	768	270	254	195	172	142	92	166	155	4,090
Inveraray ...	80	148	220	190	48	15	5	10	25	39	28	47	855
Rothsay ...	134	142	166	129	64	39	37	40	57	93	108	117	1,126
Greenock ...	73	101	120	112	94	64	48	56	60	84	86	76	974
Ballantrae ...	726	1,744	2,059	970	238	122	104	79	152	256	344	352	7,146
Scotland ...	37,816	50,870	53,509	53,085	72,181	55,047	36,541	26,292	29,914	26,668	25,657	31,967	499,547

TABLE II.—Average Catch of Cod and CODLING by small-line boats in the Moray-Firth District in cwts. per trip.

Month.	Banff.		Buckie.		Cromarty.		Helmsdale.		Lybster.	Wick.
	Cod.	Cod-ling.	Cod.	Cod-ling.	Cod.	Cod-ling.	Cod.	Codling.	Codling.	Codling.
1904.										
January ...	·072	·309	—	—	·06	·455	·514	1·115	2·118	1·921
February ...	·059	·191	—	—	·119	·506	·173	·364	2·111	·774
March ...	·068	·23	—	—	·129	·601	·209	·429	1·667	·83
April ...	·026	·097	·036	·183	·027	·396	·484	·523	1·636	1·35
May ...	·002	·041	0	·162	·006	·482	·226	·349	1·333	1·128
June ...	0	·052	·052	·161	·008	·361	·170	·255	—	—
July ...	—	—	0	0	·007	·207	·141	·201	—	1·433
August ...	—	—	0	·16	·023	·222	·044	·081	—	·038
September ...	0	·147	0	·085	·019	·222	·077	·205	·619	·163
November ...	0	·178	0	·155	·004	·308	·064	·311	1·069	·406
October ...	·017	·334	0	·263	·006	·302	·113	·338	·421	·911
December ...	·071	·363	·006	·254	·021	·259	·125	·263	·519	1·145
1905.										
January ...	·11	·341	·048	·051	·033	·548	·289	·422	·875	1·133
February ...	·061	·25	·089	·108	·06	·411	·195	·347	·381	1·023
March ...	·179	·192	·143	·156	·063	·522	·094	·244	—	·889
April ...	·031	·163	0	·4	·062	·439	·052	·397	—	1·793
May ...	·014	·046	0	·271	·067	·365	·068	·348	—	—
June ...	·006	·142	—	—	·046	·28	·043	·187	—	—
July ...	0	·051	0	·145	·015	·147	·100	·295	—	·06
August ...	0	·068	0	·035	·016	·182	·092	·376	—	·36
September ...	0	·312	·017	·078	·013	·22	·043	·448	—	·414
October ...	0	·321	·021	·298	·013	·18	·112	·507	·736	·82
November ...	·037	·356	·019	·359	·029	·329	·225	·508	·934	2·176
December ...	·128	·437	·006	·361	·085	·243	·308	·677	·778	2·107

TABLE II.—continued.

Month.				Banff.		Buckie.		Cromarty.		Helmsdale.		Lybster.	Wick.
				Cod.	Codling.	Cod.	Codling.	Cod.	Codling.	Cod.	Codling.	Codling.	Codling.
1903.													
January	...	...	...	·169	·326	0	·422	—	—	·292	·595	—	1·333
February	...	...	...	·187	·265	0	·423	·127	·316	·199	·355	—	—
March	...	...	...	·139	·249	0	1·236	·1	·431	·353	·326	—	—
April	...	...	...	·015	·069	0	·920	·012	·333	·133	·189	·666	—
May	...	...	...	·001	·091	—	—	0	·431	·092	·169	1·0	—
June	...	...	...	0	·171	0	·012	0	·377	·089	·122	—	—
July	...	...	...	—	—	—	—	0	·319	·099	·142	—	—
August	...	...	...	0	·01	0	·06	0	·258	·098	·188	—	—
September	...	...	...	0	·351	0	·307	0	·149	·075	·101	1·778	·2
October	...	...	...	0	·293	0	·268	0	·17	·019	·165	1·3	1·019
November	...	...	...	·034	·310	0	·25	0	·326	·039	·332	1·179	1·524
December	...	...	...	·053	·322	0	·169	0	·346	·147	·360	3·515	1·177

TABLE III.—Mean Catch of Cod per 100 hours' trawling (Aberdeen Trawlers) during the years 1901-1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	12·5	11·3	17·4	—	—	—	35·1	39·2	—	—	23·1
VII ...	—	11·9	10·5	9·6	11·3	17·7	—	—	—	—	—	—	12·2
VIII ...	—	—	10·1	10·3	9·7	—	—	—	—	—	—	—	10·0
IX ...	—	—	—	—	—	—	56·5	27·9	23·9	32·4	20·0	14·3	29·3
X ...	37·3	33·8	31·4	30·6	47·6	68·8	74·2	28·2	29·3	24·0	23·7	28·2	38·1
XI ...	15·6	19·4	14·0	10·8	15·2	24·5	27·6	23·6	29·4	24·8	19·7	17·7	20·2
XII ...	11·0	17·7	15·1	11·7	14·2	16·4	28·1	13·8	13·5	19·2	12·8	11·8	15·4
XIII ...	85·7	37·7	61·9	26·4	57·5	49·9	65·9	24·2	38·0	38·8	34·8	82·9	50·3
XIV ...	18·1	17·0	21·7	17·8	14·6	26·4	48·0	32·8	26·9	25·8	27·5	27·8	25·4
XV ...	18·3	17·3	14·5	16·9	18·7	19·3	28·8	23·2	27·6	23·9	22·6	19·1	20·8
XVI ...	14·1	19·0	17·3	14·9	19·0	—	—	—	—	31·9	16·0	20·3	19·1
XVII ...	80·3	48·6	74·0	76·7	32·4	91·0	68·3	46·7	35·7	13·4	23·9	28·3	51·6
XVIII ...	24·1	24·2	35·4	43·7	38·2	27·2	33·2	35·1	43·7	36·0	32·3	23·2	33·0
XIX ...	18·8	19·7	22·2	17·9	24·6	30·9	36·1	38·3	38·8	20·8	26·2	22·4	26·9
XX ...	17·6	24·2	20·1	22·4	22·9	11·9	17·0	16·5	15·2	10·9	18·7	16·7	17·8
XXIII ...	14·1	16·4	19·0	27·7	19·9	22·4	34·8	32·1	27·0	18·3	15·0	14·4	21·8
XXIV ...	31·4	28·5	35·8	28·2	29·1	34·1	47·2	34·8	32·5	26·4	26·0	21·3	31·3
XXV ...	23·7	31·6	27·0	27·7	27·6	14·9	16·2	13·1	15·2	18·6	15·4	17·4	20·7
XXVI ...	11·3	—	23·5	41·0	27·9	12·7	21·4	18·1	18·6	24·3	14·7	15·8	20·8
XXVII ...	—	—	—	—	27·1	—	—	34·2	36·8	25·4	19·8	43·5	31·1
XXVIII ...	—	8·6	—	—	16·8	53·4	22·4	—	—	13·2	16·9	29·8	23·0
XXIX ...	11·9	12·2	19·0	28·8	13·9	14·0	17·3	10·9	8·2	9·5	9·1	13·4	14·0
XXX ...	20·4	20·7	25·1	—	—	—	20·9	18·1	28·7	22·9	23·1	19·5	22·2
XXXI ...	36·0	60·9	40·9	—	23·3	18·7	18·0	13·5	17·9	21·3	22·0	19·0	26·5
XXXII ...	—	80·9	—	—	21·9	11·1	14·2	13·4	17·1	11·8	16·5	22·3	23·5
XXXIII ...	—	—	—	—	—	20·7	18·8	—	30·6	31·9	—	—	25·5
XXXV ...	—	37·7	—	—	—	11·8	—	—	—	27·3	25·6	—	25·6
XXXVI ...	38·2	60·3	29·9	—	15·9	—	—	—	14·6	26·7	26·9	—	30·4
XXXVII ...	—	12·5	—	—	16·7	—	—	—	10·7	—	—	6·8	11·7
C ...	181·0	108·3	56·2	61·8	73·6	120·9	67·5	58·9	65·1	22·2	20·8	74·8	75·9
D ...	109·0	84·4	127·4	101·7	92·0	81·9	81·6	110·8	45·2	27·8	27·5	57·0	78·9
J ...	—	—	—	—	155·2	164·2	282·8	102·4	—	—	—	9·3	142·8
K ...	122·7	176·5	110·4	115·7	—	82·7	122·9	—	—	—	—	—	121·8
Faroe ...	98·7	129·1	644·2	440·8	167·6	145·4	107·0	62·8	53·6	35·9	43·2	62·1	165·9
Iceland ...	—	910·4	1328·8	1791·9	1002·5	424·6	384·6	246·3	70·9	35·5	—	—	688·4

TABLE IV.—Mean Catch of CODLING per 100 hours' trawling (Aberdeen Trawlers) during the years 1901–1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	4.3	5.0	6.2	—	—	—	16.1	12.7	—	—	8.9
VII ...	—	9.6	8.5	6.5	7.5	12.9	—	—	—	—	—	—	9.0
VIII ...	—	—	11.0	6.9	8.1	—	—	—	—	—	—	—	8.7
IX ...	—	—	—	—	—	—	67.3	60.1	29.3	24.1	9.6	10.6	33.5
X ...	13.2	20.5	13.7	11.0	28.1	52.3	60.8	39.2	17.6	11.9	10.2	10.7	24.1
XI ...	21.0	18.1	13.8	10.6	12.2	14.8	14.9	15.3	12.4	15.8	16.1	14.8	15.0
XII ...	10.2	17.3	10.8	8.9	16.2	13.5	13.4	1.3	11.4	14.1	12.7	10.7	12.5
XIII ...	14.6	7.4	8.0	15.9	29.8	24.2	26.7	44.5	81.9	54.4	12.0	11.7	27.6
XIV ...	20.4	16.1	11.9	10.6	12.7	15.9	35.8	29.1	20.3	17.3	16.1	17.8	18.7
XV ...	24.2	22.6	16.9	14.3	16.3	16.2	20.4	18.4	22.6	19.4	17.4	17.2	18.8
XVI ...	9.9	16.8	7.9	6.4	11.5	—	—	—	—	15.7	13.1	15.4	12.1
XVII ...	23.6	9.0	8.9	6.3	10.5	20.5	19.6	19.9	17.4	19.6	16.3	24.1	16.3
XVIII ...	17.1	10.1	4.3	5.4	8.1	10.3	10.5	9.8	7.3	11.4	14.0	16.0	10.4
XIX ...	19.8	15.5	7.6	24.1	18.4	19.0	21.8	17.6	14.3	12.9	14.6	13.9	16.6
XX ...	7.8	5.9	6.5	7.9	6.0	2.6	7.6	9.2	8.0	10.6	7.9	7.5	7.3
XXIII ...	16.0	14.7	11.8	9.6	9.7	14.3	10.2	12.0	16.3	17.6	21.4	18.9	14.4
XXIV ...	20.3	16.1	5.9	21.1	19.0	14.0	9.5	4.6	6.2	8.7	12.2	16.3	12.8
XXV ...	15.5	8.9	5.0	2.5	4.2	4.3	5.7	7.1	10.7	9.0	7.7	9.8	7.5
XXVI ...	6.3	—	8.3	6.1	5.6	5.2	4.9	14.2	13.8	12.7	8.2	6.9	8.4
XXVII ...	—	—	—	—	8.3	—	—	25.2	20.7	14.6	13.9	30.9	18.9
XXVIII ...	—	16.0	—	—	18.0	62.3	32.1	—	—	41.0	41.3	36.5	35.3
XXIX ...	15.5	11.7	7.4	8.1	7.7	7.0	8.2	9.2	8.5	16.2	15.6	18.9	11.2
XXX ...	16.5	17.1	17.9	—	—	—	10.7	14.9	15.9	17.0	18.0	17.7	16.2
XXXI ...	22.1	13.8	13.6	—	8.0	7.5	9.8	11.2	13.8	11.7	11.1	21.1	13.1
XXXII ...	—	6.5	—	—	5.3	4.3	3.7	9.6	12.4	12.8	10.3	9.8	8.3
XXXIII ...	—	—	—	—	—	7.9	12.0	—	12.8	15.8	—	—	12.1
XXXV ...	—	8.5	—	—	—	9.9	—	—	—	19.0	24.9	—	15.6
XXXVI ...	20.2	7.0	10.1	—	11.2	—	—	—	15.1	17.6	16.1	—	13.9
XXXVII ...	—	10.5	—	—	3.1	—	—	—	15.4	—	—	14.1	10.8
C ...	77.6	61.5	34.5	25.0	32.3	44.8	32.0	38.2	32.5	31.7	19.4	40.5	39.2
D ...	46.6	38.0	26.5	32.9	35.5	37.3	50.4	50.3	39.1	22.7	21.4	45.8	37.2
J ...	—	—	—	—	23.9	43.6	63.1	29.5	—	—	—	9.7	34.0
K ...	16.7	13.0	14.4	27.7	—	26.9	23.1	—	—	—	—	—	20.3
Faroe ...	200.2	209.5	213.3	148.5	124.9	153.1	160.4	108.9	168.2	141.2	141.3	194.7	163.7
Iceland ...	—	22.5	68.8	86.4	60.0	54.9	47.5	18.0	14.4	21.7	—	—	43.8

THE HADDOCK. (*Gadus aeglefinus*.)

Haddock are divided in the Aberdeen market into four classes, known as Extra Large, Large, Medium, and Small, to which of recent years a fifth class of Extra Small fish is sometimes added. The average size of these five groups of fish is about 24, 16, 14, 12, and 9 inches, or 60, 40, 35, 30, and 23 centimetres. The Extra Large Haddock come in great quantities from Iceland and Faroe, whence come the largest fish of all. The largest Haddock that we have measured from Faroe was 82 centimetres, or 33 inches, and the largest from Iceland was 89 centimetres, or just about a yard long. Off the east coast of Scotland, and in the middle North Sea grounds, Haddock of this Extra Large class are rare, but a certain number come from Shetland, from the western grounds, and from the south-eastern grounds, from which the largest specimens measured are from 75 to 77 centimetres long, or about 2 feet 6 inches. About half of all the fish classed as Extra Large are from 22 to 25 inches long, and about half the Large Haddock lie between 15 and 17 inches; in like manner one-half of the Small Haddock lie between 11 and 13 inches.

In Figure 24 are shown the average catches of Extra Large Haddock in our various areas. The largest average of 10 or 12 cwts. per 100 hours' fishing, is found in the areas off the north-west of Scotland; next we have average catches of 3 or 4 cwts. in the south-eastern grounds, from the Holmen ground, and sometimes (though of these our Scotch statistics seldom give us information) on the Dogger Bank. Over the greater part of the North Sea the mean catch is somewhere about 1 cwt., and off the east coast of Scotland it is only a small fraction of that amount. Taking all our North Sea areas together, the average catch throughout the year of these Extra Large Haddock may be

roughly stated at $1\frac{1}{2}$ cwts. per 100 hours' fishing. At Faroe the average catch is 33 cwt., and at Iceland it reaches the great figure of 290 cwt. per 100 hours' fishing

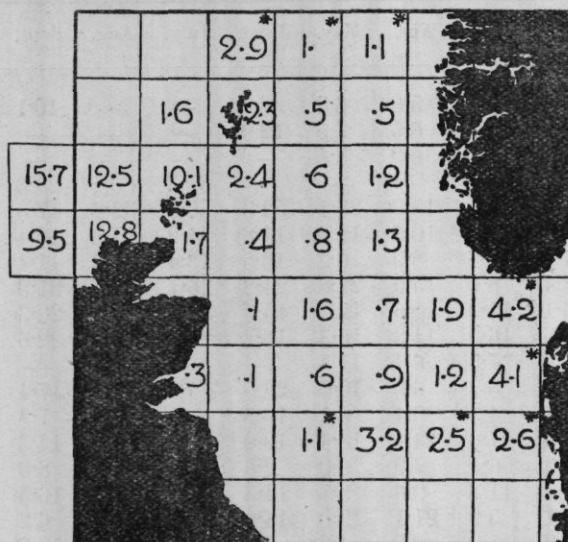


FIG. 24.—Chart showing mean catch of EXTRA LARGE HADDOCK, in cwts., per 100 hours' trawling, in various areas: 1901-6, [Faroe 33.3 cwts., Iceland 290.7 cwts.].

Figure 25 shows in like manner the average catches of Large Haddock. The numbers are greatest off the north-west of Scotland and also towards the Danish coast;

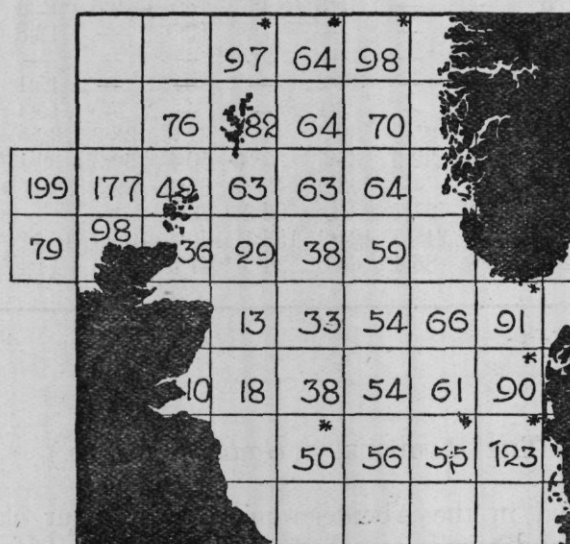


FIG. 25.—Chart showing mean catch of LARGE HADDOCK, in cwts., per 100 hours' trawling, in various areas: 1901-6, [Faroe 101 cwts., Iceland 36 cwts.].

they are distinctly larger in the northern areas of the North Sea than on the middle grounds, and they are greatly diminished in the areas adjacent to the east coast of Scotland.

In regard to the areas off the east coast of Scotland (XXIII, XXVIII, XXIX) we find not only in this case, but in that of several other fishes, that the average catches are lower than in any other part of our area. The cause of this difference is partly to be found in the undoubted fact that on these near grounds a number of the older and smaller trawlers work, using somewhat smaller nets than the larger vessels that make the more distant voyages. It would be highly important to investigate this matter more closely, but we are as yet quite unable to compare closely the catching power of these smaller vessels working with nets on a ground-rope of 130 to 150 feet, and headline of 84 to 100 feet, with that of the larger class that use a ground-rope of 180 feet and headline of 130 feet. It must also be remembered that the total amount of fishing is exceptionally great upon these grounds, and that the amount of fish drawn from them is in the aggregate much greater than that brought by our vessels from any other region of equal size in the North Sea; and, if we exclude certain of the southern grounds to which the English trawlers resort in great numbers, this statement will probably remain true of all that part of the North Sea with which we are concerned, even if we reckon the

English and Foreign trawlers together with the Scotch. It is by no means, therefore, to be wondered at if these areas show a lower average catch than do the other areas with which we deal, but it is much to be regretted that we cannot trace out the actual difference, or the cause of the actual difference, in a more thorough manner.

The mean catch of Large Haddock on our North Sea grounds may be stated at about 58 cwt. per 100 hours' fishing. At Faroe the average rises to about 100 cwts., but it falls at Iceland to 36 cwts. In the latter case it is probable that a great many of all but the largest size are thrown away.

The Small Haddocks, according to the chart (Fig. 26), vary comparatively little in abundance over the North Sea areas, being somewhat more plentiful in the middle regions.

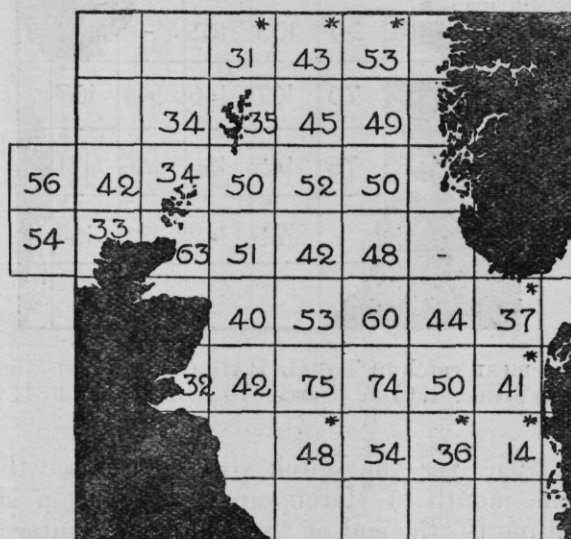


FIG. 26.—Chart showing mean catch of SMALL HADDOCK, in cwts., per 100 hours' trawling, in various areas: 1901-6, [Faroe 17 cwts., Iceland 10 cwts.].

Here again our statistics are faulty from the fact that quantities of Small Haddocks are thrown away, and, in other words, our statistics are here only a measure of what is brought home, and cannot be used for a comparative estimate of what stock actually exists on the different grounds.

The Extra Small Haddock (Fig. 27) chiefly come from the nearer grounds.

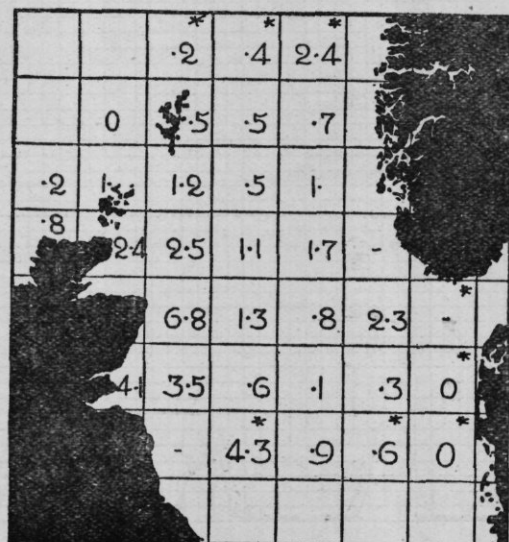


FIG. 27.—Chart showing mean catch of EXTRA SMALL HADDOCK, in cwts., per 100 hours' trawling, in various areas: 1901-6, [Faroe .1 cwt., Iceland nil].

The last chart of this series (Fig. 28) shows the total average catch of all classes of Haddock from the different areas. It is much the largest off the north-western areas, and is probably larger still in other areas to the west, north of the Lewes, which are not represented in our chart. The comparatively small catches off the east of Scotland are again conspicuous. The average catch at all seasons of the year over all our North Sea areas may be approximately stated at 135 cwts. per 100 hours' fishing, an amount that enormously exceeds that of any other of our food-fishes.

Though the Extra Large Haddock are caught in no very great numbers in any of our North Sea areas, yet the seasons of their appearance are so clearly marked that we have no difficulty in understanding the statistical evidence.

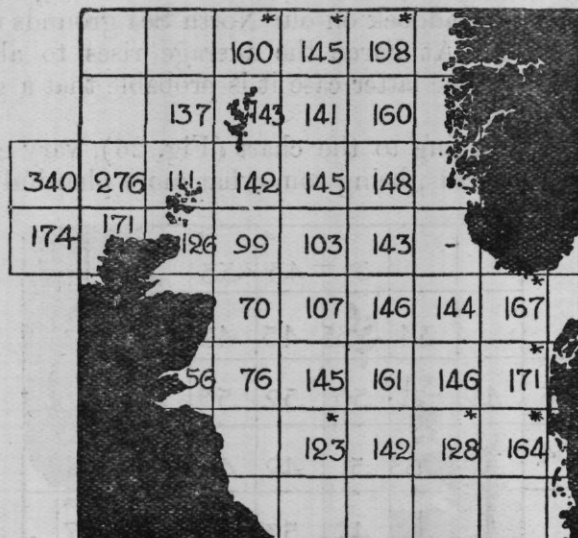


FIG. 28.—Chart showing mean catch of TOTAL HADDOCK, in cwts., per 100 hours' trawling, in various areas: 1901-6, [Faroe 170 cwts., Iceland 341 cwts.].

In area XIX (Fig. 29), over the Witch Ground, we see that the fish appear with great regularity about the month of March, and make but a short stay, disappearing altogether from May or June till the end of the following winter. Their numbers have not varied very greatly within the last six years.

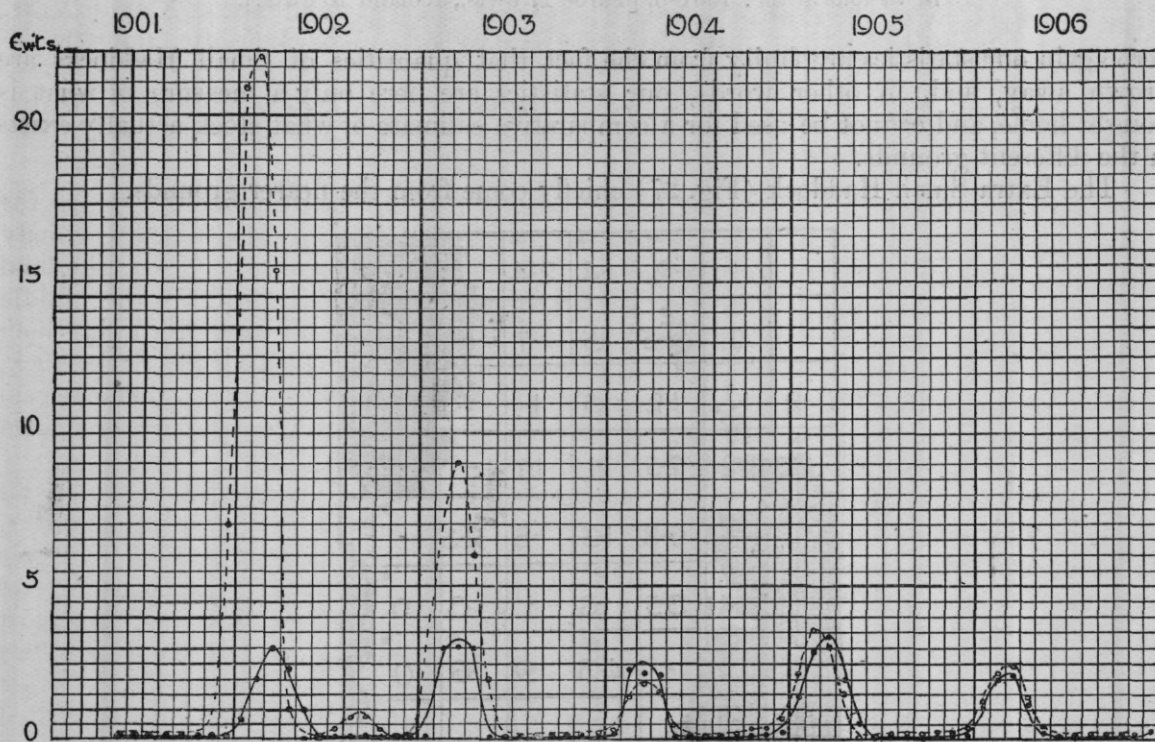


FIG. 29.—Mean monthly catches of HADDOCK, in cwts., per 100 hours' trawling, in areas XIX and XXIV: 1901-6, (smooth curves; area XIX—, area XXIV - - - -).

In area XXIV (Fig. 29), over the Gut, their appearance is equally regular, and precisely at the same season. But in this case we have evidence of comparatively large numbers in the spring of 1902, and of extremely small numbers in more recent years.

In the Shetland area (X) the season of maximum is somewhat later, the maximum being reached in June, 1904, in May, 1905, and lasting more or less over a considerable part of the summer in 1906.

In area XIII (Fig. 30), from Foula Bank to the Orkneys, we see, firstly, that the actual quantities are much larger; secondly, that the date of maximum is again a little later, being in May or June in one, in August in two, and in September in one of the

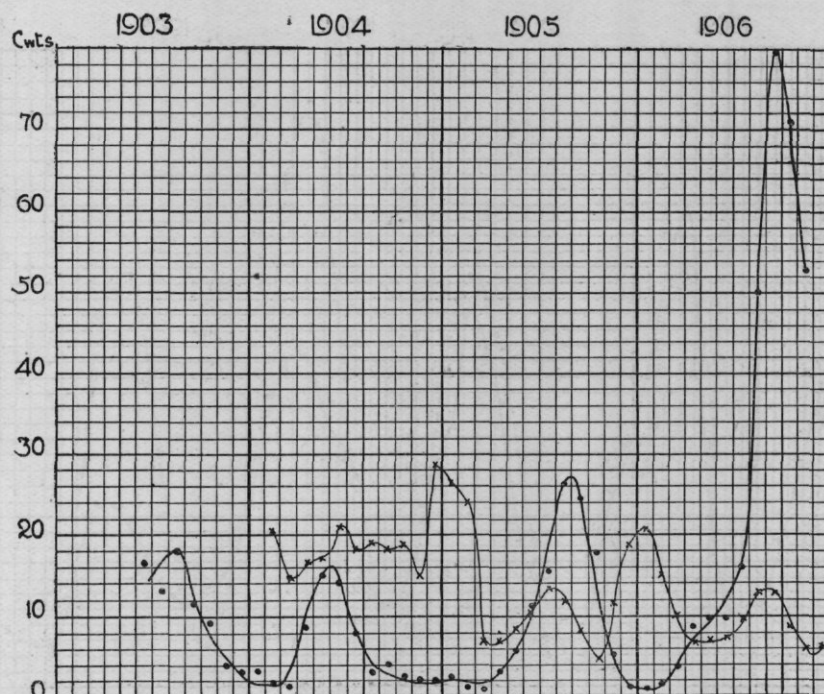


FIG. 30.—Mean monthly catches of EXTRA LARGE HADDOCK, in cwts., per 100 hours' trawling, in areas XIII and C: 1903-6, (smooth curves; area XIII - . . ., area C - x - x - x -).

four years; thirdly, we see that in 1906 the maximum attained was by far greater than in the previous years. We also notice, by the way, that in both areas X and XIII, while the quantities diminish very greatly in the seasons of scarcity, they never absolutely vanish.

At area C (including Rona and Sule Skerry, Fig. 30) we appear to have a double annual maximum: first, and chiefly, about December or January, and, secondly, about July or August.

From these illustrative cases, and from a study of such statistics as we possess for all the other areas, we arrive at the conclusion that Extra Large Haddock are chiefly abundant in summer and autumn in all areas adjacent to the Scotch coast from Shetland southwards, the dates being a little later as we proceed south, but in spring in the middle areas of the North Sea. To judge from what evidence we have for area XXVII, which includes the Holmen Ground, and from what Professor Henking tells us of the Skagerrack, there is likewise in that neighbourhood a summer maximum, and southward thereof, from the Danish coast to the Fisher Bank, we can detect an autumn increase. There is an autumn and winter maximum also off the north-west of Scotland.

In the extreme northern regions of our map (VI to VIII), our statistics are in all cases extremely defective, for fishing seldom goes on there, except in the spring months. We know that large Haddock are then very abundant there, we have some little evidence of their less abundance in autumn, and in the areas immediately to the southward we have better evidence that the maximum takes place in spring. Leaving this most northern region in some doubt, we may safely say that over all the rest of the North Sea areas with which we deal, other than those above mentioned, the largest Haddock are chiefly abundant about the months of February and March. These facts are illustrated on Plate II.

The seasons of maximum abundance of the ordinary Large Haddock resemble to a great extent those of the class just described as Extra Large; but the period of comparative abundance is spread over a larger part of the year, and a comparatively larger stock of fish remains on the ground even in the season of scarcity. In the central areas of the North Sea, over the Witch Ground and Gut, and those eastward to the Fisher Bank, the season of the Large Haddock lasts through the winter months, and it is only when that season is about to close that we recognise the period of maximum of the Extra Large sort. In Shetland, on the other hand, the largest numbers of "extra" large fish would seem, on the average, to be caught rather earlier in the season than the normal maximum of the "large."

In the East Coast areas (XXIII, XXIX, Fig. 31), we have very regular curves showing an annual maximum in early autumn, about August, September, and October, the corresponding season of greatest scarcity being from February to April. There is

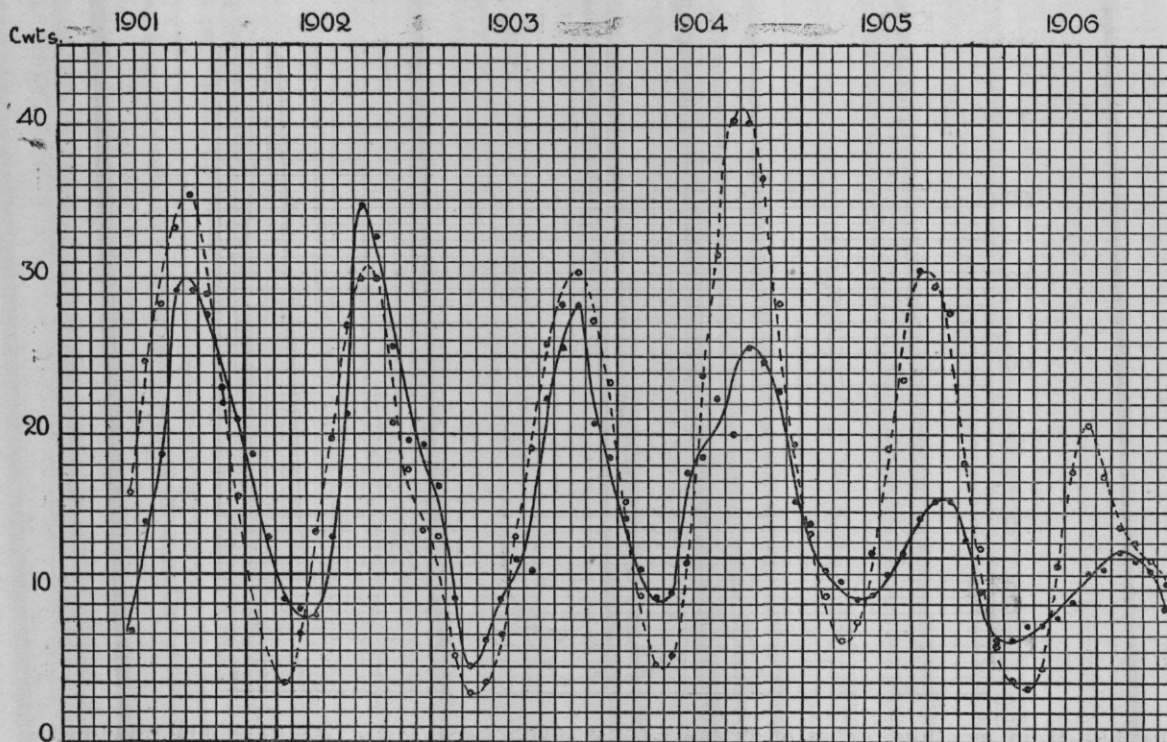


FIG. 31.—Mean monthly catches of LARGE HADDOCK, in cwts., per 100 hours' trawling, in areas XXIII and XXIX : 1901-6, (smooth curves ; area XXIII ———, area XXIX -----).

just enough difference between the two curves to indicate that the season of maximum is by a very little the later in the more northern of the two areas. As regards annual fluctuation in quantity, we see that these are greater in the case of area XXIII than of area XXIX. In both areas the autumn of 1906 gave a poor catch of Large Haddock ; in area XXIX 1904 was a very good year, but in XXIII there is a slow trend of diminution since 1902.

Turning next for a moment to the Line-fishing statistics from the Moray Firth, we find there that the maximum catch of Large Haddock by the small-line boats occurs regularly in the *winter* months, and the accompanying curves show us that the annual maximum at Cromarty is about December—January, and at Banff a month or two later (Fig. 32.)

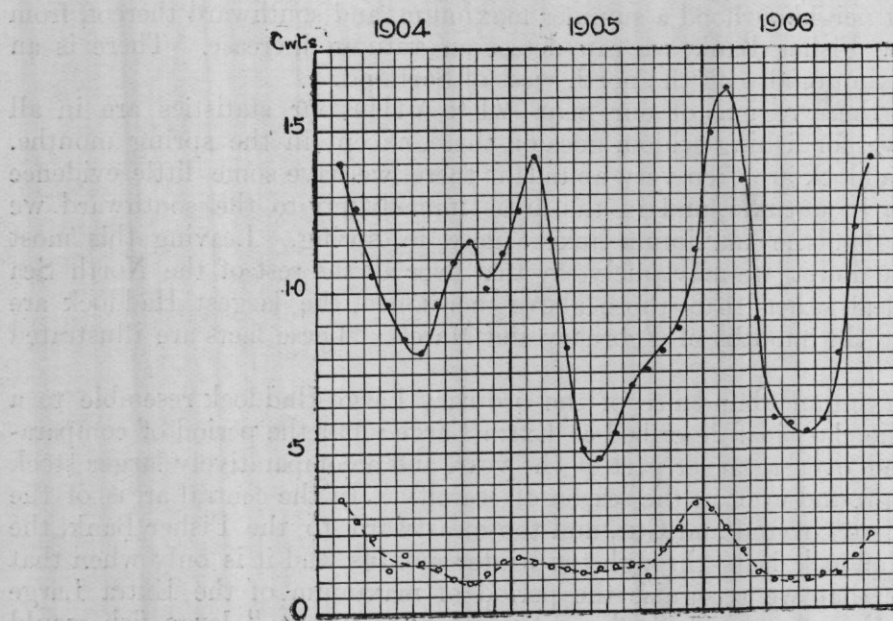


FIG. 32.—Mean monthly catches of LARGE HADDOCK, by line-fishing boats at Banff (——) and Cromarty (-----), 1904-6.

Of the areas further to the east, let us examine the curves for the Witch Ground (XIX, Fig. 34) and the adjacent areas to the southward (XXIV, Fig. 33). In both cases we find an annual winter maximum, usually from December to February, which

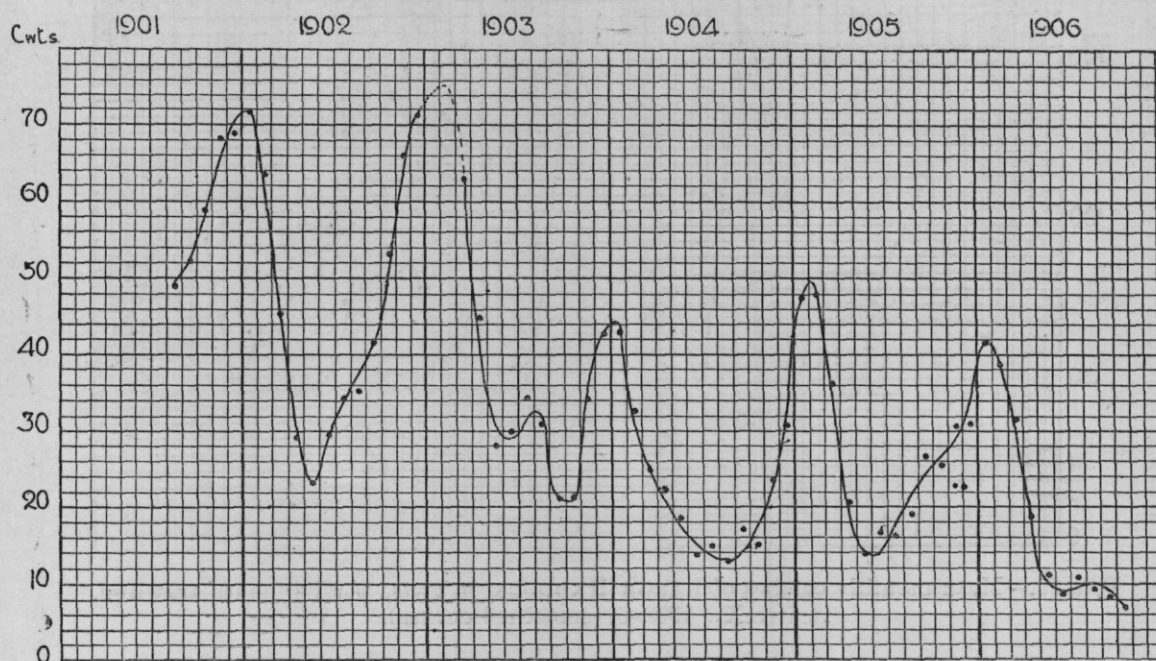


FIG. 33.—Mean monthly catches of LARGE HADDOCK, in cwts., per 100 hours' trawling, in areas XXIV : 1901-6, (smoothed curves).

agrees with the results of the Line-fishery in the Moray Firth. Without multiplying illustrations, we may say that the same winter maximum is characteristic of area XVIII, XIX, XX, XXIV, XXV, XXX, that is to say of the line of the Witch Ground and Gut, and in part of the adjacent areas on either side. In the two cases illustrated (and more

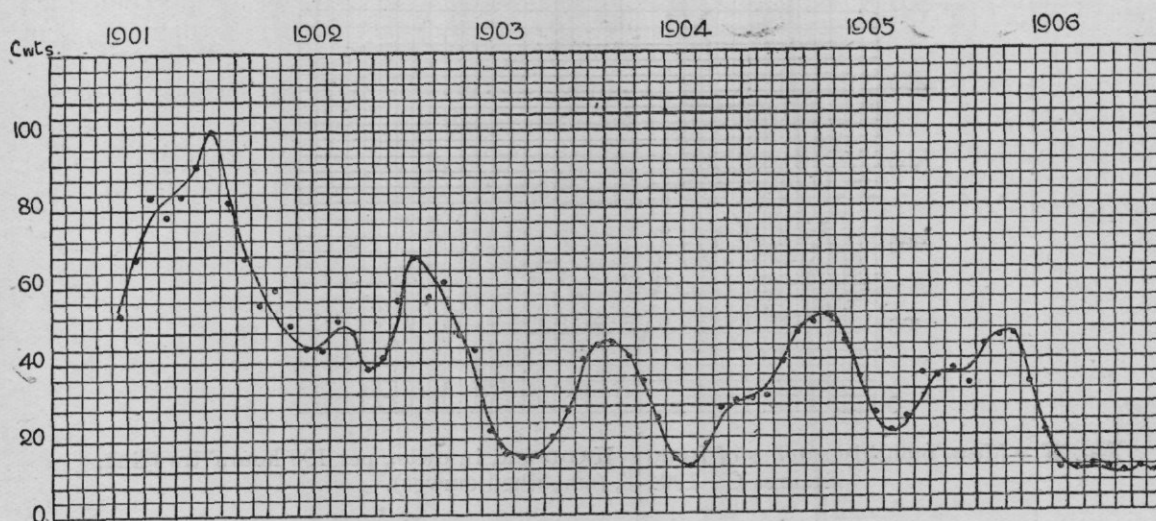


FIG. 34.—Mean monthly catches of LARGE HADDOCK, in cwts., per 100 hours' trawling, in area XIX : 1901-6, (smoothed curves).

or less in the other associated areas) the Large Haddock were especially plentiful in 1901 and 1902 ; but the three subsequent years show no further progressive diminution.

In the Shetland area (X) we have a striking contrast in regard to season with the last-named areas, for it is plain that here the maximum abundance of Large Haddock occurs in summer time, and chiefly about the month of July (Fig. 35). The curve also, however, indicates the existence of a small wave of increase in mid-winter. From

Shetland to the Scottish mainland (areas XIII, Fig. 37, XIV, XVII) we have as a general rule a maximum in early autumn, about August, September, and October. A

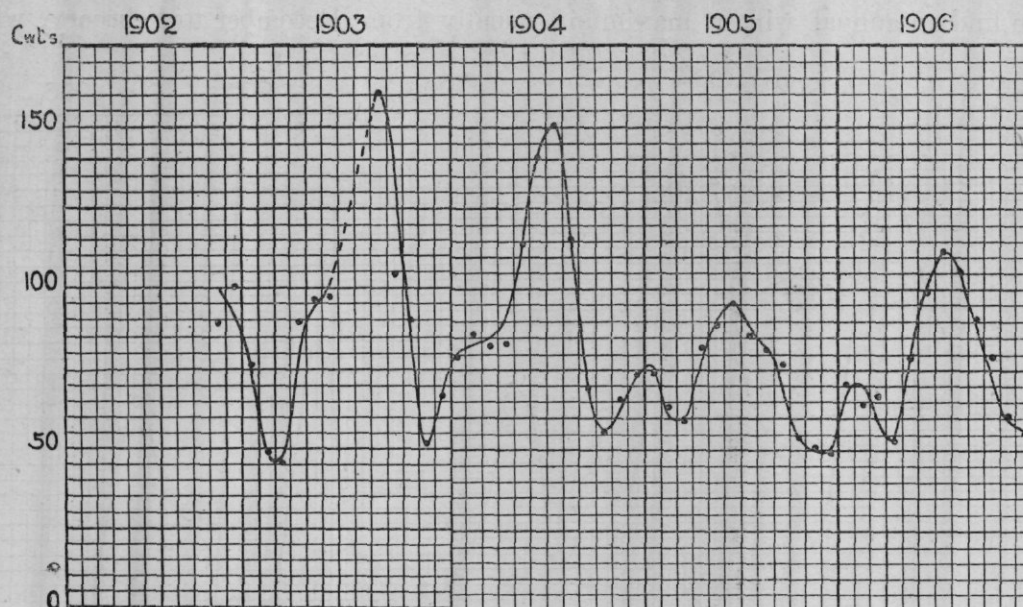


FIG. 35.—Mean monthly catches of LARGE HADDOCK, in cwts., per 100 hours' trawling, in area X : 1902-6, (smoothed curves).

winter maximum reappears in the north-western areas (C, D), which at the same time have some share in the autumn maximum of the adjacent regions (Fig. 36).

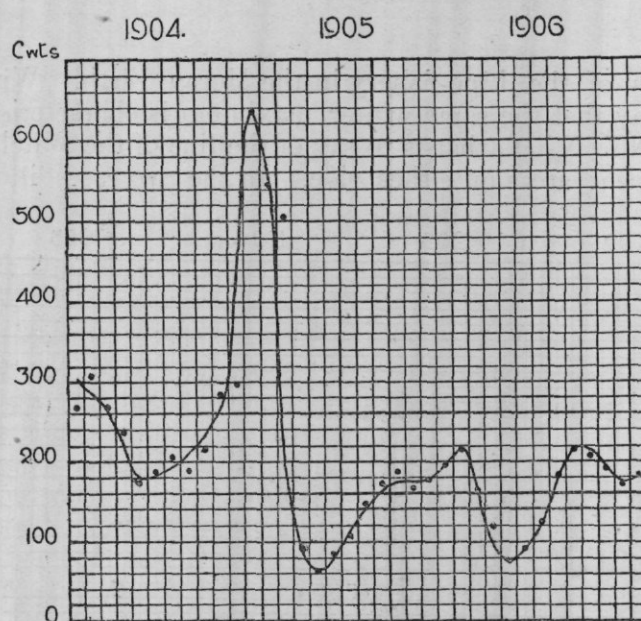


FIG. 36.—Mean monthly catches of LARGE HADDOCK, in cwts., per 100 hours' trawling, in area C : 1904-6, (smoothed curves).

To the eastward of Shetland, in area XI, we have good evidence of a double maximum, in spring and autumn, about March or April, and September, October. Here again the shoals in 1901 and 1902 were much larger than in succeeding years. For the more northern regions, as already explained, we have evidence of Large Haddock being present in abundance in spring, but little or no direct evidence as to their relative numbers at other seasons. Passing to the eastern side of the North Sea, we have in the neighbourhood of the Fisher Bank (XXVI) evidence of a double maximum in spring and autumn, and in the south-eastern regions, nearer to the Danish Coast, such evidence as we have points towards an autumn maximum. In the Skagerrack, Professor Henking tells us that the maximum is in summer (May-July), and in the southern North Sea from July to September.

Summing up, we find a winter maximum in two regions, firstly, off the north-west of Scotland, and secondly, over an extensive area in the North Sea, eastward from the

Moray Firth. A summer maximum is found at Shetland, in the Skagerrack and in the southern North Sea. Southward of Shetland, and off the east coast of Scotland, the best

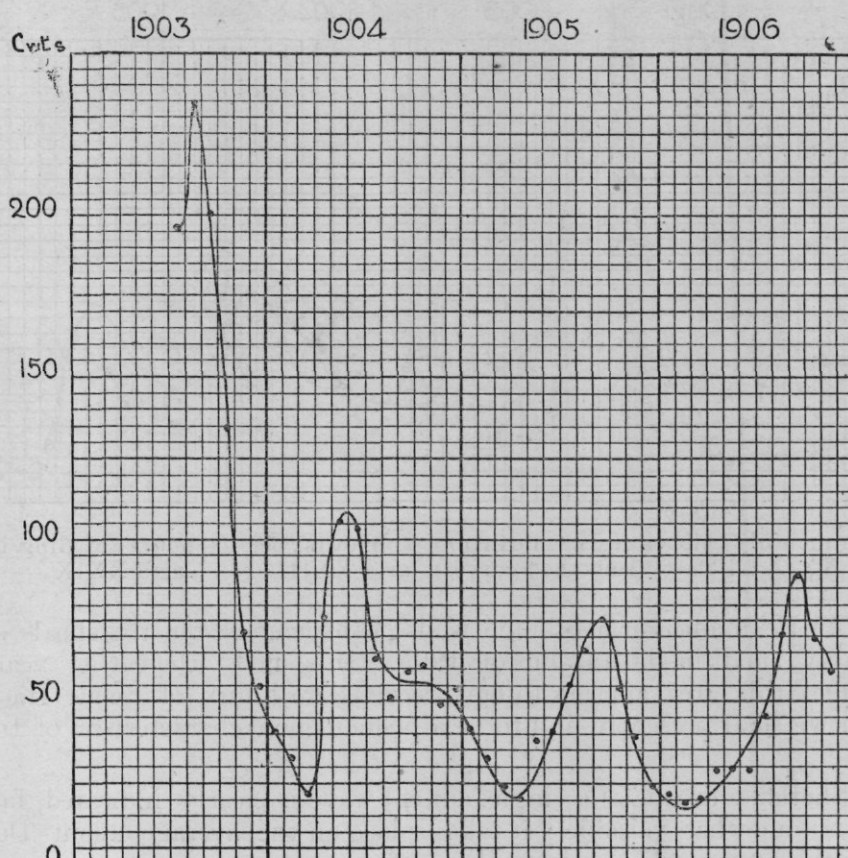


FIG. 37.—Mean monthly catches of LARGE HADDOCK, in cwts., per 100 hours' trawling, in area XIII: 1903-6, (smoothed curves).

period is in late summer and in autumn. The winter maximum of the central area extends, more or less, into spring, and a spring maximum is also marked both to the eastward (*e.g.* XXVI) and to the northward (XI, &c.). The maximum on the Faeroe trawling grounds is also in spring.

The Chart (Pl. III) on which we attempt to represent the seasonal distribution of the Large Haddock is less satisfactory than that which illustrates the Extra Large (Pl. II), chiefly owing to the circumstance, already mentioned, that the season of abundance of the Large Haddock in each area is comparatively protracted, and owing also to our imperfect knowledge of the conditions which exist towards the extreme northern and southern parts of the North Sea. It is perhaps a little premature to draw such a chart at all for the Large Haddock, with our present knowledge, but as it stands it may at least form a basis for discussion. My study of all the available evidence leads me to draw a boundary line for Large Haddock between areas of winter-spring maximum and summer-autumn maximum, not very dissimilar to that indicated in the case of the shoals of extra large fish.

While Large Haddock are caught, as we have seen, in maximum numbers in Shetland about July, and on the trawling grounds off the east coast of Scotland in early autumn, it is not till late autumn that we have the chief catches of Small Haddock in the same region. And while Professor Henking tells us that Small Haddock reach their maximum in summer in the Skagerrack, and in late summer (July to September) in the southern North Sea, there is no part of our Aberdeen trawling areas in which we clearly see a maximum of Small Haddock at that season.

In the areas nearest to the east coast of Scotland (XXIII and XXIX) we have very regular curves for Small Haddock, showing an annual maximum about the month of October, but sometimes a little later, especially towards the close of 1902 and 1906 (Fig. 38). The curves in both areas are very similar, and in both cases show a remarkably high maximum at the end of 1902. In area XXIX there is a steady decrease from that year to the close of 1905, but in both areas Small Haddock were again extremely abundant towards the end of 1906 and beginning of 1907. If we compare these curves for those illustrative of Large Haddock in the same areas we shall see, firstly, that the

period of maximum is distinctly later in the year, and secondly, that the actual quantities of Small Haddock greatly exceed those of the Large.

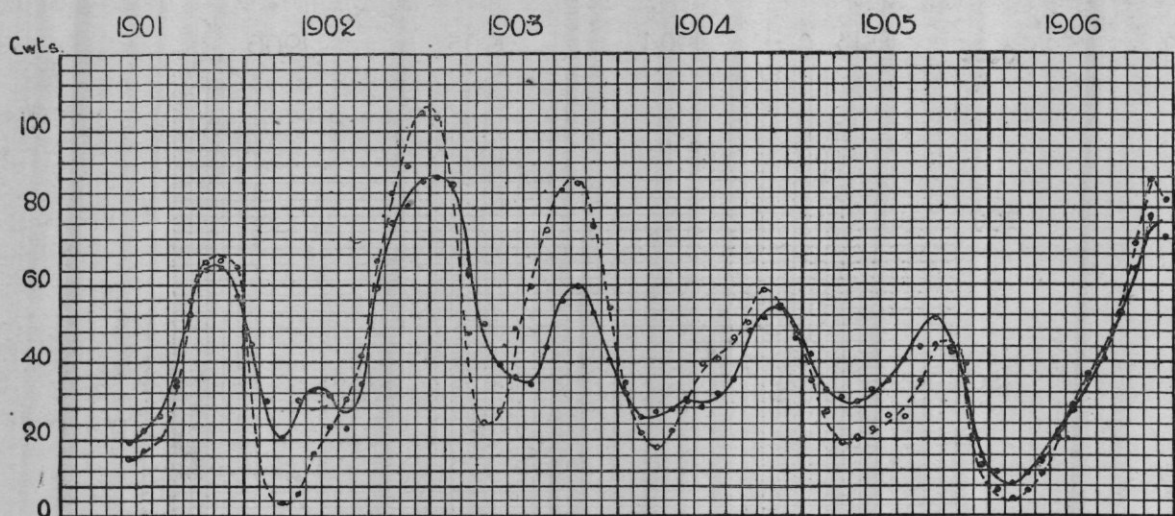


FIG. 38.—Mean monthly catches of SMALL HADDOCK, in cwts., per 100 hours' trawling, in areas XXIII and XXIX : 1901-6, (smoothed curves), (area XXIII — , area XXIX ----).

In area XVII an autumn maximum is also conspicuous, but the shoals seem to have been remarkably small in the autumn of 1905. In some of the earlier years, especially 1902 and 1904, this area appears to have received an influx of Small Haddock also in spring, which we shall presently find to be a phenomenon characteristic of the regions to the eastward.

In the Shetland area (X) a single annual wave is clearly indicated, but the season of maximum is somewhat variable; it takes place on the average about December, and may be a month or two earlier or later (Fig. 39).

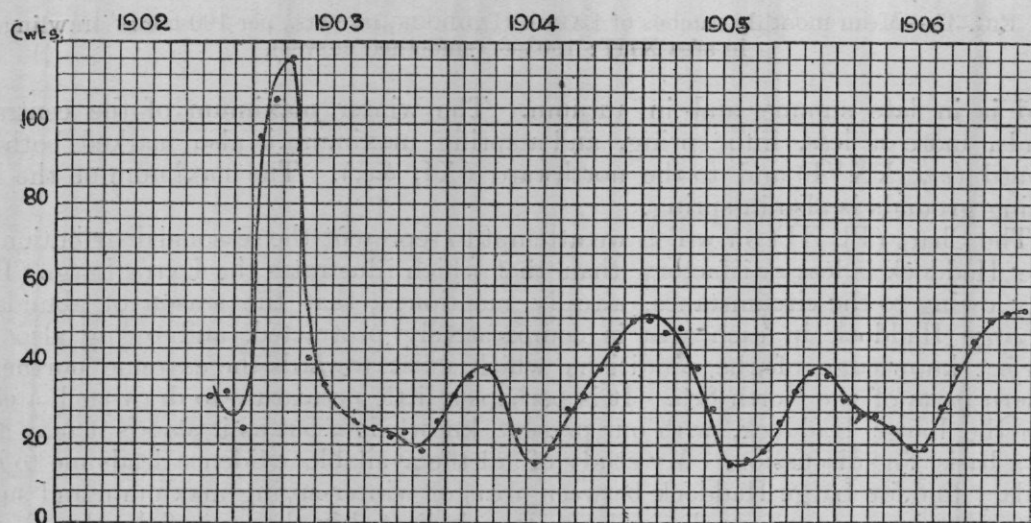


FIG. 39.—Mean monthly catches of SMALL HADDOCK, in cwts., per 100 hours' trawling, in area X : 1902-6, (smoothed curves).

The curve here reproduced is one that again illustrates the need for caution in the study of our statistics and in their illustration by means of curves. We appear to have an exceptionally high maximum in the spring of 1903, but on referring to the Tables (1902-3 Report, pp. 373, 432) we see that this is due to the large catch made by a single vessel only in February of that year.

In area XIX, though our statistics do not give us a very regular curve, we see on the whole a tendency to increase in early spring, and for the average of the six years under review the mean maximum would appear to be in March. In this case the catches in the spring of 1905 were very high, and those in the spring of 1906 exceptionally low.

The adjacent area XVIII shows a very similar period of maximum, and here again the catches were great in the spring of 1905.

The same is in general true of areas XIV and XVI immediately to the northward.

In area XXIV, over the Gut, immediately to the south of area XIX, there is a distinct annual maximum about January, sometimes, as in 1906, a little later, and here, as on our east coast, the catches in the beginning of 1906 were small, while those of 1904 were very large.

The adjacent area to the eastward, that of XXV, is closely similar.

Passing to the north-west of Scotland (area C) we have here a maximum in late autumn and winter, and especially about the month of November. The autumn of 1904 was an especially prolific season.

The Moray Firth line-fishing stations show us a maximum of Small Haddock in autumn, and the accompanying curve (Fig. 40) indicates that that maximum is attained

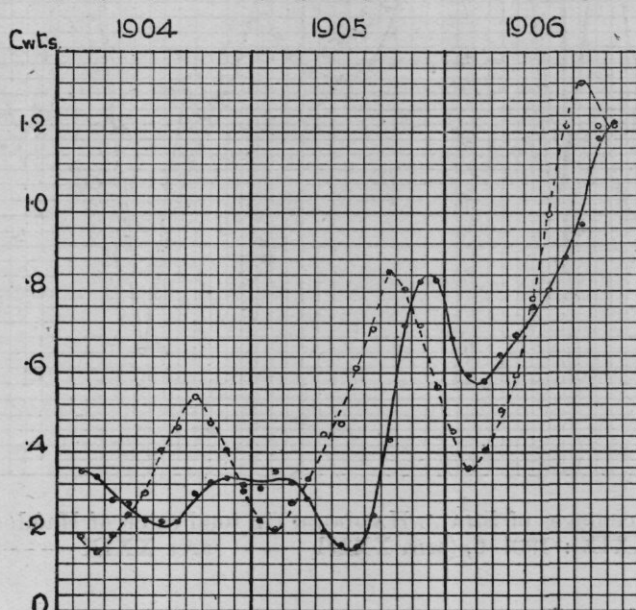


FIG. 40.—Mean monthly catches of SMALL HADDOCK by Small-Line boats at Banff and Cromarty: 1904-6, (Banff——— Cromarty - - - - -).

a little earlier at Cromarty than on the deeper waters of the Banff fishing grounds. In the Moray Firth the catch of Small Haddock increased in a marked degree between the years of 1904 and 1906.

We may briefly summarise the evidence of our statistics for Small Haddock by saying that they are especially abundant off the east coast of Scotland in autumn, and from autumn to early winter in Shetland and on the north-western grounds. In the deeper waters of the North Sea they are most abundant in mid-winter in the regions between our east coast and the Fisher Bank, while in the more northern regions their maximum abundance occurs in the months of spring (*see* Chart, Pl. IV).

At Faeroe we have evidence of a double maximum in spring and autumn.

Fig. 41 is a curve of a different kind, showing the percentage of Small Haddock to the total catch of all sizes of that fish at various seasons in areas XXIII and XXIX. It will be seen that the small fish are proportionately most numerous in spring, and least so in autumn, the latter season corresponding with the influx of the shoal of Large Haddock. Towards the end of 1904, while Small Haddock were not abnormally scarce, the large fish were unusually numerous. The chief interest of these diagrams lies in the close correspondence between the curves for the two large areas off the east coast of Scotland, indicating a great uniformity in the distribution of the various sizes of fish.

In Table V are shown the average annual catches of Haddock in the various Scottish fishery districts during the 20 years from 1886 to 1905, the ports of Aberdeen, Montrose, and Leith being the only ones where the trawling catch forms an important part of the whole. It will be seen that on the East Coast as a whole there is a double maximum in February and October, and this double maximum is also shown in the separate statistics for Leith, Montrose, and Aberdeen. In the East Coast line-fishing ports from Eyemouth to Banff the maximum is in February, except at Anstruther, where the December average is slightly greater. From Buckie to Wick on the other hand the maximum is usually in October, but a month earlier at Cromarty. In Orkney and Shetland the maximum is in January and February respectively. Turning to the West Coast, the maximum at Stornoway and Loch Broom is in December, thence southward to

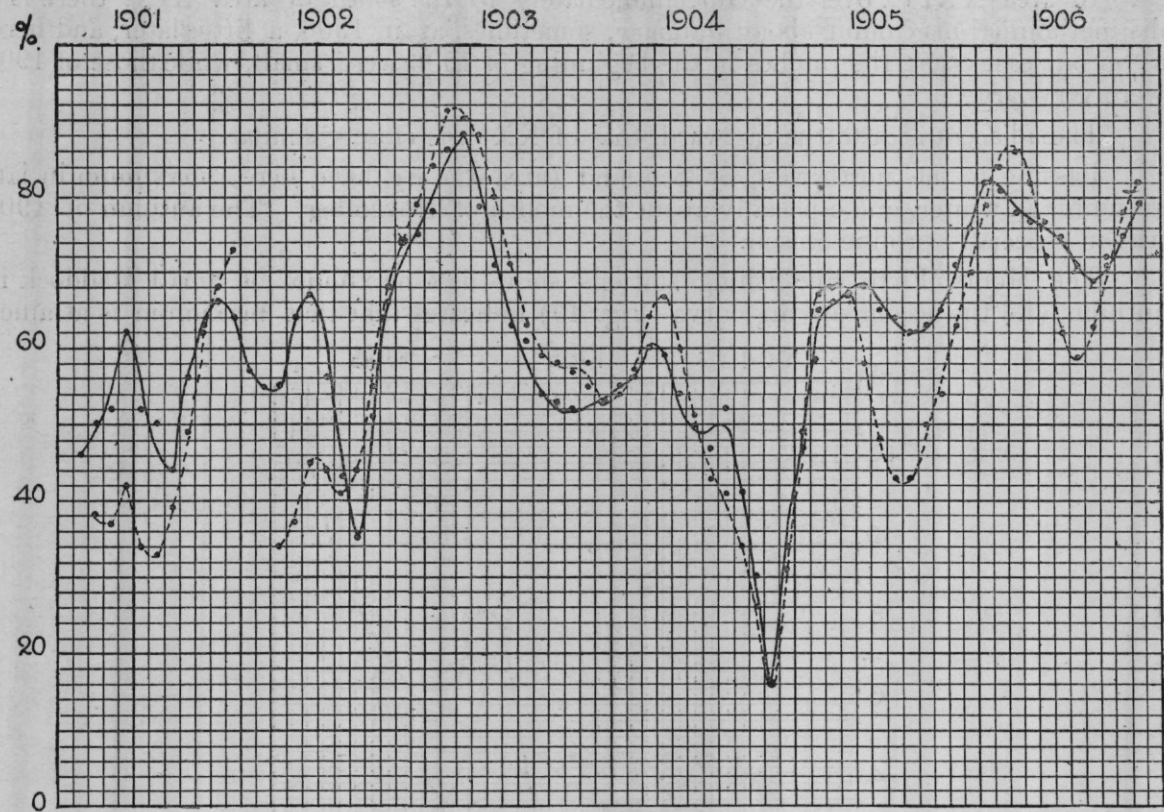


FIG. 41.—Monthly percentages of SMALL HADDOCK (in total catch of Haddock) in areas XXIII and XXIX : 1901-6, (area XXIII— area XXIX ---).

Greenock it varies from February to April, while at Ballantrae (where it is no doubt interfered with by Herring fishing in the early spring) the maximum appears in October.

TABLE V.—Average Monthly Catch of HADDOCK, in cwts., at the under-mentioned ports for the twenty years 1886-1905.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Eyemouth ...	3540	3825	2916	2376	1720	263	127	59	167	2098	2681	2638
Leith ...	9136	10298	8283	6576	7088	8431	8157	9329	12522	11948	10702	10803
Anstruther ...	1951	1949	1636	1678	1909	1762	1270	1641	1303	2016	1911	2030
Montrose ...	9485	10396	6068	6067	7724	7070	4270	5092	7810	8223	7997	6796
Stonehaven ...	2623	3162	1432	1051	1269	1106	414	310	1208	2104	1920	1422
Aberdeen ...	22771	26863	29970	22254	23983	25525	23673	26648	31249	32438	30148	29030
Peterhead ...	5763	7094	3587	3044	2227	1056	654	492	725	1968	2358	2483
Fraserburgh ...	3923	4997	4344	4073	1274	329	157	143	1686	2575	2990	2611
Banff ...	4313	5808	5328	4827	1799	1023	682	754	4166	4889	4968	3694
Buckie ...	3763	3208	2948	1649	1263	1055	258	381	3560	5592	5558	4208
Findhorn ...	2818	2942	2836	1817	1265	1347	891	1020	2816	3406	3383	3251
Cromarty ...	818	932	676	564	506	593	400	469	1080	1025	966	1002
Helmsdale ...	554	288	262	265	262	271	118	129	783	957	900	756
Lybster ...	137	124	81	61	74	62	7	7	76	191	179	167
Wick ...	810	619	342	364	354	345	284	390	1023	1424	1396	974
Orkney ...	662	627	206	248	368	434	60	419	560	661	584	653
Shetland ...	3909	4828	2898	1210	643	503	456	246	518	1332	3145	4422
Stornoway ...	1250	865	677	576	499	679	644	864	796	1559	1744	1993
Barra Loch ...	—	—	—	2	1	4	15	9	8	7	—	—
Broom Loch ...	328	266	178	98	57	158	236	305	369	343	317	380
Carron ...	93	112	66	33	25	35	48	54	55	52	65	69
Fort William ...	36	42	31	13	9	9	10	12	12	27	23	31
Campbeltown ...	109	148	157	111	74	54	34	31	54	96	92	114
Inveraray ...	47	86	99	72	23	6	—	—	—	6	10	15
Rothsay ...	118	141	141	124	64	39	29	39	58	69	88	98
Greenock ...	87	103	109	115	94	47	41	57	65	87	80	69
Ballantrae ...	230	236	250	247	161	91	86	130	282	363	333	252
Scotland ...	80134	89911	70997	60679	54736	52304	43376	49081	72960	85458	84596	80035

TABLE VI.—Mean Catch of EXTRA LARGE HADDOCK per 100 hours' trawling (Aberdeen Trawlers) during the years 1901–1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	5.3	5.1	1.5	—	—	—	1.0	1.7	—	—	2.9
VII ...	—	.8	1.5	1.8	.7	0.0	—	—	—	—	—	—	1.0
VIII ...	—	—	1.2	1.5	.6	—	—	—	—	—	—	—	1.1
IX ...	—	—	—	—	—	—	.9	.4	0.0	5.6	1.8	.6	1.6
X ...	1.4	2.4	2.9	2.5	2.7	3.5	2.8	2.6	2.6	1.9	1.4	.9	2.3
XI ...	.6	.9	1.7	.7	.2	.1	0.0	0.0	.6	.3	.2	.3	.5
XII ...	.3	.6	2.7	.9	.3	.2	.5	.1	.1	.3	.3	.2	.5
XIII ...	3.6	1.2	1.1	2.6	12.3	7.9	12.1	13.7	33.2	26.2	3.0	4.6	10.1
XIV ...	.9	1.6	3.4	1.7	.1	1.3	1.6	3.8	3.7	2.9	4.5	2.7	2.4
XV ...	.5	1.4	2.8	.9	0.0	0.0	0.0	.3	.2	.6	.2	.3	.6
XVI ...	.5	1.8	5.8	1.3	0.0	—	—	—	—	0.0	.1	.4	1.2
XVII ...	.8	.5	1.4	.9	3.4	3.2	2.8	5.0	.9	.5	.5	.5	1.7
XVIII ...	.6	.8	1.7	.5	0.0	.2	0.0	.1	.1	.1	.1	.3	.4
XIX ...	.3	2.8	5.2	.5	0.0	0.0	0.0	0.0	0.0	0.0	.2	.2	0.8
XX ...	.4	4.8	6.3	3.4	0.0	0.0	0.0	0.0	.4	.1	.1	.1	1.3
XXIII ...	0.0	0.0	.2	0.0	.1	.1	.1	.2	.3	.1	.1	0.0	.1
XXIV ...	.8	9.8	6.5	.1	0.0	0.0	0.0	1.0	.1	.1	.3	.1	1.6
XXV ...	.3	4.7	1.9	1.0	0.0	.1	.4	0.0	.2	.1	.1	.1	.7
XXVI ...	1.3	—	7.7	3.5	0.0	1.0	.3	.8	3.5	2.5	.5	.3	1.9
XXVII ...	—	—	—	—	.5	—	—	6.7	8.0	3.5	4.3	2.0	4.2
XXVIII ...	—	0.0	—	—	0.0	.8	.5	—	—	.3	.4	.2	.3
XXIX ...	.2	.1	0.0	0.0	0.0	.1	.3	.3	.2	.1	0.0	.1	.1
XXX ...	.4	2.2	2.6	—	—	—	0.0	.1	.1	0.0	0.0	.1	.6
XXXI ...	.3	2.9	4.6	—	0.0	.2	.2	.5	.6	.7	.5	.2	.9
XXXII ...	—	3.0	—	—	.1	0.0	0.0	.6	2.0	2.1	1.0	1.7	1.2
XXXIII ...	—	—	—	—	—	1.3	3.9	—	5.2	6.1	—	—	4.1
XXXV ...	—	4.4	—	—	—	0.0	—	—	—	0.0	0.0	—	1.1
XXXVI ...	5.4	4.6	4.9	—	1.0	—	—	—	3.3	2.0	1.4	—	3.2
XXXVII ...	—	2.6	—	—	0.0	—	—	—	4.0	—	—	3.5	2.5
C ...	24.7	16.2	7.6	8.5	14.1	11.5	15.0	15.9	11.1	4.5	6.6	14.5	12.5
D ...	4.7	13.1	8.1	10.1	11.8	15.5	15.4	45.5	13.0	5.6	2.4	8.6	12.8
J ...	—	—	—	—	19.8	10.1	20.7	11.5	—	—	—	16.5	15.7
K ...	2.8	10.6	10.9	7.1	—	6.7	18.8	—	—	—	—	—	9.5
Faeroe ...	33.1	30.3	52.4	23.7	29.2	19.0	38.2	47.6	33.7	24.9	32.9	34.5	33.3
Iceland ...	—	249.4	494.0	523.0	460.2	431.8	171.4	146.9	117.0	23.0	—	—	290.7

TABLE VII.—Mean Catch of LARGE HADDOCK per 100 hours' trawling (Aberdeen Trawlers) during the years 1901–1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	114.7	121.0	60.9	—	—	—	109.9	77.3	—	—	96.8
VII ...	—	36.0	99.6	99.2	62.2	25.0	—	—	—	—	—	—	64.4
VIII ...	—	—	99.4	100.0	94.7	—	—	—	—	—	—	—	98.0
IX ...	—	—	—	—	—	—	64.2	61.0	62.3	112.8	52.0	101.9	75.7
X ...	65.1	78.3	65.5	79.2	77.9	110.2	109.9	102.0	102.9	60.4	60.9	67.1	81.6
XI ...	67.3	55.8	76.5	87.1	58.9	38.8	31.6	97.2	74.9	66.6	64.5	50.4	54.1
XII ...	80.6	62.6	69.9	66.0	52.7	43.5	65.6	100.4	79.1	74.0	86.3	63.9	70.4
XIII ...	41.1	35.5	14.8	25.0	42.1	46.5	44.9	77.4	109.7	71.6	31.0	52.8	49.4
XIV ...	51.4	52.2	62.3	72.0	30.9	51.9	91.5	93.9	75.6	59.3	65.0	48.1	62.8
XV ...	58.2	59.1	62.1	64.8	65.8	61.5	86.4	55.0	72.9	59.4	61.7	49.6	63.0
XVI ...	55.1	63.5	72.6	59.7	41.9	—	—	—	—	84.3	66.5	69.1	64.1
XVII ...	25.8	25.7	24.3	18.0	28.9	28.5	30.5	56.6	60.4	58.1	38.0	31.4	35.5
XVIII ...	46.7	39.4	39.4	25.9	16.4	33.8	22.9	23.7	12.5	23.8	21.7	40.3	28.9
XIX ...	47.9	48.4	51.8	27.4	19.6	20.5	24.1	23.5	30.4	54.3	55.0	47.6	37.5
XX ...	58.8	63.0	63.9	66.8	40.9	39.8	62.0	51.7	69.9	49.0	72.6	69.6	59.0
XXIII ...	12.7	10.0	7.7	7.9	9.8	12.2	13.0	15.8	18.6	19.7	16.0	14.4	13.1
XXIV ...	44.0	43.7	51.1	18.7	18.2	14.8	21.3	17.8	18.2	33.8	56.1	54.5	32.7

TABLE VII.—*continued.*

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
XXV ...	87.5	77.3	40.0	33.7	37.7	43.3	51.8	48.0	53.5	63.7	59.9	54.3	54.2
XXVI ...	37.6	—	106.7	69.1	35.4	51.3	65.9	54.9	92.0	79.8	60.9	67.0	65.5
XXVII ...	—	—	—	—	19.1	—	—	109.3	103.7	104.7	119.7	88.0	90.8
XXVIII ...	—	3.6	—	—	5.9	11.7	19.1	—	—	13.4	9.5	9.1	10.3
XXIX ...	11.6	8.2	3.2	3.5	12.3	20.1	27.0	26.4	33.7	29.7	23.0	18.0	18.1
XXX ...	35.8	41.0	32.1	—	—	—	23.5	37.7	35.2	48.0	45.4	46.5	38.4
XXXI ...	34.1	54.0	40.5	—	35.2	46.1	61.7	60.8	67.9	69.5	62.9	58.2	53.7
XXXII ...	—	57.0	—	—	40.7	51.7	72.4	56.0	76.2	77.9	61.1	59.1	61.3
XXXIII ...	—	—	—	—	—	90.8	84.7	—	66.1	118.8	—	—	90.1
XXXV ...	—	76.2	—	—	—	29.9	—	—	—	55.8	37.2	—	49.8
XXXVI ...	71.0	51.5	75.3	—	30.5	—	—	—	48.6	60.3	55.9	—	56.2
XXXVII ...	—	30.0	—	—	41.2	—	—	—	63.6	—	—	83.3	54.5
C ...	269.4	238.3	130.6	107.5	133.0	126.8	162.4	242.6	181.8	163.6	177.8	189.0	176.9
D ...	53.9	123.3	59.1	71.3	84.7	91.2	161.0	139.6	106.1	57.9	53.8	168.8	97.6
J ...	—	—	—	—	228.7	127.7	168.0	203.3	—	—	—	266.6	198.7
K ...	10.8	44.1	83.9	99.1	—	70.8	167.4	—	—	—	—	—	79.4
Faeroe ...	105.5	99.8	160.3	106.8	129.5	97.2	96.8	111.6	82.4	74.2	80.7	61.2	100.5
Iceland ...	—	.3	15.6	45.5	20.0	62.3	37.6	40.2	85.4	14.2	—	—	35.7

TABLE VIII.—Mean Catch of MEDIUM HADDOCK per 100 hours' trawling (Aberdeen Trawlers) during the years 1901-1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	30.7	39.9	19.1	—	—	—	29.0	25.7	—	—	28.9
VII ...	—	20.8	46.5	54.5	34.1	23.5	—	—	—	—	—	—	35.9
VIII ...	—	—	51.4	53.4	26.8	—	—	—	—	—	—	—	43.9
IX ...	—	—	—	—	—	—	22.9	20.6	19.6	40.2	19.8	33.3	26.1
X ...	23.4	22.8	23.0	26.4	14.6	17.3	21.0	32.3	32.3	24.4	25.1	26.3	24.1
XI ...	30.3	25.4	39.0	41.5	31.1	32.2	24.6	33.3	25.3	32.9	31.3	27.8	31.2
XII ...	40.1	37.8	36.0	45.9	45.4	35.9	32.3	41.5	46.2	38.1	40.4	33.1	39.4
XIII ...	16.2	31.2	12.5	12.4	7.3	10.0	15.6	23.7	28.9	20.1	12.3	18.1	17.4
XIV ...	22.7	25.8	34.0	27.9	17.4	17.9	28.6	28.4	30.4	24.1	25.8	22.9	25.5
XV ...	28.2	29.3	34.5	35.2	22.5	30.0	41.4	25.9	25.5	28.0	28.8	25.6	29.7
XVI ...	37.3	32.2	36.3	28.0	23.7	—	—	—	—	27.6	32.3	36.0	31.7
XVII ...	18.2	19.3	15.3	10.4	12.5	12.3	18.4	36.9	34.9	38.2	31.5	24.5	22.7
XVIII ...	21.6	20.4	23.8	17.6	11.5	18.5	12.9	14.4	8.9	12.9	13.0	21.8	16.4
XIX ...	28.2	33.1	28.8	13.6	13.3	11.5	17.5	14.8	18.3	23.5	22.3	30.4	21.3
XX ...	43.2	42.8	37.1	29.0	21.8	13.1	24.1	37.3	32.0	37.9	31.2	46.8	33.1
XXIII ...	8.1	5.5	4.7	6.3	6.7	8.7	10.1	11.2	14.6	16.1	12.5	11.8	9.7
XXIV ...	37.3	23.2	23.4	8.2	13.2	11.5	12.0	12.1	13.5	19.6	21.7	34.0	19.1
XXV ...	68.7	18.9	24.0	18.0	15.8	18.0	27.0	35.5	34.7	36.4	36.3	34.4	30.6
XXVI ...	20.9	—	34.0	31.9	17.1	16.3	26.1	38.4	38.2	37.7	36.5	39.5	30.6
XXVII ...	—	—	—	—	18.5	—	—	40.7	44.2	41.6	38.4	27.8	35.2
XXVIII ...	—	2.2	—	—	4.4	15.9	17.3	—	—	10.4	5.6	5.4	8.7
XXIX ...	8.7	5.0	2.0	2.8	6.0	10.4	17.9	17.1	23.0	21.8	19.2	13.2	12.2
XXX ...	36.3	26.9	20.5	—	—	—	20.6	39.7	37.7	25.8	37.1	39.4	31.6
XXXI ...	32.7	28.6	31.5	—	17.3	24.7	32.3	32.7	33.0	44.0	35.3	40.6	32.1
XXXII ...	—	18.7	—	—	18.9	18.9	18.2	29.4	51.1	50.2	41.4	49.2	33.0
XXXIII ...	—	—	—	—	—	30.7	37.8	—	35.7	38.4	—	—	35.6
XXXV ...	—	7.8	—	—	—	23.7	—	—	—	30.3	19.2	—	20.2
XXXVI ...	35.4	13.8	25.9	—	13.2	—	—	—	37.6	29.0	41.1	—	28.0
XXXVII ...	—	12.6	—	—	7.5	—	—	—	67.1	—	—	50.3	34.4
C ...	53.8	47.6	30.9	21.5	24.5	29.8	47.0	66.5	49.1	55.9	54.9	55.9	44.7
D ...	18.8	37.4	15.9	19.9	20.1	20.7	34.3	34.7	30.9	24.8	31.2	37.8	27.2
J ...	—	—	—	—	50.5	34.7	57.7	79.3	—	—	—	97.3	63.9
K ...	10.9	19.7	24.5	34.3	—	39.9	55.2	—	—	—	—	—	30.6
Faeroe ...	12.0	5.6	3.9	6.7	6.8	4.9	14.9	16.6	44.3	64.7	32.0	21.5	19.5
Iceland ...	—	0.0	0.0	.8	.2	2.2	1.6	9.9	25.2	3.2	—	—	4.8

TABLE IX.—Mean Catch of SMALL HADDOCK per 100 hours' trawling (Aberdeen Trawlers) during the years 1901-1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	38.4	43.5	20.7	—	—	—	23.3	28.9	—	—	31.0
VII ...	—	21.5	57.8	59.3	39.9	38.5	—	—	—	—	—	—	43.4
VIII ...	—	—	62.0	64.8	32.2	—	—	—	—	—	—	—	53.0
IX ...	—	—	—	—	—	—	27.1	22.4	29.2	56.1	23.3	48.4	34.4
X ...	37.8	38.9	38.9	38.7	15.2	15.6	24.2	35.3	35.9	40.3	50.3	46.4	34.8
XI ...	49.5	45.3	57.0	52.8	38.3	47.0	30.9	47.1	39.0	41.6	43.2	48.0	45.0
XII ...	26.9	48.9	58.5	57.8	73.0	51.6	39.0	41.8	55.5	50.7	37.9	42.9	48.7
XIII ...	24.5	112.1	37.2	37.2	14.9	12.5	24.7	24.3	21.7	40.0	24.5	30.0	33.6
XIV ...	40.8	55.7	75.3	45.5	32.7	28.2	54.3	51.6	52.9	52.3	54.4	51.9	49.6
XV ...	46.6	54.8	63.7	62.1	38.3	53.9	71.0	47.6	48.7	38.7	44.7	49.7	51.6
XVI ...	49.0	57.5	69.5	63.1	35.6	—	—	—	—	34.3	36.4	50.8	49.5
XVII ...	58.3	69.2	56.3	40.9	32.0	29.6	41.8	73.8	80.2	101.0	102.0	74.1	63.3
XVIII ...	62.4	67.9	79.6	58.5	43.2	44.4	34.6	33.7	34.0	41.2	42.2	67.0	50.7
XIX ...	45.3	52.9	65.4	39.2	32.9	29.0	37.1	40.8	37.1	34.8	39.5	52.3	42.2
XX ...	51.1	60.1	67.9	69.9	41.5	25.8	31.1	43.9	38.7	39.1	43.3	59.2	47.6
XXIII ...	42.4	23.9	21.5	24.9	27.9	30.2	35.9	41.8	46.4	69.6	57.8	60.8	40.3
XXIV ...	102.6	58.4	60.5	41.3	45.4	41.0	30.3	35.4	37.5	45.5	50.8	85.3	52.8
XXV ...	153.5	64.1	48.5	48.6	40.4	42.7	35.9	41.4	55.0	50.7	62.0	71.7	59.5
XXVI ...	31.0	—	25.4	59.0	39.1	33.2	26.2	38.4	48.4	59.1	50.9	71.7	43.9
XXVII ...	—	—	—	—	48.5	—	—	49.0	42.6	32.3	28.6	19.8	36.8
XXVIII ...	—	9.0	—	—	13.1	53.8	35.5	—	—	57.4	33.6	24.2	32.4
XXIX ...	51.1	19.6	14.2	16.6	31.4	30.8	38.6	43.3	56.2	71.5	75.9	56.6	42.1
XXX ...	105.9	104.3	90.9	—	—	—	40.4	53.7	48.8	52.4	71.0	103.0	74.5
XXXI ...	116.0	94.8	93.3	—	43.3	63.1	38.3	49.7	58.5	74.2	64.2	116.8	73.8
XXXII ...	—	29.1	—	—	38.0	29.7	20.8	45.5	62.0	59.1	63.8	101.1	49.9
XXXIII ...	—	—	—	—	—	37.1	31.9	—	49.9	43.5	—	—	40.6
XXXV ...	—	45.8	—	—	—	35.2	—	—	—	48.8	60.8	—	47.7
XXXVI ...	59.4	31.6	72.1	—	19.9	—	—	—	59.5	63.5	70.2	—	53.7
XXXVII ...	—	20.2	—	—	29.2	—	—	—	67.8	—	—	25.4	25.6
C ...	22.1	37.5	24.8	22.6	18.6	32.3	51.8	50.0	47.2	66.8	67.4	56.7	41.5
D ...	33.2	47.6	22.4	28.2	23.0	28.6	29.5	28.2	36.0	53.9	35.3	30.9	33.1
J ...	—	—	—	—	36.6	35.4	46.9	74.7	—	—	—	86.9	56.1
K ...	9.4	47.7	50.9	55.6	—	89.4	72.9	—	—	—	—	—	54.3
Faroe ...	10.1	28.2	12.8	8.4	4.7	11.0	10.9	6.3	29.5	40.2	20.7	15.6	16.5
Iceland ...	—	0.0	0.0	.7	.5	17.1	23.5	8.6	36.7	0.0	—	—	9.7

TABLE X.—Mean Catch of EXTRA SMALL HADDOCK per 100 hours' trawling (Aberdeen Trawlers) during the years 1905-1906.

Area	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	0.0	0.0	.3	—	—	—	0.0	.9	—	—	.2
VII ...	—	0.0	0.0	.3	1.6	0.0	—	—	—	—	—	—	.4
VIII ...	—	—	7.2	0.0	0.0	—	—	—	—	—	—	—	2.4
IX ...	—	—	—	—	—	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X ...	0.0	0.0	1.9	.8	.8	.4	.3	0.0	.2	.2	0.0	1.7	.5
XI ...	0.0	.7	.5	.4	0.0	1.2	0.0	0.0	0.0	.5	0.0	3.0	.5
XII ...	0.0	.6	1.2	1.5	0.0	0.0	0.0	0.0	0.0	3.7	.2	.8	.7
XIII ...	2.5	.2	1.5	7.2	.8	.2	0.0	0.0	0.0	0.0	0.0	0.0	1.0
XIV ...	1.2	2.3	3.4	2.5	0.0	0.0	0.0	.5	0.0	.9	.4	3.4	1.2
XV ...	.2	1.4	1.1	.8	0.0	0.0	0.0	0.0	0.0	.2	1.2	1.1	.5
XVI ...	.7	1.3	2.8	1.4	0.0	—	—	—	—	0.0	.8	1.1	1.0
XVII ...	4.9	3.3	8.8	3.2	2.6	1.3	.9	0.0	0.0	0.0	0.0	3.9	2.4
XVIII ...	1.2	.8	7.2	2.9	7.9	2.1	1.2	0.0	.5	.5	2.3	3.3	2.5
XIX ...	.6	2.5	2.5	0.0	.9	3.1	.7	.2	0.0	0.0	1.8	.9	1.1
XX ...	1.6	2.2	2.3	.7	1.6	6.0	0.0	1.5	0.0	0.0	4.3	0.0	1.7
XXIII ...	9.1	14.9	13.0	11.2	12.1	8.2	2.4	.9	.7	2.9	3.4	3.3	6.8
XXIV ...	1.7	3.7	.4	0.0	.9	3.3	2.6	.2	.2	.5	0.0	0.0	1.3

TABLE X—continued.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
XXV ...	0.0	.4	1.6	2.4	.6	3.1	0.0	.1	0.0	.9	.1	1.0	.8
XXVI ...	9.8	—	4.2	0.0	0.0	4.7	0.0	0.0	6.5	0.0	0.0	0.0	2.3
XXVII ...	—	—	—	—	0.0	—	—	0.0	.2	0.0	0.0	0.0	0.0
XXVIII ...	—	10.5	—	—	0.0	0.0	10.5	—	—	4.4	0.0	3.1	4.1
XXIX ...	6.7	11.5	6.1	1.2	2.8	3.0	1.8	1.6	0.0	1.7	3.9	1.2	3.5
XXX ...	0.0	1.7	1.1	—	—	—	.6	0.0	0.0	1.9	0.0	0.0	.6
XXXI ...	0.0	.6	0.0	—	0.0	.4	.4	.2	0.0	0.0	0.0	0.0	.1
XXXII ...	—	0.0	—	—	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	.3
XXXIII ...	—	—	—	—	—	0.0	0.0	—	0.0	0.0	—	—	0.0
XXXV ...	—	15.2	—	—	—	2.0	—	—	—	0.0	0.0	—	4.3
XXXVI ...	0.0	5.2	0.0	—	1.2	—	—	—	0.0	0.0	0.0	—	.9
XXXVII ...	—	2.3	—	—	0.0	—	—	—	0.0	—	—	0.0	.6
C ...	0.0	0.0	0.0	0.0	.4	.2	.1	0.0	0.0	0.0	1.8	.5	.2
D ...	.5	.4	0.0	.3	.6	.1	.2	0.0	0.0	0.0	0.0	.7	.8
J ...	—	—	—	—	.6	0.0	0.0	0.0	—	—	—	0.0	.1
K ...	0.0	0.0	.5	.3	—	0.0	0.0	—	—	—	—	—	.1
Faroe ...	0.0	0.0	0.0	0.0	.1	.1	0.0	0.0	0.0	0.0	.8	0.0	.1
Iceland ...	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	—	—	0.0

TABLE XI.—Mean Catch of TOTAL HADDOCK per 100 hours' trawling (Aberdeen Trawlers) during the years 1901-1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	189	210	103	—	—	—	163	135	—	—	160
VII ...	—	79	205	215	138	87	—	—	—	—	—	—	145
VIII ...	—	—	221	220	154	—	—	—	—	—	—	—	198
IX ...	—	—	—	—	—	—	115	104	111	215	97	182	137
X ...	128	143	132	148	111	147	158	172	174	127	138	142	143
XI ...	148	128	175	183	129	119	87	178	140	142	139	130	141
XII ...	148	151	168	172	171	131	137	184	181	167	165	141	160
XIII ...	88	178	67	85	77	77	97	139	194	158	71	106	111
XIV ...	117	138	179	150	81	99	176	178	163	140	150	129	142
XV ...	134	146	164	164	127	146	199	129	147	127	137	127	145
XVI ...	143	156	187	154	101	—	—	—	—	146	136	157	148
XVII ...	108	118	106	74	79	75	94	172	176	198	172	134	126
XVIII ...	133	129	152	105	79	99	72	72	56	78	79	133	99
XIX ...	122	140	154	81	67	64	79	79	86	113	119	131	103
XX ...	155	173	177	170	106	85	117	134	142	126	152	176	143
XXIII ...	72	54	47	50	57	59	62	70	81	109	90	91	70
XXIV ...	186	139	142	68	78	71	66	66	69	99	129	174	107
XXV ...	310	165	116	104	95	107	115	125	143	152	159	162	146
XXVI ...	101	—	178	164	92	107	119	133	189	179	149	178	144
XXVII ...	—	—	—	—	87	—	—	206	199	182	191	138	167
XXVIII ...	—	25	—	—	23	82	83	—	—	86	49	42	56
XXIX ...	78	44	26	24	53	65	86	89	113	125	122	89	76
XXX ...	178	171	147	—	—	—	85	131	122	128	154	189	145
XXXI ...	183	181	170	—	96	135	133	144	160	189	163	216	161
XXXII ...	—	108	—	—	98	103	111	132	191	189	167	211	146
XXXIII ...	—	—	—	—	—	160	158	—	157	207	—	—	171
XXXV ...	—	149	—	—	—	91	—	—	—	135	117	—	123
XXXVI ...	171	107	178	—	66	—	—	—	149	155	169	—	142
XXXVII ...	—	68	—	—	78	—	—	—	203	—	—	163	128
C ...	370	340	194	160	191	201	276	375	289	291	308	317	276
D ...	111	222	106	130	140	156	240	248	186	142	123	254	171
J ...	—	—	—	—	336	208	293	369	—	—	—	447	335
K ...	34	121	171	196	—	207	314	—	—	—	—	—	174
Faroe ...	161	164	229	146	170	132	161	182	190	204	167	133	170
Iceland ...	—	250	510	570	481	513	234	206	264	41	—	—	341

THE WHITING. (*Gadus merlangus*.)

It is in all cases necessary to remember that the statistics with which we are at present mainly concerned are trawl statistics, and refer accordingly to fishing in the deeper waters. This is especially to be borne in mind in dealing with such a fish as the Whiting, which we know to resort at times in great shoals to the shallow waters of the shore; this phenomenon of periodic migration shorewards will have to be dealt with by help of information drawn from other sources. It also deserves to be remembered that Whiting, and especially trawled Whiting, are of small value in the market, and are often thrown overboard in large quantities, especially by trawlers working on the more distant grounds. For this reason as well as for want of information relating to the different sizes and ages of this fish, our statistics of the Whiting are much less easy to interpret than are those of Cod and Haddock.

The average catch in our trawling area, as represented in Fig. 42, is greatest to the northward, even if we exclude those most northern areas of all for which our statistics

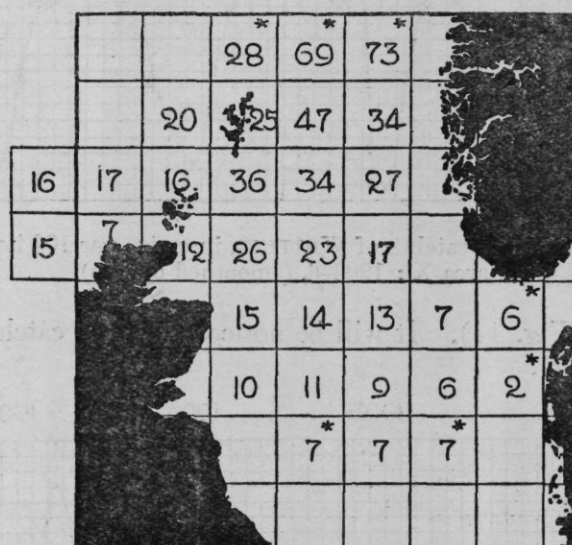


FIG. 42.—Mean catch of WHITING, in cwt., per 100 hours' trawling, in various areas: 1901-6, (Faroe 3 cwt., Iceland 7 cwt.).

are very imperfect. It is considerably less to the westward than to the eastward of Orkney and Shetland, and it diminishes as we come southward in the North Sea, the numbers remaining fairly high along the east coast of Scotland.

The mean density over our North Sea areas may be stated approximately at about 20 cwt. per 100 hours' fishing.

The quantities brought from Faroe and Iceland are very small, but for the reason already stated they cannot be safely taken as a measure of the local abundance of fish.

The smallest Whiting landed by the Aberdeen trawlers are those from the near grounds off the east coast of Scotland, while those from Iceland are by much the largest. The average (median) size off the east coast is 11 inches (28 cm.), from the middle and southern grounds 12.2 inches (31 cm.) in both cases, from the Shetland and western grounds 13.4 and 13.8 inches respectively, and from Faroe and Iceland 15.4 and 19.3 inches. One-tenth of the fish from the east coast are below 9.5 and one-tenth above 13 inches; from the southern and middle grounds one-tenth are below 10.6 inches, and one-tenth above 14.2 and 14.6 respectively: from Shetland one-tenth below 11.8 and one-tenth above 15.8: from the western grounds one-tenth below 12.6 and one-tenth above 15.8: from Faroe one-tenth below 13.4 and one-tenth above 18.5: from Iceland one-tenth below 16.1 and one-tenth above 23.6. The largest fish from the east coast was 18.5 inches (47 cm.), and the largest from Iceland 29.5 inches (75 cm.).

Over the great majority of our trawling areas Whiting tend to show a maximum in winter or early spring, with a corresponding minimum in summer. In the Shetland area (X) the annual wave is clearly shown, and the maximum is regularly in winter-time about November or December (Fig. 43). On the other hand, the small-line catches indicate a maximum in summer-time, suggesting a migration shorewards at that season (Table XII, page).

Passing directly southwards from the Shetland area, we have again a regular wave shown us in area XIV, the period of maximum, however, being later than at Shetland,

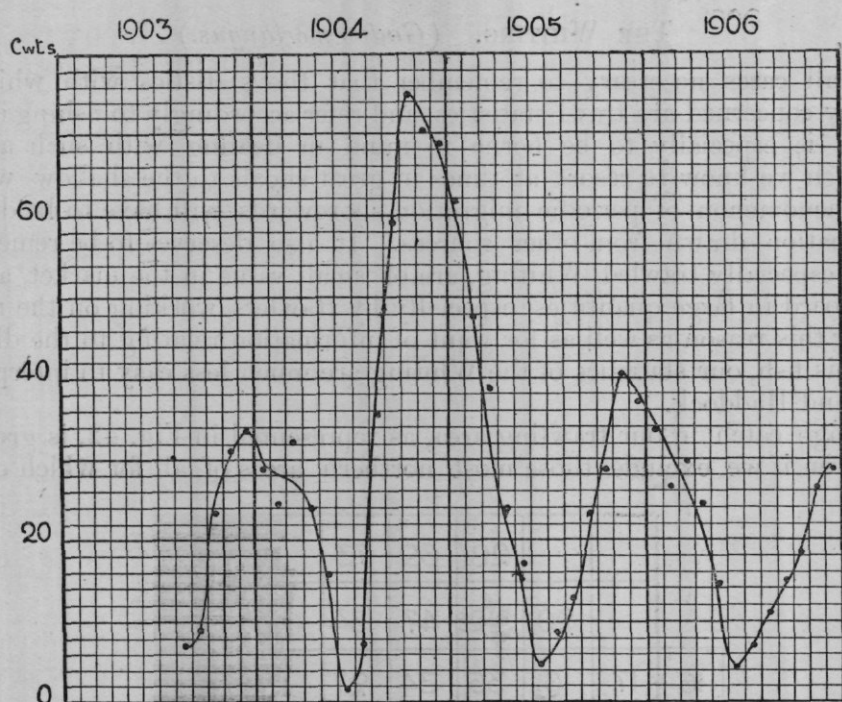


FIG. 43.—Mean monthly catches of WHITING, in cwts., per 100 hours' trawling, in area X : 1903-6, (smoothed curves).

namely in early spring (Fig. 44). It will be noticed that the catches were exceptionally large in the spring of 1905.

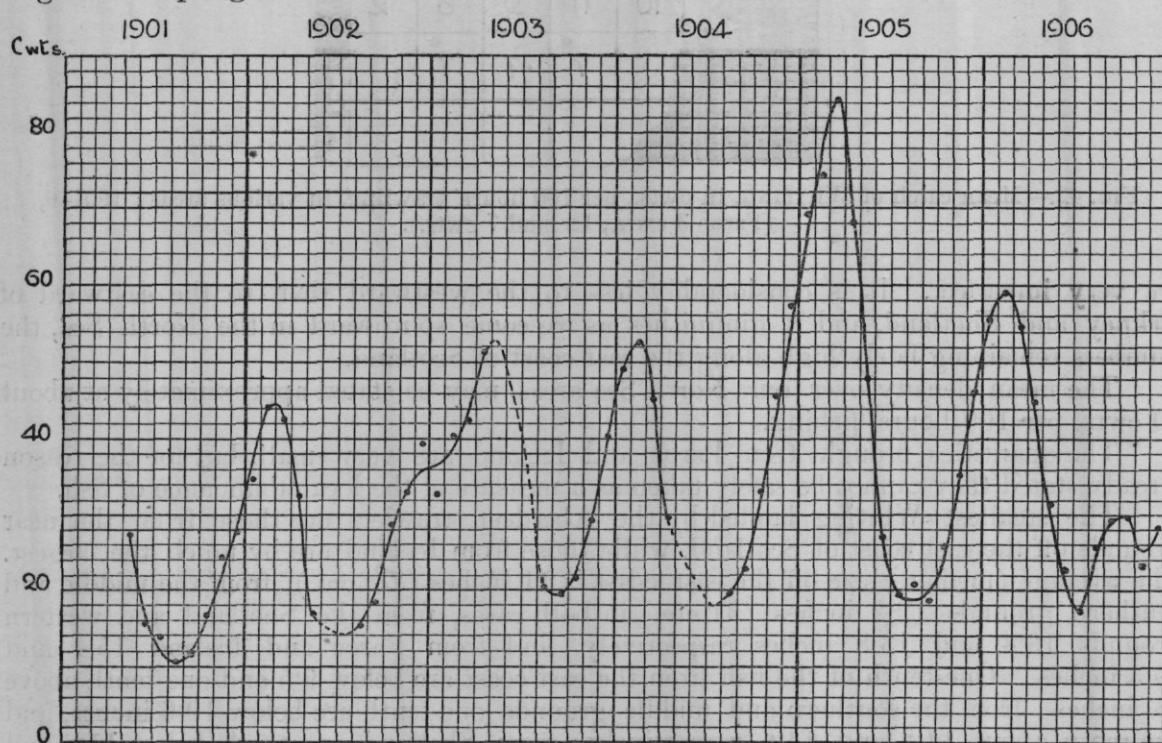


FIG. 44.—Mean monthly catches of WHITING, in cwts., per 100 hours' trawling, in area XIV : 1901-6, (smoothed curves).

Still further southwards in area XVIII a similar winter or early spring maximum is indicated, the actual date of maximum varying from January to March.

Passing to area XXIX, eastward of the Firth of Forth, we have here again, though with greatly reduced catches, evidence of a winter maximum (Fig. 45). The high maxima here shown in the winter of 1902-3 are based on some exceptional catches in January.

Off the north-west of Scotland, in areas C and D, the maximum is still in winter-time, and in December, 1904, and one or two following months, the catches off Rona and Sule Skerry were exceptionally large.

Passing to area XXV, in the middle of the North Sea, as we approach the Fisher Bank, the maximum is still in winter-time from about December to February.

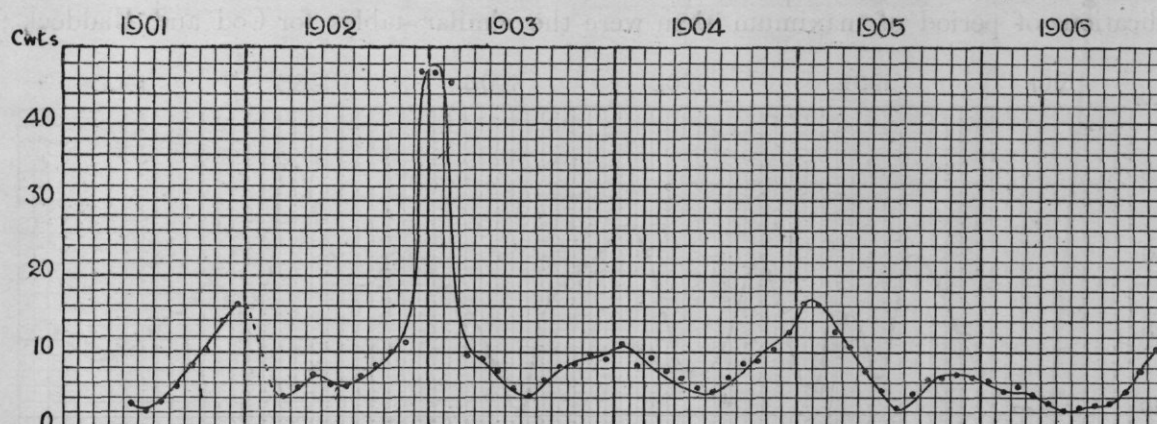


FIG. 45.—Mean monthly catches of WHITING, in cwts., per 100 hours' trawling, in area XXIX : 1901-6, (smoothed curves).

On the other hand, in the adjacent area XXIV, south of the Witch Ground (Fig. 46) we find a regular maximum about August or September, extending onwards more or less to winter-time.

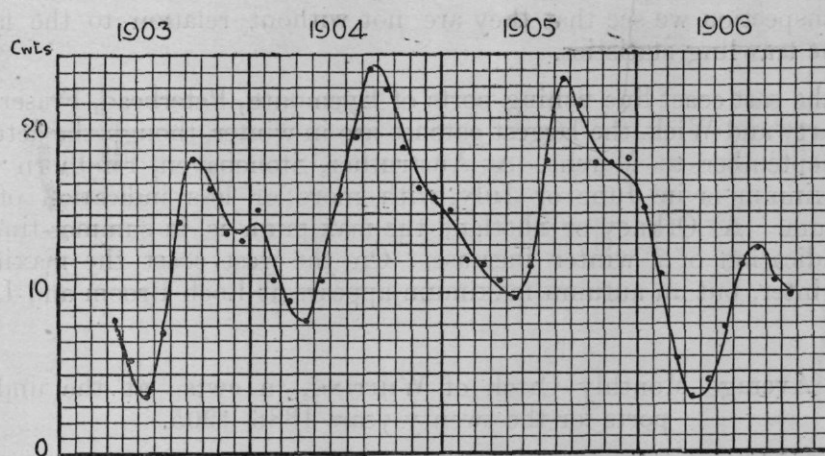


FIG. 46.—Mean monthly catches of WHITING, in cwts., per 100 hours' trawling, in area XXIV : 1903-6, (smoothed curves).

In area XXIII and XIX (Figs. 47 and 48), we have indications of a double maximum, that of early autumn being more or less distinct from that of winter, and these two maxima are again more or less clearly indicated off the Scotch coast from Orkney southward.

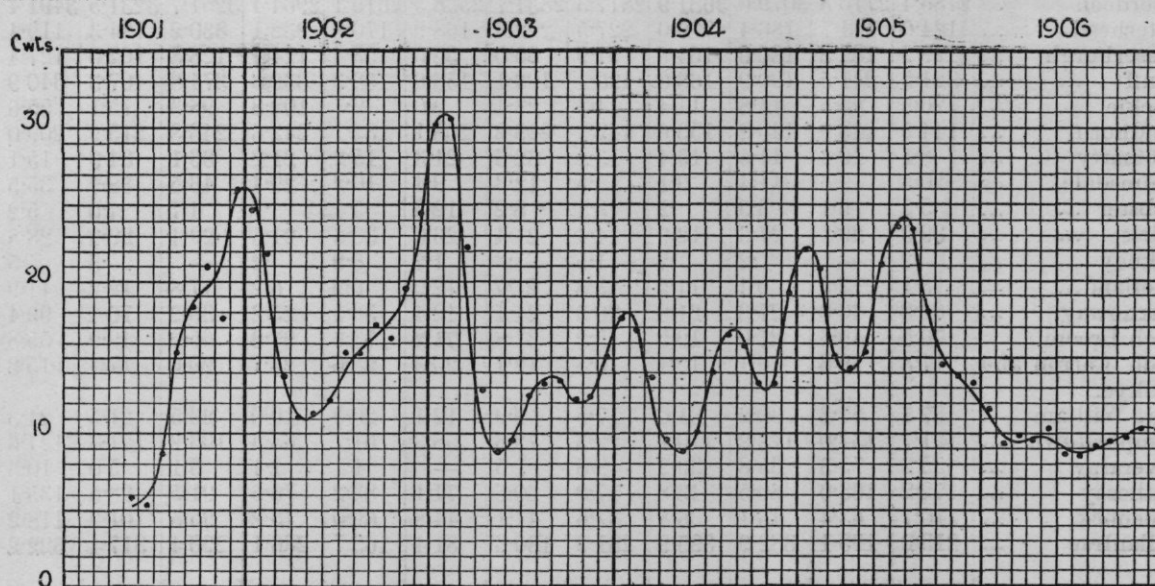


FIG. 47.—Mean monthly catches of WHITING, in cwts., per 100 hours' trawling, in area XXIII : 1901-6, (smoothed curves).

An inspection of Table XII, in which we show as usual the average quantities of Whiting landed at the Scotch ports, appears at first sight to be much less regular in its indications of period of maximum than were the similar tables for Cod and Haddock ;

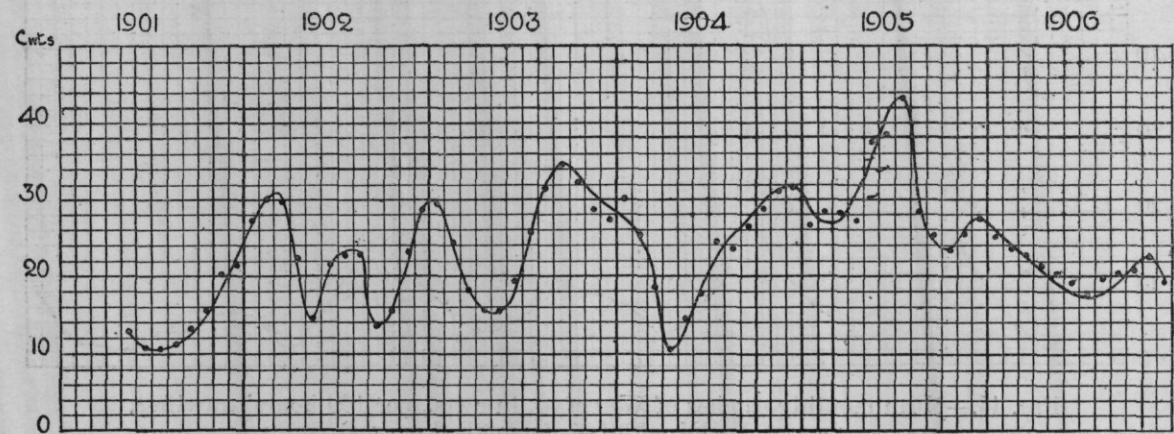


FIG. 48.—Mean monthly catches of WHITING, in cwts., per 100 hours' trawling, in area XIX : 1901-6, (smoothed curves).

but on closer inspection we see that they are not without relation to the facts we have drawn from the trawling statistics.

Thus at the east coast line-fishing ports of Eyemouth, Peterhead, Fraserburgh, Banff, Buckie, Cromarty and Wick, the largest catches are in winter, though the actual maximum varies from September to March. At Anstruther, Stonehaven, Findhorn and Lybster, the actual maximum is in June or July, with more or less indication of a secondary winter maximum. At Orkney or Shetland the maximum is in summer-time, again with a secondary indication of a winter increase. On the west coast the maximum is very generally in winter, but an autumn maximum appears at Loch Broom and Loch Carron.

TABLE XII.—Average Monthly Catch of WHITING, in cwts., at the under-mentioned ports for the twenty years 1886-1905.

Area	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Eyemouth ...	384.5	376.1	318.1	221.1	113.3	55.3	38.2	17.2	25.8	190.9	212.5	296.5
Leith ...	1106.1	1346.0	1413.6	1191.8	1021.5	1092.7	1013.8	941.9	899.9	1072.2	1138.7	973.7
Anstruther ...	118.1	118.9	109.5	117.6	152.7	164.1	143.0	113.4	107.1	133.3	121.4	111.2
Montrose ...	523.3	439.5	476.6	515.5	581.4	555.4	469.7	314.3	454.3	608.5	535.6	436.0
Stonehaven ...	119.1	64.7	72.6	90.3	166.3	300.6	289.1	275.7	318.3	416.0	329.8	167.0
Aberdeen ...	2786.4	2710.8	3079.0	3681.9	2817.3	2831.7	2558.5	2616.1	2964.4	3251.7	3231.5	3491.4
Peterhead ...	124.0	144.7	186.4	206.0	227.5	222.3	168.9	170.8	232.1	330.2	194.3	119.4
Fraserburgh ...	129.9	182.8	190.0	164.9	97.9	35.0	52.0	53.4	124.4	128.8	162.0	127.4
Banff ...	321.5	241.5	190.9	168.0	199.1	199.1	156.0	152.3	332.8	374.8	407.3	340.9
Buckie ...	26.3	22.5	14.8	14.4	14.1	23.4	9.0	9.7	102.8	98.3	75.1	55.6
Findhorn ...	144.5	143.9	140.2	153.6	143.1	249.2	208.1	182.1	242.6	243.8	215.9	209.0
Cromarty ...	8.1	10.4	11.5	15.4	13.1	32.6	21.3	15.2	21.2	36.1	34.9	15.1
Helmsdale ...	20.5	9.5	11.4	9.1	13.5	12.3	9.4	10.2	29.4	46.5	38.7	35.5
Lybster ...	5.2	6.1	3.5	.2	3.1	8.2	12.5	5.4	.7	4.7	4.0	5.2
Wick ...	39.9	29.1	27.6	12.9	14.4	21.4	26.0	30.6	21.5	29.4	29.9	28.8
Orkney ...	.2	—	.2	.2	1.5	1.3	1.2	6.9	.2	—	.3	.5
Shetland...	8.1	12.9	9.4	11.5	13.8	21.7	12.9	6.9	6.2	17.8	12.2	11.9
Stornoway ...	62.0	40.0	27.3	21.8	20.3	24.1	42.4	58.5	25.2	36.2	76.4	99.4
Loch Broom ...	70.5	49.6	27.0	19.5	5.2	33.8	71.2	73.6	97.8	65.0	49.9	55.8
Loch Carron and Skye.	17.8	19.6	16.1	12.1	10.8	12.1	20.3	28.6	24.7	20.0	17.1	15.3
Fort William ...	37.1	37.8	30.2	31.0	17.5	9.9	12.4	20.5	19.0	23.5	21.5	24.3
Campbeltown ...	121.7	134.0	172.2	110.7	72.3	79.8	58.3	61.7	63.5	103.2	121.8	124.6
Inveraray ...	55.2	75.3	65.8	39.2	9.8	1.5	—	1.1	1.4	3.1	5.0	10.3
Rothsay ...	172.2	168.0	80.5	43.8	47.9	60.6	71.1	83.2	76.5	91.5	98.5	135.1
Greenock ...	110.7	63.4	43.1	36.8	37.6	47.1	44.2	69.0	75.2	95.5	101.9	118.2
Ballantrae ...	213.2	195.1	382.9	395.9	281.9	130.5	81.4	163.7	266.1	290.4	317.4	322.2
Scotland...	6705.1	6644.8	7096.3	7275.3	6097.1	6226.7	5596.3	5482.8	6522.4	7710.9	7504.7	7331.0

TABLE XIII.—Mean Catch of WHITING per 100 hours' trawling (Aberdeen Trawlers) during the years 1901-1906.

Area.			Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI	...	...	—	—	35·6	54·1	29·0	—	—	—	10·2	10·3	—	—	27·8
VII	...	...	—	32·3	77·2	78·8	78·2	79·2	—	—	—	—	—	—	69·1
VIII	...	...	—	—	96·0	62·9	61·3	—	—	—	—	—	—	—	73·4
IX	...	...	—	—	—	—	—	—	4·7	3·7	9·5	15·8	34·2	49·5	19·6
X	...	...	36·2	32·6	30·0	37·1	6·5	5·4	3·4	13·9	23·7	29·4	32·7	52·3	25·3
XI	...	...	42·6	52·2	59·7	64·2	51·7	91·5	99·3	15·4	21·2	18·7	22·2	30·7	47·4
XII	...	...	15·6	35·1	36·4	61·9	63·0	66·3	61·6	11·8	11·5	16·5	12·9	20·7	34·4
XIII	...	...	25·0	19·5	8·6	13·7	4·0	13·6	11·1	13·5	12·9	11·8	24·3	37·1	16·3
XIV	...	...	52·8	63·0	64·1	50·7	19·4	18·8	20·2	13·9	29·5	26·0	30·9	38·5	35·6
XV	...	...	45·9	42·7	41·3	39·8	28·6	32·8	31·1	19·1	31·2	25·3	27·6	36·8	34·1
XVI	...	...	30·4	29·8	26·1	30·6	38·6	—	—	—	—	19·5	12·7	24·6	26·5
XVII	...	...	6·3	8·0	12·6	22·1	9·1	17·8	13·6	6·8	12·6	12·7	11·0	11·0	12·0
XXIII	...	...	31·9	30·3	38·1	30·1	14·9	19·0	19·8	19·4	20·2	23·3	27·1	32·9	25·6
XIX	...	...	31·3	23·7	21·2	14·8	11·9	19·7	28·2	25·3	22·1	24·2	23·1	27·0	22·7
XX	...	...	24·6	16·7	13·2	23·7	20·0	7·8	4·7	13·7	17·1	19·7	17·5	22·6	16·8
XXIII	...	...	25·3	16·2	11·6	11·2	10·4	12·6	17·4	17·5	14·3	12·4	12·3	14·7	14·6
XXIV	...	...	16·0	14·6	11·8	10·0	9·3	9·2	16·1	19·6	17·6	16·0	13·9	17·2	14·3
XXV	...	...	33·0	19·5	12·2	7·9	5·9	3·2	5·5	7·6	14·8	16·2	13·2	9·8	13·1
XXVI	...	...	4·9	—	5·3	20·1	3·6	1·6	2·6	3·7	8·0	7·1	10·1	7·9	6·8
XXVII	...	...	—	—	—	—	6·4	—	—	8·3	4·5	7·6	7·1	4·6	5·5
XXVIII	...	...	—	6·6	—	—	·7	11·4	4·9	—	—	8·8	6·2	6·0	6·4
XXIX	...	...	32·1	12·6	8·4	7·8	7·6	3·0	2·8	5·4	7·5	7·8	6·4	13·3	9·5
XXX	...	...	8·1	11·4	14·0	—	—	—	2·9	10·3	14·1	12·4	10·6	11·7	10·6
XXXI	...	...	7·9	12·7	15·0	—	3·3	3·7	4·6	6·0	10·2	11·8	9·8	11·7	8·8
XXXII	...	...	—	3·2	—	—	4·8	2·6	3·4	3·5	11·0	8·9	6·8	8·6	5·9
XXXIII	...	...	—	—	—	—	—	1·5	1·9	—	1·6	4·5	—	—	2·4
XXXV	...	...	—	10·6	—	—	—	1·3	—	—	—	10·6	4·8	—	6·8
XXXVI	...	...	5·3	4·3	8·5	—	1·6	—	—	—	7·1	13·3	7·9	—	6·9
XXXVII	...	...	—	8·1	—	—	1·7	—	—	—	11·3	—	—	6·5	6·9
C	...	...	17·7	22·2	9·6	4·3	5·0	9·6	11·3	11·5	12·4	22·7	44·1	31·5	16·8
D	...	...	22·7	9·2	9·6	4·2	2·3	6·1	3·0	2·4	1·5	7·8	3·1	5·7	6·5
J	...	...	—	—	—	—	15·8	7·4	4·5	2·7	—	—	—	51·1	16·3
K	...	...	10·5	9·4	12·8	12·2	—	34·3	11·8	—	—	—	—	—	15·2
Faroe	...	...	·4	1·7	·2	·8	·2	9·1	18·1	4·8	·4	·9	1·2	·2	3·2
Iceland	...	...	—	0·0	0·0	3·4	3·7	5·0	5·2	1·8	41·1	0·0	—	—	6·7

THE LING. (*Molva vulgaris*.)

The Ling, like the Cod, is found at all seasons of the year in all parts of the North Sea fished by the Aberdeen trawlers, but there is a very much greater discrepancy between the northern and southern waters in regard to its abundance. Fig. 49 shows for each area the average catch of Ling during our six years, and it will be seen that the

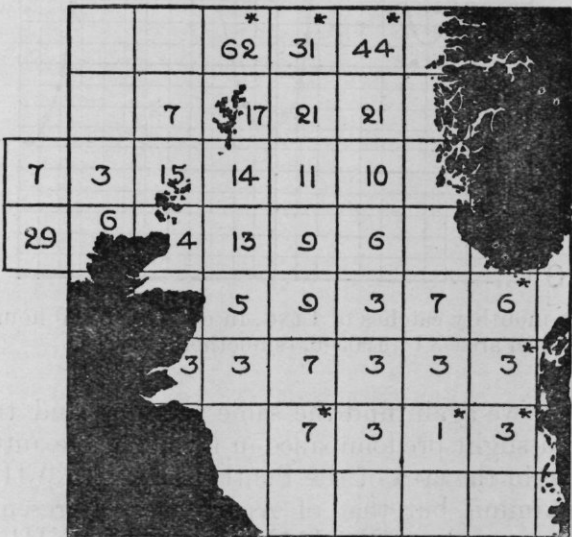


FIG. 49.—Mean catch of LING, in cwts., per 100 hours' trawling, in various areas; 1901-6, (Faroe 4 cwts., Iceland 24 cwts.).

numbers in the more southern areas are but a small fraction of those to the north of Shetland. In the northern areas the catch of Ling greatly exceeds that of Cod; in the southern areas it falls short of it in a still greater degree. In areas of the North Sea still further to the southward Ling dwindles to a vanishing quantity. It will be observed from the Chart that the quantities of Ling are somewhat greater in areas XXIV, XXX, and XXXV, that is to say, along the course of the Gut, than in the adjacent regions of similar latitude. Again we notice that around the north of Scotland from the Pentland Firth to Rona and Sule Skerry and the Minch the quantities of Ling are very small, in marked contrast to Cod, which is very abundant in these areas. Lastly the mean catch at Faroe is only 4 cwts. per 100 hours' fishing, or one-fortieth of the mean catch of Cod, and at Iceland 24 cwts., or about one-thirtieth of the Cod. The mean catch of Ling over all the areas of the North Sea dealt with in our statistics is about 10 or 12 cwts. per 100 hours' fishing, or rather less than half that of the Cod; but this average is greatly swollen by the few high figures of the northern areas. The total quantity of Ling landed by Aberdeen trawlers is about one-sixth that of Cod.

A comparatively small number of Ling, about 4,500 in all, have been measured, mostly from the Shetland region. The smallest come from the East Coast grounds, where the average (median) length is about 35.4 inches (90 cm.); from Shetland and from the Southern, Western and Middle grounds the average is about 42 inches. In all cases about one-tenth of the fish exceed 51 inches; and the largest Ling measured, from Shetland, was 63.8 inches (162 cm.) long.

In the Shetland area we have a fairly well marked double maximum of Ling annually (*see* Table XV); the periods being in April and September, with a low minimum about June and July. The autumn maximum is usually higher than that of spring; there was a high spring maximum in 1903, but in 1906 it was so small as to be scarcely visible in the curve.

In area XI (Fig. 50) to the eastward of Shetland, the two maxima are again visible, but that of spring is now very small (it was well marked in 1902), while the autumn one is characteristic of large. Still further to the east (area XII) we have but little information, but the same two maxima would appear to co-exist.

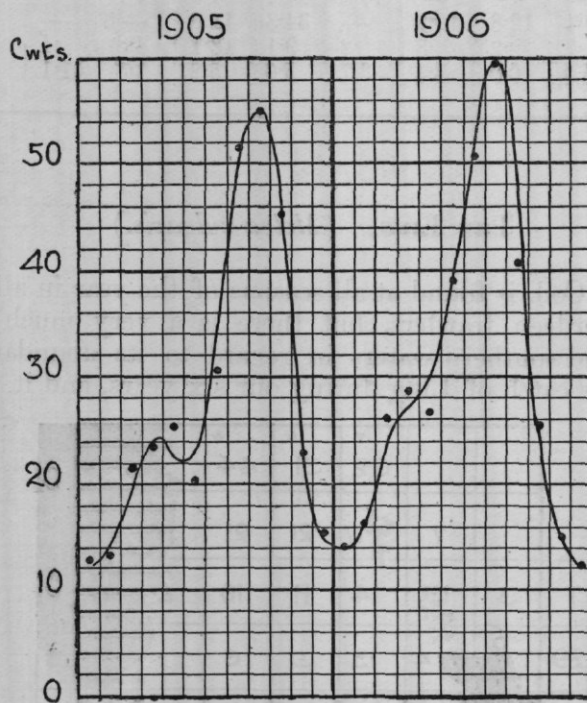


FIG. 50.—Mean monthly catches of LING, in cwts., per 100 hours' trawling, in area XI: 1905-6, (smoothed curves).

In areas XIV and XV we again find the same maxima, and they are here more or less equal in height, with a slight predominance in favour of the autumn one. Proceeding further southward we have in the area of the Pentland Firth (XVII) a curve which shows regularly the autumn maximum, but that of April, though present in 1906, is scarcely marked in any of the other years (Fig. 51). In area XVIII the April maximum disappears altogether from our curve, and the summer or autumn one, variable in date from about July or August to October, is regularly and distinctly present. The same is

true of area XIX over the witch ground, where the regular autumn maximum stands out clearly when the statistics for our six years are reduced to a single average curve (Table XV).

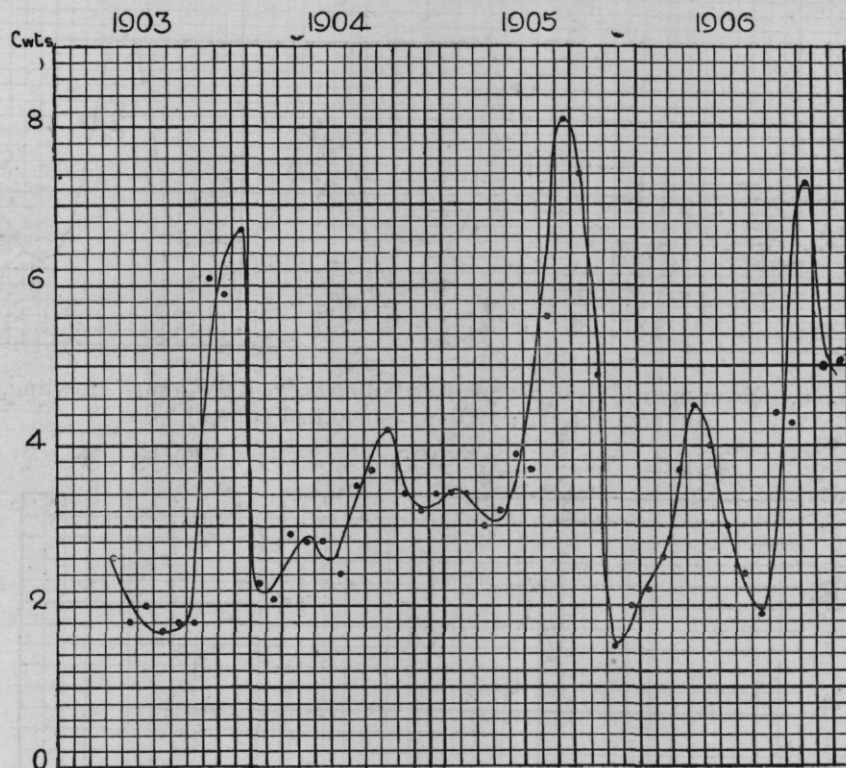


FIG. 51.—Mean monthly catches of LING, in cwts., per 100 hours' trawling, in area XVII: 1903-6, (smoothed curves).

In area XX on the other hand, the adjacent area to the eastward, it is the April maximum that is clear and large, that of autumn now disappearing (Fig. 52).

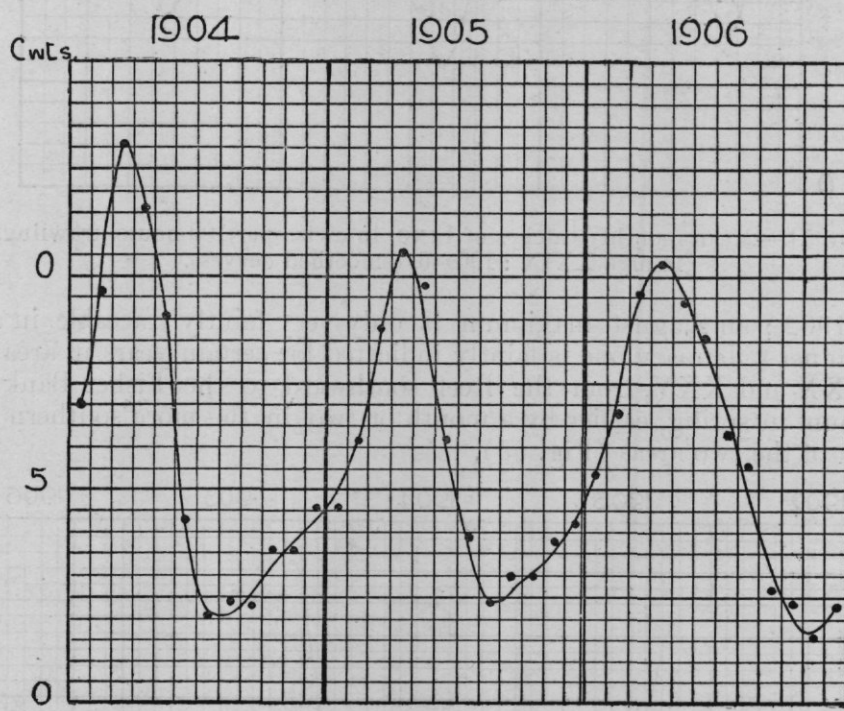


FIG. 52.—Mean monthly catches of LING, in cwts., per 100 hours' trawling, in area XX: 1904-6, (smoothed curves).

Returning to the east coast of Scotland, our curves for areas XXIII and XXIX are clear in spite of the small average catches on which they are based; but they are notably different from one another. In the more northern of the two areas (Fig. 53) we have a maximum in July or August regularly recurring with no indication in some years, and the merest trace in others, of any other period of increase. In XXIX, on the other hand, (Fig. 54), a maximum recurs in January, clearly seen in 1904, 1905 and 1906, and

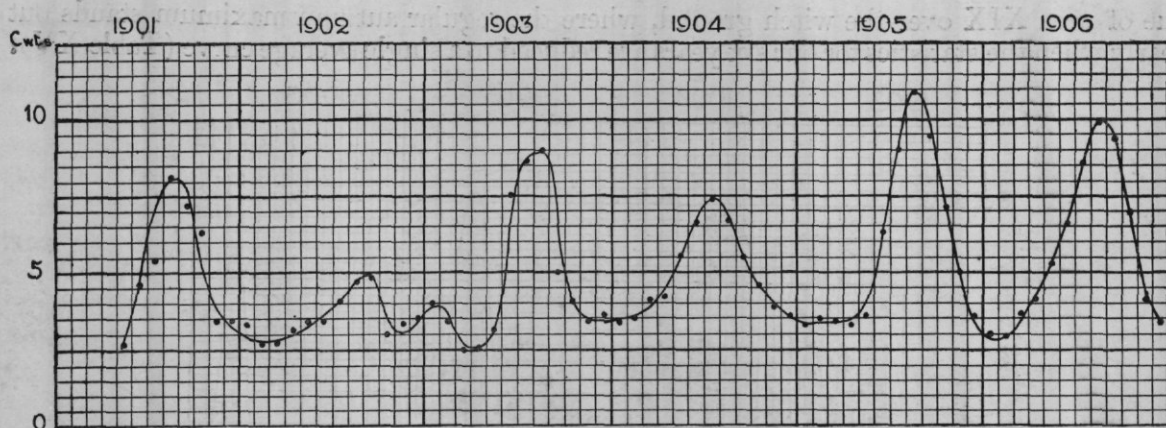


FIG. 53.—Mean monthly catches of LING, in cwts., per 100 hours' trawling, in area XXIII : 1901-6, (smoothed curves).

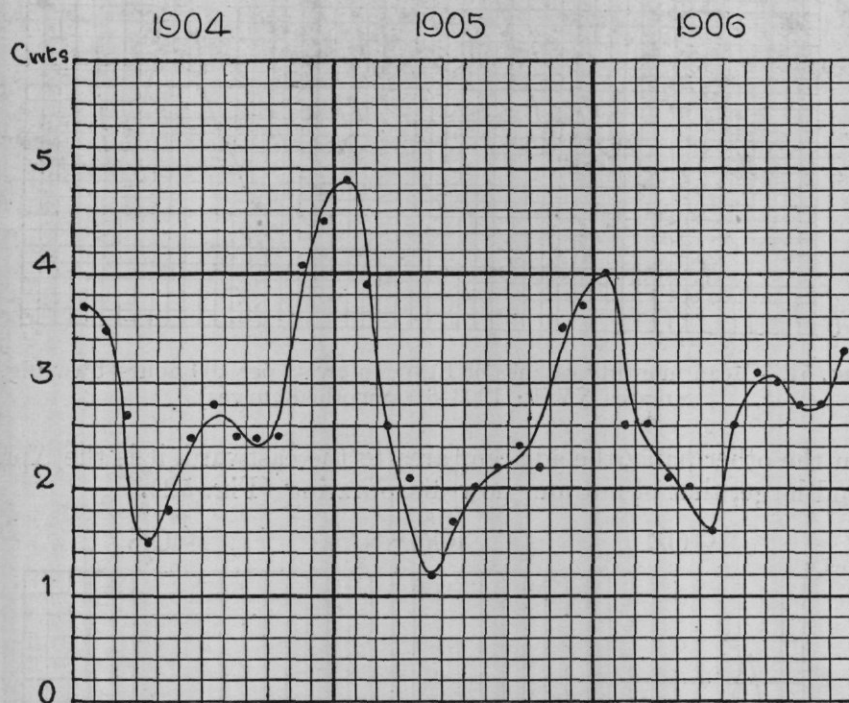


FIG. 54.—Mean monthly catches of LING, in cwts., per 100 hours' trawling, in area XXIX : 1904-6, (smoothed curves).

indicated in 1902 ; an August maximum is only very faintly traceable in area XXIX, and in like manner a January one is faintly indicated for certain years in area XXIII.

In areas XX and XXV, from the Reef southward to the Fisher Bank, we find an annual maximum in spring, earlier by a month or two in the more southern than in the more northern of the two areas (Fig. 55).

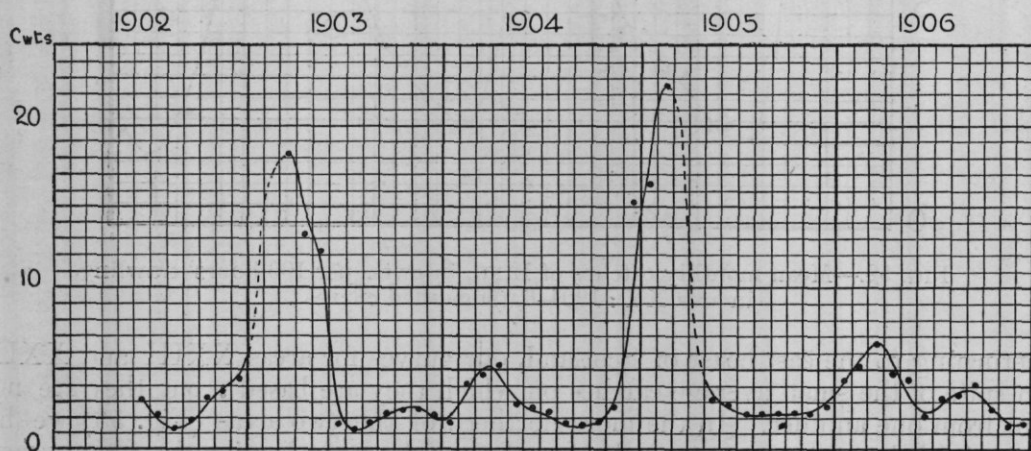


FIG. 55.—Mean monthly catches of LING, in cwts., per 100 hours' trawling, in area XXV : 1902-6, (smoothed curves).

Returning to the north-west of Scotland we have in the neighbourhood of the Minch a well-marked maximum in January, and about Rona and Sule Skerry a similar one, accompanied this time by another maximum about August.

Looking at the general statistics of the average monthly catch of Ling landed in Scotch ports during the last 20 years (Table XIV), we see that at Eyemouth (where the quantities are very small) there is a maximum in February corresponding to the result that we have obtained for our area XXIX. From Leith to Fraserburgh we regularly find the maximum about May, and while this apparently corresponds ill with our former results for area XXIII, where the maximum has been shown to take place after mid-summer, we must again call to mind the fact that line-fishing is abandoned during summer in favour of Herring fishing by the larger boats. The Moray Firth ports show in all cases a maximum in spring varying from February to April. In Orkney the maximum is in June, and at Shetland in May. In Stornoway we have a double maximum, first in February, and then a greater one in June. At Barra and Fort William it is in May; and at all the other west coast ports in March or April.

The seasons when Ling occur in comparative abundance may be briefly summarised as follows: there are in most areas two seasons of maximum in the course of the year; there is a maximum in late winter or spring in all the areas investigated, except in certain parts of the sea to the eastward of the Scottish coast. There is a maximum in January north and westward of the Orkneys, followed by a maximum from February to March along the west coast of Scotland. There is a slight maximum also about January off the south-east of Scotland, and one varying from February to April from thence towards the Fisher Bank and northward thereof. A similar maximum in February has been shown by Henking to occur in the Skagerrack. A maximum in April or May is characteristic of Shetland, also to the regions to the east thereof, and is traceable as far as the north-eastern corner of the Scottish mainland.

A summer and autumn maximum is traceable almost everywhere, except on the Fisher Bank region. It is shown by the line-fishing statistics at Stornoway in June; then about July and August, firstly at Rona and Sule Skerry, secondly off the east coast of Scotland, and thirdly, according to Henking, in the Skagerrack; it comes a little later, from August to September, in Shetland and the adjacent North Sea areas.

TABLE XIV.—Average Monthly Catch of LING, in cwts., at the under-mentioned ports during the twenty years 1886–1905.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Eymouth	12.5	22.1	10.7	3.7	7.1	2.6	3.3	3.5	2.2	2.0	3.1	5.5
Leith ...	185.9	194.6	236.0	428.7	582.5	535.8	278.7	217.1	154.8	152.1	182.7	192.8
Anstruther	97.1	112.6	154.4	525.5	933.2	429.2	4.2	.3	.9	8.2	10.7	37.4
Montrose	46.1	47.5	50.3	76.6	161.4	150.0	42.1	31.8	33.2	38.3	42.5	47.9
Stone- haven.	9.3	8.5	1.9	72.5	146.4	88.7	1.8	—	.1	.1	1.8	8.4
Aberdeen	1606.4	2637.3	3891.0	5128.7	3868.0	3435.0	4380.8	4557.2	3131.1	2115.7	1581.8	1422.7
Peterhead	240.8	313.6	290.5	923.2	898.9	189.9	7.6	1.0	1.7	7.7	33.4	114.4
Fraser- burgh.	566.1	635.0	493.9	591.8	993.5	176.3	9.9	1.5	8.4	50.1	64.4	105.6
Banff ...	154.6	204.5	155.7	121.5	111.6	41.9	4.7	3.7	3.8	18.9	24.4	44.1
Buckie ...	246.6	644.1	641.1	872.9	29.8	2.0	—	—	—	—	1.0	12.1
Findhorn	64.2	140.4	151.8	254.8	62.8	42.4	18.7	16.9	22.6	21.7	24.3	29.8
Cromarty	2.3	2.1	3.2	1.1	—	—	.1	.2	1.5	.7	1.1	4.9
Helmsdale	9.1	15.3	12.3	2.6	.7	1.9	—	.5	.5	.7	1.5	2.6
Lybster ...	.7	4.0	4.6	.2	—	.3	—	.1	—	—	.5	1.2
Wick ...	558.7	1455.1	1476.1	798.8	109.9	116.8	61.8	44.3	34.2	74.4	130.0	180.4
Orkney ...	36.3	230.8	343.6	918.6	991.8	1391.8	165.2	82.8	52.5	34.2	24.1	23.9
Shetland...	102.9	140.2	721.3	8467.5	11128.6	3999.2	3221.5	1568.5	291.2	130.1	120.1	254.1
Stornoway	1412.0	4842.8	4800.3	4119.3	6531.7	7974.1	3201.2	1320.5	211.1	190.7	332.9	548.2
Barra ...	44.1	398.2	897.6	1252.6	1487.8	825.8	256.5	95.9	25.5	15.1	8.0	2.8
L. Broom	104.8	451.4	912.3	404.0	193.7	158.6	49.5	34.4	54.7	35.6	22.6	48.5
L. Carron	210.2	286.3	302.3	113.6	145.2	165.7	109.7	79.1	57.6	55.2	52.5	94.3
and Skye.												
Fort	30.3	127.0	233.1	621.7	1127.9	860.4	67.5	7.3	6.7	37.0	13.2	100.4
William.												
Campbel- town.	22.6	69.5	180.4	111.3	40.6	25.3	14.5	11.2	36.1	4.9	3.8	5.4
Inveraray	.3	4.0	17.4	18.3	8.2	—	—	1.0	1.4	.2	.6	.8
Rothsay	13.7	14.5	17.4	14.8	11.5	9.6	5.8	7.2	7.5	12.7	10.7	13.0
Greenock	7.6	14.9	15.1	6.9	11.9	8.4	.9	3.9	10.3	12.5	6.9	
Ballantrae	62.3	188.5	192.5	76.9	26.1	17.2	13.4	4.0	4.4	13.4	22.9	15.2
Scotland ..	5834.3	13070.8	15937.1	25503.9	29164.0	20395.4	11836.6	8059.4	4138.3	3025.7	2724.3	3322.0

TABLE XV.—Mean Catch of LING per 100 hours' trawling (Aberdeen Trawlers) during the years 1901–1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	45.1	54.2	67.4	—	—	—	79.7	61.7	—	—	61.6
VII ...	—	20.0	42.2	47.1	33.6	13.7	—	—	—	—	—	—	31.3
VIII ...	—	—	46.1	43.3	43.4	—	—	—	—	—	—	—	44.3
IX ...	—	—	—	—	—	—	5.2	6.3	8.5	6.9	10.0	2.6	6.6
X ...	12.3	10.1	14.7	17.6	15.8	5.6	8.4	19.1	39.2	33.3	12.9	12.7	16.8
XI ...	6.5	15.3	21.9	30.1	22.1	21.6	23.5	13.1	39.4	20.0	21.2	16.5	20.9
XII ...	11.6	16.3	15.0	38.2	19.1	30.4	26.3	12.9	25.2	16.7	20.5	14.6	20.6
XIII ...	38.6	5.8	3.8	2.3	1.0	5.4	7.7	14.6	19.0	9.8	19.1	55.8	15.2
XIV ...	9.3	11.4	14.4	17.1	13.1	7.1	17.4	20.5	16.9	15.3	11.3	10.6	13.7
XV ...	8.9	9.4	9.8	14.9	10.7	7.4	10.5	15.1	12.0	11.9	13.3	8.5	11.0
XVI ...	5.6	12.6	11.2	11.5	11.3	—	—	—	—	8.6	14.1	6.8	10.2
XVII ...	3.5	2.4	2.7	4.3	2.6	2.7	3.0	4.9	3.7	4.3	5.7	2.5	3.5
XVIII ...	8.9	9.2	9.6	9.8	13.9	13.5	18.0	15.4	16.5	15.4	13.7	9.4	12.8
XIX ...	5.2	5.4	6.3	8.4	8.2	10.3	10.4	13.3	12.5	10.0	8.2	5.0	8.6
XX ...	4.9	6.5	8.8	15.3	9.3	4.9	5.9	2.9	2.4	3.4	4.3	4.3	6.1
XXI ...	3.4	3.1	3.5	4.0	3.6	5.8	9.9	9.4	9.3	6.0	3.5	3.4	5.4
XXII ...	5.0	10.2	6.9	10.3	8.4	10.5	12.5	9.4	10.7	9.5	6.3	5.6	8.8
XXIII ...	3.8	6.2	4.9	5.0	2.9	2.5	2.0	2.2	1.8	2.5	2.7	2.7	3.3
XXIV ...	4.0	—	13.0	20.7	5.5	3.9	6.6	5.2	3.0	4.0	3.4	5.6	6.8
XXV ...	—	—	—	—	6.9	—	—	6.4	5.4	4.4	6.3	5.8	5.9
XXVI ...	—	2.3	—	—	3	4.0	4.8	—	—	4.1	2.9	1.3	2.8
XXVII ...	3.2	3.2	2.6	1.4	1.9	2.1	2.5	3.3	2.3	2.4	1.9	4.5	2.6
XXVIII ...	4.4	5.4	4.1	—	—	—	6.8	7.1	11.0	7.4	6.2	5.8	6.5
XXIX ...	3.9	4.5	4.4	—	2.9	2.8	1.8	1.7	1.7	2.4	2.7	3.9	3.0
XXX ...	—	1.4	—	—	4.6	2.7	4.4	1.9	2.7	1.5	1.9	1.2	2.5
XXXI ...	—	—	—	—	—	1.6	1.5	—	4.9	5.6	—	—	3.4
XXXII ...	—	4.6	—	—	—	6.5	—	—	—	9.3	9.5	—	7.5
XXXIII ...	1.7	3.3	3.8	—	2.5	—	—	—	1.4	4.1	3.4	—	2.9
XXXIV ...	—	1.0	—	—	1.6	—	—	—	1.2	—	—	3	1.0
C ...	4.8	1.1	2.4	1.1	1.4	3.3	4.8	4.1	4.8	1.8	9	1.3	2.6
D ...	19.2	8.8	5.8	7.2	2.9	7.5	6.0	3.2	5.4	5.3	1.0	2.1	6.2
J ...	—	—	—	—	8	1.9	16.2	13.8	—	—	—	2	6.6
K ...	36.1	36.3	27.1	27.8	—	19.1	25.6	—	—	—	—	—	28.7
Faroe ...	3.3	4.2	6.9	6.5	6.3	3.3	2.6	3.9	2.9	3.6	1.7	2.4	4.0
Iceland ...	—	20.0	18.1	63.8	57.8	26.2	7.5	9.5	8.0	7.8	—	—	24.4

THE SAITHE. (*Gadus virens*.)

The average distribution of Saithe over our North Sea areas is somewhat similar to that of Ling. The quantities are by much the highest in the areas north and east of Shetland, and are very low off the east coast of Scotland and in the south and south-east parts of the North Sea (Fig. 56). They are somewhat higher than those of Ling in our

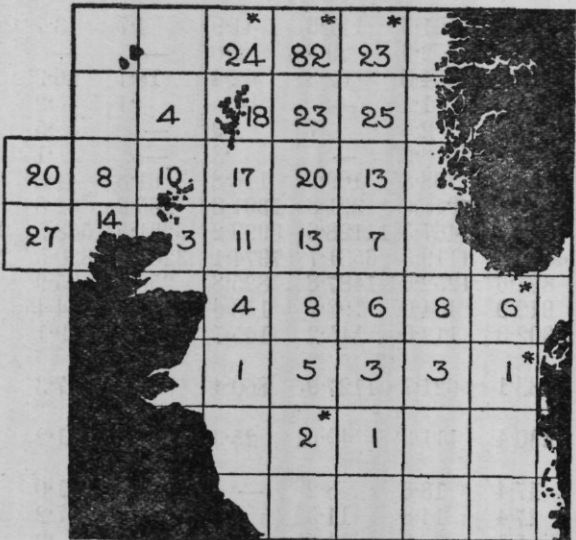


FIG. 56.—Mean catch of SAITHE, in cwt., per 100 hours' trawling : 1901–6, (Faroe 103 cwt., Iceland 75 cwt.).

north-western areas in the neighbourhood of Cape Wrath, and are again notably higher than those of Ling both at Faroe and Iceland.

The mean density over our North Sea trawling areas is much the same as that of Ling, and may be stated as a first approximation at 12 or 13 cwt. per 100 hours' fishing.

About 1,200 Saithe have been measured from the Shetland Grounds, and small numbers from the East Coast and Western and Middle Grounds. At Shetland and the Western Grounds the average size was respectively 14.2 and 15.7 inches; on the Middle and East Coast Grounds 31.1 and 38.6 inches. The largest fish was from the East Coast Grounds and measured 42.5 inches (108 cm.).

The seasonal distribution of Saithe may in most areas be traced easily and clearly, there being comparatively seldom an indication of a double maximum and the quantities often falling to zero, or nearly so, in the season of scarcity.

In area XIX (over the Witch Ground) the curve shows a regular annual wave, culminating about July or August, and falling to a low minimum in the winter months (Fig. 57). The maximum in 1901 was very low, but that for 1902 was

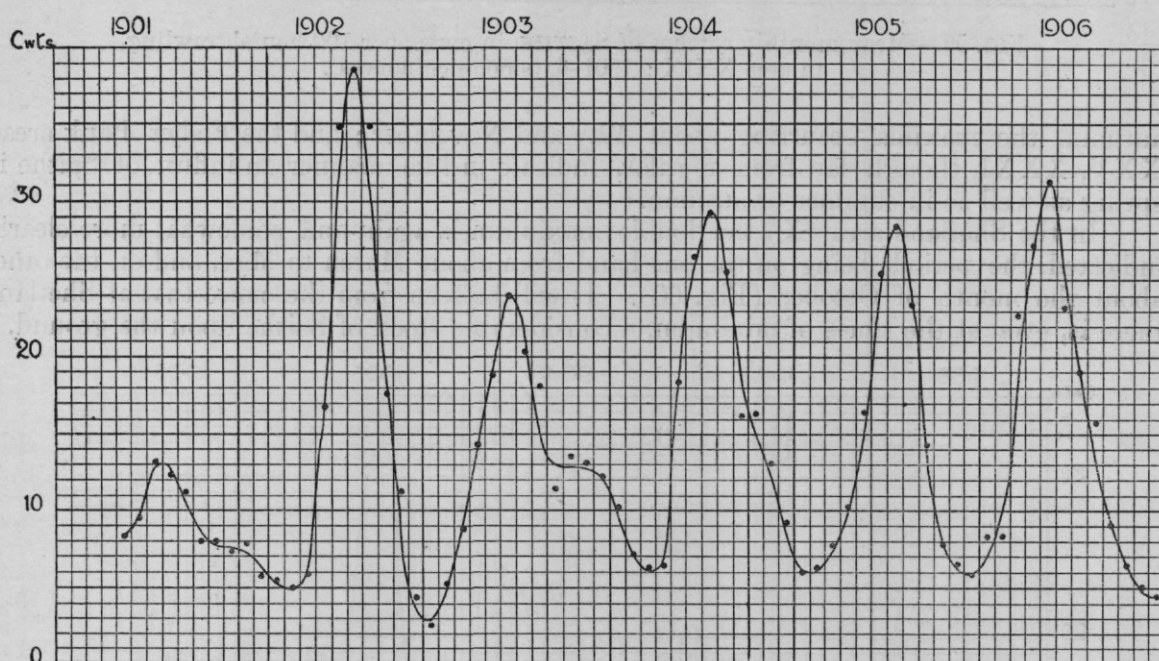


FIG. 57.—Mean monthly catches of SAITHE, in cwts., per 100 hours' trawling, in area XIX : 1901-6, (smoothed curves).

unusually high. In the two east coast areas, XXIII (Fig. 58) and XXIX (Fig. 59), the curve is identical in general features, and is equally clearly marked, in spite of the fact that the total catch of Saithe in both areas, and especially in the latter, is very small.

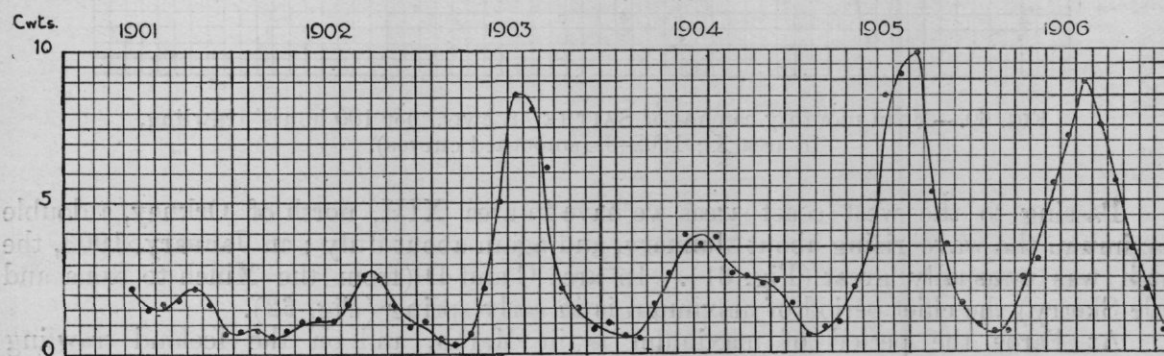


FIG. 58.—Mean monthly catches of SAITHE, in cwts., per 100 hours' trawling, in area XXIII : 1901-6, (smoothed curves).

In area XXIII both in 1901 and 1902 and also in 1904 the curves are very much lower than in the other years. A very similar period of maximum is indicated by the majority of our North Sea areas (*e.g.* XIV, XVIII, XIX, XXIV), but a difference is apparent on the one hand in Shetland, and on the other hand in the areas to the northward of the Fisher Bank.

In area XX, which includes the Reef and Ling Bank, though our statistics leave much to be desired, they are sufficient to indicate a double maximum in spring and

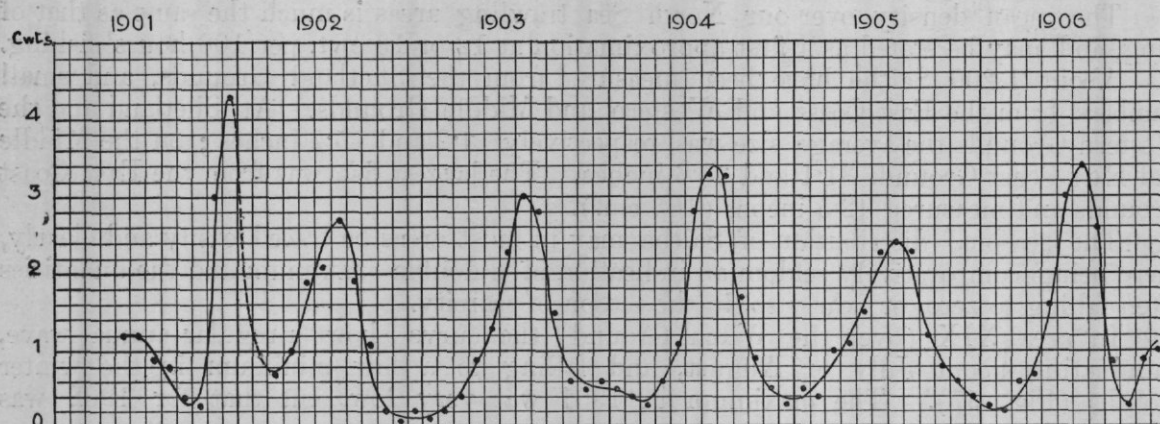


FIG. 59.—Mean monthly catches of SAITHE, in cwts., per 100 hours' trawling, in area XXIX : 1901-6, (smoothed curves).

autumn, the maxima occurring about May and November ; and the Fisher Bank areas, XXV, XXXI, though far from regular, indicate in like manner an influx of Saithe in spring as well as in summer or autumn.

In the Shetland area (X) the double maximum is again and somewhat more clearly indicated, the periods being on the one hand from about March to May, and on the other about the month of October (Fig. 60). It will be seen from the curve that at Shetland there is, even at the times of minimum, a considerable stock of Saithe upon the ground.

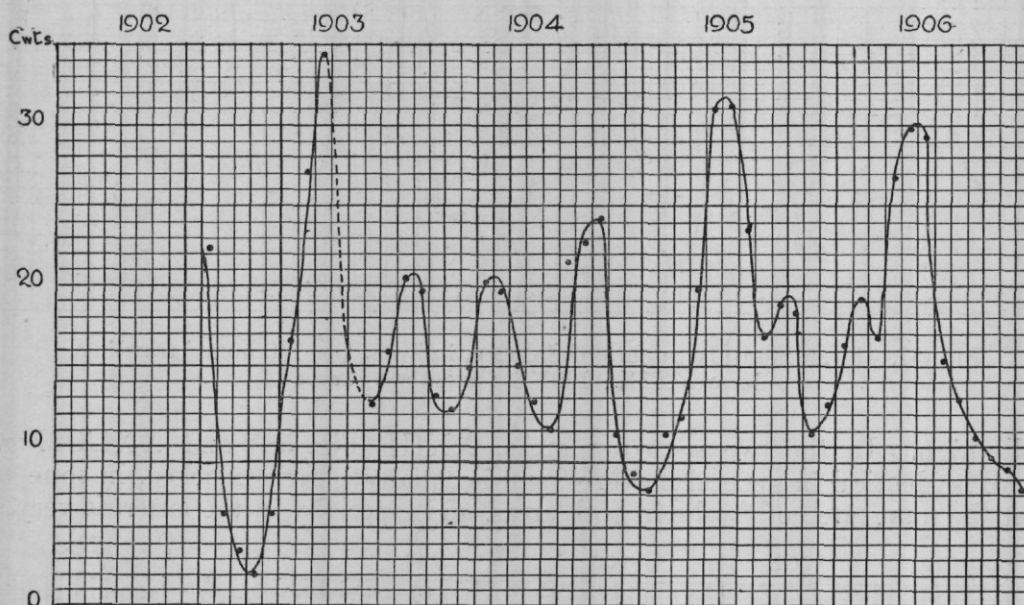


FIG. 60.—Mean monthly catches of SAITHE, in cwts., per 100 hours' trawling, in area X : 1902-6, (smoothed curves).

Passing to the west coast areas we have in area XIII, north of Orkney, a double maximum, the wave rising about January, and again about July ; in January, 1903, the catch was unusually great (Fig. 61). In area C and D (from the Minch to Rona and Sule Skerry) the chief period of maximum is in early spring (Fig. 62).

At Faroe the period of maximum is in March, and on the Iceland trawling grounds in August.

The line statistics of the east coast ports (Table XVI) show a maximum catch of Saithe in almost all cases about May and June, but certain of the Moray Firth ports, and especially Buckie and Wick, show also increased catches of Saithe about January ; they have no doubt shared in that winter migration of the fish which our trawling statistics showed us to take place at Orkney (area XIII).

At Orkney and Shetland the line catch reaches a maximum in June. At Stornoway we have a June maximum, and a supplementary smaller one in January.

The statistics of the smaller west coast ports are somewhat irregular ; at Loch Broom

there is a high maximum in February, and a smaller one in May or June. At Campbeltown and Inveraray the maximum is in July and August; at Rothesay in October or November; at Ballantrae the maximum is in February, with a small subsequent increase in October.



FIG. 61.—Mean monthly catches of SAITHE, in cwts., per 100 hours' trawling, in area XIII: 1903-6, (smoothed curves).

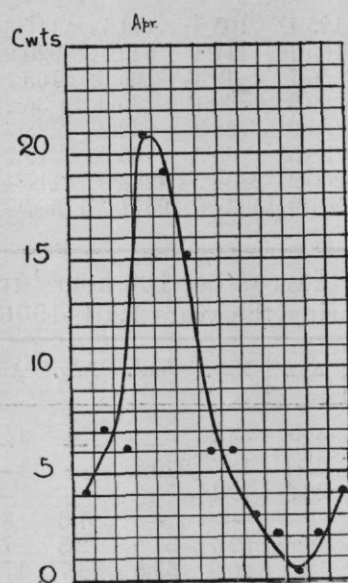


FIG. 62.—Mean monthly catches of SAITHE, in cwts., per 100 hours' trawling, in area C (Rona and Sule Skerry); mean of years 1901-6.

Summarising the foregoing statements, we find that on the north-west and west of Scotland there is an influx of Saithe, as a rule in early spring, with a second maximum at Stornoway in summer, and in the Clyde area in the autumn months. In the North Sea, in the neighbourhood of the Fisher Bank, the movements of the fish are somewhat irregular, but again indicate a double maximum in spring and autumn. At Shetland there is likewise a double influx in spring and autumn, but over the whole of the North Sea areas between Shetland and the mainland on the one hand, and the Fisher Bank on the other, there is one main influx of Saithe in the summer time, culminating in June or July, and extending more or less from May to September.

TABLE XVI.—Average Monthly Catch of SAITHE, in cwts., at the under-mentioned ports during the twenty years 1886–1905.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Eyemouth ...	5.2	5.3	3.0	12.3	17.1	28.2	29.3	16.9	18.9	4.4	5.6	2.4
Leith ...	77.1	87.7	137.1	231.5	523.1	479.9	144.2	157.7	147.1	108.4	106.0	84.2
Anstruther...	120.3	57.2	40.8	170.6	958.6	960.2	24.3	6.6	5.8	2.6	4.4	37.2
Montrose ...	25.7	23.8	36.4	79.9	272.2	274.1	60.5	29.9	42.9	36.5	42.9	44.2
Stonehaven	3.5	12.0	0.6	4.2	193.5	160.5	9.3	4.4	1.3	0.7	0.8	9.4
Aberdeen ...	632.7	751.6	1299.5	1806.2	4825.8	3265.0	1613.2	1119.3	1191.6	1154.4	1118.6	925.7
Peterhead ...	117.2	54.7	96.0	375.6	1092.3	673.4	214.5	58.4	48.7	17.8	57.6	140.0
Fraserburgh	116.8	133.5	151.9	220.1	1008.7	442.6	243.7	113.5	120.3	81.9	74.5	78.1
Banff ...	56.1	65.6	83.5	155.7	270.1	308.5	139.7	87.8	40.0	34.1	32.1	37.8
Buckie ...	183.2	134.1	176.5	113.6	33.4	36.4	4.1	1.2	2.0	2.5	5.7	27.6
Findhorn ...	47.0	42.1	47.3	43.5	49.5	35.6	11.0	6.8	1.3	3.4	5.8	15.7
Cromarty ...	3.2	1.8	12.1	3.7	12.8	4.7	4.6	2.4	1.5	.6	2.2	10.0
Helmsdale ...	32.0	12.2	12.3	22.9	30.3	29.1	23.0	15.0	6.7	7.1	8.5	14.0
Lybster ...	32.5	37.5	43.0	16.4	21.4	29.7	64.7	56.9	75.8	9.3	13.0	11.9
Wick ...	1229.8	827.9	743.2	415.5	616.5	884.8	640.4	585.6	305.0	390.0	329.5	324.5
East Coast ...	2681.8	2236.2	2831.7	3731.0	7741.4	7618.8	3192.5	2278.6	1908.6	1849.1	1796.2	1747.6
Orkney ...	1051.2	610.3	436.7	545.9	1304.6	1601.3	582.6	674.5	461.0	383.1	420.9	690.4
Shetland ...	28.2	15.2	68.3	1022.2	3556.7	6187.7	5374.8	4859.2	1639.6	103.5	36.2	107.8
Orkney and Shetland.	1079.4	676.1	505.1	1568.0	4861.3	7789.0	6007.5	4933.7	2050.7	486.6	452.1	798.1
Stornoway ...	1209.4	1251.0	579.1	330.4	1419.6	2524.9	533.0	348.9	212.4	351.5	422.7	529.6
Barra ...	43.2	45.5	63.7	74.1	200.6	132.0	194.5	90.2	67.1	113.6	97.0	60.2
Loch Broom	50.7	1200.7	544.0	115.8	492.2	316.6	147.4	149.5	191.1	157.7	100.3	70.2
Loch Carron and Skye.	441.4	571.2	836.0	360.3	88.6	115.9	66.5	73.5	82.3	84.4	62.8	71.5
Fort-William	67.9	74.4	70.5	125.1	105.4	111.7	116.3	176.6	156.3	221.3	113.5	89.6
Campbeltown	148.8	126.2	91.3	105.1	417.4	842.4	920.2	308.0	276.3	313.1	260.5	174.3
Inveraray ...	60.3	56.2	57.4	56.7	49.4	105.6	163.4	205.2	138.8	139.6	108.2	93.8
Rothsay ...	50.7	45.9	36.5	29.3	30.1	35.9	36.2	42.2	65.8	133.6	125.7	91.2
Greenock ...	24.5	23.1	24.3	36.0	28.9	32.2	28.7	32.1	36.2	40.5	30.6	29.0
Ballantrae ...	34.3	723.0	361.4	58.5	63.3	36.3	19.7	6.2	22.3	68.1	36.1	31.9
West Coast...	2118.0	3776.8	2644.8	1260.9	2834.9	4263.9	2117.4	1405.4	1228.4	1584.2	1330.2	1218.1
Scotland ...	5879.1	6689.0	6031.4	6567.9	15937.6	19671.7	11367.3	8617.7	5237.5	3919.9	3570.8	3763.9

TABLE XVII.—Mean Catch of SAITHE per 100 hours' trawling (Aberdeen Trawlers) during the years 1901–1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	28.7	23.5	22.8	—	—	—	29.3	15.5	—	—	24.0
VII ...	—	61.2	36.8	24.4	18.5	270.8	—	—	—	—	—	—	82.3
VIII ...	—	—	22.7	26.3	19.1	—	—	—	—	—	—	—	22.7
IX ...	—	—	—	—	—	—	7.8	3.8	2.9	2.3	2.3	2.9	3.7
X ...	11.2	13.4	28.7	16.6	37.7	36.6	12.3	7.9	25.7	11.6	6.8	10.4	18.2
XI ...	6.8	14.2	15.1	12.0	20.9	59.5	46.7	17.7	28.9	28.8	25.4	16.8	24.4
XII ...	15.9	32.5	23.5	21.1	30.3	42.4	31.2	16.1	24.2	24.4	23.7	17.2	25.2
XIII ...	21.2	3.5	4.9	4.6	8.2	12.9	5.7	6.2	7.6	8.5	9.5	22.3	9.6
XIV ...	9.9	9.6	14.2	7.6	8.4	16.6	27.6	29.8	28.6	19.1	18.2	13.4	16.9
XV ...	9.1	13.3	18.5	14.6	14.3	23.7	45.5	20.6	22.6	25.5	20.3	11.6	20.0
XVI ...	4.6	17.1	10.5	7.6	28.0	—	—	—	—	11.4	14.0	6.8	12.5
XVII ...	2.3	2.1	1.8	4.2	3.7	9.4	3.3	2.8	.5	1.0	1.5	.5	2.8
XVIII ...	4.2	3.7	5.0	5.9	9.2	17.3	24.6	12.0	13.7	14.6	14.8	9.8	11.2
XIX ...	5.8	8.5	6.7	7.9	12.6	23.9	28.3	16.8	13.1	11.7	10.4	7.0	12.7
XX ...	5.8	7.6	8.9	8.9	13.1	5.8	2.7	5.4	2.3	7.8	9.5	3.3	6.8
XXIII ...	.8	.3	.9	4.1	2.9	6.6	11.3	5.7	5.7	3.2	1.6	.9	3.7
XXIV ...	3.9	12.3	6.2	6.2	13.0	18.6	13.2	4.8	7.3	7.5	4.2	3.6	8.4
XXV ...	2.7	10.3	6.2	8.5	7.1	4.6	3.8	5.2	9.9	4.3	2.8	2.3	5.6
XXVI ...	1.1	—	11.3	28.1	11.0	4.2	6.2	3.8	12.9	6.7	2.9	1.8	8.2
XXVII ...	—	—	—	—	8.5	—	—	11.6	5.1	7.0	1.3	.9	5.7
XXVIII ...	—	.4	—	—	.4	1.1	1.5	—	—	.3	.3	.5	.6
XXIX ...	.4	.4	.3	1.1	1.2	2.1	4.4	2.2	1.0	.6	.4	.8	1.2
XXX ...	5.1	1.9	1.0	—	—	—	13.4	3.7	5.1	7.0	4.8	3.6	5.1
XXXI ...	3.1	1.7	2.7	—	4.0	3.0	3.6	2.8	4.2	5.0	3.4	3.7	3.4
XXXII ...	—	.2	—	—	9.2	1.6	1.6	3.1	2.1	1.8	2.5	3.6	2.9
XXXIII ...	—	—	—	—	—	2.0	.8	—	1.4	1.3	—	—	1.4
XXXV ...	—	1.4	—	—	—	2.6	—	—	—	4.6	.8	—	2.3
XXXVI ...	.6	1.0	.5	—	3.5	—	—	—	2.1	2.9	6.1	—	2.4
XXXVII ...	—	.6	—	—	.6	—	—	—	1.0	—	—	.6	.7
C ...	4.3	6.7	6.0	21.4	19.0	14.9	6.0	5.8	2.9	2.0	.3	1.5	7.6
D ...	30.7	23.2	22.3	34.1	24.1	12.9	7.0	4.3	1.6	3.9	.4	.7	13.8
J ...	—	—	—	—	37.0	26.3	28.7	10.3	—	—	—	.4	20.4
K ...	28.8	48.3	22.3	26.4	—	10.0	26.2	—	—	—	—	—	27.0
Faroe ...	10.3	31.5	95.0	58.8	29.8	39.3	26.7	40.9	21.9	12.8	12.2	10.3	32.5
Iceland ...	—	20.8	42.0	82.6	63.5	51.6	91.1	198.2	103.5	18.4	—	—	74.6

Passing to area XIX (Fig. 65), over the Witch Ground in the North Sea, we again get a satisfactory curve, showing an annual maximum about June and July; while

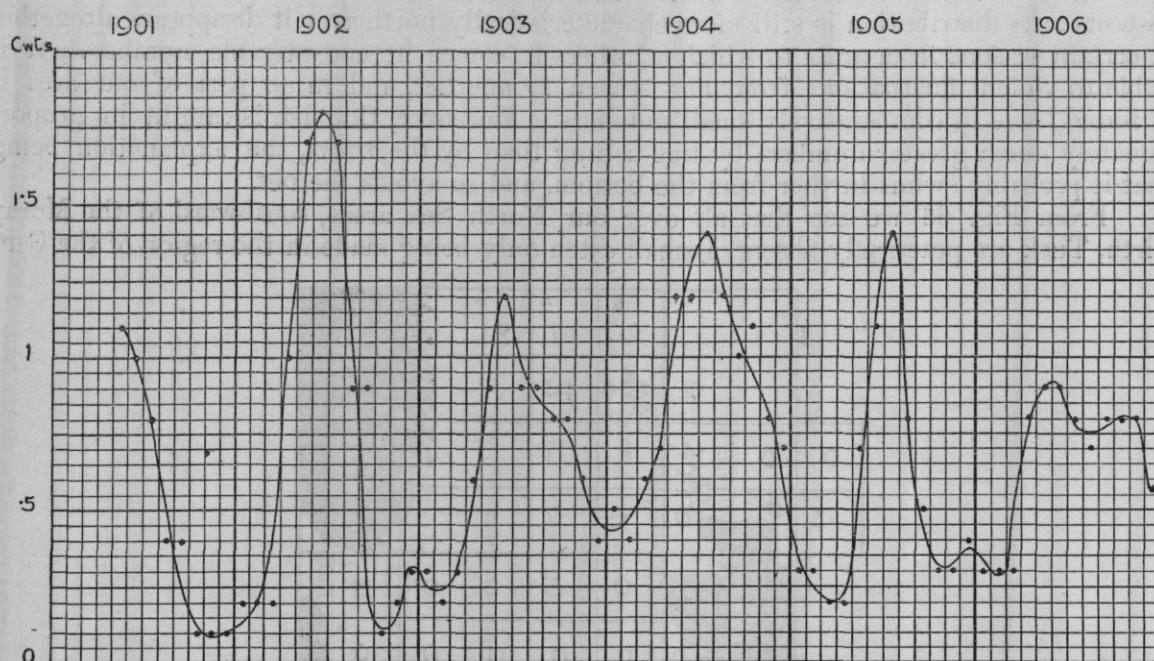


FIG. 65.—Mean monthly catches of TUSK, in cwts., per 100 hours' trawling, in area XIX : 1901-6, (smoothed curves).

the Torsk here do not absolutely disappear, they are reduced to exceedingly small numbers in mid-winter.

Southward of area XIX, in the Gut (XXIV), we find as a rule a well-marked maximum in April or May, with complete, or all but complete, disappearance in the interval (Fig. 66). This area is subject to variations, for at the end of 1905 a maximum is found in December, which may perhaps be explained as the influx that would normally

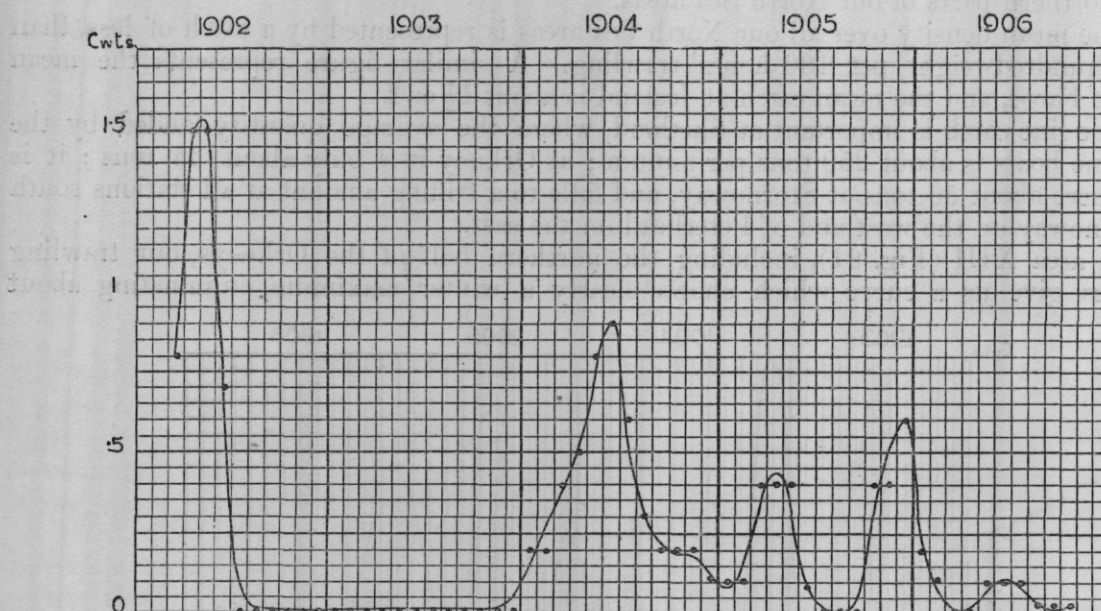


FIG. 66.—Mean monthly catches of TUSK, in cwts., per 100 hours' trawling, in area XXIV : 1902-6, (smoothed curves).

have come in the early spring, but had set in earlier than usual; and from July 1902 to January 1904 our statistics from this area show no Tusk at all.

Our curves from the other northern regions are in all cases somewhat irregular, but when the results for the several years are combined together we obtain useful composite curves. In the regions of the east of Shetland (XI and XII) the maximum is in May or June, and south of Shetland, in XIV, it is likewise in May, though here a subordinate

maximum in autumn is indicated in some years (Fig. 67). On the north-west (C) we have a well-marked maximum in spring. In XVIII, as in XIX, there is a summer maximum from April onwards, culminating in June or July, but here also there is a

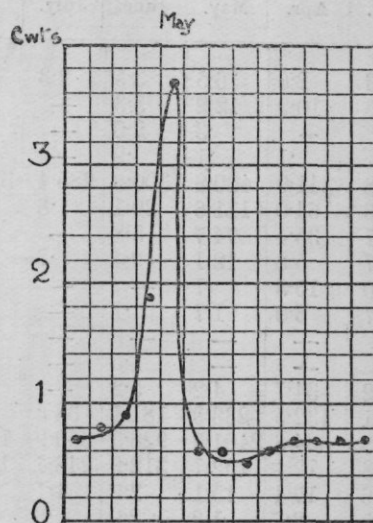


FIG. 67.—Mean monthly catches of TUSK, in cwts., per 100 hours' trawling, in area XIV : mean of years 1901-6.

tendency to a secondary maximum about November. In Shetland itself (area X) the trawling statistics show a maximum about April and May, with a secondary one about September-November (Fig. 68).

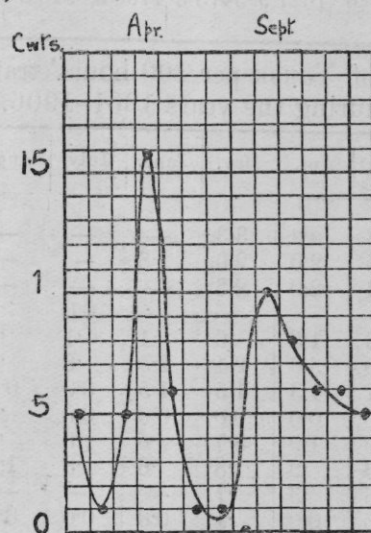


FIG. 68.—Mean monthly catches of TUSK, in cwts., per 100 hours' trawling, in areas X ; mean of years 1901-6.

Supplementing these facts by help of our statistics of line-fishing for the last 20 years we find that the east coast ports show a maximum of Tusk in April and May, a little earlier (in March) at Wick. At Orkney and Shetland the maximum is likewise in May, and at Stornoway in June. So far as we may judge from the small quantities taken at the more southerly ports on the west coast, the maximum there is in spring, from March to May. At Faroe the best catches appear to be in April and May.

The foregoing facts, if we attempt to summarise them, show us firstly a marked difference between area XIII, north of Orkney, and our other areas, there being there undoubted evidence of a maximum about December-January. In area IX, to the north of it (though our statistics are very incomplete) we have some indication also of a winter maximum, and we have already seen that a tendency to increase in late autumn is present, though it is not the main feature, in Shetland and the regions to the south thereof ; in other words a winter maximum is characteristic of parts of the sea westward of Shetland, and is slightly shared in by the adjacent North Sea regions. Everywhere else in our area, so far as Tusk extend, they increase in abundance in spring. The spring maximum would appear to be earliest in Shetland and along the west coast, where it is well in progress by March. It continues from April to May or June along the east coast of Scotland, and at Stornoway it is at its height in June. It is protracted throughout the summer at more easterly areas such as XIX.

TABLE XVIII.—Average Monthly Catch of TORSK, in cwts., at the under-mentioned ports during the twenty years 1886–1905.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Leith ...	·3	1·2	7·6	2·6	6·5	3·5	2·3	4·6	2·0	1·1	·2	·2
Anstruther ...	1·0	1·2	3·9	10·9	12·2	3·3	—	—	—	—	—	—
Montrose ...	—	—	—	—	·3	2·0	—	—	—	—	—	—
Stonehaven ...	—	—	—	·1	·1	·2	—	—	—	—	—	—
Aberdeen ...	122·2	176·5	276·8	341·9	400·8	300·2	285·4	331·1	217·9	169·8	119·2	112·1
Peterhead ...	·6	2·2	15·6	64·0	111·6	20·1	·8	—	—	·3	·2	·7
Fraserburgh ...	·5	1·7	9·7	35·4	74·7	5·8	—	—	—	·2	—	·3
Banff ...	1·9	3·3	4·7	5·8	12·1	2·4	·7	—	—	—	—	·2
Buckie ...	·2	·7	9·0	15·3	·7	—	—	—	—	—	—	—
Findhorn ...	—	·3	3·7	6·0	1·7	·1	—	—	—	—	—	—
Helmsdale ...	—	—	—	—	—	—	—	—	—	—	1·6	—
Lybster ...	—	—	—	—	—	1·5	—	—	—	—	—	—
Wick ...	11·1	34·9	69·2	34·7	4·2	5·2	—	1·0	—	·9	2·7	3·6
Orkney ...	10·2	12·9	45·1	132·5	233·9	181·1	38·8	22·2	21·3	7·9	10·3	6·1
Shetland ...	23·1	48·2	94·3	884·8	2401·7	928·3	369·9	172·0	43·0	40·8	18·3	94·5
Stornoway ...	19·5	43·7	81·8	72·1	192·7	312·9	246·4	110·9	18·4	11·4	13·6	16·5
Barra ...	—	2·2	7·6	17·4	15·1	2·9	1·1	·3	·9	·8	·2	·5
L. Broom ...	—	7·4	10·5	2·7	1·9	2·0	·8	1·0	·5	·8	·6	·4
L. Carron and Skye.	—	—	—	·1	·3	—	—	—	—	—	—	—
Fort William ...	—	·6	1·3	1·9	3·3	—	—	—	1·0	—	—	—
Campbeltown ...	—	—	—	—	·1	—	—	—	—	—	—	—
Greenock ...	—	—	—	·2	—	—	—	—	—	—	·1	—
Ballantrae ...	—	—	—	—	—	—	·2	·1	—	—	—	—
Scotland ...	190·4	341·9	640·6	1627·9	3473·6	1766·3	946·3	642·9	307·1	235·3	166·7	230·3

TABLE XIX.—Mean Catch of TORSK per 100 hours' trawling (Aberdeen Trawlers) during the years 1901–1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	·8	2·2	3·3	—	—	—	2·2	1·5	—	—	2·0
VII ...	—	1·0	1·5	2·0	2·0	1·8	—	—	—	—	—	—	1·7
VIII ...	—	—	1·4	2·0	2·8	—	—	—	—	—	—	—	2·1
IX ...	—	—	—	—	—	—	0·0	·1	·1	·1	1·1	0·0	·2
X ...	·5	·1	·5	1·6	·6	·1	·1	·1	1·0	·8	·6	·6	·5
XI ...	·6	·6	1·0	3·6	2·4	1·5	·6	·6	1·5	·9	·9	·9	1·3
XII ...	·5	·9	·7	1·3	1·5	1·5	0·0	0·0	·4	·5	·5	·5	·7
XIII ...	1·7	·6	0·0	0·0	0·0	0·0	0·0	·1	·4	·2	·6	1·2	·4
XIV ...	·7	·8	·9	1·9	3·7	·6	·6	·5	·6	·7	·7	·7	1·0
XV ...	·6	·7	·9	·9	·8	·6	·8	1·0	·8	·6	·6	·5	·7
XVI ...	·3	1·0	·6	·3	·7	—	—	—	—	0·0	·5	·4	·3
XVII ...	0·0	0·0	0·0	0·0	·1	0·0	0·0	0·0	0·0	0·0	·1	0·0	0·0
XVIII ...	·3	·5	·2	·3	·9	1·0	·7	·9	·3	·7	·6	·5	·6
XIX ...	·4	·4	·2	1·0	1·1	1·2	1·1	1·0	·4	·5	·6	·3	·7
XX ...	·3	·1	·2	·2	·2	0·0	0·0	0·0	0·0	0·0	·1	·2	·1
XXI ...	—	—	—	—	—	—	—	—	—	0·0	—	—	—
XXII ...	—	—	—	—	—	—	—	—	—	—	·1	—	—
XXIII ...	0·0	0·0	0·0	0·0	0·0	·1	0·0	0·0	0·0	0·0	0·0	0·0	0·0
XXIV ...	·1	·3	0·0	2·2	·8	·6	·2	0·0	·1	·1	·1	0·0	·4
XXV ...	0·0	0·0	·2	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
XXVI ...	0·0	—	·3	·2	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
XXVII ...	—	—	—	—	0·0	0·0	—	·5	0·0	0·0	0·0	0·0	·1
XXVIII ...	—	0·0	—	—	0·0	0·0	0·0	—	—	0·0	0·0	0·0	0·0
XXIX ...	0·0	0·0	0·0	0·0	0·0	—	0·0	0·0	0·0	0·0	0·0	0·0	0·0
XXX ...	0·0	0·0	0·0	—	—	—	0·0	0·0	0·0	0·0	0·0	0·0	0·0
XXXI ...	0·0	·1	0·0	—	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
XXXII ...	—	0·0	—	—	·1	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
XXXIII ...	—	—	—	—	—	0·0	0·0	—	0·0	0·0	—	—	0·0
XXXIV ...	—	—	—	—	—	—	—	—	—	—	—	—	—
XXXV ...	—	0·0	—	—	—	0·0	—	—	—	0·0	0·0	—	0·0
XXXVI ...	0·0	0·0	0·0	—	0·0	—	—	—	0·0	·1	0·0	—	0·0
XXXVII ...	—	·4	—	—	0·0	—	—	—	0·0	—	—	0·0	·1
XXXVIII ...	—	—	—	—	—	—	—	—	0·0	—	—	0·0	0·0
XL ...	—	—	—	—	—	—	—	—	—	0·0	—	—	—
XLI ...	—	—	—	—	—	—	—	—	—	—	—	—	—
C ...	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
D ...	0·0	0·0	·5	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
J ...	—	—	—	—	0·0	0·0	0·0	0·0	—	—	—	0·0	0·0
K ...	0·0	0·0	·1	0·0	—	0·0	1·6	—	—	—	—	—	·3
Faroe ...	·7	·7	·3	1·0	1·0	·5	·2	·4	·4	·9	·2	·1	·5
Iceland ...	—	2·1	0·0	0·0	0·0	13·3	0·0	0·0	0·0	0·0	—	—	1·6

THE HAKE. (*Merluccius vulgaris*.)

The migratory nature of the Hake is a striking and well-known phenomenon, and the seasons of its reappearance, which are as regular as those of the Herring, are also a matter of common knowledge. It comes in its proper season in great abundance to our northern and western coasts, but off our east coast and in the central areas of the North Sea it arrives in very greatly diminished numbers. To the eastward, in the neighbourhood of the Skagerrack, it is again somewhat plentiful in its proper season. On the departure of the great shoals the fish all but entirely disappears from our seas.

The average catches of Hake are shown as usual in Fig. 69, from which figure the preponderating catches in our northern waters are shown at a glance. In this case we add

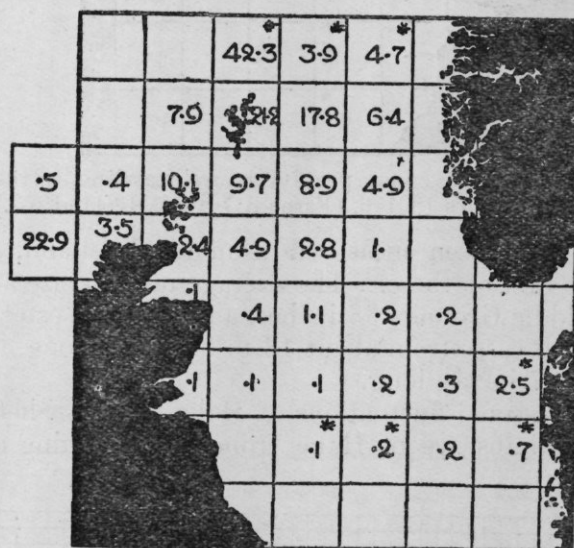


FIG. 69.—Mean catch of HAKE, in cwt., per 100 hours' trawling, in various areas: 1901-6, (Faroe .5 cwt., Iceland *nil.*).

two other figures (70 and 71) to show the contrast between the average catch in October, the season of most general abundance, and that in March during the period of scarcity.

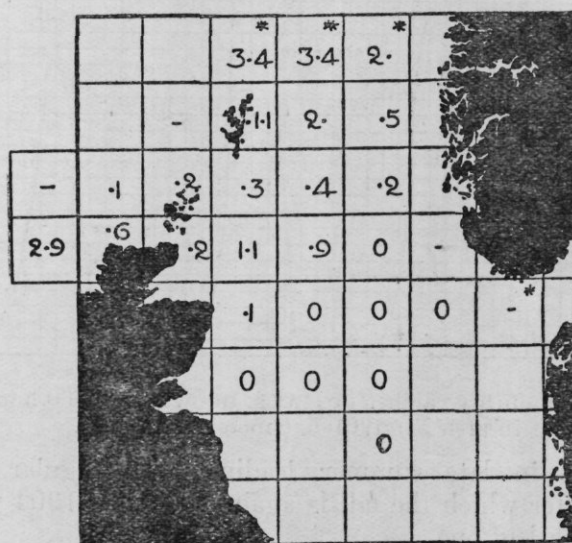


FIG. 70.—Mean catch of HAKE, in cwt., per 100 hours' trawling, in the month of March, during the years 1901-6, Faroe *nil.*, Iceland *nil.*).

The mean density of Hake over all our North Sea areas during the year may be approximately stated at about 4 cwt. But while this figure has, perhaps, some little value for comparison with those given in the case of other fishes, yet it must be repeated here that such numbers have very little absolute value, especially in the case of a fish that fluctuates so much as the Hake does in both seasonal and local abundance. It is obvious, for instance, that the inclusion in our statistics of one or two more areas to the northward, where Hake are abundant, would very considerably raise the number we have arrived at as a general average.

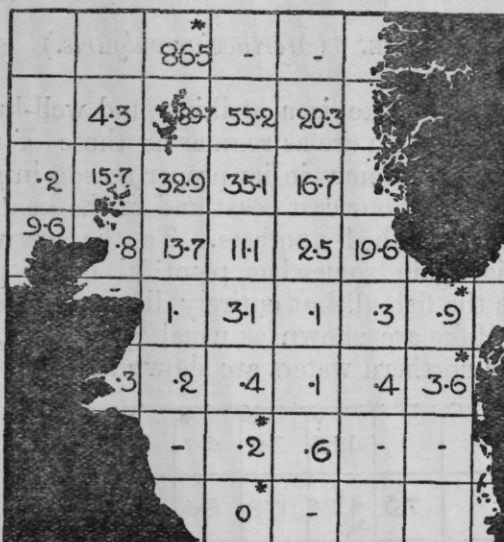


FIG. 71.—Mean catch of HAKE, in cwt., per 100 hours' trawling, in the month of October, during the years 1901-6, (Faroe 3.7 cwt., Iceland *nil.*).

About 3,500 Hake have been measured from the Shetland, Western and Middle Grounds, mostly from the first of these. The average median size at Shetland was found to be 32 inches, in the Middle Grounds 33 inches, and in the Western Grounds 24 inches. The smallest fish were in all cases from about 13 to 15 inches long, and the largest from the Western Grounds was 47 inches long.

Figure 72 shows the seasonal fluctuations of Hake in the Shetland region, and we see that after an all but total absence of Hake from the beginning of each year a sudden

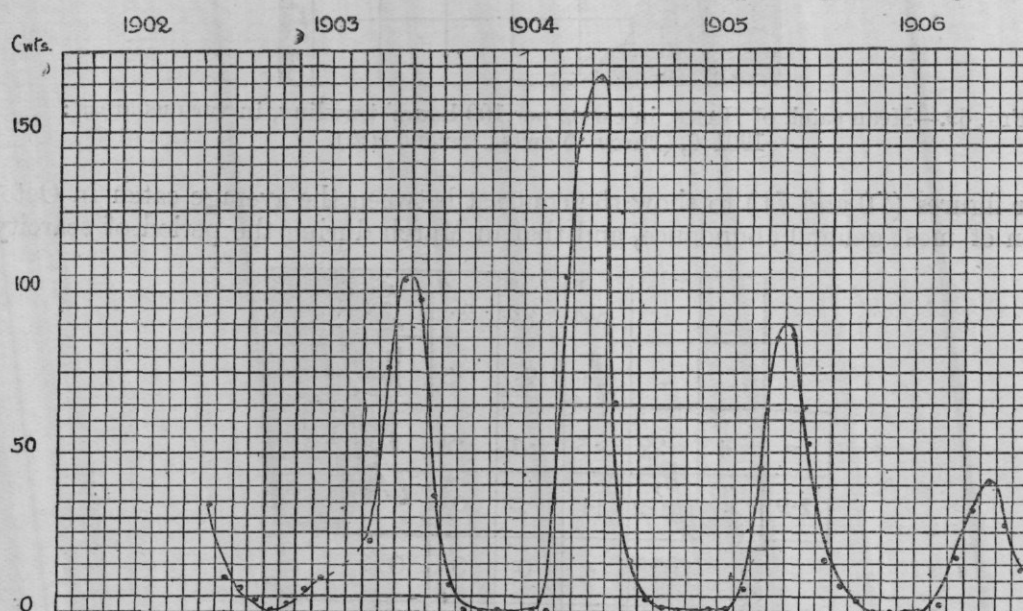


FIG. 72.—Mean monthly catches of HAKE, in cwt., per 100 hours' trawling, in area X : 1901-6, (smoothed curves).

immigration takes place in late summer, leading to a regular annual maximum in September or October, after which the fall is again sudden. 1904 was evidently a good year for Hake, and 1906 a bad one.

In area XIX, on the Witch Ground, the curve is almost equally regular (Fig. 73), but on examining the figure closely it will be seen that the date of maximum was in each year about a month later than at Shetland; it will also be seen that the total quantities in this region at the period of maximum are less than one-tenth of those in the Shetland region.

In area XXIII (Fig. 74), off Aberdeen, the curve is equally regular, though here the average catch at the best season is only one or two cwt., or perhaps a fiftieth part of the corresponding catch at Shetland.

In area XXIX (Fig. 74) the catches are still more reduced, but the curve is equally clear. It will be found that in area XXIX, though it cannot be said that the influx of Hake begins earlier than in the above-mentioned areas, it comes to an end sooner, and the period of maximum here is about July or August.

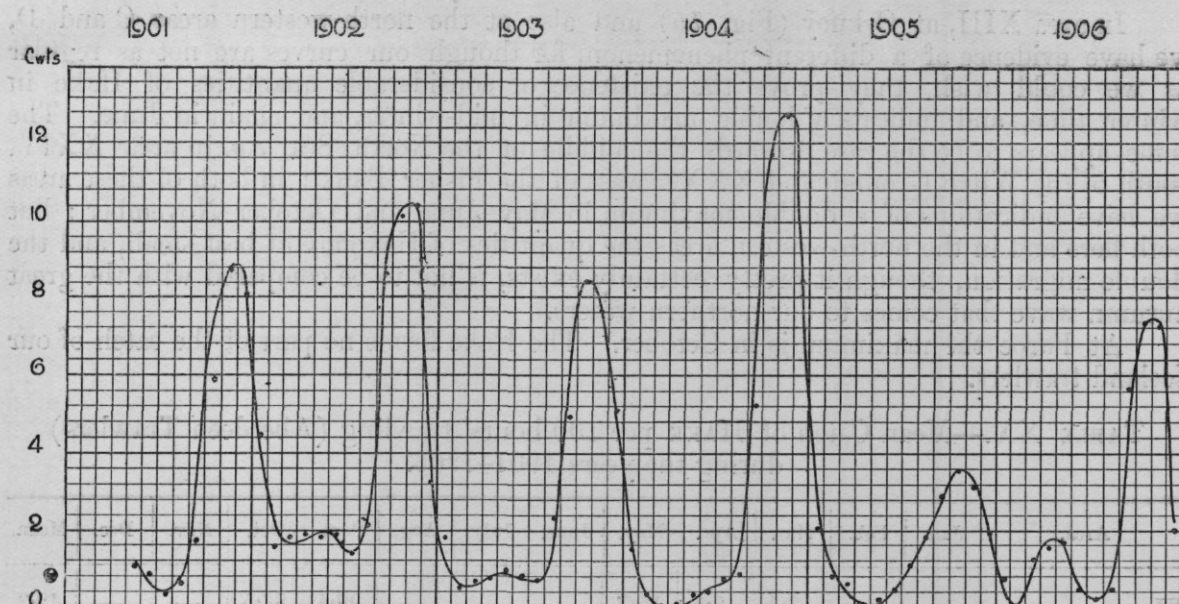


FIG. 73.—Mean monthly catches of HAKE, in cwts., per 100 hours' trawling, in area XIX : 1901-6, (smoothed curves).

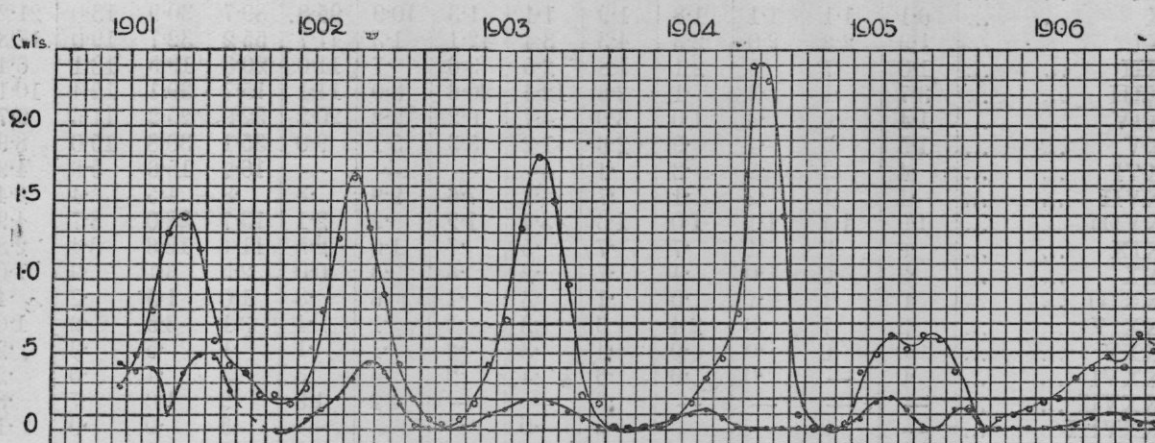


FIG. 74.—Mean monthly catches of HAKE, in cwts., per 100 hours' trawling in area XXIII and XXIX ; 1901-6, (smoothed curves ; area XXIII— area XXIX ----).

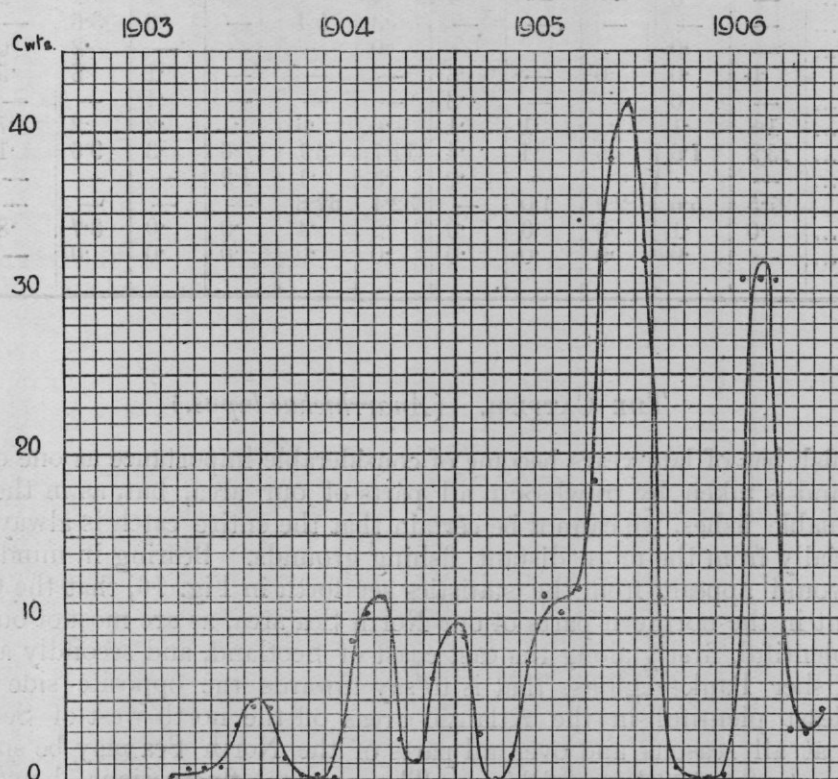


FIG. 75.—Mean monthly catches of HAKE, in cwts., per 100 hours' trawling in area XIII : 1903-6, (smoothed curves).

In area XIII, at Orkney (Fig. 75) and also at the north-western areas C and D, we have evidence of a different phenomenon, for though our curves are not as regular as we could wish, they prove the existence of considerable quantities of Hake in winter time, and indicate a double maximum in mid-winter, and again in June. The same appears to be the case towards the middle of the North Sea, *e.g.* in area XXIV, south of the Witch Ground, and XXXI, west of the Fisher Bank; in both of these areas we have indications of a double maximum in May-June and October-November; but both here and in the north-western areas the quantities of Hake are at best small, and the double migration, though it pretty certainly exists, is not to be compared with the great autumn wave that comes to our northern waters.

At Faroe the maximum is in October. The Hake forms no part of the catch of our Iceland trawlers.

TABLE XX.—Mean Catch of HAKE per 100 hours' trawling (Aberdeen Trawlers) during the years 1901-1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	3.4	7.5	15.9	—	—	—	98.4	86.5	—	—	42.3
VII ...	—	1.3	3.4	4.1	7.4	3.4	—	—	—	—	—	—	3.9
VIII ...	—	—	2.0	7.1	4.9	—	—	—	—	—	—	—	4.7
IX ...	—	—	—	—	—	—	2.8	2.1	8.0	4.3	24.0	6.3	7.9
X ...	6.1	1.1	1.1	1.8	1.9	1.1	1.3	10.9	95.8	89.7	30.9	13.0	21.2
XI ...	1.9	2.2	2.0	2.3	4.3	3.4	42.1	1.3	47.7	55.2	32.7	19.0	17.8
XII ...	1.0	.7	.5	2.1	1.8	2.5	3.6	.7	11.0	20.3	19.5	13.1	6.4
XIII ...	3.7	.1	.2	.1	2.6	12.4	20.6	3.0	11.1	15.7	39.1	12.4	10.1
XIV ...	1.4	.6	.3	1.0	3.0	4.7	6.2	9.2	20.2	32.9	25.2	11.6	9.7
XV ...	1.5	.5	.4	.9	2.6	1.2	5.3	5.1	9.0	35.1	30.8	15.0	8.9
XVI ...	.4	.3	.2	.3	.4	—	—	—	—	16.7	15.6	5.6	4.9
XVII ...	.1	.1	.2	.1	.7	4.1	7.6	9.9	.8	.8	4.5	.4	2.4
XVIII ...	1.9	1.4	1.1	1.0	1.3	3.4	1.9	.9	2.1	13.7	22.0	8.7	4.9
XIX ...	.6	.3	.1	.7	.7	.5	.7	1.0	2.5	11.1	12.6	3.4	2.8
XX ...	.3	.0	.0	.4	.7	.2	.6	.3	0.0	2.5	6.1	.9	1.0
XXIII ...	.0	.1	.1	.0	.1	.6	.4	.6	.8	1.0	1.5	.2	.4
XXIV ...	.2	.7	.0	2.4	.6	.3	.1	.1	.4	3.1	3.5	.6	1.0
XXV ...	.0	.0	.0	.0	.4	.3	.2	.1	.1	.1	.5	.3	.2
XXVI ...	.0	—	.0	.0	.6	.4	.2	.4	.3	.3	.4	.0	.2
XXVII ...	—	—	—	—	.3	—	—	1.2	1.8	.9	1.0	.7	.8
XXVIII ...	—	.0	—	—	.0	.0	.1	—	—	.3	.0	.0	.1
XXIX ...	.0	.0	.0	.0	.1	.2	.1	.1	.1	.2	.1	.0	.1
XXX ...	.2	.0	.0	—	—	—	.1	.1	.1	.4	.1	.2	.1
XXXI ...	.1	.0	.0	—	.4	.3	.3	.1	.1	.1	.2	.3	.2
XXXII ...	—	.0	—	—	.4	.4	.4	.3	.4	.4	.2	.0	.3
XXXIII ...	—	—	—	—	—	.3	5.4	—	.6	3.6	—	—	2.5
XXXV ...	—	.0	—	—	—	.0	—	—	—	.2	.0	—	.1
XXXVI ...	.0	.0	.0	—	.3	—	—	—	.1	.6	.5	—	.2
XXXVII ...	—	.0	—	—	.3	—	—	—	.4	—	—	.0	.2
C ...	1.8	.1	.1	.1	.1	.6	.6	.1	.2	.2	.7	.3	.4
D ...	13.2	1.6	.6	.4	.4	11.7	3.1	.6	.3	9.6	.1	.5	3.5
J ...	—	—	—	—	.0	.3	.1	1.2	—	—	—	.9	.5
K ...	27.5	5.6	2.9	1.0	—	32.4	67.8	—	—	—	—	—	22.9
Faroe ...	.0	.1	.0	.0	.0	.2	.4	.0	.0	3.7	.8	.9	.5
Iceland ...	—	.0	.0	.0	.0	.0	.0	.0	.0	.0	—	—	.0

THE CATFISH. (*Anarrhichas lupus*.)

The Catfish has of late years become of considerable importance as one of the coarser food fishes, and is taken by trawlers in all parts of our area, but, as in the case of the other less valuable fishes, we cannot be certain that the entire catch is always brought to market, especially from the more distant fishing grounds. Bearing in mind this element of doubt, it would appear, from the statistics set forth in Fig. 76, that the Catfish is not most abundant in the northern parts of our North Sea area, as are most of our food fishes, but is most plentiful, firstly along the east coast of Scotland, and secondly and still more so over the Fisher Bank regions, that is to say towards the opposite side of the North Sea. It is least plentiful in the Atlantic areas off the north-west of Scotland. The average catch at all seasons and over all parts of the North Sea may be stated approximately at 2½ cwts. per 100 hours' fishing. The seasonal fluctuations, however, are very

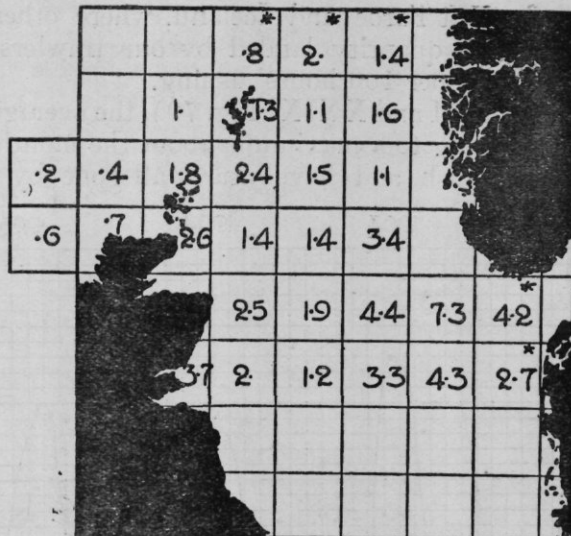


FIG. 76.—Chart showing mean catch of CATFISH, in cwts., per 100 hours' trawling, in various areas : 1901-6, (Faroe 15.4 cwts., Iceland 9.2 cwt.).

great in the case of Catfish, and an approximate average for our North Sea regions in the month of November (Fig. 78) gives only about half a cwt., and in the month of May (Fig. 77) rises to about $5\frac{1}{2}$ cwts. per 100 hours' fishing.

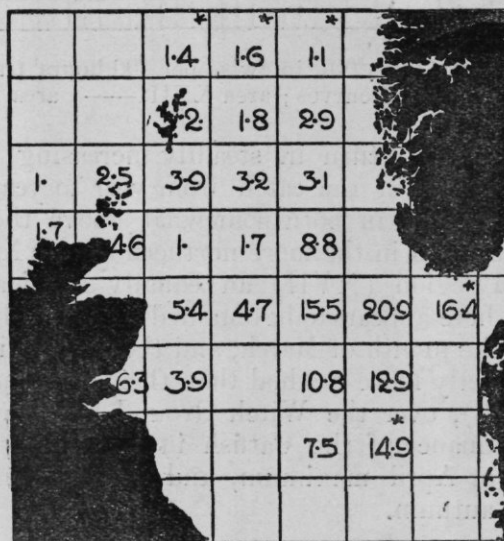


FIG. 77.—Mean catch of CATFISH, in cwts., per 100 hours' trawling, in the month of May, during the years 1901-6, Faroe 23.3 cwts., Iceland 8.4 cwts.

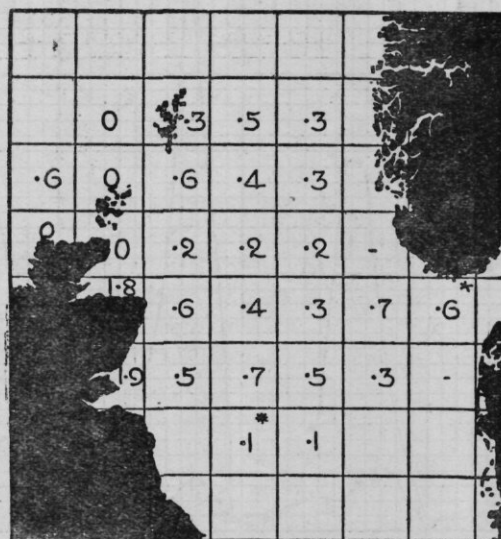


FIG. 78.—Mean catch of CATFISH, in cwts., per 100 hours' trawling, in the month of November, during the years 1901-6, (Faroe 1.1 cwts., Iceland *nil.*).

Catfish are abundant both at Faroe and Iceland, where other species of the same genus also occur. The average quantity landed by our trawlers is about 9 cwt. from Iceland, and 15 cwt. from Faroe, per 100 hours' fishing.

In our east coast areas (XXIII and XXIX, Fig. 79), the average catch of Catfish gives exceedingly regular curves, rising to a maximum about the month of May. After May or June the fish rapidly diminish, and have nearly all gone by October or November,

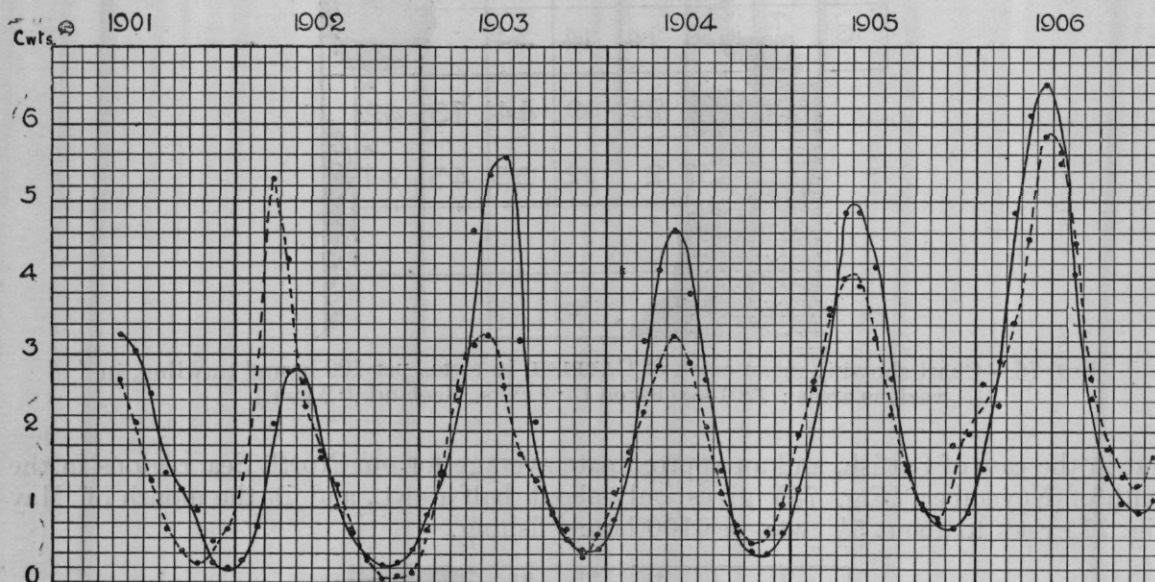


FIG. 79.—Mean monthly catches of CATFISH, in cwt., per 100 hours' trawling, in areas XXIII and XXIX : 1901-6, (smoothed curves; area XXIII— area XXIX ----).

after which season they begin to return in steadily increasing numbers. No very important differences are to be seen in the catch from year to year in these areas, but the catch in the spring of 1906 was in both somewhat above the average. The catch in area XXIX is distinctly less than in the more northern area XXIII.

In the Pentland Firth region (XVII) an equally regular curve is shown by the statistics. The maximum here appears to be obtained a little earlier than off the east coast of Scotland, namely, about the month of March, and the fall, until the disappearance of the fish in late autumn, is distinctly more gradual than their subsequent increase in spring.

In area XIX (Fig. 80), over the Witch Ground, we have in most years a still greater tendency to a continuance of the Catfish in comparative abundance for several months after their March or April maximum, and some signs even of a tendency to a secondary increase in early autumn.

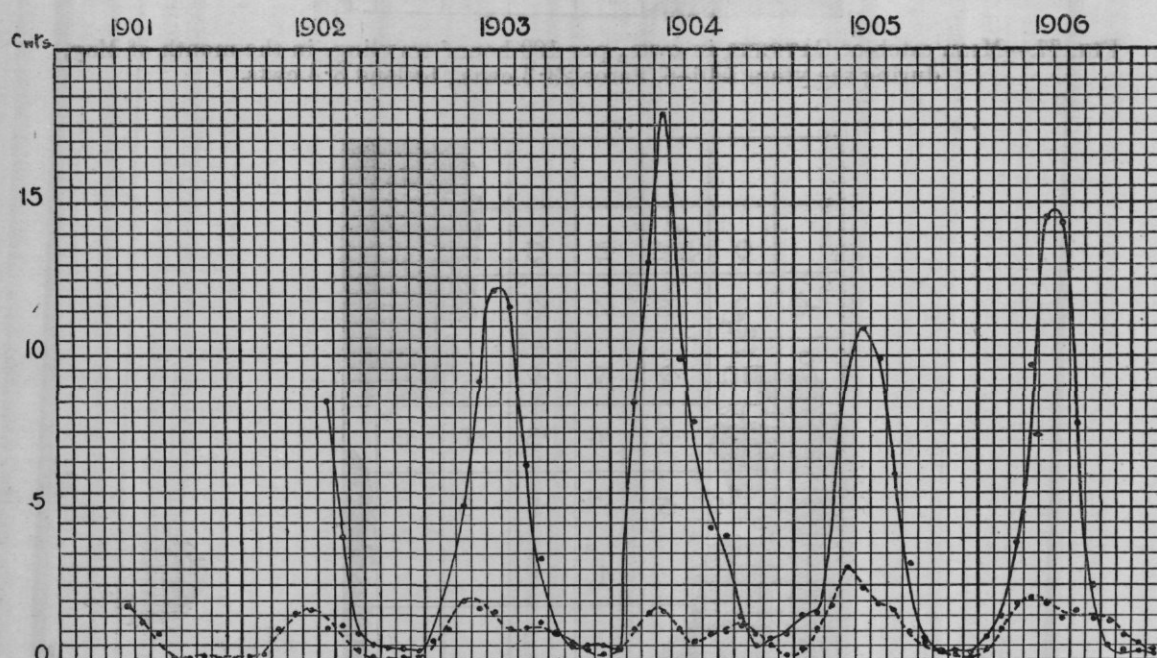


FIG. 80.—Mean monthly catches of CATFISH, in cwt., per 100 hours' trawling, in areas XIX and XXV : 1901-6, (smoothed curves; area XIX ---- XXV—).

In area XXV (Fig. 80), over the Reef and Ling Bank, Catfish are present in great numbers at the season of maximum, but their period of abundance, which varies from April to June, is not notably different from what we have found in other areas.

In the deep water area (XII), which includes the Viking Bank, our statistics are not very copious, but they appear to indicate a slightly later maximum than elsewhere, namely, in June and July (Fig. 81).

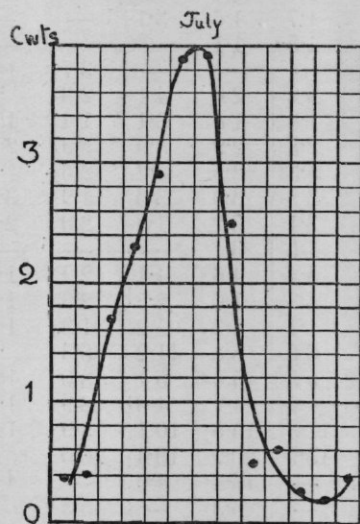


FIG. 81.—Mean catch of CATFISH, in cwts., per 100 hours' trawling, in area XII : mean of years 1901-6.

Dr. Henking has shown that in the southern North Sea Catfish reach a maximum in March and April, but in the Skagerrack, on the other hand, in July.

The migrations of the Catfish are as regular, or nearly so, as those of the Hake, and it disappears almost, though not quite, as completely as does that fish in the off season ; but the Catfish is as characteristically a spring migrant as the Hake is an autumn one. The times of arrival of the Catfish in our various areas are so nearly simultaneous that it is not easy with our present information to say much as to local differences ; but on the whole it would appear that their period of maximum is by a little the earliest in the southern North Sea and off our own eastern coasts, and distinctly the latest in the Skagerrack and in the north-eastern part of the North Sea.

At Faroe Catfish are comparatively plentiful from about February to June or July. On the Iceland trawling grounds we have some evidence of a double maximum in April and again in September.

The following Table shows how uniform is the season of abundance of the Catfish over all those areas for which our statistics are most complete.

TABLE XXI.—CATFISH.—Months of more than average abundance, 1901-1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
X ...	—	—	*	*	*	**	*	—	—	—	—	—
XI ...	—	—	*	*	*	**	*	*	—	—	—	—
XII ...	—	—	*	*	*	**	**	*	—	—	—	—
XIII ...	—	—	*	*	*	**	*	*	—	—	—	—
XIV ...	—	—	*	*	*	*	*	*	—	—	—	—
XV ...	—	—	*	*	**	*	*	*	—	—	—	—
XVI ...	—	—	*	*	**	?	?	—	—	—	—	—
XVII ...	—	*	*	**	*	*	*	—	—	—	—	—
XVIII ...	—	—	*	**	—	*	*	—	—	—	—	—
XIX ...	—	—	*	*	*	**	*	—	—	—	—	—
XX ...	—	—	*	*	*	**	*	—	—	—	—	—
XXIII ...	—	—	*	**	**	*	*	—	—	—	—	—
XXIV ...	—	*	*	—	—	—	**	*	—	—	—	—
XXV ...	—	—	—	*	**	*	*	—	—	—	—	—
XXVI ...	—	—	*	*	*	*	*	—	—	—	—	—
XXIX ...	—	*	*	*	*	*	*	—	—	—	—	—
XXX ...	—	*	*	?	?	?	*	—	—	—	—	—
XXXI ...	—	—	*	?	**	*	*	—	—	—	—	—
C ...	—	—	—	—	*	**	*	—	—	—	—	—
D ...	—	—	—	*	*	*	—	—	—	—	—	—
Faroe ...	—	*	**	*	*	*	**	—	—	—	—	—

TABLE XXII.—Mean Catch of CATFISH per 100 hours' trawling (Aberdeen Trawlers) during the years 1901–1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	.8	1.1	1.4	—	—	—	.2	.3	—	—	.8
VII ...	—	0.0	1.5	1.7	1.6	3.1	—	—	—	—	—	—	2.0
VIII ...	—	—	1.7	1.5	1.1	—	—	—	—	—	—	—	1.4
IX ...	—	—	—	—	—	—	3.7	1.3	.3	.6	0.0	.1	1.0
X ...	.2	.4	2.0	2.2	2.0	4.1	2.3	.6	.6	.5	.3	.3	1.3
XI ...	.3	.9	1.9	1.8	1.8	3.1	1.4	1.1	.7	.5	.5	.3	1.1
XII ...	.4	.4	1.7	2.3	2.9	3.9	3.9	2.2	.3	.6	.3	.2	1.6
XIII ...	.2	1.8	3.0	5.3	2.5	5.2	2.6	.2	.1	.3	0.0	.1	1.8
XIV ...	.5	1.8	3.2	3.8	3.9	3.0	4.9	3.6	1.4	1.0	.6	.6	2.4
XV ...	.3	1.1	2.4	3.1	3.2	1.8	2.0	2.7	.9	.4	.4	.3	1.5
XVI ...	.3	.9	2.1	1.5	3.1	—	—	—	—	.2	.3	.3	1.1
XVII ...	1.1	3.8	5.2	5.4	4.6	4.1	2.9	1.9	.1	.3	0.0	.2	2.6
XVIII ...	.2	.9	2.2	4.3	1.0	2.5	2.9	1.2	.8	.4	.2	.2	1.4
XIX ...	.2	.8	2.5	1.7	1.7	5.2	1.3	1.3	.6	.5	.2	.2	1.4
XX ...	.5	2.1	3.2	6.6	8.8	11.2	6.6	.8	.2	.3	.2	.3	3.4
XXIII ...	1.0	1.9	3.8	5.5	5.4	5.1	3.0	1.5	1.0	.7	.6	.6	2.5
XXIV ...	1.2	2.7	3.1	.2	4.7	4.6	2.9	1.5	1.1	.6	.4	.5	1.9
XXV ...	.5	2.2	3.6	11.3	15.5	10.1	5.9	1.7	.5	.4	.3	.6	4.4
XXVI ...	.6	—	12.1	13.9	20.9	15.4	10.0	3.6	1.6	.7	.7	1.4	7.3
XXVII ...	—	—	—	—	16.4	4.6	—	4.8	2.0	.7	.6	.4	4.2
XXVIII ...	—	5.1	—	—	6.3	—	5.5	—	—	1.6	1.9	1.7	3.7
XXIX ...	1.2	2.4	2.5	3.3	3.9	3.8	2.4	1.6	.8	.6	.5	1.0	2.0
XXX ...	.7	2.0	2.8	—	—	—	2.1	1.2	.8	.4	.7	.6	1.2
XXXI ...	1.2	3.2	6.3	—	10.8	7.8	3.6	1.3	.6	.4	.5	.4	3.3
XXXII ...	—	5.2	—	—	12.9	11.7	5.5	1.5	1.0	.4	.3	.2	4.3
XXXIII ...	—	—	—	—	—	4.8	2.7	—	2.5	1.0	—	—	2.7
XXXV ...	—	1.1	—	—	—	7.2	—	—	—	0.0	.1	—	2.1
XXXVI ...	.5	2.2	2.3	—	7.5	—	—	—	.8	.5	.1	—	2.0
XXXVII ...	—	1.1	—	—	14.9	—	—	—	.5	—	—	0.0	4.1
C ...	0.0	.1	.4	.4	1.0	1.1	.5	.3	.1	0.0	.6	0.0	.4
D ...	0.0	.1	.3	1.4	1.7	1.5	.8	.1	0.0	0.0	0.0	.3	.7
J ...	—	—	—	—	0.0	.2	.6	.2	—	—	—	0.0	.2
K ...	.1	.1	.2	1.0	—	1.4	.8	—	—	—	—	—	.6
Faroe ...	10.0	26.8	31.9	22.4	23.3	28.3	33.0	3.5	1.5	.9	1.4	1.2	15.4
Iceland ...	—	.7	15.8	19.8	8.4	6.4	3.1	5.7	20.8	2.0	—	—	9.2

THE MONK OR ANGLER. (*Lophius piscatorius*.)

The Monk or Angler is, to judge by our trawling statistics, most abundant in the neighbourhood of the Scottish coast, from Orkney and Shetland southwards, and is markedly less plentiful on the Fisher Bank areas and elsewhere to the eastward, where on the other hand Catfish are particularly abundant (Fig. 82). It is also scarce

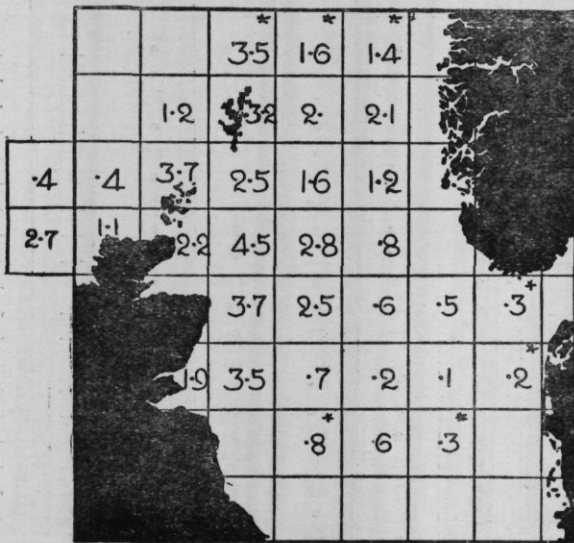


FIG. 82.—Chart showing mean catch of MONK or ANGLER, in cwts., per 100 hours' trawling, in various areas : 1901–7, (Faroe .8 cwts., Iceland .3 cwts.).

in the Atlantic areas off the north-west of Scotland. Over the whole of our North Sea areas the average catch is rather over $1\frac{1}{2}$ cwts. per 100 hours' fishing.

In area XIII to the North of Orkney we have a high maximum catch of Monks about December and January, and a fall to zero, or nearly so, in late spring and early summer (Fig. 83).

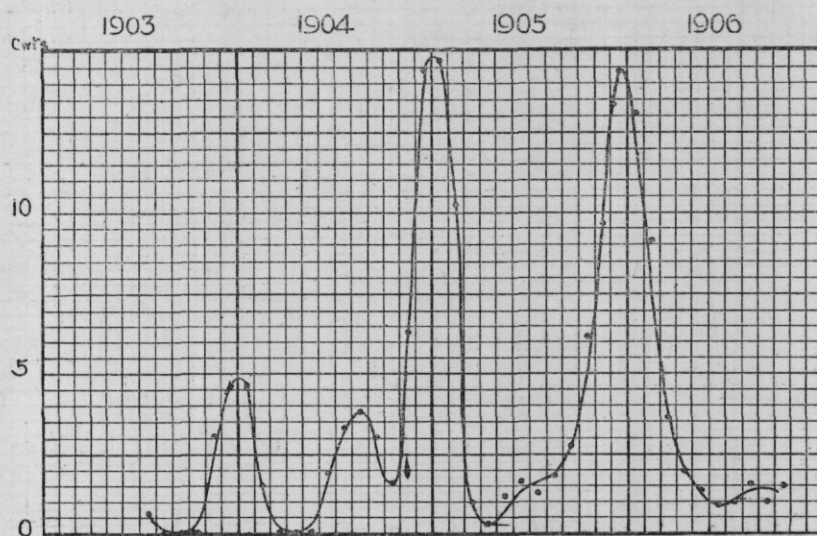


FIG. 83.—Mean monthly catches of MONK or ANGLER, in cwts., per 100 hours' trawling, in area XIII: 1903-6, (smoothed curves.).

A similar periodic influx in winter-time is common, more or less, over the whole of our North Sea areas; and we may illustrate it again by curves for area XVIII, westward of the Witch Ground, and area XXIX, eastward of the Firth of Forth (Fig. 84).

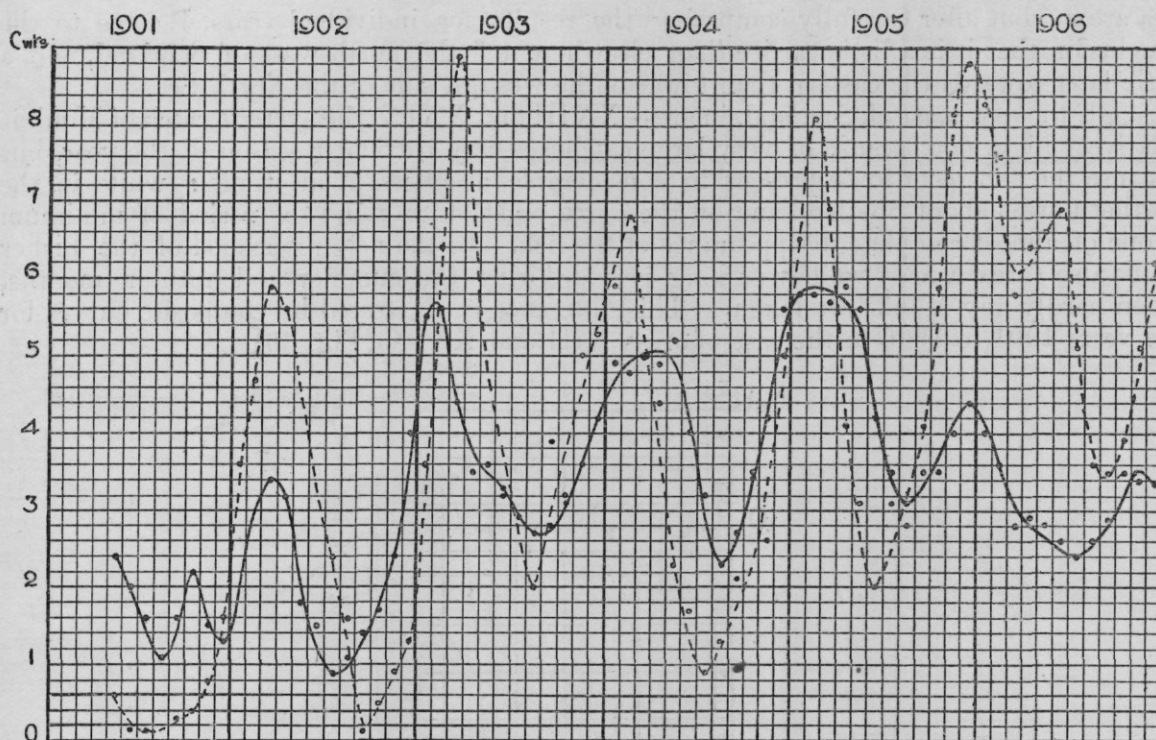


FIG. 84.—Mean monthly catches of MONK or ANGLER, in cwts., per 100 hours' trawling, in areas XVIII and XXIX: 1901-6, (smoothed curves; area XVIII ----- area XXIX——).

In the former of these the curve is much less sharp than at Orkney, and at the latter the curve is still more flattened, indicating a considerable succession of months during which the catch is relatively high.

In two areas only, lying adjacent to one another, namely area XIX, over the Witch Ground, and XXIV, over the Gut, do we find an indication of a different phenomenon (Fig. 85); in both of these areas there is evidence of a double maximum, firstly about the month of May, and secondly in the late autumn and early winter.

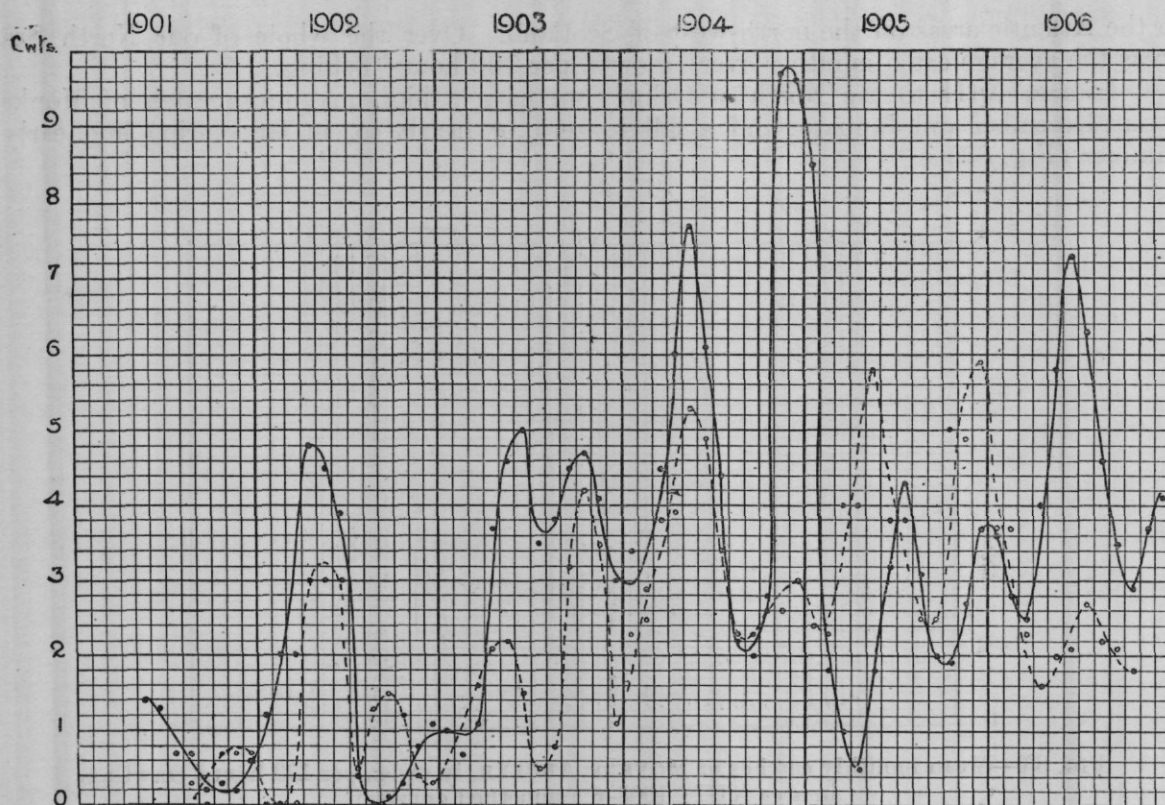


FIG. 85.—Mean monthly catches of MONK or ANGLER, in cwts., per 100 hours' trawling, in areas XIX and XXIV : 1901-6, (smoothed curves; area XIX — area XXIV ----).

As regards the winter maximum, it is nearly simultaneous over our various North Sea areas; but after carefully comparing the results for individual years, I come to the conclusion that it is a little earlier than elsewhere off the north-west of Scotland, and a little later towards the eastern than towards the western side of the North Sea.

Off the east coast of Scotland, in areas XXIII and XXIX, the average catch of Monk is relatively high, not because of very large catches at any particular season of the year, but because the fish seem to be present in considerable numbers at all times: while in the northern areas about Shetland and off the north coast of Scotland the period of minimum is one of almost complete disappearance of the fish. In the neighbourhood of the Fisher Bank also (area XXV) we have a long period during the summer and autumn months, when hardly any Monks are taken. This difference is illustrated by composite curves for the years 1901 to 1906 in the case of areas XIII and XXIX (Fig. 86).

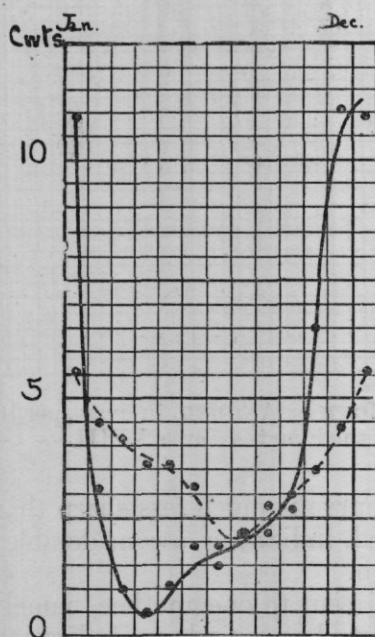
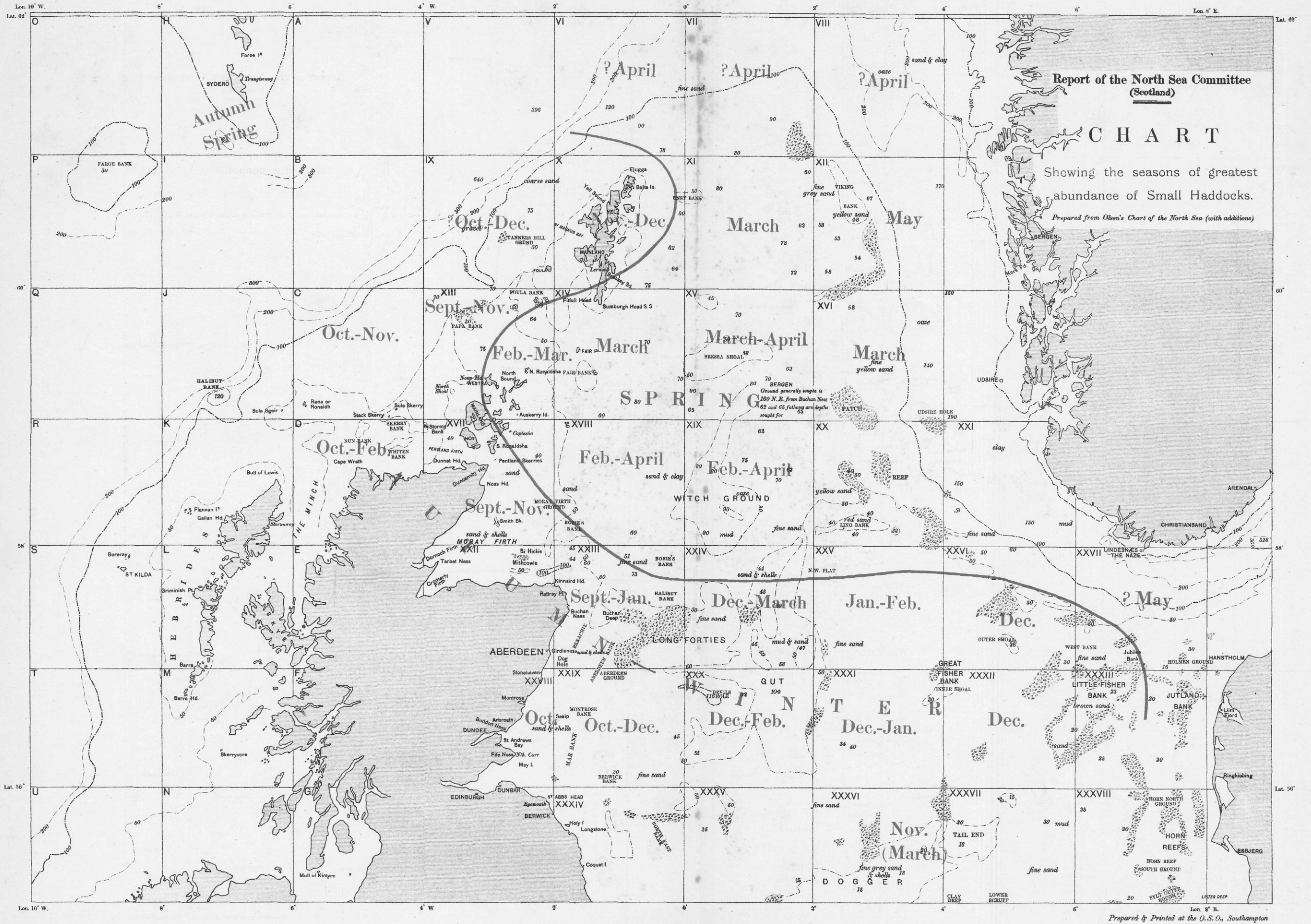
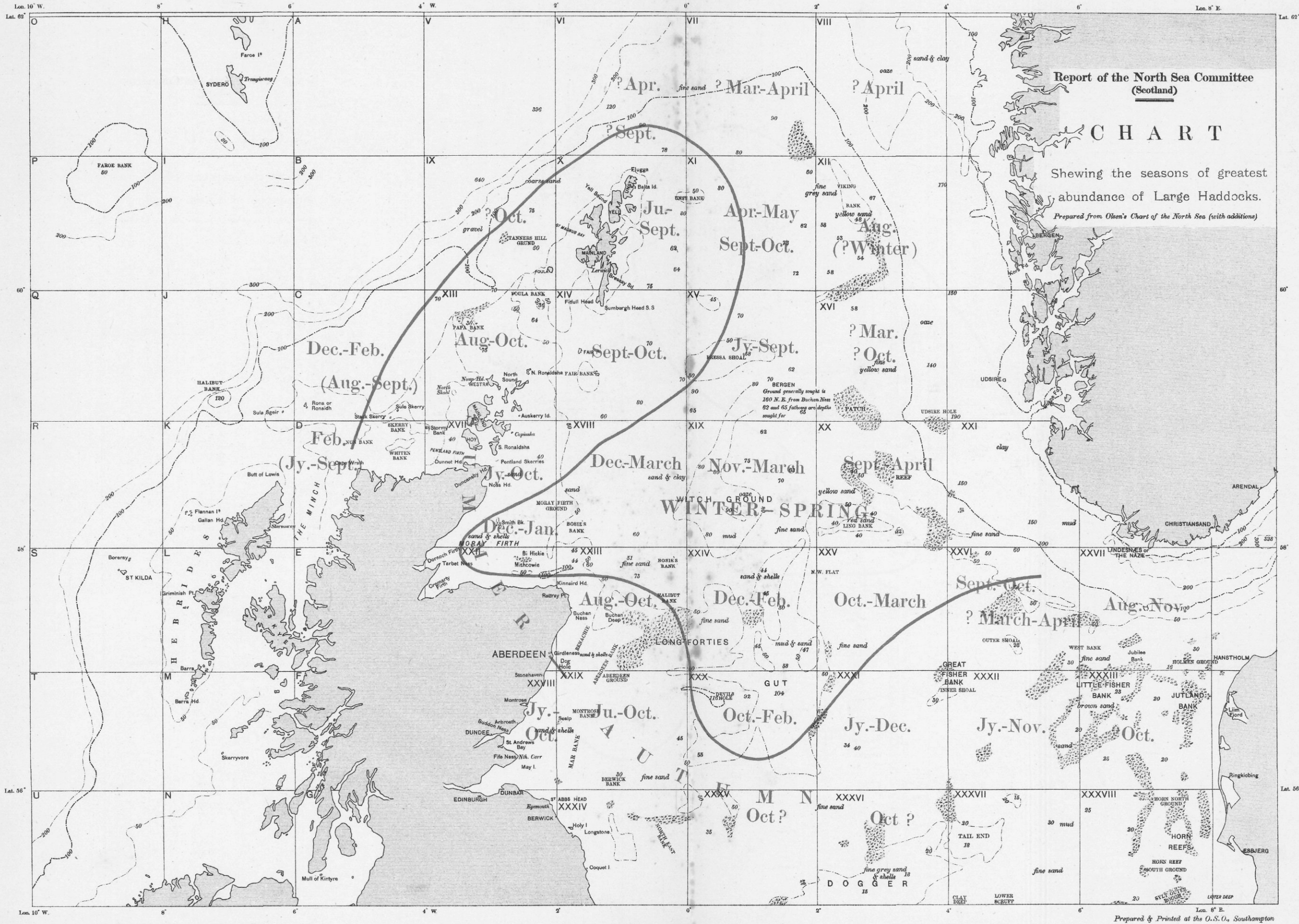


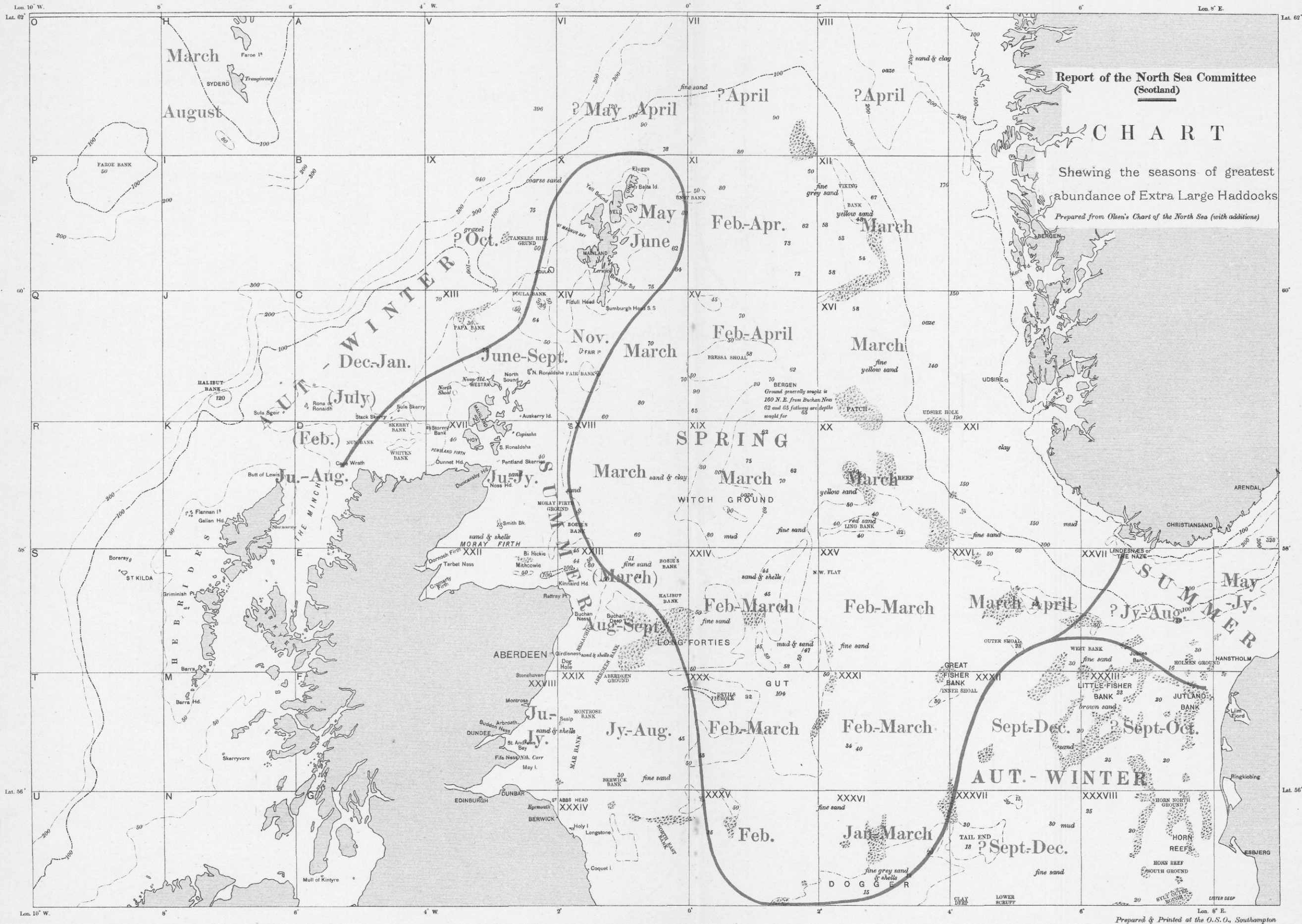
FIG. 86.—Mean catch of MONK or ANGLER, in cwts., per 100 hours' trawling, in areas XIII and XXIX : means of 1901-6, (area XIII — area XXIX ----).

TABLE XXIII.—Mean Catch of MONK or ANGLER per 100 hours' trawling (Aberdeen Trawlers) during the years 1901–1906.

Area.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
VI ...	—	—	1.2	2.3	3.7	—	—	—	3.7	6.5	—	—	3.5
VII ¹ ...	—	2.2	1.5	1.7	1.5	1.2	—	—	—	—	—	—	1.6
VIII ...	—	—	1.9	1.2	1.2	—	—	—	—	—	—	—	1.4
IX ...	—	—	—	—	—	—	.2	.5	0.0	1.3	2.7	2.4	1.2
X ...	5.6	3.5	3.3	1.6	2.5	.3	.6	1.5	6.5	4.6	4.2	4.6	3.2
XI ...	1.4	3.6	2.4	1.5	1.7	1.9	1.2	0.0	2.7	1.6	3.0	3.2	2.0
XII ...	4.2	4.2	1.9	2.1	1.3	1.9	0.0	0.0	.4	1.8	3.7	3.2	2.1
XIII ...	1.9	3.1	1.0	0.5	1.1	1.9	1.5	2.2	2.2	3.0	6.5	11.1	3.7
XIV ...	4.0	2.7	3.0	2.3	1.9	.3	1.4	1.7	1.5	3.0	3.5	3.5	2.5
XV ...	2.6	2.9	2.3	1.9	1.1	.5	1.2	1.4	.7	.9	1.6	2.1	1.6
XVI ...	.8	2.7	1.1	.5	.7	—	—	—	—	0.0	1.7	1.7	1.2
XVII ...	5.9	3.2	1.8	1.8	.7	1.1	.9	.9	1.0	1.7	1.8	5.8	2.2
XVIII ...	6.4	6.6	5.5	8.4	4.3	3.2	2.9	2.0	1.9	4.6	4.7	3.1	4.5
XIX ...	2.8	2.7	.9	1.2	5.7	4.8	4.3	3.5	1.7	1.5	2.6	2.6	2.8
XX ...	2.1	1.0	.8	.8	.4	.2	0.0	1.1	.3	.6	.7	1.8	.8
XXIII ...	4.6	3.2	3.8	3.4	3.2	3.4	2.5	3.5	4.1	4.2	4.2	4.5	3.7
XXIV ...	2.6	4.0	1.0	1.8	5.5	4.1	2.0	2.2	2.1	1.9	2.1	.6	2.5
XXV ...	2.3	1.5	.5	.2	.3	.3	.2	.3	.2	.3	.2	.8	.6
XXVI ...	.5	—	1.0	.7	.7	1.1	.3	.1	.4	.2	.6	.7	.5
XXVII ...	—	—	—	—	0.0	—	—	.2	.5	0.0	.1	.9	.3
XXVIII ...	—	.9	—	—	0.0	1.5	2.7	—	—	3.0	2.6	3.1	1.9
XXIX ...	5.6	4.5	4.2	3.7	3.7	3.2	1.9	2.2	2.8	2.7	3.5	4.4	3.5
XXX ...	.9	1.1	.7	—	—	—	.7	.4	.2	.5	1.0	1.0	7.0
XXXI ...	.3	.4	.2	—	.3	.1	0.0	.1	.2	.3	.3	.4	.2
XXXII ...	—	0.0	—	—	.4	.1	0.0	.1	0.0	0.0	.1	.1	.1
XXXIII ...	—	—	—	—	—	0.0	0.0	—	.7	0.0	—	—	.2
XXXV ...	—	1.1	—	—	—	.7	—	—	—	0.0	1.3	—	.8
XXXVI ...	0.0	.3	3.3	—	.1	—	—	—	0.0	.3	.3	—	.6
XXXVII ...	—	1.3	—	—	0.0	—	—	—	0.0	—	—	0.0	.3
C ...	1.0	.2	0.0	.2	.2	.3	.2	.2	.2	0.0	1.2	1.0	.4
D ...	3.7	1.6	.4	.8	.3	.4	.1	.1	.1	3.1	.7	2.3	1.1
J ...	—	—	—	—	0.0	.6	.2	1.1	—	—	—	.2	.4
K ...	4.7	4.3	3.2	.9	—	0.0	3.1	—	—	—	—	—	2.7
Faroe ...	.7	.1	.9	.4	.4	.4	.8	.9	.9	1.9	1.5	1.3	.8
Iceland ...	—	0.0	0.0	0.0	.1	.1	.8	1.0	.8	0.0	—	—	.3







Report of the North Sea Committee
(Scotland)

CHART

Shewing the seasons of greatest
abundance of Extra Large Haddocks

Prepared from Olsen's Chart of the North Sea (with additions)

SUMMER

AUT. - WINTER

Prepared & Printed at the O.S.O., Southampton



Report of the North Sea Committee
(Scotland)

CHART

Shewing seasons of maximum
catch of Cod.

Prepared from Olsen's Chart of the North Sea (with additions)

Prepared & Printed at the O.S.O., Southampton

