

## North Sea Investigations.

By

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### ON THE DESTRUCTION OF IMMATURE FISH IN THE NORTH SEA.

I SUBJOIN the results of statistical inquiries into this question, continued from the point at which they were left in the last number of this Journal. Having been permitted by the Council of the Association to undertake a series of lectures along the coast of Yorkshire on behalf of the North-eastern Sea Fisheries Committee during the present autumn and winter, I find it necessary to restrict the present paper to the smallest possible compass, reserving practically everything except the mere statement of figures until more time shall be available for the deduction of results.

I regret to have to say that the statistics for the month of May are by no means complete. Bibliographical work in connection with several scientific papers on which I was then engaged necessitated my absence from Grimsby during the early part of the month, and the sudden illness of my subordinate during the same period interfered with the arrangements I had made for keeping up the records. The statistics as to plaice are, therefore, a blank for the first week of May; Mr. Clark unfortunately remained unwell for the rest of the month, while a serious break-down in the circulating apparatus of the Cleethorpes aquarium made great demands upon the time which I should otherwise have been able to devote to market observations; and, though I was able to keep account of all plaice landed, my statistics as to haddock and cod are too meagre to be worth insertion. The gas-engine for water circulation was finally restored to good working order, but, to guard against any future temporary break-down, I have fitted the entire series of sea-water tanks with an apparatus for air circulation, on a pattern communicated to me by Dr. G. H. Fowler.

It has proved that this air circulation is quite sufficient to keep the tanks properly aerated throughout the night, and we have thus been able to save the excessive labour and expense (for gas) which the smallness of our reservoir had hitherto entailed in pumping by night as well as by day.

*Plaice.*—The statistics are continued from the end of April, 1894; as stated above, the eight days missed in May were at the beginning of the month.

Month.	Total No. of Boxes.	North Sea.			Iceland.	
		Total.	"Large."	"Small."	No. of Boxes.	No. of "Voyages."
1894.	I.	II.	III.	IV.	V.	VI.
May (less 8 days) .....	12,729	9,612	5,393	4,219	3,117	25
June .....	15,939	13,181	8,439	4,742	2,758	21
July (less 3 days) .....	14,304	11,295	9,034	2,261	3,009	19
August (less 1 day) ...	16,616	15,950	14,617	1,333	666	5
September (less 3 days)	15,503	15,503	14,663	840	...	...

In the last number of this Journal (p. 171) I entered at some length into the question of the diversion of fishing power from one point to another, which is revealed by comparison of the different columns in the above table. The same reasoning is of course applicable to the present season; and while we note from the close similarity of column IV in 1893 and 1894 that the "small" fish grounds were worked to about the same extent in the two years, the great diminution of column VI in July and August of 1894 shows that considerably more power was available in those months for the augmentation of column III. There is an actual increase of about 3000 boxes in the aggregate of the two months in 1894; but such an increase is of no great significance when we take into account not only the number of boats available from the diminution of column VI, but also the steady annual increase in trawling power generally. It will have been gathered from my previous remarks that the Iceland grounds are worked by steam vessels only (as far as trawling is concerned), while the "small" fish are chiefly contributed in the later part of the summer by fleets of sailing smacks. During the present year the usual practice of forming a large fleet, to land fish by steam cutters at London, has been discontinued, so that during the fleeting season the number of vessels landing at Grimsby has been proportionately greater. A very large Fishing Company belonging to the port habitually "fleets" throughout the year, its fish being landed in London, and therefore finding no place in my records.\*

The Iceland trawl fishery cannot be said to have been satisfactory during the present season. In the early part, especially in May, boats had for the first time a difficulty in finding their fish. In previous years the only difficulty had been in getting a fair price for

\* A cutter occasionally lands at Grimsby when coming in for stores or other purpose, but I do not include the fish in these returns, since to do so would tend to confusion in the deduction of results.

them, but, out of twenty-five "voyages" in May, twenty averaged but little more than 100 boxes each. Later on matters improved somewhat, but at no period were the fish to be found in the same abundance as last year, while, as I am informed, some of the best grounds were practically "cleaned out." To some extent, no doubt, on this account, but largely also on account of the higher price obtainable for the smaller inshore fish, there appears to have been a very general disregard of the territorial regulations of the Danish Government, with the result that one or two vessels were seized and heavily fined. This had the effect of bringing the season to an earlier close than last year, and, as the Iceland Parliament passed a bill early in September enforcing still heavier penalties on territorial trawling, it may be supposed that the inshore grounds will be little molested in future years. The penalties under the new law are as follows:

For the first offence . . . . .	2,000 crowns, £100 each.
For the second offence . . . . .	10,000 crowns, £500 each.
For the third offence . . . . .	Confiscation of the vessel.

On a coast where the declivity is rapid the three-mile limit is far from being the natural one, but no fault can be found with the authorities for availing themselves of all the protection which international law allows them.

*Haddock.*—The appended figures show the total number of "small" fish landed during the months specified:

June (less 1 day) . . . . .	5570 boxes.
July . . . . .	6039 "
August (less 2 days) . . . . .	6798 "
September . . . . .	6587 "

Comparison with the same months of last year (*supra*, pp. 128 and 174) shows a large increase for the present year, which increase, it may be mentioned, is being maintained in the later part of the season. Indeed, I am given to understand that haddock are now more plentiful than they have been for a great number of years, and there has certainly been a steady augmentation ever since these statistics were commenced. My figures deal only with "small" fish, but I have no evidence of any diminution in the supply of fish of all sizes, and however the haddock may have suffered from over-fishing in the past, it apparently holds its own at present. The exceptionally large catches of the autumn and winter of this year may possibly be to a great extent dependent on the favorable weather of 1893. Bottemanne has clearly established the dependence of the anchovy supply of any year on the temperature of the previous year;\* and though there exists no series of observations to

\* Cf. Dr. Fowler's epitome of Bottemanne's researches (*supra*, vol. i, N.S., p. 340).

support the same conclusions with regard to any other fish, it is at least possible that the principle is capable of a wider interpretation. Fishermen hold the opinion that a warm spring means a good supply of fish of all sorts in the autumn of the *same* year, but the experience of 1893 can hardly be said to have given any very great support to this view. It must be remembered, however, that the advantages of a good supply of fish may be seriously discounted by weather unfavorable to their capture; while, on the contrary, as during the present autumn, an open season permits of catches which may make the supply appear *relatively* greater than it actually is.

*Cod.*—Trawled codling, of the size explained in previous records, have been landed in the following numbers:

June (less 1 day)	. . . . .	354 boxes.
July	. . . . .	1708 „
August (less 2 days)	. . . . .	2140 „
September	. . . . .	2636 „

The most noteworthy feature is the lowness of the returns for June. April (*supra*, p. 175) was also somewhat unproductive, and fish were certainly scarce in May. I have already alluded to the general opinion that codling are comparatively scarce (in the trawl) in summer, and comparison of the different months shows that the least productive period of each year has been from April to June (inclusive).

*Inshore Fisheries.*—I referred in my last report to the unusually large catches of prawns (*Pandalus*), shrimps and small plaice, &c., made in the Humber last summer. It was attributed by fishermen to the fine warm weather, and I considered it probable that the good effects of such weather would continue to be felt in the summer of the present year. There has been, however, at the best only a moderate supply of prawns and shrimps this year, while “flat-fish,” *i. e.* young plaice, have been remarkably scarce, though the same cannot be said of soles. Indeed, from observations which I was able to make on board the s.s. “Garland,” both this year and last, I believe that there has been a distinct improvement in the supply of soles in the river. Comparatively few were brought to market, owing to the energetic action of the local fisheries authorities in enforcing their bye-laws with regard to fish trawling in the river, and to this action the increase may to some extent be due. It may be explained that soles are likely to receive the most protection from this legislation, because they are the fish to which the fish trawlers were wont to devote the bulk of their attention as long as they were permitted to do so, and the greatest number of soles are found in parts of the river not much frequented by other flat-fish.

mandible and none on the maxilla or the prominent parts of the gill-cover, while the fin-rays are only feebly scaled.

*Dimensions.*—Of the three specimens two were measured after preservation, the third being measured both in the fresh and preserved conditions.