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# Decline of British Herring Fisheries in the North Sea

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SINCE the Second World War (1939-45) catches in British herring fisheries in the North Sea have decreased to only a small fraction of their level in years before and after the First World War (1914-18). This decrease has taken place in both principal traditional fisheries—the Scottish summer fishery in the north-western North Sea, and the autumn fishery at East Anglia, where it has been such as to threaten the complete collapse of a once great fishery. This has caused concern amongst all in the herring industry, and has been the subject of much publicity and discussion in the trade and daily press. Further, it has been the subject of intensive scientific investigation in Britain and other countries. The purpose of this article is to outline the main changes which have taken place in these fisheries and to summarize, so far as they are known, the principal governing factors.

## Changes during the Present Century

At the beginning of this century, when publication of international fishery statistics was started by the International Council for the Exploration of the Sea, large British drift net herring fisheries were already flourishing in the north-western North Sea in summer and off the East Anglian coast in autumn. These were both based on high quality herring for human consumption and, as shown in the graph, in the period from 1900 to 1914 the catch from them rose to a peak of about half a million tons, over three-quarters of the total European herring catch from the North Sea.

During the First World War herring fishing in the North Sea was drastically reduced, but it developed again rapidly immediately afterwards with the resumption of the traditional Scottish and East Anglian drift net fisheries but at a lower level of production than before the war (see graph).

The interwar years, however, witnessed some important changes in the fisheries, the most spectacular of which was the rapid growth of Germany as a major herring fishing country in the North Sea. Whereas, before the war, and post-war up to 1925 her annual herring catch seldom exceeded 50,000 tons, after 1925 it increased steadily, to reach 250,000 tons in 1937. At the same time the British catch decreased, and in the late interwar years, German and British catches were approximately equal.

The growth of the German herring fishery was of major significance, not only by virtue of its magnitude, which itself had economic repercussions in this country, through loss of export markets for herring, but also by its nature.

Whereas British fisheries in the north-western North Sea and at East Anglia were exploited by the traditional drift net from small, relatively low-powered vessels, the German fishery developed principally as a trawl fishery, employing relatively large, high-powered craft. During its period of growth in the 'twenties and 'thirties the trawl accounted for over three-quarters of the German catch.

Therefore, by the end of this period, when fishing was again drastically curtailed following the outbreak of hostilities, the North Sea herring fisheries had changed substantially from the traditional pattern. In all but the British fishery the trawl was superseding the drift net as the principal catching gear and larger, more powerful vessels were being employed. Further, herring were being exploited over a wider area and during a greater part of the year. Whereas drift net fisheries were still largely confined to traditional grounds in the north-western North Sea and at East Anglia, trawl fisheries were centred mainly in the deep water basin in the northern North Sea and on the Dogger Bank spawning grounds.

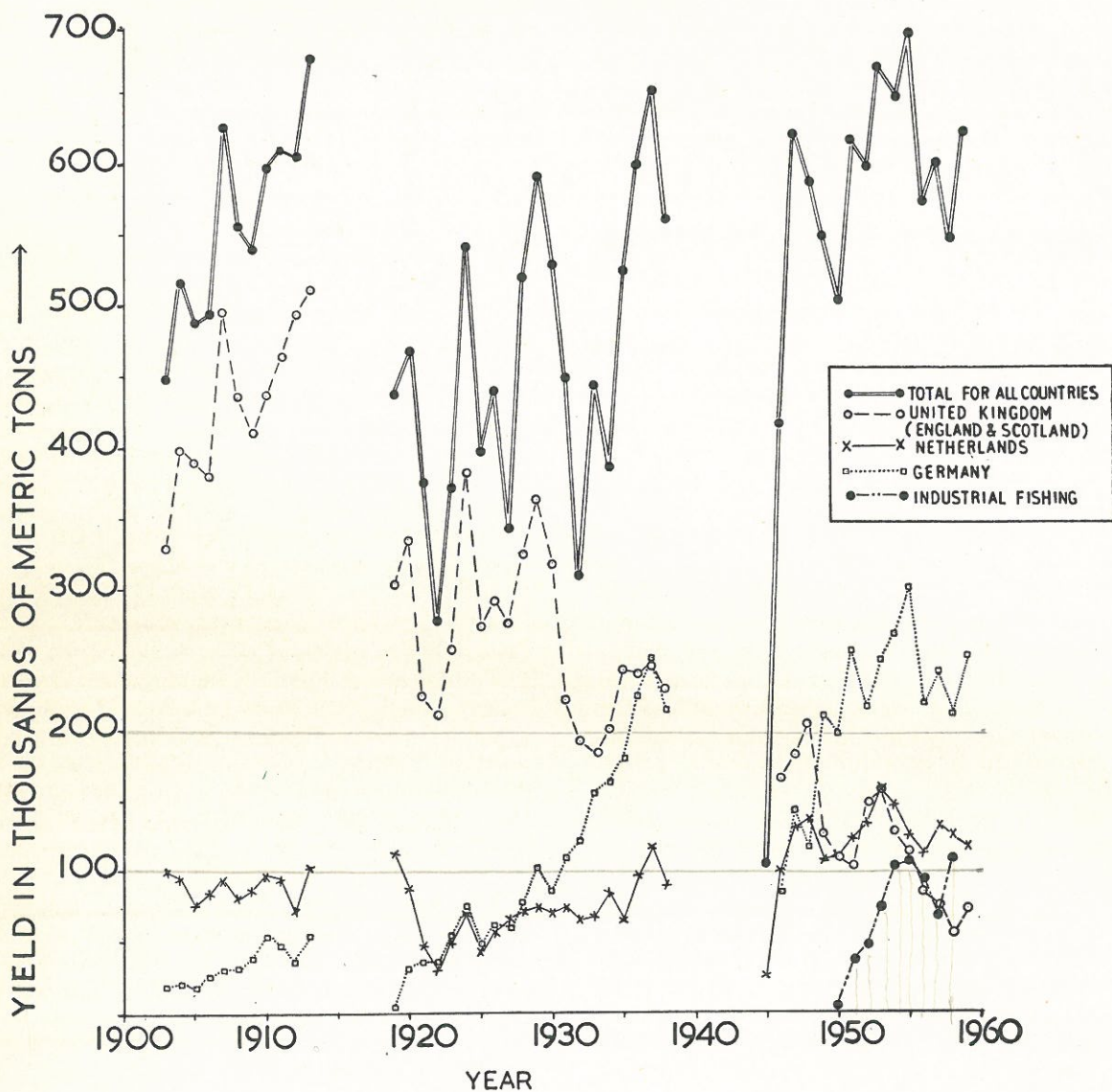
As a result of the growth of German and other trawl fisheries the total annual yield of herring from North Sea fisheries increased during the interwar period (see graph), but even at its peak in the late 'thirties, it was less than the peak yield before 1914.

## Rapid Redevelopment

Herring fishing in the North Sea was again drastically reduced during the Second World War, but it grew rapidly once more, following the cessation of hostilities in 1945. The total catch rose from about a hundred thousand tons in 1945 to between half and three-quarters of a million tons in the years after 1950. The most striking features of this growth were (a) rapid redevelopment of the German fishery, again pursued principally by trawl, which grew from rather less than 100,000 tons in 1946 to over 300,000 tons in 1955; (b) a further decrease in British drift net fisheries in northern and southern North Sea regions. In 1955, the combined Scottish and English catches amounted to no more than 114,000 tons; this was less than half the average annual yield during the late interwar years, and less than a quarter of the yield in the years preceding 1914.

Thus, the development since 1945 in the North Sea herring fisheries followed the pattern set during interwar years. Germany established herself as the major herring producing country; the trawl further superseded the drift net as the chief catching gear, not only in Germany but also in other

NORTH SEA ANNUAL ADULT HERRING YIELD, 1903-59.



European countries. Only in Britain did the fishery remain almost exclusively a drift net one, pursued mainly by the relatively small, low-powered Scottish drifter-seiner fleet. Even the small British trawl fishery for herring, which operated from Scottish and Humber ports during the interwar years and which was again prosecuted from Aberdeen in the immediate post-war years, had ceased by 1955.

This growth resulted in a further extension of fishing grounds. Whereas in interwar years, trawling was largely confined to northern (Fladen ground) and central (Dogger and Gut) regions of the North Sea, in the post-war period it extended further, especially, to spawning grounds in the southern North Sea and at the eastern end of the English Channel, where an intensive trawl fishery developed after 1950, and over a wider area of the northern North Sea. This resulted in the invasion by trawling of the fringes of traditional drift-net fishing grounds and the consequent introduction of some physical competition between the two methods of fishing.

Selective

The traditional North Sea herring fisheries were built on markets for fresh or cured herring for human consumption. These markets demanded high quality, adult herring, for which the highly selective drift net was ideally suited as the catching gear. However, a general world shortage of animal oils and the growing use of fish meal for animal feeding stuffs, especially after 1945, provided a second major outlet for herring, and its utilization for this purpose consequently grew rapidly in most European countries.

In addition to the growth of trawling for adult herring, the presence of this outlet led to the development of an "industrial" trawl fishery for small, "adolescent" herring in the south-eastern region of the North Sea. This fishery, developed in Denmark and Germany and centred principally on herring in their second and third years of life, before they recruit the "adult" stock, grew

rapidly from about 5,000 tons in 1950 to over 100,000 tons in 1955.

It is evident therefore that while the period since 1945 has been one of high catches for all herring fisheries in the North Sea combined, those from the British fisheries have decreased drastically. As shown in the graph, this started before 1939 and continued after the Second World War, especially in the East Anglian fishery. Statistics of the numbers of vessels engaged in herring fisheries in Scotland and England since 1918 show that it was associated with a steady decrease in the size of drifter fleets, and the fishing effort exerted by them. This is illustrated by the following statistics of numbers of landings made by drifters in the East Anglian and Scottish fisheries in the interwar and post-war periods.

Average annual number of landings (to nearest 1,000).

			<i>East Anglian fishery</i>	<i>Scottish fishery</i>
1924-30	..	..	24,000	41,000
1931-38	..	..	18,000	25,000
1946-50	..	..	10,000	20,000
1951-57	..	..	6,000	12,000

It is well known that the principal factor governing the downward trend in the size of the fleet was the loss, during the interwar years, and again since 1945, of continental export markets for salt-cured herring. The growth of the seine-net fishery in Scotland, by the dual-purpose drifter-seiner fleet, during the 'thirties and again since the war, together with the decrease in available manpower and the increase in the costs of herring fishing also contributed to and accelerated the decline, especially after 1945.

### Economic Factors

In the main, therefore, the long term decrease in catches by the British herring fisheries, both in the north-western North Sea and at East Anglia, can be attributed to economic factors, unrelated directly with available supplies of herring on the grounds. Indeed, in the early part of the century these supplies were often in excess of market demand, leading to "glut" conditions; dumping of unsold catches was a frequent occurrence. However, more detailed statistics of catch per unit-fishing effort for Scottish and English fisheries, and biological data on composition of catches show that since the Second World War, some important and striking changes have also taken place in the abundance and composition of exploited stocks. These have changed the "character" of the fisheries in the two regions and compositions of their catches have undoubtedly also contributed to the serious post-war decline since 1950, especially in the British East Anglian fishery and in fisheries of other countries in the southern North Sea.

Changes in the East Anglian fishery and stock have been investigated and described in detail in Britain by scientists at the Fisheries Laboratory, Lowestoft (Hodgson, 1956, 1957; Cushing and Burd, 1957; Cushing, 1959), and those in the north-western North Sea fishery, at the Marine Laboratory, Aberdeen (Parrish and Craig, 1957; Parrish (in press).

These, and investigations by scientists of other European

countries have shown that in the southern North Sea since the war there has been a decline in abundance of the exploited stock. This is reflected in declining catches per unit of fishing effort of drift-net and trawl fisheries there. Further, they indicate that this is due principally to a steady decrease in abundance of older age groups of fish in the stock. In consequence, fisheries have become progressively more dependent on young age groups, which has changed the "quality" of catch and led to an overall shortening of drift net fishing at East Anglia. No such decrease in catches per unit fishing effort has been experienced in fisheries in north-western grounds, but the same decrease in abundance of older fish has taken place on traditional drift-net fishing grounds off the East Coast of Scotland.

In addition, there have been other striking changes in exploited stocks in both areas. They may be summarized as follows:—

- (a) After 1950 there was a change in the pattern of recruitment to the fisheries. Whereas before 1951 recruits entered the fishery, partly at three and partly at four years of age, after 1951, recruitment took place principally at three.
- (b) At the same time the size of fish at each age increased due to faster growth of individuals in the stock.

The increase in mean size and change in recruitment pattern were both associated with an increase in abundance of the principal herring food organism, *Calanus*, in the North Sea. It seems likely, therefore, that recruitment change was the result of increased growth and a consequent earlier maturation of members of herring stocks.

### Complex Changes

It is evident, therefore, that the period since 1950 has witnessed complex changes in abundance, composition and biology of exploited stocks, and in fisheries exploiting them. Thus, biological events outlined above have taken place at the same time as the growth of trawl fisheries for both young and adult herring in the southern North Sea. Clearly, the problem of diagnosing principal causes of decrease in abundance of older age groups in the stock, and the decline in the southern North Sea fisheries is one of great complexity, due to changes in man-made and natural factors at the same time.

Interpretation of the changes, in the light of this complex of factors, is the subject of intensive scientific investigation at present. Much of this work has been sponsored directly by the International Council for the Exploration of the Sea, and close collaboration has been maintained between scientists of its member countries, both in execution of their research programmes and in appraisal of their results. Although much progress has been made in this way, in defining the nature and magnitude of stock and fishery changes, elucidation of the causes of some of them remain, as yet, unresolved. Thus, while it seems from scientific evidence available, and most scientists are agreed, that change in recruitment pattern to exploited stocks is associated with natural factors affecting growth, maturation, distribution and movements of the pre-recruit herring, and that this has directly affected catches,

there is less certainty, and scientific opinion is divided concerning causes of the decrease in abundance of older age groups in exploited stocks, especially as to whether it is due to increased fishing by combined trawl and drifter fleets of all countries. Available evidence indicates that it is due to factors operating on the adult stock directly, but whether it is principally increased fishing or natural factors, affecting its survival or accessibility, is less clear.

### Main Difficulties

Main difficulties lie in estimating the total amount of fishing exerted on southern and northern North Sea stocks and their changes from year to year. These comprise difficulties both of measuring total "effective" fishing effort in fisheries employing a variety of vessel and gear types, such as in North Sea herring fisheries, and in assessing amounts of fishing on each stock in different localities and seasons. The latter difficulty is of major importance, as it is known that the amount of fishing in the southern North Sea itself has decreased substantially since 1956, due largely to a drop in trawl fishing following the decline in unit catches.

*As yet, however, there has been no consequent improvement in abundance of older age groups in this area. Any explanation of decline in their abundance in terms of increased exploitation therefore must rest, for the years since 1956, on it having been subjected to increased exploitation in other areas, where it mixes with other spawning groups of herring. At present the extent of this mixing is not known and it is the subject of detailed study by scientists in a number of European countries. Some preliminary results of these investigations were presented at a symposium on "Herring Population Studies" organized by the International Council for the Exploration of the Sea, in Copenhagen in September, 1961.*

For the time being, however, explanation of causes of this important component of overall change in stocks is uncertain. There must be further detailed study of distribution, abundance and movements of East Anglian herring stock in areas outwith the southern North Sea and distribution and amount of fishing in these areas, before we can assess its total exploitation. Only then can we assess accurately whether intensity of exploitation is sufficient to account for decline in the fishery, and its persistence, and so gauge whether scarcity of older herring is due to man-made or natural factors. This involves pooling and joint appraisal of biological and statistical data for all countries with herring fisheries in the North Sea.

To make this possible, an international working group of European scientists was set up in 1961 by the International Council for the Exploration of the Sea. The first meeting of this group was held in Copenhagen in April, 1961, and the second is scheduled to take place in Hamburg in April, 1962. It is confidently expected that this joint international effort will resolve many of the current obscurities and difficulties in interpretation of complex changes in the herring fisheries and exploited stock, and lead to a closer mutual understanding and appreciation of factors governing them.

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