BRITAIN'S DISTANT WATER FISHING INDUSTRY, 1830-1914

A STUDY IN TECHNOLOGICAL CHANGE

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INTRODUCTION

The total quantity of fish landed in English and Welsh ports in the year 1913 has exceeded all anticipations...On the occassion of a record fishing year...in which for the first time the value of the fish landed reaches and exceeds a sum of £10,000,000 - it is fitting to take a retrospective glance at the British Fisheries...The circumstances which have promoted that growth are many and various. The improvement of the means of railway transport, the application of steam to the fishing industry, facilities for the preservation of fresh fish by the use of ice, and a widely increased appreciation both at home and abroad of the value of fish as food, are some of them. In this and in previous reports - annual reports and reports of various committees and commissioners - the influences which have been at work are examined in detail. The contents of such reports furnish material for the future historian of an industry which presents a variety of characteristics of the utmost interest, economical, sociological and scientific, and owing to the circumstances in which it is carried out, has affected, and must continue to affect, to a remarkable degree the history of a race whose interests are closely bound up with the sea.

Annual Report on the Sea Fisheries of England and Wales for 1913[1]

[1]Annual Report of Proceedings under Acts relating to Sea Fisheries (England and Wales) for the year 1913 (BPP, 1914, XXX) 4.

Table 1

QUANTITY (000s cwts) AND VALUE (£1,000s) OF FISH LANDED IN THE UNITED KINGDOM (Excluding shell fish)

YEAR	QUANTITY	VALUE
1886	11,131	5,433*
1887	11,056	5,013*
1888	11,651	5,520
1889	12,853	5,605
1890	12,769	6,333
1891	12,022	6,555
1892	12,528	6,495
1893	13,568	6,743
1894	14,049	6,817
1895	14,069	7,168
1896	14,711	7,058
1897	13,898	7,514
1898	15,837	7,985
1899	14,960	8,396
1900	14,671	9,242
1901	15,851	9,080
1902	17,979	9,334
1903	18,555	9,708
1904	20,265	9,065
1905	20,164	10,210
1906	20,541	10,940
1907	23,710	11,266
1908	22,674	10,548
1909	22,371	10,691
1910	22,869	11,383
1911	23,584	11,345
1912	23,624	12,642
1913	24,096	14,037
1914	17,641	11,057

*Excludes Ireland

Source: Sea Fisheries Statistics and Annual Reports for England and Wales.

i THE THESIS

This thesis assesses the role of technological change in the development of Britain's distant water fishing industry from 1830 to 1914. As can be seen from Table One, 1.21 million tons of fish was landed in the United Kingdom in 1913 compared with 0.59 million brought ashore in 1888. It was caught by a registered fishing fleet which had an aggregate tonnage of 373,494 in 1914, a figure that had grown from 242,179 in 1869.[2] Such growth was the catalyst for transformation of the distant water fishing industry, the nature of which depended on the application of technological innovations. These can be both a cause and an effect but are not an independent agent of change, their progress relying on 'the efficiency with which man exploits his physical environment to meet his wants'.[3] Consequently, this analysis identifies potential demand as the fundamental reason for growth and then focusses on its realization. The impact of new technology is determined by the ability to accommodate it within developing socio-economic conditions, which in the nineteenth century varied between industries and within the fisheries themselves. Trawling represented the leading edge of distant water fishing, and its other constituents, the line and drift net fisheries, coped with advances in different ways, showing that the introduction of new technology could act as a brake as well as an accelerator. The fishing industry operated within a context of 'commercial Darwinism',[4] a philosophy based on profitability that was heightened by the *laissez-faire* policies of successive governments. The study culminates with examination of the consequences of technological change considered through such media as the division between capital and labour and the widening differences between ecological and political interests. The fishing industry provides an ideal case-study to test the

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[2]Annual Statements of Navigation and Shipping. The 1869 figure includes the tonnages of only 90.1 per cent of smaller (Second and Third Class) fishing vessels registered.
[3]Derry and Williams, 1960, 709.
[4]Mathias, 1983, 124.

hypothesis that technology makes history by 'changing the material conditions of human existence'.[5]

ii CONTEXT

Britain's fisheries were integral to the wealth and power she derived from the sea. However, what John K.Walton referred to as 'a broad set of academic assumptions about the serious and trivial and..."proper" subjects of academic enquiry'[6] has resulted in the neglect of many aspects of maritime history - notably the fishing industry. A trawler landing cod and haddock from the North Sea may lack the allure of an ocean trader delivering arms and rolling-stock across the Indian Ocean, but neither can be excluded from a well-rounded analysis of British maritime history. This thesis constitutes part of such an a study.

Britain's fishing industry comprises vessels operating from and/or landing their catches at ports in England and Wales, Scotland, Ireland, the Channel Islands and the Isle of Man. The overwhelming bulk of such fishing boats were British, and only in the years immediately before the outbreak of war did foreign vessels make more than a nominal contribution. In 1910 this amounted to 1.7 per cent in terms of both the quantity and value of fish landed, proportions that had risen to 3.1 and 2.3 per cent, respectively, in 1913.[7]

It is necessary to formulate an effective method of classifying the fisheries. Alward stated that trawling had 'become a national asset' in terms of food production and investment,[8] and though accurate he was referring specifically to a

[5]Heilbroner, 1994, 69.
[6]Walton, 1992, 2.
[7]Statistical Abstract for the United Kingdom: Sea Fisheries (BPP, 1926, XVIII) 200-1; Annual Reports for England and Wales.
[8]Alward, 1932, 7.

particular sector of the industry. Definition is necessary and tricky, not least because this analysis is concerned with a period characterized by transformation in which goal-posts shifted considerably. Division by method of capture, species of fish, economic or geographical properties hampers cogent analysis, but the trifurcation eventually adopted minimizes such disruption.[9]

Distant water fishing is carried out on grounds that are a day's sailing or more from a vessel's home port. They constitute the main focus of this study - but are not synonymous with 'deep sea' activity. For example, West Country vessels that worked grounds off south east England and the North Sea coast fished away from home waters but not necessarily far out at sea, while some operated off foreign coasts which cannot, technically, be considered as 'deep sea'. Indeed, when taking into account the seas off the west of Ireland, all waters on the European continental shelf are anything but deep.

Herring fishing warrants separate classification because of its unique character - and potentially great, if variable, remunerativeness. Volume-wise, in the hundred years prior to 1914 the Scottish herring industry, alone, was the greatest in the world. Unlike other fisheries for surface-feeding species that for herring took place all around the British coast and became increasingly mobile with the heightened sophistication of fishing boats.[10] Herring fishermen became increasingly reconciled to spending longer periods at sea as technological advances precipitated its spread from inshore grounds to more distant areas as production methods became more efficient in response to unprecedented levels of demand.

Inshore fishing takes place inside British territorial waters, that is within three miles of the coastline, and includes estuarine and riverine areas. Species caught

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[9]See Robinson and Starkey, 1996, 123.
[10]Eighteenth Annual Report for England and Wales (BPP, 1904, XI) 168.

include shellfish and salmon besides free-swimming salt-water fish. At this time they were worked by a welter of small vessels through which developments often foreshadowed those in the distant water sector; three major instances being the employment of ice for preserving salmon, the use of steam propulsion by tugs and the deployment of the otter-trawl in yachts. Crucially, however, in view of statistical shortcomings, these fisheries were seldom subjected directly to changes that were transforming the distant water sector, attenuating their significance in the current context.

The temporal parameters of the thesis, 1830-1914, are determined from the application of technological innovations over more than eight decades in which the distant water fishing industry was transformed from one that served a limited market to one that catered for mass demand. The analysis commences in 1830, when the effects of economic depression were diminishing and new technology was hesitantly - but steadily - being implemented in British industry. Construction of a national rail network and increasingly penetrative trawling forays undertaken by progressively more efficient fishing boats created enormous potential that was largely fulfilled by 1914.

This period in the history of Britain's sea fisheries has been covered by a number of works that have concentrated on specific aspects of the industry or particular regions of the country. Technological change has been chronicled in various histories but has not constituted the focus of thorough analysis based on official data. Works like those of Holdsworth (1874), Aflalo (1904) and Alward (1932) are comprehensive and valuable, but extremely dated. More recently, Cutting's Fish Saving (1955) concentrated on the history of preserving fish, while sociological studies like Tunstall's examination of Humberside trawling (1962) and Thompson's work on herring communities (1983), are centred on repercussions rather than technological change itself. Malcolm Gray's 1978 economic study of the Scottish

fisheries is preoccupied largely with issues away from the distant water sector, and it is dealt with in terms of the supply of food in Walton's 1992 study of 'fish and chips'. Most recently, in 1996, Coull and Robinson published laudable, wide-ranging works on, respectively, Scotland and trawling.

Information about technological change can be gleaned from work which deals incidentally with the fishing industry. David's 1995 article about the Anglo-Norwegian ice industry provides vital information, like volumes such as those by March (1952 and 1953) and Carr (1934). These contain useful technical information but they do not relate it in depth to the economic operations of which they were part. Conversely, studies of particular regions, notably by Northway - Devon, Rothwell - Fleetwood, Robinson - Yorkshire, and Muirhead - Northumberland, examine many of the themes for current analysis, and while appreciation of local idiosyncrasies is essential for accurate representation on a national level, what is applicable to a specific region does not necessarily apply in a wider context.

A wealth of information must be assimilated into this analysis, pointing strongly to the fact that the absence of a work on technological change in Britain's distant water industry during this period constitutes a serious gap in the literature of British fisheries. It is hereby intended to rectify this situation and enhance appreciation of the fishing industry, specifically, and understanding of the role of technology in determining history in general.

iii SOURCES AND METHODOLOGY

> ...there are no means of ascertaining, even approximately, the annual yield of fish on the coasts of the United Kingdom. The only facts we have been able to obtain are returns of the fish traffic on several of the great lines of railway by which the fish is transported from the fishing ports to the markets.
>
> Report of the Commission into the Sea Fisheries, 1866[11]

This observation led to vast improvements in the provision of fisheries data in Parliamentary Papers. The inadequacy of information available to the Commissioners was shown by their reliance on returns from railway companies.[12] Annual Reports of the Commissioners for British Fisheries were typical, for despite their title they consisted mainly of statistics related to the herring industry and collected by the Scottish Fishery Board from within its jurisdiction. No attempt had been made to gauge the overall performance of the British fishing industry or the state of its resource base. However, despite its reputation for abolishing restrictions, the 1866 Royal Commission initiated an element of regulation that led to the production of material from which it is possible to construct an accurate and comprehensive study. Official bodies were commissioned to investigate various aspects of the fisheries, and increasingly comprehensive reports were compiled annually for the fishing industries of the United Kingdom. These were in addition to sections dealing with the fishing fleet in the Annual Statements of Navigation and Shipping and statistics related to productivity in Accounts and Papers. The resultant body of information does indeed 'furnish material for the future historian'.

The Royal Commissioners had to understand the past in order to make recommendations about the future, and their investigations provided much information about the conduct of the fishing industry in the years before 1866. Minuted evidence provided coverage of this period, which is also prominent in

[11] Report of the Commissioners appointed to inquire into the Sea Fisheries of the United Kingdom (BPP, 1866, XVII) 582.
[12] *Ibid.*

subsequent reports, particularly the Report on the Sea Fisheries of England and Wales published during the 1878-9 Parliamentary session and that of the Royal Commission on Trawling from the 1884-5 session. These first-hand accounts are indispensable in Part One, which deals with the working of the industry prior to the dynamic changes that occurred from the middle of the nineteenth century. Meanwhile non-governmental works, like literature published for the International Fisheries Exhibition held in London in 1883, is also noteworthy, its very publication indicating growing awareness of issues associated with the fisheries. Other unofficial publications such as Holdsworth's authoritative volume of 1874 are also enlightening.[13]

The availability of progressively more detailed official data facilitates analysis. From 1871 figures detailing the composition of the registered fishing fleet were incorporated into the Annual Statements of Navigation and Shipping. These were drawn from statistics for fishing boats submitted in accordance with the Sea Fisheries Act of 1868[14] and listed the number of vessels and aggregate tonnages thereof according to port of registry and class. Dividing the latter figure by the former enables the average tonnage of vessel at the port to be calculated, and it is possible to gain further information about the diffusion of particular categories of vessel therefrom. First class fishing boats were those of 15 tons and upwards, second class vessels were 'less than 15 tons, navigated otherwise than by oars only', while third class boats used oars alone. However, registration was not effectively policed and if the owners of smaller vessels saw no benefit in it they often simply did not bother; the regulations related to undecked sailing boats were still unclear as late as 1901[15] as is shown by the huge disparity in the number of third class boats registered at different ports from year to year.[16] Fortunately, as Walter Garstang of

[13]E.W.H.Holdsworth Deep Sea Fishing and Fishing Boats (1874).
[14]31 and 32 Victoria cap.45.
[15]Annual Report for England and Wales (1904) 166.
[16]Annual Statements of Navigation and Shipping.

the Marine Biological Association concluded, the omission of these vessels from central consideration due to their use by sectors of the industry largely unaffected by technological changes 'would obviously not materially affect the results' of work into developing areas of the fisheries.[17] The larger vessels characteristic of the distant water sector were usually above the vagaries of this system.

A further set of figures relating to fishing boats appeared in the Annual Statements from 1883. These concerned vessels required to be registered under the Merchant Shipping Act of 1854[18] as well as the Sea Fisheries Act - from 1895 Parts I and IV of the former. Tables were produced showing fishing boats with a registered tonnage of 15 or more. Again they were divided according to port, but were then sub-divided to distinguish steamers and smacks with the numbers and aggregate tonnage of those above and below 50 tons. However, the number of first class fishing boats registered under both measures was inconsistent. Of 8,612 listed under the Sea Fisheries Act throughout the United Kingdom in 1883, only 3,778 were also registered under the Merchant Shipping Act. Table Two shows how this total manifested itself through the constituent countries, which clearly indicates the diffusion, not just of technology, but of different attitudes generated by diverse fisheries environments.

[17]Garstang, 1900, 35.
[18]16 and 17 Victoria cap.131.

Table 2

(i) VESSELS OF 15 TONS OR MORE REGISTERED IN 1883

	SEA FISHERIES ACT	MERCHANT SHIPPING ACT
E & W	3,743	3,440 (5.3% = steamers)
Scotland	4,024	99 (40.4% = steamers)
Ireland	516	184 (2.2% = steamers)
UK inc. C.I.& I.o.M	8,612	3,778

(ii) VESSELS OF 15 TONS OR MORE REGISTERED IN 1913

	SEA FISHERIES ACT	MERCHANT SHIPPING ACT
E & W	3,463	2,962 (69.4% = steamers)
Scotland	2,732	1,255 (96.0% = steamers)
Ireland	462	278 (26.6% = steamers)
UK inc. C.I.& I.o.M	6,743	4,525

Source: Annual Statements of Navigation and Shipping.

The numerical discrepancy in Scotland in 1883 is most noticeable, and the correlation with the registration of steamers under the Merchant Shipping Act is strong. Such inaccuracies confirm different perceptions of technological change throughout the country. Up to 1887 the net tonnage of steamers was taken as the registered tonnage, which could be deceptive[19] as it meant that 'a very large number of steam trawlers' fell below the required measurement. To counter this the gross tonnage was regarded as the register tonnage from 1887,[20] and from 1894 the registration of all steamers and decked vessels was required irrespective of size.[21] The resultant statistics are used extensively in Part Two to quantify the growth and composition of fishing fleets. These statements also supply the numbers that would usually crew registered fishing boats at each port; figures that are calculated from the number of crewmen normally working on all vessels registered under the Sea Fisheries Act and give a good idea of employment trends, which is especially useful in Chapter Six.

[19]Thirteenth Annual Report for England and Wales (BPP, 1899, XIII) 128.
[20]Second Annual Report for England and Wales (BPP, 1888, XXVIII) 175.
[21]57 and 58 Victoria cap.60.

Statistics related to the quantities and values of fish forwarded by rail appeared annually in Sea Fisheries: Statistical Tables and Memoranda for the years from 1878. They were based on returns made by railway companies to the Board of Trade and classified by port and company, though after 1902 only national totals are available - as appendices to the Annual Reports for England and Wales. The level of fish traffic on the railways provides evidence related to the organization of the fisheries and is employed in Chapters Two and Six. These returns were highly susceptible to subsequent adjustment, so the latest possible figures from comparative tables are used, for example, figures for 1913 are gleaned from the Statistical Abstract for the 1938-9 Parliamentary session. Also first appearing in Sea Fisheries Statistical Tables and Memoranda - from the mid-1880s - were annual statistics detailing quantities, values and species of fish landed in the United Kingdom. They were divided into the east, south and west coasts of England and Wales, Scotland and Ireland, with their combined totals ostensibly disclosing the productivity of the British fishing industry. These too ceased in 1902, after which only the national totals were given in the Statistical Abstract for the United Kingdom. They are useful in assessing the performance of the industry by enabling assessment of the efficiency of equipment through its perceived ability to capture particular species, and determining the effect on the resource base.

Information contained in Parliamentary Papers did not only extend to quantitative data. The value of minuted evidence has already been remarked upon and this continued throughout the years after 1866. Technological development, itself, through trawling, being directly responsible for another Royal Commission in mid-1880s,[22] and it was indirectly responsible for the setting up of many other bodies.[23] The evidence of witnesses gives an insight into technological and economic aspects of the industry, though material related to more subjective issues tended to be

[22]Royal Commission to inquire on Complaints by Line and Drift Net Fishermen of Injuries by use of Trawl-Net and Beam Trawl in Territorial Waters of the United Kingdom BPP, 1884-5, XVI.
[23]See bibliography.

implicit. This was to be expected when taking account of the massive preponderance of owners, investors, merchants and skippers examined compared to the disproportionately small input from deck crews. Objectivity and reliability is often difficult to sustain where a human element is present.

Vastly improved Annual Reports were a prominent feature of government policy. From the 1880s they recorded the fortunes of sea fishing in England and Wales, Scotland and Ireland. Particularly useful are reports tendered by English and Welsh Customs Collectors for the fisheries of their districts which, however, highlighted a wider problem associated with the collection of data. Reinforcing the point made above, the system was open to a multitude of individual interpretations,[24] so it was essential that the scope for deviation was minimized, especially as attempts were made to broaden the range of data provided. Henry Malan, secretary of an Inter-Departmental Committee set up to inquire into the collection of fishery statistics, observed in 1900 that the Collector's report

> is the only return that we have showing the state of the fisheries. Many of these returns are far from satisfactory, because they are not sufficiently based on accurate information. Take for instance, the number of boats. The collector has not got access to the registers and he gives us a number which is probably the one currently reported in the village or the place as the number belonging to the port. There is no explanation offered why that number is not the same as the number supplied by the Customs in the registers...discrepancies are very considerable between the number of boats said to be registered and the number of boats which our collectors say belong to each port...I am afraid I can hardly say that either of them are trustworthy.[25]

It was common for a fishing boat to be registered, owned and operated from three different ports,[26] and development of an effective system was still incomplete in 1914, so 'considerable laxity' in the enforcement of regulations was unsurprising.[27]

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[24]Report of the Inter-Departmental Committee appointed to inquire into the system of collecting Fishery Statistics in England and Wales (BPP, 1902, XV) Q.1,630.
[25]Inter-Departmental Committee on Fishery Statistics (1902) QQ.1624-5.
[26]Annual Report for England and Wales (1904) 167-8.
[27]Jenkins, 1920, 3.

Indeed, those who wanted more detailed information in order to secure the enduring prosperity of the fishing industry felt that progress was being made too slowly. George Alward, a prominent Grimsby owner and fisheries expert, told an official inquiry that 'we have always considered government returns...very, very faulty...[and]...really of no use'.[28] Annual Statements and Sea Fisheries Statistics were helpful in assessing returns on capital but did not greatly benefit management of the resource base. Critically, they did not facilitate accurate assessment of 'whether, and if so to what extent, the supply of trawl fish is being maintained by fish brought from new and distant grounds.'[29] This was rectified to some extent by additions to official data that were incorporated into the Annual Reports for England and Wales for each year from 1906. These were concerned with matters relating to the state of specific fishing grounds, the modes and equipment used by fishing boats and the size and make-up of other European fishing fleets. They are employed in the current analysis to help gauge the efficiency of the fishing fleet towards the end of this period and to assess the ecological effects of technology in the fisheries and the contribution of foreign fishing fleets to the situation.

Information derived from the decennial census is used, chiefly in Chapter One, to quantify potential demand. Source material for Parliamentary Papers is among the holdings of the Public Record Office, Kew.[30] Here, the increased regulation of the fishing industry is apparent in two ways. Firstly through returns of the fishing boat register (PRO, BT145) that were submitted annually by each fishing station in the United Kingdom to the Registrar General of Shipping and Seamen in accordance with the Merchant Shipping (Fishing Boats) Act. The lack of consistency in the interpretation of laws designed to tighten control of the fishing industry is especially

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[28]Report of the Committee appointed to inquire into the Scientific and Statistical Investigatons now being carried out in relation to the Fishing Industry of the United Kingdom (BPP, 1908, XIII) Q.9,400.

[29]Fifteenth Annual Report of England and Wales (BPP 1901, XI) 118.

[30]See Nicholas Cox, 'Papers of the Registrar General of Shipping and Seamen' in Maritime History, II, 1972.

marked in these manuscripts and their quality varies immensely. Theoretically, these registers should have been available for the previous quarter of a century or so but Garstang, after corresponding with Customs and the Board of Trade, 'found...that "the Returns rendered by Collectors of Customs prior to 1893 no longer exist".'[31] However, their loss did not stop him producing valuable work and, similarly, their absence does not crucially undermine the present study. The 20-year range that survives is very useful in assessing the deployment of particular types of boat in Chapter Three, while information on crew sizes augments data from the Annual Statements on employment trends in Chapter Six, and details of the disposal of vessels is used in Chapter Seven to ascertain the fates of discarded fishing boats and helps to quantify the second-hand trade with other nations.

Increased regulation is also noticeable through records of the system for examining the competence of skippers and mates, which was extended from other sectors of the Merchant Navy to cover those working on trawlers of 25 tons and over, by the Merchant Shipping (Fishing Boats) Act of 1883.[32] Registers of Certificates of Competency and Service for skippers and mates exist for the period 1880-1898 (PRO, BT129/30), though for the subsequent years only the certificates themselves exist in a warehouse of the National Maritime Museum. Consultation is greatly helped by the existence of an index of all examinees up to the mid-1920s (PRO, BT138). This recorded the date and place of birth of examinees, so when used with information about the place of examination it is possible to make deductions about migratory patterns.

The Public Record Office also holds files on a number of defunct limited liability companies concerned with various aspects of the fishing industry (PRO, BT31/34/41). Capitalization meant that the industry grew beyond the reach of

[31]Garstang, 1900, 33.
[32]46 & 47 Vic. cap.41.

smaller, less sophisticated financial units, which entailed the production of papers in accordance with various Companies Acts. Each file contains details of the company's constitution, first, last and quinquennial annual returns together with winding-up details, while enlightening miscellaneous papers sometimes been kept. This source is used in Chapter Six for determining the pace and level of restructuring in the industry and assessing the diffusion of technological innovations into common use.

Primary sources allied to government statistics were used for The Fisherman's Nautical Almanack edited by O.T.Olsen, which was 'compiled from official and other sources'.[33] Published annually since 1877, later editions from this period list British and foreign steam fishing fleets and proved especially useful regarding quantification of the metal construction of fishing boats in Chapter Five, and details of British-built vessels in foreign fishing fleets in Chapter Seven. Once tracked down they further vindicated the historical value of official figures. Finally, in addition to the various manifestations of official information and volumes on the fishing industry, use has been made of the national press. The Times often published reports on different aspects of the fisheries, often reprinting items from local papers that were deemed to be of national import and supported the picture painted by official views.

[33]O.T.Olsen The Fisherman's Nautical Almanack, 1894, 316.

PART ONE
THE ECONOMIC CONTEXT OF TECHNOLOGICAL CHANGE

CHAPTER 1 THE FISH TRADE

This chapter deals with the biological classification of sea fish and shows how they were caught in offshore areas. There follows a summary of how Britain's fish trade was conducted and perceived before the commencement of the nineteenth century. Finally, the third section illustrates the potential for expansion of the fish trade that existed as the population expanded and the market remained limited.

i FISH AND THE FISHERIES

Fish produces oil that quickly turns it rancid when exposed to oxygen so it must be dealt with swiftly once removed from its natural environment; therefore the performance of the fish trade depends upon its ability to convey products to market. Before the middle of the nineteenth century constraints in this area had limited growth, but subsequent technological innovations fuelled expansion and rendered the supply capabilities of the established fish trade inadequate for contemporary needs. Up to this time the fisheries had consisted of two distinct sectors, one for fresh and the other for cured fish. Sale of the former had been restricted to consumers near the port of landing and an elite clientele that could afford to pay the high prices which resulted from contemporary modes of swift transportation. Alternatively, some form of curing such as salting, smoking or drying had to be employed so that fish could be transported more cheaply. Stockfish - cured cod - has been described, somewhat ambivalently, as a 'universal standby',[1] though relatively stable items like the Yarmouth Red Herring became an abundant source of cheap nourishment for Londoners in the fourteenth century.[2] Overall, though, the market for fish remained limited, a situation that could not be altered by available technology.

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[1]Benham, 1979, 2.
[2]Nicholson, 1979, 52.

Whatever its technical limitations the sea fishing industry possessed an excellent resource base that constituted an important source of food for millions of Europeans. Waters around Britain range in temperature from Arctic to Lusitanian which, in addition to various depths, creates a habitat for many species.[3] For instance, in the nineteenth century one-fifth of the North Sea consisted of banks 'which are always being added to by the muddy deposits of the rivers' thereby providing haunts for all sorts of marine life.[4] The confluence of currents from different climates enhances such an environment, producing excellent feeding and spawning grounds; notably, conditions resultant from the meeting of Atlantic and Baltic waters are capable of sustaining huge plankton stocks[5] which provide food for herring that are, themselves, prey for larger species. The herring is surface-living - or pelagic - one of two biological divisions of free-swimming sea-fish, the other, comprising 'larger species' are demersal and spend most of their lives near the sea bed. Both were to be found in great abundance in the waters of the European continental shelf in 1830.[6]

Pelagic species include herring, mackerel, pilchard and sprats. They swim in large shoals at or near the surface, appearing seasonally - and in fluctuating numbers - at various points off the British coast. Prior to advent of the mass market herring was the most important commercial fish in Europe. Normally plentiful off the south of England and the west of Scotland, the most important grounds were located along the east coast. Here herring fishing was centred on several sub-species native to different areas that appeared in successive months of the year. Therefore the industry 'followed the fish', starting at Shetland in late winter/early spring and climaxing off East Anglia in the autumn. Extraction, processing and marketing

[3]Southward and Boalch, 1992, 52-3; Coull, 1996, 12.
[4]R.C.on Sea Fisheries (1866) 589. See also A.Carr, 1992, 23.
[5]M.Gray, 1978, 1.
[6]Further information concerning the biological properties of fish can be found in the following: Alward The Sea Fisheries of Great Britain and Ireland (1932); Cutting Fish Saving (1955); Jenkins The Sea Fisheries (1920); Nicholson Food from the Sea (1979); Southward & Boalch 'The Marine Resources of Devon's Coastal Waters' (1992).

employed considerable numbers from all round the coast, especially Scotland, and by the end of the eighteenth century included a large seasonal element from abroad - particularly the Netherlands and France. Mackerel and sprats were concentrated mainly along the south coast, while pilchard were found mainly off Cornwall. These species were important to local inshore fisheries, but are less important within the context of the national distant water industry.

Demersal fish are non-shoaling and live at or near the sea bed, feeding off smaller creatures such as shellfish and herring. They include cod, haddock and flat fish, all of which, according to species and water temperature, were abundant throughout the year in most seas around Britain in the early nineteenth century. Pelagic species secrete oil throughout their bodies, whereas demersal fish store it in their liver - and consequently deterioration is slightly less speedy, though the difference is insufficient to diminish significantly the necessity for speedy marketing or prompt processing. Thus supplies of a preservative were essential with the rise of trawling, which essentially exploited demersal species. Unlike fish taken by lining, which could often be kept alive, a trawled catch was landed dead on deck.

Correlation between this biological division and the different sectors of the industry does not extend beyond generalizations. Pelagic fish were caught generally 'inshore' and demersal varieties in 'distant' waters - but each category was far from discrete and a more reliable parity existed between species and the means of capture. Numerous methods were employed in commercial sea fishing,[7] including the use of seine, trammel and stow nets. Seines consisted of long nets that were shot in wide sweeps to encircle a shoal of fish, and could be used either from the shore

[7]Various writings, particularly those of E.W.H.Holdsworth, Secretary to the Royal Commission set up in 1863, give detailed descriptions of all methods used to catch sea fish. Of especial note are his accounts in Deep Sea Fishing and Fishing Boats (1874), The Deep Sea Fisheries of Great Britain and Ireland (1883) and his article 'Apparatus for Fishing' in International Fisheries Exhibition Literature, I (1883). He also produced 'A General Description of the Nets and Gear used in the Sea Fisheries of the British Islands' which appeared as Appendix 1 to the R.C.on Sea Fisheries (1866).

or a fishing boat. Trammels, or set-nets, were anchored across the tide to form a barrier and ensnare pelagic or demersal species. The stow-net was funnel-shaped and designed for a shoal, usually sprats, to swim into - it was shot from a stationary fishing boat and widely used along the south coast. However, these methods were used inshore; offshore operations at the beginning of the nineteenth century were based around drift nets and lines.

Drift-net fishing involved waiting for a shoal to swim into a curtain of nets shot across its path and was the most efficient means of catching pelagic species in the open sea. The curtain could extend for over two miles and hung perpendicularly from just below the surface to a depth of about five fathoms. Vessel and nets drifted with tide and current, the intention being to intercept a shoal and 'mesh' individual fish in the nets by rendering their gills inoperable. A 'train' of nets was assembled from eight to 130 individual 'pieces', each of which was mounted on a line about two thirds its length - slackness was synonymous with efficiency - while the size of mesh depended upon the species being sought. Both ends and the upper edge were roped, while the lower was left free. The 'back' was tied by lines every few inches to a cork rope from which the not inconsiderable weight of the nets - and catch - was suspended. They were traditionally made from hemp, but early in the nineteenth century production of lighter, more efficient cotton nets was made viable by James Paterson who established a factory at Musselburgh in 1820,[8] though in an early illustration of technological diffusion they were not used generally until the late 1850s or early 1860s.[9] Up to this time hemp was spun by hand, twisted into twine and the nets were then attached seven to a warp and joined together in a train 1-2 miles long. 'Nets were barked (soaked in a solution to protect them from the effects of sea water) once or twice a season, and a quarter of the nets were expected to be renewed annually.'[10]

[8]Butcher, 1979, 21.
[9]R.C.on Trawling (1884-5) Q.1,294; M.Gray, 1978, 83; Coull, 1996, 111.
[10]Fewster, 1985, 22.

Drift nets were shot before dawn or, more commonly, around sunset, where the master of the fishing boat judged there was likely to be a shoal. It was primarily a nocturnal practice as herring have particularly poor eyesight among pelagic species, and often fail to detect the presence of nets. There was little need for a preservative as most operations were undertaken relatively close inshore, and the catch was cured as soon as it was landed, though many larger craft - notably Dutch busses - possessed on-board facilities. In the middle of the nineteenth century line fishermen and sailing drifters on the North Sea coast typically travelled for less than a day,[11] but their modes of operation differed greatly.

Line fishing involved enticing fish to take baited hooks. In its simplest form two were tied to a hand-held line shot either from shore or a fishing boat. More commercially orientated, long-lines were introduced from the Netherlands around 1770.[12] The actual lines were made from hemp or linen and the hooks were of iron, though steel became more common in the nineteenth century.[13] A long-line was typically made up from a 'string' of 180 lines of 40 fathoms with 26 baited hooks attached to them by 'snoods', secondary lines about six feet long tied on at right-angles.[14] Two types of long-line evolved. 'Small' lines were used closer to shore for species such as sole, the hooks usually being three or four feet apart, whereas 'great lines', employed in more distant grounds for larger species like cod, had larger hooks fixed at intervals of six feet or more.[15] Much time and energy was expended in their preparation as each hook had to be baited - with whelks or similar shellfish, the collection of which constituted a considerable industry itself.[16] Lines were shot across the tide so the snoods drifted clear, a small anchor was placed at intervals of

[11]R.C.on Sea Fisheries (1866) Q.28,073.
[12]Third Report of the Committee to enquire into the state of the British Fisheries (BPP, 1785, VII) 21; Cutting, 1955, 214.
[13]Coull, 1996, 81.
[14]Holdsworth, 1883(i), 76.
[15]Coull, 1996, 82.
[16]Holdsworth, 1883(i), 78.

about 40 fathoms and their location marked by a buoy every mile or so. They were usually shot at half-tide, the smack then heaving to and hauling them in when the tide was nearly complete. On sailing craft the lines could not be hauled properly unless the wind blew against the tide, which often led to the catch staying in the water too long and predators like dogfish robbing the hooks.[17] Once aboard the lines needed careful stowage and where possible this operation was performed in daylight.[18]

Hooked fish were usually landed alive, a huge advantage in the fresh fish market, and to this end supplies were improved by the introduction of well-smacks, also from Holland, at Harwich in about 1712.[19] Here, the catch was kept alive by means of a well of sea-water built in amidships, but the fish were not necessarily sold immediately and were often stored in wooden chests anchored in the harbour. Wells were mainly used for fish caught on nearer North Sea grounds and kept 'dry' for voyages further afield when they were employed for the storage of cured fish.

Use of lines and drift nets constituted the established methods of production offshore, but trawling was to disrupt dramatically this *status quo*. Earlier versions of the trawl had been used inshore and by the middle of the eighteenth century it was a 'well-established method of fishing',[20] though its efficiency was not well-suited to the prevailing market for fish. By landing the catch dead on deck problems were created regarding preservation that were exacerbated by the indiscriminate capture of all fish regardless of species, size and age. Consequently, trawled specimens were usually deemed to be inferior when judged in terms of the high-quality market for fresh fish.

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[17]Aflalo, 1904, 75.
[18]Holdsworth, 1883(i), 72-3.
[19]Holdsworth, 1883(i), 76; Chaloner, 1966, 104.
[20]R.C.on Sea Fisheries (1866) QQ.8,974-6 and QQ.18,382 and 99; Northway, 1969, 5.

Trawlers used a beam-trawl which consisted of a triangular, flat, purse-shaped net often more than 100 feet in length, that was towed through the water. Its upper lip was attached to a horizontal wooden spar - usually beech, oak or elm[21] - that was raised about three feet from the sea bed by two iron trawl-heads fixed to each end. The overall length of the beam depended on the size and power of the vessel, two or three pieces being scarfed together when necessary. Flat skids on the bottoms of the trawl-heads allowed the net to skim over the sea-bed and its lower lip was faced by a protective ground rope, usually an old hawser bound by a smaller cord and fitted with chains or bobbins to disturb the sea bed. Thus was the mouth of the net kept open, allowing the forward motion to scoop up and retain anything too large or slow to escape the mesh. Its 'belly' was in contact with the sea bed and cut away to form a 'U'-shape, so theoretically any fish disturbed by the ground rope would swim upwards to be restrained by the roof and channelled into the oncoming 'cod-end' - a bag occupying the rearmost 10 feet or so. Here the mesh was typically about 1.5 inches, having been gradually reduced from four inches or so at the mouth.[22] A curtain across the entrance to the cod-end made escape difficult, and two pockets either side, formed by lacing together the back and belly, made it virtually impossible. Nets were usually made of ordinary hemp, though Manila hemp was increasingly used from about 1870 - especially at North Sea ports - its higher cost being vindicated by greater durability.[23] Even so, and despite being well-tarred they needed replacing up to four times per year on average; more so in the case of the belly and the cod-end as both were in contact with the ground, and the latter sustained additional wear through the weight of fish.

A large trawl weighed one or two tons,[24] the trawl-heads alone could weigh as much as four hundredweight each,[25] and part of a skipper's skill lay in minimizing

[21]Aflalo, 1904, 37.
[22]Aflalo, 1904,37-8.
[23]Holt, 1895(i), 354.
[24]Aflalo, 1904, 38.
[25]Oddy, 1971, 13.

the friction produced between the gear and the sea bed. British fishing boats usually carried one trawl - on the port side - though Dutch fishermen commonly shot two simultaneously.[26] British trawls were towed by a warp about 6 inches in diameter and 150 fathoms long which was shackled to the trawl heads by two bridles of approximately 15 fathoms. They were usually shot early in the tide and left down until it was finished five or six hours later[27] and six to eight hours was common, though rough ground often shortened this to about three hours[28] and if it proved particularly uneven the vessel could be brought to a standstill.[29] In preparation for hauling the net the fishing boat was turned broadside to the wind so that the movement of the sea could aid the procedure. The warp was brought in till the bridles appeared, when the rearmost was unshackled, passed forrad and made fast to the side as soon as possible. Following this the other was brought aboard and all hands lay over the beam - now along the gunwale - and heaved in the net, the ground-rope being shipped at the earliest opportunity to prevent any fish escaping. A rope was tied around the neck of the cod-end as soon as it was within reach, and it was then hoisted above the deck where it was untied, releasing the catch.

Trawling was unique in that it involved active pursuit of the fish rather than entrapment, so it could be practiced throughout the year as long as the vessels could withstand the conditions concomitant to all-weather operations offshore. Of course, this could only be undertaken if the produce could be sold, which was the case following radical changes in attitudes towards fish that altered the market to the extent that it could not be supplied without trawled products. Technological innovations fuelled growth from the middle of the nineteenth century especially, and the performance of the trawling industry swamped increases in, and then precipitated the eventual decline of, line fishing.

[26]Aflalo, 1904, 38-9.
[27]Holdsworth, 1883(i), 40; Select Committee on Sea Fisheries (BPP, 1893-4, XV) Q.228; M'Intosh, 1895, 321.
[28]R.C.on Trawling (1884-5) Q.9,008.
[29]S.C.on Sea Fisheries (1893-4) Q.338.

ii DEVELOPMENT OF THE FISHING INDUSTRY TO 1830

> When in the nineteenth century Britain attained the position of world economic leadership, the fisheries of Britain also became world front runners.[30]

This was in stark contrast to their status in earlier times. Britain's fisheries had always possessed enormous potential but were overshadowed by the performances of industries on the continent. For example, commercial organization of the herring fishery was advanced in Scandinavia by the ninth century and prosecuted in Hanseatic towns by 1200,[31] and though Britain's industry in cured fish was characterized by a considerable degree of complexity, expansion of the fresh fish sector was stifled by the inability to serve anything more than a limited market. All in all the fisheries were of little account in government circles; any income they generated was of course welcome, but their development was neglected by successive administrations that viewed them as a political bargaining counter rather than an economic asset. They were seen as a means of providing currency to pay for imports, and the mercantile marine generally tailored any fishing activities to qualify for government bounties rather than for the lasting good of the fisheries.[32] The bounties introduced into the Scottish herring fishery in 1750, for example, encouraged growth of the herring fleet to more than 200 boats and increased production, but the system was based on vessels rather than catches and the industry failed to become self-supporting. Owners usually had other interests and their vessels served as trading ships for much of the year, while labour retained a strong seasonal element that added to the impermanence of the industry.[33] This attitude was reinforced by perception of the fisheries as a 'nursery for seamen'[34] - 3,000 men had been pressed into military service from Shetland alone by the end of the

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[30]Coull, 1996, 5.
[31]Coull, 1972, 72.
[32]Chaloner, 1966, 97-8.
[33]M.Gray, 1979, 5.
[34]The Times, 26 November 1835, 3.

Napoleonic Wars.[35] The political importance of the Newfoundland cod fishery, for example, outweighed its economic value. Despite its profitability, the attention of politicians focused more on the presence of French, Dutch, Spanish and Portuguese fishermen. The situation provided opportunities for confrontation and the affirmation of British ambitions; Anglo-French belligerence in Canadian seas, for example, was a major contributory factor in the onset of the War of the Spanish Succession in 1702.[36]

Archaeological evidence dates fishing activity in Britain from around the second millenium B.C.[37] Since this time it has been constantly present, with commercial organisation - *via* drift-netting at Great Yarmouth - being in evidence from the sixth century.[38] This was presumably practised inshore, but records show that 'English fishermen reached Iceland as long ago as the twelfth century'[39] to make good shortfalls from nearer waters by trading for fish as well as catching them,[40] and Yorkshire vessels worked cod grounds off the Faroe Islands three centuries later.[41] Meanwhile, the working of trawl-nets was referred to in 1376 when Edward III was petitioned by fishermen concerned that the practice was adversely affecting their business;[42] then in 1616 a certificate was issued to a Barking man allowing him

> to troll for plaice and soles in such places as he can best find fish in and is usually fished by the Coast men of Kent, and to bring his fish weekly to London if ye wind and weather to serve.[43]

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[35]Coull, 1996, 5; Robinson, 1989(i), 228, refers to the activities of press-gangs on the Yorkshire coast during the same conflict.
[36]Nicholson, 1979, 56.
[37]Goodlad, 1971, 42-5.
[38]Holdsworth, 1883(i), 49.
[39]Nicholson,1979, 54.
[40]Nicholson, 1979, 55, dates this trade from the twelfth and Clark, 1957, 8-9, from the first half of the fifteenth century. Icelandic historians offer the fourteenth century.
[41]Robinson, 1989 (i), 223.
[42]Alward, 1932, xx; Nicholson, 1979, 63.
[43]D.S.Hewett, 1964, 3, quoting a certificate issued to John Farsby of Barking by the King's fishmonger, William Angell, in March.

However, distant water fishing and trawling were not combined until the nineteenth century. Before then the technology did not exist to render their fusion viable and the sea fisheries remained confined within the parameters of a limited market.

Nevertheless, sophistication had been evident in trading relationships for hundreds of years;[44] the very existence of Billingsgate fish market on the Thames since the middle ages provided evidence of considerable organization.

> London was at the hub of a sophisticated supply network and was supplied with live, fresh and cured fish from all corners of the kingdom.[45]

Corresponding seaward enterprise was epitomized by Devon fishermen of the sixteenth and seventeenth centuries who sailed as far as New England. Such voyages would not have been undertaken without the prospect of financial remuneration, which was indicated by the construction of fish markets at Plymouth and Dartmouth in 1602 and 1623 respectively,[46] and about 100 years later 'a Fishery [was] carried on from Yarmouth upon the coast of Iceland, which employed about 200 vessels'.[47] The fishing industry was neither insolvent nor unsophisticated.

A substantial foreign trade, largely in cured fish, was also sustained. In addition to the reference to Great Yarmouth, records show that similar fisheries had been conducted at Plymouth since at least the twelfth century,[48] and at Scarborough, where a large Dutch presence had long been prominent, since the fifteenth.[49] Meanwhile in Scotland greater economic importance had been attached to the fisheries, especially the herring industry, 'for centuries',[50] and by the early seventeenth century one estimate put the value of fish products - primarily cured herring - at about 20 per cent of all Scottish exports. Most were sent to northern

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[44]Thompson *et als*, 1983, 11-12.
[45]Muirhead, 1992, 111.
[46]T.Gray, 1992, 143.
[47]First Report of the Committee to enquire into the State of British Fisheries (BPP, 1785, VII) 20.
[48]Southward & Boalch, 1994, 54.
[49]Heath, 1968, 58; Robinson, 1989 (i), 225-6.
[50]Coull, 1996, 7.

Germany, Russia and the Catholic states of southern Europe,[51] though more distant markets like those supplying slaves in the West Indies also provided an outlet for English as well as Scottish products.[52] Such business had resulted in the establishment of trading connexions which facilitated the export of cured herring and cod that often dated back to Medieval times. Yorkshire coast curers, for instance, 'contracted to sell their fish to London merchants before the summer drying season commenced'[53] and, given the geographical isolation of their islands, Shetlanders had to rely on trading relationships in order to conduct a trade that furnished about 80 per cent of British exports of white fish by the second half of the eighteenth century.[54] By the end of the eighteenth century the fish trade was small compared to others in the economy but it was certainly not primitive.

Such organization could not alter the fact that growth was stifled by continued absence of an efficient means of distribution. However, fish was transported overland 'in surprisingly large quantities'[55] which enabled steady if unspectacular growth. By the end of the eighteenth century fish were conveyed in trains of pannier ponies and large vans towed by four or six horses. Turnpiked roads reduced travel times and by the early 1800s an extensive system for the land carriage of fish to London had been built up all along the south coast.[56] Similar networks were built to serve fish markets at Birmingham and Manchester.[57] Edinburgh became an important centre for Fife,[58] while Exeter served cities as far away as Bristol and Bath.[59] Road improvements included government measures such as a 1761 Act that exempted empty fish vans from turnpike fees[60] and lowered costs, but still only

[51]Robinson & Starkey, 1996, 126.
[52]Robinson, 1987, 22.
[53]Robinson, 1989(i), 225-6.
[54]Coull, 1996, 92.
[55]Dyos and Aldcroft, 1969, 214.
[56]Chaloner, 1966, 101-2; Northway, 1969, 123.
[57]Northway, 1969, 16.
[58]Robinson, 1996, 10.
[59]Northway, 1969, 64.
[60]Northway, 1969, 12.

limited quantities could be carried.[61] To allay this problem much fish was forwarded by water; coastal traffic to Billingsgate increased steadily until, by 1799, it was estimated that 2,500 tons of fish were landed direct from the North Sea and the number of vessels involved had increased from 1,053 in 1780 to 1,510 in 1799.[62] Additionally, the system of inland waterways was becoming increasingly important, and from around 1,000 miles of canals in 1750 there were 4,250 a century later,[63] and used in conjunction with natural waterways they promoted the development of entrepots such as Hull, which used the Humber and its tributaries to access inland markets.[64] However, for all these advances prices were not reduced sufficiently to alter the composition of demand and the market for fish remained limited.

Transportation difficulties made it hard for the fish trade to respond to market forces. This was demonstrated at Scarborough in the winter of 1767-8 when huge landings of haddock created a glut on the coast which could not be moved inland to relieve dire food shortages.[65] Such problems were aggravated by the requirements of the curing process; red herrings, for instance, had to be kept in the smokehouse for at least three weeks if quality was not to suffer.[66] This increased the inelasticity of supply and the trade missed opportunities to respond to fluctuations in demand that resulted, for example, from poor harvests. This applied even in areas like Devon - one of the most accessible regions for fish traffic - where no population centre was more than thirty miles from the sea. A food shortage at Exeter in 1801 prompted the purchase of herring from Scotland, but the resultant supply exceeded demand and the surplus could not be disposed of within the city while surrounding areas did not want it because of the ready availability of cheap, locally caught

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[61]Robinson & Starkey, 1996, 132.
[62]Select Committee on the state of the British Herring Fishery (BPP, 1800, X) 29.
[63]Kenwood & Lougheed, 1982, 53.
[64]Robinson, 1987, 19.
[65]Robinson, 1989(i), 230.
[66]Coull, 1996, 58, states a month and Robinson, 1996, 11, suggests three weeks.

fish.[67] Though an established part of the economy, the fishing industry as it stood was subject to numerous practical constraints.

Its progress was not helped by apparent government indifference, which was illustrated with regard to the levying of a tax on salt in the eighteenth century. Cured fish was important to the economies of many coastal regions - especially in Scotland - and salt was vital in the curing process. Thus the measure was, to say the least, unpopular, and although fish curers were partially exempted in 1786[68] they were not entirely freed of the legislation until 1824-5.[69] The resultant ill feeling was not mitigated by the appointment of two Parliamentary committees in 1785 and 1786 to inquire into the conduct of the fisheries.[70] Ostensibly, they indicated an awakening of interest, but actually they represented a false dawn and no significant adjustments of policy resulted.

This attitude was not echoed in the grass-roots conduct of the industry. There were rational reasons, for example, why Yorkshire fishermen did not intercept the large shoals of herring that passed annually along their coastline. By the time they appeared the men had moved south to take part in the East Anglian fishery - where they landed catches alongside Belgian fishermen[71] - and fulfil agreements that had been concluded with Yarmouth merchants.[72] In any case there were surer ways for mariners to earn a living for it is probable that the land supplied the food needs of the local population, making it necessary to transport fish considerable distances for uncertain returns. Meanwhile, along the Yorkshire coast at this time, the 'vigorous development of other branches of maritime trade'[73] manifested itself in the

[67]Northway, 1969, 113-4.
[68]M.Gray, 1978, 6. The procedure for exemption was so complicated that few had the 'money and time' to apply for it.
[69]Robinson, 1989(i), 229.
[70]Reports of the Committee to enquire into the State of British Fisheries (BPP, 1785, VII); Reports respecting British Fisheries (BPP, 1786, VII).
[71]Alward, 1932, 12.
[72]Robinson, 1989(i), 226.
[73]Robinson, 1989(i), 223.

commitment of resources to the coastwise shipment of coal and the Baltic trade, as well as shipbuilding and repairing. The overall performance of Britain's maritime industries suggests that similar reasons accounted for the sluggish progress of fisheries elsewhere.[74]

Other nations benefitted from this state of affairs. Several, particularly the Netherlands, relied heavily on herring from Britain's east coast and their success elicited envy in many quarters,[75] but resultant measures were designed to inhibit foreign activity rather than encourage native efforts. Critical was the failure to confront the fact that due to curing methods the Dutch produced a far superior product. In Scotland some attempt was made to come to terms with this problem by the introduction of an Act 'for the further and better regulation of the British white herring fishery' in 1808.[76] Despite the title it applied almost entirely to fisheries north of Hadrian's Wall, where it greatly helped the industry by ensuring a form of quality control *via* the branding of herring barrels and, significantly, when bounties were withdrawn in 1829 it continued to prosper.[77] The positive attitude of the Scottish authorities contrasted sharply with attitudes in England. Attempts were made in north-east England, for example, to establish large-scale fishing companies to rival Dutch concerns, but they were feeble and came to nothing.[78]

At the end of the eighteenth century Britain's sea fishing industry was inferior to those of many other nations - but it was not declining, and though limited it was far from dormant. Official statistics showed that the fishing fleet of England and Wales had risen from 1,378 vessels totalling 22,762 tons in 1772, to 1,584 amounting to

[74]See Sarah Palmer Politics, Shipping and the Repeal of the Navigation Laws, Chapter 1 is especially useful; Gordon Jackson 'The Ports' in Transport in the Industrial Revolution, Transport in Victorian Britain and The History and Archaeology of Ports; Simon Ville 'Total Factor Productivity in the English Shipping Industry, 'Shipping in the port of Newcastle, 1780-1800' and English Shipowning during the Industrial Revolution.

[75]Chaloner, 1966, 98.

[76]48.Geo.III c.110.

[77]Nicholson, 1979, 53; Robinson, 1987, 29-30.

[78]Muirhead, 1992, 136.

38,679 tons in 1786.[79] Meanwhile, in Scotland the herring fleet at Wick alone had grown to over 200 fishing boats in the years leading up to 1800, growth that overshadowed the establishment of Ullapool on the north-west coast in 1788. Developments in the Scottish herring fishery foreshadowed changes in Britain's demersal sector through the shift of activity to the east coast, where only about ten per cent of cured herring was produced in 1811, a proportion that had risen fivefold by 1816.[80] However, the fishery remained largely dependent on inshore grounds. A move to more distant waters was arrested by the 'disappointing results' of herring busses.[81]

iii LATENT DEMAND

The potential for growth in the fishing industry was heightened by a sustained increase in the population, which is quantified from the middle of the eighteenth century by Table Three.

Table 3

PERCENTAGE INCREASE OF POPULATION

(i) England and Wales

Period	% change
1751-61	+7.0
1761-71	+7.3
1771-81	+6.8
1781-91	+9.5
1791-1801	+11.0

[79]Public Record Office, London, (Hereafter PRO) CUST.17/1-10.
[80]Nicholson, 1979, 53.
[81]Coull, 1996, 72.

(ii) United Kingdom

Period	% change
1801-11	+13.8
1811-21	+16.0
1821-31	+14.9
1831-41	+10.8
1841-51	+2.4
1851-61	+5.8
1861-71	+8.9
1871-81	+10.7
1881-91	+8.2
1891-1901	+9.9
1901-11	+9.1
1911-21	+4.2

Source: Deane and Cole British Economic Growth, 1688-1959: Trends and Structure, 288.

Such growth entailed transformation of marketing, and hence the production, handling and distribution of fish, if latent demand was to be realized. Thus the ability of the fishing industry to cope with dramatic change would be severely tested, for it highlighted constraints that had hitherto dogged expansion. However, potential did not just lie in the numbers of individuals that constituted the potential market, for the composition of the population was also instrumental in altering patterns of demand. Urbanization meant that an increasingly large proportion was concentrated close together, enhancing its disposition to mass marketing. Between 1841 and 1901 nearly three million potential consumers moved into English towns and more than half a million into colliery districts.[82] Access to consumers was easier and the advantages to be gained from economies of scale were increased. Table Four shows that this movement continued throughout the nineteenth and into the twentieth century.

[82]Deane and Cole, 1967, 289.

Table 4

(i) POPULATION OF SELECTED CITIES

	Population in 1,000s						
	1801	1811	1821	1831	1841	1851	1861
London	959	1,139	1,379	1,655	1,948	2,362	2,804
M'chester	77	91	129	187	243	316	358
B'mingham	71	83	102	144	183	233	296
Leeds	53	63	84	123	152	172	207
Liverpool	82	104	138	202	286	376	444
Newcastle	33	33	42	54	70	88	109

Source: Irish University Press Series of British Parliamentary Papers: Population 15, 126-7.

(ii) POPULATION OF CONURBATIONS

	Population in 1,000s					
	1871	1881	1891	1901	1911	1921
Greater London	3,890	4,770	5,638	6,586	7,256	7,488
S.E.Lancs.	1,386	1,685	1,894	2,117	2,328	2,361
West Midlands	969	1,134	1,269	1,483	1,634	1,773
W.Yorks.	1,064	1,269	1,410	1,524	1,590	1,614
Merseyside	690	824	908	1,030	1,157	1,263
Tyneside	346	426	551	678	761	816

Source: Mitchell and Deane Abstract of British Historical Statistics, 19.

Urban migration led to changes in the geographical distribution of markets, and this denoted alterations in the communities that produced fish. Developments in the fishing industry that resulted in increased demand also rendered its workers part of the growing industrial labour force that required cheap and nourishing food. The Royal Commissioners noted that

> the increasing scarcity and high price of butchers' meat...[means that]...a great field for profitable enterprise is open for the application of increased capital and skill to the sea fisheries of the United Kingdom.[83]

Population growth at large centres intensified after this statement was made, and it was further validated by increased purchasing power. People had more money to spend and this is traceable through improvements in earnings and the cost of living which are charted in Table Five.

[83] R.C.on Sea Fisheries (1866) 589.

Table 5

(i) AVERAGE WAGES FOR GREAT BRITAIN (EXCLUDING IRELAND)

Year	Wages (1840 = 100)
1790	70
1795	82
1800	95
1805	109
1810	124
1816	117
1820	110
1824	105
1831	101
1840	100
1845	98
1850	100

(ii) WAGES AND EARNINGS IN THE UNITED KINGDOM

Year	Average Real Wages (allowing for unemployment) (1850 = 100)	Average Retail Prices
1850	100	100
1855	94	126
1860	105	111
1865	120	107
1870	118	113
1875	138	113
1880	132	107
1885	140	96
1890	169	91
1895	170	84
1900	184	89
1902	176	91

(iii) COST OF LIVING AND REAL WAGES IN THE UNITED KINGDOM

Year	C/Living (1914 = 100)	Real Wages
1880	105	69
1885	91	81
1890	89	93
1895	83	100
1900	91	103
1905	92	97
1910	96	98
1913	102	97
1914	100	100

Source: Mitchell and Deane Abstract of British Historical Statistics, 343-4.

Potential was all well and good, but the lack of dynamic change in the conduct of the fishing industry rendered growth in productivity pointless because the inability to distribute fish restricted the market. Such issues merely widened the gulf between latent and actual demand and it was not only a logistical problem. Fish had to overcome prejudice that persisted deep into the nineteenth century.

> After 1815 increasing supply and decreasing prices...led to a large increase in consumption; but even in 1833 the clerk of Billingsgate declared that "the lower class of people entertain the notion that fish is not substantial food enough for them, and they prefer meat."[84]

Though usually cheap, fish was often far from appetizing. Before the middle of the nineteenth century, 'fresh' fish was not the product familiar to consumers in the late twentieth century. It was frequently old, dirty and ungutted,[85] while cured products deemed to be ideal for victualling ships voyaging outside temperate zones[86] often had problems finding favour in a non-captive market. Consumers had to want to buy fish.

The actions of investors were dictated by considerations of profitability and awareness of the untapped economic potential of the fisheries grew as technology developed. The following article reprinted by The Times in 1835 referred directly to one region but it was applicable throughout the country.

> While the North American Union, Holland, and Scotland, [*sic*] have been deriving great wealth from their enterprise in fisheries, the fishing on the south-eastern coast of England, notwithstanding its peculiar advantages and facilities, and its proximity to London, the best market in the world, has been almost entirely neglected. This unnatural depression of a most useful trade, affording at once occupation and supplies of food...cannot but be regarded as a very serious calamity. Our attention has been directed to this subject, so deeply interesting to the friends of British industry, enterprise, and maritime power, by an important meeting holden at Folkestone on Tuesday last. It is a fact not more lamentable than true, that the fisheries on the coast of Kent are, at present, from a combination of untoward circumstances, in a most unsatisfactory state. - *Kentish Gazette*[87]

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[84]Select Committee on the British Channel Fisheries (BPP, 1833, XIV) 94.
[85]Muirhead, 1992, 110.
[86]Northway, 1969, 8.
[87]The Times, 26 November 1835, 3.

When this was written railways had been in existence for several years and offered a solution to the distribution problems of the fishing industry. Hitherto, whatever improvements had been made to seaward operations were curtailed by the inability to move large quantities overland. By the 1830s this threatened to hinder the ability to exploit the potential of a mass market that was emerging in the inland industrial districts of northern England, the Midlands and central Scotland. That this did not transpire was due to the introduction of a dynamic factor that transformed the fishing industry.

CHAPTER 2 DISTRIBUTION

> The most abundant Supply may, to a great Degree, be rendered useless, so far as the internal Provision of the Country is concerned, unless proper Means are employed to regulate its Distribution and Arrangement, and to remove Prejudices which first usually oppose the Introduction of a new Article of Food.
>
> The Second Report of the Committee appointed to Consider the Present High Price of Provisions, 1800.[1]

This chapter shows how railways liberated the sea fisheries from the constraints that had restricted their growth and enabled the industry to cater for mass consumption. Having charted their effect upon the conduct of the fish trade, the second section analyses how the port system and associated factors were adjusted, and the chapter culminates by examining the way in which latent demand was realized.

i INLAND TRANSPORT

The advent of the railway system enhanced significantly the handling, conveyance and marketing of fish. However, change was not effected overnight, and among the distributive networks of food industries that for fish was 'slowest to expand'.[2] As seen in Chapter 1ii, the volume of fish distributed inland was far from negligible, and railway companies initially concentrated on capturing existing road and canal traffic rather than creating new business, therefore high freight rates were maintained as traffic was simply transferred from vans and ponies.[3] The trade at Hull and Newcastle, for example, continued to rely on the established luxury market,[4] but some indication of the potential of railways was forthcoming through the 'immense quantities' of herring transported inland from the Northumberland coast. By the 1860s merchants there were regularly supplying markets 'that had

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[1]The Second Report of the Committee appointed to Consider the Present High Price of Provisions (BPP, 1800, XXVIII) 7.
[2]Scola, 1992, 149.
[3]Aflalo, 1904, 111; Robinson, 1986, 33-4.
[4]Robinson, 1986, 35.

traditionally been served by Whitby and Scarborough',[5] but the ramifications of such developments could be unsettling for individuals. For example, on the south coast a Brighton fisherman complained that his living had suffered since the railway was extended to the town in 1840 because it enabled cheaper, North Sea fish to infiltrate the local markets upon which he relied.[6]

The basis of the railway network was in place by the end of the 1840s;[7] it reached Great Yarmouth in 1844, Lowestoft in 1847[8] and Grimsby in 1848, some years after it was extended to Hull.[9] However, London remained the 'great wholesale market' and traffic increased to and from Billingsgate.[10] Competition intensified as the number of companies rose, which tightened financial constraints and resulted in efforts to find profitable new sectors of business.[11] Consequently, the importance of low value/high volume freight increased, a trait that coincided with the escalating production potential of the fishing industry. Unfortunately practical difficulties inhibited theoretical effectiveness, and because railway companies had different policies and procedures fragmentation ensued that prevented immediate fulfilment of the network's potential.

In 1841 the Northern Fishing Company backed a scheme to develop Hartlepool's fish trade by daily despatches to Leeds, Manchester and the West Riding of Yorkshire by rail, and though unsuccessful the plan ironically led to the town's rise as a coal port.[12] About the same time Captain James Laws, manager of the Manchester and Leeds Railway instigated co-operation between the Leeds and Selby, Selby and Hull, and York and North Midland railway companies. He then

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[5]Muirhead, 1992, 345.
[6]Inspectors' Report on Sea Fisheries of England and Wales (BPP, 1878-9, XVII) 351-2.
[7]Starkey, 1993, 128.
[8]Butcher, 1979, 13-4.
[9]Cutting, 1955, 318.
[10]Holdsworth, 1874, 19.
[11]Pollard, 1981, 23; Robinson, 1996, 23-8.
[12]Muirhead, 1992, 345.

met with fishermen at Hull, Flamborough and Filey with the result that carriage rates were considerably reduced between Hull and Manchester, where a 'shop-cum-stall' was opened in the name of the Flamborough and Filey Bay Fishing Company, and as a result this outlet was handling 80 rather than 3.5 tons of fish per week within three years.[13] This local scheme presaged work done by the Railway Clearing House which was set up in 1842 to address similar problems on a national scale. However, a comprehensive policy was not forthcoming until 1857,[14] and its eventual formulation was due, in no small measure, to the influence of more progressive companies such as the Manchester, Sheffield and Lincolnshire, which probably joined in the late 1840s.[15] Such problems as the classification of fish obstructed agreement,[16] but although progress was slow it was inexorable. The first wholesale fish market on railway property was opened at Manchester in 1856,[17] though not until the 1860s and 1870s did the trade become truly 'national'.[18]

Appreciation of the profit potential of the sea fisheries led to investment being crystallized *via* the establishment and upgrading of ports in accordance with the requirements of the modern industry. This policy was apparent in the rise of Hull, where no more than 40 smacks in 1845[19] were succeeded by the registration of 670 first and second-class fishing boats 30 years later.[20] Another yardstick of its growth was the presence of six or eight basket makers serving the fishing industry there in 1849, while '20 dozen' were not sufficient in 1863.[21] However, the progress of Hull's fisheries was thwarted by commercial interests[22] that took exception to the

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[13]Robinson, 1986, 37.
[14]Robinson, 1986, 43.
[15]Bagwell, 1968, 293.
[16]Robinson, 1986, 39.
[17]Scola, 1987, 132-3.
[18]Fraser, 1981, 161. See pp.71-6 for further details about the part played by railways in the development of fishing ports.
[19]Report of the Committee of the Board of Trade relative to the Sea Fishing Trade and Relations between Owners, Masters and Crews of Fishing Vessels (BPP, 1882, XVII) 671.
[20]Annual Statements of Navigation and Shipping.
[21]R.C.on Sea Fisheries (1866) Q.3,894.
[22]Hellyer, 1915, 55.

presence of fishing boats.[23] When Charles Hellyer moved there in 1855 there was no fish dock, only four vessels could land simultaneously[24] and the only fish quay 'had an awkward range of tides and was a mile from the railway station'.[25] Nevertheless, even allowing for the large proportion of the aggregate catch that was taken to London directly by sea, the growth of rail traffic shown in Table Six augured well for the prosperity of a more committed fishing port on the Humber.

Table 6

QUANTITY OF FISH FORWARDED BY THE NORTH EASTERN RAILWAY FROM HULL

YEAR	QUANTITY (1,000s tons)
1854	1.6
1855	2.4
1856	3.9
1857	4.1
1858	3.6
1859	3.7
1860	5.5
1861	5.7
1862	5.6
1863	5.0
1864	6.3

Source: Company returns, R.C.on Sea Fisheries, BPP, 1866, XVII, 699.

Consequently, resources were diverted to Grimsby on the south bank of the Humber. Before the arrival of the railway most fish landed at the port had been used to manure local fields[26] and in 1854 only 453 tons of fish were landed[27] by about a dozen vessels,[28] but this changed once railway companies saw its potential. Having apprehended discontent among the fishing community at Hull, representations were made by the Manchester, Sheffield and Lincolnshire and Great Northern Railway Companies in June 1855, and they successfully induced many to

[23]Gill and Sargeant, 1986, 5.
[24]Hellyer, 1915, 37-9.
[25]National Maritime Museum, 1986, 29.
[26]Cutting, 1955, 318-9.
[27]Report on Relations between Owners, Masters and Crews (1882) Q.1,388.
[28]S.C.on Sea Fisheries (1893-4) Q.213.

cross the river.[29] One man recalled that there were only 'five or six' non-trawling smacks at Grimsby when he was induced to take advantage of its better facilities,[30] a situation that was remedied by offering incentives that encouraged, for example, a fleet of 13 smacks from Essex to relocate there.[31] In 1857 the first fish dock was completed and in the following year 25 houses were built for the fishermen[32] of a growing indigenous fleet.[33] Tables Seven shows that the port's potential was swiftly realized.

Table 7

QUANTITY OF FISH LANDED AT GRIMSBY

YEAR	QUANTITY (Tons)
1856	1,514
1857	3,435
1858	4,344
1859	4,742
1860	4,842
1861	5,371
1862	8,521
1863	9,408
1864	11,198
1865	13,368
1866	15,692
1867	19,416
1868	21,621
1869	24,140
1870	26,324
1871	30,857
1872	31,193
1873	34,876
1874	35,134
1875	34,881

Source: The Grimsby dock-master, Holdsworth, The Sea Fisheries of Great Britain and Ireland, 149.

This progress was matched by the amount of fish forwarded by rail shown in Table Eight, which suggests that the railway companies soon reaped handsome dividends from their investment.

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[29]Clark, 1957, 30.
[30]R.C.on Sea Fisheries (1866) Q.16,071-3.
[31]Captain R.S.Hewett, 1964, 8; Goddard and Spalding, 1987, 12.
[32]Goddard and Spalding, 1987, 12.
[33]Report on Relations between Owners, Masters and Crews (1882) 671.

Table 8

QUANTITY OF FISH FORWARDED BY RAIL FROM GRIMSBY

YEAR	QUANTITY (Tons)
1859	4,950
1864	12,299
1869	24,139
1874	34,434
1879	49,468
1881	50,612

Source: The Grimsby dock-master, Report on Relations between Owners, Masters and Crews, BPP, 1882, XVII Q.1,388.

These figures do not tally exactly with those given in Table Nine, but the overall trend rather than exact quantities are significant. Besides the two lines from Grimsby, the North Eastern Railway, which served the Yorkshire coast as well as Hull, conveyed almost three times as much fish in the nine years from 1856, while a steady increase was also observable in South Devon.

Table 9

QUANTITY OF FISH FORWARDED BY SELECTED RAILWAY COMPANIES

	QUANTITY 1,000s tons			
YEAR	MCR, SHEFF LINCS	NORTH EASTERN	GREAT NORTHERN	SOUTH DEVON
1854	-	-	-	0.9
1855	-	-	-	0.6
1856	0.9	8.2	1.4	1.3
1857	1.3	9.7	3.1	1.1
1858	1.9	14.3	3.8	1.7
1859	2.4	18.9	3.8	2.4
1860	3.0	18.7	3.6	2.2
1861	3.5	23.4	3.5	3.0
1862	5.4	23.0	5.3	3.2
1863	6.3	23.5	5.2	2.8
1864	8.5	23.5	5.3	3.0

Source: Company Returns, R.C.on Sea Fisheries (BPP,1866, XVII) 582.

In South Devon the rise was less spectacular, not least because of greater reliance on the more erratic pelagic fisheries, but it must also be noted that Brixham, the largest fishing port on that coast, had no rail link until 1861. Its topography hindered landward expansion for although it possessed an excellent harbour the steep quayside hampered communications. Nevertheless, one local recorded that in

the decade from 1867 the amount of fish forwarded from the port had risen from less than 200 tons 'carted away' to 2,000 tons railed from the port.[34]

Meanwhile, Hull's more emotive problems continued to inhibit its fishing industry, though they did not stop its accession to the forefront of the industry. Nevertheless, despite the opening of the Albert Dock in 1869 railway facilities remained poor and fleeting retained its importance, and as late as 1880 the estimated difference between rail and water carriage was 1/6d per box.[35] A new fish dock was opened in 1883 which had been built to handle coal traffic that never materialized,[36] but the port remained congested and 'often ships had to wait for three or four tides before they could enter. To avoid this Hellyer's ran their fleets to London.'[37]

Elsewhere in Britain, though, railways assumed greater importance in the movement of fish, and Table Ten shows that the North British Railway was moving considerable quantities from Scottish ports by the mid-1860s.

Table 10

QUANTITIES OF FISH FORWARDED BY THE NORTH BRITISH RAILWAY

YEAR	QUANTITY (1,000s tons)
1862	12.3
1863	11.5
1864	15.1

Source: Company Returns, R.C.on Sea Fisheries (BPP, 1866, XVII) 698.

Subsequently, the annual report on Scottish fisheries for 1880 confirmed that rail traffic 'has increased rapidly',[38] and in a similar vein, returns for the amount of fish forwarded to Dublin by two major railway companies in Ireland - the Great

[34]Report on Sea Fisheries of England and Wales (1878-9) 338.
[35]Robinson, 1996, 72-3.
[36]Clark, 1957, 37.
[37]Cutting, 1955, 234.
[38]Annual Report of the Fishery Board (Scotland) for 1880, (BPP, 1881, XVII) 478.

Southern and Western, and the Midland Great Western - totalled 1,410 tons in 1858 and 1,764 tons the following year.[39]

Railways superimposed a new pattern of distribution upon that already in existence. As The Times pointed out in October 1841

> many persons...are in the habit of buying up large stocks of fish at Billingsgate daily, and of exporting them into the interior of the country, where they meet with a ready and advantageous sale. This expedient is greatly facilitated by means of railway conveyance, and vans may be seen in regular attendance at the Gate, waiting to take their supplies of fish, which are promptly despatched by the various trains to the more central towns and districts of England.[40]

The ramifications of better means of transport were particularly noticeable at a fishing station like Harwich where new technology eroded its importance. One of the chief reasons for its growth as a fishing station had been its close proximity to Billingsgate, but railways eradicated this advantage by enabling more efficient overland conveyance. Decline of the port's fishing interests can be seen in Table 11.

Table 11

QUANTITY OF FISH CARRIED BY THE GREAT EASTERN RAILWAY FROM HARWICH.

YEAR	QUANTITY (Tons)
1860	1,507
1861	1,830
1862	1,690
1863	2,071
1864	1,931
1869	2,011
1870	1,644
1871	1,741
1872	2,643
1879	1,290
1880	1,672
1881	1,041
1882	1,255
1883	1,091
1884	1,203

Sources: 1860-72 - Holdsworth, 1874, 234; 1879-84 - BPP Sea Fisheries Statistics.

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[39]Report of the Commissioners of Fisheries, Ireland for 1859 (BPP, 1860, XXXIV) 665.
[40]The Times, 15 October 1841, 5.

By the 1880s tonnages fell consistently short of what they had been twenty years earlier, though Billingsgate itself continued to prosper. One salesman speaking in the early 1860s claimed that the quantity of incoming fish there had doubled in the previous thirty years,[41] and the Clerk confirmed that supplies had increased since the introduction of railways, even though 'inland export' had declined[42] as an ever larger volume of traffic by-passed it and accessed inland markets directly.[43] The upshot was that although 'the supply of fish to Billingsgate is constantly increasing, it fails to keep pace with the demand'.[44] However, it remained an entrepot for fresh fish throughout much of southern England and huge quantities of cured products continued to be exported within Britain and abroad.[45]

By the late 1850s the volume of rail-borne supplies to Billingsgate roughly equalled that arriving by sea,[46] and an increased amount of rail traffic was inferred by the drastic reduction of four horse vans paying tolls at the market; the number dwindled from 3,155 in 1855 to 471 in 1859.[47] Nevertheless, by the 1880s more water-borne fish was conveyed to Billingsgate,[48] due largely to continued patronage by carriers from Hewett's fleet and Hull, and despite reports that by the mid-1860s railway rates had been lowered to such an extent that it was more profitable to bring fish ashore for forwarding to London.[49] The importance of water-borne traffic was accentuated by the restricted potential for landward expansion[50] and high railway rates,[51] as much as to its own efficacy. The number of vessels paying dues at the market fell from 653 in 1854 to 97 in 1893,[52] but this disregarded the number of

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[41]R.C.on Sea Fisheries (1866) Q.11,320.
[42]R.C.on Sea Fisheries (1866) Q.13,116.
[43]Northway, 1969, 137.
[44]R.C.on Sea Fisheries (1866) 589.
[45]R.C.on Sea Fisheries (1866) Q.13,115.
[46]Stern, 1971, 53 and 59.
[47]Mullender, 1964, 22.
[48]Report on Sea Fisheries of England and Wales (1878-9) 437.
[49]R.C.on Sea Fisheries (1866) Q.7,852.
[50]The Times, 8 April 1840, 7; Holdsworth, 1874, 20; Aflalo, 1904, 124.
[51]Walpole, 1883(i), 11.
[52]Mullender, 1964, 22.

landings and the fact that vessels were much bigger. The issue was not clear cut, as Table 12 shows, for the proportion of water-borne fish landed remained comparatively steady to the end of the century, albeit within an increasing total.

Table 12

QUANTITY OF FISH DELIVERED AT OR NEAR BILLINGSGATE MARKET BY RAIL AND SEA

	PERCENTAGE BY		
YEAR	RAIL	SEA	TOTAL (TONS)
1895	77.0	23.0	143,889
1896	77.4	22.6	173,692
1897	75.2	24.8	178,768
1898	74.3	25.7	182,567
1899	71.9	28.1	179,983
1900	79.7	20.3	187,684
1901	80.1	19.9	196,190

Source: Monthly returns of the Fishmongers' Company, Sea Fisheries Statistics and Memoranda.

Despite Billingsgate's lack of rail facilities their importance was demonstrated by the failure of a second fish market in London, the Columbia at Bethnal Green opened in 1869, but closed in 1874[53] largely because it possessed 'no direct railway communication with the centres of supply'.[54] The 'short lived' Shadwell fish market[55] was opened by Hewett's at Stepney in opposition to - and defiance of - Billingsgate. Among its 'modern' facilities was accommodation for hundreds of horse-drawn vehicles, but these amenities could not offset the damage done by merchants who bought fish there and then sold it at a profit in Billingsgate.[56] Its conception had been based on the assumption that London would maintain its importance in the fish trade, but it had not been appreciated that although railways brought in more fish traffic they also enabled other centres to obtain supplies direct from ports.[57] Buyers from cities like Manchester and Birmingham were going to

[53]Weinrub and Hibbert, 1995, 196. The market was designed to 'wean' costermongers from the streets. It was not solely a fish market, and was re-opened briefly in 1884.
[54]The Times, 20 May 1872, 13.
[55]Weinrub and Hibbert, 1995, 802.
[56]Cutting, 1955, 230-1.
[57]Stern, 1971, 59.

Hull and Grimsby.[58] By the 1860s a Staithes fish buyer who had sent his fish to London, but did not always get the best prices because he was unable to send large quantities to more remunerative areas, despatched an increasing amount into Yorkshire.[59] Changes also took place in the type of fish sent to market, and by the late 1870s the town clerk at Tynemouth included 'offal' species like plaice and haddock that were sent away to Manchester and Glasgow, among the most lucrative sectors of the town's fish trade.[60]

The blinkered approach of railway companies had largely changed by the 1860s and they increased investment away from the established fish trade, and not just at the main trawling stations. Inauguration of the Great Western line to Penzance in 1859 led to a rapid increase in the number of fishing boats, especially trawlers, using the port. Mackerel made up a large proportion of landings, but trawlers were attracted by the fact that they could, like the 'mackerel men', arrange a special train for catches of 20 tons or more if they missed the afternoon departure.[61] Throughout the nineteenth century the rate of progress in fish traffic, nationally, maintained much of the impetus apparent in the performance of the Manchester, Sheffield and Lincolnshire company at Grimsby. An important factor in this was the employment of ice as a preservative, without which railways 'would have lost half their utility'; hitherto its use had been constrained because it was so heavy.[62] Fish traffic had increased hugely by the late 1870s, and subsequent progress can be seen in Table 13, compiled from annual returns made to the Board of Trade by all railway companies. The figures included packing and ice which impaired their accuracy, but the objective here is the identification of trends rather than exact quantification.

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[58]R.C.on Sea Fisheries (1866) QQ.12,567-74.
[59]R.C.on Sea Fisheries (1866) QQ.5,545-51.
[60]Report on Sea Fisheries of England and Wales (1878-9) 371.
[61]Report on Sea Fisheries of England and Wales (1878-9) 302-3.
[62]Walpole, 1883(ii), 50-1.

Table 13

QUANTITY OF FISH CONVEYED BY RAILWAY THROUGHOUT THE UNITED KINGDOM

YEAR	QUANTITY (1,000s TONS)
1878	216.3
1879	251.4
1880	266.1
1881	275.0
1882	278.7
1883	299.5
1884	339.7
1885	334.9
1886	347.9
1887	359.4
1888	356.2
1889	387.1
1890	385.2
1891	396.7
1892	426.3
1893	439.8
1894	443.2
1895	446.7
1896	476.4
1897	472.7
1898	491.6
1899	492.5
1900	516.6
1901	543.7
1902	621.4
1903	623.9
1904	656.3
1905	633.8
1906	674.1
1907	717.7
1908	722.7
1909	744.3
1910	745.4
1911	750.0
1912	745.9*
1913	731.0*
1914	704.3*

*Not including Ireland.

Sources: Statistical Tables; Annual Reports for England and Wales

Nationally, it can be seen that railways facilitated the movement of escalating quantities of fish. Improved elasticity of supply and market penetration was illustrated by the fact that in the early 1890s, for instance, one cargo deemed not good enough for Aberdeen was diverted to Grimsby where it fetched £200.[63]

[63]S.C.on Sea Fisheries, (1893-4) Q.3,276.

Following this in the early twentieth century, Bournemouth was buying 90 per cent of its daily supply of fresh fish from the Humber or Billingsgate and only a tenth from Devon, which was only a third of the distance away.[64] Such examples masked differences in the diffusion of technology that became apparent when returns were broken down according to ports, as they were for 25 years. Table 14 illustrates the progress made at three fishing stations at the forefront of the modern industry.

Table 14

QUANTITY OF FISH CONVEYED BY RAIL FROM THE FOLLOWING PORTS

	(1,000s tons)		
YEAR	GRIMSBY	HULL	ABERDEEN
1878	44.8	26.9	-
1879	48.9	26.1	2.0
1880	42.7	20.6	2.0
1881	49.6	22.1	1.9
1882	52.3	20.7	2.7
1883	55.7	18.0	4.4
1884	64.1	19.6	5.1
1885	66.8	22.1	6.7
1886	68.2	19.3	7.8
1887	65.4	18.0	8.9
1888	67.5	18.9	10.1
1889	64.6	22.4	13.2
1890	66.4	39.0	14.6
1891	69.6	48.8	15.3
1892	74.1	52.6	17.7
1893	75.5	54.0	20.4
1894	83.0	57.1	20.2
1895	85.4	58.5	23.1
1896	92.6	64.6	28.9
1897	89.0	63.7	31.9
1898	94.6	73.7	35.6
1899	103.8	72.4	36.8
1900	119.2	63.3	43.4
1901	114.2	67.8	55.4
1902	147.7	91.0	59.8

Source: Statistical Tables for Sea Fisheries

The combined traffic of the two companies that operated from Grimsby in 1864 (see Table Nine) had multiplied fourfold by 1878, a number that was to increase by almost 2.5 times by 1902, which proved to be something of a bumper year for the herring fishery,[65] which does much to explain the huge increase on the previous

[64]Aflalo, 1904, 89.
[65]Sea Fisheries Statistics.

year's figures. About this time the Great Central Railway - as the Manchester, Sheffield and Lincolnshire had become - was forwarding daily between 200 and 300 wagons loaded with 800 tons of fish or more.[66] The figures for Hull were less impressive, that for the North Eastern in 1864 had risen by only 3,400 tons, which did not include the amount of fish still carried directly to London. However, the subsequent rise to 91,000 tons by 1902 indicated growing reliance on its rail link. The quantity of traffic from Aberdeen had much to do with the rise of trawling and showed that growth was not restricted to the Humber. The statistics cited in Table Ten included much cured fish, and it was not a coincidence that traffic increased drastically with the advent of steam operations.

Not all ports benefitted so spectacularly from rail links, as Table 15 indicates.

[66]Aflalo, 1904, 85.

Table 15

QUANTITY OF FISH CONVEYED BY RAIL FROM SELECTED PORTS

	QUANTITY (1,000s tons)		
YEAR	BRIXHAM	RAMSGATE	LOWESTOFT
1878	-	-	15.5
1879	2.0	2.7	17.9
1880	2.0	2.6	20.2
1881	2.3	2.6	23.0
1882	2.3	2.2	19.1
1883	1.8	2.3	22.9
1884	1.9	2.8	27.8
1885	1.8	2.6	24.8
1886	1.9	2.1	28.5
1887	2.0	2.6	26.9
1888	2.5	1.7	24.8
1889	2.5	2.0	30.2
1890	2.5	1.8	23.1
1891	2.5	1.9	24.8
1892	3.2	2.3	30.1
1893	2.7	2.3	29.9
1894	3.4	3.0	29.2
1895	3.5	2.6	29.5
1896	3.2	2.5	27.0
1897	3.4	2.8	36.2
1898	3.4	2.2	30.0
1899	3.5	1.5	31.2
1900	3.6	2.0	37.3
1901	2.8	2.0	38.0
1902	2.5	2.0	40.5

Source: Statistical Tables for Sea Fisheries

There was no marked increase at Brixham or Ramsgate over this period. Both were situated away from the main North Sea trawling grounds and production relied on smacks, which might indicate a reluctance to adopt new methods. This was not the case at Lowestoft where smack operations persisted in deference to trends in their deployment at 'new' fishing stations. Increased use of railways was due to the existence of a fish market that had been updated by the Great Eastern Railway Company in the 1860s;[67] the fact that a large proportion of its business emanated from the herring industry being irrelevant in the present context. Railway technology facilitated the movement of fish away from the port of landing, so the expansion of smaller fishing stations was stunted by lack of a railhead, though to judge a port's prosperity solely in terms of rail traffic was unwise. At Plymouth, for

[67]Aflalo, 1904, 257; Pyper, 1903, 28.

instance, only 70 per cent of fish landed was so transported in 1901 because of a large local market, while the corresponding figure for Brixham was 99 per cent.[68]

Railways enabled the fish trade to overcome constraints that had been in place for centuries, but they were not universally beneficial to the supply of fish.

> It is a remarkable circumstance arising from the network of railways that now intersects the kingdom that fish is nearly as dear in the towns on the Tyne and Wear as in Birmingham and other inland towns situated a considerable distance from the sea; the fact being that those latter towns are connected by railways with fishing communities employed in the deep sea fishing; whereas Sunderland, Shields, Newcastle, and the other towns in the county of Durham and Northumberland depend for their supplies principally upon the fishing villages on the coast, whose inhabitants, with scarcely an exception, fish only some 10 or 15 miles from the coast in small cobles, and who also, in rough and stormy weather, when the winds blow from the north and east, are unable for weeks to pursue their vocation, and idle and starve on the shore.
>
> The Times, April 1857.[69]

Railways created and sustained markets which required an infrastructure that could cope with much greater demand. However, those outside it, which included areas around fishing ports that had hitherto been well provided with fish, were marginalized.[70] A Hartlepool fisherman questioned in 1863 stated that whereas he used to live 'almost entirely' on cheap fish it was now very expensive and hard to get.[71] Many regions continued to depend on hawkers, for example, much of Brixham's fish was still taken around the neighbourhood and to markets like Totnes.[72] Similarly, in north east England before the spread of new outlets in the 1890s, 'much of the old system of fish retailing - street trading and retail fish markets - continued to survive'.[73] Large fishing boats were needed to work North Sea banks, so members of smaller fishing communities pooled their resources to acquire such vessels in order to supply local markets. Among these were the

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[68]Porter, 1994, 248.
[69]The Times, 22 April 1857, 12.
[70]Holdsworth, 1874, 15.
[71]R.C.on Sea Fisheries (1866) QQ.4,374-5.
[72]R.C.on Sea Fisheries (1866) QQ.8,275-8.
[73]Muirhead, 1992, 397.

Northumberland and Durham Deep Sea Fishing[74] and the North Eastern Deep Sea Fishing[75] companies, both of which had been founded in April 1857 and wound up by 1860, the financial costs involved having proved too high. The phenomenon persisted well into the twentieth century when Fleetwood, despite its national importance, still had 'no regular market', fish being immediately 'consigned inland...[leaving] very little' for local sale.[76]

Railways were not a cure for all the ills of the fishing industry. Theoretically, the cheaper transport costs became the lower the price of the product and the easier it was to market. However, the fish trade harboured severe grievances concerning the freight rates imposed by railway companies, but such opportunism was to be expected when supplies were increasing along with demand. A Hull merchant declared that price was 'ruled entirely by the supply',[77] and though his comment is not totally accurate it is more so than Aflalo's assertion that 'carrying companies can hardly be held responsible for the relations between supply and demand'.[78] This idea was disproved by the fact that railways companies fixed prices at levels that inhibited fish traffic. Technologically, railways were a crucial liberating factor but, economically, their use was conditioned by the cost of their services. The Secretary of the Fish Dealers' Association in Birmingham complained in the late-1870s that freight rates were limiting the region's trade. Demand was such that all fish brought to the city was sold, but excessive transport costs deterred many would-be suppliers from outlying districts that, as a consequence, were supplied direct from the ports or not at all. He laid the blame for deficient supplies squarely with the railway companies. 'The whole question is one of freight not of fishing'.[79] In the 1880s it was written that 'fish would never come within the reach of the poor of London

[74]PRO, BT41/518/2,842 and BT31/263/874.
[75]PRO, BT41/508/2,790.
[76]Report into Collecting Fishery Statistics (1902) Q.1623.
[77]R.C.on Sea Fisheries (1866) Q.7,106.
[78]Aflalo, 1904, 110.
[79]Report on Sea Fisheries of England and Wales (1878-9) 437

while it had to be conveyed by railway'.[80] Further vindication came with the assertion that

> railways carry coal from Yorkshire to London for about as many pence as they charge shillings for carrying fish from Grimsby to London...[and] that they carry one ton of Scotch meat from Glasgow to London for £5, and that they carry a ton of fish from Glasgow to London for a sum which is somewhere between £6 10s. and £7. But this contrast...does not represent the whole truth. The railways, in the case of meat undertake to collect the meat in Glasgow free of charge, and to deliver it free of charge in the markets in London: but in the case of fish the rate only includes the actual charge from station to station.[81]

Charles Hellyer reported that a large proportion of fish was landed at Hull and sent to London in the 1880s. Formerly, carriers had alternated between the two ports, but they were soon all going to the Thames, not only because prices were better there, but the rates charged by railway companies were eating too far into profits.[82] Also around this time fishing boat owners complained that extortionate railway rates had put smack fleets out of business and were inhibiting the 'supply of fish in the London market'.[83] Smaller owners and operators were finding it increasingly hard to earn a living as the industry became geared to larger-scale operations, and railway companies were contributing to this state of affairs.

The formulation of a Bill for Railway (Carriage of Common Kinds of Fish) Rates and Charges presented in 1888 should have been of some help. It was designed to fix a single uniform scale of charges that would be applicable to all Railway Companies and main species of fish. It recognized that

> existing rates and charges for the conveyance of common kinds of fish are found to be oppressive, and tend to retard the development of the sea fishing industry of the United Kingdom and to restrict the distribution and consumption of common descriptions of sea fish.[84]

However, it did not resolve the problem. The controversy resurfaced in the 1890s with remonstrations from the Scottish herring industry.[85] It was pointed out that by

[80]'Practical Fishermen's Congress: Railway Rates', 1883, 65.
[81]Walpole, 1883(i), 8.
[82]Hellyer, 1915, 49.
[83]'Practical Fishermen's Congress: Railway Rates', 1883, 65.
[84]Bill for Railway (Carriage of Common Kinds of Fish) Rates and Charges (BPP, 1888, VI) 447.
[85]S.C.on Sea Fisheries, (1893-4) QQ.7,128-9; 7,414-24.

levying rates which made it cheaper to convey fish from Fraserburgh to Australia rather than to Glasgow, the railway companies were securing only three per cent of the port's catch and inhibiting their own financial performances.[86] The Collector at Cardiff, where attempts were made to establish a fishing industry in 1893, warned that increased railway rates were having an adverse effect and 'will seriously interfere with fishing in the future'.[87] The following year he restated the case:

> Much more fish would be landed at Cardiff but for the railway rates, which are higher than from other ports farther from the principal markets.[88]

But still the problem persisted, and little had changed ten years later, with 'not more than 3 per cent of herring landed at Wick or Fraserburgh ever reach[ing] London shops.'[89] Such economic mitigation of technological progress was further exemplified by testimony forthcoming in 1908. A glut of herring at Yarmouth had not been averted because high carriage costs made merchants reluctant to transport them away so that the quantity that was eventually sent 'fresh' to London was 'to a great extent wasted.'[90] Later still came a protest at the rates levied for the carriage of cod to London from the north-west of Scotland. Citing a 'not exceptional' case it was shown that shipments on the London and North Western Railway were costed at over a third more than the value of the fish.[91] Such pricing proved fatal to many small-scale fishing enterprises.

ii PORT INFRASTRUCTURE

Railways were the fundamental catalyst for change in the fishing industry despite their negative aspects. By the mid 1890s fish was 'being delivered in the best condition at the industrial centres' because it was being transported speedily by

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[86]S.C.on Sea Fisheries, (1893-4) QQ.5,858; 5,903-8.
[87]Seventh Annual Report on England and Wales (BPP, 1893-4, XVIII) 245.
[88]Eighth Annual Report on England and Wales (BPP, 1894, XXII) 243.
[89]Aflalo, 1904, 111.
[90]Report of the Committee into Statistics (1908) Q.8,751.
[91]The Times, 10 April 1911, 19.

train.[92] Improved distribution led to increased production which meant larger scale operations, so the infrastructure of the fishing industry had to be adjusted so it could cope economically and physically with greater quantities. This was particularly apparent at ports, the 'points of transference' between landward and seaward operations where the 'catching, selling, processing and distribution' of fish was organized. The stimulus of railways enhanced the importance of economies of scale, and thereby created 'an urgent demand for deep-water harbours, so that boats may get in at any time of tide to deliver their catch',[93] and led to 'the construction of Harbours...[and]...the establishment of Telegraphic communications'.[94] The modern industry devolved to bigger ports that could provide

> the large quantities of consumable stores, such as coal, oil and ice...[and]...good harbours [that were] accessible at all states of the tide, and [were] provided with ample quay space, railway sidings, dry docks or patent slips for repairs.[95]

Such installations required considerable investment, and again the prime example was Grimsby where the commitment of railway interests ensured its growth from virtually nothing. Changes in the economic structure of the fishing industry were inevitably manifested in its physical configuration. The centripetal dispersal of resources reflected the gathering of capital among fewer and larger concerns to the cost of individuals, particularly in the distant water sector.

Increased landings did not necessitate 'new methods of marketing and distribution',[96] rather the 'new methods' of 'marketing and distribution' required 'increased landings'. Fishing stations became larger and fewer,[97] with over 87 per cent of 5,686 Certificates of Service granted to skippers and mates of fishing boats at only 11 ports in England and Wales in 1883 and 1884.[98] Then, by 1903 more

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[92]Annual Report for Scotland (1896) 4.
[93]Report of the Commissioners for British Fisheries for 1858 (BPP, 1859(II) XIV) 9.
[94]Annual Report on the British Fisheries (1867) 6.
[95]Jenkins, 1920, 14; and see S.C.on Sea Fisheries, (1893-4) QQ.3,163-8.
[96]March, 1953, 44.
[97]Fifth Annual Report on England and Wales for 1890 (BPP, 1890-1, XX) 127.
[98]PRO, BT130.

than 70 per cent of demersal fish landings in England and Wales were made at Grimsby, Hull, North Shields, Fleetwood, Milford Haven and Lowestoft - the proportion for the Humber ports alone being 58 per cent.[99] This trend had also been in evidence in Scotland, with centripetal movement of the white fishery to Aberdeen especially, where, when Certificates of Service were implemented north of the border in 1907, nearly two-thirds were issued at the port.[100]

By 1914 such things as steam cranes to heave fish from hold to quay,[101] docks, fish markets, railways, coaling hoists and ice manufacture were prerequisites of a modern fishing station.[102] Hull was handling about 150,000 tons of fish *per annum* by the outbreak of war and possessed electric and hydraulic steam cranes, 13 'jiggers' capable of lifting from 1.5 to 100 tons and seven coal hoists. The quays were adorned with an array of warehouses, sheds, cellars and cold stores.[103] It was impossible for a small port to accede to such operations; its physical properties were geared to a different industry and no amount of investment or application of technology could alter the fact.

Nevertheless, for a while 'ancient ports were revitalized to meet the ever-growing demand'.[104] However, poorer facilities attracted fewer buyers, which meant, among other things, that smaller ports could not benefit from the auction system, which lowered their prices further while it boosted those at larger ports.[105] Fishing had been established at a vast number of small landing bases because of the restricted range of fishing boats, and earlier technology had imposed constraints that rendered it necessary to cure the bulk of fish. Therefore a port system had evolved to deal with smaller quantities with a less urgent requirement for swift transportation,

[99]Coull, 1972, 160.
[100]PRO, BT130.
[101]Cutting, 1955, 222.
[102]Ashford, 1915, 85.
[103]'Hull & Barnsley Railway', 1915, 123.
[104]Fraser, 1981, 29.
[105]Coull, 1972, 153-4.

which was patently unsuited to the evolving market. Logistically, smaller ports could not cope with the throughput and economically they could not afford the sophisticated facilities essential to service the industry.

The growth of the Humber ports has already been recounted[106] and such was their rise that other fishing stations were often seen as 'branches'.[107] However, though undoubtedly the largest, they were by no means the sole beneficiaries of development in the sea fisheries. Like Grimsby, Aberdeen emerged from next to nothing, and even more speedily, to become the third largest fishing station in Britain. Landings were encouraged by good harbour and rail facilities, but in the early 1880s the first steam trawlers at the port had to land catches at a small wooden jetty where fish were laid out amidst 'dust or mud'. This state of affairs prompted examination of better facilities, and eventually a modern installation was constructed that combined the virtues of Shadwell and Lowestoft.[108] Steam was also instrumental in the rise of Tynemouth where, in response to 900 tons of fish landed by tug-trawlers from November 1877 to July 1878, 'the corporation' spent £26,000 promoting the trade, including construction of a special quay, while it was also 'anxious to obtain railway communication'.[109] Similar developments prompted the Wear Commissioners to make 'considerable' improvements to their own fish market.[110]

On the west coast the rise of Milford Haven as a fishing station resembled that of Grimsby in that both had been reliant on railway money. Plans for a new fishing port in South Wales dated back to the 1860s when operations commenced at Aberdovey 'in connection with the Cambrian Railway', though they came to

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106See pp.51-5.
107S.C. of the House of Lords (1904) QQ.1,412-3.
108Pyper, 1903, 23-4.
109Report on Sea Fisheries of England and Wales (1878-9) 371.
110Report on Relations between Owners, Masters and Crews (1882) 852.

nothing largely because of the railway panic of 1864.[111] However, the Haven was an excellent harbour, but when Milford docks opened in September 1888, there were no facilities for handling fish, but 12 trawlers and a number of merchants were established there by 1889, and its development was rapid.[112] No sea fishing had taken place there, except for some lobster and crab fishing at nearby Neyland, but remunerative workings took place off the Irish coast and landings were made by 'visiting' vessels in South Wales.[113] For instance, a dozen steam carriers landed mackerel at Milford by the mid 1890s,[114] and rail access to London and Midland markets facilitated the forwarding of almost 9,500 tons of fish. In 1892 the Great Western Railway was approached successfully to increase investment in the port,[115] and the figure had risen to nearly 30,000 twelve years later,[116] making Milford the fifth largest fishing port in terms of the quantity of fish forwarded by rail. The railway company's commitment was further illustrated in 1903 when, partly in response to landings of mackerel and herring from Ireland, business that had been carried on for some years,[117] it provided a special quay and carrier.[118]

Despite similarities in the physical and economic improvements bestowed on Grimsby and Milford by railway companies the two were intrinsically different. Whereas Grimsby possessed a large native fleet, that at Milford relied considerably on landings by vessels from other ports. In 1903 the resident fleet totalled 9,796 tons while visiting vessels amounted to over 18,000 tons.[119] Many - notably from Hull - voyaged to southerly waters, while a large proportion of smacks from Devon

111Matheson, 1929, 35.
112Matheson, 1929, 74.
113Annual Report for England and Wales (1888) 205.
114Seventh Annual Report on England and Wales (BPP, 1893-4, XVIII) 247.
115Annual Report for England and Wales (1893-4) 291.
116Sea Fisheries Statistics.
117Annual Report for England and Wales (1900) 287.
118Aflalo, 1904, 85.
119Aflalo, 1904, 341.

operated in nearer waters.[120] Swansea and Cardiff also had some success with distant water fishing around the turn of the century.[121] In 1902 the Harbour Trustees at Swansea opened a new fish market costing nearly £20,000, and initial users included 15 steamers belonging to that port and Milford,[122] while steam trawling at Cardiff, 'synonymous with...Neale and West', had been present in some form since the early 1880s.[123] However, Milford remained the region's premier fishing station, and its fortunes contrasted with smaller ports along the South Wales coast like Tenby, that lost out in the face of increased capitalization.[124]

Fleetwood, further north on the west coast did not benefit from the patronage of a railway company, despite attempts by the Preston and Wyre Company to arouse interest in the fisheries there in the 1840s.[125] Only in 1857 were regular fish sales organised, and in that year the Lancashire and Yorkshire Railway Company made special provision for fishermen and buyers, with a 'Fish-shed built on the riverside quay and fish-trucks attached to trains serving inland towns.' However, when the dock was opened in 1877 it was not available to fish traffic.[126] Nevertheless, from 2,177 tons of fish forwarded by rail in 1880, 8,352 were railed away in 1902,[127] and growth was furthered by the eventual opening of the dock to fish in 1905, as general cargo declined, and the beginning of fish auctions the following year. Construction of a fish dock, market and ice company in 1908 testified to its suitability to modern operations.[128]

120Annual Report for England and Wales (1890) 124; Annual Report for England and Wales (1890-1) 135; Annual Report for England and Wales (1894) 122; Committee on Statistical and Scientific Investigations (1908) QQ.5,406-7.
121Matheson, 1929, 74.
122The Times, 4 February 1902, 2.
123Matheson, 1929, 74.
124Aflalo, 1904, 340.
125Aflalo, 1904, 347-8.
126Horsley and Hirst, 191, 114.
127Sea Fisheries Statistics.
128Horsley and Hirst, 1991, 114-5.

Obviously, ports constructed to meet the demands of contemporary distant-water operations prospered, but previously established fishing stations did not necessarily fail in terms of the modern industry. The progressive attitude of the port authorities and the Great Eastern Railway at Lowestoft meant that because of its modern fish market and associated facilities, the nature of its floating capital was not the liability some commentators took it to be. Similarly, Brixham's commitment to smacks did not stop the formulation of arrangements with the London and South Western Railway for the good of its trawlers working from Padstow.[129] However, Scarborough's fishing industry fared less well. Its topography resembled Brixham's in that good harbour facilities combined with unfavourable landward features to stifle expansion. The railway could not be extended to the harbour so fish had to be carted through the town, which produced friction with non-fishing interests.[130] The departure of bigger craft to the Humber ports meant that large-scale operations never became established, and the port's fishing industry was not equal to the upheaval involved in serving a mass rather than a limited market, which involved moving upwards a gear rather than expanding an established infrastructure. The situation at Brighton was similar, though here the problems were due to poor harbour facilities rather than landward restrictions. The railway could convey fish from the town but it could not be landed from the sea. The improved navigational abilities of fishing boats made it easier to negotiate shallow harbours like Ramsgate,[131] but this was completely offset by their size, a phenomenon graphically illustrated by the advent of steam drifters at the turn of the century. Although not as big as trawlers, they were large enough to render useless numerous small herring ports dotted around the coast. Typical was the experience of Lossiemouth, a sizeable port on the east coast of Scotland that was large enough for the construction of steam drifters but not their operation.[132]

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[129]Annual Report for England and Wales (1900) 287.
[130]Dade, 1933, 185.
[131]Aflalo, 1904, 273.
[132]Report of the Committee into Statistics (1908) QQ.1,725-31.

Many erstwhile fishing stations were not suitable for the modern distant water sector either in terms of landward or seaward facilities. Reference has been made to a fish buyer at Staithes, who began shifting increasing amounts by rail to destinations other than London. Although making use of modern technology, he lamented the 12-mile trip to the nearest railhead,[133] so despite lower carriage costs and larger supplies he could not always take full advantage of better price levels.[134] Small places were less reliable[135] and felt

> more and more the want of facilities for getting their fish to market...there is an increasing tendency for the boats to take their catches direct to the large centres.[136]

Whitby had been a considerable fishing port, but in 1886 the Whitby Gazette complained that Grimsby vessels predominated locally but did not land there because of 'inadequate harbour accommodation.'[137] The local Collector charted the problem around the turn of the century, the herring fishing suffering for lack of a tug to help smacks negotiate the harbour entrance,[138] and when one was eventually hired it proved inadequate as its physical condition had deteriorated.[139] To the south, Flamborough was much smaller and the reports of its Collector over the ten years or so from 1889 showed that although the local fisheries seemed to be flourishing there was concern about the lack of facilities. The 'general condition of the station is good' though boats were deterred from landing for want of 'harbour accommodation'. This and 'insufficient railway accommodation' deflated prices and vain efforts to rectify the situation included a scheme to build a light railway. Flamborough was ideal for cobles but not large trawlers, which was reflected by the fact that in 1898 it enjoyed more prosperity than for 'some years', though it could

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133R.C.on Sea Fisheries (1866) Q.5,319.
134Robinson, 1996, 29.
135R.C.on Sea Fisheries (1866) Q.5,548.
136Annual Report for England and Wales (1897) 110-1.
137Jones, 1982, 316.
138Annual Report for England and Wales (1898) 223; Annual Report for England and Wales (1899) 134; Annual Report for England and Wales (1901) 219.
139Annual Report for England and Wales (1903) 115.

never hope to compete with the major fishing stations.[140] A trawler owner described investment in small places as money thrown away,[141] and argued that unless they could accommodate vessels and possessed a market there was no point in landing fish there[142] because a better sale could be had at larger ports.[143] The upshot of improved technology in the distant water fisheries was that while smaller ports suffered the industry went from strength to strength.

Fresh fish had formerly been despatched to predetermined destinations and curing had taken place locally. However, by the second half of the nineteenth century effective distribution of large quantities of fresh fish required the most remunerative market to be identified before a consignment was forwarded from the port in order to facilitate the shortest possible transit time. Even before the widespread use of railways the need to shift greater quantities meant that the system of basing marketing decisions on letters received daily from markets[144] was becoming progressively inadequate. Thus conditions were ripe for the use of the electric telegraph. The first public line was introduced in 1843 and its development was strongly backed by railway companies to whom operation was initially confined. Largely due to their funding, from 1855 to 1868 the average annual increase in the number of messages sent was more than 16.3 per cent.[145] In the fish trade it enabled speedier communications between inland buyers and quayside salesmen, which enhanced the elasticity of supply and subjected the trade increasingly to market forces rather than tying it to regular orders.

> By means of a telegram or two, the best markets...can readily be discovered, and the fish are forthwith sent off wherever they are likely to bring the best price. If two guineas can be had for a cod-fish in Manchester

[140]Annual Report for England and Wales (1890) 145; Annual Report for England and Wales (1893-4) 199; Annual Report for England and Wales (1894) 195; Annual Report for England and Wales (1896) 235; Annual Report for England and Wales (1897) 225; Annual Report for England and Wales (1899) 241.

[141]S.C. on Sea Fisheries (1893-4) Q.6,519.

[142]S.C. on Sea Fisheries (1893-4) Q.6,490.

[143]S.C. on Sea Fisheries (1893-4) Q.6,621

[144]R.C.on Sea Fisheries (1866) Q.5,786.

[145]Encyclopaedia Britannica XXVI, 1910-11, 525.

> and Bradford only offers 30s., Manchester will assuredly obtain that fish.[146]

The cured fish sector also benefitted from this example of modern technology, until by 1882 it was written that 'only by the increase of telegraph stations' could supplies of salt and barrels be moved to places where the herring fleet were going to land.[147] A decade later their importance in facilitating communication 'from outlying districts to centres of population' was stressed together with a recommendation that the Post Office undertook the extension of the telegraph system on improved terms.[148] Introduction of the telegraph contributed to growing pains that resulted in frequent imbalances like that at Boston in Lincolnshire, where expansion had taken place to accommodate steam trawlers from the Humber in the last two decades of the nineteenth century. Thereafter, however, only two salesmen were based there, despite its 'spacious' market, as the pull of Hull and Grimsby proved increasingly detrimental to its long-term future.[149]

Greatly improved distribution reduced price differences that had existed between towns inland, where supplies had been infrequent and expensive, and those formerly better served near the coast. However, it did not reduce the number of intermediate stages in getting fish from the port to the consumer. Fish were

> sold on the coast by a salesman; they are packed in the railway vans; in hot weather they are packed in ice; the railway freight from the ports to London has to be paid; the carriage from the railway terminus to Thames Street has to be charged; the porterage from the van to the market has to be added; market dues at Billingsgate raise the price still further; the salesman at Billingsgate necessarily expects his own profit; and, lastly, the retailer has to charge his own expenses in driving to the market to buy his fish, the rent of his shop, and the cost of distributing the fish to the consumer. In addition to all these expenses, a certain loss must be experienced in dealing with a perishable item like fish in hot weather.[150]

146The Times, 13 March 1876, 6.
147First Annual Report on the Fisheries of Scotland for 1882 (BPP, 1883, XVIII) 754.
148S.C.on Sea Fisheries, (1893-4) 22-3.
149Report on Collecting Fishery Statistics (1902) QQ.1,530-3.
150Walpole, 1883(ii), 56.

The procedure for placing fish before the consumer had never been simple and with increased technology it grew less so. Despite development of a suitable infrastructure the fish trade remained susceptible to 'excessive rates for the conveyance of fish to inland markets',[151] as has been shown. It had to be able to withstand stringent demands from an increasingly capital-intensive industry - and fundamental was the demand for fish from the consumer. It was fruitless for the sale of fish to be 'organised into a regular trade'[152] unless the potential demand referred to in Chapter One could be realized.

iii ACTUAL DEMAND

To this end it was essential to align the point-of-sale marketing of fish products with demand from consumers. In the 1830s Dickens had referred to a London 'fried fish warehouse' in Oliver Twist and Henry Mayhew wrote of the trade employing an estimated 300 people in 1861,[153] while the presence of outlets in towns like Portsmouth and Coventry[154] showed that they were not peculiar to London. This is borne out further by the figures in Table 16 which indicates growth of the fish trade in a major provincial city by 1871.

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151 Annual Report on the Fisheries of Scotland (1896) 11.
152 Holdsworth, 1874, 15.
153 Cutting, 1955, 240.
154 Walton, 1992, 26.

Table 16

NUMBER OF FISHMONGERS' RETAIL OUTLETS IN MANCHESTER AND SALFORD

Year	Outlets	Number located in markets
1788a	1	1
1800a	2	2
1811a	3	3
1821b	5	5
1831b	11	11
1841a	25	13
1850a	47	16
1861a	80	17
1871a	126	17

a = Directory entries
b = Rate book entries

Sources: Manchester rate books and directories, Scola Feeding the Victorian City, 197.

Here, the effects of rising demand within a growing industrial economy due to an expanding railway network[155] are discernible and the growth of fish retailing in Manchester by the 1870s is clear.

The availability of fish in towns where hitherto it had been unobtainable was all to the good from the merchants' point of view, not least because it did not lead to any great reduction of prices. Advances had been particularly evident at Hull by the middle of the nineteenth century; a total of 42 fishmongers and six wholesalers signified considerable growth over the 23 firms of the former recorded for 1838.[156] In the 1840s fish traffic from Yorkshire ports was conveyed extensively inland within the county and to Lancashire until, by 1863 progress of fishing operations meant that products forwarded to London ranged far beyond the high-quality salmon that had been the only species sent there before 1854.[157] Once the need to create new business had become apparent, railway companies had not been slow to grasp the necessity of building up markets. Many fish merchants were offered free

[155]Report on Relations between Owners, Masters and Crews (1882) 671.
[156]Bellamy, 1965, 248.
[157]Robinson, 1986, 41.

passes,[158] one Hull man recalling 17 years of travel at the expense of the North Eastern Railway from the mid-1840s. As a result in towns that formerly had no retail outlet, save the occasional chance visit by a hawker, 'there are now four, six, or seven fishmongers...all of them getting a living.'[159] Such establishments were frequently run by people previously unconnected with the fish trade, as in North-East England, where very few outlets were founded by experienced fishmongers.[160] Ten years later Holdsworth asserted that thousands of tons of plaice and haddock found a 'ready market' in industrial areas where shortly before they had been 'unheard of'.[161]

Fish had to be rendered more attractive if latent demand was to be realized. This meant acquainting people with new products and reversing deep-seated prejudices that stemmed from widespread doubts about certain aspects of retailing and numerous preconceptions about the nutritional value of fish.[162] In May 1884 a London fish merchant said that fish sales had been helped by

> the showing of it in these exhibitions, the cooking of it, and the people being able to see it properly cooked, the result of which is people who never ate these common types of fish before now eat them. Well, we will see tradespeople instead of going for soles and salmon now go for plaice and haddock and cat fish, fish that usually 30 years ago used to be put on the land and sold for manure.[163]

Such events as the International Fisheries Exhibition were significant but, economically, fish had a great asset. It invariably remained cheaper than butcher's meat, thereby giving it a major cost advantage that promoted its value as a form of nutrition for the poorer classes in manufacturing districts.[164]

158Robinson, 1989(ii), 87.
159R.C.on Sea Fisheries (1866) QQ.7,103-4.
160Muirhead, 1992, 418.
161Holdsworth, 1874, 13.
162Scola, 1992, 149; Fraser, 1981, 29.
163R.C.on Trawling (1884-5) Q.11,320.
164R.C.on Trawling (1884-5) QQ.10,823-4; Coull, 1996, 139.

Increased trawling activity broadened the range of species being landed and widened the range of available products. Fish merchants had been concerned chiefly with prime species like sole and turbot but species such as plaice and haddock were being marketed by the middle of the century. By 1883 the total annual catch at Hull alone was about 40,000 tons of all species worth around £500,000, the 'principal part' of which was plaice and haddock.[165] These species had formerly been termed 'offal' fish and, when not thrown back, were usually turned into fish meal or used as manure. Improved technology enhanced greatly the ability to market them in an edible state which, allied to the desire of railway companies to create new business, promised greater remuneration for the industry. Technological development derived from economic motivations that were concerned for existing demand and was capable of precipitating further increases.

Frying was an effective way of preserving and disguising undersized specimens and 'unmarketable' species of fish. Euphemisms such as 'rock salmon' for dogfish, were introduced to broaden the range of marketable fish, and to a similar end filleting was pioneered in 1900, though it did not become widespread until after World War One.[166] Quantification of consumption was difficult because a certain stigma was attached to fish, and many people were reluctant to admit they ate it, a difficulty that was compounded by the fact that much was eaten outside the home.[167] However, the lack of serious rivals testified to the popularity of fried fish - with or without chips - by the latter years of the nineteenth century. Consumption of shellfish declined in the wake of typhoid scares, while tripe, eels, meat pies and mash all emerged, though none exhibited the market penetration and durability of fried fish and chips.[168] Some indication of this phenomenon can be gleaned from the

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[165]R.C.on Trawling (1884-5) Q.8,631(29).
[166]Chaloner, 1971, 84 *et seq.*
[167]Walton, 1992, 137-8.
[168]Walton, 1992, 166.

continuing increase in the number of retail outlets - for fish and fish and chips - which are given for Hull in Table 17.

Table 17

THE FISH TRADE IN HULL

Period	Fish Merchants	Fried Fish Sellers	Curers
1880s	83	13	32
1914	177	243	50

Source: Bellamy, 'Some Aspects of the Economy of Hull', 360-1.

The rise in fish merchants indicated that business was booming, while the huge increase in fried fish sellers compared to the comparatively modest increase in curers reflects the fact that the escalation in fish business generally was due to expansion of the demersal rather than the pelagic sector. Expansion of the fried fish trade, specifically, is illustrated *via* Table 18 showing the number of fish and chip shops listed at Preston in the industrial north west of England.

Table 18

FISH AND CHIP SHOPS LISTED IN PRESTON DIRECTORIES.

YEAR	NUMBER
1885	22
1889	32
1892	70
1895	93
1898	129
1904	134
1907	148
1910	142
1913	133

Source: Preston Town Directories, Walton Fish and Chips and the British Working Class, 1870-1940, 29.

Post Office directories revealed that there were 250 fried fish shops in London in 1888, a number that had risen to 600 18 years later, when local Inspectors disclosed that there were 1,057.[169] Irrespective of inaccuracies the upward trend is obvious - and the shortcomings of sources probably underestimate numbers, for example the two main Carlisle directories record different totals - each including establishments

[169]Walton, 1992, 26.

omitted by the other.[170] Such evidence supports the view that fried fish was established in England by the end of the nineteenth century. More certain is that the number of fish and chip shops rose 177 per cent in the first three decades of the twentieth century - the fastest rate of growth in terms of outlets among the retail trades.[171]

The fortunes of small shopkeepers were probably not what the Royal Commissioners had in mind when they reported in 1866 that 'a great field of profitable enterprise is open for...the Sea Fisheries of the United Kingdom.'[172] The rise of the fishing industry and the fish and chip trade are not synonymous, but demand from the former relied upon the deployment and performance of retail outlets to provide a readily available food for the industrial workforce. The prosperity of the fishing industry depended upon them as much as fishermen and fishing vessels. Once markets were connected to ports the trawler needed the 'chippie' as much as the 'chippie' needed the trawler. Technology had made possible the rise of the fishing industry and rendered crucial interdependence between links in the chain of supply.

170Walton, 1992, 29.
171Walton, 1992, 6.
172R.C.on Sea Fisheries (1866) 589.

PART TWO
TECHNOLOGICAL CHANGE AND FISH PRODUCTION

CHAPTER 3 SAIL

This chapter is concerned with the development of smack operations. The first section recounts the development of trawling and shows how it enabled advantage to be taken of improved landward distribution and created a need for more sophisticated vessels. This theme is built up with details of smack technology and its diffusion around the country. Allied strongly to these aspects of the fishing industry was the use and supply of ice as a preservative, which is detailed in the third section. The chapter culminates with a description of indirect uses of steam in various aspects of the production process away from the actual propulsion of boats.

i TRAWLING

The changes detailed in Chapter Two shifted the onus for expansion of Britain's distant water fishing industry from distribution to production. They precipitated increased demand that rendered supplies from line fishing and drift netting inadequate, despite the 'increase in...size and sea-going qualities of the boats'.[1] Trawlers offered a solution, but in the words of a skipper in the 1880s, even they could not 'meet the demands of the country'.[2] Nevertheless, offshore trawling was the only method by which supplies could be increased to anywhere near the level required by the mass market, thus economics determined that the technological development of production focused on this sector. Brixham was the seminal source of offshore trawling.[3] In 1863 a Devonian fisherman speaking from Sunderland stated

> I have been acquainted with the fisheries for the last 40 years. I was brought up in Brixham. At that time there was not a smack over on this coast but what belonged to Brixham.[4]

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[1] R.C.on Sea Fisheries (1866) 582.
[2] R.C.on Trawling (1884-5) Q.10,321.
[3] R.C.on Sea Fisheries (1866) QQ.3,220 and 8,073; S.C. of the House of Lords (1904) Q.1,403.
[4] R.C.on Sea Fisheries (1866) Q.3,894.

By 1786 about 100 trawlers were registered there,[5] but most operated in local waters and rarely left port for longer than 24 hours.[6] In the late 1830s about 50 Torbay smacks had 'scattered all over the country' because it was found that, for instance, fish that would be worth £10 in Devon could fetch up to £25 if landed in the north-east and 'as there is no use in starving ourselves we travel about.'[7] However, although the range of trawling operations had broadened geographically, economically it was still restricted. Trawled fish were usually landed dead on deck which put them at a serious disadvantage in a market that called for a high-quality product. This problem was attenuated in line fishing which was, however, labour and capital intensive,[8] and thereby vulnerable to changes that favoured economies of scale.

One such change occurred when food shortages created by the French Wars (1793-1815) resulted in a market for hitherto unsaleable and less appetizing products. Consequently, trawling assumed a higher profile as the emphasis shifted from quality to quantity. Britain's 'fishermen had a virtual *monopoly of the English* Channel fisheries and the home market'[9] and trawling from southern fishing stations was supplemented by operations from northern ports like Hartlepool.[10] This was a boom period for Britain's fishing industry in general - and trawling in particular - but it did not last far beyond the cessation of hostilities. After the Treaty of Vienna (1815) the market reverted to its pre-war state and lining resumed its status as the main source for supplies of demersal fish - albeit within an economic environment characterized by deflated prices, declining profits and falling employment.[11]

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[5]Robinson, 1996, 18.
[6]Edwards, 1908, 12.
[7]R.C.on Sea Fisheries (1866) QQ.3,284-5.
[8]Holdsworth, 1874, 251-2.
[9]Clark, 1957, 24.
[10]Robinson, 1996, 16.
[11]Select Committee on the British Channel Fisheries, (BPP, 1833, XIV) 69; R.C.on Sea Fisheries (1866) 586.

Brixham vessels had sailed to 'different parts' of the coast from the end of the eighteenth century.[12] Westward voyages resulted in attempts to establish fishing stations at Munster in Ireland and Swansea,[13] but those in the opposite direction had far greater significance. In 1818 a number of South Devon trawlers began operating from Dover and then Ramsgate.[14] By the early 1820s there were 30 or 40 smacks at these ports during the summer, whence Devon men supplied the London market more effectively by cutting overland transport costs,[15] which was the initial reason for this migration. However, this activity remained only 'a minor part of the national fish trade',[16] though North Sea operations were feasible from the Kent coast.[17] In the mid 1820s about 40 per cent of Brixham trawlers were working from there and many sailed into these waters[18] and eventually 'took' the fish trade to Hull.[19] Such movement entailed the discovery of new grounds, but lining was still the chief method of catching white fish and this sector of the industry pioneered many fishing grounds like the Great Fisher Bank and areas around Iceland[20] that subsequently proved remunerative for trawlers. The most celebrated example of the exploitation of new grounds by trawlers was that of the 'Silver Pits' - prolific sole grounds situated on the Dogger Bank. The earliest estimate puts their discovery at 1837, though the actual date has proved to be a matter for conjecture and their effect has probably been overrated.[21] Nevertheless, they were indisputably a factor in the settlement of fishermen on the North Sea coast. While 'not more than two or three trawlers left the Humber' in the mid 1840s over 40 moved there from Ramsgate and Brixham later in the decade, and fifteen years later 300 of nearly

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[12]R.C.on Sea Fisheries (1866) Q.8,073.
[13]Calderwood, 1894, 73; Holt, 1895, 363; Robinson, 1996, 22.
[14]Committee into Collecting Fishery Statistics (1902) Q.1,414
[15]R.C.on Sea Fisheries (1866) QQ.3,894, 7,120-3; Holt, 1895, 364; Nicholson, 1979, 63; Northway, 1994, 132; Robinson, 1996, 17.
[16]Robinson, 1996, 17 and 22.
[17]Holt, 1895, 364.
[18]Holt, 1895, 364.
[19]R.C.on Sea Fisheries (1866) Q.3,894.
[20]Holt, 1895, 367.
[21]R.C.on Trawling (1884-5) Q.8,648; The Times, 4 February 1845, 6; Bellamy, 1965; Robinson, 1989(i) 84.

double the tonnage sailed out of Hull.[22] This rise in trawling activity was implicit in a Brixham fleet of about 300 smacks by the early 1860s[23] and was echoed on the Thames, from where 200 sailed during these years as opposed to 50 in 1822, and at Great Yarmouth where 140 were based in succession to the four or five of 17 to 18 years previously.[24] A Staithes man dated the local working of trawlers from about 1820,[25] while their arrival in Filey's waters was put at 1843. A Sunderland fishmonger dated the introduction of trawled fish at 1859,[26] while reports from more northerly locations testify to the spread of trawling in subsequent years.[27]

Around the middle of the nineteenth century the influence of the south coast on distant water operations was at its height, and although the south-west retained a large interest in the development of Irish Sea ports the focus of attention was directed eastwards. The 1851 census recorded that 'there were already more than 1,000 persons from Cornwall, Devon and Kent living in Hull',[28] and these counties were a source of finance as well as manpower.[29] Of 168 smacks registered in Hull in the 1850s, for example, 126 had been built in South Devon or at southerly ports subsequently opened up by natives thereof.[30] Such progress coincided with the technological development of landward operations - so as trawling assumed greater significance at sea a new market was opening out.

This situation created financial opportunities and investors sought to maximize profits. To this end the fleeting system had been devised to enhance returns on capital by altering the deployment rather than the physical properties of fishing boats. Its origins dated back to its use by lining smacks at Barking and Harwich

[22]R.C.on Sea Fisheries (1866) 595; QQ.3,894 and 6,868-70.
[23]R.C.on Sea Fisheries (1866) QQ.3,284-5.
[24]R.C.on Sea Fisheries (1866) 594 and Q.11,091.
[25]Report on Sea Fisheries of England and Wales (1878-9) 425.
[26]R.C.on Sea Fisheries (1866) QQ.3,856; 6,206.
[27]R.C.on Sea Fisheries (1866) QQ.1,098-9; 2,591; 5,901-3.
[28]Robinson, 1996, 48.
[29]Bellamy, 1965, 248.
[30]Robinson, 1996, 48.

around 1828,[31] and by the middle of the century the collective catch of as many as 200 vessels was being taken to market daily by a single carrier, or cutter - initially one of the fishing boats, though specialized carriers were soon introduced. Fleeting extended the range of smacks and enabled more time to be spent on the actual fishing operation, and by about 1858 nearly all trawlers used the system.[32] By the mid 1830s, for example, Devon fishermen frequently rendezvoused with fishing boats off the Isle of Man,[33] but it was especially remunerative in the southern North Sea, where the comparative shallowness of the waters (see Map 1) was well suited to trawling smacks. Consequently, they were sent out for about six weeks during the summer and replenished by carriers as required.[34] Fleets were usually enlarged by fishing boats from other ports - particularly Brixham[35] - and Robert Hewett remarked that from 60 to 120 fished with 50 or so of his Short Blue smacks as 'the nucleus of a fleet, under the command of a man in our pay.'[36] Visitors swelled their own profits - as well as the cargoes of the Essex cutters - before wintering in local waters.[37] Fleeting was hazardous for crewmen, and became increasingly so as the weather deteriorated, the transfer of catches from smack to cutter was normally carried out by two men in a small boat, which greatly increased the 'occupational risk of trawling'.[38] Fleeters reverted to single-boat operations for the winter, so although the design of fishing boats was influenced by fleeting it was not done to the undue detriment of their individual performance.

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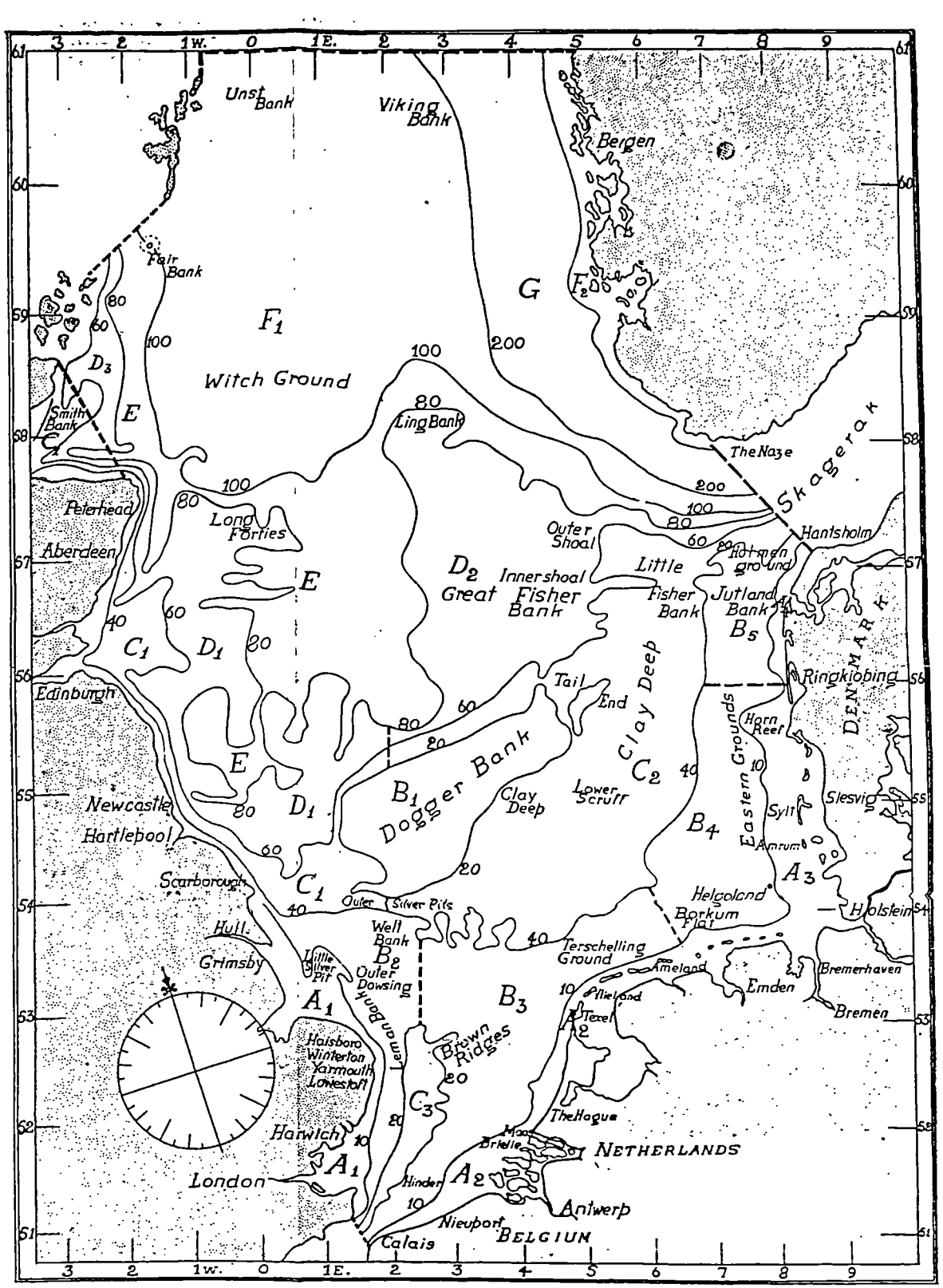
[31]Holt, 1895(i), 364.
[32]Report of the Board of Trade on the System of Deep Sea Trawl Fishing in the North Sea (BPP, 1883, XVII) 436.
[33]Robinson, 1996, 71.
[34]Captain R.S.Hewett, 1964, 7.
[35]Holt, 1895(i), 364; Butcher, 1980, 13.
[36]R.C.on Sea Fisheries (1866) QQ.12,925-6.
[37]Hellyer, 1915, 37.
[38]Rule, 1976, 389. And see Mather, 1887.



MAP OF THE NORTH SEA TRAWLING GROUNDS (DEPTHS IN METRES).

MAP 1: FISHING AREAS OF THE NORTH SEA

Initially, a fleet's catch was pooled and its value divided equally among the participants, which worked well among southern fleets like Hewett's and Shuckford's, but was a source of increasing dissatisfaction at Hull and Grimsby where it was felt that lazy crews profited unfairly. Consequently, a new procedure was implemented in 1878 whereby a smack sorted and boxed its own catch and was accredited proportionately.[39] This restored incentive and meant that the fish arrived at market in better condition, though by this time such considerations were increasingly subjugated to matters of quantity.

Fleeting had been conceived to increase the productivity of smacks, but as the nineteenth century progressed more distant fishing grounds were opened up that were less well suited to the system. Some bifurcation had been apparent in 1864 when Hewett's operated a Home Fleet in the southern North Sea and the Short Blue Fleet further north,[40] while about 20 years later, when the advent of steamers at Grimsby accentuated the smack's shortcomings, 66 were bought up by the Grimsby Ice Company and deployed in fleets operating in nearer waters in order to eke out their profitability.[41] It was estimated that a Grimsby smack spent less than 20 per cent of her time actually trawling in the late-1870s,[42] and efficiency was increasingly eroded the farther away she operated. Additionally, potentially remunerative grounds like those around Iceland were not well charted, a fact that did not accord well with the inferior handling qualities of sailing craft that would take longer than steamers to perform the same operations and therefore would require depots on foreign soil.[43]

Technically, by the 1880s the efficiency of smacks was nearing maximisation, which only highlighted the superior economic performance of the steamer in all, but

[39]Robinson, 1996, 71-2.
[40]Robinson, 1996, 71.
[41]Goddard and Spalding, 1987, 19.
[42]*Ibid.*
[43]Holt, 1895, 141-2.

especially more distant, grounds. Somewhat ironically therefore, attention was turned back to fleeting in 'an attempt to wring the last ounce of profit out of the smacks' in the North Sea.[44] Owners at Grimsby sought to extend it to an all-year activity *via* the inauguration of six to eight week voyages in the autumn and winter and the extension of summer trips. Unsurprisingly, this move proved highly unpopular, and after returning at the end of the summer of 1878, the steam cutter *Celerity* left port again with only about 20 of the 40 smacks of her intended fleet.[45] Fleeting allowed more intensive fishing of nearer grounds, but the arrival of the fishing steamer meant that it merely postponed the eventual demise of smacks at major North Sea trawling stations. By the turn of the century the system had been abandoned at Grimsby,[46] and Dade recalled that the last Scarborough fleet sailed 'about 1896 or 1897.'[47] The only port where it remained viable into the twentieth century was Hull, where three fleets continued to work the North Sea grounds. Each consisted of 50 vessels and together they accounted for the bulk of about 40,000 tons of water-borne fish out of about 200,000 consigned to Billingsgate *per annum* in the years around 1880,[48] and at the end of the century each carrier was transporting the catches of 50 to 60 trawlers.[49]

Fleeting facilitated increased production rather than improved quality, and it was not unknown for a salesman to fill a box landed by steam cutter with single-boated fish in better condition so as to secure a higher price for the whole cargo.[50] Such actions highlighted the quantity/quality issue that manifested itself for years in the debate over whether trawled or lined fish was superior.[51] The resultant controversy was not entirely amicable, to say the least, and much bad feeling stemmed from

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[44]Goddard and Spalding, 1987, 21.
[45]Robinson, 1996, 73-4.
[46]Goddard and Spalding, 1987, 21.
[47]Dade, 1932, 369.
[48]Cutting, 1955, 253-4.
[49]Report into Collecting Statistics (1902) QQ.1,895-6.
[50]Report on Trawling (1883) 436.
[51]Fifth Annual Report for the Sea Fisheries of England and Wales for 1890 (BPP, 1890-1, XX) 134.

complaints about the ruthless efficiency of trawl-nets, and fishermen 'got grounded in the belief that if trawling was once gone into it would not only wreck and ruin line fishing, but also the fishing wholly.'[52] However, the Royal Commissioners concluded that it was not 'wastefully destructive...[but rather] one of the most copious and regular sources of the supply...of food to the people'.[53] Trawlers were always at sea, unlike liners[54] who often took part in the herring fishery when that season came round.[55] Additionally, lined fish was too dear for 'the poorer classes'[56] and, as a Hull merchant put it

> if in this country there was no more fish than what the long-line fishers catch, there would scarcely be enough for a half or even a quarter of the public.[57]

A colleague agreed, saying that not 'in any way' would it be possible to supply the market without trawled fish,[58] but line fishermen disputed this.[59] A St.Andrew's man declared that it would not affect the market;[60] his reasoning took into account the length of time that trawled fish was in the water,[61] but his perspective was parochial rather than national, emotive rather than rational - he assessed the prospects of trawling in terms of the established trade. Most line and drift-net fishermen operated on a much smaller scale than trawlers, whose activities they saw as a threat to their livelihoods. Trawlermen, however, declared that they helped line fishermen by stirring up the ground,[62] and a Grimsby man described the two factions as being 'like brothers' at that port - a large trawling station - in the 1860s,

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[52]Report of the Committee into Statistics (1908) Q.6,290. A witness recalling the attitude of his forefathers.
[53]R.C.on Sea Fisheries (1866) 675.
[54]R.C.on Sea Fisheries (1866) 589.
[55]R.C.on Sea Fisheries (1866) Q.7,105.
[56]R.C.on Sea Fisheries (1866) QQ.4,482-7.
[57]R.C.on Sea Fisheries (1866) Q.7,084.
[58]R.C.on Sea Fisheries (1866) Q.7,905.
[59]R.C.on Sea Fisheries (1866) QQ.5,748-9.
[60]R.C.on Trawling (1884-5) Q.2,565.
[61]R.C.on Trawling (1884-5) QQ.2,417-20.
[62]R.C.on Sea Fisheries (1866) Q.7,305; Report on Sea Fisheries of England and Wales (1878-9) 369.

though both he and a Hull man reported being 'stoned' when trying to land catches at smaller, more northerly ports.[63]

Developments favoured larger, more capitalized units and the attitudes of major investors were telling. Aware of changes in the fish trade, their views were probably conditioned by regard for future prosperity. Robert Hewett operated 50 to 60 vessels in the 1860s of which only seven were trawlers because, although there was a dearth of fresh haddock, trawled specimens would not keep.[64] Nevertheless, they all trawled 'in the winter',[65] and when questioned in the late 1870s he responded that trawlers 'have as much right to fish as he has'.[66] An Aberdeen salesman praised the superior quality and price of lined fish - the trawled variety would not suit him - but he was careful to point out that trawlers had done no harm.[67] Such prudence was wise, for as early as the 1860s a Hull merchant said that he preferred the greater variety of fish[68] that 'could not...be procured' by means other than trawling,[69] by 1878 a Newbiggin merchant stated that although he had traditionally bought from liners, since May he had only purchased from trawlers,[70] and a North Shields buyer deemed the quality of trawled fish to be 'second to none'.[71] The Scottish curer who only bought trawled fish when there was no lined alternative,[72] was increasingly out of step with contemporary developments, and 30 years later a trawler owner reaffirmed that it was not 'in any way' possible to supply the market without trawled fish.[73]

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[63]R.C.on Sea Fisheries (1866) QQ.7,306;
[64]R.C.on Sea Fisheries (1866) QQ.12,811-7.
[65]R.C.on Sea Fisheries (1866) Q.11,242.
[66]Report on Sea Fisheries of England and Wales (1878-9) 449.
[67]R.C.on Trawling (1884-5) QQ.2,031-44 and 2,077.
[68]R.C.on Sea Fisheries (1866) Q.7,078.
[69]Annual Report for Scotland (1881) 478.
[70]Report on Sea Fisheries of England and Wales (1878-9) 371.
[71]Report on Sea Fisheries of England and Wales (1878-9) 375.
[72]R.C.on Trawling (1884-5) QQ.3,730-1.
[73]Report of the Committee into Statistics (1908) Q.7,905.

Technological developments facilitated distant water operations that were susceptible to economies of scale. Factors that had formerly determined the nature of the fishing industry became irrelevant, and this was apparent in the fate of Barking, the 'greatest fishing centre in England'[74] early in the nineteenth century. Its growth, like Harwich's, had been initiatated by the close proximity of Billingsgate, and its status was enhanced by its properties as a natural dry dock,[75] which contributed to the presence of fleets like Lelen's and firms like Hewett's. By 1833 it possessed 133 vessels of from 40 to 60 tons that were 'faster than anything afloat' when sailing into the wind,[76] but although the Short Blue fleet alone had grown to about 220 vessels and 1,370 men were engaged in fishing at the port by 1851,[77] its proportion of the fish trade was declining together with its standing in the distant water industry. This was due to the effects of the slump after 1815, which were compounded by Barking's poor situation in respect of more distant grounds that were increasingly exploited from the 1820s. Consequently, in spite of line fishing's 'overwhelming popularity amongst English North Sea fishermen' as late as the 1840s,[78] its leading port was by then in terminal decline. The irony of this situation was heightened by the working of these new grounds with the help of men and vessels from Barking who had moved to Yarmouth and Lowestoft. This activity led to the growth of a large road traffic in soles to London,[79] for although shortcomings in overland transport remained a problem, they were insufficient to arrest the port's demise. Barking had grown within an economy that was rapidly becoming obsolete, and completion of the removal of the Short Blue Fleet to Gorleston near Great Yarmouth in 1896 - where Hewett's fishing fleet had already operated for some years[80] - signalled the end, with much of Barking's business moving further north from the 1870s as Grimsby took over as the 'great centre' for

[74]Mundahl, 1883, 11.
[75]Douglas Hewett, 1964, 3.
[76]Captain R.S.Hewett, 1964, 6.
[77]Captain R.S.Hewett, 1964, 7.
[78]Robinson, 1989(ii), 79.
[79]Holt, 1895(i), 364.
[80]Hewett, 1964, 8.

the cod fisheries by the 1890s.[81] In 1889 there were 144 first class liners there,[82] while a total of 89 first class fishing boats were registered at London.[83]

The fall of Barking is all the more ironic because, together with Brixham, it had been Britain's foremost trawling station. Many of its smacks were regularly engaged in trawling when bad weather halted line fishing, and Hewett's trawling interests had grown steadily, and as early as the 1790s their field of operations extended east to the Dutch coast and north to Smith's Knoll in the North Sea.[84] The fall in prices around 1815, helped the trawling business but damaged the prosperity of Barking's other fisheries, so the Kentish trawling colony came to include many Barking men[85] whose knowledge of the North Sea fisheries no doubt proved useful. Such grounds were characterized by harsher conditions than those generally found inshore along the south coast and they required vessels that could be got 'through the weather better...[and were]...more safe'.[86]

ii SMACKS

> We have bigger vessels and go farther a-field for the fish. Small vessels dare not go as far as we go. We go to the Dogger Bank and outside the Dogger Bank, and God knows where we don't go.
>
> Hull trawlerman, 1863.[87]

The burgeoning demand for fish in the nineteenth century rendered it insufficient to simply divert resources to trawling. Such were market requirements that vessels had to voyage to more distant grounds in search of larger catches in order to

[81] Annual Report for England and Wales (1890) 125; Sixth Annual Report on England and Wales (1892) 127.
[82] Annual Report for England and Wales (1890) 147.
[83] Annual Statement of Navigation and Shipping.
[84] Robinson, 1996, 17.
[85] Chaloner, 1966, 104.
[86] R.C.on Sea Fisheries (1866) QQ.3,292-3.
[87] R.C.on Sea Fisheries (1866) Q.3,475.

maintain production levels. Returns from craft like cobles and fifies used by inshore fishermen on the English and Scottish coasts were inadequate for a mass market. Greater production meant more extensive operations which in turn necessitated the combination of capacity and seaworthiness in fishing boats - characteristics that usually went together but were not entirely synonymous.[88] By 1880 some of the largest fishing boats in Britain were well-smacks of over 100 tons that belonged to Grimsby,[89] but two tons of water slopping about amidships did little for their stability.[90] Conversely, some smaller liners of 15 to 30 tons proved to be extremely seaworthy, though as their voyages usually lasted less than a day[91] their productivity did not meet the demands of the fish trade.

The trend towards larger fishing boats had begun in the eighteenth century. Throughout England the average tonnage of smacks rose from 16.5 in 1772 to 24.4 in 1786.[92] The corresponding figure for Brixham was 30 by the end of the century[93] and this had risen to 34 by the middle of the next.[94] At this time existing fishing boats were being modified as well as new craft being laid down. The Short Blue smacks were lengthened 15-20 feet by means of an insert in the hull,[95] and the same method was employed at Scarborough[96] where the average length of smacks rose from 45 feet in the years 1850-4 to 74 feet in 1875-9.[97] Fishermen in north east England declared their vessels to be almost twice as big as they were 50 years earlier, a 'good deal larger' than 25 years previously and 'nearly double as large' as 18 years ago, and many smacks were 'adapted for cutter purposes' because of their

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[88]Report on Relations between Owners, Masters and Crews (1882) Q.5,811; Annual Report for Scottish Fisheries (1896) 4.
[89]Annual Report for England and Wales (1887) 141.
[90]Captain R.S.Hewett, 1964, 6.
[91]R.C. on Sea Fisheries (1866) QQ.28,073-83.
[92]PRO, CUST 17/1-10.
[93]Edwards, 1908, 13.
[94]R.C. on Sea Fisheries (1866) Q.8,031.
[95]Alward, 1932, 146.
[96]Dade, 1932, 365-7.
[97]Robinson, 1996, 67.

size.[98] Before 1840 the average tonnage at Hull and Scarborough had been between 25 and 35[99] - a fleet of 21 smacks ranging from 23 to 32 tons moving to the former in the mid-1840s[100] - while the average at Grimsby was estimated to be about 44 tons at that time.[101] By the early 1860s the figure for the Humber ports was put at between 50 and 70 tons[102] and most Yarmouth smacks ranged between 50 and 60 tons.[103] The figure was higher at trawling stations where larger vessels operated more than 20 miles from shore and in at least 20 fathoms of water.[104] Referring to his own vessels, Henry Toozes, a Hull smack owner, stated that 75 tons had been average in the early 1870s, though ten years later the figure for his own fleet was 80 to 85, with some vessels going up to 90.[105] By the mid 1880s North Sea trawlers were generally ketch or dandy-rigged craft of from 50 to 80 tons,[106] though away from the North Sea 15 sailing trawlers at Tenby ranged between only 25 and 30 tons.[107] The average at Grimsby by the early-1890s was given as 73 tons.[108]

Type of rig gave a further indication that larger vessels were being employed. Trawlers had customarily been cutter-rigged, a configuration based on a single mast. However, even when augmented by lug-sails it proved inefficient on larger vessels, where longer booms and greater masses of sail had to be handled. These presented difficulties for a trawling smack's typical crew of five which often included two or three boys.[109] Consequently, two-masted rigs were adopted in order to increase the area of sail and reduce its unwieldiness, and the addition of a

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[98] R.C. on Sea Fisheries (1866) QQ.1,111; 3,286; 6,870; Q.7,895.
[99] Holt, 1895(i), 365.
[100] R.C. on Trawling (1884-5) QQ.8,631a.
[101] S.C.on Sea Fisheries (1893-4) Q.220.
[102] R.C. on Sea Fisheries (1866) 610.
[103] R.C. on Sea Fisheries (1866) 594.
[104] R.C. on Sea Fisheries (1866) 610.
[105] Report on Relations between Owners, Masters and Crews (1882) Q.9.
[106] Annual Report for England and Wales (1887) 137.
[107] Second Annual Report for the Sea Fisheries of England and Wales for 1887 (BPP, 1888, XXVIII) 204.
[108] S.C.on Sea Fisheries (1893-4) Q.220.
[109] S.C.on Sea Fisheries (1893-4) Q.1,778-9; Aflalo, 1904, 273. Rule, 1976, 385, states that Humber smacks typically had crews of five, while those based at Great Yarmouth had six.

mizzen-mast became widespread from about 1867-8.[110] The 82-foot Grimsby trawler *Frank Buckland*, a converted ketch 'clearly derived from Brixham boats', was a typical unit of the North Sea fishing fleet in the 1880s.[111] Although smaller, drifters also began to use two-masted rigs,[112] but the period of transition in this sector was more protracted. Their customary lugger-rigs were faster and more manoeuvrable allowing, for example, Scottish boats taking part in the East Anglian herring fishery to outpace English smacks when running for market.[113]

Pure speed was less important for trawlers, where it had to be accompanied by sufficient power to tow the gear. The heavier it was, the more power that was required, which usually meant a larger vessel. Thus the length of trawl-beams gives a further indication of vessel sizes. Early in the nineteenth century 50 feet, the approximate limit beyond which a wind-driven beam-trawl became impracticable,[114] was exceptional. Those used by Hewett's around the middle of the century ranged from 32 to 42 feet,[115] but by 1880 50-feet was near the average at larger trawling stations[116] - which was still the case at the Humber ports ten years later.[117]

Analysis of data published in British Parliamentary Papers shows that smack development continued to 1914. Board of Trade returns for 1869, 1871 and every year thereafter enable assessment of the constitution of Britain's fishing fleet. Table 19 shows the percentage of the total registered fleet in each class according to the number of vessels and their total tonnage. The comparatively small number of first-class boats and their large aggregate tonnage is obvious.

110Robinson, 1996, 67.
111White, 1952, 11.
112First Annual Report for the Sea Fisheries of England and Wales for 1886 (BPP, 1887, XXI) 139.
113Robinson, 1987, 87.
114Ashford, 1915, 85.
115R.C. on Sea Fisheries (1866) Q.12,908.
116R.C.on Trawling (1884-5) Q2,575; S.C.on Sea Fisheries (1893-4) QQ.312; 1,529; 1,776.
117S.C.on Sea Fisheries (1893-4) QQ.216 and 860.

Table 19

PERCENTAGE OF REGISTERED FISHING BOATS IN EACH CLASS IN THE UNITED KINGDOM
(Quinquennial Averages)

(i) Number of Fishing Boats

Period	First Class	Second Class	Third Class
1869, 71-3	12.6	62.9	24.5
1874-8	19.4	60.9	19.7
1879-83	26.4	54.9	18.7
1884-8	30.2	51.5	18.3
1889-93	30.6	51.8	17.6
1894-8	28.8	53.2	18.0
1899-1903	27.3	53.4	19.3
1904-8	27.7	49.8	22.5
1909-13	28.4	47.2	24.4
1914	29.7	46.5	23.8

(ii) Tonnages

Period	First Class	Second Class	Third Class
1892-6	79.8	17.8	2.4
1897-1901	78.7	18.9	2.4
1902-6	79.5	17.8	2.7
1907-11	81.0	16.3	2.7
1912-3	81.7	15.6	2.7

Sources: Annual Statements of Navigation and Shipping

The unreliability of returns relating to second and third class boats, for which tonnage figures were not available until 1892, disguises neither the nature of the first-class fleet nor its rise within the industry. Table 20 shows the nature of these vessels, with average tonnages rising almost constantly.

Table 20

FIRST CLASS FISHING BOATS IN THE UNITED KINGDOM
(QUINQUENNIAL AVERAGES)

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869, 71-3	5,372	143,818	26.7
1874-8	6,668	189,831	28.4
1879-83	8,719	249,361	28.6
1884-8	9,021	286,802	31.8
1889-93	8,344	280,436	34.1
1894-8	7,708	263,514	34.2
1899-1903	7,195	245,585	34.1
1904-8	7,279	273,391	37.6
1909-13	6,945	283,358	40.8

Sources: Annual Statements of Navigation and Shipping

The number of vessels peaks in the 1884-8 period and then declines sharply, though the aggregate tonnage was sustained. However, no account is taken in the above tables of the increased proportion of steam-driven fishing boats from about 1890, but from the mid 1880s statistics distinguished between sail and steam fishing boats registered under the Sea Fisheries and Merchant Shipping Acts. The figures for the United Kingdom are reproduced in Table 21.

Table 21

SAIL-POWERED FISHING BOATS REGISTERED IN THE UNITED KINGDOM UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS
(Quinquennial Averages)

	NO.OF VESSELS		TOTAL	AVERAGE
YEAR	50 TONS-	50 TONS+	TONNAGE	TONNAGE
1883-7	2,132	1,534	173,403	47.2
1888-92	1,875	1,588	171,161	49.4
1893-7	1,646	1,239	139,770	48.4
1898-1902	1,455	448	74,714	38.8
1903-7	1,300	254	54,633	35.2
1908-12	1,206	186	47,164	33.9
1913	1,046	136	38,724	32.8

Sources: Annual Statements of Navigation and Shipping

National figures give the impression of rising smack tonnages until the early-1890s, followed by their decline which generally dove-tailed with the rise of steam power, and is evident in the declining proportion of sail-powered vessels classified under the same criteria (Table 22).

Table 22

PROPORTION OF SAIL-POWERED FISHING BOATS IN THE FISHING FLEET OF THE UNITED KINGDOM THAT WAS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS
(Quinquennial Averages)

YEAR	PERCENTAGE VESSELS	PERCENTAGE TONNAGE
1883-7	92.4	94.7
1888-92	88.0	89.6
1893-7	78.6	78.3
1898-1902	56.3	49.9
1903-7	51.8	34.4
1908-12	32.1	24.2
1913	26.1	18.3

Sources: Annual Statements of Navigation and Shipping

These overall figures hide considerable differences in the fortunes of smacks at various ports. Evolution of the sailing ship did not stagnate with the advent of steam,[118] indeed it was only with the development of economical high-pressure boilers - the first triple-expansion engine was introduced in 1884 - that steamers began to assume a clear ascendancy in British fleets.[119] The financial nature of the fishing industry meant the diffusion of such technology depended greatly on the economic environment into which it was introduced. Hence, at Lowestoft and the larger Channel ports, where 'landings of soles, the highest priced sea fish, were far in excess of the catches of steam trawlers',[120] sailing craft - 'obsolete' capital - persisted well beyond the turn of the century. This is shown to good effect in Table 23 with regard to the English and Bristol Channel fisheries.

[118]See Gerald S.Graham, 'The Ascendancy of the Sailing Ship'.
[119]Starkey, 1993, 133.
[120]March, 1953, 45.

Table 23

LANDINGS OF WET FISH BY SMACKS AND STEAMERS (EXCL.PELAGIC SPECIES)

(i) English Channel

	(1,000 cwts)		% OF E & W TOTAL TAKEN
YEAR	STEAM	SAIL	IN REGION
1906	12	105	2.8
1913	22	91	2.4

(ii) Bristol Channel

	(1,000 cwts)		% OF E & W TOTAL TAKEN
YEAR	STEAM	SAIL	IN REGION
1906	38	42	1.0
1913	63	40	1.4

Source: Annual Reports for Fisheries of England and Wales

The proportion of the national total, however, indicates that smacks were declining in importance by 1906, especially given that these two areas were probably the most active as far as sailing fishing boats were concerned. However, from these figures it can be seen that it is erroneous to rely purely on the foremost trawling ports to give an accurate picture of the diffusion of smack technology. Differences existed between 'smack' ports, as well as sail and steam propulsion. Conversion to two-masted rigs, for example, was completed at Barking around 1876[121] yet the process had not even started at Brixham 15 years later.[122]

Variations between larger fishing stations are sufficient to illustrate this point and do not involve unreliability that is associated with lesser outposts. Accuracy is enhanced with the ports selected for analysis by the fact that the difference between the number of vessels registered under the Merchant Shipping and Sea Fisheries Acts is small (see Table Two). In Table 24 the difference was less than one per cent at Brixham, under 1.5 per cent at Hull and Ramsgate, and lower than two per cent

121Paterson, 1964, 12.
122National Maritime Museum, 1986, 26.

at Grimsby.[123] These figures show the proportion of the fishing fleet that was made up of smacks at these ports and illustrate different perceptions of the possibilities and impact of steam propulsion within a locality, together with the varying extents to which resources were diverted from smack development.

Table 24

PROPORTION OF SAIL-POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS
(Quinquennial Averages)

(i) GRIMSBY

YEAR	PERCENTAGE VESSELS	PERCENTAGE TONNAGE
1883-7	97.7	97.4
1888-92	92.0	92.0
1893-7	72.8	74.4
1898-1902	17.7	18.5
1903-7	6.0	5.1
1908-12	4.0	2.8
1913	3.1	1.9

(ii) HULL

YEAR	PERCENTAGE VESSELS	PERCENTAGE TONNAGE
1883-7	95.7	95.3
1888-92	79.3	82.6
1893-7	47.9	54.2
1898-1902	7.1	6.9
1903-7	1.5	0.8
1908-12	0.9	0.5
1913	1.5	0.6

(iii) RAMSGATE

YEAR	PERCENTAGE VESSELS	PERCENTAGE TONNAGE
1883-7	100.0	100.0
1888-92	100.0	100.0
1893-7	100.0	100.0
1898-1902	99.9	100.0
1903-7	100.0	100.0
1908-12	99.3	99.7
1913	98.7	99.4

[123] Annual Statements of Navigation and Shipping.

(iv) BRIXHAM

YEAR	PERCENTAGE VESSELS	TONNAGE
1883-7	100.0	100.0
1888-92	99.8	99.3
1893-7	99.4	99.1
1898-1902	100.0	100.0
1903-7	100.0	100.0
1908-12	99.8	99.9
1913	99.5	99.7

Sources: Annual Statements of Navigation and Shipping.

Closer analysis of the fleets at these ports reveals more about the nature of smack development. Weather conditions, for instance, exacerbated differences between old and new methods of fishing. What were judged to be favourable conditions for large smacks could stop all fishing from a neighbouring port, where perhaps the beach launching of cobles as well as the state of the sea prevented working. Conversely the 'light breezes' deemed suitable for smaller vessels - and later steamers - could restrict the operations of large smacks.[124]

Trawling started at Grimsby in 1854 and the number of smacks had grown to around 300 in 1868,[125] while the 40-odd smacks based at Hull in 1845[126] had swelled to a fleet of 270 by 1863.[127] Their respective fleets continued to rise, but bearing in mind the large proportion of fishing steamers at both ports the number of first class vessels is only recorded until 1882 in Table 25 so as to minimize distortion.

[124]Annual Report for England and Wales (1895) 113.
[125]S.C.on Sea Fisheries (1893-4) QQ.212-6.
[126]Report on Relations between Owners, Masters and Crews (1882) 420.
[127]Report on Relations between Owners, Masters and Crews (1882) 420.

Table 25

(i) GRIMSBY

FIRST CLASS FISHING BOATS REGISTERED UNDER THE SEA FISHERIES ACT, 1868
(Quinquennial averages)

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869, 71-3	290	14,722	50.2
1874-8	447	25,739	57.2
1879-82	581	35,581	61.2

SAIL-POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS
(Quinquennial averages)

	NO.OF VESSELS		TOTAL	AVERAGE
YEAR	50 TONS-	50 TONS+	TONNAGE	TONNAGE
1883-7	123	607	48,148	65.7
1888-92	82	652	51,464	70.1
1893-7	62	448	36,072	70.8
1898-1902	29	71	6,503	61.0
1903-7	17	15	1,707	52.6
1908-12	13	10	1,188	50.3
1913	12	8	950	47.5

(ii) HULL

FIRST CLASS FISHING BOATS REGISTERED UNDER THE SEA FISHERIES ACT, 1868
(Quinquennial averages)

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869, 71-3	291	15,633	53.4
1874-8	405	23,693	58.3
1879-82	532	34,147	64.1

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS
(Quinquennial averages)

	NO.OF VESSELS		TOTAL	AVERAGE
YEAR	50 TONS-	50 TONS+	TONNAGE	TONNAGE
1883-7	32	418	32,613	72.4
1888-92	22	348	28,248	76.4
1893-7	16	186	15,646	77.6
1898-1902	12	16	1,674	47.2
1903-7	6	0	214	35.3
1908-12	3	1	126	43.2
1913	6	0	193	32.2

Sources: Annual Statements of Navigation and Shipping

From the 1890s the fishing fleets at both ports were swamped by steamers and though 'a few smacksmen clung to sail and fought tenaciously to stem the tide of

circumstances...it was a losing battle.'[128] At Hull 'some half score' of smacks were laid up awaiting buyers in 1899[129] as purpose-built steamers came on to the market. Fleeting and icing had enhanced the catching power of smacks temporarily, but their ultimate effect was to quicken the exhaustion of their potential at centres where steam provided a viable alternative. George Alward of Grimsby summed up the situation there in 1904, saying that 'the sailing vessel, so far as we are concerned, has become extinct'.[130]

Such progress signified a dramatic acceleration in sophistication at the leading edge of the fishing industry, but as late as 1880 North Sea fleets still fished relatively close inshore without ice and relied on the speed of the carrier.[131] Trawlers based south of the Humber, notably fleeting smacks sailing from Great Yarmouth operated so, but lessening remuneration of North Sea grounds meant that trawling, generally, from the port was unprosperous.[132] The Short Blue smacks which had moved to nearby Gorleston from Barking in the 1850s[133] were laid up for most of 1899.[134] However, smacks at Lowestoft only a few miles to the south prospered. Here there was no fleeting[135] and the grounds were relatively close to shore.[136] Trawling commenced there in about 1860 with a dozen or so vessels of 25 to 30 tons working off Lowestoft Flats. In 1863 there were 176 herring and mackerel luggers but only eight trawlers at the port.[137] An influx of Brixham and Ramsgate men resulted in the presence of about 60 vessels of 50 tons by 1870, this had risen to 120 such vessels ten years later, and 325 at an average of around 80 tons by the early-1890s. At this time a local smacksman observed that as large

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128March, 1953, 44.
129Annual Report for England and Wales (1900) 233.
130S.C. of the House of Lords (1904) Q.1,468.
131Cutting, 1955, 230.
132Annual Report for England and Wales (1890) 124.
133Fewster, 1985, 28.
134Annual Report for England and Wales (1900) 237; S.C.on Sea Fisheries (1893-4) Q.1,553.
135Cunningham, 1895, 125.
136S.C.on Sea Fisheries (1893-4) QQ.1,539-40.
137R.C.on Sea Fisheries (1866) Q.13,887.

vessels were unsuitable for the port 'we are going back to the smaller vessels of 45 to 50 tons...adding a great number of vessels to the fleet.'[138] A decade later the port possessed a 'splendid' fleet of about 320 trawling smacks, the largest of which was 60 tons, that rendered Lowestoft a thriving fishing port.[139] Table 26 confirms this, and the port's importance in the pelagic fisheries helps to explain discrepancies between the figures therein and those cited above.

Table 26

LOWESTOFT

FIRST CLASS FISHING BOATS REGISTERED UNDER THE SEA FISHERIES ACT, 1868
(Quinquennial averages)

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869, 71-3	245	6,640	27.0
1874-8	356	11,026	30.9
1879-83	425	14,114	33.2
1884-88	410	14,468	35.3
1889-93	422	17,796	42.1
1894-98	460	20,665	44.9
1899-1903	471	20,534	43.6
1904-8	537	23,334	43.5
1909-13	600	24,612	41.0

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS
(Quinquennial averages)

	NO.OF VESSELS		TOTAL	AVERAGE
YEAR	50 TONS-	50 TONS+	TONNAGE	TONNAGE
1883-7	315	76	13,801	35.3
1888-92	274	129	16,483	40.8
1893-7	258	190	20,252	45.3
1898-1902	269	171	19,727	44.9
1903-7	204	176	17,715	46.7
1908-12	191	130	15,022	46.8
1913	163	97	12,202	46.9

Sources: Annual Statements of Navigation and Shipping

There was no falling off in trawling[140] and a year into the new century still no steam trawlers belonged to the port.[141] Indeed, by 1913 14 new first class smacks were

[138] S.C.on Sea Fisheries (1893-4) QQ.1,529 and 1,533.
[139] S.C. of the House of Lords (1904) QQ.1,558-9.
[140] Annual Report for England and Wales (1890) 124; Committee into Collecting Fishery Statistics (1902) Q.1,562.
[141] Committee into Collecting Fishery Statistics (1902) Q.677.

built.[142] This is less surprising considering the legacy of the Lowestoft Steam Trawling Company that set up with three steamers in 1887 and lost £10,000 in three years.[143]

The preference for smaller vessels at Lowestoft and larger ones at the Humber induced the response that such differences were the result of adaptations to local conditions,[144] though Holt frankly admitted that he could not identify them.[145] Cunningham tentatively suggested that distance from coalfields was instrumental in the use of steam, but this failed to explain the proliferation of steam drifters at the port after the turn of the century. More confident was his assertion that 'the grounds in the immediate vicinity are not extensive enough, or productive enough' to enable the viable operation of steamers, ports such as Grimsby, Boston and Aberdeen affording more convenient bases for productive northerly waters.[146] This theory was supported by the evidence of a local man who observed that sailing trawlers fished off Norfolk and Suffolk and sometimes went to the Dutch coast, but not far to the north.[147] This view was helped by the Brown Ridges and Leman Banks lying within easy reach of Lowestoft, and the Goodwin Sands off Ramsgate.

Even given economic reasons, abstinence from a form of propulsion that enabled greater control was perhaps surprising at a port such as Lowestoft that was prone to congestion, especially at the height of the herring season.[148] This was also a pertinent observation regarding Ramsgate, a port that adhered to sail despite the difficulty of navigating its harbour. Though classified officially as a south coast port much of its catch came from eastern waters, but accusations that the port's fishermen were reactionary because of their persistence with smacks were

[142]Annual Report for England and Wales (1914) 25.
[143]S.C.on Sea Fisheries (1893-4) Q.1,535; Butcher, 1980, 16.
[144]Garstang, 1900, 44.
[145]Holt, 1895(i), 355.
[146]Cunningham, 1895, 125.
[147]S.C. of the House of Lords on the Sea Fisheries Bill (1904) Q.1,563.
[148]Jenkins, 1927, 116.

inaccurate. Although they just fished in the Channel[149] they employed methods and technology best suited to the conduct of such operations. In the early 1890s a Ramsgate owner explained that the local grounds were suitable for Humber fishing boats

> but our vessels are not so expensive as their great vessels. They have made a mistake; they have vessels too big and expensive, and if they complain it is only because their vessels are too big to do the work.[150]

He went on to say that the average tonnage at the port was 40 and the average beam length 40 feet. Nevertheless, quantity was maintained even though they fished off the North Foreland and did not venture to the Dogger,[151] a fact later confirmed by a colleague who stated that they fished 80 to 90 miles out, and that all but 'one or two' vessels were under 50 tons.[152] Accusations of being reactionary were also countered by the equipping of smacks with steam capstans by most owners by the twentieth century.[153] Table 27 may show that fishing boats were smaller than the above witnesses stated, but it reaffirms the overall trend.

Table 27

RAMSGATE

FISHING BOATS REGISTERED AS FIRST CLASS UNDER THE SEA FISHERIES ACT, 1868
(Quinquennial averages)

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869, 71-3	137	4,895	35.7
1874-8	155	5,462	35.2
1879-83	168	6,114	36.3
1884-8	142	5,115	36.1
1889-93	167	5,751	34.5
1894-98	187	6,087	33.0
1899-1903	164	4,725	28.8
1904-8	170	4,645	27.4
1909-13	166	4,286	25.7

149Annual Report for England and Wales (1908) 132.
150S.C.on Sea Fisheries (1893-4) Q.1,772.
151S.C.on Sea Fisheries (1893-4) QQ.1,773-83.
152Committee into Collecting Fishery Statistics (1902) Q.2,467.
153Aflalo, 1904, 270.

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS
(Quinquennial averages)

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL TONNAGE	AVERAGE TONNAGE
1883-7	130	9	5,054	36.4
1888-92	152	10	5,691	35.1
1893-7	175	7	6,047	33.1
1898-1902	166	5	4,997	29.3
1903-7	165	4	4,675	27.7
1908-12	168	2	4,416	26.0
1913	156	1	3,883	24.7

Sources: Annual Statements of Navigation and Shipping

English ports away from the North Sea coast and in Scotland, where most voyages still lasted less than two or three days,[154] proved to be quite resistant to steam technology. An official report noted that sailing fishing boats nationally had declined in the 20 years prior to 1908, but there was no precipitous fall, and average tonnages increased.[155] The chairman of the Lancashire and Western Seas Committee noted that a feature of his area was the better class of fish caught by sailing trawlers, which were increasing in number and size.[156] Table 23 has shown that smacks were still important away from the east coast, though the percentages of the national totals taken in these two areas confirmed that their effectiveness in terms of a mass market was strictly limited, a fact confirmed by the fact that second and third class fishing boats in the English Channel were responsible for almost as much fish as first class vessels.[157]

The seasonal employment of smaller smacks continued to be a feature of Ramsgate in the mid-1890s,[158] and though they were prosperous over these years before the turn of the century many were laid up because crewmen preferred to work ashore.[159] Nevertheless, the harbour master declared in 1900 that there were

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[154]Report on Relations between Owners, Masters and Crews (1882) 671.
[155]Report on Statistical Investigations (1908) Q.2,043.
[156]Report on Statistical Investigations (1908) QQ.315 and 536.
[157]Annual Report for England and Wales (1908) 132.
[158]Annual Report for England and Wales (1898) 115.
[159]Annual Report for England and Wales (1899) 131.

'no steam trawlers at all' there,[160] and there was 'not one' based at Brixham according to a fish salesman of that town in the same year.[161] The smack fleet as well as the size of each vessel, had increased by 1863,[162] a trend that continued to the last years of the century, and though a Grimsby steamer landed there in 1902 the experiment was not repeated.[163] Brixham possessed the largest indigenous fishing fleet on the south coast, including about 150 large trawlers of 30 or 40 tons.[164] Table 28 shows the constitution of its fishing fleet, though its existence as a sub-port of Dartmouth for statistical purposes necessitates care.

Table 28

BRIXHAM

FISHING BOATS REGISTERED AS FIRST CLASS UNDER THE SEA FISHERIES ACT, 1868 (INCLUDED IN DARTMOUTH UP TO AND INCLUDING 1901)
(Quinquennial averages)

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869, 71-3	130	5,119	39.5
1874-8	171	7,264	42.3
1879-83	231	10,376	45.0
1884-8	219	9,530	43.6
1889-93	247	9,993	40.4
1894-8	254	9,856	38.9
1899-1901	230	8,393	36.4
1902-3	188	6,716	35.9
1904-8	227	7,968	35.2
1909-13	211	7,282	34.6

[160] Committee into Collecting Fishery Statistics (1902) Q.1,260.
[161] Committee into Collecting Fishery Statistics (1902) Q.514.
[162] R.C. on Sea Fisheries (1866) QQ.8,035.
[163] Aflalo, 1904, 291.
[164] Aflalo, 1904, 293.

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS
(Quinquennial averages)

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL TONNAGE	AVERAGE TONNAGE
1883-7	171	39	9,191	43.9
1888-92	193	52	9,990	40.8
1893-7	207	45	9,763	38.7
1898-1901	225	17	8,804	36.4
1902	172	4	5,358	30.4
1903-7	218	2	7,611	34.3
1908-12	212	2	7,448	34.8
1913	198	1	6,837	34.4

Sources: Annual Statements of Navigation and Shipping

There were no vessels over 65 tons at the port[165] because grounds closer to shore like those between Portland and Berry Head provided local fishermen with a living. Brixham smacks trawled from Portland to Scilly but not westward.[166] Also a factor in the promotion of sail over steam at Brixham was their respective cost. A smack could be purchased for as little as £500 while a steamer would cost about £10,000,[167] nevertheless, trawling continued to prosper at the port from the late 1880s to 1897. New vessels were being built and employment was increasing,[168] so there was little incentive to change. However, half a dozen or so years of depression followed 1897, which had looked like being a record year until gales wreaked havoc.[169] The following summer was long and resulted in the port's smacks being laid up three days in the week,[170] while bad weather again harmed fortunes in 1899 and the trawling industry suffered 'severely' with no money being advanced for the building of new smacks.[171] By 1901 this situation had become an 'acute crisis' as investment continued to be witheld and, the Collector observed, 'no lack of fish...[rather] want of management seems to be the cause of decline.'[172] If this was an oblique reference to the port's persistence with smacks it was not heeded for in

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165 Committee into Collecting Statistics (1902) Q.2,277.
166 Report on Statistical Investigations (1908) QQ.4,911-2.
167 Report on Statistical Investigations (1908) Q.4,988.
168 Annual Reports of England and Wales.
169 Annual Report for England and Wales (1898) 116.
170 Annual Report for England and Wales (1899) 281.
171 Annual Report for England and Wales (1900) 271.
172 Annual Report on the Sea fisheries of England and Wales for 1901 (BPP, 1902, XIV) 839.

1903 the launch of 14 new sailing trawlers heralded something of a revival,[173] which culminated in 1910 with the yards 'being busier than for years.'[174]

There was a 'slight decrease' in the smack fleets of Lowestoft, Ramsgate and Brixham in 1900,[175] and the tendency to work inshore grounds from these ports resulted in an increase in second class vessels in 1902 as the number of first class boats declined.[176] According to the Annual Statements the number of second class vessels at Brixham declined from 37 in 1871 to 13 in 1900, from where it picked up to 55 the following year before falling back and never exceeding 17 to 1913. At Ramsgate there were 103 in 1877, a number that fell to nine in 1901. It then recovered, peaking at 32 in 1906 and remained in the 20s thereafter. There was a single Second Class fishing boat at Lowestoft in 1889, but the total rose to 66 in 1903 then remained above 47. Despite the note in the report for 1902 no lasting trend of any significance was reported from these statistics and the numbers of first class vessels was maintained.[177]

Financial backers at Brixham were concerned about the port's persistence with smacks in the face of the increasing employment of steamers elsewhere around the coast.[178] The technical zenith of the smack and the commencement of its economic downfall were temporally very close and it is easy to see the advent of steam fishing boats as precipitating an adverse effect on smack prices, but values were already prone to swift depreciation. A line fisherman at Eyemouth told how a smack that cost £2-300 in the late-1840s sold for only £40 to £60 15 years later,[179] at which time a trawler in Devon 'that must have cost 800l. a few years ago was sold for

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[173]Annual Report for England and Wales (1904) 241.
[174]Annual Report on the Sea fisheries of England and Wales for 1910 (BPP, 1912-3, XXVI) 409.
[175]Annual Report for England and Wales (1901) 113.
[176]Annual Report on the Sea fisheries of England and Wales for 1902 (BPP, 1903, XIII) 10.
[177]Annual Statements of Navigation and Shipping.
[178]Porter, 1994, 245-6.
[179]R.C.on Sea Fisheries (1866) QQ.28,158-61.

2001. a short time ago.'[180] In the early 1880s one of the best Hull smacks, complete with stores and gear, cost from £1,500 to £1,700,[181] but as steamers came in owners were often fortunate to get £200 only a few years later.[182] Charles Hellyer, a major trawler owner in Hull, recalled that his 12 'beautiful' trawling smacks lost half their value 'as soon as the first [steam] trawlers put in an appearance',[183] and at the same port Christopher Pickering sold 21 smacks in one deal as soon as he 'had the steam trawlers ready'.[184] In 1896 the Grimsby smack *Argo* was withdrawn from auction when bids failed to exceed £39, no matter that she had cost £1,600 in 1877.[185] In the early years of the twentieth century Thomas Campbell of Grimsby sold five smacks built between 1884 and 1894. Having 'steadfastly' refused to convert to steam he finally sold them for £215 each, complete with stores, though their original cost probably exceeded £7,000 all found.[186] Not surprisingly, such occurrences sowed doubts in the minds of potential investors in the smack fishery at Brixham.

Maintenance was often neglected as smack owners endeavoured to remain competitive and tried to meet costs for such things as ice that were incurred by sailing farther afield. In 1887 alone thirty smack owners went bankrupt in Grimsby and when, in the mid 1880s, the Grimsby Ice Company bought up 58 smacks that belonged to its directors, shareholders were understandably piqued at being used as a 'safety net.'[187] Away from the leading edge of the industry, as Mathias wrote, it was

> much more convenient, easier and cheaper, in the short run, to repair and replace machines than to scrap and innovate...Why scrap a perfectly good machine that was superbly made, lovingly maintained.[188]

180R.C.on Sea Fisheries (1866) Q.18,506.
181Report on Relations between Owners, Masters and Crews (1882) 671.
182Pickering, 1915, 75.
183S.C. of the House of Lords (1904) Q.1,406.
184Pickering, 1915, 75-6.
185Boswell, 1974, 23; Goddard and Spalding, 1987, 18.
186Wood, 1911, 53-4.
187Goddard and Spalding, 1987, 19.
188Mathias, 1983, 385.

Great sums were invested in smacks. The price of the largest rose from £7-900 in the early-1860s[189] to about £2,000 for a similar vessel in the mid-1880s,[190] which was a huge leap, but they were still much cheaper than steamers. Purchase of the latter necessitated a changed infrastructure to facilitate ownership - one that would preclude erstwhile owners on economic grounds.

Such prices affected the demersal sector first of all, but the pelagic fisheries were similarly afflicted following the introduction of the steam drifter. Drift-netting had remained immune to steam propulsion up to the last years of the nineteenth century, when the viability of steam drifters prompted the decline of large, purely sail-powered smacks. Meanwhile the advent of the internal combustion engine in the first years of the twentieth century did much for the sailing smack away from distant waters, in which the drifting smack became rarer as their domain was increasingly restricted to grounds closer inshore.

In June 1900 a retired fisheries inspector voiced the opinion that without doubt 'the sailing trawler is doomed to extinction.'[191] The last new smacks were built for Hull in 1886 and for Grimsby in 1893. Of over 450 at Hull in 1884 'virtually every one' had been disposed of by 1900, and the last at Grimsby sailed in 1903.[192] Their profitablity was diminishing at the leading edge of the industry and the introduction of the otter-trawl in 1895 speeded their departure, which was further hastened by stormy weather at the beginning and end of the year with an 'exceptionally fine summer' in between.[193] Discarded vessels were sold abroad (see Chapter 7i) or to ports in Britain where new technology had not been established, this involved the devaluation of smacks at Grimsby, for example, by 70 per cent.[194] In 1896 a fleet

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189Robinson, 1996, 68.
190Annual Report for England and Wales(1887) 137.
191Select Committee on Sea Fisheries Bill (BPP, 1900, VIII) Q1,213.
192Robinson, 1996, 112.
193Annual Report for England and Wales (1896) 122.
194Annual Report for England and Wales (1895) 197.

of smacks had been broken up at Grimsby[195] and the Grimsby Ice Company's fleet of nearly 100 vessels transferred to Great Yarmouth.[196] By the turn of the century the contribution of smacks at major trawling centres was negligible, and on the eve of World War One a Fife fisherman expressed the view that there was 'no future' for sailing boats in his locality.[197] The 'significant' revival in building first-class smacks for the North Sea in 1913[198] could not overcome the basic reason for the demise of the sail-powered fishing boat, namely the changing market for fish. With the coming of a mass urban market for fresh fish speed and reliability became vital. A trawlerman could no longer afford to allow weather conditions to determine whether he put in to Hull, Lowestoft or London.[199] Railways had initiated the smashing of the economic 'bottleneck' that had stifled development for so long, and fishing steamers completed its destruction by enabling production to maintain parity with progress made elsewhere in the chain of supply. The Royal Commissioners' words of 1866 are at least as pertinent for subsequent decades.

> 'The machinery for fishing has increased in efficiency, while in proportion to that efficency the cost of working it is actually diminished'.[200]

However, the price of that 'machinery' was prohibitive to many owners of sailing smacks and the drastic changes it implied frightened others. Thus did the sailing smack persist, and thereby added a significant dimension to the issue of technological diffusion in the fishing industry at this time.

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195 Annual Report for England and Wales (1897) 111.
196 Annual Report for England and Wales (1897) 227.
197 Scottish Committee on North Sea Fishing (1914) Q.2,518.
198 Annual Report for England and Wales (1914) 25.
199 R.C.on Sea Fisheries (1866) Q.7,570.
200 R.C.on Sea Fisheries (1866) 582.

iii ICE

The value of ice as a preservative has already been commented upon, and it certainly enhanced the productivity of smacks and 'helped to transform the supply side' of the fishing industry.[201] It had first been used in the fisheries in 1780 to facilitate the transport of salmon from Scotland to London[202] and thereafter it was utilized in the coastwise carriage of fish landed from inshore grounds.[203] Offshore, the ubiquitous Hewett's were using it by the late 1840s 'for preserving white fish at sea'[204] - a fact borne out by the construction of an ice house by Barking Creek in 1846[205] - and a Yarmouth skipper reckoned its first use by the port's smacks dated back to 'about 1843'.[206] Meanwhile, a Billingsgate salesman estimated that the early 1850s saw its first use on the Thames - only four or five years after the arrival of fleeting cutters.[207] As with the development of smacks, the precise date of the introduction of ice varied according to location, but whatever the precise date, it greatly enhanced the flexibility of distant water operations, not least because it enabled development of the trawl,[208] and by 1880 it had become a fact of life in wholesaling and retailing and its use at sea was widespread.[209] It facilitated more intensive fishing of a wider area and heightened the level and reliability of fish supplies.

Ice was crushed and loaded into the holds of smacks *via* chutes. When introduced into Hewett's fleet tonnages rose from under 50 to 70 as 'vessels turned into floating ice containers, holding fish in boxes with a layer of ice on top of each

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201Fraser, 1981, 161.
202De Caux, 1881, 108; Chaloner, 1966, 98.
203Chaloner, 1966, 98; Northway, 1969, 17; Muirhead, 1992, 116.
204Cutting, 1955, 222; Robinson, 1996, 71.
205Captain R.S.Hewett, 1964, 6.
206R.C on Trawling (1884-5) Q.10,896; Jenkins, 1920, 145 reckons 1854.
207R.C.on Sea Fisheries (1866) Q.12,502.
208Cutting, 1955, 224. Quoting Captain R.S.Hewett speaking in the early 1950s.
209Cutting, 1955, 233.

box.'[210] Fish could be kept at sea for about a week in the summer months,[211] Hull cutters, for example, being loaded with eight to ten tons for a trip to the North Sea and on to London. This voyage rarely took more than five days and was undertaken in the knowledge that there was little chance of losing the cargo, and the fish arrived at market in better condition than if it had been railed. Hull was not renowned for its rail links, and 'nearly all' its fish traffic to the capital was conveyed by sea.[212] The Clerk at Billingsgate confirmed that most water-borne fish arrived in cutters, and only pelagic species were delivered by the actual fishing boats.[213]

Ice was integral to optimum working of the fleeting system and reliance on it increased in the 1870s when longer voyages signalled a movement to single-boating, but its use grew irrespective of how smacks were deployed.[214] Many considered that ice was 'extremely dear',[215] which was especially true when a mild winter followed a hot summer. Offshore fishing was becoming increasingly expensive and a lack of supplies, particularly ice, could lead to vessels that normally stayed at sea for six to eight weeks, abandoning their fleets and operating singly inshore, from where they could land their catch daily.[216] With the resolution of practical problems and its regular availability, however, normal fleeting voyages were extended to between eight and ten, sometimes even to twelve, weeks in summer, by the 1880s, and thus were realized fears of many fishermen who had initially expressed doubts about the use of ice because they 'thought the owners were going to usurp and tyrannize over them, and keep them at sea.'[217] However, prior to the mid 1880s the use of ice in Scotland was 'comparatively rare'.[218] The General Steam Fishing Company in

[210]Stern, 1971, 60.
[211]R.C.on Sea Fisheries (1866) QQ.7,897 and 10,363-6.
[212]R.C.on Sea Fisheries (1866) QQ.7,893-7,900.
[213]R.C.on Sea Fisheries (1866) Q.12,588.
[214]Cutting, 1955, 233.
[215]R.C.on Sea Fisheries (1866) Q.7,895.
[216]Muirhead, 1992, 263.
[217]R.C.on Sea Fisheries (1866) Q.8,519.
[218]M'Intosh, 1895, 316.

Granton did not use it in winter, and in warmer weather used a daily carrier equipped with bagged ice,[219] meanwhile, to the south, Hewett's Home Fleet, which restarted operations in 1878, also spurned the use of ice.[220]

Single-boat operation gradually displaced fleeting as more extensive grounds were worked for up to three weeks[221] by vessels that could bring their own fish to market.[222] R.M. Hewett found that a straightforward procedure involving the mixture of ice and salt produced very low temperatures which kept the ice intact for a considerable period with no installation and at very little expense.[223] As early as 1864 some Hull smacks had ice-boxes on board and could operate independently,[224] putting increasingly distant grounds within their range. In 1878 it was estimated that the annual ice bill for a trawler was £100, about nine per cent of its earnings,[225] and by the end of the nineteenth century five tons was an average shipment of ice per trawler,[226] the same amount being carried by the larger vessels at Aberdeen in the mid 1890s.[227]

The fisheries were not unique in their use of ice. Other food industries relied heavily on supplies but their requirements were generally for high quality crystal ice,[228] whereas the fishing industry had less stringent needs which made it comparatively cheap. At first, supplies were obtained from local canals and ditches. Hewett's got theirs from 'the frozen Essex marshes', and two to three thousand men, women and children were employed to collect it for storage in specially built ice houses.[229] One such was erected at the mouth of Barking Creek at a cost of

219M'Intosh, 1895, 317.
220Alward, 1932, 151.
221Report on Relations between Owners, Masters and Crews (1882) 671.
222Annual Report for England and Wales (1887) 139.
223Alward, 1932, 146.
224Cutting, 1955, 232.
225Robinson, 1996, 70.
226Cutting, 1955, 232.
227M'Intosh, 1895, 316.
228David, 1995, 56-7.
229Butcher, 1980, 13.

£1,300, and provided space for approximately 5,000 tons that could last the summer within walls approximately 27 inches thick.[230] Vessels *en route* from London would take aboard 10-20 tons before proceeding to the open sea - though the same source goes on to specify that between eight and 35 tons were loaded in summer and from five to 16 in winter - the quantity having much to do with whether or not it was 'blowing weather'.[231] Marsh ice was not only cheaper, fishermen asserted that it had greater qualities as a preservative.[232] Accordingly, Grimsby firms started using ice from local ponds in 1858,[233] but as Hewett's had found such supplies were unreliable.[234]

The Barking firm had experimented with importing ice from Norway[235] and their lead had been taken up at Hull in 1851 where William Carr, a 'pioneer fish merchant...fitted up an Ice House stored with Pure Block Ice.'[236] This entailed considerable expense, and even higher costs were incurred if ice had to be imported from North America.[237] Despite its liberating effect on fishing operations, supplies remained limited and its cost prohibitive to an increasing number of concerns. This was especially so at Hull where trawlers that spent the summer with London fleets were salesmen charged 20 per cent by salesmen for their services, which led, in 1859, to the formulation of a scheme to build large cutters and run iced catches to Hull in summer.[238] This resulted in the founding of the Hull Mutual Ice Company and the building of ice houses for year-round use by the port's trawlers. Still, though, the problem of supplies persisted, and one London merchant remarked in 1863 that if ice was readily available vessels would go farther afield and earn

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230Captain R.S.Hewett, 1964, 6.
231R.C.on Sea Fisheries (1866) QQ.12,788-806.
232Captain R.S.Hewett, 1964, 6.
233Cutting, 1955, 234.
234R.C.on Sea Fisheries (1866) Q.12,797.
235Captain R.S.Hewett, 1964, 6.
236Bellamy, 1965, 274. Quoting Hull Advertiser, 22 August 1851.
237R.C.on Sea Fisheries (1866) Q.12,790.
238Hellyer, 1915, 43.

more.[239] As it was its scarcity contributed to the fact that half the fish sent to London from the North Sea that year was condemned.[240]

This unsatisfactory situation led to formation of the Wenham Lake Ice Company in 1865, through whose offices a Norwegian lake near Drobeck, which supplied nearly all the imported ice for the British fishing industry, was purchased.[241] The increase in imports of Norwegian ice is shown in Table 29, which includes imports for all purposes but, as mentioned above, natural ice was of a quality unacceptable to most industries.

Table 29

BRITISH IMPORTS OF NORWEGIAN ICE

Year	Natural Ice (Tons)
1855	2,960
1860	13,718
1865	38,605
1870	90,242
1875	56,219
1880	178,949
1885	268,578
1890	356,282
1895	409,505
1900	448,813

Source: PRO, CUST 5, in David 'The Demise of the Anglo-Norwegian Ice Trade', 53.

It became usual for Grimsby smacks to load two or three tons of ice for a six to ten day trip around the middle of the nineteenth century[242] so supplies had to be assured. The port's requirements were furnished by several ice barques owned by the Great Grimsby Ice Company which had been founded in July 1864.[243] They sailed from Bergen with blocks of ice crushed, sacked and wrapped in straw to reduce melting, though about 50 per cent of the volume was still lost in transit.[244] All eight founders of the company were local smackowners or 'fish salesman' with

[239]R.C.on Sea Fisheries (1866) QQ.13,190-4.
[240]R.C.on Sea Fisheries (1866) Q.3,894.
[241]Robinson, 1996, 70.
[242]Cutting, 1955, 235.
[243]PRO, BT31/978/1427C and BT31/14,789/20,686.
[244]Robinson, 1996, 70.

vested interests in the prosperity of fishing at the port, but the company supplied trawlers other than their own[245] and was not the only firm supplying ice at the port. The Grimsby and Cleethorpes Ice Company was established in March 1868 for the 'encouragement, protection and increase' of east coast fishing,[246] and by the early 1880s ice carriers cost £1,600 to £1,800 according to a major Hull smackowner whose fleet included six of these vessels.[247] Offshore fishing required increasingly large amounts of capital as the scale of operations expanded and requirements diversified. The use of ice was indicative of the fact that it was no longer sufficient to own a boat and catching equipment in order to earn a living from distant water fishing.

22,000 tons of ice was imported into Grimsby in 1872[248] and 90,000 tons was used there in 1900,[249] while the number of first class fishing boats at the port, irrespective of catching power, rose 166 per cent and their aggregate tonnage 196 per cent in the same period.[250] Thus demand for ice escalated, but supplies remained far from reliable, so there was considerable economic incentive to find an alternative source. An uneconomic refrigeration plant had been fitted aboard a wooden steamer, *Major*, in the middle of the century,[251] but it was some years before ice was being manufactured for the fisheries. The use of artificial ice was inhibited by the fact that prejudice against it lingered 'well into the twentieth century',[252] despite the fact that it meant 'surer supplies and therefore more stable prices'.[253] The Lowestoft Ice Company sold 1,440 tons at 21/- in 1875 and 6,000 at 35/- in 1882.[254]

245Cutting 1955, 235.
246PRO, BT31/1,395/3944.
247Report on Relations between Owners, Masters and Crews (1882) QQ.6-7 and 14.
248Holdsworth, 1874, 256.
249Cutting, 1955, 235.
250Annual Statements of Navigation and Shipping.
251Alward, 1932, 146.
252Cutting, 1955, 235.
253David, 1995, 61.
254Butcher, 1987, 74.

Artificial ice was first used commercially in the sea fisheries in 1874.[255] Different qualities were manufactured for different markets, the Linde British Refrigeration Company's plant at Shadwell, for example, was constructed in 1887[256] and produced 'the lowest quality...[for] the Thames fishing fleet',[257] and the rate of progress was variable in different regions. Hull imported all its ice from Norway[258] until the construction of the first ice plant there in 1891[259] following the Hull Ice Company's 'reconstruction' from a firm that had concentrated on the import of ice for 25 years.[260] It produced 50 tons per day and the Hull Steam Fishing and Ice Company underwent similar changes, and 'restructured' to facilitate manufacture rather than importation.[261] In this case the company was wound up and restarted in 1889, its authorized capital being raised from £30,000 to £200,000, with the vested interests and resources of such investors as the trawler owner Charles Hellyer undoubtedly playing a part. The figures in Table 30 are derived from returns of the Hull Ice Company and they show the meteoric rise of manufactured ice and the corresponding decline of imported supplies.

Table 30

ICE SUPPLIES AT HULL

Year End 30 April	% Imported by Hull Ice Co.	% Manufactured by Hull Ice Co.	Total (Tons)
1891	100.0	0.0	16,574
1895	48.7	51.3	27,944
1900	24.6	75.4	72,024
1905	11.5	88.5	86,768
1910	13.0	87.0	88,194
1913	7.8	92.2	81,804

Source: Hull Ice Company, in Clark 'The Location and Development of the Hull Fish Industry', Appendix C Table 36.

[255]Robinson, 1996, 69.
[256]Alward, 1932, 146.
[257]David, 1995, 56.
[258]Pickering, 1915, 76.
[259]Cutting, 1955, 235.
[260]PRO, BT31/881/922C.
[261]PRO, BT31/2,623/13,888 and 4,748/31,368

By 1915 there were six factories in Hull producing about 2,000 tons of ice per week[262] and reliance on imports fell greatly as can be seen from the above table. This relationship is less certainly illustrated in Table 31 as the aggregate quantity imported into Grimsby is offset by the figures of only one manufacturer. Hagerup & Doughty were one of the largest trawler firms at the port and built their own factory in 1897, extending it to enable greater output, in line with other firms, two years later.[263]

Table 31

ICE SUPPLIES AT GRIMSBY

Year	Tons Imported into Grimsby	Tons Manufactured by Hagerup & Doughty
1897-8	75,493	19,741
1898-9	84,325	31,581
1899-1900	74,623	38,250
1900-1	68,390	35,868
1901-2	23,340	47,824
1902-3	26,250	46,586
1903-4	17,760	-
1904-5	16,660	-

Sources: PRO Cust 25 for 'imported' ice: Records of Hagerup & Doughty at South Humberside Area Record Office for 'manufactured' ice. From David 'The Demise of the Anglo-Norwegian Ice Trade', 60.

In 1898 the East Anglian Ice Company built a factory at Lowestoft that was soon producing 10-12,000 tons per year,[264] but the manufacture of ice was not restricted to the North Sea coast of England. Fisheries authorities at Aberdeen had long regarded the import of ice as unsatisfactory, which led to the Aberdeen Ice Company having built three plants by 1890,[265] one of which was producing 20 tons per day by the middle of the decade.[266] Such advances meant that manufactured ice became the chief source of supply to the industry by the end of the century.[267] Milford had two ice factories that produced a total of 20,000 tons in 1903 [268] and a

262Pickering, 1915, 78.
263David, 1995, 59.
264Cutting, 1955, 235; Butcher, 1987, 74.
265Pyper, 1903, 23.
266M'Intosh, 1895, 316.
267Robinson, 1996, 69.
268Aflalo, 1904, 99.

few years later Fleetwood was similarly equipped, the north-west having been a major consumer of ice, 11,000 tons being imported into Liverpool in 1896.[269]

Developments at the Lancashire port were particularly significant as it had been a major pillar in the Anglo-Norwegian ice trade. From 1907 to 1910 'it was importing more ice from Norway than any port outside London',[270] so when the Fleetwood Ice Company[271] built an 'impressive' factory the business suffered enormously.[272] Table 32 shows how it declined during the early years of the early twentieth century.

Table 32

IMPORTS OF ICE AT TEN PORTS

	QUANTITY (Tons)		
Port	1905	1912	% Decline
London	180,915	155,014	14
Grimsby	16,660	6,660	60
Fleetwood	14,898	5,441	63
Liverpool	12,864	10,270	20
Hull	11,520	7,390	36
Glasgow	7,453	4,349	42
Penzance	7,365	1,675	77

Sources: Cold Storage and Ice Trades Review, Vol.9, No.94 (Jan 1906); Cold Storage and Produce Review, Vol.18, No.202 (Jan 1915). From David 'The Demise of the Anglo-Norwegian Ice Trade', 64.

Just as haphazard supplies of fish from smacks could not be counted upon, the decline of this trade stems from the fact that reliance on ice had grown to such an extent that erratic supplies could no longer be tolerated,

269Jarvis, 1995, 70.
270David, 1995, 62.
271PRO, BT31/5,780/40,510 (1894); BT31/8,676/63,306 (1899); BT31/13,069/107,319 (1910).
272David, 1995, 62.

iv STEAM AND SMACKS

Holt dated the indirect adaptation of steam to fishing purposes at 'about 1850,' and its extensive use from 'about 1860.'[273] Initially, its use in the fisheries was confined to towing and carrying. Towing 'had represented the most familiar use of steam at sea since the 1820s',[274] and an early example from the fishing industry cited Margate fishermen in around 1850 who 'would pay a steamboat £20 to get a tow up'. If delayed at sea the catch barely realized 40 per cent of the price obtainable if it was caught and landed on the same day, and indeed in hot weather it would probably be worthless.[275] Tugs were hired from outside the industry and the cost was prohibitive for small concerns, while for larger firms the outlay on capital that would be idle for much of the time was uneconomic. Investment in sail hardened resistance to steam, an attitude epitomized by a Hull smack owner who foresaw 'great difficulties' in the management of a system that included steamers,[276] though he acknowledged the safety net represented by the attendance of 'steamboats' prepared to tow smacks up the Humber.[277] Similarly, the carriage of fish by steamers was deemed impractical. Reasons given included the assumption that heat from the boilers would spoil them and melt the ice, necessitating a 'very large vessel' to separate the two elements,[278] and such craft would roll excessively to the detriment of the catch[279] - not to mention the men trying to board them, a factor that did not prevent experiments being carried out.[280] The Hull man was convinced that 'our own boats' could collect the catches of a scattered fleet more efficiently than a single steamer,[281] though he did not address issues related to the

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[273]Holt, 1895(i), 365.
[274]National Maritime Museum, 1986, 31.
[275]March, 1953, 37.
[276]R.C.on Sea Fisheries (1866) Q.7,949.
[277]R.C.on Sea Fisheries (1866) Q.7,902.
[278]R.C.on Sea Fisheries (1866) QQ.7903-4.
[279]Cutting, 1955, 229.
[280]R.C.on Sea Fisheries (1866) QQ.12,726-7.
[281]R.C.on Sea Fisheries (1866) Q.6,881.

greater speed of steamers and the waste of time resultant from craft being engaged in searching for the dispersed fleet.

Towing, carrying and extraction were seen as separate functions in the production process, though one incident muddied these distinctions. During 'the long hot summer of 1860' two Sunderland trawling smacks were towed to, and over, inshore grounds by the paddle tug *Heatherbell*, hauling their nets so she could take their catches ashore in time for the first market of the day and return to repeat the operation. The witness stated that 'the practice was never again repeated to my knowledge'.[282] From the same year tugs were used at Great Yarmouth to tow fishing boats over the difficult approaches to the harbour and sometimes to the fishing grounds.[283] A tug towed up to ten smacks,[284] which indicated a significant demand for their services.

Such developments were not confined to the production of white fish. The report on British fisheries for 1867 noted 'it is in contemplation to employ Steam Tugs at different places in aid of the Fishing Boats',[285] while at Scarborough in 1870 a tug was employed for the general benefit of the port's smacks.[286] Though opposition to steam was probably more intense at some Scottish ports than anywhere else in the country, notable appreciation of its value existed in the upper echelons of the industry. In 1871 'At Aberdeen the Fishery is greatly indebted to steam-tugs, which are taken up...to tow them [the fishing boats] to the fishing grounds and bring them back into port'.[287] At Fraserburgh a few years later, in face of the failure of inshore grounds and the attractions of more distant waters 'the fishermen could not go much

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[282]Holt, 1895, 369. Quoting the testimony of Mr T.N.T.Potts.
[283]Fewster, 1985, 30.
[284]Report on Relations between Owners, Masters and Crews (1882) Q.121. Photographic evidence of this can be seen in Gray, 1982, 41; National Maritime Museum, 1986, 41; Ekberg, 1984, 30.
[285]Report for the British Fisheries (1867-8) 625-6.
[286]Robinson, 1987, 61.
[287]Report for the Herring Fishery: Scotland (1872) 611.

further than they do now without steam.[288] The same report included evidence from a North Sunderland fisherman who employed carriers to send his fish to market as well as tugs to help his smacks.[289] Five years later this reliance had increased with steamers on the west coast that had been employed to carry herrings also rendering 'valuable assistance by towing the boats but for which the fishing would have been less productive than it was.'[290] Fishermen in the Eyemouth district paid £3,700 for tows in 1885,[291] so it is perhaps as well that productivity was high.

As the nature of the market changed so it became all the more imperative to convey fish to shore as soon as possible. This had long been evident in the conception and widespread deployment of specialized fleet carriers which, unlike tugs, were owned by fishing concerns. Therefore it was a significant step in the diffusion of steam technology when the pressure to get fish to market at the earliest opportunity precipitated the conception and use of steam carriers. Robert Hewett recognized the potential of such vessels and ordered four to replace his sailing cutters in 1864, and the Royal Commissioners noted that London's fishing fleet had increased by ten sailing and two steam vessels in the two years previous to 1866.[292] *Lord Alfred Paget* and *Wellesley* carried three times the quantity of fish and could deliver it to Billingsgate in one-third of the time taken by their predecessors.[293] In 1865 they were joined by *Frost* and *Hallett*, doubling efficiency and providing a regular thrice-weekly service.[294] The vessels they displaced were converted into ketches and used as trawling smacks,[295] another example, given the greater capacity of carriers, of how the size of fishing boats was increasing.

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288 Report on the Herring Fishery of Scotland (1878) 326.
289 Report on the Herring Fishery of Scotland (1878) 448.
290 Annual Report for Scotland (1883) 762.
291 Annual Report for Scotland (1886) 225.
292 R.C.on Sea Fisheries (1866) 589.
293 March, 1953, 149.
294 Cutting, 1955, 229.
295 White, 1950, 23.

Steamers performed an expanding role in the conduct of the fisheries. Carriers were in use at Grimsby by 1875[296] and were developed in keeping with the rising production of the industry. In 1880 the Hull Steam Fishing and Ice Company was formed and five screw-driven carriers were built, and additionally a coal hulk was purchased at Gravesend to provide 'bunkering facilities',[297] and further illustrated the fact that steamers necessitated much more investment. Steam carriers in the 1880s resembled the 100-foot *Supply* that was made of iron and carried 45 tons of coal, 30 tons of ice and 30,000 empty fish trunks.[298] Maximizing their efficiency was a factor in attempts to implement fleeting throughout the year in the early 1880s,[299] and at a cost of about £6,000 apiece this was understandable.[300] By the middle of the decade 'regular steam carriers...[were] attached to most of the fleets and the smacks remain at sea from six to eight weeks, or even longer',[301] and several years later one admiral reported that the use of steam carriers with fleets consisting solely of sailing smacks was entirely normal.[302] North Sea fleets of about 200 vessels contrasted strongly with others, like a fleet of Short Blue trawlers that comprised of only four or five vessels fishing off Iceland which was serviced by six carriers during the last summers of the nineteenth century.[303]

These events provide a telling commentary on the diffusion of steam technology in the British fisheries. As shown earlier in the chapter, prejudice against its use derived initially from the fact that it would render obsolete huge quantities of expensive capital worked from within the smack-based infrastructure. Thus it was perceived as a threat to the livings of fishermen, but a smaller and more powerful

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296Alward, 1932, 90.
297Bellamy, 1965, 328-9.
298Cutting, 1955, 229-30.
299Annual Report for England and Wales (1887) 139; Cutting, 1955, 235.
300Report on Relations between Owners, Masters and Crews (1882) QQ.6-7 and 13-14. And see Bellamy, 1965, 330 and Goddard and Spalding, 1987, 20.
301Annual Report for England and Wales (1887) 139.
302S.C.on Sea Fisheries (1893-4) Q.1,219.
303Alward, 1932, 149. Quoting the testimony of R M Hewett.

group of larger owners were prepared to combine resources in order to implement such new technology in pursuit of profit.

The implementation of new technology in the fishing industry highlighted the differences between investors keen to increase supplies, profits and dividends, and more established owners and operators anxious to safeguard their livelihoods. Prosperity for the former invariably meant bankruptcy for the latter, as the tide was moving inexorably towards change at the expense of the erstwhile infrastructure. Smack owners did all they could to eke out the efficiency of their vessels and this manifested itself through the implementation of steam capstans aboard fishing boats from the mid-1870s. Whereas hauling a trawl manually took 'an hour or two', it was possible in 20 minutes with such aid.[304] These devices were pre-dated a few years by the introduction of steel warps and wires that replaced ropes and allowed deeper trawls and facilitated the practical operation of larger vessels.[305] Such craft, irrespective of how they were powered needed more such developments to operate to their potential.[306]

The power for hauling nets - of whatever type - and working equipment had customarily been provided by manpower with the aid of hand capstans, but with the increasing sizes of smacks deck work involved the expenditure of effort to and beyond human limits. However, efficiency was enhanced greatly by the introduction of steam-powered alternatives. The first steam capstan was produced by Smith, Stephenson & Company of Grimsby in 1876,[307] and their use quickly spread.[308] Besides hauling the trawl they were used to adjust the rigging,[309] while the 'donkey'

304Rule, 1976, 389.
305Morey, 1968, 131; Robinson, 1996, 68.
306Cutting, 1955, 271.
307Alward, 1932, 57, J.Alward helped design the 'small donkey boiler' that powered it as well as the capstan itself.
308Annual Report for England and Wales (1887) 137.
309Holt, 1895, 353; Carr, 1934, 84.

engine, that powered it was also used for such tasks as sluicing the fish down[310] and pumping away melted ice.[311] One Grimsby owner stated that 'they are getting them very fast', nearly 100 being used aboard the port's smacks by the early 1880s,[312] though things were moving less speedily at Ramsgate where an owner said that only one vessel had a steam capstan at that time,[313] while a counterpart at Yarmouth possessed four smacks of which two were so equipped in October 1882.[314] Progress was helped in 1884 when William Garood 'thought of the idea of taking steam through the hollow spindle to an engine on top of the capstan'.[315] This halved coal consumption which speeded their deployment throughout the trawling and drift netting fleets. Another Yarmouth owner reported in the early 1890s that he ran twelve smacks, of which two-thirds were so equipped,[316] and all Lowestoft ketches had steam capstans by the mid-1890s.[317]

The technical properties of these capstans were undisputed, but as with other applications of steam power they were not greeted with unanimous enthusiasm. The crew had their burden lightened, but the 'iron man' took five per cent of any profit in consideration of the expense incurred in paying for this new equipment.[318] This provoked the Capstan Riots in East Anglia in the 1880s,[319] and was the reason that many Devon smacks shunned such devices for years to come,[320] and as late as the second half of the twentieth century owners still took out a share on behalf of the capstan.[321] Once they were being used one Grimsby owner deemed that smacks were not adequately manned[322] and absence of a steam capstan warranted

310R.C. on Trawling (1884-5) Q.12,299.
311M'Intosh, 1895, 317.
312Report on Relations between Owners, Masters and Crews (1882) Q.1,717.
313Report on Relations between Owners, Masters and Crews (1882) Q.5,809.
314Report on Relations between Owners, Masters and Crews (1882) Q.4,074-5.
315March, 1953, 94.
316S.C.on Sea Fisheries (1893-4) Q.5,485.
317Cunningham, 1895, 125.
318Aflalo, 1904, 271.
319Butcher, 1979, 48.
320Aflalo, 1904, 271.
321Butcher, 1979, 48.
322Report on Relations between Owners, Masters and Crews (1882) Q.1,718.

employment of an extra crewman,[323] though a Hull skipper held the opinion that although steam winches saved labour trawlers were still undermanned.[324]

The 'cost and upkeep [of fishing boats] were a very serious consideration',[325] and though technological changes brought advantages their financial cost was prohibitive to many. The fishing industry was becoming more reliant on marine steam power to sustain, let alone increase, productivity in relation to market demand. However, there was a widespread reluctance to admit it within the sail-based infrastructure. Many owners and operators could not afford to implement the latest developments and so persisted with equipment that, though remunerative in the short term, was fated to become obsolete in the face of more modern methods. In 1904 it was written that 'the respective spheres for the operation of "steam" and "sail" will always be more or less sharply defined...[and]...the position of sailing trawlers is likely to be still further strengthened.'[326] This was not so, viable new technology rendered wind power increasingly obsolete for trawling, and although smacks endured for decades after 1914 in some areas of the fisheries, by that year their deployment in the distant water sector was very much on the wane. They became progressively less suited to the economic environment, as can be seen from the development of the steam-driven vessels that displaced them.

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[323]Report on Relations between Owners, Masters and Crews (1882) Q.1,719.
[324]Report on Relations between Owners, Masters and Crews (1882) Q.1,155.
[325]Report on Relations between Owners, Masters and Crews (1882) QQ.1,156-9.
[326]Annual Report for England and Wales (1904) 170, *et seq.*

CHAPTER 4 EARLY STEAMERS

Steam power did not arrive suddenly in the sea fishing industry. As shown in the preceding chapter it was applied indirectly in various ways throughout the production process. However, the implementation of steam propulsion to fishing boats was not taken up with alacrity, and it was several decades before such vessels were rendered viable. The first section of this chapter details various experiments undertaken and culminates in the profitable use of tug-trawlers in north east England, which led to the conception, construction and operation of purpose-built fishing steamers. Section Two describes their diffusion throughout the country and their development to the mid 1890s.

i EXPERIMENTS AND TUGS

Steam propulsion was proved to be viable at sea in the early years of the nineteenth century. The first sea-going steamer, *Hibernia*, was operated across the Irish Sea in 1816[1] and *Savannah* crossed the Atlantic in 1819.[2] However, attempts to promote its use in fishing boats were not made until the 1850s. Early marine steam engines were uneconomic and the efficiency of sailing smacks was constantly being improved, as shown in Chapter Three. For fishermen to invest in steamers before the 1880s involved unnecessary risk and was illogical, and the general attitude was summed up in Robert Hewett's axiom that 'coal costs money, wind is free'.[3] Nevertheless, the idea of fishing steamers was nurtured in some quarters and a number of ways of applying steam propulsion to fishing boats were devised.

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[1]Moyse Bartlett, 1946, 11.
[2]Dyson, 1977, 245.
[3]Cutting, 1955, 231; Captain R.S.Hewett, 1964, 8.

One of the first was the conception and construction of a steamer for the Deep Sea Fishing Association of Scotland in 1852-3.[4] *Enterprise* was designed to act as mother ship to four boats line fishing from the vessel while she herself used lines or trawled. Steam power was to generate jets of water to be controlled by nozzles, and the hull was built of iron at a length of 100 feet, while 30 horse-power engines contributed to a tonnage of about 100. However, no reference can be found of her subsequent career so presumably, like other early fishing steamers, she soon proved uneconomic. Such was the case with *Albatross*, a 'beautiful' vessel that operated from Grimsby for a short while in 1856.[5] She was owned by the British Steam Fisheries Company founded in August of that year for the development of line fishing *via* 'welled steam vessels'.[6] This venture was not successful, the vessel proved unprofitable and the company was wound up in November 1857.

Similar fates awaited a spate of other attempts in the 1850s. Most were based on sailing smacks modified to take a steam engine. Several appeared at Grimsby in 1854, where the low value of their catches, the high initial outlay, and subsequent running costs all contributed to their demise.[7] The smack *Pearl* had her engine removed after a short time in October 1855,[8] and though the iron screw steamer *Corkscrew* was equipped with trawls in 1858, her 50 horsepower engine proved so unreliable that despite catching plenty of fish she was soon sold away from the port.[9] Lack of commitment to mechanical power was characteristic and manifested itself in a number of contraptions. Dade recalled that some smacks fitted with an engine had a 'hollow mizzenmast' - doubling as a funnel - and 'half a dozen' caused a 'great sensation' on the Humber. However, like the development of a kind of steam-powered outboard motor worked by a donkey engine, they did not prove

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[4]The Times, 31 March 1852, 5; 8 November 1853, 6; 21 December, 1853, 8.
[5]Alward, 1911, 8.
[6]PRO, BT41/103/583.
[7]Alward, 1932, 8.
[8]Ekberg, 1984, 21.
[9]March, 1953, 43.

viable.[10] Fishing boats were operated within tight financial margins so any experiment had to quickly prove remunerative. Installing a steam engine was an expensive business so the sight of one being removed would act as a deterrent to many others who fancied their chances'.[11] Nearly all these ventures were concerned with fishing operations carried out relatively close to shore, and smacksmen working farther afield were scornful and amused rather than worried. Neither were they disturbed when *Diana*, a Hull whaler, was fitted with a steam engine and equipped for line fishing in more distant grounds in 1857. Though well-suited to Arctic operations she could not bear the costs involved;[12] but her failure did not discourage an Eyemouth crew who 'expressed their intention of having a steam boat built for the long line fishery' in 1860 - the plan also came to nothing.[13] Meanwhile, a North Berwick fisherman had asserted that prior to that year a steam trawler which belonged to Leith had trawled west of Dunbar all year round. She apparently had a destructive effect on fish stocks besides being uneconomic.[14]

Isolated experiments continued in the 1860s. In August 1864 a Dunmore pilot reported the presence of a paddle steamer in Waterford Bay with 'much heavier' gear than other trawlers that 'drags all the fish away'.[15] Later, a local fisherman stated that it had been a paddle tug which, although she caught a large quantity of fish, proved to be unprofitable. Such also was the case with an experiment involving salmon fishing in the Shannon[16] and a small screw steamer built at Aberdeen in 1864.[17] In that year the French company Pecheries de la Gironde successfully operated a small British-built steam trawler from Bordeaux, and two years later a couple of iron vessels were ordered from Elder's in Govan, and five

[10]Dade, 1932, 371-3.
[11]Godfrey, 1974, 30.
[12]Cutting, 1955, 249; Nicholson, 1979, 74.
[13]Muirhead, 192, 270-1.
[14]R.C.on Sea Fisheries (1866) QQ.27,272-5 and 27,311-4.
[15]R.C.on Sea Fisheries (1866) QQ.39,175-85.
[16]Select Committee on Sea Coast Fisheries (Ireland) Bill (BPP, 1867, XIV) QQ.2,748-53 and QQ.2,894-7.
[17]Cutting, 1955, 249.

more in 1868 - four from Scottish yards and one from England[18] - while the first two, *Cormoran* and *Heron*, were reported still to be fishing in 1912.[19] Late in 1867 a Scottish 'Steam Fishing Boat' worked in the 'deep-sea White Fishery',[20] and around this time George Bidder was involved in the design and construction of several steam trawlers at Dartmouth.[21] This region did not provide the most amenable environment in which to conduct such experiments, so it is perhaps unsurprising that no further information is forthcoming. Circumstances were different at Hull, though the career of the iron well-smack *Tubal Cain*, built in 1870 for a Grimsby owner,[22] was also less than successful. Designed as a sailing smack with provision for conversion to steam, the change was not affected until 1886.[23] Experiments continued throughout the 1870s, typical was the auxiliary trawler *Sequel* that was based at Hull among many other ports as it proved repeatedly to be uneconomic.[24]

Most ideas revolved around the extraction of demersal species, but in Scotland scattered attempts were made to apply steam propulsion to the herring fisheries. A steam fishing boat was reported to be on the stocks in 1867 ready for operation the following year,[25] and experiments continued with the installation of auxiliary engines in fifies.[26] In 1870 'the first steam herring drifter appears to have been built at Aberdeen',[27] though that distinction is also claimed for *Pioneer*, built at Yarmouth in 1873.'[28] Around 1877 the smack *Pioneer* was equipped with an auxiliary engine at Aberdeen by David Allen of Granton, who also fitted out *Onward*, a special screw steamship for drift-netting from Newhaven. This project

[18]Carr, 1934, 86; Cutting, 1955, 250.
[19]Cutting, 1955, 250.
[20]Annual Report for the British Fisheries (1867-8) 625-6.
[21]Robinson, 1996, 84.
[22]Carr, 1934, 86.
[23]Benham, 1979, 68.
[24]Ashford, 1915, 84.
[25]Annual Report for the British Fisheries (1867-8) 625-6.
[26]National Maritime Museum, 1986, 33.
[27]Carr, 1934, 86.
[28]Kent, 1970, 9.

was impaired by problems with getting crews and selling the fish[29] and similar troubles afflicted a steamer built on the Tyne for the 1878 herring fishery. Robert Gray, a Craster fish curer was behind the venture; another *Enterprise*, she was fitted with a nine horsepower engine and a donkey boiler for working the nets, at a price of £1,300 - exclusive of fishing gear that cost a further £300. Her catch did not exceed that of a sailing smack and running costs ate into profits. Trawling was tried the following winter, but these operations also proved uneconomic. Essentially, the vessel was underpowered, and she was sold in 1880.[30]

Fishing boats in the pelagic fisheries were generally owned and operated from smaller business units that were not well suited to steamers. While smacks continued to perform efficiently returns did not justify outlay. Meanwhile larger businesses were reluctant to commit resources to research and development without a successful precedent. Thus it was not surprising that vessels neither designed nor built for fishing operations would eventually instigate implementation of steam propulsion in fishing boats on a commercial scale. They provided a necessary bridge from sail to steam by breaking this vicious circle and demonstrating the potential of steam fishing boats.

Steam colliers had been introduced in 1852-3 and by 1865 the majority of coal carried coastwise to London was transported in steamships.[31] This contributed to the decline of the towing trade, especially on Tyneside, where many tug owners and operators found themselves in financial difficulties that were intensified by a number of colliery disputes that culminated in a long stoppage in 1877.[32] This situation prompted William Purdy of North Shields, owner of the paddle tug *Messenger*, to seek a supplementary source of income.[33] Having scratched around

[29]Cutting, 1955, 250.
[30]Report on the Sea Fisheries of England and Wales (1878-9) 364 and 370; Muirhead, 1992, 280-1.
[31]Harley, 1971, 222.
[32]Muirhead, 1992, 272.
[33]Report on Relations between Owners, Masters and Crews (1882) Q.2,573.

the port for fishing gear he bought second-hand trawl parts from Grimsby and began working local grounds.[34] *Messenger*'s first trawling voyage commenced on 1 November 1877 and 'on her return twenty-four hours later her catch sold for the tidy sum of £7 10s.'[35] By the middle of December there were 15 tugs trawling at North Shields, a number that had risen to 43 by the end of the winter and 53 by the beginning of the next. The success of their operations was reflected in the quantities of fish landed at the port in Table 33.

Table 33

Landings of Fish at North Shields

Winter	Tons
1876-7	406
1877-8	999
1878-9	2,200 plus

Source: Port returns in Muirhead, 'The Fishing Industry of Northumberland', 270.

By the end of the 1877-8 winter similar operations were being conducted on the Wear and from Hartlepool.[36] Steam trawling was 'increasing the supply of fish',[37] especially flat fish,[38] and bringing its price down.[39] In the words of a Sunderland merchant.

> The steam trawling is a golden boon to the poor of Sunderland, the supply being much more regular than it ever was before.[40]

Steam trawling was profitable, and its progress was fostered by the low price of coal - which had been a major cause of the depression that prompted the practice in the first place.[41] In the meantime towing continued to decline, one of Purdy's colleagues towed a single ship during the the first seven months of 1878 and another

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[34]Robinson, 1987, 73.
[35]Carr, 1934, 87-8.
[36]Robinson, 1996, 86-7.
[37]R.C.on Trawling (1884-5) QQ.1,601 and 5,410.
[38]Report on Sea Fisheries of England and Wales (1878-9) 419.
[39]Report on Sea Fisheries of England and Wales (1878-9) 405; R.C.on Trawling (1884-5) QQ.1,606-7.
[40]Report on Sea Fisheries of England and Wales (1878-9) 419.
[41]*Ibid.*

only three in the five months from March;[42] thus tugs would tow a ship if they came upon one 'but would not go to seek them.'[43] Though largely restricted to inshore grounds tugs could work areas where sailing trawlers would not venture. Their average net tonnage was between 10 and 20[44] which meant they were quite manoeuvrable, while the 44 and 45 foot trawl-beams used by *Cambria* and *Vigilant*, respectively,[45] infer considerable catching power. *Powerful* also used a 44 foot beam, and operated six to eight miles from Tynemouth Pier in about 27-33 fathoms to good effect. *Patriot* could earn anything between £12 and £56 per week, of which coal and tallow took £5, so alluring were these figures that her owner had chartered a tug to experiment with line fishing.[46]

The use of tug-trawlers soon spread beyond north-east England. In 1878 *United* was converted for trawling at Grimsby,[47] and in December 1880 'a number of ex-tugboats from the North-East' were operating from Scarborough. They immediately proved profitable and before the month was out two more paddle trawlers were resident at the port - *Dandy*, an old iron tug from Liverpool, and *Tuskar*, a similar vessel from Cardiff - and were joined by more in the following months.[48] Northward, *Emu* started line fishing from Whitby,[49] and by the early-1880s the port was frequented by 17 tug-trawlers,[50] while at Fleetwood the owners of the paddler *Dhu Artach*, a small pleasure steamer, had equipped it with a trawl 'about 1877'. Operating over inshore waters during the winter[51] she achieved good returns, but

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[42]Report on the Sea Fisheries of England and Wales (1878-9) 370-1.
[43]Report on the Sea Fisheries of England and Wales (1878-9) 370.
[44]Report on the Sea Fisheries of England and Wales (1878-9) 366.
[45]Report on the Sea Fisheries of England and Wales (1878-9) 418.
[46]Report on Sea Fisheries of England and Wales (1878-9) 375.
[47]Gillett, 1970, 269.
[48]Godfrey, 1974, 24.
[49]Robinson, 1987, 73.
[50]R.C.on Trawling (1884-5) Q.10,047.
[51]Horsley and Hirst, 1991, 17.

her activities aroused the ire of other fishermen and were stopped after a couple of months.[52]

Such reactions were widespread as for many fishermen steamers compounded the perceived evil of trawling. However, like earlier experiments with steam, these vessels were not considered to be a serious threat by offshore fishermen. The performance of tug-trawlers over inshore grounds could not disguise the fact that they were designed for towing,[53] and although more tugs came onto the market as such business declined most were old, past work and 'not fit to go out to sea',[54] *Messenger*, for example, had been built in 1843.[55] One smack skipper observed that few such craft 'can go out beyond, say, a four-mile limit',[56] while another skipper did not normally venture above twenty miles from port in his paddle tug.[57] If they had to keep out 10 miles in winter and 15 in summer steam trawling would have to stop.[58] They stayed at sea on average for two days[59] and were not adapted for the use of ice.[60] They could not work trawls in more than about 30 fathoms[61] - one tug skipper usually worked grounds to a depth of 25 or 26 fathoms in winter.[62] Another cost, fuel consumption was estimated to be between 20 and 35 tons of coal per week.[63] Nevertheless, with gross earnings, as in the case of *Cambria* of Sunderland in the year from 12 February 1878 of £2,152 12s 6d[64] they were still bought up and modified. However, their limitations meant that they could not maintain the quantities of fish caught in these first months[65] so profits soon diminished.[66] They

[52]Alward, 1932, 284.
[53]Report on Relations between Owners, Masters and Crews (1882) QQ.2,555, 2,754 and 2,768.
[54]Report on Sea Fisheries of England and Wales (1878-9) 364.
[55]Muirhead, 1992, 275.
[56]R.C.on Trawling (1884-5) Q.10,496.
[57]R.C. on Trawling (1884-5) QQ.8,130-2.
[58]Report on Sea Fisheries of England and Wales (1878-9) 370.
[59]Godfrey, 1974, 30.
[60]R.C. on Trawling (1884-5) Q.8,018.
[61]Muirhead, 1992, 275.
[62]Report on Sea Fisheries of England and Wales (1878-9) 370.
[63]M'Intosh, 1895, 315; Muirhead, 1992, 275.
[64]R.C. on Trawling (1884-5) Q.1,000.
[65]Report on the Sea Fisheries of England and Wales (1878-9) 364.
[66]Holt, 1895, 369-70.

were ill-suited to fleeting,[67] so profitability could not be maintained that way, and as early as July 1879 it was reported that 'some of the steam tugs have already given up trawling.'[68]

The way to eradicate the faults and maximize the advantages of tug-trawlers was to design and construct steam vessels for fishing, but their success fuelled prejudices and inhibited development.[69] The negative properties of tug-trawlers were applied to the prospect of specially built fishing steamers. Consequently, one smack owner did not feel threatened because 'tugboats cannot contend with bad weather'[70] and so, a tug owner concluded, 'it will not pay to build steamers specially for trawling'.[71] This view was also tendered by the admiral of a Hull fleet several years later who asserted that steamers will never work trawls.[72] This attitude was intensified by continued advances in smack technology. Fishermen resurrected doubts and prejudices that had been aired about steam carriers over 15 years earlier, and one owner who declared that although fishing steamers would never become omnipresent steam carriers would be permanent.[73] Even an eminent authority like E.W.H.Holdsworth considered carrying and towing to be the limit of the use of steam propulsion in fishing.[74] Whatever the qualities of smacks there was not much confidence about the future of fishing steamers. This was illustrated by James Alward in December 1883. He represented the Grimsby Smackowners' Association before a Parliamentary investigation and was described as 'manager of the only steam trawler belonging to Grimsby' (He has also been credited with designing the first purpose-built steam trawlers at the port[75]), yet when asked if he thought steam would replace sail trawling 'altogether' he replied that 'it will never supersede

[67]Report on the Sea Fisheries of England and Wales (1878-9) 371.
[68]Report on the Sea Fisheries of England and Wales (1878-9) 444.
[69]Godfrey, 1974, 30.
[70]Report on the Sea Fisheries of England and Wales (1878-9) 395.
[71]Report on the Sea Fisheries of England and Wales (1878-9) 445.
[72]R.C. Trawling (1884-5) Q.9,454.
[73]R.C. on Trawling (1884-5) QQ.9,454-6.
[74]Holdsworth, 1874, 289-90.
[75]Ekberg, 1984, 21.

sailing in my opinion.'[76] His view was probably coloured by a recent abortive attempt to work seven Grimsby steam trawlers from Fraserburgh;[77] and he went on to cite the heightened efficiency of smacks and the running costs incurred by steamers, though he conceded that they might be of some use inshore.[78]

Experiments with steam propulsion indicated that greater productivity was in the minds of some, but sailing smacks were far from obsolete. The practicalities of distant water fishing meant that there was no economic motivation to hone steamers into capital assets until the invention of double and triple expansion engines in the 1880s and 1890s enhanced their viability. In the meantime huge fuel consumption completely offset the operational advantages of steam vessels.[79] However, the success of tugs in the late-1870s provided evidence of their potential which, allied to increasing awareness of the approaching ceiling in the catching power of sailing craft in the face of constantly rising demand, brought into sharper focus the need to find a way of sustaining supplies. By the beginning of the 1880s an alternative had become desireable even if it was not then a matter of urgency, but when 'eventually small Compound Engines with a suitable boiler' were successfully installed into larger smacks,[80] the limitations of sail power and the viability of an alternative strengthened the case for purpose-built craft.

ii STEAM FISHING BOATS

The Humber was the focus for development of purpose-built steam fishing boats. Established smack owners at Hull and Grimsby recognized that future expansion of the fishing industry would be stifled by obsolete technology. Consequently they

[76]R.C. on Trawling (1884-5) Q.9,211.
[77]R.C. on Trawling (1884-5) Q.1,012.
[78]R.C. on Trawling (1884-5) QQ.9,212-4.
[79]Starkey, 1993, 133-4.
[80]'Amos and Smith', 1915, 108.

merged to produce capital-intensive concerns able to fund research and development - and facilitate the discarding of out-dated capital. Such attitudes were crystallized by the appearance of the Danish steam trawler *Proven* at Grimsby in 1880.[81] She 'aroused great interest' and the Great Grimsby Steam Trawling Company was founded in the following year. Its instigators included members of the Manchester, Sheffield and Lincolnshire Railway Company and leading local smackowners like Harrison Mudd, Walker Moody and George Fellowes.[82] Late in 1881 Mudd spoke of the superior condition in which steam trawlers landed fish at other ports and warned that 'the trade and reputation' of Grimsby would suffer unless efforts were made to keep up with modern developments.[83] Smacks were nearing the ceiling of their efficiency in terms of the national market, which posed a problem to which the inshore operations of tug-trawlers did not provide a satisfactory answer - though the vessels themselves indicated a solution. Hence the Great Grimsby Steam Trawling Company financed the design and construction of what was arguably the first purpose-built fishing steamer.

This vessel was *Zodiac*, launched in December 1881.[84] March wrote that Hewett's carriers had 'undoubtedly' been the first steam trawlers, but they were equipped with fishing gear in order to escape heavy port dues in London[85] and whether they used it is questionable. Robert Hewett said that his sailing carriers all trawl 'occasionally' but added that they were 'frequently running',[86] and March, himself, admits that their steam-powered successors were 'probably among the hardest driven of all craft.'[87] A similar claim was lodged by the Hull News regarding the Hull Steam Fishing and Ice Company's carriers,[88] but neither can be

[81]Gillett, 1970, 269-70.
[82]PRO, BT31/2,782/15,191; Gillett, 1970, 269-70.
[83]Gillett, 1970, 270.
[84]Butcher, 1980, 14.
[85]March, 1953, 149.
[86]R.C.on Sea Fisheries (1866) QQ.12,923 and 12,930.
[87]March, 1953, 151.
[88]Bellamy, 1965, 329. Quoting Hull News, 30 August 1890.

substantiated. Equally vague is a reference to the steam trawler *Cecily*, allegedly built in Grimsby before *Zodiac* in 1881.[89]

More concrete was the registration of *Pioneer* at Scarborough in October 1881.[90] At 94 feet[91] she was a foot longer than *Zodiac* and a foot shorter than *Aries*,[92] the second Grimsby steam trawler, launched in April 1882.[93] All three were iron-built and larger than any smack,[94] though confidence in their mechanical power was undermined by their possession of sails and disconnecting engines.[95] However, they soon proved to be far more efficient than the best smacks, and the Grimsby firm ordered four more such vessels in 1882.[96] They were capable of trawling to depths of 12 fathoms, where smacks were limited to not more than eight.[97] Also, their greater speed and reliability were soon apparent and they were used as carriers in the summer months.[98] Arrangements were made with other owners to bring their fish to Grimsby,[99] which included landing 'the catches of Hull smacks',[100] whose first steam trawlers were put to the same use.[101]

Zodiac and *Aries* cost £3,500 and £3,550, respectively,[102] a prohibitive price for most smack owners, and at sea such vessels were not indestructible. Among the welter of smacks lost in the notorious March gale of 1883 was the 94-ton 'steam dandy' *Speedwell*, which encountered heavy seas, was 'thrown on beam ends', had her fires extinguished and her sails swept away.[103] Steamers were not perfect, but

[89]Gillett, 1970, 270.
[90]Robinson, 1996, 91.
[91]*Ibid.*
[92]Gillett, 1970, 270.
[93]Cutting, 1955, 253.
[94]Cutting, 1955, 253;Robinson, 1996, 91.
[95]Godfrey, 1974, 30; Robinson, 1996, 92.
[96]Robinson, 1996, 91-2.
[97]R.C.on Trawling (1884-5) Q.2,591.
[98]Cutting, 1955, 253; Gillett, 1970, 269-70.
[99]Alward, 1932, 228.
[100]March, 1953, 43.
[101]R.C. on Trawling (1884-5) Q.8,774.
[102]Alward, 1932, 228; Cutting, 1955, 253.
[103]Report on Deep Sea Trawling in the North Sea (1883) 471.

examination of the other casualties inferred that they were more fitted to distant water operations than smacks.

Following the *Speedwell* incident an owner observed in December 1883 that there were no steam trawlers at Hull while there were 'five or six' at Grimsby.[104] Construction of the Grimsby company's first six trawlers was divided equally between yards at the two ports,[105] but Hull's status as a commercial port detracted from operations by specialized fishing vessels and 'some' Hull fishermen migrated north to work steam trawlers.[106] However, the philosophy outlined by Mudd eventually manifested itself there and Christopher Pickering of Hull recalled that

> With a fleet of fishing smacks my situation looked hopeless, there was nothing to be done but to either get rid of them and go in for the whole conquering steam, or turn my back upon the fish trade.[107]

That Hull lagged behind was not obvious from the returns reproduced in Table 34. However, the calibre of vessel is not clear and presumably there was a large proportion of non purpose-built craft at Hull that were incidental to its function as a commercial port. Nevertheless, both ports were at the forefront of the deployment of fishing steamers as was indicated by the rising proportion of the fleet so powered. Occasional fluctuations occurred, like the considerable slackening in the construction of steam trawlers at Hull in 1892,[108] but such instances were minor blips within the prevailing trend.

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[104]R.C. on Trawling (1884-5) QQ.8,775-7.
[105]Gillett, 1970, 270.
[106]R.C. on Trawling (1884-5) Q.8631(12).
[107]Pickering, 1915, 75-6.
[108]Annual Report for England and Wales (1893-4) 199.

Table 34

STEAM VESSELS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS

(i) GRIMSBY

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL STEAM TONNAGE	% FLEET STEAMERS VESSELS	TONNAGE
1883	2	7	556	1.4	1.4
1884	3	12	1,192	2.2	2.7
1885	4	16	1,558	2.7	3.2
1886	2	18	1,634	2.4	2.9
1887	2	19	1,732	2.5	3.0
1888	2	24	2,145	3.2	3.8
1889	3	34	2,914	4.7	5.2
1890	4	46	3,806	6.4	6.9
1891	23	75	6,474	12.1	11.4
1892	25	85	7,175	13.8	12.9
1893	34	104	8,656	17.5	15.7
1894	47	120	10,185	21.6	19.1
1895	62	126	11,170	26.0	22.7
1896	91	139	13,006	36.4	31.5
1897	100	180	15,823	44.4	39.1
1898	119	245	20,904	59.6	54.7
1899	111	308	25,082	80.7	79.7
1900	110	374	29,866	88.3	89.0
1901	109	369	29,417	90.7	91.2
1902	108	367	29,071	92.1	92.8
1903	113	371	29,575	92.9	93.7
1904	103	372	29,318	93.0	93.8
1905	101	388	31,032	94.0	94.9
1906	97	436	35,681	94.7	95.8
1907	88	471	39,422	95.2	96.5
1908	80	469	39,348	95.1	96.5
1909	75	475	40,057	95.7	96.9
1910	74	488	41,516	96.1	97.2
1911	72	503	42,682	96.6	97.7
1912	68	514	45,185	96.4	97.7
1913	70	555	49,913	96.9	98.1

(ii) HULL

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL STEAM TONNAGE	% FLEET STEAMERS VESSELS	TONNAGE
1883	1	9	1,067	2.3	3.4
1884	1	9	1,087	2.2	3.4
1885	3	12	1,326	3.1	3.7
1886	7	22	2,191	6.0	6.1
1887	8	27	2,512	7.1	6.9
1888	9	43	3,529	10.6	9.7
1889	11	50	4,002	13.2	11.6
1890	18	61	4,895	17.6	14.7
1891	28	107	7,970	29.0	23.8
1892	35	120	9,051	33.3	27.3
1893	35	134	9,911	38.2	32.0
1894	36	156	11,321	44.5	37.9
1895	35	180	12,784	51.6	44.7
1896	35	206	14,455	59.1	52.7
1897	27	233	15,751	67.2	61.7
1898	22	282	18,545	79.6	76.3
1899	45	331	22,573	94.5	95.2
1900	47	338	23,382	95.8	96.9
1901	47	336	23,474	97.2	98.4
1902	50	342	24,330	97.3	98.6
1903	56	367	26,716	97.7	98.8
1904	53	370	27,117	98.1	99.0
1905	48	383	28,483	98.6	99.4
1906	44	402	29,862	98.9	99.5
1907	45	413	31,213	99.1	99.4
1908	43	416	31,293	99.1	99.4
1909	42	417	31,621	99.6	99.7
1910	39	414	31,366	99.3	99.6
1911	33	411	31,669	98.9	99.4
1912	23	380	29,984	98.5	99.3
1913	18	379	30,544	98.5	99.4

Source: Annual Statements of Navigation and Shipping

While differences are discernible in these figures, when the average tonnages of fishing steamers at the two ports are calculated, Table 35, close correlation between the two was evident once the eccentricities represented by the presence of various non purpose-built steamers had diminished.

Table 35

AVERAGE TONNAGES OF REGISTERED STEAM FISHING BOATS

YEAR	HULL	GRIMSBY
1883	106.7	61.8
1884	108.7	79.5
1885	88.4	77.9
1886	75.6	81.7
1887	71.8	82.5
1888	67.9	82.5
1889	65.6	78.8
1890	62.0	76.1
1891	59.0	66.1
1892	58.4	65.2
1893	58.6	62.7
1894	59.0	61.0
1895	59.5	59.4
1896	60.0	56.5
1897	60.6	56.5
1898	61.0	57.4
1899	60.0	59.9
1900	60.7	61.7
1901	61.3	61.5
1902	62.1	61.2
1903	63.2	61.1
1904	64.1	61.7
1905	66.1	63.5
1906	67.0	66.9
1907	68.2	70.5
1908	68.2	71.7
1909	68.9	72.8
1910	69.2	73.9
1911	71.3	74.2
1912	74.4	77.6
1913	76.9	79.9

Source: Annual Statements of Navigation and Shipping

Growth was so marked at Hull and Grimsby that Boston in Lincolnshire became, in effect, an overspill port 'engaged in the same operations'.[109] Located south of the Humber, it possessed a favourable position on the North Sea coast and drew much of its finance and personnel from the two ports. By 1890 steam trawling had proved a 'great success' and its fleet continued to grow,[110] which can be seen in Table 36.

[109]Holt, 1895(i), 348.

[110]Annual Report for England and Wales (1890) 147.

Table 36

STEAM VESSELS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS AT BOSTON

YEAR	NUMBER
1883	0
1885	2
1890	15
1895	30
1900	39
1905	35
1910	31
1913	29

Source: Annual Statements of Navigation and Shipping

In 1883 only a handful of first class fishing boats were registered at the port, and the number of second class vessels had declined from 89 to 18 in the previous 12 years.[111] The advent of steam trawlers reversed this decline in the last two decades of the nineteenth century. However, as early as 1893 the quantity of fish landed was below average and the Iceland fisheries had not proved profitable.[112] By the end of the century Boston's attraction in terms of new and more distant grounds was diminishing and other ports were better suited to nearer operations. The 24 steam trawlers at Great Yarmouth at the end of the 1890s, for instance, largely worked local waters.[113]

Fishing stations were subject to numerous influences, which were reflected in the average tonnages of fishing steamers throughout the United Kingdom. These are shown in Table 37, where the yearly figure is consistently far smaller than those at the Humber ports shown in Table 35.

111 Annual Statements of Navigation and Shipping
112 Eighth Annual Report of England and Wales (BPP, 1894, XXII) 119.
113 S.C.on Sea Fisheries Bill (1900) Q.1,545.

Table 37

AVERAGE TONNAGES OF REGISTERED STEAM FISHING BOATS

YEAR	UNITED KINGDOM
1883	29.5
1884	31.9
1885	32.3
1886	34.2
1887	34.2
1888	36.6
1889	39.4
1890	41.6
1891	44.9
1892	45.0
1893	44.9
1894	45.6
1895	46.2
1896	46.7
1897	47.9
1898	49.1
1899	50.2
1900	51.2
1901	50.2
1902	50.0
1903	49.6
1904	49.2
1905	50.1
1906	51.4
1907	50.1
1908	50.1
1909	50.3
1910	49.8
1911	50.2
1912	50.9
1913	51.7

Source: Annual Statements of Navigation and Shipping

As with the statistics for smacks in Chapter Three, a national average hides variations in the diffusion steamers around the country, and this is noticeable even with the encroachment of steam fishing boats into the industries of composite countries of the United Kingdom shown in Table 38.

Table 38

STEAM VESSELS IN THE FISHING FLEET

(i) UNITED KINGDOM

PERIOD	PERCENTAGE VESSELS	TONNAGE
1883-7	7.6	5.3
1888-92	12.0	10.4
1893-7	22.4	21.7
1898-1902	43.7	50.1
1903-7	57.3	65.6
1908-12	67.9	75.8
1913	73.9	81.7

(ii) ENGLAND AND WALES

YEAR	PERCENTAGE VESSELS	TONNAGE
1883-7	6.7	4.8
1888-92	10.9	9.7
1893-7	21.1	20.9
1898-1902	43.2	50.2
1903-7	55.6	65.1
1908-12	63.7	74.4
1913	69.4	80.1

(iii) SCOTLAND

YEAR	PERCENTAGE VESSELS	TONNAGE
1883-7	41.4	32.5
1888-92	49.0	45.2
1893-7	62.6	59.8
1898-1902	78.1	77.0
1903-7	88.1	88.0
1908-12	94.0	93.8
1913	95.9	95.9

Source: Annual Statements of Navigation and Shipping

Statistics for England and Wales follow comparatively closely. But in Scotland the proportion was consistently much higher, while it was vastly lower in Ireland, where the percentage remained in single figures until 1911.[114]

The economic value of steam fishing boats varied in different areas of the country and the best way to analyse diffusion is to examine their fortunes at selected fishing stations. Like the Humber ports quantitative evidence showed that Scarborough had

[114] Annual Statements of Navigation and Shipping.

as many, or more, fishing steamers in the first few years, but the make-up of the fleet and its subsequent fortunes were strikingly different. The skipper of one of the first tug-trawlers at Scarborough found it 'more profitable than a sailer...[prompting the conclusion that]...steam trawlers will in course of time put out the sailing trawlers.'[115] He may have been right, but not in relation to his home port. Scarborough played a leading role in the first years of steam fishing, but Table 39 shows the predominance of smaller vessels throughout the period.

Table 39

STEAMERS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS AT SCARBOROUGH

	NO.OF VESSELS		AVERAGE STEAM
YEAR	50 TONS-	50 TONS+	TONNAGE
1883	23	4	28.5
1884	19	3	27.2
1885	19	3	27.3
1886	15	3	26.6
1887	13	3	26.8
1888	15	3	26.6
1889	15	3	30.5
1890	16	2	29.4
1891	16	2	29.4
1892	16	0	24.3
1893	16	0	24.7
1894	17	0	24.4
1895	18	0	24.2
1896	19	0	23.7
1897	20	0	23.6
1898	18	0	24.3
1899	18	0	24.3
1900	19	0	24.9
1901	17	0	25.1
1902	13	0	28.1
1903	13	0	28.1
1904	12	0	28.8
1905	12	0	28.8
1906	12	0	28.8
1907	11	0	27.3
1908	7	0	33.3
1909	6	0	36.2
1910	6	0	36.2
1911	6	0	36.2
1912	5	1	43.7
1913	11	6	43.7

Source: Annual Statements of Navigation and Shipping

[115]Report on the Sea Fisheries of England and Wales (1878-9) 398.

In 1873 *Dewdrop*, an auxiliary-powered yacht, 'showed fishermen...it was not necessary to have a steamboat specially built',[116] which seemed to contradict the lack of subsequent information. Her fortunes were probably similar to those of a steam launch based at Bridlington Quay that fished inshore to little effect in June 1877.[117] Nevertheless, these episodes did not deter the screw-driven yacht *Cormorant*[118] from operating 'very close to the land' in the following year. There was no lack of enterprise, especially with the appearance of the aforementioned *Pioneer*. However, commitment to purpose-built craft was not deep-seated, as was shown by a list of Scarborough's registered fishing steamers published in 1882.[119] The fleet consisted mainly of small vessels.[120] *Cormorant* was a 'yacht with a fishing certificate' and *Fawn*, at under 10 tons, combined trawling operations with the duties of a pleasure boat. At the end of 1880 *Young Squire*, a smack with an auxiliary engine,[121] joined tug-trawlers like *Dandy* and *Tuskar* in fishing operations. Then, in March 1882 the Knight of the Cross company[122] raised nearly £2,400 to purchase a steam tug of that name from Liverpool. With a gross tonnage of 169 she was the largest and most powerful fishing steamer at the port - and it was intended that her income would be supplemented by pleasure boat steaming - but she was 20-years old and constantly laid up for repairs,[123] and the result was that the company was wound up in April 1883. Still, being straightforward and easy to maintain these paddlers persisted despite their obsolescence,[124] and in December 1883 seven or eight were working.[125] However, the limitations referred to above were much in evidence; one skipper stated that he fished between three and 15 miles out for seven months of the year and 'close inshore' for the remainder,[126] while another said that

116Godfrey, 1974, 23, quoting Scarborough Gazette of 28 August 1873.
117Robinson, 1987, 73.
118Robinson, 1987, 73.
119Report on Relations between Owners, Masters and Crews (1882) 871.
120Report on Relations between Owners, Masters and Crews (1882) Q.2,762.
121Robinson, 1996, 91.
122PRO, BT31/2957/16575.
123Robinson, 1996, 90.
124Aflalo, 1904, 43.
125R.C. on Trawling (1884-5) Q.8,778.
126R.C. on Trawling (1884-5) Q.10,258.

although he had crossed to the European coast he had recently been working within 15 or 16 miles.[127] Operating ranges changed according to individual craft, but generally it was felt that it did not pay for older steamers to go as far as ten miles out.[128] Consequently, a proposed ban on steam trawling threatened the future of steam trawling at Scarborough.[129] Economics determined the nature of its fishing fleet, thus in the summer of 1884 six paddle tugs landed catches at Hull[130] and the following decade Holt observed that a large proportion of Scarborough's first class vessels were 'more or less constantly employed at Grimsby',[131] where vessels employed beyond home waters patently found facilities more attractive. The nature of Scarborough's steamers was obvious from the Collector's report for 1901, which stated that all 17 were engaged in inshore trawling - and were laid up for about a month or six weeks in the latter part of the summer.[132]

The limitations of established fishing stations for steamers were echoed at other ports along the North Sea coast. In the second half of the nineteenth century those at Whitby and Berwick could not attract investment on the scale necessary to implement effectively the latest technology. The allocation of resources to the Humber further diminished their potential and steam trawlers only 'occassionally' used Whitby; the channel at the harbour entrance was very shallow and money to rectify it was not forthcoming.[133] Steamers trawled 'in the bay' at Berwick,[134] but they preferred to land their fish at bigger markets where they would fetch a better price. Both ports therefore failed to build up a significant fleet of fishing steamers; the application of, rather than the technology itself, determined the fortunes of fishing stations.

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127 R.C. on Trawling (1884-5) QQ.10,342-4 and 10,351.
128 R.C. on Trawling (1884-5) QQ.10,317-9.
129 R.C. on Trawling (1884-5) QQ.10,568-70.
130 Ashford, 1915, 83-4.
131 Holt, 1895(i), 348.
132 Annual Report for England and Wales (1902) 799.
133 Annual Report for England and Wales (1890) 143.
134 Annual Report for England and Wales (1890) 135.

This was discernible with ports along the South Wales coast where towing trade in the Bristol Channel gave rise to a large number of tug-trawlers. Such operations were encouraged by an abundance of sole found in the Bristol Channel,[135] and Swansea, Llanelli, Neyland and Cardiff were cited as major fishing centres, with the first steam trawler starting operations from the latter in 1888,[136] though Table 40 shows that steamers had been registered for fishing several years earlier.

Table 40

NUMBER OF STEAMERS REGISTERED AT CARDIFF UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS

YEAR	50 TONS-	50 TONS+
1883	5	0
1884	2	0
1885	3	0
1886	9	0
1887	14	0
1888	13	0
1889	10	0
1890	10	1
1891	10	1
1892	7	1
1893	5	0
1894	4	0
1895	2	0
1896	2	0
1897	3	0
1898	3	0
1899	2	1
1900	1	1
1901	1	1
1902	1	1
1903	1	1
1904	3	10
1905	3	13
1906	3	14
1907	1	14
1908	1	16
1909	1	16
1910	1	20
1911	0	15
1912	0	17
1913	0	18

Source: Annual Statements of Navigation and Shipping

[135]Annual Report for England and Wales (1888) 179.
[136]Matheson, 1929, 39.

The preponderance of smaller boats in earlier years suggests that many were tugs, a hypothesis reinforced by the local Collector's observation for 1887 that 'little deep-sea fishing [was] carried on from the South Wales coast'. By the end of that year he estimated that ten tug-trawlers were working from Cardiff, four from Swansea, two from Llanelly and one from Neyland.[137] His totals differed from Board of Trade returns, but it would be wrong to interpret this discrepancy as a failure to take fishing seriously. Fishermen were employed to manage fishing operations on tugs[138] and the Irvins, significant members of the fishing community at North Shields, deemed it worth operating three paddle trawlers from Milford Haven between 1889 and 1894.[139] In 1887, 'with the exception of one steam trawler...no sea fishery [was] carried on' from Milford although a large quantity of fish caught off the Irish coast was brought there 'by steamers and sent away by rail.'[140] This traffic was developed with the opening of a fish market at Milford in 1889[141] (see Chapter Two) and fuelled by the discovery of promising hake grounds off south-west Ireland.[142] The natural properties of Milford Haven attracted many trawlers from ports outside the region,[143] and the numbers of visitors increased when grounds off Milford Haven were found to be 'fully equal to those of the North Sea'.[144] Table 41 illustrates this by comparing registrations in the Annual Statements with the observations of the local Collector.

137Annual Report for England and Wales (1888) 179.
138Report on Sea Fisheries of England and Wales (1878-9) 375; Annual Report for England and Wales (1888) 204.
139Muirhead, 1992, 277.
140Annual Report for England and Wales (1888) 205.
141Third Annual Report on the Sea Fisheries of England and Wales for 1888 (BPP, 1889, XXII) 213.
142Cutting, 1955, 253.
143Annual Report for England and Wales (1890) 124; Annual Report for England and Wales (1890-1) 135.
144Annual Report for England and Wales (1890-1) 135.

Table 41

STEAMERS REPORTED TO BE WORKING AND NUMBER REGISTERED AT MILFORD

YEAR	Working	Registered
1889	20	2
1890	35	2
1891	36	4
1892	67	12
1893	60	12
1894	47	12
1895	45	12
1896	55	24
1897	60	24
1898	60	30
1899	69	36
1900	82	41
1901	86	43
1902	98	41

Sources: 1889-1898 - Garstang 'The Impoverishment of the Sea'; 1899-1902 - Annual Statements of Navigation and Shipping and Annual Reports on the Fisheries of England and Wales.

The region's fishing industry grew with the migration of vessels from the Humber, but native adoption of fishing steamers was tentative. Tugs continued to constitute a high proportion and in 1890 bad weather diminished the quantities caught by Cardiff paddle boats unable to withstand adverse conditions.[145] This decline was reinforced the following year when diminishing returns led to the conclusion that the Bristol Channel was 'fished out' and some tugs ceased fishing.[146] However, 'several' persisted and continued to run into Milford from in 1890.[147]

By the end of the 1880s there were 46 steam trawlers at Cardiff, Swansea, Llanelly, Tenby, Neyland and Milford,[148] though the Annual Statements disclosed about half that number, while in 1891 there were 36 steam and 160 sailing trawlers working at Milford alone according to the Collector.[149] Whatever the precise totals, the fishing industry was growing and the activities of steam trawlers were

[145]Annual Report for England and Wales (1890-1) 277.
[146]Annual Report for England and Wales (1892) 126.
[147]Annual Report for England and Wales (1890-1) 277.
[148]Annual Report for England and Wales (1890) 203.
[149]Annual Report for England and Wales (1892) 126.

instrumental. This is reflected in statistics for fishing steamers registered at Milford in Table 42.

Table 42

STEAMERS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS AT MILFORD

	NO.OF VESSELS		TOTAL
YEAR	50 TONS-	50 TONS+	TONNAGE
1883	1	0	19
1884	2	0	64
1885	2	0	64
1886	1	0	45
1887	1	0	38
1888	2	0	46
1889	2	0	79
1890	1	1	104
1891	2	2	200
1892	9	3	563
1893	9	3	563
1894	7	5	693
1895	6	6	718
1896	18	6	1,099
1897	18	6	974
1898	24	6	1,172
1899	25	11	1,543
1900	29	12	1,708
1901	31	12	1,795
1902	30	11	1,718
1903	31	11	1,751
1904	29	13	1,755
1905	29	15	1,881
1906	24	21	2,143
1907	23	36	3,324
1908	19	46	4,072
1909	17	51	4,445
1910	18	46	4,055
1911	20	46	4,237
1912	20	48	4,419
1913	19	50	4,590

Source: Annual Statements of Navigation and Shipping

From the mid-1890s the home fleet grew considerably, which implied the growth of the region's and the port's fishing industry. This was amplified by confirmation that Milford's market was growing by the mid-1890s, despite a 'slight decrease' in the number of fishing vessels reported to be using the port in 1893.[150] In the mid-1890s much fish was being taken by steam trawlers in the Bay of Biscay, though it did not

[150]Annual Report for England and Wales (1894) 122.

always reach the market in good condition because of the distance involved.[151] By 1904 there were 'about 14 large steam trawlers' bringing in a large quantity of fish from 'wherever they can catch them'.[152] A 'large quantity' came from the 'important' trawling grounds off Morocco.[153] Easterly and northerly grounds tended to be left to fishing fleets at North Sea ports[154] though Fleetwood, further north on the west coast, proved to be 'a formidable rival as a trawling station.'[155]

Steam fishing had not been adopted enthusiastically in the North West. At Liverpool, for example, three fishing steamers were present in 1883, but none were registered there by 1888. The Liverpool Steam Fishing Company was founded in the following year and operated four vessels,[156] when it was reported that 'six trawlers...that have previouly trawled out of other ports'[157] had been added to the register at Fleetwood, though they had been already been using the port for three years. Fleetwood's attraction in terms of distant water operations was largely derived from fisheries of the southern Irish Sea. This fishing took place in waters adjacent to the south of Ireland where 50 boats had successfully formed a company in 1889 and engaged steamers to run their fish to market.[158] By the middle of the 1890s the Inspector of Irish fisheries reported that, except for a couple of fishing boats 'you can hardly call steam trawlers', there were none in Ireland, though English vessels operated all round the coast. He cited a great many from Hull, Grimsby and Milford that were drawn by stocks of plaice, sole and turbot in particular,[159] Fleetwood being a base for many vessels from the Humber ports. It resembled Milford in the considerable disparity between visiting and native fishing boats using the port, as is shown in Table 43.

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151 Tenth Annual Report of England and Wales (BPP 1896, XX) 126.
152 S.C. of the House of Lords (1904) QQ.1,836-9.
153 Committee on Statistical and Scientific Investigations (1908) Q.5,406.
154 Eighth Annual Report of England and Wales (BPP 1894, XXII) 119.
155 Committee on Statistical and Scientific Investigations (1908) Q.5,407.
156 Jarvis, 1995, 65.
157 Annual Report for England and Wales (1890) 211.
158 Annual Report for England and Wales (1890-1) 136.
159 S.C.on Sea Fisheries (1893-4) QQ.6,237-42.

Table 43

STEAMERS REPORTED TO BE WORKING AND NUMBER REGISTERED AT FLEETWOOD

YEAR	Working	Registered
1889	0	0
1890	0	0
1891	0	0
1892	11	0
1893	11	0
1894	10	0
1895	21	6
1896	19	8
1897	36	36
1898	40	38
1899	8	4
1900	25	11
1901	39	13
1902	21	12

Sources: 1889-1898, Garstang 'The Impoverishment of the Sea'; 1899-1902, Annual Statements of Navigation and Shipping and Annual Reports on the Fisheries of England and Wales.

The first steam trawler, *Lark*, one of Grimsby's ABC fleet, was reported to have arrived at Fleetwood in October 1891[160] and Messrs. Beechey and Kelsall of Hull transferred their fleet to the port in 1892.[161] The Collector's report for 1893 remarked on the good 'general condition' of the fisheries and mentioned that 11 steamers registered at Hull 'have arranged to stay here for several years' after they landed large catches during the summer months,[162] and the growth of steam trawling 'either by steamers belonging to the port or by strangers' was remarked upon at Fleetwood as well as Milford and Boston.[163] Fleetwood retained its attraction for visiting vessels well into the twentieth century when it was reported that Grimsby trawlers still used the port.[164] The phenomenon was also noticeable at Plymouth, where it was all the more significant given the apparent aversion to steamers in South Devon. Table 44 shows the difference between the two categories.

160Peter, 1932, 48; Horsley & Hirst, 1991, 17.
161Peter, 1932, 52; Horsley & Hirst, 1991, 17 and 114.
162Annual Report for England and Wales (1894) 253.
163Annual Report for England and Wales (1901) 114.
164Committee on Statistical and Scientific Investigations (1908) Q.9,851.

Table 44

STEAMERS REPORTED TO BE WORKING AND NUMBER REGISTERED AT PLYMOUTH

YEAR	Working	Registered
1889	2	0
1890	0	0
1891	0	0
1892	0	0
1893	0	0
1894	0	0
1895	13	0
1896	27	0
1897	30	0
1898	35	2
1899	52	3
1900	52	4
1901	52	5
1902	32	6

Sources: 1889-1898, Garstang 'The Impoverishment of the Sea'; 1899-1902, Annual Statements of Navigation and Shipping and Annual Reports on the Fisheries of England and Wales.

Most of the visiting vessels were trawlers from Hull and Grimsby and used the port when fishing in the Bay of Biscay, to the westward[165] and grounds off the coast of Spain, though the 'expense of forty-three hours' steaming to and from Vigo Bay in the latter region proved too much in terms of profitability.[166] As early as 1892 Hull steamers worked grounds off the French coast, the west of Ireland and in the Bristol Channel, and landed their catches at Milford and Fleetwood and Plymouth,[167] which indicated the nature of distant water operations and the way the industry was developing due to improved technology 'extending the tether' as it were. Just as smaller owner/operators could not afford to operate steam vessels, small ports could not attract fish traffic. Harbour authorities and merchants at large ports, however, stood to gain by the activities of vessels that could venture away from their home ports more freely.

However, the vessels using North Shields were mainly indigenous and its large registered fleet was wholly made up of steamers,[168] which made it unique in Britain.

165Committee on Collecting Statistics (1902) Q.1,586.
166Calderwood, 1894, 76.
167Seventh Annual Report of England and Wales (BPP 1893-4, XVIII) 199.
168Annual Statements of Navigation and Shipping

Although its accession to the steam fishing industry emanated from the conversion of tugs to trawlers from November 1877, the port developed its fisheries until late in 1883 30 to 40 steam trawlers and 14 steam liners landed fish there.[169] Production was reduced by bad weather in 1888 but prices and quality remained buoyant and according to the local Collector it was the base for 'upwards of forty steam trawl and line boats',[170] and the construction of four vessels and conversion of two more[171] indicates a degree of permanence which was reinforced the following year when it was reported that the building of fishing steamers had continued and that all the boats fishing from the station were of a 'considerably superior class than what they were some few years ago.'[172] An effort to wean the industry away from craft that had a limited future was far more apparent than at Scarborough. Though steam trawlers fished in the North Sea 'abreast of their own station',[173] purpose-built screw steamers began to displace paddle steamers, as is inferred in the rising average tonnages in Table 45.

169R.C. on Trawling (1884-5) QQ.8,240-8,240a.
170Annual Report for England and Wales (1889) 210.
171*Ibid.*
172Annual Report for England and Wales (1890) 139.
173S.C.on Sea Fisheries Bill 1900) Q.1,488.

Table 45

STEAMERS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS AT NORTH SHIELDS

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL TONNAGE	AVERAGE TONNAGE
1883	50	1	607	11.9
1884	68	1	776	11.2
1885	69	1	757	10.8
1886	72	0	672	9.3
1887	71	0	646	9.1
1888	72	0	608	8.4
1889	68	0	701	10.3
1890	75	0	983	13.1
1891	82	2	1,527	18.2
1892	87	3	1,437	16.0
1893	94	4	1,595	16.3
1894	94	4	1,555	15.9
1895	96	4	1,633	16.3
1896	95	4	1,617	16.3
1897	90	4	1,731	18.4
1898	98	5	2,000	19.4
1899	100	6	2,211	20.9
1900	106	7	2,584	22.9
1901	119	9	3,207	25.1
1902	119	13	3,573	27.1
1903	123	15	3,868	28.0
1904	112	15	3,632	28.6
1905	106	13	3,336	28.0
1906	103	14	3,534	30.2
1907	100	15	3,517	30.6
1908	101	16	3,640	31.1
1909	97	18	3,662	31.8
1910	94	19	3,679	32.6
1911	94	20	4,118	36.1
1912	85	19	3,573	34.4
1913	75	25	3,743	37.4

Source: Annual Statements of Navigation and Shipping

As stated earlier, non purpose-built fishing steamers were generally aged when they started their fishing careers, while dimensions deemed suitable for towing or pleasure cruising did not coincide with the optimum requirements for sea fishing - let alone distant water fishing. Most such vessels were paddle steamers and the reasons for their failure within a wider maritime context are valid in this context. Ocean-going vessels suffered broken shafts and damaged engines in heavy seas which, among other problems, could lead to variations in speed and fuel consumption - not ideal for fishermen operating within tight financial margins.

Alward referred to failed attempts to adapt trawling gear to 'larger and more modern side-wheel tugs', but their success was dependent on weather conditions; handling rather than towing the trawl, especially in poor conditions was a problem.[174] This was supported by a Sunderland man speaking in December 1883 who reported that steam trawlers 'are very erratic in their movements' and frequently stopped off at the port for repairs.[175] Much depended on how laden a paddle vessel was and how well the wheels gripped the water; such factors affected running costs and hence profitability. Paddle tugs had been well-suited to reaping immediate profits, but the economic implications of their technical properties were not conducive to long-term investment. Consequently, progress in paddle ship technology was largely arrested in the fisheries, especially when it became apparent that longer voyages would be necessary. However, paddle trawlers persisted for several years, notably, at Montrose on the east coast of Scotland, where they were still being built in the 1890s.[176] Table 46 illustrates the pace and intensity of the change from paddlers to screw-powered ships in the fishing industry at North Shields.

Table 46

PADDLE AND SCREW-DRIVEN FISHING BOATS REGISTERED AT NORTH SHIELDS

Year	1877	1880	1885	1890	1895	1900	1905	1910
Paddle-driven	43	56	89	43	41	23	5	3
Screw-driven	1	2	8	42	66	123	130	111

Source: Ship and fishing boat registers. From Muirhead, 'The Fishing Industry of Northumberland', 282.

The advent of steam drifters caused North Shields to diversify its fishery interests, which quickened the switch away from paddlers. Apart from the fact that their greater width - due to the wheels - meant the payment of higher harbour dues, they were also harder to handle in restricted areas, which were a feature of herring ports

[174]Alward, 1932, 227.
[175]R.C. on Trawling (1884-5) Q.7,287.
[176]M'Intosh, 1895, 313.

at the height of the season. Table 47 quantifies the increasing proportion of drifters among the port's fishing fleet from the turn of the century.

Table 47

NUMBER AND TYPE OF STEAM FISHING BOATS REGISTERED AT NORTH SHIELDS

Year	1877	1880	1885	1890	1895	1900	1905	1910
Trawlers	32	42	55	56	72	110	101	81
Liners	12	16	42	29	35	29	18	14
Drifters	0	0	0	0	0	7	16	19

Source: Ship and fishing boat registers. From Muirhead, 'The Fishing Industry of Northumberland', 282.

The advent of the steam drifter was even more marked in Scotland. However, the implementation of steam propulsion north of the border had also commenced in the 1880s *via* trawling. In the mid-1890s Holt asserted that although

> an occassional Scotch steam-trawler may be found fishing in the southern part of the North Sea, and landing her fish at an English port...otherwise the industries of the two nations do not seem to commingle much.[177]

This was not accurate, especially once steam fishing boats enabled fishermen to venture farther afield. His view had more to do with the roots of fishing in the two countries. In Scotland drift netting was highly important and Scottish fishermen generally, and vehemently, viewed trawling - let alone steam trawling - as 'unfair fishing'. All ports were steeped in this culture; Fraserburgh, for instance, was heavily committed to the herring industry, and when steam trawling was tried there in 1882 the experiment soon failed.[178] The steam trawler seen off Dunbar in the late 1850s (see page 136) had been an isolated incident and as late as 1869 there were no trawlers at Aberdeen;[179] thus the increase in such activity in the late-1870s and early-1880s, which was due largely to seasonal visits by English trawlers, caused much consternation[180] - but earned considerable returns. In the light of these

[177]Holt, 1895(i), 346.
[178]S.C.on Sea Fisheries (1893-4) Q.1,012.
[179]Robinson, 1996, 93.
[180]M.Gray, 1978, 166-7.

activities it is an overstatement, to say the least, to state that the two industries did not 'commingle much.'

In 1883 a native of Brixham recalled how he had been fishing since the 1840s - his career included being based at most ports along the east coast of England and led to his steam trawling from Aberdeen,[181] and the skipper of one of the first tug-trawlers at Aberdeen came from North Shields.[182] Steam trawling in Scotland was instigated at ports like Granton, Leith and Newhaven at Edinburgh, and Dundee as well as Aberdeen. In 1882 the 'average' number of steam trawlers employed in Scotland was 25, though several belonged to ports in Northumberland.[183] Most worked off the east coast between the Firth of Forth and Aberdeen and their success continued the following year when fine weather led to many venturing 50 or even 60 miles out to sea.[184] Most were paddle tugs and some were converted for trawling by Mr Allen of the General Steam Fishing Company in Granton[185] who submitted the figures in Table 48 to a parliamentary inquiry, commenting that smaller vessels were being replaced by larger boats for 'deep-sea' operations.

Table 48

STEAM TRAWLERS REGISTERED AT GRANTON AND LEITH

Year	1879	1880	1881	1882	1883
Granton	0	0	2	1	6
Leith	1	3	2	2	3

Source: Statuory registers, R.C. on Trawling (1884-5) Q.5,410(23).

A further trend in the last decades of the nineteenth century in Scotland was the increased concentration of steam operations on Aberdeen. As in England the first fishing steamers here were converted vessels; one of the first was *Toiler*, a 50-ton paddle tug built on the Tyne and purchased from Dublin. She commenced fishing in

[181] R.C. on Trawling (1884-5) QQ.1,895-913.
[182] Muirhead, 1992, 281.
[183] Annual Report for Scotland (1883) 774.
[184] Annual Report for Scotland (1884) 618; R.C. on Trawling (1884-5) Q.5,410.
[185] Cutting, 1955, 251.

1882 and though initial results were not encouraging, once an experienced fisherman was employed her performance improved to the extent that former opponents invested in the project.[186] Other vessels quickly followed, including the screw steamer *Bonito* that had been designed as a tug[187] and 'built specially' for fishing, but 'did not answer'[188] when so working at North Shields from 1878 to 1880 though she then spent ten successful years at Aberdeen.[189] A Grimsby owner recalled despatching a steam trawler to Aberdeen in the early-1880s where it proved ill-suited to deep sea fishing,[190] which probably says more about the vessel itself than trawling in Scotland. There were definite links between the English and Scottish industries in the last decades of the nineteenth century. The association was strengthened with the implementation of steam trawlers north of the border, the rise of which is traced for Aberdeen in Table 49.

186Cutting, 1951, 251; Ritchie, 1991, 6.
187Muirhead, 1992, 281.
188Report on Relations between Owners, Masters and Crews (1882) Q.2,754.
189Muirhead, 1992, 281.
190R.C.on Trawling (1884-5) Q.9,183.

Table 49

STEAMERS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS AT ABERDEEN

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL TONNAGE	AVERAGE TONNAGE
1883	13	1	331	23.6
1884	11	2	374	28.8
1885	12	1	310	23.8
1886	8	0	200	25.0
1887	5	1	186	31.0
1888	7	1	231	28.9
1889	11	1	379	31.6
1890	25	1	830	31.9
1891	33	2	1,123	32.1
1892	41	4	1,524	33.9
1893	46	4	1,668	33.4
1894	52	4	1,907	34.1
1895	52	5	1,990	35.0
1896	64	6	2,492	35.6
1897	69	6	2,621	34.9
1898	70	6	2,711	35.7
1899	88	10	3,660	37.3
1900	108	24	5,279	40.0
1901	125	45	7,083	41.7
1902	130	64	8,365	43.1
1903	138	80	9,651	44.3
1904	129	76	9,075	44.3
1905	125	71	8,624	44.0
1906	126	88	9,661	45.1
1907	134	99	10,689	45.9
1908	144	106	11,505	46.0
1909	145	116	12,309	47.2
1910	141	122	12,461	47.4
1911	134	144	14,013	50.4
1912	123	164	15,232	53.1
1913	112	174	15,665	54.8

Source: Annual Statements of Navigation and Shipping

This fleet was added to from the mid-1880s by the fact that many trawlers from Leith and Newhaven were based further north and worked fishing grounds in and around Aberdeen Bay.[191]

However, the use of steam trawlers in Scottish waters was inhibited by the prohibition of British vessels trawling in the Firth of Forth, in response to which the General Steam Fishing Company of Granton ordered two steam line fishing

[191]Muirhead, 1992, 275; Robinson, 1996, 94-6.

boats.[192] The closure of this area might account for the slump in registrations at Aberdeen and that in the building of fishing steamers in Scotland at this time.[193] However, the port soon recovered and consolidated its position at the forefront of steam fishing in Scotland; it remained an important trawling port and accounted for nearly 80 per cent of fishing boats over 50 tons registered in Scotland by 1913,[194] but the rising number of smaller vessels from the last years of the nineteenth century suggested considerable commitment to drifters.

Aberdeen had many features in common with the Humber ports. Besides being well situated in relation to fishing grounds it was both an established port - like Hull - but relatively undeveloped with regard to fishing - as Grimsby had been in the 1850s. Thus, although there were elements of 'old relationships and ways of working',[195] the fact that English vessels often preferred to land catches there and take advantage of good rail facilities[196] - which gave rise to the establishment of a daily auction in 1881[197] - was not surprising as there also existed an amenability to modern requirements.

In 1883 most of the fishing steamers registered at Aberdeen were converted paddlers,[198] but viable specialized trawlers were built in Scotland from 1882.[199] In September of that year one skipper had claimed ownership of such a vessel that also performed as a liner; with a gross tonnage of 45, a donkey-engine and a main unit generating 10.25 horsepower she was larger than most smacks and paid 'much better', with monthly earnings of £270 or so compared to £120 with a sailing trawler.[200] One of the first purpose-built steam trawlers was *North Sea* of Aberdeen

192Annual Report for Scotland (1886) 257-8.
193Annual Report for Scotland (1887) 312.
194Annual Statements of Navigation and Shipping.
195M.Gray, 1978, 175.
196Carr, 1934, 89.
197Robinson, 196, 93.
198Robinson, 1996, 94.
199Carr, 1934, 89.
200R.C. on Trawling (1884-5) QQ.1,414-6 and 1,481-7.

owned by William Pyper which was closely followed by similar vessels in 1888.[201] The economic benefits of operating fishing steamers were indisputable, and prejudices were soon overcome where finances allowed. In 1889 there were 118 Scottish trawling smacks and steamers working in Scottish waters, together with 'from 50 to 60 [regularly employed] English trawlers, mostly steamers,' landing the bulk of their catches at Scottish ports, particularly Aberdeen.[202] Given the profitability of trawling it is not as surprising as is often made out that 'Scotland leaped to the forefront when steam came in'.[203] Economic factors overrode considerations for the welfare of the established industry.

Table 50 shows details of Scotland's steam fishing fleet. In the early years, as in England, it paid to use smaller, converted vessels. The number of larger fishing boats steadily increased but the greater number of steamers under 50 tons after the turn of the century indicated the extensive use of steamers for drifting.

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201 Annual Statements of Navigation and Shipping; Ritchie, 1991, 9; Robinson, 1996, 94.
202 Eighth Annual Report of the Fisheries Board of Scotland (BPP, 1890, XXII) 32.
203 March, 1953, 47.

Table 50

STEAMERS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS IN SCOTLAND

	NO.OF VESSELS		TOTAL
YEAR	50 TONS-	50 TONS+	TONNAGE
1883	38	2	987
1884	51	4	1,507
1885	51	5	1,407
1886	54	5	1,670
1887	51	4	1,336
1888	57	5	1,547
1889	61	5	1,747
1890	75	4	2,287
1891	83	6	2,779
1892	100	10	3,657
1893	109	10	3,801
1894	115	9	3,978
1895	118	10	4,046
1896	133	10	4,631
1897	141	10	4,788
1898	146	13	5,124
1899	173	25	6,815
1900	206	47	9,306
1901	230	68	11,282
1902	239	90	12,823
1903	300	105	15,409
1904	340	105	16,208
1905	351	102	16,279
1906	417	126	19,163
1907	652	139	25,356
1908	767	149	29,663
1909	796	159	31,457
1910	863	165	33,999
1911	924	188	37,945
1912	943	214	40,731
1913	979	225	43,150

Source: Annual Statements of Navigation and Shipping

Some parts of the United Kingdom remained more immune than others to the spell of profit cast by fishing steamers. This was well demonstrated in Ireland, where the number of registered vessels did not reach double figures until 1910,[204] and the south coast of England, as stated in Chapter Three, adhered largely to sail. However, the Annual Report for 1889 recorded that there were 'some steam trawlers fishing from Rye'[205] though only three small steamers were actually

[204]Annual Statements of Navigation and Shipping.
[205]Fourth Annual Report on England and Wales (BPP, 1890, XXI) 167.

registered at the port.[206] By the mid-1890s the same number was still there, another three were based at Falmouth and one at Dartmouth,[207] though the manager of the Falmouth Steam Fishery Company reported that only two 'visitors' were then working off the Cornish coast, his firm's two vessels having been put back to towing,[208] while the Dartmouth steamer was in fact a steam yacht.[209] This evidence only relates to actual registrations, and the figures for Plymouth in Table 44 give a better idea of the activity of steam vessels. Areas away from the forefront of the distant water sector resources continued to be diverted towards converted vessels. However, on the east coast the number of steam trawers increased steadily in 1890,[210] and by the following year that on the north-east coast was described as 'remarkable.'[211]

The magnitude of the leap needed to affect the transition from smacks is well illustrated by observing that contemporary steam trawlers essentially resembled vessels being built 70 years later, the 'basic design evolved in less than ten years'.[212] This involved finances beyond the means of many business units in the fishing industry of the second half of the nineteenth century, but even for many that could afford the jump improved technology proved to be a double-edged sword. Financial risk was reduced by new engines that vastly improved fuel consumption but the fact that they were fitted in larger vessels increased the initial cost. Technological progress led to these vessels being built and earlier versions came onto the second-hand market. But as they came within the finances of many purchasers they were simultaneously rendered obsolete at the leading edge of the industry by their successors.

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206 Annual Statements of Navigation and Shipping.
207 S.C.on Sea Fisheries (1893-4) Q.2,441.
208 S.C.on Sea Fisheries (1893-4) QQ.7,809-11.
209 S.C.on Sea Fisheries (1893-4) Q.2,443.
210 Annual Report for England and Wales (1890-1) 132.
211 Annual Report for England and Wales (1892) 125.
212 Robinson, 1996, 96.

The schooner-rigged steam trawler *Hawk* was built in 1882 along with the steam liner *Rob Roy* at the yards of C.Elliott at Leith.[213] *Hawk* resembled *Zodiac* and *Pioneer*, and possessed a gross tonnage of 83 and a length of over 87-feet while her wooden hull accommodated 'two-stage expansion engines'[214] that were similar to the Grimsby vessel's 35 horse-power unit.[215] The introduction of fuel-saving double and triple-expansion engines in the 1880s and 1890s had been vital for the viability of fishing boats that voyaged farther afield. Fuel consumption had been slashed nearly tenfold and most steam trawlers burned about 2.5 tons a day in surface-condensing boilers;[216] by the end of 1887 ones with a pressure of 150lbs were being built and they soon surpassed 200lbs[217] which thus extended the economic parameters of operations. By the mid-1880s lengths had increased to an average of between 90 and 100 feet and total displacements to around 250 and 300 tons wherein space was provided for 50 to 70 tons of coal while the fish hold had capacity for up to 20 tons.[218] *Dalhousie*, built at Dundee in 1886 with a 38 horse-power triple-expansion engine broadly conformed to this pattern.[219]

The 1880s were characterized by developments in the size of vessels that necessitated increased expenditure on equipment to facilitate their optimum operation. Such changes were characterized by the shift from hemp to wire ropes which had occurred with smacks around 1873[220] and the later introduction of steam winches to operate the fishing gear.[221] However, the first fishing steamers were too small to work economically more distant grounds and were constrained by running costs. This changed with the introduction of the triple-expansion engine, in particular, about 1888. Boiler pressure rose from 80-90 pounds to around 160,

213Fewster, 1955, 30.
214White, 1952, 12.
215Cutting, 1955, 253.
216M'Intosh, 1895, 315.
217Robinson, 1996, 95-6.
218Jenkins, 1920, 146.
219Robinson, 1996, 96.
220Robinson, 1996, 68.
221'Amos and Smith', 1915, 119.

though it was commonly felt that this increase and 'the additional complication of the machinery would not be successful in trawlers', which somewhat delayed their general introduction.[222] The honing of metals did not only foster growth in power units. By the 1890s there had been

> a remarkable change in the character of the large vessels engaged in the fisheries especially those hailing from east coast ports. Iron is taking the place of wood and sails are giving way to steam. At the same time several ports which, until recently were scarcely considered as fishing stations, now send fleets of steam trawlers into the North Sea.[223]

The change from wooden to metal hulls was another indication of how technological advances transformed the distant water industry. It was first noticeable at Grimsby and Hull and is quantified in Table 51.

Table 51

FISHING VESSELS BUILT FOR GRIMSBY AND HULL 1882-91.

	Grimsby		Hull	
Year	Wood	Iron	Wood	Iron
1882	50	3	17	2
1883	46	6	22	1
1884	61	8	29	1
1885	74	11	39	18
1886	91	4	19	12
1887	39	4	12	7
1888	25	9	10	14
1889	10	15	3	15
1890	17	17	3	27
1891	13	54	2	58

Source: Sixth Annual Report on the Sea Fisheries of England and Wales (BPP, 1892) 132.

The numbers of wooden and iron-hulled fishing boats was practically reversed in this decade, and for 1896 the Hull Collector reported that 'not a single wooden vessel has been added to the fleet, neither is there the least prospect of such an addition being made.'[224] More wide-ranging were statistics for the whole of Britain that were published in Olsen's Fisherman's Almanack. These provide the basis for Table 52, and though the results were undoubtedly distorted by the advent of

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222 'Amos and Smith', 1915, 109.
223 Annual Report for England and Wales (1892) 132.
224 Annual Report for England and Wales (1897) 227.

wooden steam drifters around the turn of the century, they cannot disguise the establishment of metal construction and therein the move towards steel.

Table 52

PERCENTAGE OF REGISTERED 'BRITISH FISHING STEAMERS OF 15 TONS AND UPWARDS' CLASSIFIED ACCORDING TO MATERIAL USED IN CONSTRUCTION

YEAR	WOOD	IRON	STEEL	IRON & STEEL	NOT GIVEN
1894	9.4	82.7	7.9	0	0
1899	5.6	64.6	20.1	0	9.7
1904	15.6	40.4	43.6	0.2	0.2
1909	23.1	23.1	53.4	0.1	0.3
1913	32.5	15.2	51.4	0.1	0.8

Source: Olsen The Fisherman's Nautical Almanack, editions for 1895, 1899, 1905, 1910 and 1914.

The steam trawler *Nyanza* was iron-built at Beverley in 1890 for operations in the North Sea. She was over 100 feet long with triple expansion engines - despite which she was still ketch-rigged - and three watertight bulkheads which gave her a gross tonnage of 153.[225] That she was specifically designed for North Sea operations highlighted a bifurcation in the design of steam fishing boats that became increasingly noticeable in the last decade of the nineteenth century. Operations in the southern North Sea, where fewer places were deeper than 30 fathoms, produced different requirements to those carried out to the north where waters rapidly attained a depth 'impracticable for trawling'. At Grimsby 'inshore' boats, including auxiliary-powered smacks, ranged between about 35 and 40 tons and fishing steamers that had been laid down for longer voyages were from about 50 to 70.[226] The largest steamer at the port by the early-1890s had a net tonnage of 80, though her gross - like *Nyanza* - was 153.

[225]White, 1952, 12.
[226]Holt, 1895, 354.

The diffusion of technology proceeded according to economic necessity, thus were trawlermen prepared to work deeper areas.[227] The Grimsby trawler *Aquarius* worked off Ingol's Hoof on the south coast of Iceland in the summer of 1891 and returned with a 'fine catch of plaice and haddock.'[228] However, ice and fog prevented winter operations there, though the return of nine trawlers the following summer[229] illustrated the attraction of these grounds. Technical development diminished concerns about the necessity of establishing foreign depots for supplies that would eat into profits.[230] Increased ranges also facilitated exploration away from northern waters, for example, the Humber Steam Trawling Company[231] operated in the Bay of Biscay and on the west coast of Ireland in 1892;[232] the fish being carried to London, Plymouth, Milford, and Fleetwood.[233]

Provision of icing facilities was essential for distant water operations. In 1884 vessels working off Aberdeen had carried fish loosely on deck, but such arrangements were patently inadequate for longer voyages and larger catches. By the mid-1890s a typical arrangement consisted of five 'pounds' formed from planks that were stood in grooves on deck. Here the fish was sorted and gutted before being placed in ice from the 'ice-house' forward of the fish hold. In the 'best' ships these were from nine to ten feet high and divided into compartments with two shelves while the fish was stored between alternate layers of ice.[234]

The function of steam propulsion in line fishing was restricted to motive power, though some owners perceived a future for steam lining - especially in view of the trawling ban imposed around the Firth of Forth. This was evident with vessels such

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227Annual Report for England and Wales (1887) 142.
228Robinson, 1996, 105.
229Holt, 1895, 130.
230The Danish (R.C.on Trawling (1884-5) Q.9,217) and Icelandic coasts (Holt, 1895, 141-2).
231PRO, BT31/14,820/22,308.
232S.C.on Sea Fisheries (1893-4) Q.756.
233Annual Report for England and Wales (1893-4) 199.
234M'Intosh, 1895, 316.

as the aforementioned *Aquarius* which possessed a dual-purpose compartment amidships that could serve either as a well or a fish hold;[235] an arrangement also characteristic of the 114-foot *Ocean Bride*,[236] though its profitability as a liner was considerably reduced. Nevertheless, one school of thought held the opinion that 'the steam line-boat will in time supersede the steam-trawler'.[237] By the end of the 1880s 15 steam liners from Grimsby and eight from Hull constituted a new and growing fishery on the Humber, that fulfilled expectations for the expansion of lining at Grimsby[238] and its instigation at Hull.[239] The reasons put forward for this were that they could be smaller and less powerful, thereby reducing running costs, while a set of lines was about £40 compared to £100 to £150 for trawl gear. Crucially, though, this calculation ignored market developments that heightened the importance of quantity and diminished that of quality; it assumed that a 'very much better price' would continue to be obtained for lined fish. Also trawling operations became increasingly viable as nearer fish stocks diminished and steam trawlers more economical. Table 53 charts the progress of steam lining at Grimsby through the number of vessels recorded in the Fishing Boat Register - most sailing liners had crews of seven or less.

235Holt, 1895, 353.
236M'Intosh, 1895, 322.
237Holt, 1895(i), 370. Quoting Potts.
238R.C.on Trawling (1884-5) Q.9,245.
239Annual Report for England and Wales (1890) 125; Annual Report for England and Wales (1890-1) 132.

Table 53

COMPLEMENTS OF REGISTERED FISHING BOATS USING LINES AT GRIMSBY

(Either solely or with other modes of fishing)

Complement	1893	1895	1900	1905	1910	1913
8	6	3	1	0	2	0
9	8	7	3	2	0	0
10	39	32	8	2	3	0
11	13	15	6	2	0	0
12	12	16	9	7	2	0
13	8	8	10	7	7	3
14	2	4	19	19	31	34
15	0	2	7	6	8	7
16	0	0	0	0	1	0
17	0	0	0	0	0	0
18	0	0	0	0	0	3
Total	88	87	63	45	54	47

Source: PRO, BT145/1/12/24/34.

While the number of vessels with a complement of 14 or more increased the overall number of line fishing vessels decreased in the twentieth century, and the trend and magnitude of the line fishery does not bear comparison to that for trawling at the port. Liners constituted a higher economic risk than a trawler. Thus, 'although catches fell [and] the smaller landings fetched more money than larger ones had done in the pre-railway era'[240] on the east coast it was not enough to help line-fishing in the long term. The forces of economic rationalization reacted negatively to the highly labour and capital intensive nature of line fishing. Although steamers accounted for around 92 per cent of all demersal species so caught between 1906 and 1913, the quantity of all line-caught fish landed was barely four per cent of the total.[241] Its fortunes were similar in Scotland. By the end of the century it was found that in general the profits for liners were proportionately less than those for trawlers - the supply of bait was a particular problem north of the border.[242] A 'good many' steam liners were built in Scotland in the mid-1880s and there were 19 'sailing from Aberdeen' in 1891. However, the trend at the port mirrored that at Grimsby. The trawling fleet was 'constantly receiving additions' while the overall total of line

240Robinson, 1987, 66.

241Annual Reports for England and Wales.

242Seventeenth Annual Report of the Fishery Board of Scotland (BPP, 1899, XIV) 8.

fishing boats was declining.[243] Some maintained that steam liners were better than sailers,[244] but this difference was belittled by that between the efficiency of lining and trawling. Symptomatic of this, a steel steam liner was built at Dundee in 1897 'with a view to its adaptability for use if necessary, as a trawler.'[245] Lining continued to serve a niche market, and often involved cod being thrown overboard to make room for prime species like halibut. However, trawling was far more profitable, and its greater efficiency determined that it would supersede lining. So when a brief respite for steam liners came in 1892 when 'several' trawlers fitted out with lines and worked farther afield at the halibut fishing at Faroe *in lieu* of perceived detrimental effects on the fish stocks of the Dogger and Great Fisher Banks - it soon proved to be, indeed, nothing more than a 'brief respite.[246]

Christopher Pickering of Hull said that he got rid of a 'great quantity of sailing vessels'[247] in order to purchase steam trawlers, such was commitment to them in the name of profitability. The number of voyages undertaken from Grimsby rose from 13,932 in 1878 to 19,306 in 1892,[248] but in 1900 the price of coal went up which affected efficiency and as a result some vessels were laid up.[249] Hull's Collector reported that working expenses had risen to such an extent that profits were reduced practically to nil.[250] Although vastly more cost effective than smacks in distant waters steamers were not impervious to market forces. This was especially apparent in the use of trawl-beams which, though several feet longer than those employed by smacks, were also constrained by practical limitations. As shown in Chapter Three the maximum for a smack was about 50 feet, any longer and it 'warped or bent in the centre' closing the mouth of the trawl.[251] For steamers the limit was about 60

[243]Tenth Annual Report of the Fisheries Board of Scotland (BPP, 1892, XXII) 22.
[244]S.C.on Sea Fisheries (1893-4) QQ.6,384-9.
[245]Sixteenth Annual Report of the Fishery Board of Scotland (BPP, 1898, XVI) 7.
[246]Holt, 1895(i), 370. Quoting T.N.T.Potts.
[247]S.C.on Sea Fisheries (1893-4) Q.857.
[248]S.C.on Sea Fisheries (1893-4) Q.213.
[249]Annual Report for England and Wales (1901) 114.
[250]Annual Report for England and Wales (1901) 221.
[251]M'Intosh, 1895, 317; Ashford, 1915, 85.

feet, the average at Grimsby being 58,[252] and the largest at Hull was thought to be 56 feet by the early-1890s.[253] Production was growing but, like smacks, the steam-driven beam-trawl was nearing the ceiling of its efficiency. Some way of increasing production was needed to maintain supplies in accordance with escalating demand in order to validate, economically, further technological development.

[252]S.C.on Sea Fisheries (1893-4) Q.312.
[253]S.C.on Sea Fisheries (1893-4) Q.860.

CHAPTER 5 DEVELOPMENT AFTER 1894

This chapter begins by detailing adaptation of the otter-trawl for offshore trawling, which effectively raised production potential. Freed from the constraints imposed by the beam-trawl, distant water vessels could be developed in accordance with the continued escalation of demand. Indeed, the post 1894 era was characterized by development rather than innovation in this sector. Section Two charts progress in the demersal industry and the third Section examines the way in which technology, notably *via* the steam drifter, devolved to the pelagic fisheries. Fishing steamers were not new by the turn of the century, but their diffusion to new parts of the industry had a great impact. Finally, the fourth section analyses the implementation of the internal combustion engine, the effects of which were significant, though somewhat attenuated in terms of distant water operations, and the development of wireless communication in the last years of the period, which provides an interesting footnote to technological change.

i THE OTTER-TRAWL

Chapter Four concluded by pointing out that the beam-trawl was approaching the ceiling of its efficiency, though the demand for fish continued to grow. Some way of increasing production was imperative in order to sustain expansion, and such a method was forthcoming through adaptation of the otter-trawl for use offshore in 1894. The principle was not unknown, a version had been employed on the Forth in 1858[1] and Wilcock mentioned it in The Sea Fisherman or Sea Pilotage in 1865.[2] It had also been used on yachts and inshore boats in Ireland,[3] while similar references by Holdsworth[4] were borne out by a men at Falmouth[5] and Instow.[6] The otter-trawl

[1]M'Intosh, 1895, 318.
[2]Butcher,1980, 14.
[3]Annual Report for England and Wales (1896) 127.
[4]Holdsworth, 1883(ii), 8 and 28.
[5]Report on Sea Fisheries of England and Wales (1878-9) 298 and 330.

dispensed with the cumbersome beam and the mouth of the net was kept open by otter boards, or doors, fixed to each corner at such an angle that the weight of oncoming water forced them apart. Each board weighed between 800 and 1,000 pounds and measured up to ten feet by five.[7] They were usually three to four inches thick, sheathed with iron,[8] and attached to a net with a mouth 80 to 100 feet wide,[9] which produced areas of 300 or 400 square feet.[10] The net normally lay above the sea bed, thereby reducing friction, but constant forward motion, for which steam propulsion was suited, was essential for optimum performance. Smack operation was possible but sailing vessels often lacked the strength to work the otter effectively.[11]

Where and for how long it was shot depended, as with the beam-trawl, on the skipper or admiral. Offshore working usually involved five hour hauls, though they were normally shorter for boats operating in nearer waters; vessels in Aberdeen Bay or the Moray Firth typically towed for three or four hours.[12] Once hauled aboard and hoisted above the 'pound' at the fore-deck[13] it was common practice at Grimsby and other leading ports to shoot a second trawl.[14] Smacks had only carried a single set of gear,[15] but economic pressures were such that steamers wasted as little time as possible once they were at the fishing ground.

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[6]Report on Sea Fisheries of England and Wales (1878-9) 330.
[7]Edwards, 1907, 18.
[8]Aflalo, 1904, 44.
[9]Select Committee on Sea Fisheries Bill (BPP, 1900, VIII) Q.25. T.Wemyss Fulton cites those of the Aberdeen trawlers *St Andrew* and *Star of Hope*, used in scientific investigations in 1900, as being 120 and 108 feet respectively; Nineteenth Annual Report of Scottish Fisheries (BPP, 1901, XIII) 526; Oddy, 1971, 13.
[10]Aflalo, 1904, 45.
[11]Tenth Annual Report on England and Wales (BPP, 1896, XX) 127.
[12]Annual Report for Scotland (1901) 526.
[13]Annual Report for Scottish Fisheries (1901) 526-7.
[14]M'Intosh, 1895, 319-20. At Aberdeen the second trawl was kept in reserve in case of damage to the first, Annual Report for Scotland (1901) 526-7.
[15]Alward, 1932, 90.

The otter-trawl's introduction to the offshore fisheries was widely credited to Mr Scott of the General Steam Trawling Company at Granton, who saw it as a means to arrest declining profits.[16] Claims for its 'invention' have been recoreded for C.August Nielsen[17] and a Mr Hearder of Plymouth,[18] though moderated assertions that the latter 'adopted' it in 1874[19] carried more weight. Scott's efforts soon bore fruit commercially, and in June 1894 many of the company's trawlers were fitted with the otter, in a clear case of technological progress being prompted by economic considerations. Having patented the bracketed otter board,[20] a similar application from Robert Hewett failed soon afterwards,[21] though subsequently it turned out that only small modifications were needed to evade the patent.[22] One example was an improvement that involved the use of rigid iron brackets instead of chains for setting the angle of the boards.[23]

The otter was first fitted to several trawlers belonging to the Granton company in June 1894, after which three vessels were chartered to fish with the gear from other ports. The Anglo-Norwegian Steam Fishing Company was the first other firm to use it at Hull[24] while, according to Scott, during the summer of 1894 there were sixteen or seventeen at that port, eight at Granton, two at Grimsby, two at Milford[25] and one at Boston, while another example was seen at Scarborough.[26] However, the gear was reported to still be undergoing trials about six months later[27] and it was not 'generally adopted by English steamers' for another year,[28] and according to

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[16]Cunningham, 1895, 117; Muirhead, 1992, 287.
[17]Holm, 1994, 151.
[18]Aflalo, 1904, 36.
[19]National Maritime Museum, 1986, 19.
[20]Paterson, 1964, 13.
[21]Hewett, 1964, 8.
[22]Cunningham, 1895, 118.
[23]Ashford, 1915, 85.
[24]Cunningham, 1895, 117.
[25]Annual Report for England and Wales (1896) 291.
[26]Cunningham, 1895, 117.
[27]M'Intosh, 1895, 318
[28]Garstang, 1900, 52.

Collector's reports it was not 'universally adopted' until 1896,[29] by which time its use at Aberdeen was widespread and it had been fitted to nearly all vessels in Leith.[30] Unlike the protracted implementation of steam power into the fisheries, its adoption was swift, no doubt due in large part to its relative cheapness. A trawlerman serving with a fleet on the Dogger Bank recalled that

> as the boats went back to Hull for coal, they were not sent out again until they had the otter gear fitted, even if it took a week or ten days.'[31]

There was probably a greater economic risk in not making the change, and indicitave of its profitability was the conversion of 'several steam liners...into trawlers'.[32]

However, its effects were not entirely beneficial. In 1895 several Boston steam trawlers were laid up during the summmer owing to 'serious falls in prices' induced by gluts caused by increased productivity.[33] The situation was not helped by unprofitable trips to Iceland[34] and the following year some steamers from the port tried their luck at Aberdeen and Milford. The otter-trawl broadened the gap between the sail and steam-based infrastructures.

> Although compelled to adopt it by the necessity of self-preservation, many of those who depend on the fishing industry at Hull have not rejoiced at the introduction of the new gear.[35]

It represented increased production and speeded the implementation of larger, more highly capitalized concerns to the detriment of smaller owners and operators. The greater efficiency of the steamer-mounted otter accentuated the inferiority of smacks, which already had considerable difficulty in earning enough for their maintenance.[36] In spite of this, it was adopted swiftly by owners of older, non

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[29]Annual Report for England and Wales (1897) 227.
[30]Fifteenth Annual report on Scottish Fisheries for 1896 (BPP, 1897, XIX) 5 and 9.
[31]Garstang, 1900, 52, citing Mr Ascroft of Hull's Red Cross Fleet.
[32]Seventeenth Annual Report of the Fishery Board of Scotland (BPP, 1899, XIV) 4.
[33]Tenth Annual Report on England and Wales (BPP, 1896, XX) 122 and 239.
[34]Annual Report for England and Wales (1896) 122.
[35]Cunningham, 1895, 118-9.
[36]Annual Report for Scotland (1897) 118.

purpose-built steamers, and at North Shields, for example, numerous ageing paddlers were given a new lease of life.[37]

The first otters were handled with simple tackles fixed to the masts or davits,[38] but such equipment soon became inadequate and was replaced by trawl gallows. Purpose-built trawlers were fitted with wire warps up to 1,200 fathoms long by the end of the century,[39] which prompted development and adoption of double-barrelled winches that were soon controlling lengths of 1,500 fathoms,[40] and tug-trawlers could not remain competitive where such equipment was required. The otter-trawl enhanced catching power dramatically, and by June 1900 'nearly all' steam trawlers were so equipped.[41] Wherever it was used the it was found to be more effective than the beam 'irrespective of depth, force of current, &c',[42] and attempts to quantify the relative efficiency of the 'Granton trawl' produced various results. The Marine Biological Association conducted experiments from which it concluded that the otter caught 47 per cent more fish than the beam trawl,[43] while trawlermen claimed it had multiplied efficiency eight times by 1900.[44] A recent source estimated the increase was nearer 30 per cent,[45] but whatever the true figure the otter proved to be 'a very effective means of capture, some of the fishing banks off the English coast being already almost depleted'[46] by 1895. Walter Garstang's investigations just before the turn of the century used statistics published by the Fishery Board of Scotland that related to catches made by steam trawlers operating from the east coast. He produced figures for the two years either side of that in which the otter was

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[37]Muirhead, 1992, 288.
[38]Paterson, 1964, 13.
[39]Edwards, 1907, 18-20; Clark, 1957, 42-3.
[40]Edwards, 1907, 27; National Maritime Museum, 1986, 32. See Chapter Three.
[41]S.C. on Sea Fisheries Bill (1900) Q.25.
[42]Sixteenth Annual Report of Scottish Fisheries for 1897 (BPP, 1898, XVI) 9.
[43]Jenkins, 1920, 26.
[44]March, 1953, 45; Nicholson, 1979, 74.
[45]Robinson, 1996, 112.
[46]Fourteenth Annual Report on Scottish Fisheries for 1895 (BPP, 1896, XXI) 7.

introduced and these are reproduced in Table 54, revealing an overall increase of 37 per cent.

Table 54

GARSTANG'S FIGURES COMPARING THE EFFICIENCY OF BEAM AND OTTER TRAWLS

Species	Average catch (cwts.) 1893-4 (Beam)	1896-7 (Otter)	Relative Efficiency of the Otter
Cod	505	1,071	2.12
Haddock	2,216	3,095	1.35
Lemon Sole	153	146	0.95
Plaice etc.	409	448	1.10
Totals & Average	3,802	5,227	1.37

Source: Garstang 'The Impoverishment of the Sea', 50.

Garstang's findings were evident in returns of the quantities of fish landed. Table 55 refers to landings of selected species in England and Wales, and Scotland, and quantify the assertion that there was an increase in the capture of round fish,[47] especially cod and haddock, in Scottish waters at this time.[48] The otter worked above rather than along the sea bed which resulted in the capture of species in different proportions to formerly.

Table 55

(i) QUANTITIES OF SELECTED DEMERSAL SPECIES LANDED IN ENGLAND AND WALES

	(1,000s cwts)		
YEAR	COD	HADDOCK	PLAICE
1893	402.0	1,957.7	845.9
1894	436.5	2,175.2	855.4
1895	495.9	2,432.9	789.1
1896	486.9	2,557.2	720.1
1897	540.7	2,548.9	746.9

[47]Annual Report for Scotland (1899) 4.
[48]Pyper, 1903, 17.

(ii) QUANTITIES OF SELECTED DEMERSAL SPECIES LANDED IN SCOTLAND

(1,000s cwts)

YEAR	COD	HADDOCK	HALIBUT
1893	426.2	684.8	31.3
1894	447.8	812.4	31.5
1895	459.3	1,001.3	29.0
1896	575.1	990.2	33.1
1897	590.8	866.3	30.1

(iii) VESSELS LANDING FISH (EXCLUDING HERRING) IN SCOTLAND IN 1906

(1,000s cwts)

	Trawlers	Liners	Nets	Total
Round Fish	1,683.3	585.6	15.6	2,284.5
Flat Fish	137.5	41.7	4.7	183.9

Sources: (i) and (ii) Statistical Tables and Statistical Abstracts for Sea Fisheries; (iii) Committee on Scientific and Statistical Investigations for the Fisheries (BPP, 1908, XVIII) 442.

The otter-trawl was but one stage in 'continuous improvements as regards speed, storage capacity, tonnage, and size of trawl'.[49] It was a major element in attempts to maximize the efficiency of capital by matching operational methods to the increasingly stringent requirements of the market. Thus the number of first class fishing boats at Hull had fallen from 440 in 1877 to 418 in 1913,[50] but aggregate catching power had been enhanced greatly - the United Kingdom's first class fleet having risen from 5,248 vessels in 1871 to 6,743 in 1913[51] while catches rose from 11.1 to 24.1 million hundredweight. Until the turn of the century technological developments were largely confined to the demersal sector, but with the advent of the steam drifter in the late 1890s the pelagic fisheries became central to such advances and were brought within the scope of the distant water industry. The transformation of this sector overshadowed the 'white fishery' in the early years of the century, not just because of the introduction of new methods, but because their introduction into a sector that was more strongly established and based on smaller-scale operations heightened their impact.

[49]Garstang, 1900, 46.
[50]Annual Statements of Navigation and Shipping.
[51]Annual Statements of Navigation and Shipping.

ii DEMERSAL FISHERIES

Alward wrote that by 1900 'the old class of sailing vessels were superseded, more or less, at most of the ports in Great Britain',[52] which was certainly the case at major trawling stations. Supplies had to be maintained if the industry was to prosper and this could not be done for long even with the most efficient steamers of the mid-1890s. Vessels had to voyage further in order to maintain production of demersal fish, and therefore increasingly rigorous demands had to be placed upon fishing boats if they were to remain profitable. Faced with declining catches trawlers 'invariably go elsewhere',[53] a theory that was vindicated in respect of faltering returns from North Sea fishing grounds. Of the total landed by English and Welsh vessels, the percentage of fish taken from this fell considerably to 1906, whence it dropped from 54.75 to 41.49 in 1913, while actual landings fell from 217,550 to 169,300 tons.[54] Although these grounds remained 'unchallenged' as the main source of fish,[55] resources were increasingly diverted to other grounds (see Map 2) as shown in Table 56.

Table 56
PERCENTAGE OF WET FISH (EXCL. PELAGIC SPECIES) LANDED BY ENGLISH AND WELSH VESSELS FROM SELECTED FISHING GROUNDS

	PERCENTAGE OF CATCH LANDED FROM REGION	
REGION	1906	1913
Iceland	20.9	22.9
Faroe	7.8	8.1
Rockall	1.4	0.7
White Sea	0.6	1.5
North of Scotland	0.1	0.9
West of Scotland	3.0	7.6
West of Ireland	0.1	1.8
Bay of Biscay, Portugal, Morocco	1.1	0.9
South of Ireland	5.6	7.6
Total	40.6	52.0

Source: Annual Reports for Fisheries of England and Wales

[52]Alward, 1932, 232.
[53]S.C.of the House of Lords (1904) Q.1,194.
[54]Annual Reports of England and Wales.
[55]Annual Report for England and Wales (1908) 133.

MAP 2: FISHING AREAS AROUND THE BRITISH ISLES

However, despite this shift and the application of increased catching power the total of demersal fish landed in England and Wales in the same years declined from 8.43 million hundredweight in 1906 to 8.36 million in 1913.

Exploitation of these areas meant longer voyages, so fishing boats had to carry more supplies yet remain profitable enough to cover expenses.[56] This entailed increased seaworthiness, and methods such as double rivetting were employed to enable fishing boats to withstand harsher conditions and the strain of towing heavier trawling gear that regularly fouled obstacles.[57] Table 57 shows that steam propulsion was almost mandatory in distant waters.

Table 57

NUMBER OF LANDINGS FROM THE SAME GROUNDS BY DIFFERENT TYPES OF FISHING BOAT IN 1906

	Trawlers		Liners	
Region	Steam	Sail	Steam	Sail
Iceland	1,579	0	346	1
Faroe	1,085	0	340	1
Rockall	95	0	158	0
White Sea	41	0	0	0
North of Scotland	24	0	35	0
West of Scotland	963	0	67	0
West of Ireland	33	0	0	0
Bay of Biscay, Portugal, Morocco	525	0	0	0
South of Ireland	1,787	348	13	0

Source: Annual Reports for Fisheries of England and Wales

The number of smacks 'South of Ireland' was due to the large number of local waters that were fished by south coast fleets (see Chapter Three). The prevalence of trawlers over liners is also indicated, a trend confirmed when it was stated that of 556 fishing boats at Grimsby all but 28 were steamers and only 50 non-trawlers.[58]

Port of registration was not a reliable indicator to the fishing grounds frequented. Tables 41, 43 and 45 illustrate the increased mobility of fishing fleets, and this data

[56]Jenkins, 1920, 148.
[57]Edwards, 1907, 26-7.
[58]Report on Scientific and Statistical Investigations (1908) QQ.9,350-1.

is augmented by figures detailing the coasts on which fish was landed (see Appendices 4iii and 4xii), from which the overwhelming predominance of the east coast is immediately noticeable, especially with reference to a species like haddock, which was found mainly in more distant areas. In 1903 the east coast 'possessed' 990 of 1,146 steam trawlers and 1,288 of 1,457 steam fishing vessels in England and Wales, while there were 162 steamers on the west coast and 8 on the south.[59] Fleets at the major ports were more modern, and such was the pace of progress that an Aberdeen steam trawler operational in 1897 would soon have dated.

Such a vessel was steel-built, typically, and fitted with triple-expansion engines, a double-barrelled winch, acetylene-gas lighting for deck work, and soon after the introduction of the otter was representative of the largest type of operational steam trawler.[60] A more typical example had a gross tonnage of about 400 and a length of 130 feet, with 350 i.h.p. engines that generated about ten knots in favourable conditions. This vessel was 'fitted with steel gallows for the leading blocks of the head lines...deck rollers, and a powerful steam winch for hauling in the catch.'[61] Smaller examples designed for working nearer waters were 100 to 120 feet long with triple-expansion engines producing 50-60 h.p.[62] *Zodiac*, which had represented a huge advance itself, seemed primitive compared to such craft that were the fruit of increased capitalization. The difference was more pronounced by about 1904 when a 'modern screw-trawler' of iron construction with a length of 120 feet was described as having capacity for at least sixty tons of coal and five tons of ice and, with nets and gear, was estimated to cost approximately £5,000.[63] In the same year one of the 'latest trawlers built for the Icelandic fishery' was 130 feet long with 80 horsepower triple-expansion engines feeding boilers able to cope with 200 pounds

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[59]Annual Report on England and Wales for 1903 (BPP, 1904, XI) 173.
[60]Annual Report on Scottish Fisheries (1898) 9.
[61]White, 1952, 12.
[62]Nicholson, 1979, 75; National Maritime Museum, 1986, 32.
[63]Aflalo, 1904, 44.

pressure. She could carry 150 tons of coal and 40 tons of ice, together with 'all necessary stores to prosecute a month's fishing'.[64]

The equipment carried was vital to the efficiency of such vessels. Apart from the actual fishing gear the most important item was the mechanical winch, derived from earlier capstans and imperative to the optimum working of increasingly larger trawls. The double-barrelled steam winch had been developed by G.L.Alward to work the otter[65] and not only did it aid handling, it made the use of longer, steel cables possible, which thus allowed deeper operations and extended the field of operations. A Milford firm was reportedly the first to use winches of 1,000 fathoms[66] and they were soon in widespread use. Weighing about eight to nine tons[67] they made fishing possible to depths of 200 fathoms, though 100 fathoms was more usual.[68] Distant water operations were becoming increasingly sophisticated, and indicative of greater and necessary capitalization was the fact that, in common with other industries at this time, the fisheries relied more and more on outside concerns; anchors and chains for some Hull trawlers, for example, came from the Black Country.[69] The aim of technological development was to enhance economic performance, and if this was accomplished the pressure for further improvement was heightened, thus creating a vicious circle and so, for example, as one witness remarked, smaller winches had to be replaced by larger ones.[70]

Fleeting was subject to such pressures and the comparative benefits of single-boating precipitated its decline. By the early-1890s all Grimsby's steam trawlers went single boating[71] and fleeting was seen as the 'last vantage-ground of the

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[64]Select Committee of the House of Lords (1904) Q.1,396.
[65]Alward, 1932, 59-60.
[66]Report on Scientific and Statistical Investigations (1908) Q.9,802.
[67]'Cochrane & Sons', 1915, 103.
[68]Jenkins, 1920, 23.
[69]Report into the Supply and Training of Boy Seamen (1907) Q.5,054.
[70]Report into Scientific and Statistical Investigations (1908) Q.8,055.
[71]S.C.on Sea Fisheries (1893-4) QQ.1,219-20.

smack' in the Northern ports. The system had been described as representing the 'highest development' of trawling, because it reduced the element of chance to a minimum, but it was helped by a practically unlimited market and the success of single-boaters voyaging to further grounds.[72] However, the latter factor, in particular, eventually eradicated the benefits of fleeting at all but one port as fishing boats increasingly journeyed beyond the North Sea. The survival of the system at Hull was helped because there was progressively less competition from rivals, and it was fostered by poor rail links and the relatively cheap cost of sending catches to London by water. Also, at about this time several steamers were designed and launched especially for fleeting,[73] thus in September 1894 the *Eastern Morning News* reported that the Red Cross fleet's cutter had landed the catches of 19 steam trawlers and 64 smacks at London, while that for the Great Northern had landed those of 10 steamers and 70 smacks.[74] In 1902 there were 145 fleeting vessels at the port[75] It remained particular to Hull and though steamers were built for fleeting in the 1890s,[76] it was not until November 1905 that Hellyer's Steam Fishing Company announced the construction of a 'new fleet' of 40 trawlers in November 1905.[77] The following February, at the launch of two steam cutters, the chairman, Charles Hellyer, referred to the construction of fifty steamers for the North Sea to 'probably' be followed by a further ten that would be the first vessels built 'in Hull to land fish from the North Sea at Hull' for nine years.[78]

Fleeting was carried on by three fleets of 60, and one of 50 vessels,[79] that in 1907 were responsible for landing 44 per cent of all fish landed by Hull trawlers.[80] By 1912 the Gamecock Fleet consisted of 42 steam trawlers, six steam fish-carriers and

[72]Annual Report for England and Wales (1904) 171.
[73]Holt, 1895, 355.
[74]Cunningham, 1895, 120.
[75]Annual Report for England and Wales (1903) 119.
[76]Holt, 1895(i), 355.
[77]The Times, 2 November 1905, 10.
[78]The Times, 13 February 1906, 8.
[79]Report on Scientific and Statistical Investigations (1908) QQ.8,741-2.
[80]Bellamy, 1965, 360.

a hospital ship,[81] while the port itself possessed 259 fleeters and cutters that constituted about 60 per cent of the port's tonnage.[82] However, there were signs that its days were numbered when the Collector reported for 1910 that

> A number of the smaller trawlers were disposed of but the efficiency of the fleet was maintained by the building of a number of larger vessels specially adapted for fishing in Icelandic and White Sea waters.[83]

In 1913 25 firms operated steam trawlers from Hull[84] and all were built so that they could prosecute fishing around 'Iceland, the sea of Nova Zembla, and off the coast of Newfoundland.'[85] In this time none had been built for such operations in the North Sea, though by 1915 there was a desire to increase such activity.[86]

By 1903, 1,450 steam trawlers had been built in Britain,[87] but their distribution throughout the country continued to be uneven. The greatest concentration was along the North Sea coast, but migration from these bases, notably from Humberside to Fleetwood,[88] and the prosecution of more distant grounds led to their deployment elsewhere. Lowestoft, as detailed in Chapter Three, persisted with trawling smacks, though this had more to do with their continued efficiency rather than any prejudice against steamers, as it was at the forefront of the implementation of steam drifters. However, there were examples of steamers encroaching into environments prejudicial to their presence. Though South Devon was firmly entrenched in the smack culture typified by Brixham, Plymouth had served steam trawlers voyaging to southern waters for several years.[89] In 1896 *Reginald* appeared on the register to be followed by nine such vessels in the ensuing decade.[90] The

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[81]Butcher, 1980, 14.
[82]Cutting, 1955, p.254.
[83]Annual Report on England and Wales for 1910 (BPP 1912-3 XXVI) 393.
[84]Bellamy, 1965, 360.
[85]Hellyer, 1915, 57.
[86]*Ibid.*
[87]National Maritime Museum, 1986, 32.
[88]Annual Report for England and Wales (1901) 285; Annual Report for England and Wales (1902) 865.
[89]Annual Report for England and Wales (1896) 275; Annual Report for England and Wales (1899) 285; Annual Report for England and Wales (1900) 125 and 275.
[90]Porter, 1994, 245.

experience of Newlyn in Cornwall was similar, having provided facilities for 'several steam trawlers from Hull and other ports...local enterprise was responsible for starting a steam trawling company' in 1908.[91] Steam technology permeated regions away from the main fishing centres - as long as it was viable. Blyth on the Northumberland coast was conveniently situated for fishing grounds and coalfields, but neither was imperative for distant water steam trawling, what with improved inland communications and increasing ranges of vessels, so when efforts were made to establish it as a fishing station the Humber and Tyne markets provided competition that forced abandonment of the activity in 1913.[92]

Voyages to Icelandic grounds involved a trip of about 1,000 miles and those to the White Sea between 1,700 and 1,800, which meant larger quantities of coal, ice and other stores had to be carried. By 1914 trawlers designed for these grounds were up to 140-feet long and capable of carrying about 250 tons of coal[93] while North Sea trawlers were about 120 compared to around 90-feet in 190.[94] Coal consumption was approximately eight tons per day to feed triple-expansion engines that generated more than 80 horse-power,[95] which amounted to around 2,000 tons annually, most of which was used in getting to and from the fishing grounds.[96] The boilers could withstand a pressure of about 200 pounds *per* square inch, which was about a 25 per cent improvement from the first such engines.[97] Electric or acetylene lighting aided deck work such as the cleaning and gutting of fish[98] and such 'luxury' gave a steam trawler a tonnage of about 120 tons by 1914. The cost had been quoted as £6-7,000,[99] though a contemporary builder gives £7-9,000 for average

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[91] Annual Report on the Sea Fisheries of England and Wales for 1908 (BPP, 1910, XXX) 173.
[92] Alward, 1932, 360-1.
[93] 'Amos & Smith', 1915, 109-110.
[94] 'Cochrane & Sons', 1915, 103.
[95] Jenkins, 1920, 20.
[96] Jenkins, 1920, 148.
[97] 'Amos & Smith', 1915, 119.
[98] 'At Sea With the Trawlers', 1915, 63.
[99] Jenkins, 1920, 20.

vessels and £15,000 for the largest types ready for sea.[100] This particular builder had built 39 vessels with a total tonnage of 10,000 in 1914, and expected to exceed the figure the following year.[101] The nature and deployment of steamers in the demersal fisheries had altered in accordance with the demands of the economic environment.

Decades of technological development in vessels for the demersal fisheries ended in 1914. Christopher Pickering of Hull recalled the first steamers bought to replace his smacks. These were,

> compared with the present day trawlers, very small, two of them being only 90 feet long. To-day they are double the size in tonnage and cost more than double the price to build.[102]

The trip undertaken by a Grimsby steamer to Newfoundland in 1911[103] could not have been undertaken by *Zodiac*, and little more than 30 years previously trawling, let alone steam trawling, had not been practised widely in Scotland. However, by the turn of the century shipbuilders were swamped with orders for steamers, one firm having to open a branch yard.[104] Table 58 charts the growth of this industry.

100'Cochrane & Sons', 1915, 105.
101*Ibid*.
102Pickering, 1915, 76.
103Cutting, 1955, 257.
104Annual Report for Scotland (1899) 4.

Table 58

TRAWLERS CONSTRUCTED IN SCOTLAND, 1892-1914

YEAR	SAIL	STEAM
1892	4	21
1893	2	19
1894	17	14
1895	0	12
1896	1	31
1897	3	47
1898	1	92
1899	2	76
1900	0	57
1901	1	27
1902	0	29
1903	1	27
1904	0	15
1905	0	32
1906	0	81
1907	1	53
1908	0	22
1909	0	20
1910	0	25
1911	0	32
1912	1	33
1913	0	31
1914	0	54

Source: Annual Reports on Scottish Fisheries

Scottish fishermen had not been keen to take up trawling, whether steam or sail, because of its alleged effect on other fisheries. Its capital intensive nature was at odds with the characteristic traditional, smaller-scale operations which impaired the diffusion of technology. Animosities that existed in England were all the more evident north of the border, but the situation altered with the advent of steam drifters in the final years of the nineteenth century.

iii PELAGIC FISHERIES

These vessels were generally smaller than trawlers and the growth of their use is indicated in Table 59.

Table 59

STEAMERS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS EMPLOYED IN THE UNITED KINGDOM AT DECEMBER EACH YEAR AND CLASSIFIED ACCORDING TO TONNAGE

	(Percentage of total fleet in each category)			
YEAR	Under 50	50-100	100-200	200 and over
1885	60.0	22.0	18.0	0.0
1886	66.7	21.4	11.5	0.4
1887	71.1	18.6	10.3	0.0
1888	64.0	25.2	10.8	0.0
1889	57.9	32.7	9.4	0.0
1890	60.6	32.5	6.9	0.0
1891	53.2	42.2	4.4	0.2
1892	51.9	44.0	4.1	0.0
1893	51.8	44.8	3.4	0.0
1894	52.5	47.0	0.0	0.0
1895	49.8	47.8	2.4	0.0
1896	52.4	45.1	2.5	0.0
1897	49.5	48.5	2.0	0.0
1898	45.9	52.2	1.9	0.0
1899	43.2	54.8	2.0	0.0
1900	42.3	56.1	1.6	0.0
1901	44.5	54.2	1.3	0.0
1902	46.3	52.6	1.1	0.0
1903	48.4	50.2	1.4	0.0
1904	48.9	49.7	1.4	0.0
1905	48.5	49.3	2.2	0.0
1906	46.9	49.0	4.1	0.0
1907	49.1	45.1	5.8	0.0
1908	52.4	41.5	6.0	0.1
1909	52.6	40.9	6.5	0.0
1910	53.6	39.8	6.6	0.0
1911	53.9	38.4	7.7	0.0
1912	54.8	36.9	8.2	0.0
1913	55.5	35.3	9.1	0.1

Source: Annual Statements of Navigation and Shipping.

The proportion of registered steamers under 50 tons increased in the 13 years from 1899, having been in general decline since 1887. The greater and more immediate financial attraction of the white fishery earlier in the nineteenth century was tempered as it became increasingly competitive, while technological advances led to the cessation of comparative neglect in the pelagic sector until, by 1912, the herring catch was 'undoubtedly' the outstanding feature of the English and Welsh sea fisheries.[105] This is quantified by returns in Table 60 which show how the amount and value of the United Kingdom's herring catch rose from 1888.

[105]Annual Report on the Sea Fisheries of England and Wales for 1912 (BPP, 1913, XXIV) 5.

Table 60

QUANTITIES AND VALUES OF HERRING LANDED IN UNITED KINGDOM

YEAR	QUANTITY (1,000s cwts)	VALUE (£1,000s)
1888	4,602.6	1,089.3
1889	5,760.7	1,227.7
1890	5,397.2	1,340.9
1891	4,849.0	1,466.6
1892	5,332.3	1,222.3
1893	5,952.0	1,239.8
1894	5,888.5	1,226.9
1895	5,685.4	1,380.8
1896	5,730.7	1,117.2
1897	5,069.4	1,299.0
1898	7,000.4	1,454.6
1899	5,873.6	2,039.3
1900	6,229.7	2,261.8
1901	7,139.1	2,051.5
1902	8,478.6	2,548.8
1903	7,571.5	2,220.4
1904	8,918.3	1,870.2
1905	8,759.0	2,629.3
1906	8,568.6	3,093.9
1907	11,002.2	3,024.3
1908	9,924.1	2,360.6
1909	9,622.7	3,082.2
1910	10,065.4	3,212.8
1911	10,685.0	3,145.9
1912	11,051.1	3,705.5
1913	12,183.4	4,572.2
1914	6,695.3	2,115.9

Sources: Statistical Tables for the Sea Fisheries.

By the mid-1880s several steam vessels had been built for herring fishing in Scotland and the use of tugs and carriers was not uncommon. In 1880 two steam fishing boats, *Waterwitch*, built at Leith[106] and *Alpha*, were employed at Wick. They landed 400 and 300 crans, respectively, in good condition, but proved unremunerative in terms of initial outlay and were put up for sale.[107] Two years later a similar venture was tried at Aberdeen when, despite arriving late in the season, a steamer landed good catches in calm weather that enabled her to show 'strikingly' the advantages of steam over sail.[108] Nevertheless, her performance

[106]Kent, 1970, 9; gives the specifications of this vessel.
[107]Report of the Commission of the Fishery Board (Scotland) (1881) 478-9.
[108]Annual Report for Scotland (1883) 758.

failed to convince drift net fishermen of the value of steam and the idea was not pursued. Experiments were similarly fruitless in England where 'two small wooden steam-drifters', *Perseverance* and *Resolute*, operated from Fleetwood in the 1880s.[109] Three more steamers operated from Aberdeen in the middle of the decade[110] and a short while later five 'of a superior class and well equipped, and having large meshed nets' operated from the district and captured herring of 'large size.'[111] Such reports remained subject to verification as the strict definition of what constituted a steam vessel in the eyes of local Customs Collectors was a matter for some conjecture. At Buckie, for instance, the equipping of 'some fishing boats...with engines and capstans for hauling nets'[112] - and presumably aiding rigging adjustments - seemed to be enough. About ten years later a few small steamers were used from Granton for herring but an argument used against steam trawlers, that boiler heat was detrimental to the catch, was allied to the general antipathetic attitude to steam in Scotland, at least while the financial prospects were bleak. A merchant expressed the view that 'I do not think the men will take to steam at all.'[113] The validity of such arguments did not deter experiments in steam power, and about 1894 two steam mackerel boats were employed from Penzance and Newlyn.[114]

Technological development had not been dormant in the pelagic fisheries though, especially in Scotland, they had been greater in the inshore fisheries,[115] notably through implementation of the ring-net. As mentioned earlier, lighter and more flexible cotton nets were feasible from the second half of the nineteenth century and enhanced catching power; at Great Yarmouth by the 1880s drifters were carrying 80

109Horsley and Hirst, 1991, 17.
110Annual Report for Scotland (1884-5) 204.
111Annual Report for Scotland (1886) 228.
112Annual Report for Scotland (1886) 257-8.
113S.C.on Sea Fisheries (1893-4) QQ.5,848-9.
114Annual Report for England and Wales (1895) 243.
115Coull, 1996, 96.

to 130 as opposed to about 60 to 90 twine nets that had been carried in the 1830s.[116] However, the length of time before cotton nets were widely adopted suggested that the implementation of steam propulsion would also take time. Certainly this seemed to be the case before the construction of viable steam drifters, but once instigated their effect was arguably even more spectacular than that in the demersal sector. It disrupted the *status quo* within an industry that possessed deeper traditions; there was a far greater subsistence element among commercial interests which rendered change more traumatic than in the trawling sector. New types of nets had hinted at greater prosperity for the herring industry, but steamers entailed abandonment of an infrastructure that had been in place for centuries. For example,

> the exignecies of harbour accommodation, a large market, ready access to London, and facilities for the cleaning and packing of the herrings after landing form tendencies towards concentration of the landings in a few large ports.[117]

As with trawling, steam widened the gulf between reality and potential of the industry. However, unlike in trawling, drift-netting was not dependent on steam in the actual fishing operation. The limitations of sail became apparent in respect of range and reliance on the weather with regard to supplying the market. In 1914 it was remarked that the modern drifting smack with a steam capstan was 'not inferior' to the steam drifter as regards the actual fishing operation but lost out when it was necessary to travel further in order to exploit stocks at greater distances from port.

Reference had been made to the first steam drifter at Buckie, owned at Leith around the end of the 1880s,[118] that contradicts the assertion that the first such vessels there were 'very successful, and...encouraged more fishermen to go in for them.'[119] The latter statement must have referred to steamers that immediately

116Fewster, 1985, 22 and 25.
117Eighteenth Annual Report on England and Wales for 1903 (BPP, 1904, XI) 184.
118Report on the Scottish Sea Fishing Industry (1914) QQ.4,075-8.
119Report on the Scottish Sea Fishing Industry (1914) 958.

followed one bought from England around the turn of the century.[120] Commercial steam drifters most likely originated in East Anglia. March cited the construction of the first steam drifter, *Consolation*, at Lowestoft in 1897,[121] though Kent ascribed that status to *Test* at the same port two years later,[122] while the first at Yaromouth, *Claudian*, appeared in August 1899. In 1898 two steam herring-fishing boats, one constructed at Lowestoft, operated from Wick and Stornoway, the latter being especially conspicuous due to her 'superiority over sailing craft...[and the]...higher prices secured by her crew.'[123]

Whatever the exact details of their introduction there was no questioning their effect. The nature of the herring industry, its economic composition and itinerant nature, ensured that the ability to catch twice as much fish with the same spread of nets[124] meant that use of the steam drifter was more uniformly spread throughout the sector than had been the case with trawlers. Like early steam trawlers they were fully rigged[125] and many were hastily built, being little more than adapted dandies.[126] They were 'hopelessly under-powered', a Lowestoft vessel built for a Hull firm in 1900 had only 15 horsepower,[127] and March recalled speaking with a drifterman on the subject:

> He told me that Mr William Elliott was seriously perturbed at the loss of power in the Yarmouth drifter *Cicero*. 'If you blew the whistle the steam pressure fell.'[128]

Such technical shortcomings did not stop 20 steam herring boats landing their catches at Grimsby from September to November in 1898,[129] a number that was doubled in 1900[130] when, as well as Scotland, these boats came from Lowestoft and

120Report on the Scottish Sea Fishing Industry (1914) QQ.1,220-3.
121Butcher, 1979, 44.
122Kent, 1970, 11.
123Annual Report for Scotland (1899) 11.
124Cutting, 1955, 271.
125March, 1952, 89; National Maritime Museum, 1986, 33.
126Butcher, 1979, 46.
127Cutting, 1955, 271.
128March, 1952, 89.
129Annual Report for England and Wales (1899) 243.
130Annual Report for England and Wales (1901) 221.

Yarmouth where steam drifters where swiftly replacing smacks.[131] The following season the herring fishery was notable for the 'large number of steam drifters employed',[132] and the year after it was recorded that their influence was beginning to infiltrate the mackerel fishery. The season at Newlyn was remembered for the presence of about 40 steamers from eastern ports that out-performed the smacks.[133]

This superior performance was clearly demonstrated at Lowestoft, where the number of steamers registered under Parts I and IV of the Merchant Shipping Act had risen to 327 in 1913, as can be seen from Table 61.

[131] Annual Report for England and Wales (1900) 126 and 237.
[132] Annual Report for England and Wales (1901) 125.
[133] Annual Report for England and Wales (1902) 851.

Table 61

STEAM VESSELS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS AT LOWESTOFT

	NO.OF VESSELS		TOTAL
YEAR	50 TONS-	50 TONS+	TONNAGE
1883	0	0	0
1884	0	0	0
1885	3	0	92
1886	3	1	152
1887	3	1	152
1888	1	0	32
1889	1	0	32
1890	1	0	32
1891	1	0	32
1892	1	0	32
1893	1	0	32
1894	1	0	32
1895	1	0	32
1896	1	0	32
1897	2	0	59
1898	2	0	59
1899	3	0	72
1900	13	0	434
1901	35	0	1,229
1902	70	0	2,486
1903	101	0	3,559
1904	110	0	3,929
1905	124	0	4,476
1906	150	0	5,450
1907	190	0	6,571
1908	225	0	7,766
1909	245	0	8,415
1910	268	0	9,314
1911	313	0	11,028
1912	327	2	11,780
1913	335	2	12,203

Source: Annual Statements of Navigation and Shipping

This rise was similar at Great Yarmouth (see Appendix) as resources were diverted to drifting, and by 1904 steam drifters had superseded their sailing counterparts at the port.[134] Table 62 shows the rise of steam drifting from English ports along the North Sea coast.

[134]Aflalo, 1904, 254.

Table 62

NUMBER OF STEAM DRIFTERS REGISTERED AT ENGLISH NORTH SEA PORTS

YEAR	NUMBER
1902	176
1903	226
1904	248
1905	262
1906	288
1907	349
1908	392
1909	426
1910	478
1911	553
1912	599
1913	624

Source: Annual Report for England and Wales for 1913[135]

Such growth was apparent throughout the United Kingdom. In Scotland

> Notwithstanding the great development of the trawling industry, the number of net and line fishermen has not been affected to any appreciable extent; and, in consequence of the very successful herring fishing experienced, a large number of crews have been enabled to replace old craft with the latest type of boat, fitted up with all the most modern time and labour-saving appliances.[136]

Whether the 'latest type of boat' meant steamers is not specified, but Table 63 indicates that this was so in many cases.

[135]Annual Report for England and Wales (1914) 55.
[136]Annual Report for Scotland (1899) 4.

Table 63

FISHING BOATS (NON-TRAWLERS) CONSTRUCTED IN SCOTLAND

	FISHING BOATS	
YEAR	SAIL	STEAM
1892	354	8
1893	319	12
1894	443	9
1895	440	11
1896	374	23
1897	346	10
1898	333	0
1899	305	2
1900	340	12
1901	350	14
1902	379	3
1903	384	19
1904	249	18
1905	184	7
1906	176	50
1907	175	179
1908	193	78
1909	164	29
1910	151	48
1911	131	67
1912	140	34
1913	129	43
1914	129	63

Source: Annual Reports on Scottish Fisheries.

Certainly to the extent that in 1908, in the wake of a bumper year for the herring industry, steam trawlers were being converted into drifters because builders could not cope with demand.[137] Nevertheless, as shown in Table 64, more than two-thirds of Scottish herring production still came from sailing boats in 1906.

Table 64

QUANTITIES OF HERRING LANDED BY STEAM AND SAIL VESSELS IN SCOTLAND IN 1906

	(1,000 cwts)	
	Steam	Sail
East coast	578	2,125
Orkney and Shetland	827	908
West coast	166	412
Total	1,571	3,445

Source: Board of Trade returns, Report into Scientific and Statistical Investigations (BPP, 1908, XIII) 442.

[137]J.Duncan, 1909, 830.

Steam drifters were smaller and cheaper than trawlers, *Test* built in 1899 cost £1,950 'ready for the sea',[138] while the Lowestoft-built steamer at Wick referred to above cost £1,700 to build.[139] The material used in their construction affected the price, and Table 52 shows how this manifested itself through the resurgence of wooden vessels after the turn of the century. However, although wooden drifters threw less strain on the nets,[140] metal vessels were less prone to damage in crowded ports,[141] another reason for their progressive incursion into the industry other than that they were more cost effective and had a longer operational life.[142]

> The growing cost of providing the drifters which were fitted out with more powerful engines and after a time made of iron and steel instead of wood, made it more and more difficult for the working fishermen to find the necessary capital to provide these costly instruments of production.[143]

By 1904 a wooden steam drifter at Yarmouth ready for operations cost between £2,300 and £3,300.[144] By 1914 this had risen to about £2,700 for a wooden vessel and £3,200 for a steel drifter, in addition to £400 for nets.[145] Nets were expensive and usually had to be replaced after a year.[146]

The increased prices of the latest vessels indicated that the drifting sector, like trawling, was becoming increasingly capitalized. This was clear in the contrast between the technical properties of a drifting smack and those of a steel-hulled steamer like *English Rose* which was built at Selby for Yarmouth in 1914.[147] With a length of nearly 120 feet giving her a tonnage of 82, and powered by a 25 horsepower triple-expansion engine, she rectified earlier complaints that steam drifters were too small and underpowered, properties that had been worsened

[138]Kent, 1970, 11.
[139]Annual Report for Scotland (1899) 11.
[140]Aflalo, 1904, 63.
[141]Committee into the Scottish Sea Fishing Industry (1914) Q.6,228.
[142]Committee into the Scottish Sea Fishing Industry (1914) Q.1,243.
[143]Committee into the Scottish Sea Fishing Industry (1914) 690.
[144]Aflalo, 1904, 63. To equip a first-class drifter with fishing gear including at least 200 nets, 12 coils of messenger rope, stopers, buoys and buoy ropes was cost about £6-800 - Committee into the Scottish Sea Fishing Industry (1914) 958
[145]Committee into the Scottish Sea Fishing Industry (1914) 956.
[146]Committee into the Scottish Sea Fishing Industry (1914) QQ.1,244-5.
[147]Kent, 1970, 11.

because the crew often neglected the gear, as it did not pay them, as hired hands, to attend to it, though more likely, the owners could not pay to attend to it.[148] Steam drifters only paid when they were made larger, and this entailed greater capitalization, which was reflected by the fact that from about 1907 their greater size facilitated the conversion of some smaller trawlers to drifters.[149]

The concept of combining trawling and drifting was not new. Attempts to operate such vessels had been tried, particularly on the Continent, but they were not taken up with alacrity in Britain.[150] Herring fleets were mainly geared to seasonal operation, smacks were laid up for a period and crewmen took jobs ashore.[151] This situation changed with the more capital-intensive approach concomitant with steam drifters where there was greater pressure to keep vessels earning all the time, and as a result the number of drifter-trawlers built in East Anglian yards grew.[152] However, these vessels were not the sole manifestation of the use of trawling in the pelagic fisheries. Trawling for such species was of increasing significance from 1902 when the first catch was landed at Wick. The vessel belonged to the Aberdeen Trawling Company and, being a steamer, locals found the exploit all the more annoying, so it was not surprising that the skipper was 'stoned'.[153] Their reaction, though understandable, was of little consequence and the proportion of herrings landed by trawl in England and Wales alone between 1907 and 1913 rose from 3.0 to 7.2 per cent of the total.[154]

Trawling for pelagic species is generally credited to experiments conducted by fishermen at Milford Haven and Fleetwood early in the century. Otter-trawls were

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[148]Committee into the Scottish Sea Fishing Industry (1914) Q.4,080.
[149]Report into Scientific and Statistical Investigations (1908) Q.5,045; Committee into the Scottish Sea Fishing Industry (1914) QQ.4,081-2.
[150]Jenkins, 1920, 23; also see Edwards, 1908, 49-52.
[151]Butcher, 1980, 63.
[152]*Ibid.*
[153]Jenkins, 1927, 144.
[154]Annual Report for England and Wales (1914) 42.

adapted for the fishery, though specialized gear was later devised,[155] and the initiative shown at these ports is apparent by their prominence in Table 65.

Table 65

PORTS LANDING OVER 10,000 CWTS. OF TRAWLED HERRING, 1907-13

	Quantity (1,000 cwts)						
PORT	1907	1908	1909	1910	1911	1912	1913
Fleetwood	80	99	73	12	26	34	66
Milford	22	28	11	-	-	-	23
Hull	12	14	-	21	189	167	203
Grimsby	-	-	-	-	32	38	139
North Shields	-	-	-	-	22	20	59
Hartlepool	-	-	-	-	-	-	14
Liverpool	-	-	-	-	-	-	14

Source: Annual Report for England and Wales for 1913.[156]

A Cardiff trawler owner remarked in 1908 that he and local colleagues got 'an immense quantity of herring by trawl' from off the Pembrokeshire and Irish coasts.[157] This success was not mirrored on the east coast where the practice had not been tried from Yarmouth.[158] This was perhaps surprising as by 1912 over 95 per cent of herring so caught were extracted from the North Sea.[159]

Herring trawlers towed more quickly than those for white fish, the species being speedier and with better eyesight. Even so, it was mainly worked in daylight before midday, while the hauls were often as short as half an hour.[160] Questions were resurrected about the quality of trawled fish because some authorities reckoned that marketability suffered as handling often damaged appearance and flavour.[161] Nevertheless, this did not deter trawlermen from extending operations to mackerel. This diffusion was no doubt helped by the significant presence of steam drifters at

[155]Jenkins, 1927, 138.
[156]Annual Report for England and Wales (1914) 49.
[157]Report into Scientific and Statistical Investigations (1908) Q.8,017.
[158]Report into Scientific and Statistical Investigations (1908) QQ.10,026-7.
[159]Annual Report for England and Wales (1914) 22.
[160]Jenkins, 1927, 140.
[161]Jenkins, 1920, 54.

Milford for the mackerel season,[162] and the national growth of this fishery can be seen from Table 66.

Table 66

MACKEREL TAKEN WITH THE TRAWL, 1907-13

YEAR	QUANTITY (000s CWTS.)	% OF TOTAL CAUGHT BY ALL METHODS
1907	5.8	1.4
1908	6.3	1.8
1909	8.9	2.4
1910	11.8	2.9
1911	24.8	6.7
1912	41.7	12.5
1913	28.6	8.3

Source: Annual Report for England and Wales for 1913[163]

iv MOTORS AND WIRELESSES

By 1914 the herring fishery off the Northumberland coast was substantial, but it was largely conducted by steam drifters based at 'fishing centres outside the region.'[164] Steam propulsion not only enabled larger catches from local boats it fostered migratory trends, particularly among Scottish fishermen and curers who were already in the habit of partaking of the autumn fishery in East Anglia.[165] This phenomenon was well illustrated by the herring fishing off the East Anglian coast in the autumn of 1913. Although 1,000 steam drifters fished from Yarmouth and 600 from Lowestoft,[166] 1,163 Scottish boats came to East Anglia, of which 854 were steamers, 209 sailing drifters and 100 powered by motors,[167] while some vessels were powered by sail with auxiliary motor, and a steam (donkey) engine.[168] The

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[162]Annual Report for England and Wales (1905) 577; Annual Report for England and Wales (1906) 464; Annual Report for England and Wales (1908) 286.
[163]Annual Report for England and Wales (1914) 52.
[164]Muirhead, 1992, 468.
[165]Butcher, 1979, 14.
[166]Kent, 1970, 9.
[167]Jenkins, 1927, 116; Kent, 1970, 9.
[168]Committee into the Scottish Sea Fishing Industry, (1914) 694.

accession of the internal combustion engine to the fisheries contributed further to the incursion of technology into the pelagic fisheries, and some idea of its effect can be drawn from Table 67

Table 67

PERCENTAGE OF HERRING CAUGHT BY TYPES OF FISHING BOAT, 1906-14

YEAR	STEAM	SAIL	MOTOR
1906	31	69	-
1907	45	55	-
1908	50	50	-
1909	54	46	-
1910	56	40	4
1911	59	36	5
1912	61	33	6
1913	64	28	8
1914	74	19	7

Source: Annual Reports for Scotland

Little progress had been made with the marine motor in the British fishing industry until after 1900.[169] When it became available it could be installed in existing smacks and was of 'lower power and more economical...than the ordinary marine steam engine',[170] and thereby facilitated more efficient working of smacks within an infrastructure that had been developed to accommodate steamers. However, this development did not improve the seaworthiness of existing vessels, the effect of which continued to diminish in terms of the distant water fisheries. The marine internal combustion engine as it existed in the early years of the century suited economies 'whose economic organisation is less based on coal than ours and whose fisheries are carried on in more sheltered waters than ours',[171] which is clear from Table 68. Unlike steam propulsion, which largely affected first class vessels, motor boats registered in Scotland were prominent in the second class and, to a lesser extent, the third class category.

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[169]Muirhead, 1992, 458. See pp.268-9 for earlier development of the internal combustion engine in European fishing industries.

[170]Committee into the Scottish Sea Fishing Industry (1914) 693.

[171]Committee into the Scottish Sea Fishing Industry (1914) 682.

Table 68

MOTOR BOATS REGISTERED IN SCOTLAND

YEAR	1ST CLASS	2ND CLASS	3RD CLASS	TOTAL
1901	1	-	-	1
1902	2	-	-	2
1903	3	-	-	3
1904	3	-	-	3
1905	4	-	-	4
1906	5	-	-	5
1907	6	1	-	7
1908	11	7	-	18
1909	38	30	7	75
1910	57	90	9	156
1911	79	144	10	233
1912	96	244	16	356
1913	182	313	28	523
1914	265	397	32	694

Source: Annual Reports for Scotland

This point is reinforced by March's observation that at eight major Scottish drifting ports in 1910, of 2,070 fishing boats over 15 tons only three were motorized.[172] Motors and steam engines both represented technological advances on sail, but they possessed different characteristics.

Though cheaper than a steamer the cost of a motor, about £480 in 1907 and not less than £500 seven years later,[173] still proved to be a considerable stumbling block for many. Early versions were unreliable, but by 1907 in Scotland[174] and 1909 in East Anglia their use was increasing.[175] In the prevailing economic climate it was essential to improve on the performance of the smack, and in Scotland it was reported that

> sailing-boats, particularly without motor power, have become almost useless for the English fishing which a few years ago was found a very remunerative fishing by Wick crews. It is also recognized that during next season, and perhaps for a series of seasons, shoals of herring may not be struck at a distance which would be so accessible to sailing-boats, and motor power would be absolutely necessary to give the sailing-boats a chance of competing with steamers.[176]

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[172]March, 1952, 262-3.

[173]Report into Scientific and Statistical Investigations (1908) Q.6,308; Committee into the Scottish Sea Fishing Industry (1914) 956.

[174]Report into Scientific and Statistical Investigations (1908) Q.6,308.

[175]Carr, 1934, 76.

[176]Committee into the Scottish Sea Fishing Industry, (1914) 956.

This situation was helped by the fact that motors gave fishing boats the ability to double the number of trips with one man less, which offset the extra costs incurred. Experience soon taught that the best policy was to detail an individual look after the engine, and it soon became apparent that for a 40 ton boat an engine of about 50 to 55 h.p. was sufficient, any larger and the law of diminishing returns, through fuel costs, rendered the boat uneconomic,[177] while with a good wind the sails could be used to conserve fuel.

Despite such perceived advantages by 1914 only 11 out of 600 cobles and herring boats in Northumberland had motors fitted[178] while the proportion was variable in Scotland. Zulus, motorized or not, were more common north of the Tay but did not lend themselves to engines as well as the Fifies in more southerly districts. One port that had progressed considerably with the latter was Eyemouth which, by the end of 1912 had 36 first-class smacks with motors. A further reason for this was probably that these vessels mainly worked local waters and did not go north, thus not requiring a powerful engine, either steam or motor. Fishermen had also found loans obtainable locally, and there had been no predisposition against the steamer unlike in other areas.[179] Conversely, in Newlyn only a few motors had been introduced, yet local fishing boats were still 'handicapped by having no propelling power other than sail.'[180] Though primarily associated with drifting the internal combustion engine continued to be developed and was used by other sectors of the industry by 1914, as can be seen from Table 69.

177March, 1952, 262-3.
178Muirhead, 1992, 468.
179Committee into the Scottish Sea Fishing Industry, (1914) 694.
180Annual Report for England and Wales (1912-3) 413.

Table 69

EMPLOYMENT OF MOTOR FISHING BOATS IN ENGLAND AND WALES 1912 AND 1913.
(Number and net tonnage of first and second class motor fishing boats on the register at 31st December)

	First Class		SecondClass	
	1912	1913	1912	1913
Method	V/T	V/T	V/T	V/T
Trawling	6/117	6/117	15/80	14/71
Trawling & Lining	2/37	6/115	9/44	16/92
Trawling & Drifting	0/0	4/97	11/61	7/55
Lining	4/60	4/94	17/80	29/160
Lining & Drifting	30/534	43/803	25/202	31/265
Drifting	84/2,250	85/2,290	25/247	40/340
Others	4/80	3/60	21/100	56/297
Not Employed	1/29	2/58	3/24	1/7
Total	131/3,107	153/3,634	126/838	194/1,287

Source: Annual Report for England and Wales for 1913.[181]

By the end of this period sailing drifters with auxiliary motors had proved successful which no doubt delayed their demise,[182] a fact that was also applicable to line fishing.[183] However, the addition of motors did not convert inshore vessels into distant water craft.

Increased mobility and intense competition rendered it somewhat surprising that Britain's distant water fleet did not take to ship-to-ship communications with greater alacrity. The first attempt to adapt wireless telegraph gear to the sea fisheries was made by the Dutch in 1905 and it was followed by successful trials between two German vessels in 1908.[184] Early in the twentieth century Germany had four steam trawlers, four steam drifters and an 'investigation steamer', France six steam trawlers and Belgium one steam trawler so equipped.[185] Not until 1910 was such equipment licensed by the Post Office and tried in a British vessel, and after a 'short

[181] Annual Report for England and Wales (1914) 100.
[182] Jenkins, 1927, 116.
[183] Coull, 1996, 151.
[184] Annual Report for England and Wales (1912-3) 224.
[185] Annual Report for England and Wales (1914) 111.

trial' the experiment was abandoned.[186] The Hull trawler *Othello* and the carrier *Caesar* had been used[187] and several years later trials were conducted with *Santa Lucia* and *St Vincent* from the same port.[188] Technical limitations made it impossible to send over 50 miles which made it practically useless,[189] but in 1913 Messrs. Hellyer's co-operated with the Marconi company and found that telescopic masts solved the problem of aerial span and *Othello* sent 180 and *Caesar* 270 miles.[190] Accordingly, several trawlers belonging to Hellyer's Steam Fishing Company[191] and the Hull Steam Fishing and Ice Company,[192] in which Charles Hellyer was also involved, were so fitted, though the outbreak of hostilities prevented further development.

The diffusion of technology in various forms increased the production potential of Britain's distant wate fishing industry throughout this period. Technical problems were invariably solved, though the holy grail of the unsinkable fishing boat remained unattainable, despite the endeavours of Mr John White of Cowes. This well-known boat builder had designed a vessel which, he claimed, 'will not sink if overwhelmed by the sea.'[193] A feature of unsuccessful ventures, it was not heard of again, though if it had been one feels that the ramifications described below would have been even more dramatic.

186Annual Report for England and Wales (1912-3) 224.
187Clark, 1957, 49.
188Annual Report for England and Wales (1914) 110.
189*Ibid.*
190Annual Report for England and Wales (1914) 111.
191PRO, BT31/15,760/52,041.
192PRO, BT31/2,623/13,888; 4,748/31,368.
193The Times, 2 December 1885, 7.

PART THREE

RAMIFICATIONS OF TECHNOLOGICAL CHANGE

CHAPTER 6 THE INDUSTRY

> The trade and the country having reached such a position, it will no longer be satisfied with a haphazard organisation, and therefore it is that we have fish trade organisations endeavouring to stimulate a progress which the individual members, following traditions and forced to consider immediate results, cannot reasonably be expected to inaugurate.
>
> W. Anderson Smith, 1883.[1]

Changes in production allied to those in distribution created new priorities that rendered obsolete the established infrastructure of the fishing industry. This chapter analyses the repercussions of such developments in financial and human terms by examining contemporary sources to find out what occurred.

i BUSINESS ORGANIZATION

The technological developments detailed in Part Two rendered the smack-based infrastructure inadequate for distant water fishing, but their potential had to be reconciled to the social and economic environment in order to render them viable. Consequently, a process of rationalization had to be undertaken in order to formulate an effective replacement. For example, by 1866 there were 300 smacks representing an investment of about £250,000 sailing from Hull and Grimsby,[2] and although firms like Hewett's and the Liverpool Fish Company, which had 19 or 20 vessels in the 1840s,[3] contradicted the stereotypical view of small operators, the cost of working fishing boats had increased far beyond the capacity of most smack owners. The first purpose-built steam trawlers had cost about £3,500, but by the turn of the century the price of such a vessel had risen to £10,000 for construction, before running costs of about £5,000 *per annum* were considered.[4] Extensive rationalization was necessary in order to cope with revolutionary innovations. This meant confronting attitudes that had been conditioned by a lifestyle centred on the

[1]Anderson Smith, 1883, 226.
[2]R.C. on Sea Fisheries (1866) 610.
[3]Jarvis, 1995, 58.
[4]March, 1953, 45.

smack. Their owners often possessed a single vessel and insufficient resources to invest in new technology. Therefore the efficiency of existing capital was maximized within an increasingly hostile economic context in which it was increasingly difficult to compete with businesses at the leading edge of the industry. This has been illustrated in particular through the development of the wind-driven fishing boat in Chapter Three and the introduction of the otter-trawl in Chapter Five. The latter was, itself, cheap, and vastly improved the return on investments, but this was largely academic for most smack owners, as it was necessary to have already bought a steamer - which represented huge financial expenditure.

Established fishing communities had lived 'for at least 200 years on the basis of a volatile market economy and developing technology',[5] circumstances that were heightened from the second half of the eighteenth century by the technological changes taking place within an industrializing nation. However, although an effective factory system and the beginnings of a machine-based infrastructure had been in place for over fifty years by 1850, industrial capitalism in Britain was far from ubiquitous. More than half the population still lived in rural areas and over a fifth were employed in agriculture.[6] The diffusion of technology was initially confined to heavier industries such as iron, steel and engineering that were reliant on coal and overland transport.[7] Industrialization quickened and spread from the mid-1860s with 'the introduction of technical changes that encouraged the growth of firms geared to large-scale production for the supply of mass markets.'[8] The distant water fishing industry was a case in point, and not until the mid nineteenth century did trawling begin to cater for a mass national demand.[9] Contrary to common belief the nineteenth century was not characterized by relentless progress; ideas spread

[5]Thompson *et als*, 1983, 6.
[6]Fraser, 1981, 239; Starkey, 1993, 129.
[7]Hartwell, 1965, 16.
[8]Kenwood & Lougheed, 1982, 124.
[9]Robinson, 1996, 49.

irrespective of political boundaries, but their practical implementation was subject to numerous economic and non-economic factors that determined their diffusion.

> Innovation transformed several sectors of industry, with new technology and organisation at the core of change...[but] at the same time, many branches of the economy were affected only slightly.[10]

Watt's steam engine, for example, was patented in Britain in 1776 and introduced into France three years later, into Germany in 1788, and Italy in 1816. However, it was not widely used in Britain for about 60 years, and similar lags were characteristic in the other countries.[11] This was manifested in the distant water fisheries by the initial use of steam power for towing and carrying in the middle of the nineteenth century, followed by its tentative adoption for propulsion in the 1870s and its commercial use in the pelagic fisheries from the late 1890s. Meanwhile, the use of sailing vessels persisted to various degrees throughout the sea fishing industry.

Most established business units were geared to the operation of these craft, and being self-financing their funds were patently inadequate for the operation of numbers of steamers. Survival, let alone long-term prosperity, called for 'radically new methods of capital formation and management systems'.[12] These necessitated the amalgamation of business units, but such was the level of investment required that the pooling of resources within the fishing industry was not always sufficient - outside capital had to be provided in order to facilitate research and development to ensure prosperity in the future as well as efficient running in the present. Owners and operators that had invested in sail were understandably reluctant to commit resources to research that would effectively render their own capital obsolete. Survival was the prime concern and among fishing companies it was more usual to reap the profits of research conducted elsewhere than to sponsor such work. Established sources of capital, usually individuals or groups of individuals, were

[10]Stearns, 1993, 21. See also Pollard, 1981, Chapter 1.
[11]Kenwood & Lougheed, 1982, 5-6.
[12]Stearns, 1993, 26.

incapable of funding such projects, and moneyed parties outside the industry were reluctant to invest without at least a reasonable chance of a good profit. This contributed to the protraction of developments in the fishing industry and was observable, for instance, through the persistence of tug-trawlers in some regions. However, such vessels demonstrated that steam operations had economic potential, and confidence grew throughout the 1880s and positively flourished in the 1890s, as investors became impatient for the maximum possible remuneration. This does much to explain the diffusion of resources to the herring fishery. The trawling sector had greater profit potential, which attracted potential investors and limited opportunities, *in lieu* of which more attention to be directed towards other areas of the fisheries.

Economic restructuring of the fishing industry led to a shift from the influence of 'individual members' to collective units where opportunism and finances combined and businesses were formed into limited companies. This process had started, long before commercial steam propulsion in the fisheries, around the middle of the nineteenth century in response to perceived profit potential. The fisheries were the focus of a number of speculative ventures fuelled by desires to cash in on the construction of the rail network and ongoing improvements in fishing vessels. Among these was a spate of limited liability companies based on the Irish fisheries. Typical were the Irish Deep Sea Fishing and Irish Coast Fishing Piers and Harbour Association[13] set up in 1846, and the British and Irish Fisheries Company founded 'for the further prosecution on an extensive scale of the various British and Irish fisheries' later in the same year.[14] Both were promoted by London 'businessmen' and their speedy demise was characteristic. Sound theoretical ideas fired by financial resources and opportunism were not enough; they did not take account of practicalities like the policies and attitudes of railway companies.

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[13]PRO, BT41/323/1,863.
[14]PRO, BT41/97/544.

Lack of financial resources rather than practical experience seems to have precipitated the downfall of the similarly short-lived North Eastern Deep Sea Fishing Company of Tynemouth referred to in Chapter Two. It was founded in 1857 and all 1,000 one-pound shares were bought by local people associated with fishing in some way. However, its demise within months suggests that problems had more to do with financial shortcomings rather than impetuosity or a shortage of common-sense. The nature of the fishing industry as conditioned by the latest technology necessitated taking advantage of economies of scale, for which a combination of money and know-how was necessary, but this was not appreciated by those behind the grand-sounding British Deep-Sea Fisheries Company which was set up in the late 1850s.[15] The Times reported the issue of a prospectus designed to attract 'capital of 200,000l. in 10l. shares...[to finance operations]...to be carried on both upon the eastern and western coasts.'[16] The ambitious nature of this and similar enterprises was undermined by failure. Once again 'businessmen' were behind these schemes, and despite their lack of success they demonstrated an unprecedented readiness to plough greater sums of money into the fisheries.

The reason for the failure of these companies was not lost on later investors, and such sums were eventually used to greater effect. Reference has been made to difficulties in the practical implementation of railways, but repercussions of their presence were being felt throughout British industry by the middle of the century.[17] These included vast quantities of private capital which railway companies brought to many sectors, including the increasingly lucrative fisheries, where they aided economic and physical growth.[18] Railways represented a massive leap forward for the fishing industry, but with regard to the diffusion of technology it is worth

[15]PRO, BT41/88/498 and 216/669. See also British Fishing Company, BT41/92/512, which was founded in February 1848 and wound up in August 1853; British and Great Grimsby Fisheries Company, BT41/95/534, founded 1855 and wound up 1860; National Deep Sea Fishing Company, BT41/467/2,635, established in July 1858.

[16]The Times, 10th January 1857, 5.

[17]Starkey, 1993, 128.

[18]Committee on Scientific and Statistical Investigations (1908) Q.1,930.

remembering that in 1875 over half the population still lived in rural areas and that the sailing smack continued to be the basis of production. However, changes were afoot, and although the average cost of a Humber smack ranged from £600 to £650[19] around 1860, 20 years later it had risen to between £1,500 and £1,700 - inclusive of steam capstan, stores and nets - for the finest smacks.[20] Such costs made higher returns possible, but required a larger initial outlay which was beyond the resources of most established investors. Technological advances enabled increased quantities to be taken, but they necessitated more expensive larger-scale operations in order to render them viable. Thus the threshold at which grounds became uneconomic to work was heightened, which fostered the amalgamation of assets from which the industry could be run in accordance with the most modern developments. It was indisputable that 'trawlers take very large quantities of fish, and there is a very large capital invested in them',[21] which was epitomized by owners such as Mudd and Moody at Grimsby and Hellyer and Pickering at Hull, who had been closely associated with owning smacks. Ownership became increasingly

> an impossible ambition for a working skipper to realize by the 1890s...The separation of capital and labour was already clear in the days of sail. Steam needed only to supply the finishing touches.[22]

Distant water operations became increasingly sophisticated from the middle of the nineteenth century when owners and companies increasingly diversified their interests, for example, smack owning was profitable and many fish merchants willingly expanded into it.[23] George Davidson of Aberdeen was a major owner 'connected with other branches of the fish trade' who disclosed that steam trawling was not his 'largest occupation',[24] and Alfred Ansell was similarly prominent in

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[19]Committee on Owners, Masters and Crews (1882) QQ.9-10.
[20]Committee on Owners, Masters, and Crews (1882) 671.
[21]Report on Sea Fisheries of England and Wales (1878-9) 302.
[22]Rule, 1976 407.
[23]Mullender, 1964, 22.
[24]R.C.on Trawl Fishing (1884-5) Q.1,670.

Hull. In addition to trawlers and their equipment he owned steam carriers, ice-carrying vessels, ice houses and 'other buildings' that rendered his 'floating capital' worth about 60 per cent of the million pounds at which he valued his total interests.[25] Given the level of efficiency at which the distribution system operated once railways began to exert an influence, the onus on the non-'floating' 40 per-cent to ensure the marketability of the balance increased greatly. Railways had initiated a momentum that the smack-based infrastructure could cope with for the time being, but its ceiling of efficiency was being approached inexorably. Technological development had fuelled demand to such an extent that when it was matched by an equally dynamic force on the supply side, a wholly new structure was required to enable it to operate effectively.

Anderson Smith recognized this, but as well as re-organizing the 'whole system',[26] he was concerned for its survival. Presumably he had vested interests, but his hopes were doomed, entailing as they did continuing prosperity within an obsolete infrastructure. Samuel Plimsoll, in a letter to The Times in 1883, also favoured the *status quo*, seeing the fisheries - like earlier speculators - as a source of financial gain.

> Capital invested in fishing boats is immediately productive, for, even in the case of new boats, only a small portion of cash is needed on ordering them, and as soon as they are launched and fully paid for they earn handsomely at once...the harvest of the sea is unfailing...and, as for sale, there is room for almost unlimited supplies in London alone.[27]

Like the failed ventures of forty years before, he ignored practical aspects of fishing, which provoked the following reaction from a Scarborough smackowner.

> The majority of people in the trade would be only too glad to get out of their vessels. The risk is enormous and the management of the crews is often so vexatious a business, that if people were not born to it they would have nothing to do with it...no wonder that the industries connected with the trade pay, for there are too many craft

[25]R.C.on Trawl Fishing (1884-5) Q.8,631a.
[26]Anderson Smith, 1883, 235.
[27]The Times, 3 August 1883, 3.

> on the sea now...and however bad the fishing may be, they must all have sails, ice &c.'[28]

The writer, Henry Woodger, was by no means a poor man, owning four smacks and being 'interested' in seven steam trawlers,[29] but the above exchange counterpoints two opposing factions. The former letter displays a lack of regard for any but financial rewards, whereas Woodger belongs to the same class as Mudd and Hellyer, for whom fishing was a business which necessitated rationalization to produce the optimum yield of available resources. The desire for profit was ever-present, of course, being accentuated by increased outlay - which was the stumbling block for many - and they appreciated the necessity of amalgamating resources. The net result of such capital-intensive operations was socio-economic change that displaced many former 'capitalists' who lacked sufficient resources to retain their former status.[30]

According to a the skipper of a trawling smack 'capitalists had taken fishing away from the fishermen'[31] by the mid-1880s, but this had been increasingly so for years. The impetus for restructuring the economy of the fishing industry was present long before the advent of steamers speeded matters to a head. The bulk of investment for modernizing the industry continued to come from wealthy men who had been prominent within the sail-based infrastructure and, unlike the majority of former investors, could afford to invest in new capital. The Great Grimsby Steam Trawling Company[32] illustrated this well, set up in April 1881 with a capital of £50,000 divided into ten-pound shares, its promoters comprised of two 'smackowners' and six 'fish merchants' - a somewhat generic term that covered numerous associations within the fish trade - and explains the presence of Harrison Mudd, Walker Moody and George Fellowes, three of the biggest smackowners at the port. Capital in the distant water fisheries focussed around such figures to the exclusion of those

[28]The Times, 11 August 1883, 3.
[29]Committee on Owners, Masters, and Crews (1882) Q.2,825.
[30]Coull, 1996, 126.
[31]R.C.on Trawl Fishing (1884-5) QQ.10,514-7.
[32]PRO, BT31/2,782/15,191.

persisting with old ways and entrepreneurs seeking purely financial remuneration. The Grimsby and North Sea Steam Trawling Company,[33] formed in August of that year following the winding up of the above company for 'reorganization and reconstruction', the Knight of the Cross Steam Trawling and Fishing Company of Scarborough[34] founded in 1882, and the Humber Steam Trawling Company of 1886 of Hull,[35] are all characterized by local investors, often with small shareholdings and frequently with no evident occupational connection to the fishing trade. The Grimsby company, despite the eminence of its promoters, relied on shares taken up by fishmongers and local individuals. In August 1881 the 1,122 shares taken up were distributed among 85 shareholders, while subscribers to the Scarborough firm included a draper, a hotel-keeper and a schoolmaster.

Chapter Three includes reference to Christopher Pickering's disposal of sailing smacks as soon as his steam trawlers were ready, but such a wholesale transition was not common. The progressive nature of the fisheries at Lowestoft and its doggedness in clinging to the smack culture caused one owner at the port to regret the copious amounts of capital that were 'swamping' the industry. In his view its increased application was precipitating increased catching power but no commensurate growth in profits.[36] He stated that fishing was 'a working man's business...those are the people who can make it prosper',[37] and that 'the thing will right itself by the ordinary laws of supply and demand'.[38] However, he failed to grasp that that was precisely what was happening - but in accordance with requirements of the latest technology - which for owners like himself 'were consuming the small profits, if any, that were made.'[39] William Pyper, an Aberdeen

[33]PRO, BT31/14,688/15,801.
[34]PRO, BT31/2,957/16,575.
[35]PRO, BT31/14,820/22,308.
[36]S.C. on Sea Fisheries (1893-4) QQ.1,703-16.
[37]S.C. on Sea Fisheries (1893-4) Q.1,601.
[38]S.C. on Sea Fisheries (1893-4) QQ.1,598-1,607.
[39]Alward, 1932, 250.

steam trawler owner, showed how this occurred by presenting the following figures for one of his vessels that operated in the early 1890s.

Table 70

ANNUAL EARNINGS OF AN ABERDEEN STEAM TRAWLER

Item	Sum (£s)
Fish sold for	92,745
Dividends to owners	19,612
Crew Wages	28,454
Coal	16,234
Ice	3,125
Stores	3,410
Fishing gear	8,983
Repairs	2,722
'Management'	2,396
'Dues'	1,184
Labour	579
Insurance	2,677

Source: William Pyper, Aberdeen steam trawler owner, Select Committee on Sea Fisheries (BPP, 1893-4, XV) Q.6,517.

The net result was an average profit of four shillings in the pound,[40] against which it was difficult to sustain the case for smacks. Assessments of the distant water sector by those associated with smacks and unable to make the jump necessitated by modern technology, were invariably conducted in terms of the established fisheries and failed to take account of the possibility of fundamental restructuring. Smacks struggled to supply demand so there was money to be made from the employment of steam fishing boats, and promises of handsome financial returns were more resonant than concerns for the passing of obsolete ways and means. However, smacksmen were not reactionary for the sake of it. Their motivations at ports like Lowestoft and Brixham were the same as those of the owners of steam trawlers - profit - but the nature of their operations rendered smacks the most cost effective vessels for the grounds that they worked.

Charles Hellyer, a leading trawler owner at Hull, was one of the major exponents at the leading edge of the sea fishing industry. The nature of his activities and those

[40]S.C. on Sea Fisheries (1893-4) Q.6,518.

of his fellows showed that owning was becoming increasingly sophisticated. In the early years of the twentieth century 291 of over 400 steam trawlers at Hull were covered by the Humber Steam Trawlers' Mutual Insurance and Protection Company.[41] Of these around 70 were owned by Hull Steam Fishing and Ice Company, in which he had a large stake, and 58 by Hellyer's Steam Fishing Company. Operation of the latter disclosed, through the company's file, a characteristic of progress in economic structures at the leading edge of the distant water industry. Numerous mortgage certificates, share listings, balance sheets and miscellaneous paperwork are related to financial wheeling and dealing centred upon the company's steam trawlers, comprehension of which was largely lost on those who remained ensconced in the former system.

Rationalization was designed to facilitate economic growth rather than promote understanding. William Caseley, a smack owner of Ramsgate, for instance, echoed the feelings of many when he failed to see how Hull and Grimsby people could say their grounds were not profitable when 'they are having vessels and steamers built as fast as they can build them'.[42] The idea that when 'home' waters were exhausted they could - and would - operate elsewhere was alien to him. Once again, values conditioned by the former infrastructure were being applied inappropriately. However, he would have had little difficulty understanding the method behind William Purdy Junior's first excursions into owning steam trawlers. Son of the first tug-trawler skipper, he began his career with seven companies in the years 1898-1900. Each was formed to secure the purchase, at under £3,000, and fund the subsequent activities of, a single vessel.[43] Shareholders were usually local and often very small investors, but from this base he was soon 'well-known as the successful manager of a number of Fishing Companies which have proved highly

[41] Report on the Supply and Training of Boy Seamen (1907) QQ.5,048-9. Also Hull and Grimsby Mutual Fishing Vessels' Insurance Company, BT31/2,480/12,718.
[42] S.C. on Sea Fisheries (1893-4) Q.1,771.
[43] PRO, BT31/8,004/57,559; 8,702/63,534; 8,702/63,535; 15,993/57,560; 16,074/59,356; 16,431/66,531; 16,555/68,418.

remunerative',[44] on the strength of which he founded the Purdy Steam Fishing Company.[45] At this point Caseley would probably have experienced difficulties, as Purdy sought to expand his interests to correspond with developments in the industry. He formed the company to fund the construction, purchase and operation of two large steel trawlers estimated to be worth 'about £5,000' when fully equipped. Expenditure of this magnitude warranted a new financial configuration, which is indicated by the mortgaging of the company in 1902, 15 months after it had been founded. At the end of 1914 the company was operating five steam trawlers, for which single ship firms would have been inadequate and wasteful. The harbour master at Eyemouth summed things up when he said that in the early 1880s it had been possible to take a 'disused tugboat and make any amount of money out of it for trawling purposes', whereas by the first decade of the twentieth century a new vessel cost from £12,000 to £14,000 and had to be able to land catches from Icelandic, Faroese or Biscayan grounds among others.[46]

In 1892 an estimated £1.5 million was invested in Scottish fisheries, and compared to 14,000 smaller smacks there were 140 trawlers, with average values of £49 and £1,636, respectively.[47] In the face of such developments former methods were unsuitable, and all Scottish steam trawlers were owned by companies which 'represent a capitalist class of owner'.[48] This was the case throughout Britain, and of the eight trawlers at work from Dublin around 1906, five were owned by the only steam trawler company in Ireland.[49] By that time the largest steam trawler cost £7,500, plus £1,800 for refrigerating gear,[50] and at Grimsby alone more than £2.75 million was invested in 556 vessels.[51]

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[44]Prospectus for the Purdy Steam Fishing Company Limited, see below.
[45]PRO, BT31/16,659/70,474.
[46]Committee on Scientific and Statistical Investigations (1908) Q.6,287.
[47]S.C. on Sea Fisheries (1893-4) Q.3,137.
[48]Committee on Scientific and Statistical Investigations (1908) Q.1,908.
[49]Committee on Scientific and Statistical Investigations (1908) QQ.4,569-70.
[50]Committee on Scientific and Statistical Investigations (1908) Q.1,909.
[51]Committee on Scientific and Statistical Investigations (1908) Q.9,352.

By 1914 rationalization had proved instrumental in moulding the financial infrastructure of the fishing industry. Many erstwhile investors were precluded from participation by the large sums involved but they were not replaced by cliched figures of wealth. Shareholders continued to be mainly local people, though usually more detached from the actual running of the industry than formerly, and the distant water fisheries were largely promoted and managed by several eminent local figures at each port. Economic rationalization ensured an effective balance for the promotion of the fishing industry in the wake of a revolution in working methods.

Symbolic of the capitalization of the distant water sector was the indignation felt against steam trawlers. They were hailed as 'the greatest enemy that ever came into the North Sea' rather than as 'benefactors' for the country, supplying important foodstuffs for the industrial population. This was Hellyer's view of things, and he pointed out that in contrast to the representation of 'innumerable' other interests, only one Member of Parliament, Doughty at Grimsby, carried the torch for trawling, which 'makes it very difficult...for legislators to understand the question.'[52] This situation was also referred to by George Alward, who pointed out the hostility of southern interests and underlined the greater representation of opposing forces in Parliament.[53] The political ramifications of the sitution were crystallized by the fact that in Scotland by 1892 about a sixtieth of men employed in the fisheries relied on trawlers, that accounted for around a sixth of the total value of fish taken,[54] a total of £2,000,000 being employed in 'reaping the harvest of the sea' towards the end of the decade.[55]

In Scotland this sum was less confined to the trawling sector. By 1908 herring fishing accounted for about 57 per cent of the quantity and 52 per cent of the value

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[52]S.C. of the House of Lords (1904) Q.1,407.
[53]S.C. of the House of Lords (1904) Q.1,526.
[54]S.C. on Sea Fisheries (1893-4) Q.3,384.
[55]Annual Report for Scotland (1899) 7.

of the industry, a much larger proportion than in England.[56] The use of steam drifters in Scotland spread rapidly from the turn of the century - their value being nearly £2 million by 1914[57] - and they were built and owned by those that worked sailing vessels to a much greater extent than in trawling. They were cheaper than trawlers, costing from £2,500 which, 'with assistance from the banks', was within the means of prosperous fishermen.[58] The laws of *laissez faire* economics shaped the course of the industry within parameters defined by its technological capabilities. Consequently trawling superimposed a new system while the herring fisheries progressed *via* developing an established system.

Most sailing fleets in the pelagic fisheries were based in definite localities and had standing arrangements with particular curers in earlier years, though by 1885 the auction system was in the ascendancy.[59] However, the greater range of steam drifters enabled use to be made of more than one port, so a greater number of buyers bought their catches, which fostered the trend towards standardized prices and greater division of labour.[60] Agents met the herring boats, that were mostly funded by banks, fish salesmen and merchants, when they landed.[61] The herring fishery throughout Britain grew more capital-intensive and steam operations became concentrated in certain ports. By 1914 in Scotland only about 60 of 981 steam drifters were owned outside the North East.[62] The problem for areas less amenable to modern developments was clearly apparent in the Shetlands where the lack of capital led to perseverance with vessels that were obsolete elsewhere, so the efficiency of its fleet suffered and most money was 'carried away' as soon as it was earned.[63] Throughout Scotland herring companies, with 'one or two exceptions',

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[56]Committee on Scientific and Statistical Investigations (1908) Q.1,914.
[57]Report on the Scottish Sea Fishing Industry (1914) 692.
[58]Committee on Scientific and Statistical Investigations (1908) Q.1,908.
[59]See M.Gray, 1978.
[60]Report on the Scottish Sea Fishing Industry (1914) 701.
[61]Report on the Scottish Sea Fishing Industry (1914) 692.
[62]Coull, 1996, 134.
[63]Goodlad, 1971, 186-7.

had formerly been based around families,[64] but by 1914 there was only one such on the east coast of Scotland, at Peterhead.[65] The importance of familial connections declined as 'the capitalist is the industry now',[66] and so, for example, a 'large proportion of the Buckie fleet is insured in local mutual associations.'[67] The steam drifter was an instrument of production and as such could not be left idle out of season while crewmen attended to other interests. Winter fishing was instituted,[68] not just because it was feasible, but because the economics of the situation dictated as much.

The ownership of steam drifters was difficult for fishermen of limited means, and this became all the more so because capitalists, often fish salesmen in the herring industry, saw large numbers of shareholders as detrimental to fishing operations.[69] About 1905 it was noted that there were fewer smaller boats as their owners were serving as hired fishermen on steam drifters, the management of which 'does not lend itself to divided ownership'.[70] Such were the effects of new technology in the herring industry, but such results were widespread in the sea fisheries. Where capitalists had been induced to invest in the fisheries with a view to their development for the good of the country, the poor and their own pockets, the benefits were ambivalent. For example,

> Upwards of 140 new trawling smacks were equipped from Yarmouth alone, and the trade became abnormally active, without producing any of the happy results which had been so confidently anticipated. To-day there are vessels laid up in harbour, which for the past years had been working at a loss; hundreds of men are out of work; and upwards of £30,000 is reported to have been lost last year alone upon the Great Yarmouth trawlers. Other towns have also suffered in proportion.'[71]

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[64]Report on the Scottish Sea Fishing Industry (1914) Q.5,910.
[65]Report on the Scottish Sea Fishing Industry (1914) Q.6,516.
[66]Report on the Scottish Sea Fishing Industry (1914) 959.
[67]Report on the Scottish Sea Fishing Industry (1914) 958.
[68]Report on the Scottish Sea Fishing Industry (1914) Q.709.
[69]Report on the Scottish Sea Fishing Industry (1914) 957.
[70]Report on the Scottish Sea Fishing Industry (1914) 693.
[71]Mather, 1888, 187-8.

ii HUMAN RESOURCES

Technological development of the distant water fisheries necessitated a new financial structure that engendered changes that were 'traumatic in human terms.'[72] They echoed changes throughout the economy that generally yielded financial opportunities for the wealthy but not the poor. Consequently, workers throughout Britain underwent 'a more decisive set of changes than most people ever experience',[73] though the Royal Commissioners did not think that 'any class of our labouring population are now in more comfortable circumstances than the British fisherman'.[74] The numbers engaged in the fisheries had doubled from 1841 according to official figures,[75] and growth in employment to the 1880s is shown by the census returns reproduced in Table 71, which compares employment trends and numbers with those working on the land. These figures somewhat underestimated the actual number working in the fisheries. Many part-time fishermen living in isolated places, especially Scottish crofters, and those at sea, were omitted from the total. Nevertheless, they give some idea of the numbers employed.

Table 71

THE LABOUR FORCE
(1,000s)

YEAR	AGRICULTURE, HORTICULTURE AND FORESTRY	FISHING
1841	1,515	24
1851	2,017	37
1861	1,942	40
1871	1,769	48
1881	1,633	61
1891	1,502	54
1901	1,425	51
1911	1,553	53

Source: Census returns, Mitchell and Deane Abstract of British Historical Statistics, 60.

[72]Boswell, 1974, 23.
[73]Stearns, 1993, 5.
[74]R.C.on Sea Fisheries (1866) 586.
[75]*Ibid.*

However, the increased labour force of the fisheries did not match the rise in productivity. The respective numbers of crewmen employed on smacks and steam fishing boats can be seen in Table 72, where the constantly rising total contains an increasing proportion of crewmen employed on steamers. This trend overcame the approximate nature of these statistics, calculated from returns of the statuory fishing boat register, a fact that is acknowledged in the Annual Statements themselves.

Table 72

NUMBER OF MEN AND BOYS EMPLOYED ON FISHING BOATS REGISTERED UNDER THE MERCHANT SHIPPING AND SEA FISHERIES ACTS IN THE UNITED KINGDOM

YEAR	SAIL	STEAM	TOTAL
1885	15,793	1,029	16,822
1886	15,926	1,598	17,524
1887	16,326	1,965	18,291
1888	19,009	2,288	21,297
1889	18,684	2,671	21,355
1890	17,316	3,196	20,512
1891	16,806	4,342	21,148
1892	16,190	4,945	21,135
1893	16,077	5,618	21,695
1894	15,452	6,287	21,739
1895	14,696	6,685	21,381
1896	14,184	7,869	22,053
1897	13,335	8,795	22,130
1898	11,961	10,504	22,465
1899	10,364	12,016	22,380
1900	8,599	13,711	22,310
1901	7,580	14,412	21,992
1902	7,297	15,573	22,870
1903	7,066	16,931	23,997
1904	6,991	17,467	24,458
1905	7,005	18,477	25,482
1906	7,152	20,309	27,461
1907	6,922	22,961	29,883
1908	6,776	25,439	32,215
1909	6,617	25,909	32,526
1910	6,268	27,005	33,273
1911	5,460	28,567	34,027
1912	5,022	29,948	34,970
1913	4,622	31,175	35,797

Source: Annual Statements of Navigation and Shipping.

The number of men working on steamers in 1913 was less than twice that working on sailing craft in 1885, though the efficiency of the two indicates the disparity between their aggregate catching power (see Part Two). This point is reinforced by

examination of figures charting the increased number of crewmen employed at particular ports. Data from the Annual Statements of Navigation and Shipping record the numbers that would man a port's fishing fleet if all its vessels were employed with their normal crews (Appendix 6 includes these figures for other ports).

Table 73
NUMBER OF MEN AND BOYS EMPLOYED ON REGISTERED FISHING BOATS IF OPERATING WITH THEIR USUAL CREWS
(Quinquennial averages)

PERIOD	GRIMSBY	HULL	ABERDEEN
1873-7	1,522	2,240	1,948
1878-82	1,024	2,537	1,965
1883-7	1,985	2,537	2,123
1888-92	3,079	2,211	2,440
1893-7	3,697	1,765	2,252
1898-1902	4,203	2,579	2,318
1903-7	4,888	4,475	2,836
1908-12	5,689	4,679	3,049
1913	6,291	4,513	2,978

Source: Annual Statements of Navigation and Shipping.

The rise of fishermen employed at Grimsby is especially marked, but the plateau reached at Hull and Aberdeen is echoed at other ports (see Appendix 6). The nature of fisheries work changed as the requirements of seaward operations altered and a greater volume of produce was channelled through fewer and larger ports. Thus those employed in the distant water fisheries were also concentrated as they sought to provide the diverse range of services necessary for the efficient handling of fishing vessels. Whereas established fishing villages had recruited from within the community, the rapid expansion of trawling centres meant that local labour supplies could not keep pace with increased demand, especially at the east coast trawling ports.[76] The ability of the workforce to change jobs and location was therefore crucial, and highlighted the fact that mobility was one of the most important characteristics of an industrialising economy.[77]

[76]Rule, 1976, 390.
[77]Kenwood & Lougheed, 1993, 99.

Fishing had been characterized by the physical mobility of its labour force for many years. This was illustrated in the herring industry by the seasonal migration of labour up and down the eastern coast, and it was especially evident in the spread of trawlermen from Brixham. Holdings at the Public Record Office include an index of first and second hands that were certificated for service and competence from 1880 which, because it records their place and date of birth, enables a picture to be built up of the location of fishermen and fishing communities during the last 80 years of the nineteenth century. This is shown in Table 74, from which eastward movement away from Brixham towards the Humber ports can be seen as time progresses.

Table 74

YEAR AND PLACE OF BIRTH FOR HANDS CERTIFICATED THROUGHOUT BRITAIN
(Surnames A-F)

YEAR	BRIX	RAMS	BARK	YARM	LTOFT	HULL	GRIM
1818-25	6	0	0	0	0	1	0
1826-30	6	2	5	1	1	0	0
1831-5	5	7	2	3	0	4	0
1836-40	12	5	10	12	5	6	0
1841-5	11	14	11	18	7	15	3
1846-50	22	14	14	26	3	16	0
1851-5	13	21	22	39	13	30	4
1856-60	22	23	13	49	20	43	12
1861-5	28	26	5	53	31	51	14
1866-70	38	14	4	23	43	69	27
1871-5	36	25	1	25	58	50	22
1876-80	41	21	0	7	46	39	33
1881-5	26	8	1	10	47	44	25
1886-90	23	6	0	16	45	39	45
1891-5	16	3	1	8	38	19	29
1896-1900	6	0	0	3	13	15	13

Source: PRO, London, BT138/1.

The trend vindicates much that is detailed in Chapter Three, and although a considerable base remained at Brixham, the decline in births at Barking and Ramsgate are evidence of the comparative deterioration of their fisheries. This is confirmed by looking at the place birth in relation to the examining port. Table 75 shows the number of fishermen awarded Certificates for Competence and Service at selected ports. The former were legally required of all aspiring first and second

hands from 1883 and Certificates of Service were granted to serving men in 1883 and 1884.

Table 75

NUMBER OF SKIPPERS AND MATES CERTIFICATED FOR COMPETENCE AND SERVICE AT SELECTED PORTS IN SELECTED YEARS, AND CLASSIFIED ACCORDING TO PLACE OF BIRTH.

(i) BRIXHAM

Competence

	YEAR OF ISSUE			
Location	1884	1889	1894	1897
Brixham	56	32	28	21
Devon	23	7	10	2
S.W.England	1	2	1	1
Kent	2	1	0	1
Elsewhere on south coast	3	1	1	0
Elsewhere in G.B.	6	4	2	8
Outside G.B.	1	0	0	0
Total	92	47	42	33

Service

Location	Number
Brixham	287
Devon	104
Kent	11
Hull	5
Pembroke	5
Elsewhere in G.B.	20
Outside G.B.	1
Total	433

(ii) RAMSGATE

Competence

	YEAR OF ISSUE			
Location	1884	1889	1894	1897
Ramsgate	10	15	12	13
Kent	7	10	4	9
South Coast	0	3	0	2
Devon	0	0	0	0
Elsewhere in G.B.	7	10	11	6
Outside G.B.	0	0	2	0
Total	24	38	29	30

Service

Location	Number
Ramsgate	116
Kent	114
Devon	24
London area	20
Elsewhere in G.B.	35
Outside G.B.	2
Total	311

(iii) LOWESTOFT

Competence

Location	YEAR OF ISSUE 1884	1889	1894	1897
Lowestoft	1	8	13	10
Great Yarmouth	1	3	1	0
East Anglia	7	30	24	10
Elsewhere on east coast	1	0	1	3
Elsewhere in G.B.	4	12	6	1
Total	14	53	45	24

Service

Location	Number
Lowestoft	63
Suffolk	124
Norfolk	40
Essex	22
London area	25
Kent	65
Devon	27
Elsewhere	27
Total	263

(iv) GREAT YARMOUTH

Competence

Location	YEAR OF ISSUE 1884	1889	1894	1897
Great Yarmouth	11	18	7	3
Lowestoft	0	1	0	0
East Anglia	25	51	6	6
Elsewhere on east coast	3	0	1	1
Elsewhere in G.B.	5	13	2	6
Outside G.B.	2	0	0	0
Total	46	83	16	16

Service

Location	Number
Great Yarmouth	266
Norfolk	504
Suffolk	225
Essex	91
London area	166
Elsewhere	76
Total	1,328

(v) HULL

Competence

Location	YEAR OF ISSUE 1884	1889	1894	1897
Hull	8	46	10	23
Yorkshire	4	21	1	4
Lincolnshire	4	4	0	1
East Anglia	4	10	3	3
London area	3	8	0	4
South coast	6	5	0	1
N.E.England	0	1	0	0
Scotland	0	1	0	0
Elsewhere in G.B.	11	13	3	10
Outside G.B.	2	6	0	2
Total	42	115	17	48

Service

Location	Number
Hull	278
Yorks.	82
Lincs.	57
Norfolk	60
Suffolk	27
Essex	42
London area	134
Kent	100
Devon	112
Elsewhere in G.B.	126
Outside G.B.	41
Total	1,059

(vi) GRIMSBY

Competence

Location	YEAR OF ISSUE 1885	1890	1895	1897
Grimsby	5	15	4	14
Lincs.	7	15	4	9
Hull	4	4	2	3
Yorks.	1	11	4	2
Norfolk	2	4	3	1
Suffolk	0	5	1	3
Essex	3	6	2	1
London area	7	12	8	8
Kent	2	2	5	1
Devon	1	3	0	0
South coast (excl. Devon and Kent)	1	3	0	2
Elsewhere in G.B.	8	17	9	9
Outside G.B.	1	6	1	2
Total	42	103	43	55

Service

Location	Number
Grimsby	9
Cleethorpes	19
Lincs.	32
Hull	16
Yorks.	15
Norfolk	26
Suffolk	14
Essex	37
London area	57
Kent	18
Devon	17
Elsewhere in G.B.	37
Outside G.B.	11
Total	308

Sources: PRO, BT129-30.

At Hull in the early-1880s 2-3,000 men and boys were employed on fishing boats while about 10,000 were directly interested, and 20,000 indirectly, in the fishing industry which employed about a million pounds of capital.[78] This was mirrored to a great degree at Grimsby where one estimate reckoned about 6,100 individuals were employed in the fisheries, while almost half the inhabitants of the town its hinterland, who totalled 80-90,000, were 'directly or indirectly interested' in them.[79] At Aberdeen, which was located among a high concentration of non-trawling fishing communities, about 1,000 people were connected with the curing and handling of fish.[80] This suggests encroachment of the modern industry on a lesser scale north of the border, but Table 76 shows how strong was the trend towards regulation in terms of the increased number of certificated hands.

[78]R.C. on Trawling (1884-5) QQ.8,627a and 8,631a.
[79]Committee on Scientific and Statistical Investigations (1908) QQ.9,355-7.
[80]S.C. on Sea Fisheries (1893-4) QQ.6,513-5.

Table 76

YEAR OF BIRTH FOR CERTIFICATED SKIPPERS AND HANDS IN SCOTLAND
(Quinquennial totals of surnames beginning A-F)

YEAR	NUMBER
1818-25	0
1826-30	0
1831-5	0
1836-40	4
1841-5	14
1846-50	37
1851-5	72
1856-60	130
1861-5	219
1866-70	257
1871-5	274
1876-80	268
1881-5	296
1886-90	282
1891-5	197

Source: PRO, London, BT138/1.

Steamers required larger, more skilled crews[81] and their increased use accelerated a trend in working conditions and status that had been underway in some degree since the end of the eighteenth century. One of the first indications of increased capitalization was the greater risk incurred by operating the fleeting system,[82] and the difference between the village fisherman, who had been shore-based, and the sea-based smacksman became more marked.[83] The latter advanced to the cost of the former as more and more resources were diverted to larger centres. However, crewmen on smaller boats were well-versed in the ways of sea and fish, and though formerly opposed to trawling, such men could be among the most successful skippers of vessels so employed.[84]

The crew of a typical smack was led by the skipper who 'had to order and control the whole labour process' and make life or death decisions in adverse

[81]Robinson, 1996, 85.
[82]Rule, 1976, 389.
[83]Rule, 1976, 384-5.
[84]S.C. on Sea Fisheries (1893-4) QQ.6,513-5; Committee on Scientific and Statistical Investigations (1908) Q.5,885.

circumstances. The second hand, or mate, was responsible for keeping the stores and had to take over from the master whenever the occasion arose. The third hand controlled the smack with the gear down, had to prepare it for shooting, manage the small boat when ferrying fish to carrier, and help the fourth hand in dealing with the catch. The fourth took a watch, handled the smack in fair weather, the small boat and performed routine deck duties. As the lowliest crew member, the cook basically assisted the fourth hand in cleaning and lighting the boat.[85] Theoretically, this practice was characterized by 'perfect mobility', with most skippers passing through these stages.[86] However, increasingly technological changes created a demand for a new type of fisherman, effectively a hired hand whose way of life was dictated by his employer's desire for 'productive efficiency', which required long and rigorous periods at sea as units of an industrial labour force.[87]

Scottish and Channel smacks were usually manned by four hands, although larger vessels normally carried crews of five or six,[88] though a crew of two men and three boys was considered insufficient for such craft by the Mutual Insurance Company of Grimsby.[89] Smacks were prone to becalming which provided a 'ready market for cheap alcohol'[90] and fostered coper traffic, which worsened the conditions under which they worked. The presence of boys derived from the use of poor-law apprentices as a low-cost solution to the labour shortage at newer fishing stations in particular. One such individual, J.Plastow, left the Hackney workhouse in 1854 and took a fishing apprenticeship at Barking, ultimately becoming a well-to-do fish merchant and the owner of several Grimsby smacks,[91] though his case was very much an exception. In 1872 boys outnumbered adult fishermen by 1,350 to 1,150 at

[85]Rule, 1976, 389.
[86]Rule, 1976, 392.
[87]Rule, 1976, 411.
[88]Committee on Owners, Masters and Crews (1882) 671.
[89]Committee on Owners, Masters and Crews (1882) Q.1,710.
[90]Rule, 1976, 394.
[91]Goddard And Spalding, 1987, 13.

Grimsby,[92] and by 1877 there were 1,340 apprentices as opposed to 910 paid hands.[93] Boys were usually indentured at between 13 and 15 years of age and bound by covenant until they were 21. Most non-apprentices were first or second hands, though often apprentices served in such capacities before their time was up.[94] They usually came from other towns, workhouses and reformatories, and in the period 1880-5 only ten per cent of those indentured at the port came from Grimsby itself.[95] The system was strengthened at the port in 1868 when a smack owner became a councillor for the first time and by 1873 the number had risen to four in 16.[96] Demand for labour continued to exceed supply for east coast smacks and this was felt acutely at Grimsby, being a new fishing station without a ready store of labour, and the burgeoning, labour intensive line fishery, worsened the situation. The result was that at the end of 1886 1,064 apprentices were employed there compared to 610 elsewhere.[97] The fate of the system at Scarborough was more typical of the country as a whole, and Table 77 illustrates how it declined there from the late-1870s.

Table 77

NUMBER OF APPRENTICES ENROLLED AT SCARBOROUGH

YEAR	NUMBER
1876	13
1877	8
1878	14
1879	10
1880	2
1881	2
1882	0

Source: Collector of Customs, Scarborough, Committee on Owners, Masters and Crews (BPP, 1882, XVII) 871.

The demise of the system stemmed from the unsuitability of its products in a labour market tailored to the demands of an increasingly sophisticated fishing industry, and was accelerated because it received, justifiably, a bad press.[98] Charles Hellyer

[92]Goddard And Spalding, 1987, 13.
[93]Rule, 1976, 391.
[94]*Ibid.*
[95]Rule, 1976, 390.
[96]Goddard and Spalding, 1987, 13 and 15.
[97]Annual Report for England and Wales (1887) 142.
[98]Rule, 1976, 404.

employed about 5,000 men and no apprentices on his fishing boats by 1908.[99] Exploitation had commonly been cited as a feature of the system, though a call for its resurrection by an ex-president of the Aberdeen Steam Fishing Vessel Owners Association should not necessarily be dismissed as the stereotypical view of a capitalist regarding labour. He was pointed out that there was difficulty in getting 'good, reliable, skilled men' and a well run apprenticeship system would be of 'great advantage to the trade'.[100]

Sailing trawlers of the 1880s usually carried crews of five from the Humber and six from Great Yarmouth,[101] and the complement of a tug-trawler in the early 1880s normally consisted of a master, engineer, two firemen, a deck hand and two fishermen.[102] By the 1890s an Aberdeen trawler owner normally manned each vessel with eight men,[103] and by 1914 nine hands was usual, with a skipper, mate, boatswain, two deck-hands, cook, two engineers and a fireman.[104] However, by this time the crew size depended on the nature of the voyage, as the design of trawlers for the North Sea and Iceland differed. Hellyer declared that his steamers for the former carried nine hands, while those for the latter were usually crewed by between 12 and 14 men,[105] a distinction that could also be made between fleeters and single boaters.[106] The figures tendered in Table 78 show the switch from sail to steam as it manifested itself through the numbers of fishing boats with various complements. The number of vessels with crews of six or less includes small boats in the second and third classes that were often manned by only one or two people,

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[99]Committee on Scientific and Statistical Investigations (1908) QQ.8,713-4.
[100]Committee on Scientific and Statistical Investigations (1908) Q.5,883.
[101]Rule, 1976, 385.
[102]Committee on Owners, Masters and Crews (1882) 851. This arrangement was similar throughout the north east at this time. The tug *Patriot* had a crew of six, Report on Sea Fisheries of England and Wales (1878-9) 375; North Shields tugs were usually crewed by three hands, a boy and two fishermen, Committee on Owners, Masters and Crews (1882) Q.2,552.
[103]S.C. on Sea Fisheries (1893-4) QQ.6,513-5.
[104]Jenkins, 1920, 20.
[105]Report on the Supply and Training of Boy Seamen (1907) Q.5,051.
[106]Bellamy, 1965, 360.

but the growth in the number of vessels with crews of nine or more, usually steamers, indicates the burgeoning industrial labour force aboard fishing boats.

Table 78

CREWS SIZES EMPLOYED ON REGISTERED FISHING BOATS AT SELECTED PORTS

(i) Grimsby

Complement	1893	1895	1900	1905	1910	1913
6 and under	547	458	46	55	67	78
7	17	13	7	4	0	1
8	25	27	19	7	9	4
9	82	136	379	370	382	412
10	44	35	24	35	76	56
11	15	16	15	15	15	26
12	23	26	19	15	17	45
13	9	9	11	8	12	3
14	3	5	22	22	32	36
15	0	2	7	6	8	7
16	0	0	0	0	1	0
17	0	0	0	0	0	0
18	0	0	0	0	0	3

(ii) Hull

Complement	1893	1895	1900	1905	1910	1913
6 and under	288	296	85	278	284	280
7	3	3	1	0	2	3
8	30	28	22	6	0	1
9	92	140	294	326	339	263
10	17	26	27	13	39	51
11	2	8	10	34	33	27
12	10	15	24	48	65	84
13	2	2	2	1	1	1
14	0	0	0	0	0	0
15	1	1	1	0	0	0

(iii)Aberdeen

Complement	1893	1895	1900	1905	1910	1913
6 and under	432	423	396	239	173	113
7	13	16	11	8	2	1
8	26	33	31	36	29	40
9	8	11	81	151	217	236
10	0	1	0	4	16	18
11	0	0	0	1	0	0
12	0	1	0	0	2	0
13	0	0	0	0	1	0

(iv) Fleetwood

Complement	1893	1895	1900	1905	1910	1913
6 and under	95	91	80	65	64	59
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	4	11	24	32	41
10	0	0	0	1	18	24
11	0	1	0	0	13	14
12	0	1	0	0	1	8
13	0	0	0	0	2	2

(v) Milford

Complement	1893	1895	1900	1905	1910	1913
6 and under	90	82	83	80	78	72
7	0	0	2	2	0	0
8	1	1	0	3	4	5
9	11	11	38	42	64	60
10	0	0	0	4	1	0

(vi) Brixham

Complement	1893	1895	1900	1905	1910	1913
6 and under	-	-	-	244	258	223

(vii) Rye

Complement	1893	1895	1900	1905	1910	1913
6 and under	120	108	97	175	168	185
7*	0	0	1	1	2	4

*Steam trawlers.

Source: PRO, London, BT145.

Payment of crews was characterized by owners trying to maintain the share system as much as possible in order to cut their costs and the fact that any increase in pay had to come from greater catches was seen as an incentive. The degree to which this was implemented varied from port to port at different times. For instance, in the early years of fishing in Grimsby the skipper was paid a share, so normally worked the crew hard.[107] In the mid-1880s a Sunderland tug master together with the head fisherman each received 1.25 shares, while one share went to each of three crewmen and half a share went to the cook. Seven of the thirteen remaining went to the owner, and the balance to the crew. There was no wage, and in an average week

[107]Goddard and Spalding, 1987, 14.

the vessel earned about £40 net.[108] Later in the decade at Grimsby, once working expenses like ice and dues had been deducted from gross receipts, the net earnings of trawlers were divided into eight shares. Of these the owner received 5.5, the skipper $1^3/_8$ and the mate $1^1/_8$. The other hands were purely on wages of approximately 17 shillings for the third, 14 for the deck hand, and 11 for the cook. Apprentices were paid no wage but received board, lodging and clothing from the master.[109] The system at Great Yarmouth was different as there was a wage element for the whole crew along with a share payment, or poundage, as shown in Table 79.

Table 79

PAYMENT FOR TRAWLERMEN AT GREAT YARMOUTH

	WAGE	POUNDAGE
Skipper	14-18s.	1s in the £
Mate	14s.	6d " "
Third hand	14s.	4d " "
Fourth hand	10-12s	3d " "
Fifth hand	9-10s.	1d " "
Cook	7s.	1d " "

Source: Annual Report for England and Wales (1887, XXI) 137-8.

If the catch realised more than £100 the rate of poundage was increased for the whole crew, for instance, the skipper received an extra fivepence in the pound and the third hand an extra penny.[110] The share system was loaded in favour of the owners and when they tried to extend it to the whole crew at Grimsby in 1901 it led to the 'great lock-out' of trawlermen.[111] However, there was no tradition of labour organization in the fishing industry and trade unionism in the fishing industry was 'relatively weak and fluctuating.'[112] Although the separation of labour and capital created a 'context' for conflict, distant water fishing was a new industry in, and there were 'no traditions of defence.'[113] The first recorded strike among fishermen at Hull took place in April 1852, but though it found in favour of the men its

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108R.C. on Trawling (1884-5) QQ.8,136-8.
109Annual Report for England and Wales (1887) 137-8.
110*Ibid.*
111Goddard and Spalding, 1987, 23.
112Buckley, 1955, 24.
113Rule, 1976, 411.

outcome rested on the decision of the mayor, to whom the dispute had been referred for arbitration.[114] However, as as at Grimsby, smack owners were becoming increasingly prominent in local communities, so such decisions were more likely to be biased as their vested interests rose. Attempts at unionization were made throughout the 1870s, and by the end of 1878 antipathy to steam cutters was such that 'in the following spring the police had to be called out to protect the first fleet of thirty-two vessels to set sail.'[115] Crewmen were not oblivious to the fact that the owners also supplied consumables for the vessel and themselves, so that by raising prices their own income was reduced, 'owners liked to have complete control over their employees'.[116] Fishing was risky and involved the loss of capital, so their response was to shift as much expense as possible onto the fishermen,[117] so after a poor trip, if they earned nothing, they owed for expenses.[118]

Steamer operations entailed greater care of the catch, so it may have been expected that capitalists would be more mindful of the welfare of labour. However, more stereotypical attitudes characteristic of the industrial revolution seem to have prevailed, thus, for example, despite the feasibility of enclosed wheel-houses open versions were persevered with. Whatever truth there was in the idea that 'the men are apt to sleep in the covered houses, and prefer to be in the open air during their watches',[119] it undoubtedly involved less expense. Regard for profit rather than philanthropy had been evident at Brixham in the 1880s when dogfish, customarily the crew's 'perk', ceased to be so once the value of offal species rose.[120] A direct consequence of new technology, when steam capstans were introduced they greatly alleviated the workload, but the engine and boiler that powered it made the living

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114Robinson, 1996, 75.
115Robinson, 1996, 74.
116Goddard and Spalding, 1987, 79.
117*Ibid.*
118Goddard and Spalding, 1987, 23-4.
119M'Intosh, 1895, 314.
120Aflalo, 1904, 294-5.

quarters 'unbearably' hot[121] while, as mentioned in Chapter Three, the 'iron man' got a share of earnings. Such occurrences were not conducive to positive attitudes among crews, and according to one owner they thought that 'the company has plenty of money; it does not matter.'[122] Technological developments in fishing were not matched by comparable advances with regard to labour relations, one result of which was that men were employed increasingly on a casual basis and could be discarded at the owner's discretion. The following exchange illustrated attitudes, the examinee being Henry Woodger, the same man who later responded to Plimsoll's approbation of the fisheries with concern that fishing was seen as a way of making money to the detriment of more human priorities.

> Can your tugs carry boats in the davits? - Yes, sir.
> Why should they not? - I could not answer the question.
> You do not think that a life-boat would be a benefit? - I do not think so.
> Why not? - Because these other boats are sufficient, and a life-boat would be cumbersome, if you had a large one.
> But why not have a 14 foot boat rendered buoyant as a life-boat? - That might answer.
> Then it is only because they have not done it that you think they ought not to do it? - I do not say they ought not.
> You see no reason why they should not? - I do not.[123]

Such attitudes prevailed with regard to all crewmen, even skippers, whose payment by share theoretically acted as an incentive, a factor that was largely negated in fleeting where they had no control over the fishing operation.[124] Skippers and mates formed their own association and struck successfully at Swanton, Kent, in 1885-6 thereby securing the right to supervise the loading of stores, because they feared owners were short changing them.[125] The introduction of fleeting had lengthened working hours, but crews were unable to do anything about it due to the lack of such organization, which had always been hampered by the fact that fishermen were never all ashore at the same time, which hindered the effectiveness of meetings and retarded relations not only with other parties but among crews themselves.

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[121]Rule, 1976, 386.
[122]S.C. on Sea Fisheries (1893-4) Q.1,654.
[123]Committee on Owners, Masters and Crews (1882) QQ.2,777-85.
[124]Goddard and Spalding, 1987, 21-2.
[125]*Ibid.*

Increased capitalization heightened awareness of the need to maximize economic potential. To bodies such as the Smackowners Association of Grimsby this meant reducing costs and increasing working hours,[126] which, because many of its members, like directors of the Ice Company, ran steam cutters costing about £6,000 each,[127] entailed attempts to extend fleeting voyages to involve eight weeks at sea and one ashore in the late-1870s.[128] Samuel Hewett had provoked much unrest when he tried a similar ploy at Barking and Yarmouth,[129] and at Grimsby antipathy manifested itself through failure to accompany the cutter when she left port in the autumn of 1878. Only half the forty intended smacks joined her, and they were dispersed by a gale two days later, and the operation was abandoned after only a few weeks. Nevertheless, owners 'pressed on with the construction of more steam cutters.'[130]

Matters came to a head at Grimsby in September 1880 when owners tried to deduct more money for nets and other equipment from the earnings of crewmen. Linked to the prospect of winter fleeting this precipitated a clash, and initially the owners agreed among themselves to six week voyages, but this was rejected by crews and so the stand-off escalated. The upshot was that 400 smacks were idle and 700 men went on strike. At the end of the month the dispute was resolved by a committee of the Smackowners Association which decided that owners should be relieved of their responsibility to the association and 'be at liberty to get their smacks to sea as they deemed best.'[131] Some weeks later, encouraged by the 'success' at Grimsby, the Hull Trawlerman's Protection Association also resolved to resist fleeting. The Association claimed to represent over 400 men but the owners refused to recognize it, and by 8 November 100 smacks were laid up and 450

126Goddard and Spalding, 1987, 19-20.
127Goddard and Spalding, 1987, 20.
128Rule, 1976, 384.
129Hewett, 1964, 7.
130Robinson, 1996, 73-4.
131Robinson, 1996, 74-5.

fishermen were on strike. Many continued working, however, and after 8 weeks the strike was called off and the 'principle of winter fleeting' was established,[132] and George Alward attributed large increases in the catches of Grimsby trawlers to 'a general extension of the fleeting period...from an average of about five or six months in previous years to eight months in 1882.' However, the system could not be maintained owing to the opposition it aroused, 'which culminated in a general strike of the hands in 1883', followed by reversion of the system to its former limits.[133]

The issue resurfaced at Hull, also in 1883, after a severe storm in March resulted in the loss of about 250 lives. The Humber ports were badly hit and there was considerable public sympathy which intensified when the owners tried to get the smacks away for winter fleeting later in the year. Strike action resulted in limiting the number of vessels to 60, that were not to venture north of 55 degrees. However, there was no total ban and antagonism festered. Already it had been remarked that:

> The only drawback to the progress of this industry...appears in the unsatisfactory relations existing between the owners and crew of some of the vessels.[134]

However, their relationship was not helped by the advent of steam fishing boats, which accentuated economic pressures within the industry and exacerbated labour relations. The engineer was taken on with a reference and received a wage, whereas the fireman was casual,[135] but the engine crew were not usually seen as seamen,[136] and the resultant hostility can be seen as a characteristic function of the division of labour, with the engine crew signifying the impact of technological change.[137] This set up a complex environment in which the interdependence of a wider set of activities simultaneously created estrangement between the people engaged in their

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132Robinson, 1996, 76.
133Garstang, 1900, 44.
134Committee on Owners, Masters and Crews (1882) 671.
135Committee on Owners, Masters and Crews (1882) QQ.2,867-71.
136Aubert and Arner, 1959, 278.
137Duncan, 1963, 334.

performance.[138] If the founding of a union for the senior members of the crew was unpopular, the situation was aggravated still further by the accession to fishing crews of engineers and stokers.

The introduction of engine crews into fishing boats enhanced the culture of unionization as many were affiliated to unions based on their status within the Merchant Navy rather than as fishermen. Further to the action of skippers and mates at Swanton, a Seamen and Firemen's Society was founded at Aberdeen in the mid-1880s but lasted 'only two or three years',[139] collapsing in 1886 as membership declined due to the trade depression.[140] Unionization was not the only response to capitalization among crewmen in the fishing industry. In 1883 legislation extended the examination of skippers and mates in the merchant navy to those on trawlers of and above 25 tons. The measure did not apply to Scottish vessels, which invoked a feeling of bemusement, not least from the General Secretary of the National Federation of Fishermen of Great Britain and Ireland about ten years later.[141] Nevertheless, some sort of qualification was required at Aberdeen, where insurance companies insisted on a certificate.[142] Owners invariably had a considerable stake in such companies, which gave them a further lever over crews.[143] The 1880s were also characterized by high railway rates, and while these may have contributed to increased price levels which helped to deflate fishermen's wages,[144] whether they were the main cause remains doubtful given the attitudes and objectives of owners.

In the late 1880s winter fleeting increased and at Grimsby the owners seemed to have the upper hand as the number of vacancies at the port declined because of the availability of apprentices. Meanwhile the bankruptcy of smaller owners worsened

138Duncan, 1963, 346.
139Buckley, 1955, 30.
140Buckley, 1955, 36.
141The Times, 6 June 1892, 13.
142Report on the Scottish Sea Fishing Industry (1914) QQ.6,623-4.
143Goddard and Spalding, 1987, 79.
144'Practical Fishermen's Congress: Railway Rates', 1883, 65.

the climate for the individual and made the practice 'acceptable' to more men from lack of an alternative.[145] In 1887 there was a dispute at Scarborough over a further reduction in shares which was not particularly significant in itself, but it indicated that smacks were becoming less profitable, and during the 1890s most ports gradually abandoned fleeting.[146] In 1890 the fishermen's unions at a number of ports united to form the National Federation of Fishermen of Great Britain and Ireland,[147] and at the 1892 Trade Union Congress the Grimsby Steam Fishing Vessel Owners' Mutual Insurance and Protection Association was criticized for encouraging owners to send out unseaworthy vessels.[148] Again it is apparent that the application of technology, rather than the technology itself was the central factor. Further unionization came when the Aberdeen Steam Fishing Vessels Enginemen and Firemen's Union was formed in 1899. It was quickly established as a stable body, having over 400 members within a few months, however, though conceived specifically for the crews of fishing boats it delibrately excluded deck-hands and cooks.[149]

Lack of union development in the sea fishing industry became all the more evident in 1901. Grimsby owners had suffered dwindling profits due to over-production, and their response was to increase shares and reduce basic wages, so the men had a direct interest in making the trip profitable but the cost of a bad voyage was reduced.[150] This move was resisted, not least because absence of a wage meant that the men were not covered by the Workmen's Compensation Act.[151] One argument put forward for the share system was that it made it possible to share in 'any extraordinary luck', though there were not too many cases of 'exceptional

145Goddard and Spalding, 1987, 21.
146Robinson, 1996, 81.
147Goddard and Spalding, 1987, 22.
148Goddard and Spalding, 1987, 25-6.
149Buckley, 1955, 51-2.
150Alward, 1932, 250-1.
151Wood, 1911, 169.

good fortune'.[152] The upshot was that when the Grimsby Federated Owners' Protection Society published new conditions for signing on crews in July they were opposed by the Port of Grimsby Share Fisherman's Protective Society and the Joint Disputes Committee.[153] In this environment the Owners' Society was appointed to act constitutionally and settle differences between owners and crews.[154] The resultant lock-out lasted from July to October when the fishermen were forced back to work by 'hunger and intimidated' by the calling in of the army. A Board of Trade arbitrator was also called in, awarded the men little more than the owners' initial offer (Table 80), and the share system eventually became the main element of a fisherman's income.[155]

Table 80

RATES OF PAY FIXED BY THE ARBITRATOR AT GRIMSBY IN 1901

Position	Weekly wage	Poundage
Chief engineer	34s	3.5d
Second engineer	27s	2.5d
Third hand	20s	2.5d
Deck hands, cook, trimmer	18s	1.5d

Source: Wood North Sea Fishers and Fighters, 166.

Four hundred men had been idle for about three months,[156] and the results were accepted by all parties, but 'the regulations, which were largely dependent on the honour of all concerned, were not strictly conformed to.'[157] The owners, having pleaded poverty, promptly purchased 100 steam trawlers.[158] The dispute was calamitous for the port, though smaller ports like Boston and Scarborough did benefit from a rise in prices and visits from several 'strange' steamers.[159] However, such benefits did not redress the balance, and it was of little comfort to know that if

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152Wood, 1911, 166-7.
153Alward, 1932, 250-1.
154Alward, 1932, 250.
155Goddard and Spalding, 1987, 24.
156Annual Report for England and Wales (1902) 801.
157Alward, 1932, 251.
158Goddard and Spalding, 1987, 24.
159Annual Report for England and Wales (1902) 799 and 803.

the dispute had occurred several years later it would have been 'infinitely more serious.'[160]

A National Federation of Fishermen was formed in 1902 to include unskilled deck hands, however, this meant that in the event of any dispute members could be comparatively easily replaced, which was especially so at Grimsby where that year '200 codmen struck for an improvement in wages.' After three weeks they capitulated and rapidly found themselves out of work, due to the availability of apprentices, so unsurprisingly the National Federation declined rapidly in influence.[161] Several subsequent attempts to organise labour were made, and many fishermen joined the Gas and General Workers Union which itself faded in 1912 after many members left to join the Seamen's Union at a reduced rate. By 1913 it had 2,000 members on the Grimsby trawlers.[162]

Increased capitalization entailed greater reliance on the performance of larger units within the industry, which resulted in greater neglect of certain aspects at a personal level. This was epitomised by the fact that skippers were no longer master of apprentices and took little trouble over their education. Not that this had worked perfectly before, but when the decline of Yarmouth as a trawling port was blamed on failings related to the 'buoyage and lighting' of its approaches, whatever the validity of the reasons given, it remained pertinent that it was deemed necesary to warn that such 'matters...be seriously considered by owners and managers interested in the future manning of their vessels.'[163] The harbour master at Eyemouth related that the companies no longer paid like they used and they also fished on Sundays unlike formerly,[164] an aspect of the fishing industry that was even more evident with drift netting.

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[160]Wood, 1911, 166.
[161]Goddard and Spalding, 1987, 22.
[162]Goddard and Spalding, 1987, 25-6.
[163]Annual Report for England and Wales (1897) 117.
[164]Committee on Scientific and Statistical Investigations (1908) Q.6,286.

As with trawling, the advent of steam drifters brought about disputes that supported 'the view that [they were] bringing together a larger class of wage-earning fishermen.'[165] The transition from sail to steam resulted in fishermen 'beginning to put their sons to trades, and some of them have lately left the fishing and gone abroad - an unheard of thing in the past'.[166] The cause, as with trawling disputes was the share system, for only engineers were paid wholly *via* a weekly wage.

> The earnings of the [steam drifting] venture are divided as follows:- The general expenses of the voyage, viz wages of the engineer and fireman, the landing dues, salesmen's commission, engine-room stores, and coal, are paid from the gross earnings, and the remainder is divided into thirds, one-third for the vessel, one-third for the nets, and one-third for the crew.[167]

Conversely, trawlermen received a regular weekly wage and 'this security prompted many of the Lowestoft men especially to go in for trawling', and drift netting was left to those from smaller ports, who were probably seasonal fishermen.[168] Nevertheless, steam drifting proved profitable as is evident from the rise of such boats in Table 81.

Table 81

NUMBER OF FISHING BOATS ACCORDING TO CREW SIZE AT LOWESTOFT

Complement	1893	1895	1900	1905	1910	1913
6 and under	245	269	248	492	474	444
7	5	8	21	3	2	4
8	20	25	11	0	0	3
9	154	150	168	92	49	32
10	9	11	20	121	267	301
11	2	1	0	0	0	0

Notes
Crews of 9 = Sailing drifters.
Crews of 10 = Steam drifters.

Source: PRO, London, BT145/2/13/24/34.

As with trawling, there was little labour organization, and the General Secretary of the Scottish Steam Vessls' Enginemen and Firemen's Union in Aberdeen bemoaned

[165]Report on the Scottish Sea Fishing Industry (1914) 692.
[166]Report on the Scottish Sea Fishing Industry (1914) 957.
[167]Report on the Scottish Sea Fishing Industry (1914) 958.
[168]Butcher, 1979, 89.

the small membership among steam drifters.[169] Steam drifting was also characterized by a tendency to concentrate the industry in large fishing stations, though smaller ports continued to a surprising extent. Especially in Scotland there was not the wholesale exodus from small fishing harbours that might be imagined from looking solely at the returns of fish landed,[170] due, not least, to congestion at larger ports. In Scotland and Ireland a greater proportion of men and boys were employed in non-trawling methods,[171] which is shown in relation to Scotland in Table 82.

Table 82

PROPORTION OF MEN AND BOYS IN SCOTLAND ENGAGED IN TRAWLING AND OTHER MODES OF SEA FISHING

	(PERCENTAGES)	
YEAR	TRAWLING	OTHER MODES
1889	1.0	99.0
1890	1.1	98.9
1891	1.4	98.6
1892	2.3	97.7
1893	2.3	97.7
1894	2.4	97.6
1895	2.4	97.6
1896	2.6	97.4
1897	3.0	97.0
1898	3.5	96.5
1899	4.8	95.2
1900	5.4	94.6
1901	5.9	94.1
1902	6.3	93.7
1903	6.5	93.5
1904	7.3	92.7
1905	7.4	92.6
1906	7.6	92.4

Source: Committee into Scientific and Statistical Investigations (BPP, 1908, XIII) 448.

In real terms this meant that in the mid 1890s 140,000 men were employed in non-trawling methods as against only 700 trawlermen.[172] Thus it seemed that while the change from sail to steam was not possible for many, an intermediate step would ease matters, and such a step was forthcoming with the advent of motors, that

[169]Report on the Scottish Sea Fishing Industry (1914) QQ.6,623-4.
[170]Committee on Statistical Investigations (1908) Q.2,083.
[171]Aflalo, 1904, 36.
[172]S.C. on Sea Fisheries (1893-4) Q.3,137.

needed neither fireman nor engineer,[173] or the cost they represented. The growing popularity of motor boats in Scotland can be seen from Table 68, allied to which the continued preponderance of sailing drifters (mostly with complements of six and under) despite the growth of the steam fleet, can be seen at Peterhead in Table 83

Table 83

NUMBER OF FISHING BOATS ACCORDING TO CREW SIZE AT PETERHEAD

Complement	1893	1895	1900	1905	1910	1913
6 and under	547	473	384	196	157	152
7	33	32	20	83	36	30
8	1	1	9	17	10	5
9	0	0	5	33	116	125

Source: PRO, BT145.

Most of the steam drifters (crews of eight and nine[174]) combined drifting and line fishing, for it was the practice for herring fishermen to go lining outside the herring season.[175] However, *Star of Hope* launched at Buckie in October 1896, showed through the efforts of individuals that small-scale operations were generally unequal to the changes brought about by technological developments. The vessel provided the 'first instance of a steam liner being owned and manned by a crew of fishermen',[176] but the overheads proved too much, the crew was not *au fait* with steam operation and she was soon converted into a trawler.[177]

[173]Report on the Scottish Sea Fishing Industry (1914) QQ.2,047, 3,511.
[174]Committee on Scientific and Statistical Investigations (1908) Q.5,220. Steam liners and drifters usually carried the same complement.
[175]Committee on Scientific and Statistical Investigations (1908) Q.5,215.
[176]Annual Report for Scotland (1897) 7.
[177]Annual Report for Scotland (1898) 4 and 7.

CHAPTER 7

EXTERNAL FORCES

This chapter starts by assessing the impact of technological change on European fishing industries, their influence on the British industry, and, conversely, Britain's effect on the performance of neighbouring fisheries. The second section examines the attitudes derived from the antagonism between economic and ecological issues, the result of which was rendered all the more significant as technological change made the industry increasingly efficient. Finally, continuing this theme, allusion is made to the import of this issue for the future health and prosperity of the distant water fisheries.

i EUROPEAN FISHING INDUSTRIES

Britain was not the only exponent of distant water fishing operations in Europe. Rye Bay on the south coast of England, for example, had been worked by French fishermen for 'a long period of years',[1] and by the late nineteenth century, in the words of a Hull trawler owner, 'if the English or Scotch people do not work steam trawlers, the Germans, or the Dutch, or the Belgians would'.[2] Economic pressures were universal and 'If one man can get well paid for a few boxes of baby fishes, his neighbour naturally thinks that he too will make money in this way.'[3] This sentiment was applied to a small Scottish fishing station and the 'neighbour' referred to was a fellow fisherman at the same port, but the description was just as valid in an international context. The implementation of mechanically-powered fishing fleets was the most significant indication of technological change in European fishing industries at this time, though the criterion was not synonymous

[1] R.C.on Sea Fisheries (1866) 583.
[2] S.C. on Sea Fisheries (1893-4) Q.2,036.
[3] Calderwood, 1894, 74.

with such alterations, especially in nation's where the sea fishing operations were focused more on inshore operations, which was true of nations like Norway. Data related to the fishing industries of some European countries is reproduced in Appendix Five.

The first fishing steamers anywhere were probably constructed and operated in France, where several worked successfully from the middle years of the nineteenth century, though subsequent development was inhibited by lack of financial backing.[4] Meanwhile, unification helped economic growth in Germany and facilitated preconditions for the expansion of the fishing industry, notably through emergence of an industrial workforce and construction of a railway network, like in Britain. In contrast, the fisheries of smaller states like Norway were restricted by a shortage of capital,[5] though their importance in that country led to the introduction of new technology *via*, for example, the use of steam tugs from Bergen in the herring fishery in 1867,[6] and the construction of an advanced telegraph system by 1870.[7] The appearance of the converted Danish steam trawler *Proven* at Grimsby in 1880[8] illustrated that British experiments were not isolated, and indeed there was a degree of co-operation on fishing matters with continental Europe. This was evident in the signing of a convention to restrict the activities of copers - vessels that sold tobacco and alcohol to fishing boats at sea - with France, Germany, Holland, Belgium and Norway in 1886.[9]

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[4]Herubel, 1912, 294-5; Cutting, 1955, 250.
[5]Coull, 1972, 68.
[6]Report for British Fisheries (1867-8) 625-6.
[7]Report for the Herring Fishery: Scotland (1870) 275.
[8]Gillett, 1970, 269-70.
[9]Mather, 1888, 224.

In the previous year the first German steam trawler, *Sagitta* of Geestemunde, began operations,[10] and a similar vessel undertook an abortive trip to Faxa Bay off Iceland in 1889.[11] By 1897 Germany possessed 109 steam trawlers,[12] and they began to prosper in the mid-1890s[13] -as did those of Belgium[14] - though in the view of a Grimsby fleet admiral, their vessels were old and 'very few', while the men were poor fishermen.[15] Steam trawlers had first appeared in the Netherlands in 1893,[16] and though 12 were registered by 1899, a number that rose to 21 in the following year,[17] at the turn of the century development was not far advanced.[18] Technological progress in the French industry was impaired by numerous labour disputes that eradicated quickly any lead it had held. Introduction of the otter-trawl, for instance, resulted in the Congress of Saint-Brieuc at which its abolition was demanded,[19] the struggle between the old and new fisheries was even more divisive than in Britain. 'Steam-fishing...won its case', but it involved a bitterly fought struggle that proved detrimental to French sea fisheries.[20]

Technological progress in the Scandinavian countries took a different route. These countries were more involved with the fisheries of home waters, for which steamers were less well suited. In Denmark, steam capstans had been used aboard smacks from 1890, and kerosene motors appeared later in the decade.[21] Despite *Proven,* the development of purpose-built fishing steamers was sluggish and, according to official figures, it was 1896 before two eventually appeared and, after peaking at three over the turn of the century, by 1902 once more there were none.[22] However,

[10]Rasmussen, 1985, 222.
[11]Thor, 1988, 268.
[12]Rasmussen, 1985, 222.
[13]S.C. on Sea Fisheries (1893-4) Q.412.
[14]S.C. on Sea Fisheries (1893-4) Q.412.
[15]S.C. on Sea Fisheries (1893-4) QQ.1,134-5.
[16]Annual Report for England and Wales (1901) 124.
[17]Annual Reports for England and Wales.
[18]S.C. on Sea Fisheries (1893-4) Q.412.
[19]Herubel, 1912, 295.
[20]Herubel, 1912, 297.
[21]Holm, 1994, 151n.
[22]Annual Report for England and Wales (1904) 124.

considerable Danish fisheries away from the mainland foster doubts about these statistics, as included in their 'home' waters were those of Iceland and the Faroe Islands that were worked by Danish as well as non-Danish vessels in the mid 1890s.[23]

Furthermore, it was said at this time that not only had the size of overseas steam trawlers kept pace 'pretty much' with British vessels,[24] but 'Danish, and other continental steam trawling vessels' were indeed larger than British craft performing similar operations.[25] Holt explained that

> our fishermen consider that any advantages that may be gained by increasing the size of vessels are more than counterbalanced by the injury which a large vessel is apt to inflict on the trawl in a heavy swell. This distrust may ultimately be overcome, since we know that similar fears which manifested themselves at every increase in the tonnage of smacks have never been realised.[26]

One contemporary suggested that design was inhibited by a general feeling that larger vessels were less well-suited to working conditions, a similar phenomenon to that noted at British ports regarding the use of smacks or steamers (see Chapter Three). Economic performance did not improve with increased size, although such vessels might be safer and more seaworthy,[27] but whatever the rights and wrongs of the issue it point out that Britain was not the only nation that was devoting resources to enhancing the efficiency of her fisheries.

Table 84 is a compilation of data drawn from Annual Reports for England and Wales, which details the fishing steamers of European nations. Most of the information comes from official sources and shows that the use of fishing steamers throughout Europe, notwithstanding the vast numerical superiority of the British fleet, was growing.

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[23]Annual Report for England and Wales (1894) 119; Poul Holm, 'Fishing in Britain and Denmark: Success and Failure since 1890.' Public lecture, 16th May 1997 at Grimsby town hall.
[24]S.C. on Sea Fisheries (1893-4) Q.410.
[25]Holt, 1895(ii), 134.
[26]Holt, 1895(ii), 133-4.
[27]M'Intosh, 1895, 314.

Table 84

NUMBER OF STEAM TRAWERS AND OTHER STEAM FISHING VESSELS BELONGING TO THE STATES OF WESTERN EUROPE

(Trawlers/Others)

YEAR	GERMANY	NETHERLANDS	FRANCE	BELGIUM	PORTUGAL
1900	124	21	3	-	-
1901	120	24	19	24	-
1902	119	29/2	3/36	22/-	-
1903	119/16	28/35	4/36	22/-	-
1904	118/17	36/42	3/26	22/-	-
1905	135/21	43/41	4/52	23/-	-
1906	154/27	75/34	4/86	23/-	-
1907	239/32	78/32	212/33	23/-	-
1908	310	79/40	232/32	-	14/-
1909	293	90/34	226/54	24/-	16/-
1910	298	90/34	231/51	26/-	26/-
1911	301	111/38	236/61	26/-	34/-
1912	233/80	-	271/-	26/1	32/-
1913	254/78	-	-	29/1	-

YEAR	NORWAY	DENMARK	SWEDEN	BRITAIN
1900	-	3	-	1,500
1901	-	1	-	1,603
1902	-	-	-	1,711
1903	-	-	-	1,873
1904	-	-	-	1,926
1905	-	-	-	1,978
1906	-	-	-	2,172
1907	20/180	4/-	-	2,538
1908	195	-	14/-	2,726
1909	180	15/-	18/-	2,796
1910	183	6/-	19/-	2,928
1911	182	7/-	-	3,116
1912	184	6/-	-	3,217
1913	-	-	38/-	3,343

Notes
Germany: North Sea ports only.
France: Including Algeria and only vessels over 25 tons.
Denmark: Including the Faroe Islands.
Britain: Steam vessels registered under Parts I and IV of the Merchant Shipping Act.

Source: Annual Reports for the Sea Fisheries of England and Wales

The largest non-British steam fishing fleet was undoubtedly that of Germany, and with the advent of steam a successful distant water industry was established.[28] A typical voyage from one of the main centres, Hamburg or Bremen, lasted about a week,[29] and by 1904 there were estimated to be between 120 and 130 German steam

[28]Alward, 1932, 91.
[29]Aflalo, 1904, 211.

trawlers,[30] a number that had risen to about 290 by 1909, which was still nowhere near the 1,336 fishing steamers registered in England and Wales.[31] About 220 German steamers, crewed by 2,660 men, were based at ports on the North Sea in 1910, when it and adjacent grounds yielded satisfactory results, though the Iceland fishery proved poor. The impact of this was cushioned by the fact that the German fisheries, like those of France, received governmental assistance. Money was loaned at very low rates of interest to help develop the industries.[32] In France by 1914 ports like Boulogne, Amiens, Arachon and Fecamp serviced important fisheries in Iceland and Newfoundland,[33] while 'numerous' trawlers were being built in England for French owners.[34] Typical was the 175-foot *Maroc*, built at Selby for the Newfoundland cod trade,[35] and 'Several very large trawlers' of about 750 i.h.p. that were capable of over 11 knots.[36] Such vessels represented a huge investment, and the French industry resembled the Dutch distant water fisheries, centred on Ymuiden, in that they were owned almost entirely by 'shore based capitalists'.[37]

Britain's distant water fishing industry was also susceptible to influence from other nations through the conduct of its own industry. This is apparent in the presence of number of examinees for Board of Trade fishing certificates that were born outside the British Isles (Table 85).

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[30]S.C. of the House of Lords (1904) Q.2,170.
[31]Rasmussen, 1985, 222.
[32]S.C. of the House of Lords (1904) Q.1,379.
[33]Annual Report for England and Wales (BPP, 1913, XXIV) 71; Moran Boyd, 1915, 121.
[34]Moran Boyd, 1915, 121.
[35]'Cochrane & Sons', 1915, 105.
[36]'Amos & Smith', 1915, 111.
[37]Committee into the Scottish Sea Fishing Industry (1914) 683.

Table 85

NUMBER OF CERTIFICATED CREWMEN BORN OUTSIDE THE UNITED KINGDOM

Denmark	29
Sweden	20
Germany	11
Iceland	7
Belgium	5
Netherlands	4
Russia	4
Norway	3
Sicily	1
British Empire	10
Total	94

Source: PRO, BT138.

A Danish connection is indicated by these figures, and was supported by Rasmussen's assertion that there were 15 Danish captains and about 20 second and third hands at Hull in September 1890.[38] He wrote that there were no significant long term results of this,[39] though a mission for Danish fishermen was still open at Grimsby in 1994. Meanwhile, back in 1890 the Danish Steam Trawling Company which fished from England was founded.[40]

A second manifestation of European influence on Britain's distant water fisheries was the presence of fishing boats at British ports, where they were attracted, basically, by better prices. This phenomenon was initiated on a notable scale by German steam trawlers landing catches from Faroese and Icelandic grounds in the early years of the twentieth century.[41] They supplied cheaper, distant water cod for drying[42] and were still a significant presence in June 1911, when the number arriving from Iceland was double that for the same month in 1910.[43] Meanwhile, the Collector at Plymouth recorded that in 1900 the port was used by two French, a Belgian and a Dutch steam trawler,[44] and by two vessels from Boulogne and two

[38]Rasmussen, 1985, 222.
[39]Rasmussen, 1985, 223.
[40]Rasmussen, 1985, 222.
[41]Coull, 1996, 145.
[42]Cutting, 1955, 256-7.
[43]Wood, 1911, 152.
[44]Annual Report for England and Wales (1901) 263.

from Ostend in the following year.[45] Five Dutch vessels landed fish from Scottish waters at Fleetwood for about 3 months in 1900,[46] a number that doubled between February and August 1901[47] and continued into 1902, a practice that stemmed from the closure of the Clyde to Britons.[48] In the same year the fishing industry at Cardiff was 'considerably handicapped by foreign trawlers being allowed to work off British coasts, where English trawlers are prohibited'.[49] However, such closures remained one of the reasons for Fleetwood's good fortune; in 1905 Norwegian, Swedish, Danish and Belgian boats fished the Clyde in the summer and landed their catches at the port.[50] Indicative of the potency of foreign steamers was the fact that Brixham smacks were chased away to the Bristol Channel earlier than usual in 1905 due to the arrival of a 'number' of foreign steam trawlers on local grounds.[51] Table 86 quantifies the contribution of non-British fishing boats to the productivity of the British industry at the end of this period, though exact quantities may be suspect due to a number of British fishing boats that were registered abroad in order to avoid restrictive legislation. Their aggregate catch was not great compared to the amounts landed by indigenous craft, but neither was it negligible by 1914, and it reinforced the point that the fisheries of the European continental shelf were by no means synonymous with British operations.

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[45] Annual Report for England and Wales (1902) 843.
[46] Annual Report for England and Wales (1901) 285.
[47] Annual Report for England and Wales (1902) 865.
[48] S.C. of the House of Lords (1904) Q.2,127.
[49] Annual Report for England and Wales (1903) 173.
[50] Committee on Scientific and Statistical Investigations (1908) QQ.9,857-60.
[51] Annual Report for England and Wales (1906) 456.

Table 86

QUANTITY AND VALUE OF WET FISH LANDED BY FOREIGN VESSELS FROM THE DEEP SEA FISHERIES WITH PERCENTAGE OF THE TOTAL LANDED IN THE UNITED KINGDOM

	1910	1911	1912	1913	1914
Qty (cwts.)	394,557	411,383	552,565	739,690	707,518
% of total	1.7	1.7	2.3	3.1	4.0
Value (£)	190,993	153,765	224,703	323,612	326,810
% of total	1.7	1.4	1.8	2.3	3.0

Sources: Statistical Abstract for the United Kingdom (BPP, 1926, XXVIII) 200-1 (bound copy) and Annual Reports for England and Wales.

Ports on the South Devon coast were used by British vessels working fishing grounds to the south, including the Bay of Biscay, and in the first years of the twentieth century the French were 'fishing the district thoroughly' themselves.[52] Their interests extended to the pelagic fishery where steam had been applied to herring boats since the early 1880s,[53] and about 1902 a couple of Boulogne shipowners built *Jean*, a 'mixed' herring boat.[54] However, Britain's main 'rival' in steam fishing for herring came again from Germany, though once more its fleet did not match the British industry in size or productivity. The development of steam drifting had been similar in each country, with experiments carried out in the last stages of the nineteenth century,[55] though commercial vessels did not enter service until its last few years. The German herring fishery was based around the Ems, Weser and Elbe, and from five steam drifters in 1898 its fleet had grown to 89 in 1913.[56] In 1910 13 companies were involved in the industry, which then included 15 steamers, 68 steam luggers (with auxiliary steam engines), and 186 sailing luggers,[57] which contrasted with the Netherlands where, by 1910, the number of

[52]Committee on Scientific and Statistical Investigations (1908) Q.8,056.
[53]R.C.on Trawl Fishing (1884-5) Q.9,451.
[54]Herubel, 1912, 299.
[55]Annual Report for Scotland (1898) 5-6.
[56]Annual Report for England and Wales (1914) 85-6.
[57]Committee into the Scottish Sea Fishing Industry (1914) 570.

steamers was fewer than in 1903.[58] However, the diffusion of steam technology did not just involve comparisons between sail and steam by this time.

The smaller-scale operations of countries like Norway were more typical of many European countries than the highly capitalized trawling activities which they nonetheless rivalled 'in output'.[59] Compared with steam, the internal combustion engine was lower powered, more economical, and better suited to these fisheries. It could enhance the productivity of existing capital which suited smack owners in smaller inshore-based economies. Motors were adopted throughout Scandinavia[60] at an earlier stage than in Britain, and their popularity swiftly grew throughout the continent,[61] as can be seen from comparison with the figures for Scotland included in Table 87.

Table 87

NUMBER OF MOTOR FISHING VESSELS IN WESTERN EUROPE

	1908	1909	1910	1911	1912	1913
Denmark	1,480	1,680	1,866	2,131	2,445	-
Norway	1,636	1,974	2,912	4,168	5,376	-
Sweden	38	515	725	-	-	1,597
Germany	142	207	294	487	668	823
France	-	-	191	358	-	-
Belgium		10	11	9	16	25
N'lands	4	4	4	12	-	-
Portugal	-	-	-	-	27	-
Scotland	18	75	156	233	356	523

Source: Annual Reports for England and Wales and Annual Reports for Scotland.

The technological development of motor fishing boats in the fisheries rested far more with European nations than had steam propulsion. In Britain the internal combustion engine was mainly employed as an auxiliary power source for smacks, whereas by the summer of 1907 12 Danish fishing boats of 20-40 tons were trawling in Icelandic waters, which led to the establishment of the Iceland-Faroes

[58] Annual Report for England and Wales (1914) 85-6.
[59] Committee into the Scottish Sea Fishing Industry (1914) 550.
[60] Committee into the Scottish Sea Fishing Industry, (1914) 693.
[61] Annual Report for England and Wales (1914) 54-5.

Fishery and Trading Company based at Esbjerg.[62] Additionally, by 1909-10 72 large motor boats, mostly from Bohuslan, trawled in spring and early summer, before drift net fishing for herring during the winter, and the number of these vessels had risen to 103 in 1911-2. Another Swedish firm, Bolinders, sponsored construction of an advanced motor drifter, *Bolinders*, which was built at North Shields and based there and at Berwick 1911-2,[63] while catching power was also enhanced *via* Britain through a 'certain number' of European steamers trawling for herring by 1914.[64]

However, despite these developments most fishing operations in Scandinavian countries continued to be undertaken by smacks, many of which were purchased from Britain and subsequently fitted with diesel engines.[65] This trade marked a further link between Britain's fishing industry and those of her European neighbours. An indirect effect of technological change in Britain was the enhanced catching power of continental industries *via* the purchase of discarded vessels, as they represented the often considerable upgrading of continental fleets.[66] At Hull 'a great many' sailing trawlers were sold abroad in 1891,[67] three years later the port's fleet was reduced by 39 due to 'losses and sales to foreigners',[68] and by the end of the century most smacks were sold abroad.[69] Fourteen out of 32 smacks cancelled from the register at Hull in 1894 went to Norway, Sweden and Holland, and 18 out of 38 were sold 'foreign' during the following year.[70] Meanwhile, three smacks were sold to Iceland from Fleetwood in 1897,[71] and the report for 1898 noted that while ten years ago there had been nearly 1,000 smacks and under 80 steamers

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[62]Twenty Second Annual Report of England and Wales (BPP, 1909, XXII) 54-5.
[63]Muirhead, 1992, 459.
[64]Committee into the Scottish Sea Fishing Industry (1914) 562.
[65]Robinson, 1996, 112.
[66]Annual Report for England and Wales (1914) 85-6.
[67]Annual Report for England and Wales (1892) 125.
[68]Annual Report for England and Wales (1895) 197.
[69]Annual Report for England and Wales (1900) 124.
[70]PRO, BT145/2.
[71]Annual Report for England and Wales (1898) 291.

sailing from the Humber, there were by then over 600 steamers and less than half the number of smacks - many of which had been sold abroad.[72] Table 88 provides information about this trade by using data from the statuory register of fishing vessels of several ports. These manuscript sources are neither consistent nor straightforward, but it is possible to ascertain from them that a significant percentage of fishing boats was sold abroad.

Table 88

DISPOSAL OF FISHING VESSELS TO EUROPEAN COUNTRIES FROM SELECTED PORTS
(Steamers unless indicated)

(i) ABERDEEN, 1904-1914

Netherlands 18
Portugal 15
Sweden 13
France 5
Denmark 4 (2 sail)
Norway 4
Spain 3
Unspecified) 16 (1 sail)

(ii) BRIXHAM, 1904-14
(all sail)

Norway 28
Belgium 3
Netherlands 1
Sweden 1
Unspecified 2

(iii) GRIMSBY, 1899-1914

Denmark 67 (39 sail)
Sweden 58 (50 sail)
Norway 56 (24 sail)
Netherlands 40 (21 sail)
France 21(1 sail)
Germany 19
Spain 9
Russia 3
Portugal 2
Belgium 1 (1 sail)
Unspecified) 9 (1 sail)

[72]Annual Report for England and Wales (1899) 131.

(iv) HULL, 1894-1914

Netherlands 44. (25 sail)
France 38 (4 sail)
Sweden 37 (25 sail)
Denmark 35 (29 sail)
Spain 33
Norway 27 (22 sail)
Germany 7 (3 sail)
Belgium 2
Portugal 2
Russia 1
Unspecified 17 (all sail)

(v) LOWESTOFT, 1899-1914

Norway 139 (138 sail)
Sweden 44 (all sail)
Belgium 32 (all sail)
Netherlands 12 (all sail)
Denmark 2 (both sail)
France 4 (all sail)
Spain 1
Unspecified 11 (all sail)

(vi) RAMSGATE, 1899-1914

Belgium 20 (all sail)
Norway 11 (all sail)
Sweden 2 (both sail)
France 1 (sail)
Unspecified 2 (both sail)

Source: PRO, BT145.

The export of smacks continued to 1914, among notable cases being the sale from Lowestoft and Brixham of old smacks to 'Norway and the continent'.[73] Many had been disposed of in 'fairly considerable numbers to foreign countries, including Holland, Belgium, France, Spain, Portugal, Sweden, Russia and Iceland',[74] with the aid of firms such as W.A.Massey & Sons Ltd 'Ship Salesmen and Valuers' at Hull and Grimsby, who also sold many of the first steam fishing boats to foreign and colonial buyers.[75] A large proportion of the Danish and Faroese fishing fleets were of British origin, and it has been written that 'Worn out English smacks passed a peaceful old age in Danish long-lining',[76] though whether fishermen anywhere would knowingly invest in 'worn out' capital remains highly debatable.

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[73]Annual Report for England and Wales (1908) 268; Annual Report for England and Wales (1912-3) 409.
[74]Annual Report for England and Wales (1914) 54-5.
[75]'Second Hand Steam Trawlers', 1915, 133.
[76]Rasmussen, 1985, 224.

The construction of fishing boats for foreign fleets by British shipyards had a more direct effect on European catching power. The extent to which new steam vessels were supplied can be gauged by statistics that were available for a number of years in Olsen's Fisherman's Almanack, a cross-section of which is presented in Table 89. From the builder's name and address it was possible to ascertain that a high proportion of foreign fishing fleets were of British origin.

Table 89

BRITISH-BUILT STEAM VESSELS IN FOREIGN FISHING FLEETS

	YEAR			
COUNTRY	1895	1899	1904	1909
Germany	9	5	11	12
Belgium	9	17	14	18
France	5	15	39	92
Holland	0	10	29	55
Denmark	1	3	5	0
Norway	0	0	19	26
Spain	1	1	1	1
Portugal	1	1	1	10
Total	26	52	119	214
% of fleet built in Britain	25	25	28	30

Notes
1904: No location of build given for 52 vessels.
1909: No location of build given for 62 vessels.

Source: O T Olsen Olsen's Fisherman's Nautical Almanack, editions for 1896, 1900, 1905 and 1910.

These figures are augmented by data from the annual reports for Scottish fisheries that categorized the type of fishing vessels built at ports and their destination. Table 90 gives details of two that supplied fishing boats to other countries (see also Appendix Three).

Table 90

STEAM TRAWLERS CONSTRUCTED WITHIN THE BOUNDARIES OF SELECTED PORTS IN SCOTLAND

ABERDEEN

1898: 4 of 28 for ports outside Britain.
1902: 1 of 18 for France.
1904: 1 of 9 France.
1905: 2 of 20 for France.
1906: 2 of 47 for France and 2 for Germany.
1907: 3 out of 37 for France and 3 for Germany.
1908: 1 of 14 for France.
1910: 1 of 20 for France.
1911: 2 of 31 for France and 1 for Portugal.
1912: 2 of 29 for France.
1913: 4 of 31 for France.

GREENOCK

1898: 1 for Norway and 2 for France out of 52.
1899: 1 of 27 for Belgium.
1904: 2 of 5 sold 'foreign'.
1906: 2 out of 30 for Germany and 1 each for France and Belgium.
1908: All 4 for France.
1910: 2 out of 5 for France and 1 each for Belgium and Portugal.
1911: 1 of 1 for Belgium.
1912: 1 of 2 for Belgium.

Source: Annual Reports for Scotland.

By 1914 British distant water operations had 'extended to localities as far distant as Morocco, Iceland and the Barents Sea',[77] but the number of steamers in the fishing fleets of European countries showed that the state of these grounds was not purely due to these workings, though Britain's influence was huge and on her shoulders rested the great bulk of responsibility. Fishermen of all countries were keen to make as large a profit as possible, which meant using the most suitable craft available and this frequently involved purchasing from Britain, where the application of new technology forced the pace of progress throughout Europe. Economic concerns were paramount as well as universal and conditioned the attitudes analysed in the following section.

[77]Annual Report for England and Wales (1913) 71.

ii PERCEPTIONS OF THE FISHERIES

Denmark, Germany and Holland landed 36 per cent more cod, haddock and plaice from the North Sea in 1904 than in the previous year,[78] and by the first years of the twentieth century about 200 non-British steam trawlers worked the region from adjacent ports.[79] These were in addition to the North Sea operations of a British steam fishing fleet that numbered over 1,900 in 1904,[80] and consequently, according to one source, these fishing grounds were 'simply done up for trawling operations' before 1910.[81] Central to the denudation of fish stocks was simultaneous appreciation of their heightened economic value and greatly enhanced ability to extract them, a combination that produced attitudes on ecological issues that were characterized largely by indifference.

Escalating pressure on stocks dated from the extension of the railway network to fishing ports in Britain and the use of ice.[82] These factors enabled development of the trawl and growth of a fishing industry concerned with extracting rather than harvesting resources, faced as it was with intensified economic pressures that resulted from the need to cope with a mass rather than a limited market. Investors were impatient for maximum possible remuneration, so as much fish as possible had to be landed as soon as possible, and although steamers were more efficient than sailing smacks, better steamers could land even more fish and earn even more money. As mentioned above, economic issues were universal, and short-term profitability always overshadowed longer-term considerations, a gulf that became wider and more crucial as technological change increased the efficiency of fish production and the likelihood of inflicting lasting damage on fish stocks. The

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[78] Annual Report for England and Wales (1906) 378.
[79] S.C. of the House of Lords (1904) QQ.196-7; Twentieth Annual Report for the Sea Fisheries of England and Wales (BPP, 1906, XVI) 387.
[80] Annual Statements of Navigation and Shipping.
[81] Committee on Statistical Investigations (1908) Q.6,288.
[82] R.C. on Trawling (1884-5) Q.10,932.

situation was summed up by the manager of a Grimsby steam trawling fleet in 1893, who stated that although his vessels were were productive for fishers they were 'exceedingly destructive to fish'.[83] However, the infrastructure that had been evolved to facilitate the operation of technological developments would not allow for the reconciliation of these factors. As early as the mid 1890s a Hull man pronounced that 'we have now come to...the "besom" part of the business, that is to say, we have almost swept the North Sea of ground fish',[84] and this was borne out by the declining calibre landed by Humber vessels. There was a 'marked falling off' of quality in the first decade or so of steam trawling from Grimsby, as quantities were maintained through the capture of smaller fish,[85] vessels caught much young cod[86] and other small sized fish.[87] In the same period 721 tons of fish was destroyed at Billingsgate because it was undersized and no use, and was discarded even by the poor,[88] while hundreds of tons of such plaice was caught off the Dutch, German and Danish coasts, and another 70 tons at least was condemned in June 1891 by the Fishmonger's Company at Billingsgate.[89]

Though it lagged behind the demersal sector in the implementation of new technology, concerns for fish stocks had been voiced in the herring industry some years earlier. However, with seasonal fluctuations of considerable magnitude, it was difficult to gauge the true state of the fishery. Before 1900 there was no tangible evidence of overfishing, although it had long been recognized that 'increased machinery for capture, and not to an increase in the fish in the sea' was responsible for greater catches.[90] Sure enough, when record landings of herring were brought ashore in 1884 the catch 'was largely composed of immature and small fish' which

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[83]S.C. on Sea Fisheries (1893-4) Q.1,855.
[84]S.C.on Sea Fisheries, (1893-4) Q.468.
[85]S.C.on Sea Fisheries (1893-4) QQ.1,070-7.
[86]Annual Report for England and Wales (1893-4) 199.
[87]Annual Report for England and Wales (1896) 237.
[88]S.C. on Sea Fisheries (1893-4) QQ.47-58.
[89]Annual Report for England and Wales (1892) 125-6.
[90]Report of the Commission of Fishery Board (Scotland) (BPP, 1878, XXI) 326.

was therefore of much less value.[91] The situation grew worse after the introduction of steam drifters which, by 1908 caught 43.5 cwts. for every 1,000 square yards of net, whereas smacks captured 20 cwts.[92] Around that time the Harbour Master at Eyemouth reckoned that trawling was 'all played out',[93] and by 1914 a Fife man stated that he saw no future with smacks as the North Sea was 'almost depleted', especially with regard to cod.[94]

A Flamborough fisherman landed six hundred cod in the winter of 1832 and lamented that they were sold for £18, while thirty years later they were worth four or five shillings apiece.[95] Such a rise in price denoted significant changes in market conditions, and necessarily entailed significant repercussions. A Scarborough trawlerman recalled shovelling overboard up to three-quarters of a catch in 1836 because it could not be marketed.[96] But nearly 50 years later, by which time the market had altered considerably, a Whitby fisherman noted that on average a quarter of the catch was still tossed overboard because it was of 'no use',[97] while around the same time 'thousands of tons of good fish' were reported to be thrown overboard annually.[98] It had been presumptuous to assume that because there was a market for most types of fish, including 'small plaice or haddocks...[that before]...would never have been brought on shore',[99] this practice had ceased. In 1902 Boston trawlers landed much small fish, but 'many of the masters reported [still] having thrown tons overboard'.[100]

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[91] Annual Report for Scotland (1884-5) 197.
[92] Committee into Scientific and Statistical Investigations (1908) Q.1,904.
[93] Committee on Statistical Investigations (1908) Q.6,286.
[94] Committee into the Scottish Sea Fishing Industry, (1914) QQ.2,518-9.
[95] R.C.on Sea Fisheries (1866) Q.6,772.
[96] R.C.on Sea Fisheries (1866) QQ.6,011-21.
[97] R.C.on Trawl Fishing (1884-5) Q.9,928.
[98] The Times, 11 October 1886, 13.
[99] Calderwood, 1894, 73.
[100] Annual Report for England and Wales (1903) 121.

Trawl nets were indiscriminate and retained anything too big to escape the mesh and they could be operated all year round, a situation that was exacerbated by the fact that steamers were able to work in almost any weather. However, not only did these vessels fish intensively, another Flamborough man operated his coble over rocky ground amid strong tides where larger, unwieldy craft would not venture,[101] and thus did trawlers precipitate more intensive working of areas where they themselves did not go. Ecological concerns regarding the health of fishing grounds were first voiced by small-scale fishermen worried about their economic prosperity. They alleged that trawlers damaged young or spawning fish, and as the century advanced some trawlermen expressed similar concerns, which highlighted the lack of data from which reliable assumptions could be made and action taken.

> OUR SEA FISHERIES... The supply has made every effort to keep pace with the demand; and, so far as men and boats and tackle are concerned it would have done so. But now the commodity itself is falling off, and the amount of ignorance prevailing on the subject is so great that no one knows for certain whether we are not eating our goose as well as our golden eggs...The common assumption under which the fishery is at present conducted seems to be that there always were and there always will be "as good fish in the sea as ever came out of it"...It will be necessary for us to obtain a more accurate knowledge of the natural history of fishes...It is not fair to lay all the blame on the poor trawlers. They only follow the general opinion, that everything is fair in fishing.[102]

This article appeared in 1863, the same year that a Royal Commission fronted by three eminent authorities, including Professor T.H.Huxley, was set up to investigate Britain's sea fisheries. Its exhaustive investigations resulted in a seminal report that was presented to Parliament in 1866. By this time fishing boats often crossed to within three miles of the Dutch coast,[103] though 'abundant proof' was forthcoming of the continued productiveness of nearer grounds. Banks off the eastern coast, including the western part of the Dogger, were flourishing, while Rye Bay on the south coast was more productive than ever despite the attentions of French as well

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[101]R.C. on Sea Fisheries (1866) Q.6,772.
[102]The Times, 9 April 1863.
[103]R.C.on Sea Fisheries (1866) 610.

as British fishermen.[104] A Sunderland merchant moved away from southern waters because of a lack of ice rather than any shortage of fish,[105] but some south coast grounds were 'alleged' to be showing 'signs of over-fishing'[106] and reports of lessening returns in the North Sea due to 'intensive exploitation' were mooted.[107] However, the findings of the Commission were not what non-trawlermen had been hoping for. The tone of the report was set by acknowledgement of the 'progressive state of the sea fisheries on the coasts of Great Britain',[108] and it recommended a *laissez-faire* policy that involved the repeal of 'complicated, confused, and unsatisfactory' laws.[109] This permitted 'unrestricted freedom of fishing',[110] and the 'absence of restrictive regulations materially assisted the enormous development of British fisheries which took place during the next few decades.'[111]

This constituted the abiding legacy of the report, and once sanctioned by Parliament many took it to be a 'licence to fish'. They disregarded the fact that the Commissioners also

> considered it a matter of great importance that fishery statistics should be systematically collected. It is only by such means that the constant recurrence of the panics to which the sea fishery interest has hitherto been subjected can be prevented, and that any trustworthy conclusion can be arrived at regarding the effects of the modes of fishing which are in use.[112]

Economic pressures meant that the practical implementation of all the recommendations of the Royal Commission compromised its theoretical cogency. In practice, they were tailored to suit the economic requirements of the distant water industry and the implementation of its latest technology, which resulted in failure to monitor the sea fisheries at a time of escalating catching power, which accelerated

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104 R.C.on Sea Fisheries (1866) 583.
105 R.C.on Sea Fisheries (1866) Q.3,894.
106 R.C.on Sea Fisheries (1866) 583.
107 Cutting, 1955, 255.
108 R.C.on Sea Fisheries (1866) 583.
109 R.C.on Sea Fisheries (1866) 675.
110 R.C.on Sea Fisheries (1866) 678.
111 Johnstone, 1905, 71.
112 R.C.on Sea Fisheries (1866) 678. See also Robinson, 1997, 138-9.

the obsolescence of the report. One abiding truth was that the fisheries 'could not be conducted as if they were inexhaustible',[113] but this was precisely what was done.

Definition of the fisheries as 'a great field for profitable enterprise...open for the application of increased capital and skill'[114] was an alluring watchword for many concerned with the economic well-being of the fishing industry. So while a 'Fisherman's Friend' declared in 1886 that Huxley was mistaken in saying that North Sea fish stocks were unlimited,[115] 17 years later William Pyper, an Aberdeen steam trawler owner, still proclaimed that he and his fellows were 'only advancing the theories of two great authorities, namely the late Professor Huxley and Frank Buckland.'[116]

The Royal Commissioners had concluded that none of the complaints against trawling were of 'sufficient gravity' to necessitate legislation, a view that was reinforced by a report on the sea fisheries of England and Wales published in the 1878-9 Parliamentary session. This report did recognize, however, that 'considerable injury is done to drift fishermen and hook and line fishermen',[117] though nothing was done about the situation. A fisherman at Staithes recalled that since trawlers arrived in the area the quantity of fish had decreased,[118] while a Lowestoft smack master later recalled that when he first started trawling in 1849 he had rarely travelled further than 30 to 35 miles from land, whereas by 1875 he had 'taken vessels to the mouth of the Cattegut... [a trip of 2-300 miles, before the use of ice]...encouraged us to go farther and farther.'[119] This was in keeping with the trend in trawling towards the 'gradual extension of the fishing-areas...not...so much

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113Johnstone, 1905, 71.
114R.C.on Sea Fisheries (1866) 589.
115The Times, 11 October 1886, 13.
116Pyper, 1903, 28. Sir Frank Buckland was one of Huxley's successors, serving on four Parliamentary inquiries into the fisheries between 1875 and his death in 1880.
117Report for the Sea Fisheries of England and Wales (1878-9) 260.
118Report for the Sea Fisheries of England and Wales (1878-9) 425.
119R.C.on Trawling (1884-5) QQ.11,006-8.

[as] the result of pure exploration as of the absolute necessity to find more remunerative grounds.'[120] Whatever the sustainable levels of fish stocks, once catches diminished and capital had been worked to the limits of viability in a certain area, the standard solution was to move to new and more distant grounds. Thus economic necessity generated technological development that facilitated the exhaustion of a wider area, at which point economic pressures prompted further research to enable the exploitation of more distant waters, *ad nauseam* - until the economic exhaustion of a finite resource base.

Protests against trawlers and steamers were loud and constant, and often emanated from trawlermen themselves. Shortly before purpose-built steam fishing boats were introduced, for example, The Times reported that 'Mr Hewett a large smackowner said it would be beneficial to have the close time applied to the whole North Sea',[121] which was enlightening considering his preoccupation with economic prosperity. By the mid 1880s it was warned that because of incessant fishing operations the 'present system' would harm the fishing in Aberdeen Bay,[122] thus obliging trawlers to go farther out to keep up supplies.[123] An Aberdeen trawler skipper noticed that he caught more small fish when working closer in,[124] and another master took most of his fish within three miles of the port and asserted that there were more fish in those waters than 45 years ago at Yarmouth, he does not mention the quality or nature of the fish he caught. As early as the 1880s operations became increasingly extensive as intensive activities became less remunerative for large fishing boats.[125] This was apparent from the mobility indicated in Tables 41, 43 and 44, where technological development resulted in a considerable number of 'visitors' operating away from 'home' grounds. Improved technology and increased

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[120]Calderwood, 1894, 76.
[121]The Times, 24th April 1878, 3.
[122]R.C.on Trawl Fishing (1884-5) Q.1,686.
[123]R.C.on Trawl Fishing (1884-5) Q.1,927.
[124]R.C.on Trawl Fishing (1884-5) Q.1,488.
[125]R.C.on Trawl Fishing (1884-5) QQ.1,715, 1,722-3, 1,842.

investment meant the working of waters previously unconsidered, and of greater depth as well as at a greater distance.[126] For instance, in 1903 experimental voyages were undertaken from Cardiff to the Spanish and Portuguese coasts.[127]

Meanwhile, in nearer waters, especially away from the forefront of the industry, the issue of stock depletion seemed clear cut. Speaking in the late 1870s, a Billingsgate salesman warned that many

> English grounds now are quite exhausted, and there are many grounds in the North Sea where 20 years ago they could get more fish in a night than they could now in 8 or 10 days.[128]

A Hartlepool fisherman declared that 'one smack 18 years ago would catch as much fish as three steam trawlers can now'.[129] Meanwhile a Staithes fisherman was not making 'one half as much' as he was in the 20 years previous to December 1883,[130] though this may have been due to factors other than the scarcity of fish. However, away from the North Sea, a Brixham fisherman complained of the destruction of young fish in the Bristol Channel, especially where steam trawlers work,[131] and he favoured some sort of legislation in view of 'the immense increase in the quantity of the vessels and the great catching power'.[132] The situation from the point of view of these fishermen was summed up by an Aberystwyth man who said that 'if steam trawling were instituted here the bay [Cardigan] would be fished out in a week'.[133]

However, vested interests rendered matters less distinct. Robert Hewett, having admitted the benefits of a close time in the North Sea, said that he alone brought more fish to London than the total landed 50 years previously. He went on to say that 'if 200 vessels are trawling together, the hindermost vessel will get as many

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126 R.C.on Trawl Fishing (1884-5) Q.11,140.
127 Annual Report for England and Wales (1904) 249.
128 Report for the Sea Fisheries of England and Wales (1878-9) 448.
129 Report for the Sea Fisheries of England and Wales (1878-9) 421.
130 R.C.on Trawl Fishing (1884-5) QQ.9,778, 9,885.
131 S.C. on Sea Fisheries (1893-4) Q.4,911.
132 S.C. on Sea Fisheries (1893-4) Q.258.
133 Report for the Sea Fisheries of England and Wales (1878-9) 377.

fish as the foremost ones.'[134] Whatever the truth of the matter, conflicting views highlighted the need for better data related to the fisheries - as recommended by the Royal Commissioners. This was all the more keenly felt as greater quantities of fish were extracted due to the transition from a limited to a mass market. As a Plymouth trawler owner pointed out, there was no falling off of supplies where only sailers were working,[135] but such craft could not meet demand.

Off Shields it took three or four days to take what used to be caught in a night,[136] and the lack of recovery time for fishing grounds was more keenly noticed with leaps in efficiency,[137] thus at Boston it had already been noted for 1891 that 'great catching power does not seem to have improved the fisheries', and it was re-stated that the weight landed was maintained by the capture of younger fish, 'probably at the cost of the fishing of the future.'[138] Two years later the quantity taken was below average, and even Icelandic voyages proved unprofitable[139] at a time when more east coast vessels were travelling there.[140] Increased catches were due to more and larger fishing boats and extension of the areas from which they obtained their catches.[141] Regions worked by steam trawlers from Hull, Grimsby, Boston and North Shields that had formerly enjoyed a natural close season showed signs of denudation; ling, for example, were reported to be 'exceptionally small',[142] and again many trawlers, themselves, admitted the need for some sort of legislation.[143] George Alward of Grimsby gave evidence before a Parliamentary Select Committee in the mid-1890s that was summarized and responded to as follows:

> Such has been the development of trawling in the North Sea, whether by increasing the efficiency of the gear or by the application of steam, that

[134] Report for the Sea Fisheries of England and Wales (1878-9) 449.
[135] S.C.on Sea Fisheries (1893-4) Q.1,353.
[136] S.C.on Sea Fisheries (1893-4) QQ.763-71.
[137] S.C. on Sea Fisheries (1893-4) Q.5,171.
[138] Annual Report for England and Wales (1892) 125.
[139] Annual Report for England and Wales (1894) 119.
[140] Annual Report for England and Wales (1894) 119.
[141] Annual Report for Scotland (1898) 13.
[142] Annual Report for England and Wales (1890-1) 132.
[143] Johnstone, 1905, 61-2, and see page 98.

> unless some method is adopted for your own protection against your own ingenuity, you run a considerable chance of falling into a bad condition of trade. - That is so, and not only fall into a bad condition of trade, but the fisheries may become extinct. That, I think, is almost the proper term to use, because we have known ports where the fishing trade is dying out.
> And that is due to the ingenuity of man in developing the resources of trawling? - That is so.[144]

However, it was not long before catching power was heightened still further, by the introduction of the otter-trawl, and by 1896 some fishing banks off the English coast were 'already almost depleted of all fish'.[145] Progressively larger quantities of lesser quality were captured as boats proceeded 'further and further to sea year after year'.[146] The efficiency of the industry continued to rise, but there was no way to gauge its actual effect with any accuracy.

A senior member of National Sea Fisheries Protection Association asserted in the mid 1890s that steamers were four times more efficient than smacks. Thus, he estimated, the increase of 14,000 in the tonnage of the steam fleet between 1886 and 1891 equalled 56,000 tons, while over the same period the total smack tonnage had declined by 8,000 tons. Overall, therefore, the fleet had increased by 48,000 tons - but the 6.4 million hundredweight of fish caught in 1886 had diminished to six million in 1891.[147] A few years later figures from the North Sea fleet operated by the Hull Steam Fishing and Ice Company reflected this trend. In 1894 each vessel landed on average 8,969 boxes of fish at about 5.5 stone per box, giving a total of 308 tons. Two years later this had risen to 11,113 boxes at 382 tons, but in 1899 the catch of same vessel in the same waters was 8,851 boxes - 304 tons - a total that declined to 6,232 boxes and 214 tons in the following year.[148] The above details do not confirm conclusively that the resource base was being eroded, but the view of a Billingsgate salesman in the 1890s, that if the fishing fleets at Lowestoft and Ramsgate had increased in same proportion and - it must be added - in the same

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[144] S.C. on Sea Fisheries (1893-4) QQ.421-2, 433.
[145] Annual Report for Scotland (1896) 7.
[146] Annual Report for Scotland (1897) 5.
[147] S.C.on Sea Fisheries (1893-4) QQ.133-9.
[148] Committee into Collecting Statistics (1902) QQ.451-3.

way, as at Hull and Grimsby their fisheries 'would have been exhausted long ago'[149] was not incredible.

Walter Garstang of the Marine Biological Association endeavoured to determine the state of Grimsby's fisheries at the turn of the century. By using official and unofficial sources he sought to provide an insight into their fortunes from 1886 to 1899 - the very fact that he had to use the latter to carry out the recommendations of the Royal Commissioners said much about contemporary attitudes. His aim was 'to determine whether the official returns exhibit a constant or declining catch per fishing boat per annum.'[150] The numbers of steam fishing vessels were extracted from the Annual Statements of Navigation and Shipping while Sea Fisheries Statistics provided figures for the quantities of fish sent inland by rail. The latter were divided by the number of units of available catching power to produce the average quantity of fish landed annually per unit. This was calculated from returns tendered by the aforementioned George Alward that detailed the performances of four trawling smacks and two steam trawlers in three years from January 1883. These showed that steam trawlers landed about four times as many fish as smacks,[151] so a ratio of four smack units to one steamer was adopted, where one unit represented the annual catch landed by a sailing vessel. Identification of a trend rather than faultlessness was the objective, and Garstang added that

> in order to avoid any suspicion of having exaggerated the catching power in the later years of the period, I have purposely neglected all advances in the efficiency of the steamers.[152]

His results have been extended back to 1878 and forward to 1902 using corresponding statistics.

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[149]S.C. on Sea Fisheries (1893-4) Q.1,850.
[150]Garstang, 1900, 28.
[151]Garstang, 1900, 45.
[152]Garstang, 1900, 28.

Table 91

THE STATE OF GRIMSBY FISHERIES

YEAR	1ST CLASS F/BOATS Total	Smacks	Steamers	TOTAL UNITS	TONS OF FISH SENT INLAND BY RAIL*	AVERAGE PER UNIT (TONS)
1878	540	540	0	540	44,782	83
1879	552	552	0	552	48,924	89
1880	567	567	0	567	42,730	75
1881	587	587	0	587	49,583	84
1882	617	617	0	617	52,309	85
1883	638	629	9	665	55,727	84
1884	686	671	15	731	64,077	88
1885	748	728	20	808	66,790	83
1886	823	803	20	883	69,609	79
1887	839	818	21	902	66,698	74
1888	811	785	26	889	68,883	77
1889	789	752	37	900	66,280	74
1890	777	727	50	927	67,974	73
1891	811	713	98	1,105	69,593	63
1892	793	683	110	1,123	74,117	66
1893	787	649	138	1,201	75,527	63
1894	771	604	167	1,272	83,001	65
1895	720	532	188	1,284	85,430	66
1896	630	400	230	1,320	92,638	70
1897	630	350	280	1,470	89,006	60
1898	611	247	364	1,703	94,643	55
1899	524	99	425	1,799	103,783	58
1900	548	64	484	2,000	119,207	60
1901	528	50	478	1,962	114,216	58
1902	518	43	475	1,943	147,668	76

* These returns include substantial quantities of pelagic fish not landed by Grimsby vessels.

Sources: For years 1886-99 (inclusive) Garstang 'The Impoverishment of the sea'; other years BPPs, Annual Statements of Navigation and Shipping and Sea Fisheries Statistics.

Garstang's methodology produced a generally downward trend that was augmented in the eight years to 1886, though it was less conclusive for the three after 1899. According to national figures (see Table 93) the bumper year of 1902 did not signal any revival.

By the last decade of the nineteenth century increased quantities of species like haddock that were landed from distant waters were being landed at Hull, Grimsby and Boston, while at lesser ports on the east coast the take remained largely static. This was due in large measure to the discovery of rich grounds for plaice off

Iceland around the turn of the century. Some years earlier large quantities of haddock, plaice and witches were found off its southern coast,[153] but these new grounds proved very remunerative. Meanwhile, vessels from other east coast ports were mainly confined to the North Sea, which gave an opportunity for the authors of the Annual Report for England and Wales for 1900 to compare the quantities of fish landed at various east coast ports, the figures for which are reproduced in Table 92.

Table 92

(i) QUANTITY OF BRILL, COD, HADDDOCK, HAKE, HALIBUT, LING, PLAICE, SOLE AND TURBOT LANDED AT GRIMSBY, HULL AND BOSTON.

YEAR	QUANTITY (1,000 cwts)
1891	1,565
1892	1,639
1893	1,776
1894	1,972
1895	2,194
1896	2,343
1897	2,400
1898	2,509
1899	2,667
1900	2,866

(ii) QUANTITY OF BRILL, COD, HADDDOCK, HAKE, HALIBUT, LING, PLAICE, SOLE AND TURBOT LANDED AT NORTH SHIELDS, SUNDERLAND, HARTLEPOOL, SCARBOROUGH, YARMOUTH, LOWESTOFT AND RAMSGATE.

YEAR	QUANTITY (1,000 cwts)
1891	571
1892	580
1893	625
1894	575
1895	624
1896	554
1897	521
1898	509
1899	535
1900	569

Source: Annual Report for England and Wales (BPP,1901, XI) 123.

[153] Annual Report for England and Wales (1893-4) 199.

> The increase at Grimsby, Hull and Boston is almost entirely in those kinds which are also to be found off Iceland and Faroe, whereas the quantity of the same kinds landed at the ports which are not affected by supplies from those northern fisheries has on the whole decreased.[154]

These new grounds seemed to promise untold riches, and the fish were so plentiful that cod and haddock 'so large as to be unmarketable' were thrown overboard.[155] Steamers were built larger to carry enough stores and crewmen for voyages of three or four weeks.[156] However, the activities of Humber trawlers were not always successful. In 1902, when the port's smacks were fishing in the Bristol Channel most of the year, a Hull vessel spent a fortnight there in September before abandoning the operation.[157]

Little attention was paid to such 'blips', and by 1907 trawler owners were 'getting bigger trawlers which are going further afield, but the older trawlers are working in exactly the same places.'[158] There was no way to quantify the depletion of fish stocks, but that they were under increasing pressure was all too clear. Statistics for the landings of fish merely testified to the escalating efficiency of the fishing fleet, for though they detailed the quantities of each species landed no information was provided about their size or where they were caught, an integral requirement in attempting to gauge and anticipate levels of fish stocks.

iii LEGACY

A more comprehensive range of statistics was introduced in 1906, but even these were insufficient for monitoring - let alone farming - the natural resource base. However, even perfectly adequate figures could only provide a basis for action, the motivation for which seemed to be absent. The gulf between the efficiency with

[154] Annual Report for England and Wales (1901) 123.
[155] Committee into Collecting Statistics (1902) Q.377.
[156] Committee into Collecting Statistics (1902) Q.377.
[157] Annual Report for England and Wales (1903) 157.
[158] Committee on Scientific and Statistical Investigations (1908) Q.5,044.

which fish stocks were exploited and the ability to marshal them grew constantly wider as short-term economic needs eclipsed longer-term ecological considerations. The effects of this can best be seen by assessing the effect of distant water operations by 1914, and expanding the methodology Walter Garstang applied to the Grimsby fisheries (Table 91) to the United Kingdom. When he published 'The Impoverishment of the Sea' in 1900 the technology associated with the fishing industry was improving to the extent that, speaking of the figures from the 1880s that he tendered, Alward stated that they

> ...convey a very poor idea of the quantity of fish caught in the interval between 1885 and the present time. They will serve only as a comparison of the early class of steam trawlers and the sailing trawlers of that day. In the interval between 1885 and the present time several new fishing grounds have been worked, and the modern steam trawler would catch about double the quantity caught by either of the two steam trawlers whose figures I give, if they had been fishing on the same ground at the same time.[159]

Like Garstang's original objective, the aim here is to establish a trend, and by expanding his methodology the only divergence has been the adoption of an eight smacks to one steamer ratio for 1900 and the subsequent years. If this seems presumptuous, purely on the basis of Alward's words from the late 1890s, Garstang, himself provided vindication some years later.

> The conclusion I arrived at was that the catching power of a steam trawler relatively to a smack of a constant size has varied through a term of years, has increased in fact, owing to the fact that the size and efficiency of the steamers themselves has increased in that time and that the gear used by the steam trawler has itself greatly increased in catching power. I mean the substitution of the otter trawl for the beam trawl has caused in itself a great increase in the catches of the steam trawlers. Consequently the conclusions that I arrived at were, that whereas the catching power of a steam trawler compared with a large deep sea smack would be about four to one some twenty years ago, it is more like eight or ten times the catching power of a smack now.'[160]

Much of the impact of Garstang's original article resulted from the fact that he delibrately underestimated the efficiency of steamers by ignoring developments since 1883. Similarly, by taking an eight to one ratio, which Garstang himself said

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[159]Garstang, 1900, 47.

[160]S.C. of the House of Lords (1904) Q.2,156.

was likely to be 'eight or ten', and disregarding developments after 1904, the figures in Table 93 are rendered all the more significant.

Table 93

THE STATE OF UNITED KINGDOM FISHERIES

YEAR	1ST CLASS F/BOATS Total	Smacks	Steamers	TOTAL UNITS	TONS OF FISH SENT INLAND BY RAIL	AVERAGE PER UNIT (TONS)
1883	8,612	8,385	227	9,293	299,469	32
1884	9,088	8,803	285	9,943	339,706	34
1885	9,365	9,051	314	10,307	334,942	32
1886	9,002	8,660	342	10,028	347,857	35
1887	8,890	8,551	339	9,907	359,353	36
1888	8,758	8,395	363	9,847	356,170	36
1889	8,595	8,227	368	9,699	387,081	40
1890	8,411	7,986	425	9,686	385,248	40
1891	8,316	7,760	556	9,984	396,664	40
1892	8,241	7,611	630	10,131	426,299	42
1893	8,156	7,464	692	10,232	439,828	43
1894	8,000	7,254	746	10,238	443,231	43
1895	7,788	6,994	794	10,170	446,688	44
1896	7,704	6,800	904	10,416	476,375	46
1897	7,595	6,594	1,001	10,598	472,662	45
1898	7,453	6,284	1,169	10,960	491,609	45
1899	7,236	5,906	1,330	11,226	492,480	44
1900	7,124	5,621	1,503	17,645	516,613	29
1901	7,083	5,475	1,608	18,339	543,715	30
1902	7,187	5,472	1,715	19,192	621,416	32
1903	7,344	5,397	1,947	20,973	623,942	30
1904	7,322	5,386	1,936	20,874	656,254	31
1905	7,176	5,191	1,985	21,071	633,754	30
1906	7,219	5,038	2,181	22,486	674,093	30
1907	7,360	4,809	2,551	25,217	717,691	28
1908	7,318	4,574	2,744	26,526	722,667	27
1909	7,166	4,323	2,843	27,067	744,306	27
1910	7,040	4,046	2,994	27,998	745,411	27
1911	6,964	3,746	3,218	29,490	750,020	25
1912	6,811	3,428	3,383	30,492	745,868	24
1913*	6,281	2,808	3,473	30,592	731,040	24
1914*	6,267	2,576	3,691	32,104	704,270	22

*Figures exclude Ireland

Sources: BPPs, Annual Statements of Navigation and Shipping and Fisheries Statistics.

These figures indicate that concern for fish stocks was well placed, however, legislation was necessary to protect them from the nets, and fishermen from the

economic pressures that forced many to act contrary to what they saw as good sense. Genuine concern for the welfare of the fisheries existed within the fishing industry,[161] and one commentator wrote in 1894 that the fisheries represented

> the most obvious "killing the goose which lays the golden eggs" that probably ever occurred...fishermen are crying out in despair that the methods which they themselves are practising are ruining the fisheries, but that they dare not stop because others won't.[162]

This passage features again the phrase about the goose and its golden eggs, a cliche but not less fitting for that. Evidence of a timorous shift back to legislative restriction was discernible in the growing body of information being gathered about the fisheries, and through the increasingly stringent regulation of fishing boats and their crews. However, the uninhibited deployment of increased catching power due to the technological development of Britain's fishing fleet continued in the face of diminishing returns. The attitude of George S.F.Edwards, an eminent figure in the fishing industry of north-east England, bordered on jingoism and was typical of many. In 1908 he wrote that due to progress in the design and construction of fishing boats

> the question as to the supply of fish giving out has now lost its serious character, solved in the logical manner of the prophet, 'If the mountain will not come to Mahomet, Mahomet must go to the mountain', hence we find our British fishing vessels distributed over thousands of miles, exploring new grounds, conforming to strange conditions, but always succeeding in the end.[163]

Vast amounts were invested in the capital tied up in the distant water fishing industry, which muted much criticism of its effect on fish stocks. Thus, while many identified the problem and its likely cause, comments had tended to skirt the issue.[164] One official witness saw increased catching power as the problem but had no objection to steam trawlers.[165] Further, the annual report on the sea fisheries of England and Wales for 1890 elaborated on this point recording that

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[161]R.C.on Trawling (1884-5) Q.1,686.
[162]Calderwood, 1894, 75.
[163]Edwards, 1908, 65.
[164]S.C.on Sea Fisheries (1893-4) QQ.2,036, 2,430, 5,171.
[165]S.C. on Sea Fisheries (1893-4) Q.5,329.

> it is doubtful if these large and powerful vessels...do not tend to over-fish the grounds and banks, which formerly enjoyed a natural close season whenever bad weather kept the fishermen in port...In one instance it has been reported that fish, especially ling, have been exceptionally small "owing probably to the large number of steam trawlers now employed."[166]

The point is not exactly made forcefully, as if the author(s) were afraid of upsetting someone, yet, as mentioned above, there was genuine concern for the welfare of fish stocks. Charles Hellyer was a leading capitalist in the industry, who built larger and larger vessels that went farther afield because, he said, of

> the disheartening fact [*sic*] that the authorities will not do anything to try and prevent this destruction. We believe that in a couple of years, if those fish were left alone, they would work back and replenish the North Sea again.[167]

Before the same Select Committee George Alward reinforced the point, saying that an 'immense quantity' of 'large' trawlers from Hull and Grimsby were going to Iceland all year round because the North Sea no longer pays.[168] Economic pressures meant that these more distant grounds were developed with little or no regard for conservation. Skippers were on a 100 per cent share and owners were willing to turn a blind eye to 'poaching' in territorial waters in order to secure a good catch.[169]

The Anglo-Danish Territorial Waters Treaty had been signed in 1901, by which the Danes accepted a three-mile limit around Greenland, Iceland and the Faroes.[170] The concept of territorial waters did not really take hold until well after the First World War, but its roots dated back to the years of steam trawling when longer voyages were undertaken and technology facilitated the violation of the fishing areas of other nations. Anglo-Danish encounters off Iceland, as British trawlers sought ever more remunerative grounds, proved to be a particular source of antagonism, and sowed the seeds of discontent for decades to come. Earlier, in Sweden in 1899 an International Scientific Co-operation Conference had taken place which led to the founding of the International Council for the Exploitation of the Sea, in Oslo in

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166Annual Report for England and Wales (1890-1) 132.
167S.C. of the House of Lords (1904) Q.1,396.
168S.C. of the House of Lords (1904) Q.1,526.
169Goddard and Spalding, 1987, 27.
170Robinson, 1997, 147; Thor, 1992, 237-8.

1902.[171] There was some facade of international co-operation over fisheries, on political and ecological matters. However, essentially, by 1914 the transformation of Britain's distant water fisheries due to economic growth, and conducted through the medium of technological change, which had been echoed to lesser extents among European nations, sowed the seeds of ecological and political problems that were destined to endure.

Britain's distant water fisheries evolved to 1914 in order to facilitate the economic management of the industry. Unfortunately it could not cope with associated environmental or political issues. New technology had facilitated greater economic elasticity at the cost of inelasticity in with regard to such issues. The solution to the problem of ecological depletion of the North Sea had been recognized at an early stage. Fish stocks needed respite from constant extraction in order to recover, yet in 1918, after four years' rest, trawlers were again extracting such huge catches that they, allegedly, had to cut their warps so as not to be dragged under. One solution to the depletion of fish stocks had been the proposed transplanting of young plaice from coastal grounds to the Dogger. Not a major occurrence in the history of the fisheries, but it illustrates the gulf that existed between economic and ecological thinking at this time. The originator of the scheme admitted himself that the only stumbling block was how 'the trawlers could be induced to carry out such transplanting on commercial lines'. Given the response to the 1866 Report, the economic incentives would presumably have had to have been considerable.[172]

The world's major eco-systems, which include these fishing grounds, are in decline. The current state of these fisheries owes much to the formulation of a system that was developed to make optimum economic use of the latest technology, but could not deal effectively with the other issues it raised. Such was the case before 1914,

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[171]Robinson, 1997, 148.
[172]The Times, 30 December 1911, 5.

and subsequent history suggests that little progress has been made in reconciling the economic and ecological potential of fishing technology.

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LIST OF APPENDICES

APPENDIX 1 SAIL-POWERED FISHING BOATS

(i) PERCENTAGE OF SAIL FLEET REGISTERED UNDER THE MERCHANT SHIPPING AND SEA FISHERIES ACTS EMPLOYED IN DECEMBER OF EACH YEAR CLASSIFIED ACCORDING TO TONNAGE

	TONNNAGE			
YEAR	Under 50	50-100	100-200	200 and over
1885	53.7	46.1	0.2	0.0
1886	52.0	47.8	0.2	0.0
1887	52.3	47.5	0.2	0.0
1888	49.5	50.3	0.2	0.0
1889	48.0	51.8	0.2	0.0
1890	48.2	51.7	0.1	0.0
1891	47.6	52.3	0.1	0.0
1892	47.2	52.7	0.1	0.0
1893	47.4	52.5	0.1	0.0
1894	49.5	50.4	0.1	0.0
1895	51.3	48.6	0.1	0.0
1896	57.3	42.6	0.1	0.0
1897	61.0	38.9	0.1	0.0
1898	65.8	34.1	0.1	0.0
1899	73.8	26.1	0.1	0.0
1900	80.0	19.9	0.1	0.0
1901	80.6	19.3	0.1	0.0
1902	80.9	19.0	0.1	0.0
1903	81.8	18.1	0.1	0.0
1904	81.6	18.3	0.1	0.0
1905	81.7	18.2	0.1	0.0
1906	82.6	17.4	0.0	0.0
1907	83.4	16.6	0.0	0.0
1908	83.9	16.1	0.0	0.0
1909	84.8	15.2	0.0	0.0
1910	85.7	14.3	0.0	0.0
1911	86.1	13.9	0.0	0.0
1912	86.5	13.5	0.0	0.0
1913	86.8	13.2	0.0	0.0

FISHING BOATS POWERED BY SAIL WITH PERCENTAGE OF THE FISHING FLEET THAT IS SAIL-POWERED

(ii) UNITED KINGDOM

FISHING BOATS REGISTERED AS FIRST CLASS UNDER THE SEA FISHERIES ACT, 1868

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869	4,856	125,609	25.9
1871	5,248	139,197	26.5
1872	5,583	151,922	27.2
1873	5,802	158,544	27.3
1874	6,008	166,382	27.7
1875	6,207	170,420	27.5
1876	6,593	184,635	28.0
1877	6,996	205,199	29.3
1878	7,534	222,520	29.5
1879	8,759	234,138	26.7
1880	9,019	243,577	27.0
1881	8,461	248,929	29.4
1882	8,744	262,391	30.0
1883	8,612	257,772	29.9
1884	9,088	272,898	30.0
1885	9,365	290,794	31.1
1886	9,002	291,241	32.4
1887	8,890	290,691	32.7
1888	8,758	288,386	32.9
1889	8,595	285,684	33.2
1890	8,411	279,887	33.3
1891	8,316	279,173	33.6
1892	8,241	279,407	33.9
1893	8,156	278,030	34.1
1894	8,000	274,261	34.3
1895	7,788	266,664	34.2
1896	7,704	264,589	34.3
1897	7,595	259,165	34.1
1898	7,453	252,891	33.9
1899	7,236	241,406	33.4
1900	7,124	238,947	33.5
1901	7,083	237,165	33.5
1902	7,187	248,357	34.6
1903	7,344	261,752	35.6
1904	7,322	263,053	35.9
1905	7,176	262,553	36.6
1906	7,219	272,613	37.8
1907	7,360	282,846	38.4
1908	7,318	285,888	39.1
1909	7,166	283,159	39.5
1910	7,040	281,249	40.0
1911	6,964	283,119	40.7
1912	6,811	283,127	41.6
1913	6,743	286,138	42.4
1914	6,715*		

*Excluding Channel Islands

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL TONNAGE	AVERAGE TONNAGE
1883	2,233	1,318	159,217	44.8
1884	2,202	1,395	164,185	45.6
1885	2,124	1,562	175,391	47.6
1886	2,068	1,685	183,620	48.9
1887	2,035	1,708	184,602	49.3
1888	2,004	1,686	182,035	49.3
1889	1,970	1,656	179,113	49.4
1890	1,860	1,587	170,847	49.6
1891	1,789	1,522	163,525	49.4
1892	1,751	1,490	160,286	49.5
1893	1,707	1,446	156,048	49.5
1894	1,658	1,374	149,652	49.4
1895	1,634	1,246	139,959	48.6
1896	1,615	1,143	132,326	48.0
1897	1,617	984	120,864	46.5
1898	1,616	779	105,299	44.0
1899	1,547	525	84,431	40.7
1900	1,439	374	68,374	37.7
1901	1,351	288	59,298	36.2
1902	1,320	275	56,167	35.2
1903	1,296	260	54,424	35.0
1904	1,296	262	55,244	35.5
1905	1,303	261	55,150	35.3
1906	1,307	249	54,709	35.2
1907	1,298	236	53,639	35.0
1908	1,304	225	53,156	34.8
1909	1,283	209	51,007	34.2
1910	1,231	185	47,898	33.8
1911	1,146	163	43,546	33.3
1912	1,066	146	40,212	33.2
1913	1,046	136	38,724	32.8

YEAR	PERCENTAGE VESSELS	TONNAGE
1883	94.0	96.0
1884	92.7	94.8
1885	92.1	94.5
1886	91.6	94.0
1887	91.7	94.1
1888	91.0	93.2
1889	90.8	92.5
1890	89.0	90.6
1891	85.6	86.8
1892	83.7	85.0
1893	82.0	83.4
1894	80.3	81.5
1895	78.4	79.2
1896	75.3	75.8
1897	72.2	71.6
1898	67.2	64.7
1899	61.0	55.9
1900	54.7	47.1
1901	50.6	42.4
1902	48.2	39.6
1903	45.4	37.0
1904	44.7	36.8
1905	44.2	35.7
1906	41.7	32.9
1907	37.7	29.7
1908	35.9	28.0
1909	34.8	26.6
1910	32.6	24.7
1911	29.6	21.8
1912	27.4	19.7
1913	26.1	18.3

(iii) GRIMSBY

FISHING BOATS REGISTERED AS FIRST CLASS UNDER THE SEA FISHERIES ACT, 1868

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869	219	10,001	45.7
1871	264	13,216	50.1
1872	330	17,142	51.9
1873	348	18,527	53.2
1874	371	20,156	54.3
1875	392	21,651	55.2
1876	429	24,355	56.8
1877	505	29,924	59.3
1878	540	32,611	60.4
1879	552	33,793	61.2
1880	567	34,812	61.4
1881	587	35,006	59.6
1882	617	38,711	62.7

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS

	NO.OF VESSELS		TOTAL	AVERAGE
YEAR	50 TONS-	50 TONS+	TONNAGE	TONNAGE
1883	117	510	39,831	63.5
1884	124	550	43,366	64.3
1885	129	598	47,615	65.5
1886	127	677	54,083	67.3
1887	119	702	55,843	68.0
1888	100	688	54,450	69.1
1889	86	667	52,672	69.9
1890	78	651	51,325	70.4
1891	76	639	50,375	70.5
1892	72	614	48,498	70.7
1893	68	584	46,411	71.2
1894	69	538	43,003	70.8
1895	61	474	38,038	71.1
1896	56	346	28,253	70.3
1897	54	296	24,653	70.4
1898	45	202	17,332	70.2
1899	32	68	6,391	63.9
1900	28	36	3,699	57.8
1901	21	28	2,822	57.6
1902	19	22	2,269	55.3
1903	19	18	1,976	53.4
1904	18	18	1,931	53.6
1905	16	15	1,664	53.7
1906	17	13	1,545	51.5
1907	16	12	1,419	50.7
1908	16	12	1,419	50.7
1909	14	11	1,273	50.9
1910	12	11	1,201	52.2
1911	12	8	987	49.4
1912	13	9	1,062	48.3
1913	12	8	950	47.5

YEAR	PERCENTAGE VESSELS	TONNAGE
1883	98.6	98.6
1884	97.8	97.3
1885	97.3	96.8
1886	97.6	97.1
1887	97.5	97.0
1888	96.8	96.2
1889	95.3	94.8
1890	93.6	93.1
1891	87.9	88.6
1892	86.2	87.1
1893	82.5	84.3
1894	78.4	80.9
1895	74.0	77.3
1896	63.6	68.5
1897	65.6	60.9
1898	40.4	45.3
1899	19.3	20.3
1900	11.7	11.0
1901	9.3	8.8
1902	7.9	7.2
1903	7.1	6.3
1904	7.0	6.2
1905	6.0	5.1
1906	5.3	4.2
1907	4.8	3.5
1908	4.9	3.5
1909	4.3	3.1
1910	3.9	2.8
1911	3.4	2.3
1912	3.6	2.3
1913	3.1	1.9

(iv) HULL

FISHING BOATS REGISTERED AS FIRST CLASS UNDER THE SEA FISHERIES ACT, 1868

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869	245	12,060	49.2
1871	264	13,933	52.8
1872	313	17,332	55.4
1873	342	19,205	56.2
1874	357	20,948	58.7
1875	356	19,248	54.1
1876	386	21,953	56.9
1877	440	26,310	59.8
1878	484	30,004	62.0
1879	509	31,651	62.2
1880	536	33,842	63.1
1881	535	33,858	63.3
1882	549	37,237	67.8

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS

	NO.OF VESSELS		TOTAL	AVERAGE
YEAR	50 TONS-	50 TONS+	TONNAGE	TONNAGE
1883	35	397	30,220	70.0
1884	31	406	31,164	71.3
1885	32	438	34,167	72.7
1886	31	427	33,687	73.6
1887	32	423	33,828	74.3
1888	28	411	32,963	75.1
1889	24	376	30,386	76.0
1890	23	348	28,300	76.3
1891	18	312	25,489	77.2
1892	18	293	24,103	77.5
1893	18	255	21,104	77.3
1894	17	222	18,554	77.6
1895	16	186	15,806	78.2
1896	15	152	12,995	77.8
1897	14	113	9,773	77.0
1898	13	65	5,751	73.7
1899	13	9	1,141	51.9
1900	13	4	752	44.2
1901	11	0	375	34.1
1902	11	0	352	32.0
1903	10	0	317	31.7
1904	8	0	280	35.0
1905	6	0	179	29.8
1906	5	0	165	33.0
1907	3	1	128	47.0
1908	3	1	128	47.0
1909	1	1	43	51.5
1910	2	1	70	46.7
1911	4	1	176	35.2
1912	5	1	214	35.7
1913	6	0	193	32.2

YEAR	PERCENTAGE VESSELS	TONNAGE
1883	97.7	96.6
1884	97.8	96.6
1885	96.9	96.3
1886	94.0	93.9
1887	92.1	93.1
1888	89.4	90.3
1889	86.8	88.4
1890	82.4	85.3
1891	71.0	76.2
1892	66.7	72.7
1893	61.8	68.0
1894	55.5	62.1
1895	48.4	55.3
1896	40.9	47.3
1897	32.8	38.3
1898	20.4	23.7
1899	5.5	4.8
1900	4.2	3.1
1901	2.8	1.6
1902	2.7	1.4
1903	2.3	1.2
1904	1.9	1.0
1905	1.4	0.6
1906	1.1	0.5
1907	0.9	0.6
1908	0.9	0.6
1909	0.4	0.3
1910	0.7	0.4
1911	1.1	0.6
1912	1.5	0.7
1913	1.5	0.6

(v) LOWESTOFT

FISHING BOATS REGISTERED AS FIRST CLASS UNDER THE SEA FISHERIES ACT, 1868

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869	180	4,515	25.1
1871	245	6,498	26.5
1872	269	7,460	27.7
1873	284	8,088	28.5
1874	309	9,120	29.5
1875	325	9,829	30.2
1876	348	10,844	31.2
1877	390	12,320	31.6
1878	410	13,018	31.8
1879	415	13,454	32.4
1880	420	13,885	33.1
1881	430	14,278	33.2
1882	437	14,638	33.5
1883	423	14,314	33.8
1884	424	14,373	33.9
1885	428	14,742	34.4
1886	408	14,522	35.6
1887	390	14,059	36.0
1888	398	14,642	36.8
1889	405	15,547	38.4
1890	407	16,515	40.6
1891	416	17,650	42.4
1892	436	19,239	44.1
1893	446	20,028	44.9
1894	444	20,230	45.6
1895	454	20,538	45.2
1896	461	20,678	44.9
1897	462	20,577	44.5
1898	481	21,303	44.3
1899	464	20,456	44.1
1900	452	19,689	43.6
1901	469	20,354	43.4
1902	480	20,948	43.6
1903	488	21,222	43.5
1904	497	21,918	44.1
1905	508	22,621	44.5
1906	526	23,111	43.9
1907	560	23,909	42.7
1908	594	25,111	42.3
1909	602	25,038	41.6
1910	605	24,854	41.1
1911	603	24,502	40.6
1912	593	24,165	40.8
1913	599	24,499	40.9

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL TONNAGE	AVERAGE TONNAGE
1883	315	79	13,621	34.6
1884	326	71	13,604	34.3
1885	326	74	14,057	35.1
1886	312	78	14,066	36.1
1887	298	77	13,655	36.4
1888	298	88	14,373	37.2
1889	288	104	15,228	38.8
1890	271	127	16,297	40.9
1891	256	151	17,431	42.8
1892	255	175	19,088	44.4
1893	254	188	19,922	45.1
1894	246	194	20,124	45.7
1895	256	192	20,365	45.5
1896	266	189	20,519	45.1
1897	266	187	20,332	44.9
1898	284	186	20,955	44.6
1899	274	178	21,157	46.8
1900	274	161	19,086	43.9
1901	271	161	18,999	44.0
1902	243	167	18,437	45.0
1903	222	166	17,646	45.5
1904	206	180	17,951	46.5
1905	195	188	18,107	47.3
1906	196	178	17,598	47.1
1907	202	166	17,275	46.9
1908	209	159	17,316	47.1
1909	207	147	16,548	46.7
1910	204	130	15,477	46.3
1911	175	112	13,425	46.8
1912	160	102	12,342	47.1
1913	163	97	12,202	46.9

YEAR	PERCENTAGE VESSELS	TONNAGE
1883	100.0	100.0
1884	100.0	100.0
1885	99.3	99.3
1886	99.0	98.9
1887	98.9	98.9
1888	99.7	99.8
1889	99.7	99.8
1890	99.7	99.8
1891	99.8	99.8
1892	99.8	99.8
1893	99.8	99.8
1894	99.8	99.8
1895	99.8	99.8
1896	99.8	99.8
1897	99.6	99.7
1898	99.6	99.7
1899	99.3	99.7
1900	97.1	97.8
1901	92.5	93.9
1902	85.4	88.1
1903	79.3	83.2
1904	77.8	82.0
1905	75.5	80.2
1906	71.4	76.4
1907	65.9	72.4
1908	62.1	69.0
1909	59.1	66.3
1910	55.5	62.4
1911	47.8	54.9
1912	44.3	51.2
1913	43.6	50.0

(vi) RAMSGATE

FISHING BOATS REGISTERED AS FIRST CLASS UNDER THE SEA FISHERIES ACT, 1868

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869	149	5,239	35.2
1871	129	4,564	35.4
1872	139	5,014	36.1
1873	132	4,763	36.1
1874	137	4,823	35.2
1875	147	5,154	35.1
1876	157	5,467	34.8
1877	166	5,840	35.2
1878	169	6,025	35.7
1879	179	6,449	36.0
1880	184	6,724	36.5
1881	173	6,300	36.4
1882	163	5,995	36.8
1883	142	5,101	35.9
1884	142	5,173	36.4
1885	140	5,155	36.8
1886	132	4,867	36.9
1887	140	5,059	36.1
1888	155	5,323	34.3
1889	162	5,752	35.5
1890	170	5,988	35.2
1891	168	5,761	34.3
1892	165	5,594	33.9
1893	168	5,661	33.7
1894	176	5,948	33.8
1895	182	6,145	33.8
1896	190	6,219	32.7
1897	195	6,289	32.3
1898	191	5,832	32.3
1899	184	5,471	29.7
1900	165	4,760	28.8
1901	152	4,353	28.6
1902	157	4,440	28.3
1903	162	4,603	28.4
1904	166	4,625	27.9
1905	167	4,647	27.8
1906	169	4,664	27.6
1907	174	4,714	27.1
1908	172	4,574	26.6
1909	174	4,589	26.4
1910	175	4,581	26.2
1911	166	4,298	25.9
1912	160	4,061	25.4
1913	157	3,900	24.8

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL TONNAGE	AVERAGE TONNAGE
1883	132	8	5,081	36.3
1884	134	8	5,166	36.4
1885	130	9	5,085	36.6
1886	124	10	4,892	36.5
1887	129	11	5,048	36.1
1888	143	11	5,534	35.9
1889	149	11	5,712	35.7
1890	154	14	5,947	35.4
1891	157	9	5,720	34.5
1892	156	7	5,542	34.0
1893	161	7	5,648	33.6
1894	169	7	5,922	33.6
1895	174	9	6,148	33.6
1896	184	7	6,222	32.6
1897	189	7	6,296	32.1
1898	187	6	5,880	30.5
1899	178	6	5,477	29.8
1900	161	4	4,780	29.0
1901	149	4	4,391	28.7
1902	153	4	4,458	28.4
1903	159	4	4,638	28.5
1904	164	4	4,653	27.7
1905	164	4	4,661	27.7
1906	167	4	4,686	27.4
1907	172	3	4,737	27.1
1908	171	2	4,610	26.6
1909	173	2	4,593	26.2
1910	172	2	4,551	26.2
1911	164	2	4,281	25.8
1912	159	1	4,044	25.3
1913	156	1	3,883	24.7

YEAR	PERCENTAGE VESSELS	TONNAGE
1883	100.0	100.0
1884	100.0	100.0
1885	100.0	100.0
1886	100.0	100.0
1887	100.0	100.0
1888	100.0	100.0
1889	100.0	100.0
1890	100.0	100.0
1891	100.0	100.0
1892	100.0	100.0
1893	100.0	100.0
1894	100.0	100.0
1895	100.0	100.0
1896	100.0	100.0
1897	100.0	100.0
1898	100.0	100.0
1899	99.5	99.96
1900	100.0	100.0
1901	100.0	100.0
1902	100.0	100.0
1903	100.0	100.0
1904	100.0	100.0
1905	100.0	100.0
1906	100.0	100.0
1907	100.0	100.0
1908	100.0	100.0
1909	100.0	100.0
1910	98.9	99.5
1911	98.8	99.5
1912	98.8	99.5
1913	98.7	99.4

(vii) BRIXHAM

FISHING BOATS REGISTERED AS FIRST CLASS UNDER THE SEA FISHERIES ACT, 1868

(Included in Dartmouth up to and including 1901)

YEAR	NO.OF VESSELS	TONNAGE	AVERAGE TONNAGE
1869	106	4,031	38.0
1871	138	5,515	40.0
1872	136	5,411	39.8
1873	138	5,517	40.0
1874	147	5,952	40.5
1875	150	6,170	41.1
1876	164	6,906	42.1
1877	186	7,996	43.0
1878	208	9,297	44.7
1879	221	9,934	45.0
1880	229	10,356	45.2
1881	237	10,728	45.3
1882	249	11,145	44.8
1883	217	9,719	44.8
1884	220	9,747	44.3
1885	216	9,515	44.1
1886	206	9,179	44.6
1887	220	9,479	43.1
1888	232	9,731	41.9
1889	244	10,136	41.5
1890	245	10,185	41.6
1891	246	10,043	40.8
1892	253	10,122	40.0
1893	249	9,481	38.1
1894	245	9,631	39.3
1895	246	9,681	39.4
1896	254	10,037	39.5
1897	260	10,001	38.5
1898	264	9,930	37.6
1899	249	9,242	37.1
1900	229	8,283	36.2
1901	213	7,653	35.9
1902	176	6,357	36.1
1903	199	7,075	35.6
1904	213	7,556	35.5
1905	224	7,937	35.4
1906	235	8,310	35.4
1907	233	8,149	35.0
1908	228	7,887	34.6
1909	222	7,715	34.8
1910	215	7,536	35.1
1911	206	7,189	34.9
1912	206	7,045	34.2
1913	204	6,925	33.9

SAIL POWERED FISHING BOATS REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL TONNAGE	AVERAGE TONNAGE
1883	172	43	9,656	44.9
1884	175	31	8,907	43.2
1885	164	34	8,723	44.1
1886	164	43	9,186	44.4
1887	179	42	9,484	42.9
1888	192	42	9,753	41.7
1889	196	50	10,157	41.3
1890	188	58	10,099	41.1
1891	191	56	9,957	40.3
1892	198	55	9,985	39.5
1893	196	54	9,755	39.0
1894	195	51	9,545	38.8
1895	201	46	9,595	38.8
1896	214	41	9,923	38.9
1897	227	35	9,995	38.1
1898	239	27	9,921	37.3
1899	233	20	9,290	36.7
1900	219	13	8,317	35.8
1901	207	9	7,687	35.6
1902	172	4	5,358	30.4
1903	195	4	6,082	30.6
1904	212	2	7,598	35.0
1905	222	2	7,937	35.4
1906	233	2	8,311	35.4
1907	230	2	8,126	35.0
1908	225	2	7,864	34.6
1909	219	2	7,692	34.8
1910	212	2	7,513	35.1
1911	203	2	7,168	35.0
1912	202	1	7,001	34.5
1913	198	1	6,837	34.4

YEAR	PERCENTAGE VESSELS	TONNAGE
1883	100.0	100.0
1884	100.0	100.0
1885	100.0	100.0
1886	100.0	100.0
1887	100.0	100.0
1888	100.0	100.0
1889	100.0	100.0
1890	99.6	98.9
1891	99.6	98.9
1892	99.6	98.9
1893	99.6	98.9
1894	99.2	98.9
1895	99.2	98.9
1896	99.2	98.9
1897	100.0	100.0
1898	100.0	100.0
1899	100.0	100.0
1900	100.0	100.0
1901	100.0	100.0
1902	100.0	100.0
1903	100.0	100.0
1904	100.0	100.0
1905	100.0	100.0
1906	100.0	100.0
1907	100.0	100.0
1908	100.0	100.0
1909	100.0	100.0
1910	100.0	100.0
1911	99.5	99.7
1912	99.5	99.7
1913	99.5	99.7

APPENDIX 2 STEAM-POWERED FISHING BOATS

NUMBER OF STEAM VESSELS AND AGGREGATE STEAM TONNAGE REGISTERED UNDER THE SEA FISHERIES AND MERCHANT SHIPPING ACTS OR PARTS I AND IV OF THE MERCHANT SHIPPING ACT AND % OF THE TOTAL OF THE FLEET SO REGISTERED

(i) UNITED KINGDOM
(Including England and Wales, Scotland, Ireland, Channel Islands and Isle of Man)

	NO.OF VESSELS		TOTAL/AV STEAM	%FLEET STEAMERS	
YEAR	50 TONS-	50 TONS+	TONNAGE	VESSELS	TONNAGE
1883	189	38	6,689/29.5	6.0	4.0
1884	232	53	9,095/31.9	7.3	5.2
1885	248	66	10,150/32.3	7.9	5.5
1886	258	84	11,690/34.2	8.4	6.0
1887	251	88	11,609/34.2	8.3	5.9
1888	254	109	13,278/36.6	9.0	6.8
1889	243	125	14,483/39.4	9.2	7.5
1890	274	151	17,673/41.6	11.0	9.4
1891	322	234	24,938/44.9	14.4	13.2
1892	361	269	28,366/45.0	16.3	15.0
1893	389	303	31,064/44.9	18.0	16.6
1894	406	340	34,036/45.6	19.7	18.5
1895	423	371	36,656/46.2	21.6	20.8
1896	483	421	42,198/46.7	24.7	24.2
1897	503	498	47,932/47.9	27.8	28.4
1898	547	622	57,387/49.1	32.8	35.3
1899	584	741	66,511/50.2	39.0	44.1
1900	650	850	76,807/51.2	45.3	52.9
1901	733	870	80,470/50.2	49.4	57.6
1902	805	906	85,553/50.0	51.8	60.4
1903	919	954	92,821/49.6	54.6	63.0
1904	959	967	94,748/49.2	55.3	63.2
1905	971	1,007	99,124/50.1	55.8	64.3
1906	1,035	1,137	111,579/51.4	58.3	67.1
1907	1,302	1,236	127,226/50.1	62.3	70.3
1908	1,448	1,278	136,533/50.1	64.1	72.0
1909	1,493	1,303	140,697/50.3	65.2	73.4
1910	1,606	1,322	145,923/49.8	67.4	75.3
1911	1,741	1,370	156,060/50.2	70.4	78.2
1912	1,808	1,409	163,837/50.9	72.6	80.3
1913	1,888	1,455	172,768/51.7	73.9	81.7

(ii) ENGLAND AND WALES

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL/AV STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	145	36	5,575/30.8	5.3	3.6
1884	175	49	7,507/33.5	6.4	4.6
1885	190	61	8,640/34.4	6.9	4.9
1886	196	79	9,911/36.0	7.4	5.4
1887	191	84	10,127/36.8	7.5	5.5
1888	190	104	11,575/39.4	8.1	6.3
1889	175	120	12,580/42.6	8.2	7.0
1890	191	147	15,206/45.0	9.8	8.7
1891	231	228	21,993/47.9	13.4	12.6
1892	253	259	24,540/47.9	14.9	14.1
1893	270	292	26,977/48.0	16.5	15.6
1894	282	331	29,888/48.8	18.4	17.6
1895	296	361	32,441/49.4	20.3	20.0
1896	337	411	37,352/49.9	23.3	23.4
1897	352	488	42,984/51.2	26.8	28.0
1898	391	609	52,103/52.1	32.5	35.5
1899	400	716	59,515/53.3	38.7	44.4
1900	435	803	67,339/54.4	44.8	53.3
1901	494	802	69,026/53.3	48.7	57.6
1902	557	813	72,349/52.8	51.2	60.4
1903	612	846	77,050/52.8	53.5	62.7
1904	613	859	78,187/53.1	54.0	62.7
1905	615	903	82,561/54.4	54.9	64.1
1906	613	1,008	92,079/56.8	56.7	66.8
1907	646	1,094	101,554/58.4	58.7	69.3
1908	675	1,125	106,448/59.1	60.0	70.7
1909	688	1,140	108,789/59.5	61.1	72.0
1910	728	1,151	111,254/59.2	62.9	73.7
1911	795	1,176	117,284/59.5	66.2	76.7
1912	816	1,189	121,878/60.8	68.3	78.8
1913	823	1,224	127,891/62.2	69.4	80.1

(iii) SCOTLAND

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL AV/STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	38	2	987/24.7	40.0	29.3
1884	51	4	1,507/27.4	43.7	35.4
1885	51	5	1,407/25.1	45.2	33.8
1886	54	5	1,670/28.3	40.0	34.7
1887	51	4	1,336/24.3	38.2	29.4
1888	57	5	1,547/25.0	42.5	33.8
1889	61	5	1,747/26.5	42.6	35.3
1890	75	4	2,287/28.9	47.6	44.0
1891	63	6	2,779/31.2	53.0	53.0
1892	100	10	3,657/33.2	59.1	59.8
1893	109	10	3,801/31.9	60.4	59.2
1894	115	9	3,978/32.1	61.1	59.5
1895	118	10	4,046/31.6	62.4	59.9
1896	133	10	4,631/32.4	64.1	59.9
1897	141	10	4,788/31.7	65.1	60.6
1898	146	13	5,124/32.2	67.7	63.9
1899	173	25	6,815/34.4	73.6	72.0
1900	206	47	9,306/36.8	78.6	78.2
1901	230	68	11,282/37.9	84.9	84.9
1902	239	90	12,823/39.0	85.5	85.8
1903	300	105	15,409/38.0	86.9	87.0
1904	340	105	16,208/36.4	87.1	86.8
1905	351	102	16,279/35.9	85.8	86.3
1906	417	126	19,163/35.3	88.1	88.2
1907	652	139	25,356/32.1	92.4	91.7
1908	767	149	29,663/32.4	92.8	92.3
1909	796	159	31,457/32.9	93.1	92.7
1910	863	165	33,999/33.1	94.0	93.8
1911	924	188	37,945/34.1	94.8	94.8
1912	943	214	40,731/35.2	95.4	95.3
1913	979	225	43,150/35.8	95.9	95.9

(iv) IRELAND

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	4	0	92	2.2	1.7
1884	4	0	46	2.2	0.8
1885	5	0	68	2.9	1.3
1886	7	0	86	3.6	1.4
1887	8	0	123	3.9	1.9
1888	5	0	88	2.3	1.3
1889	5	0	88	2.3	1.3
1890	6	0	112	2.9	1.7
1891	6	0	111	2.8	1.6
1892	5	0	74	2.4	1.1
1893	7	0	107	3.6	1.7
1894	7	0	107	3.7	1.8
1895	6	0	83	3.2	1.4
1896	8	0	72	4.2	1.2
1897	6	0	50	3.1	0.8
1898	6	0	50	2.9	0.7
1899	7	0	71	3.3	1.1
1900	6	0	75	3.0	1.2
1901	6	0	75	3.0	1.3
1902	6	3	294	4.2	4.8
1903	4	3	275	3.3	4.7
1904	3	3	266	2.8	4.5
1905	2	2	197	1.8	3.4
1906	2	3	250	2.2	4.2
1907	1	3	229	1.7	3.8
1908	2	4	306	2.5	4.9
1909	5	4	335	3.7	5.5
1910	10	6	530	6.8	9.1
1911	22	6	691	11.3	11.6
1912	41	6	1,057	18.4	17.6
1913	68	6	1,556	26.6	24.5

(v) ABERDEEN

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	13	1	331	87.5	75.1
1884	11	2	374	92.9	82.2
1885	12	1	310	92.9	79.3
1886	8	0	200	80.0	67.1
1887	5	1	186	66.7	62.4
1888	7	1	231	72.7	67.3
1889	11	1	379	92.3	95.7
1890	25	1	830	96.3	98.0
1891	33	2	1,123	97.2	98.5
1892	41	4	1,524	100.0	100.0
1893	46	4	1,668	100.0	100.0
1894	52	4	1,907	100.0	100.0
1895	52	5	1,990	100.0	100.0
1896	64	6	2,492	100.0	100.0
1897	69	6	2,621	100.0	100.0
1898	70	6	2,711	100.0	100.0
1899	88	10	3,660	100.0	100.0
1900	108	24	5,279	100.0	100.0
1901	125	45	7,083	100.0	100.0
1902	130	64	8,365	100.0	100.0
1903	138	80	9,651	100.0	100.0
1904	129	76	9,075	100.0	100.0
1905	125	71	8,624	100.0	100.0
1906	126	88	9,661	100.0	100.0
1907	134	99	10,689	100.0	100.0
1908	144	106	11,505	100.0	100.0
1909	145	116	12,309	100.0	100.0
1910	141	122	12,461	100.0	100.0
1911	134	144	14,013	100.0	100.0
1912	123	164	15,232	100.0	100.0
1913	112	174	15,665	100.0	100.0

(vi) BRIXHAM
(Included in Dartmouth up to and including 1901)

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	0	0	0	0	0
1884	0	0	0	0	0
1885	0	0	0	0	0
1886	0	0	0	0	0
1887	0	0	0	0	0
1888	0	0	0	0	0
1889	0	0	0	0	0
1890	0	1	108	0.4	1.1
1891	0	1	108	0.4	1.1
1892	0	1	108	0.4	1.1
1893	0	1	108	0.4	1.1
1894	1	1	111	0.8	1.1
1895	1	1	111	0.8	1.1
1896	1	1	110	0.8	1.1
1897	0	0	0	0	0
1898	0	0	0	0	0
1899	0	0	0	0	0
1900	0	0	0	0	0
1901	0	0	0	0	0
1902	0	0	0	0	0
1903	0	0	0	0	0
1904	0	0	0	0	0
1905	0	0	0	0	0
1906	0	0	0	0	0
1907	0	0	0	0	0
1908	0	0	0	0	0
1909	0	0	0	0	0
1910	0	0	0	0	0
1911	1	0	21	0.5	0.3
1912	1	0	21	0.5	0.3
1913	1	0	21	0.5	0.3

(vii) FLEETWOOD

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL/AV STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	0	0	0	0	0
1884	0	0	0	0	0
1885	0	1	52	2.4	3.6
1886	0	0	0	0	0
1887	0	0	0	0	0
1888	0	0	0	0	0
1889	0	0	0	0	0
1890	0	0	0	0	0
1891	0	0	0	0	0
1892	0	0	0	0	0
1893	0	0	0	0	0
1894	0	0	0	0	0
1895	6	0	234/39.0	10.3	12.6
1896	5	3	345/43.1	13.3	17.5
1897	24	12	1,758/48.8	43.4	54.3
1898	26	12	1,873/49.3	45.8	56.4
1899	4	0	168/42.0	8.9	10.6
1900	5	6	638/58.0	20.4	33.0
1901	5	8	770/59.2	21.7	35.0
1902	5	7	698/58.2	21.4	34.0
1903	5	10	899/59.9	25.4	40.6
1904	7	12	845/44.5	31.1	40.5
1905	7	22	1,899/65.5	42.0	62.0
1906	5	41	3,296/71.7	55.4	75.2
1907	7	54	4,501/73.8	62.2	80.4
1908	7	64	5,839/82.2	70.3	86.8
1909	5	62	5,646/84.3	69.1	86.6
1910	6	62	5,403/79.5	68.0	85.1
1911	6	70	6,339/83.4	69.1	86.5
1912	9	77	7,084/82.4	72.3	88.6
1913	14	77	7,442/81.8	74.6	90.7

(viii) GRIMSBY

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	2	7	556	1.4	1.4
1884	3	12	1,192	2.2	2.7
1885	4	16	1,558	2.7	3.2
1886	2	18	1,634	2.4	2.9
1887	2	19	1,732	2.5	3.0
1888	2	24	2,145	3.2	3.8
1889	3	34	2,914	4.7	5.2
1890	4	46	3,806	6.4	6.9
1891	23	75	6,474	12.1	11.4
1892	25	85	7,175	13.8	12.9
1893	34	104	8,656	17.5	15.7
1894	47	120	10,185	21.6	19.1
1895	62	126	11,170	26.0	22.7
1896	91	139	13,006	36.4	31.5
1897	100	180	15,823	44.4	39.1
1898	119	245	20,904	59.6	54.7
1899	111	308	25,082	80.7	79.7
1900	110	374	29,866	88.3	89.0
1901	109	369	29,417	90.7	91.2
1902	108	367	29,071	92.1	92.8
1903	113	371	29,575	92.9	93.7
1904	103	372	29,318	93.0	93.8
1905	101	388	31,032	94.0	94.9
1906	97	436	35,681	94.7	95.8
1907	88	471	39,422	95.2	96.5
1908	80	469	39,348	95.1	96.5
1909	75	475	40,057	95.7	96.9
1910	74	488	41,516	96.1	97.2
1911	72	503	42,682	96.6	97.7
1912	68	514	45,185	96.4	97.7
1913	70	*555*	*49,913*	*96.9*	*98.1*

(ix) HULL

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	1	9	1,067	2.3	3.4
1884	1	9	1,087	2.2	3.4
1885	3	12	1,326	3.1	3.7
1886	7	22	2,191	6.0	6.1
1887	8	27	2,512	7.1	6.9
1888	9	43	3,529	10.6	9.7
1889	11	50	4,002	13.2	11.6
1890	18	61	4,895	17.6	14.7
1891	28	107	7,970	29.0	23.8
1892	35	120	9,051	33.3	27.3
1893	35	134	9,911	38.2	32.0
1894	36	156	11,321	44.5	37.9
1895	35	180	12,784	51.6	44.7
1896	35	206	14,455	59.1	52.7
1897	27	233	15,751	67.2	61.7
1898	22	282	18,545	79.6	76.3
1899	45	331	22,573	94.5	95.2
1900	47	338	23,382	95.8	96.9
1901	47	336	23,474	97.2	98.4
1902	50	342	24,330	97.3	98.6
1903	56	367	26,716	97.7	98.8
1904	53	370	27,117	98.1	99.0
1905	48	383	28,483	98.6	99.4
1906	44	402	29,862	98.9	99.5
1907	45	413	31,213	99.1	99.4
1908	43	416	31,293	99.1	99.4
1909	42	417	31,621	99.6	99.7
1910	39	414	31,366	99.3	99.6
1911	33	411	31,669	98.9	99.4
1912	23	380	29,984	98.5	99.3
1913	18	379	30,544	98.5	99.4

(x) LOWESTOFT

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL/AV STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	0	0	0	0	0
1884	0	0	0	0	0
1885	3	0	92	0.7	0.7
1886	3	1	152	1.0	1.1
1887	3	1	152	1.1	1.1
1888	1	0	32	0.3	0.2
1889	1	0	32	0.3	0.2
1890	1	0	32	0.3	0.2
1891	1	0	32	0.2	0.2
1892	1	0	32	0.2	0.2
1893	1	0	32	0.2	0.2
1894	1	0	32	0.2	0.2
1895	1	0	32/32.0	0.2	0.2
1896	1	0	32/32.0	0.2	0.2
1897	2	0	59/29.5	0.4	0.3
1898	2	0	59/29.5	0.4	0.3
1899	3	0	72/24.0	0.7	0.3
1900	13	0	434/33.4	2.9	2.2
1901	35	0	1,229/35.1	7.5	6.1
1902	70	0	2,486/35.5	14.6	11.9
1903	101	0	3,559/35.2	20.7	16.8
1904	110	0	3,929/35.7	22.2	18.0
1905	124	0	4,476/36.1	24.5	19.8
1906	150	0	5,450/36.3	28.6	23.6
1907	190	0	6,571/34.6	34.1	27.6
1908	225	0	7,766/34.5	37.9	31.0
1909	245	0	8,415/34.3	40.9	33.7
1910	268	0	9,314/34.8	44.5	37.6
1911	313	0	11,028/35.2	52.2	45.1
1912	327	2	11,780/35.8	55.7	48.8
1913	335	2	*12,203/36.2*	*56.4*	*50.0*

(xi) MILFORD

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL/AV STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	1	0	19/	10.0	6.2
1884	2	0	64/32.0	14.3	15.7
1885	2	0	64/32.0	20.0	42.1
1886	1	0	45	9.1	13.6
1887	1	0	38	8.3	10.5
1888	2	0	46/23.0	14.3	11.6
1889	2	0	79/39.5	13.3	17.4
1890	1	1	104/52.0	14.3	22.9
1891	2	2	200/50.0	23.5	33.8
1892	9	3	563/46.9	46.2	57.5
1893	9	3	563/46.9	44.4	56.0
1894	7	5	693/57.8	48.0	64.5
1895	6	6	718/59.8	52.2	71.9
1896	18	6	1,099/45.8	75.0	83.6
1897	18	6	974/40.1	70.6	76.9
1898	24	6	1,172/39.1	71.4	76.8
1899	25	11	1,543/42.9	75.0	80.3
1900	29	12	1,708/41.7	77.4	81.8
1901	31	12	1,795/41.7	82.7	87.1
1902	30	11	1,718/41.9	82.0	86.6
1903	31	11	1,751/41.7	84.0	86.7
1904	29	13	1,755/41.8	79.2	82.3
1905	29	15	1,881/42.8	80.0	83.3
1906	24	21	2,143/47.6	81.8	87.8
1907	23	36	3,324/56.3	84.3	91.1
1908	19	46	4,072/62.6	85.5	92.6
1909	17	51	4,445/65.4	85.0	92.4
1910	18	46	4,055/63.4	86.5	93.0
1911	20	46	4,237/64.2	82.5	90.6
1912	20	48	4,419/65.0	82.9	90.6
1913	19	50	4,590/66.5	83.1	90.3

(xii) NORTH SHIELDS

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL/AV STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	50	1	607/11.9	100.0	100.0
1884	68	1	776/11.2	100.0	100.0
1885	69	1	757/10.8	100.0	100.0
1886	72	0	672/ 9.3	100.0	100.0
1887	71	0	646/ 9.1	100.0	100.0
1888	72	0	608/ 8.4	100.0	100.0
1889	68	0	701/10.3	100.0	100.0
1890	75	0	983/13.1	100.0	100.0
1891	82	2	1,527/18.2	100.0	100.0
1892	87	3	1,437/16.0	100.0	100.0
1893	94	4	1,595/16.3	100.0	100.0
1894	94	4	1,555/15.9	100.0	100.0
1895	96	4	1,633/16.3	100.0	100.0
1896	95	4	1,617/16.3	100.0	100.0
1897	90	4	1,731/18.4	100.0	100.0
1898	98	5	2,000/19.4	100.0	100.0
1899	100	6	2,211/20.9	100.0	100.0
1900	106	7	2,584/22.9	100.0	100.0
1901	119	9	3,207/25.1	100.0	100.0
1902	119	13	3,573/27.1	100.0	100.0
1903	123	15	3,868/28.0	100.0	100.0
1904	112	15	3,632/28.6	100.0	100.0
1905	106	13	3,336/28.0	100.0	100.0
1906	103	14	3,534/30.2	100.0	100.0
1907	100	15	3,517/30.6	100.0	100.0
1908	101	16	3,640/31.1	100.0	100.0
1909	97	18	3,662/31.8	100.0	100.0
1910	94	19	3,679/32.6	100.0	100.0
1911	94	20	4,118/36.1	100.0	100.0
1912	85	19	3,573/34.4	100.0	100.0
1913	75	25	3,743/37.4	100.0	100.0

(xiii) RAMSGATE

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	0	0	0	0	0
1884	0	0	0	0	0
1885	0	0	0	0	0
1886	0	0	0	0	0
1887	0	0	0	0	0
1888	0	0	0	0	0
1889	0	0	0	0	0
1890	0	0	0	0	0
1891	0	0	0	0	0
1892	0	0	0	0	0
1893	0	0	0	0	0
1894	0	0	0	0	0
1895	0	0	0	0	0
1896	0	0	0	0	0
1897	0	0	0	0	0
1898	0	0	0	0	0
1899	1	0	2	0.5	0.04
1900	0	0	0	0	0
1901	0	0	0	0	0
1902	0	0	0	0	0
1903	0	0	0	0	0
1904	0	0	0	0	0
1905	0	0	0	0	0
1906	0	0	0	0	0
1907	0	0	0	0	0
1908	0	0	0	0	0
1909	0	0	0	0	0
1910	2	0	22	1.1	0.5
1911	2	0	22	1.2	0.5
1912	2	0	22	1.2	0.5
1913	2	0	22	1.3	0.6

(xiv) SCARBOROUGH

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL/AV STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	23	4	770/28.5	21.1	13.7
1884	19	3	599/27.2	18.6	11.5
1885	19	3	600/27.3	19.0	11.8
1886	15	3	479/26.6	16.7	9.8
1887	13	3	428/26.8	16.0	9.3
1888	15	3	479/26.6	18.4	10.6
1889	15	3	549/30.5	18.2	12.0
1890	16	2	529/29.4	18.9	12.1
1891	16	2	529/29.4	21.4	13.7
1892	16	0	389/24.3	19.8	10.7
1893	16	0	395/24.7	20.0	11.1
1894	17	0	415/24.4	21.5	11.7
1895	18	0	435/24.2	24.0	13.2
1896	19	0	451/23.7	26.4	14.5
1897	20	0	471/23.6	28.2	15.8
1898	18	0	438/24.3	26.5	15.4
1899	18	0	438/24.3	32.7	20.8
1900	19	0	474/24.9	35.8	23.9
1901	17	0	427/25.1	37.0	24.6
1902	13	0	365/28.1	33.3	23.4
1903	13	0	365/28.1	36.1	25.7
1904	12	0	345/28.8	42.9	33.9
1905	12	0	345/28.8	38.7	30.2
1906	12	0	345/28.8	42.4	28.3
1907	11	0	300/27.3	33.3	24.7
1908	7	0	233/33.3	24.1	20.3
1909	6	0	217/36.2	22.2	19.9
1910	6	0	217/36.2	23.1	20.6
1911	6	0	217/36.2	22.2	20.0
1912	5	1	262/43.7	24.0	25.2
1913	11	6	743/43.7	51.5	53.5

(xv) GREAT YARMOUTH

YEAR	NO.OF VESSELS 50 TONS-	50 TONS+	TOTAL/AV STEAM TONNAGE	%FLEET STEAMERS VESSELS	TONNAGE
1883	0	2	134/67.0	0.3	0.6
1884	1	4	395/79.0	0.8	1.6
1885	3	4	416/59.4	1.0	1.4
1886	3	4	416/59.4	1.1	1.4
1887	0	3	287/95.7	0.5	1.0
1888	0	2	207/103.5	0.3	0.7
1889	0	0	0/	0	0
1890	0	0	0/	0	0
1891	1	0	34/34.0	0.2	0.2
1892	1	1	120/60.0	0.5	0.6
1893	2	1	122/40.7	0.7	0.6
1894	4	2	250/41.7	1.4	1.1
1895	3	2	248/49.6	1.2	1.2
1896	5	2	274/39.1	1.5	1.0
1897	5	2	274/39.1	1.8	1.2
1898	9	2	384/34.9	3.2	2.0
1899	14	3	584/34.4	5.5	3.5
1900	27	3	1,057/35.2	14.8	10.8
1901	55	3	1,865/32.2	34.7	29.8
1902	88	3	2,957/32.5	48.4	43.2
1903	97	3	3,279/32.8	53.5	48.3
1904	114	3	3,741/32.0	60.0	54.2
1905	114	3	3,737/31.9	60.0	54.4
1906	113	0	3,504/31.0	57.9	51.6
1907	128	0	3,888/30.4	59.8	53.5
1908	137	0	4,123/30.1	63.1	56.9
1909	145	0	4,383/30.2	67.8	62.4
1910	162	0	4,892/30.2	74.0	69.6
1911	179	0	5,482/30.6	85.6	82.7
1912	198	0	6,081/30.7	96.6	95.5
1913	*207*	*2*	*6,491/31.1*	*98.6*	*97.9*

APPENDIX 3 FISHING VESSELS CONSTRUCTED IN SCOTLAND

(i) Aggregate

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	354	8	4	21
1893	319	12	2	19
1894	443	9	17	14
1895	440	11	0	12
1896	374	23	1	31
1897	346	10	3	47
1898	333	0	1	92
1899	305	2	2	76
1900	340	12	0	57
1901	350	14	1	27
1902	379	3	0	29
1903	384	19	1	27
1904	249	18	0	15
1905	184	7	0	32
1906	176	50	0	81
1907	175	179	1	53
1908	193	78	0	22
1909	164	29	0	20
1910	151	48	0	25
1911	131	67	0	32
1912	140	34	1	33
1913	129	43	0	31
1914	129	63	0	54

(ii) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF EYEMOUTH

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	9	1	0	0
1893	6	0	0	0
1894	3	1	0	0
1895	12	0	0	0
1896	5	0	0	0
1897	12	0	0	0
1898	6	0	0	0
1899	8	0	0	0
1900	7	0	0	0
1901	9	0	0	0
1902	9	0	0	0
1903	7	0	0	0
1904	5	0	0	0
1905	0	0	0	0
1906	2	0	0	0
1907	3	2	0	0
1908	1	1	0	0
1909	2	0	0	0
1910	3	0	0	0
1911	1	0	0	0
1912	1	0	0	0
1913	0	0	0	0
1914	0	0	0	0
Total	111	5	0	0

Steam = 1 in 1892 'English', 1 in 1894 North Shields.

(iii) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF LEITH

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	18	0	0	2
1893	23	3	0	3
1894	25	2	0	1
1895	23	2	0	2
1896	13	3	0	2
1897	13	1	0	2
1898	12	0	0	7
1899	12	0	0	8
1900	15	2	0	2
1901	18	2	0	0
1902	19	1	1	1
1903	24	0	0	1
1904	5	0	0	1
1905	1	0	0	0
1906	0	0	0	0
1907	0	7	0	1
1908	6	0	0	1
1909	1	2	0	0
1910	0	0	0	0
1911	0	0	0	0
1912	0	0	0	0
1913	0	0	0	0
1914	0	0	0	5
Total	228	25	0	39

4 steam fishing boats liners for North Shields in 1894 and 1895.
3 steam trawlers for Belgium 1895, 6 and 8.

(iv) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF ANSTRUTHER

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	10	4	0	0
1893	6	7	0	0
1894	16	2	0	0
1895	6	4	0	0
1896	22	1	0	0
1897	13	4	0	0
1898	12	0	0	0
1899	17	0	0	2
1900	22	2	0	4
1901	30	3	0	0
1902	29	0	0	0
1903	28	0	0	0
1904	14	0	0	0
1905	11	0	0	0
1906	5	5	0	0
1907	4	10	1	0
1908	8	4	0	0
1909	4	0	0	0
1910	4	0	0	0
1911	7	0	0	0
1912	3	0	0	0
1913	3	0	0	0
1914	9	0	0	0
Total	286	46	1	6

1912: 2 of 3 sailing fishing boats = m.v.
1914 5 of 9 " = m.v.s for Montrose
No steam fishing boats after 1908.
27 for England in 1901 and before, 8 recorded for North Shields.
The sailing trawler in 1907 for Belgium.
The steam trawlers all in 1899 and 1900, 5 of 6 for North Shields.

(v) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF MONTROSE

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	14	0	0	0
1893	9	0	0	0
1894	11	0	0	0
1895	9	0	0	0
1896	18	1	0	0
1897	19	2	0	1
1898	10	0	0	5
1899	0	0	0	15
1900	10	2	0	4
1901	5	0	0	0
1902	4	0	0	0
1903	5	0	0	0
1904	3	0	0	0
1905	2	0	0	1
1906	1	0	0	4
1907	1	23	0	6
1908	7	3	0	3
1909	4	1	0	2
1910	1	1	0	0
1911	0	1	0	0
1912	3	0	0	2
1913	0	0	0	0
1914	0	4	0	4
Total	135	38	5	47

The 5 sailing trawlers, in 1898 4 England and 1 Aberdeen. Steam trawlers: 26 for England of which 11 specify Grimsby.

(vi) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF ABERDEEN

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	9	2	0	7
1893	5	0	0	3
1894	6	2	0	5
1895	2	5	0	1
1896	6	16	0	3
1897	7	3	0	10
1898	5	0	0	28
1899	1	0	0	23
1900	0	0	0	32
1901	0	1	0	25
1902	0	2	0	18
1903	0	8	0	20
1904	0	9	0	9
1905	0	4	0	20
1906	0	9	0	47
1907	2	30	0	37
1908	0	20	0	14
1909	2	7	0	16
1910	0	10	0	20
1911	0	12	0	31
1912	0	14	0	29
1913	0	5	0	31
1914	0	9	0	45
Total	45	168	0	474

1896: 1 steam liner for Wick and 1 for Buckie.
1898: 4 of 28 trawlers for ports o/s GB.
1902: 1 of 18 trawlers for France.
1904: 1 of 9.
1905: 2 of 20.
1906: 2 France and 2 Germany out of 47.
1907: 3 each Fr and Ger of 37.
1908: 1 of 14 Fr.
1910: 1 of 20 Fr.
1911: 2 of 31 Fr and 1 Portugal.
1912: 2 of 29 Fr.
1913: 4 of 31 Fr and 5 Fleetwood.
1914: 7 of 45 for Fleetwood.

(vii) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF PETERHEAD

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	20	1	0	0
1893	11	2	0	0
1894	24	1	0	0
1895	25	0	0	0
1896	17	0	0	0
1897	12	0	0	0
1898	18	0	0	0
1899	11	0	0	0
1900	39	4	0	0
1901	14	4	0	0
1902	18	0	0	0
1903	19	0	0	0
1904	6	0	0	0
1905	0	0	0	0
1906	0	3	0	0
1907	0	3	0	0
1908	0	4	0	0
1909	1	0	0	0
1910	3	1	0	0
1911	0	1	0	0
1912	2	1	0	0
1913	0	1	0	0
1914	2	1	0	0

(viii) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF FRASERBURGH

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	43	0	0	0
1893	38	0	0	0
1894	89	0	0	0
1895	85	0	0	0
1896	72	0	0	0
1897	64	0	0	0
1898	90	0	0	0
1899	61	0	0	0
1900	58	0	0	0
1901	75	0	0	0
1902	79	0	0	0
1903	69	0	0	0
1904	92	0	0	0
1905	54	0	0	0
1906	57	0	0	0
1907	47	12	0	0
1908	46	5	0	0
1909	33	0	0	0
1910	37	4	0	0
1911	37	5	0	0
1912	32	5	0	0
1913	28	8	0	0
1914	28	12	0	0

(ix) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF BANFF

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	21	0	0	0
1893	30	0	0	0
1894	21	0	0	0
1895	23	0	0	0
1896	22	0	0	0
1897	22	0	0	0
1898	12	0	0	0
1899	15	0	0	0
1900	20	0	0	0
1901	26	0	0	0
1902	30	0	0	0
1903	29	1	0	0
1904	15	1	0	0
1905	19	0	0	0
1906	15	4	0	0
1907	7	4	0	0
1908	20	3	0	0
1909	18	8	0	0
1910	13	17	0	0
1911	13	20	0	0
1912	26	5	0	0
1913	17	17	0	0
1914	9	17	0	0

1894: 7 of 21 sailing f/boats with steam capstans.
1895: 5 of 23 " "

(x) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF BUCKIE

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	26	0	0	0
1893	19	0	0	0
1894	39	0	0	0
1895	40	0	0	0
1896	31	0	0	0
1897	28	0	0	0
1898	37	0	0	0
1899	33	1	0	0
1900	34	1	0	0
1901	38	0	0	0
1902	41	0	0	0
1903	35	2	0	0
1904	11	5	0	0
1905	4	3	0	0
1906	4	26	0	0
1907	0	42	0	0
1908	1	16	0	0
1909	2	6	0	0
1910	2	5	0	0
1911	0	8	0	0
1912	2	5	0	0
1913	1	8	0	0
1914	0	14	0	0

(xi) FISHING VESSELS CONSTRUCTED WITHIN THE BOUNDARIES OF GREENOCK

	FISHING BOATS		TRAWLERS	
YEAR	SAIL	STEAM	SAIL	STEAM
1892	3	0	0	12
1893	0	0	0	13
1894	15	1	0	8
1895	15	0	0	9
1896	4	2	0	26
1897	0	0	0	34
1898	0	0	0	52
1899	1	0	0	27
1900	2	0	0	15
1901	1	1	0	2
1902	0	0	0	10
1903	0	5	0	6
1904	2	2	0	5
1905	2	0	0	11
1906	0	0	0	30
1907	3	23	0	9
1908	1	13	0	4
1909	2	4	0	2
1910	2	1	0	5
1911	1	8	0	1
1912	3	0	0	2
1913	3	0	0	0
1914	4	0	0	0
Total	59	60	0	283

1896: 2 steam liners for Wick.
1893: 13 steam trawlers for 'Hull and Grimsby owners' total value £52,000.
1898: 2 of 52 Fr and 1 Norway.
1899: 1 of 27 Belgium.
1904: 2 of 5 'foreign'.
1906: 30 total, 2 Ger, 1 Fr and 1 Belgium.
1908: All 4 st trawlers for France.
1910: 2 of 5 Fr, 1 Belgium, 1 Portugal.
1911: 1 of 1 Bel.
1912: 1 of 2 Bel.
1893-8 inc. 137 of 142 steam trawlers for Hull and Grimsby.

APPENDIX 4 QUANTITIES OF FISH LANDED

(i) QUANTITY (000s cwts) AND VALUE (£000s) OF FISH LANDED IN THE UNITED KINGDOM (Excluding shell fish)

YEAR	QUANTITY	VALUE
1886	11,131	5,433*
1887	11,056	5,013*
1888	11,651	5,520
1889	12,853	5,605
1890	12,769	6,333
1891	12,022	6,555
1892	12,528	6,495
1893	13,568	6,743
1894	14,049	6,817
1895	14,069	7,168
1896	14,711	7,058
1897	13,898	7,514
1898	15,837	7,985
1899	14,960	8,396
1900	14,671	9,242
1901	15,851	9,080
1902	17,979	9,334
1903	18,555	9,708
1904	20,265	9,065
1905	20,164	10,210
1906	20,541	10,940
1907	23,710	11,266
1908	22,674	10,548
1909	22,371	10,691
1910	22,869	11,383
1911	23,584	11,345
1912	23,624	12,642
1913	24,096	14,037
1914	17,641	11,057

*Excludes Ireland

(ii) QUANTITY (000s cwts) OF FISH LANDED IN ENGLAND & WALES, SCOTLAND AND IRELAND (Excluding shell fish)

YEAR	ENGLAND & WALES	SCOTLAND	IRELAND
1886	6,412	4,718	No return
1887	6,012	5,044	No return
1888	6,341	4,631	679
1889	6,460	5,589	803
1890	6,096	5,864	809
1891	5,966	5,434	621
1892	6,486	5,436	606
1893	6,579	6,208	781
1894	7,024	6,189	836
1895	7,264	6,107	698
1896	7,551	6,147	1,014
1897	7,946	5,002	950
1898	8,088	6,558	1,191
1899	8,605	5,145	1,210
1900	8,600	5,369	702
1901	8,648	6,385	818
1902	10,479	6,866	634
1903	11,198	6,519	838
1904	11,365	7,948	952
1905	11,310	7,856	998
1906	12,195	7,593	753
1907	13,994	9,018	698
1908	13,282	8,645	747
1909	13,955	7,423	993
1910	13,118	8,710	1,041
1911	14,419	8,176	989
1912	14,612	8,118	894
1913	16,152	7,267	676
1914	10,125	6,926	590

(iii) PERCENTAGE OF FISH (EXCLUDING SALMON) LANDED ON EACH COAST OF ENGLAND AND WALES, WITH ACTUAL TOTAL

YEAR	EAST	SOUTH	WEST	TOTAL (000s cwts)
1886	83.0	13.6	3.4	6,412
1887	85.5	10.7	3.8	6,029
1888	82.9	9.5	7.6	6,348
1889	80.8	10.1	9.1	6,465
1890	77.4	9.6	13.0	6,101
1891	78.3	10.0	11.7	5,966
1892	78.8	9.2	12.0	6,486
1893	80.9	8.5	10.6	6,579
1894	81.7	8.9	9.4	7,024
1895	82.5	8.1	9.4	7,264
1896	81.1	9.2	9.7	7,551
1897	78.9	9.2	11.9	7,946
1898	78.5	7.7	13.8	8,088
1899	80.5	8.6	10.9	8,605
1900	82.5	7.4	10.1	8,600
1901	81.2	8.3	10.5	8,648
1902	84.0	6.5	9.5	10,479
1903	85.3	5.8	8.9	11,198
1904	82.2	7.3	10.5	11,365
1905	80.1	9.1	10.8	11,310
1906	82.4	6.1	11.5	12,195
1907	82.0	5.3	12.7	13,994
1908	80.5	5.0	14.5	13,282
1909	80.4	4.8	14.8	13,955
1910	79.7	5.3	15.0	13,118
1911	81.1	4.3	14.6	14,419
1912	82.6	3.8	13.6	14,612
1913	84.7	3.2	12.1	16,152
1914	77.6	4.7	17.7	10,125

(iv) QUANTITIES LANDED IN UNITED KINGDOM (000s cwts)

YEAR	TURBOT	COD	HADDOCK
1888	61.7	748.8	2,368.7
1889	61.7	849.7	2,381.7
1890	58.8	852.0	2,355.4
1891	63.1	919.0	2,487.8
1892	68.6	881.5	2,652.2
1893	73.8	869.8	2,664.6
1894	86.3	924.6	3,016.1
1895	82.5	998.9	3,465.1
1896	86.5	1,104.0	3,579.0
1897	76.2	1,178.7	3,443.4
1898	78.1	1,154.9	3,380.4
1899	73.9	1,113.2	3,447.6
1900	67.8	1,056.7	3,261.0
1901	59.5	1,040.7	3,194.1
1902	64.1	1,584.6	2,941.3
1903	93.1	1,906.7	3,768.7
1904	104.6	1,920.5	3,576.7
1905	96.8	2,118.9	3,091.3
1906	77.0	2,648.1	3,906.5
1907	74.6	2,657.9	4,071.5
1908	74.2	2,766.2	3,703.1
1909	66.2	3,060.7	3,262.5
1910	56.7	3,369.6	2,978.7
1911	56.5	3,574.5	3,145.2
1912	67.1	3,436.4	2,878.1
1913	69.3	3,534.4	2,220.8
1914	59.7	3,307.1	1,898.9

(v) QUANTITIES OF HERRING LANDED IN UNITED KINGDOM

YEAR	QUANTITY (000s cwts)
1888	4,602.6
1889	5,760.7
1890	5,397.2
1891	4,849.0
1892	5,332.3
1893	5,952.0
1894	5,888.5
1895	5,685.4
1896	5,730.7
1897	5,069.4
1898	7,000.4
1899	5,873.6
1900	6,229.7
1901	7,139.1
1902	8,478.6
1903	7,571.5
1904	8,918.3
1905	8,759.0
1906	8,568.6
1907	11,002.2
1908	9,924.1
1909	9,622.7
1910	10,065.4
1911	10,685.0
1912	11,051.1
1913	12,183.4
1914	6,695.3

(vi) QUANTITY LANDED IN ENGLAND AND WALES (000s cwts)

YEAR	TURBOT	COD	HADDOCK
1886	59.9	248.2	1,243.3
1887	63.2	256.2	1,545.6
1888	55.0	245.5	1,538.4
1889	53.6	301.4	1,577.0
1890	51.9	363.4	1,585.4
1891	56.9	360.5	1,740.5
1892	62.6	377.5	1,903.8
1893	68.2	402.0	1,957.7
1894	81.8	436.5	2,175.2
1895	77.9	495.9	2,432.9
1896	80.1	486.9	2,557.2
1897	69.6	540.7	2,548.9
1898	69.9	546.5	2,608.2
1899	65.4	564.9	2,646.4
1900	60.7	589.0	2,487.2
1901	52.8	572.4	2,353.5
1902	57.3	1,083.3	2,034.2
1903	83.3	1,364.9	2,756.2
1904	97.1	1,253.7	2,531.2
1905	89.5	1,423.4	2,148.4
1906	70.6	1,911.0	2,820.4
1907	67.3	1,947.3	2,862.8
1908	67.1	1,928.8	2,532.3
1909	64.3	2,151.1	2,223.6
1910	51.0	2,365.4	2,039.5
1911	51.0	2,562.2	2,114.3
1912	62.1	2,486.8	1,972.3
1913	64.9	2,646.7	1,553.9
1914	55.1	2,579.1	1,337.1

(vii) QUANTITIES OF HERRING LANDED IN ENGLAND

YEAR	QUANTITY (000s cwts)
1886	1,973.6
1887	1,605.1
1888	1,729.0
1889	1,923.3
1890	1,331.6
1891	1,206.5
1892	1,580.9
1893	1,421.8
1894	1,455.6
1895	1,436.7
1896	1,526.1
1897	1,815.8
1898	1,832.4
1899	2,239.2
1900	2,425.2
1901	2,452.8
1902	3,482.7
1903	3,059.0
1904	3,199.3
1905	3,062.1
1906	3,278.3
1907	4,439.6
1908	3,983.7
1909	4,564.1
1910	3,827.6
1911	4,996.0
1912	5,377.1
1913	7,313.4
1914	2,016.9

(viii) QUANTITY LANDED IN SCOTLAND
(000s cwts)

YEAR	TURBOT	COD	HADDOCK
1886		No Return	
1887	5.3	383.0	751.5
1888	5.4	469.5	820.5
1889	6.3	503.7	792.1
1890	5.6	448.9	753.7
1891	5.0	514.2	726.3
1892	4.6	467.0	722.8
1893	4.1	426.2	684.8
1894	3.1	447.8	812.4
1895	3.6	459.3	1,001.3
1896	5.4	575.1	990.2
1897	5.0	590.8	866.3
1898	6.2	556.3	748.6
1899	7.0	514.5	784.9
1900	5.6	434.1	761.3
1901	5.5	445.7	831.1
1902	5.7	486.4	900.0
1903	9.0	525.1	1,004.1
1904	6.9	646.3	1,029.7
1905	6.5	676.9	931.7
1906	5.7	720.3	1,074.5
1907	6.5	695.7	1,192.6
1908	6.2	817.3	1,151.3
1909	6.3	882.0	1,022.0
1910	5.0	980.2	922.6
1911	4.5	985.6	1,013.7
1912	4.0	919.8	890.9
1913	3.8	867.4	656.6
1914	4.0	708.8	558.3

(ix) QUANTITIES OF HERRING LANDED IN SCOTLAND

YEAR	QUANTITY (000s cwts)
1886	No Returns
1887	3,217.4
1888	2,741.4
1889	3,718.5
1890	3,980.4
1891	3,539.6
1892	3,655.1
1893	4,424.6
1894	4,333.9
1895	4,077.5
1896	3,960.3
1897	2,966.0
1898	4,703.6
1899	3,207.1
1900	3,520.2
1901	4,338.6
1902	4,753.9
1903	4,279.5
1904	5,432.5
1905	5,342.8
1906	4,979.8
1907	6,253.3
1908	5,690.1
1909	4,541.3
1910	5,687.2
1911	5,036.5
1912	5,201.2
1913	4,449.3
1914	4,383.2

(x) QUANTITY LANDED IN IRELAND
(000s cwts)

YEAR	TURBOT	COD	HADDOCK
1886		No returns	
1887		No returns	
1888	1.2	33.8	9.8
1889	1.7	44.6	12.6
1890	1.4	30.6	16.4
1891	1.2	44.3	20.9
1892	1.4	36.9	25.6
1893	1.5	41.7	22.1
1894	1.4	40.3	28.5
1895	1.0	43.6	30.9
1896	1.0	42.0	31.6
1897	1.7	47.3	28.2
1898	2.0	52.1	23.5
1899	1.5	33.8	16.3
1900	1.5	33.6	12.4
1901	1.2	22.6	9.6
1902	1.1	14.9	7.1
1903	0.8	16.7	8.4
1904	0.6	20.5	15.8
1905	0.8	18.6	11.3
1906	0.7	16.8	11.6
1907	0.8	14.8	16.1
1908	0.9	20.1	19.5
1909	0.7	27.6	17.0
1910	0.7	24.0	16.6
1911	1.0	26.7	17.3
1912	1.0	29.9	15.0
1913	0.6	20.4	10.3
1914	0.5	19.2	3.5

(xi) QUANTITIES OF HERRING LANDED IN IRELAND

YEAR	QUANTITY (000s cwts)
1886	No Returns
1887	No Returns
1888	132.3
1889	118.9
1890	85.3
1891	102.9
1892	96.3
1893	105.6
1894	99.0
1895	171.3
1896	244.3
1897	287.7
1898	464.3
1899	427.4
1900	284.3
1901	347.6
1902	241.9
1903	233.0
1904	286.5
1905	354.1
1906	310.4
1907	309.3
1908	250.3
1909	517.3
1910	550.6
1911	652.6
1912	472.7
1913	420.6
1914	295.2

(xii) QUANTITY OF TURBOT LANDED EACH COAST OF ENGLAND AND WALES (PERCENTAGES) AND ACTUAL TOTAL (cwts)

YEAR	EAST COAST	SOUTH COAST	WEST COAST	TOTAL
1886	92.7	5.4	1.9	59,850
1887	91.1	5.7	3.2	63,166
1888	88.6	8.0	3.4	55,041
1889	82.6	10.9	6.5	53,576
1890	78.6	13.0	8.4	51,879
1891	83.7	9.5	6.8	56,875
1892	84.3	9.9	5.8	62,630
1893	85.3	8.8	5.9	68,237
1894	88.1	7.4	4.5	81,836
1895	86.4	7.7	5.9	77,931
1896	82.8	8.8	8.4	80,119
1897	79.5	12.7	7.8	69,578
1898	74.0	13.2	12.8	69,948
1899	76.2	14.7	9.1	65,422
1900	75.4	14.4	10.2	60,715
1901	72.9	15.2	11.9	52,801
1902	74.9	12.8	12.3	57,348

QUANTITY OF COD LANDED EACH COAST OF ENGLAND AND WALES (PERCENTAGES) AND ACTUAL TOTAL (cwts)

YEAR	EAST COAST	SOUTH COAST	WEST COAST	TOTAL
1886	94.9	1.2	3.9	248,197
1887	93.0	1.1	5.9	256,155
1888	90.6	2.0	7.4	245,497
1889	84.8	4.0	11.2	301,405
1890	83.7	3.9	12.4	363,374
1891	85.3	2.4	12.3	360,511
1892	84.9	2.4	12.7	377,546
1893	85.5	2.1	12.4	401,990
1894	86.7	2.2	11.1	436,544
1895	86.5	2.0	11.5	495,923
1896	84.6	2.4	13.0	486,886
1897	80.4	1.8	17.8	540,711
1898	84.1	2.2	13.7	546,494
1899	88.9	1.7	9.4	564,877
1900	92.4	1.2	6.4	588,958
1901	93.2	0.9	5.9	572,414
1902	96.8	0.5	2.7	1,083,318

QUANTITY OF HADDOCK LANDED EACH COAST OF ENGLAND AND WALES (PERCENTAGES) AND ACTUAL TOTAL (cwts)

YEAR	EAST COAST	SOUTH COAST	WEST COAST	TOTAL
1886	99.8	0.1	0.1	1,243,325
1887	99.8	0.0	0.2	1,545,604
1888	99.6	0.1	0.3	1,538,368
1889	99.6	0.1	0.3	1,576,954
1890	99.5	0.0	0.5	1,585,392
1891	99.3	0.0	0.7	1,740,548
1892	98.9	0.0	1.1	1,903,831
1893	98.7	0.0	1.3	1,957,696
1894	98.3	0.0	1.7	2,175,177
1895	98.0	0.0	2.0	2,432,938
1896	97.7	0.0	2.3	2,557,245
1897	97.3	0.0	2.7	2,548,913
1898	97.3	0.0	2.7	2,608,199
1899	97.0	0.0	3.0	2,646,391
1900	97.2	0.0	2.8	2,487,222
1901	98.5	0.0	1.5	2,353,468
1902	97.9	0.0	2.1	2,034,169

QUANTITY OF HERRING LANDED EACH COAST OF ENGLAND AND WALES (PERCENTAGES OF ENGLAND AND WALES TOTAL) AND ACTUAL TOTAL (cwts) AND THAT OF SCOTLAND

	EAST	SOUTH	WEST	TOTALS	
YEAR	COAST	COAST	COAST	ENGLAND	SCOTLAND
1886	91.2	5.6	3.2	1,973,637	No returns
1887	91.7	5.2	3.1	1,605,140	3,217,361
1888	90.6	2.2	7.2	1,728,982	2,741,371
1889	90.4	2.5	7.1	1,923,258	3,718,505
1890	90.7	3.0	6.3	1,331,560	3,980,363
1891	81.2	7.3	11.5	1,206,457	3,539,624
1892	85.1	4.8	10.1	1,580,890	3,655,117
1893	91.1	2.0	6.9	1,421,755	4,424,591
1894	92.0	1.7	6.3	1,455,613	4,333,926
1895	91.0	1.6	7.4	1,436,701	4,077,466
1896	90.5	3.5	6.0	1,526,113	3,960,281
1897	89.7	2.8	7.5	1,815,765	2,965,965
1898	90.9	2.3	6.8	1,832,423	4,703,641
1899	90.3	3.3	6.4	2,239,176	3,207,078
1900	93.5	1.7	4.8	2,425,247	3,520,216
1901	92.2	4.5	3.3	2,452,848	4,338,635
1902	95.7	2.0	2.3	3,482,736	4,753,944

(xiii) QUANTITIES OF SOLES LANDED IN THE UNITED KINGDOM

YEAR	QUANTITY (000s cwts)
1888	76.2
1889	78.6
1890	76.7
1891	86.6
1892	76.7
1893	82.7
1894	85.3
1895	84.6
1896	85.5
1897	81.4
1898	86.1
1899	82.4
1900	78.4
1901	79.6
1902	76.6
1903	84.5
1904	80.5
1905	83.7
1906	71.3
1907	66.1
1908	68.6
1909	67.2
1910	61.0
1911	64.4
1912	73.6
1913	68.8
1914	62.2

Sources: Statistical Tables and Statistical Abstracts for Sea Fisheries in BPP Accounts and Papers

APPENDIX 5 FISHING INDUSTRIES OF WESTERN EUROPE

(i) GERMANY

STEAM FISHING VESSELS REGISTERED

YEAR	REGISTERED AT PORTS ON THE NORTH SEA	BALTIC
1888	5	1
1889	8	3
1890	13	4
1891	18	4
1892	32	6
1893	54	8
1894	62	9
1895	65	8
1896	85	5
1897	105	4
1898	120	3
1899	123	3
1900	124	3
1901	120	3
1902	119	2
1903	131	2

CREWS

	1908	1909	1910	1911	1912
Sailing vessels	617	613	585	417	405
" crewmen	3,833	3,876	3,732	3,283	3,194
Sailing vessels with motors	32	40	57	87	115
" crewmen	116	135	200	436	531
Steam vessels	309	292	299	304	317
" crewmen	3,700	3,561	3,667	3,765	3,827

(ii) FRANCE
(including Algeria)

PERCENTAGE OF VESSELS IN THE FISHERIES

	COD FISHERIES. ICELAND, NORTH SEA, NEWFNDLND.	OTHER DEEP SEA AND INSHORE FISHERIES	ACTUAL TOTAL
1900	2.1	97.9	25,721
1901	1.7	98.3	25,860
1902	1.8	98.2	25,935
1903	1.7	98.3	26,722
1904	1.7	98.3	28,498
1905	1.5	98.5	27,846
1906	1.5	98.5	28,700
1907	1.7	98.3	28,676
1908	1.5	98.5	29,980
1909	1.3	98.7	29,867
1910	1.5	98.5	28,742
1911	1.3	98.7	28,885
1912	1.4	98.6	29,451

PERCENTAGE TONNAGE IN THE FISHERIES

YEAR			
1900	30.2	69.8	172,714
1901	34.5	65.5	165,061
1902	28.7	71.3	175,677
1903	28.3	71.7	172,570
1904	29.0	71.0	178,013
1905	28.9	71.1	196,684
1906	26.7	73.3	201,581
1907	26.8	73.2	224,321
1908	26.2	73.8	229,211
1909	24.2	75.8	228,777
1910	34.3	65.7	240,205
1911	29.9	70.1	243,654
1912	32.4	67.6	267,097

PERCENTAGE PERSONS ENGAGED IN THE FISHERIES

YEAR			
1900	7.2	92.8	158,392
1901	6.3	93.7	161,305
1902	6.8	93.2	154,645
1903	6.8	93.2	157,873
1904	7.0	93.0	157,335
1905	6.4	93.6	153,359
1906	6.2	93.8	153,612
1907	7.5	92.5	152,453
1908	6.9	93.1	156,734
1909	5.9	94.1	169,884
1910	7.7	92.3	128,869
1911	6.9	93.1	137,057
1912	6.9	93.1	154,931

VALUE OF THE FISHERIES

YEAR	COD FISHERIES NFL, ICELAND, DOGGER (% OF TOTAL)	HOME FISHERIES (% OF TOTAL)	TOTAL VALUE (000sFRANCS)
1874	20.4	79.6	73,384
1875	19.9	80.1	77,167
1876	18.1	81.9	88,991
1877	18.7	81.3	87,227
1878	17.4	82.6	86,972
1879	16.5	83.5	88,079
1880	15.3	84.7	86,918
1881	16.6	83.4	82,670
1882	17.3	82.7	92,963
1883	16.8	83.2	107,227
1884	15.6	84.4	87,961
1885	15.6	84.4	105,484*
1886	14.0	86.0	94,976*
1887	14.3	85.7	100,534*
1888	14.2	85.8	99,238*
1889	14.2	85.8	96,335*
1890	12.3	87.7	107,563*
1891	11.0	89.0	109,686*
1892	10.1	89.9	113,418*
1893	10.9	89.1	116,713*
1894	11.1	88.9	117,139*
1895	13.9	86.1	103,539
1896	12.6	87.4	106,290
1897	13.8	86.2	109,117
1898	14.8	85.2	102,192
1899	18.7	81.3	105,051

* Includes oysters.

PERCENTAGE VALUE IN THE FISHERIES (£)

YEAR			
1900	18.0	82.0	4,236,014
1901	18.7	81.3	4,425,268
1902	19.3	80.7	4,416,753
1903	16.8	83.2	4,125,752
1904	15.4	84.6	4,692,898
1905	15.4	84.6	4,915,641
1906	15.2	84.8	4,508,025
1907	19.9	80.1	4,958,304
1908	15.6	84.4	5,185,843
1909	18.9	81.1	5,394,629
1910	23.0	77.0	5,611,528
1911	20.1	79.9	5,582,736
1912	17.9	82.1	5,720,126

Source: 1874-81 Fisheries Statistics for 1893
1882-99 Fisheries Statistics for 1901

STEAM FISHING BOATS IN FRANCE

YEAR	NUMBER	TONNAGE
1902	134	9,296
1903	169	12,458
1904	169	N/A
1905	201	13,651
1906	216	18,523
1907	241	32,054
1908	268	32,689
1909	269	35,232
1910	263	37,389
1911	291	47,010
1912	339	47,010

1910: 191 VESSELS WITH NON-STEAM MECHANICAL POWER
1911: 358 "
1912: 358 "

(iii) NETHERLANDS

NUMBER OF VESSELS AND TONNAGE ENGAGED IN FISHING

YEAR	PERCENTAGE IN NORTH SEA		PERCENTAGE IN ZUIDER ZEE AND OTHER WATERS		ACTUAL TOTAL	
	Number	Tonnage	Number	Tonnage	Number	Tonnage
1898	27.1	70.4	72.9	29.6	5,385	183,556
1899	25.8	69.7	74.2	30.3	5,661	188,452
1900	25.7	69.9	74.3	30.1	5,719	192,801
1901	26.1	71.9	73.9	28.1	5,851	196,144
1902	25.9	73.7	74.1	26.3	5,938	212,194
1903	26.0	75.6	74.0	24.4	5,922	214,741
1904	25.9	76.2	74.1	23.8	5,781	212,404
1905	26.2	79.1	73.8	20.9	5,334	230,993
1906	26.8	79.1	73.2	20.9	5,386	237,019
1907	27.2	79.4	72.8	20.6	5,454	237,351
1908	27.2	79.6	72.8	20.4	5,356	235,474
1909	27.0	79.8	73.0	20.2	5,366	237,215
1910	27.5	80.8	72.5	19.2	5,370	244,644

Steam trawlers registered in Holland
1898 2; 1899 12; 1900 21; 1901 24; 1902 29; 1903 28

YEAR	NUMBER OF TRAWLERS STEAM	MOTOR	SAIL
1902	30	0	694
1903	41	0	669
1904	48	0	625
1905	78	0	547
1906	80	2	577
1907	80	2	579
1908	78	2	569
1909	90	2	591
1910	90	1	608
1911	111	4	397
1912	140	5	401

YEAR	NUMBER OF LINERS SAIL
1902	30
1903	28
1904	29
1905	28
1906	29
1907	28
1908	28
1909	26
1910	25
1911	22
1912	20

	NUMBER OF DRIFTERS		
YEAR	STEAM	MOTOR	SAIL
1902	32	1	722
1903	35	1	736
1904	34	1	739
1905	29	1	708
1906	29	1	721
1907	31	2	735
1908	31	2	722
1909	34	2	697
1910	34	3	713
1911	38	8	705
1912	37	9	695

NUMBER OF FISHERMEN ENGAGED IN THE SEA FISHERIES
% WITH ACTUAL TOTAL

YEAR	ON TRAWLERS	ON LINERS	ON DRIFTERS	TOTAL
1902	20.7	3.3	76.0	12,091
1903	20.5	2.9	76.6	12,452
1904	20.2	2.9	76.9	12,459
1905	18.7	3.1	78.2	11,702
1906	20.7	3.1	76.2	12,099
1907	20.6	3.0	76.4	12,289
1908	20.6	3.0	76.4	12,265
1909	21.8	2.8	75.4	12,173
1910	21.6	2.6	75.8	12,399
1911	18.9	2.5	78.6	11,819
1912	22.0	2.2	75.8	11,753

	NUMBER OF VESSELS	
YEAR	COD FISHERIES	HERRING FISHERIES
1874	114	332
1875	115	337
1876	109	338
1877	113	357
1878	127	392
1879	128	396
1880	133	414
1881	139	407
1882	144	406
1883	150	409
1884	125	466
1885	117	461
1886	138	461
1887	135	464
1888	110	455
1889	131	439
1890	119	462

Source: Fisheries Statistics for 1893

YEAR	NUMBER OF VESSELS	AGGREGATE TONNAGE
1884	3,230	-
1885	3,363	-
1886	3,591	-
1887	3,637	-
1888	3,785	-
1889	3,987	-
1890	4,326	-
1891	4,427	164,357
1892	4,647	167,549
1893	4,902	172,603
1894	5,151	176,649
1895	5,189	179,782
1896	5,211	181,953
1897	5,318	184,576
1898	5,385	186,554
1899	5,661	191,530
1900	5,719	195,950

Sources:
1884 Fisheries Statistics for 1897
1885 Fisheries Statistics for 1898
1886 & 7 Fisheries Statistics for 1900
1888 - 1900 Fisheries Statistics for 1901

(iv) BELGIUM

NUMBER OF VESSELS

YEAR	COD FISHERY	SMALL HERRRING FISHERY	GREAT HERRING FISHERY	INSHORE FISHERY
1893	30	78	0	336
1894	32	81	0	338
1895	46	76	0	393
1896	42	86	0	432
1897	46	81	0	416
1898	40	90	0	415
1899	22	85	0	401
1900	21	85	0	391
1901	9	67	0	406
1902	6	71	0	420
1903	1	86	0	443
1904	2	26	0	437
1905	1	8	0	441
1906	1	99	0	422
1907	2	103	1	434
1908	0	141	1	460
1909	0	128	3	475
1910	0	192	3	498
1911	2	178	2	438
1912	2	184	3	413

(v) NORWAY

YEAR	COD FISHERIES No.of Vessels	COD FISHERIES Persons Employed	Total Value of All Fisheries (£000s)
1874	-	-	1,295
1875	-	-	1,322
1876	15,135	62,757	1,237
1877	15,676	66,386	1,635
1878	16,903	73,740	1,170
1879	19,600	83,589	1,186
1880	18,475	80,441	1,254
1881	15,572	69,266	1,090
1882	17,233	75,839	1,118
1883	19,171	77,858	1,352
1884	19,063	76,742	1,355
1885	18,316	76,504	1,066
1886	19,084	78,952	1,238
1887	21,547	84,703	820
1888	20,004	81,394	1,214
1889	20,158	83,092	1,295
1890	21,356	89,283	1,234
1891	23,252	94,836	1,451
1892	24,176	101,659	1,377
1893	22,178	93,743	1,312
1894	23,749	96,385	1,272
1895	20,386	86,087	1,234
1896	22,203	93,277	1,206
1897	21,769	92,693	1,400
1898	20,984	89,292	1,147
1899	17,892	77,139	1,350
1900	19,264	82,098	1,633
1901	17,542	75,866	1,533
1902	17,897	75,999	1,631
1903	17,499	73,471	1,606
1904	18,512	77,460	1,495
1905	19,532	83,286	1,741
1906	20,213	87,976	1,843
1907	18,992	85,187	2,170
1908	20,055	90,615	1,947
1909	21,001	93,638	2,122
1910	20,661	88,144	2,426
1911	19,407	86,301	2,883
1912	21,211	94,281	3,010

Sources: 1874-1883 Fisheries Statistics for 1886
1884-1899 Fisheries Statistics for 1901
1900-1901 Annual Report for England and Wales for 1911
1902-1912 Annual Report for England and Wales for 1913

APPENDIX 6 CREWS OF FISHING BOATS REGISTERED UNDER THE SEA FISHERIES ACT:
Men and boys required if all boats are employed at the same time with their usual crews.

(i) ABERDEEN

YEAR	NUMBER
1873	2,160
1874	1,997
1875	1,941
1876	1,842
1877	1,800
1878	1,928
1879	1,840
1880	1,924
1881	2,098
1882	2,035
1883	2,041
1884	2,153
1885	2,260
1886	2,319
1887	1,843
1888	2,338
1889	2,417
1890	2,414
1891	2,489
1892	2,544
1893	2,412
1894	2,401
1895	2,150
1896	2,107
1897	2,189
1898	2,099
1899	2,052
1900	2,326
1901	2,673
1902	2,441
1903	2,853
1904	2,868
1905	2,794
1906	2,787
1907	2,880
1908	3,002
1909	3,051
1910	3,049
1911	3,080
1912	3,065
1913	2,978

NUMBERS OF 3RD CLASS BOATS: 1882 30; 1894 29; 1904 4; 1913 26.

(ii) BRIXHAM (DARTMOUTH TO AND INCLUDING 1902)

YEAR	NUMBER
1873	1,091
1874	955
1875	1,069
1876	896
1877	1,052
1878	736
1879	739
1880	741
1881	680
1882	695
1883	842
1884	730
1885	651
1886	952
1887	927
1888	973
1889	1,089
1890	1,084
1891	1,084
1892	1,008
1893	1,119
1894	1,089
1895	1,071
1896	1,105
1897	1,121
1898	1,142
1899	1,053
1900	968
1901	886
1902	665
1903	758
1904	824
1905	871
1906	902
1907	907
1908	887
1909	865
1910	845
1911	811
1912	809
1913	786

NUMBERS OF 3RD CLASS BOATS: 1882 12; 1883 2; 1913 2.

(iii) FLEETWOOD

YEAR	NUMBER
1873	102
1874	331
1875	323
1876	320
1877	289
1878	281
1879	255
1880	225
1881	251
1882	204
1883	236
1884	185
1885	207
1886	236
1887	216
1888	306
1889	344
1890	330
1891	379
1892	360
1893	372
1894	360
1895	406
1896	416
1897	649
1898	636
1899	317
1900	374
1901	387
1902	374
1903	380
1904	415
1905	491
1906	622
1907	792
1908	880
1909	848
1910	811
1911	901
1912	1,027
1913	1,074

NUMBERS OF 3RD CLASS BOATS: NONE

(iv) GRIMSBY

YEAR	NUMBER	
1873	1,335	
1874	1,083	
1875	1,489	
1876	1,893	
1877	1,808	
1878	1,482	
1879	1,085	
1880	978	
1881	523	(RE-CHECKED)
1882	1,053	
1883	1,849	
1884	1,232	
1885	1,394	
1886	2,847	
1887	2,604	
1888	3,032	
1889	3,495	
1890	3,041	
1891	2,945	
1892	2,882	
1893	3,080	
1894	3,873	
1895	3,889	
1896	3,850	
1897	3,793	
1898	4,527	
1899	3,825	
1900	3,944	
1901	4,278	
1902	4,439	
1903	4,633	
1904	4,310	
1905	4,718	
1906	5,287	
1907	5,491	
1908	5,491	
1909	5,474	
1910	5,642	
1911	5,869	
1912	5,969	
1913	6,291	

NUMBERS OF 3RD CLASS BOATS: 1882 4; 1903 0; 1913 28.

(v) HULL

YEAR	NUMBER
1873	2,167
1874	2,003
1875	2,222
1876	2,466
1877	2,344
1878	2,416
1879	2,267
1880	2,519
1881	2,933
1882	2,551
1883	2,508
1884	2,536
1885	2,777
1886	2,678
1887	2,184
1888	2,715
1889	2,538
1890	2,193
1891	1,930
1892	1,681
1893	2,070
1894	1,949
1895	2,079
1896	1,330
1897	1,395
1898	1,078
1899	3,012
1900	2,355
1901	2,599
1902	3,849
1903	3,730
1904	4,507
1905	4,510
1906	4,737
1907	4,893
1908	4,975
1909	4,967
1910	4,588
1911	4,479
1912	4,385
1913	4,513

NUMBERS OF 3RD CLASS BOATS: 1882 1; 1903 283; 1904 148; 1905 153; 1913 135.

(vi) LOWESTOFT

YEAR	NUMBER
1873	2,768
1874	2,684
1875	3,083
1876	3,055
1877	2,516
1878	2,578
1879	2,967
1880	2,666
1881	2,721
1882	2,903
1883	3,157
1884	2,460
1885	2,728
1886	2,713
1887	2,910
1888	2,993
1889	2,990
1890	2,706
1891	2,680
1892	2,639
1893	2,846
1894	2,691
1895	2,893
1896	2,822
1897	2,648
1898	2,644
1899	2,999
1900	2,961
1901	3,117
1902	3,697
1903	3,755
1904	3,857
1905	3,907
1906	4,012
1907	4,325
1908	4,661
1909	4,705
1910	4,821
1911	4,970
1912	4,972
1913	4,983

NUMBERS OF 3RD CLASS BOATS: 1882 1; 1897 2; 1903 273; 1904 161; 1905 161; 1913 152.

(vii) MILFORD

YEAR	NUMBER
1873	526
1874	600
1875	605
1876	577
1877	613
1878	232
1879	165
1880	100
1881	113
1882	118
1883	110
1884	106
1885	115
1886	73
1887	65
1888	80
1889	98
1890	61
1891	251
1892	285
1893	346
1894	161
1895	317
1896	265
1897	183
1898	143
1899	539
1900	555
1901	567
1902	550
1903	550
1904	568
1905	599
1906	590
1907	726
1908	777
1909	803
1910	762
1911	778
1912	790
1913	766

NUMBERS OF 3RD CLASS BOATS:1882 2; 1886 0; 1898 0; 1903 9; 1905 8; 1913 8.

(viii) NORTH SHIELDS

YEAR	NUMBER
1873	1,441
1874	983
1875	1,283
1876	950
1877	1,151
1878	1,255
1879	1,301
1880	1,223
1881	1,222
1882	1,102
1883	1,304
1884	1,261
1885	1,131
1886	1,410
1887	1,337
1888	1,478
1889	1,462
1890	1,338
1891	1,445
1892	1,423
1893	1,460
1894	1,494
1895	2,150
1896	1,407
1897	1,486
1898	1,612
1899	1,553
1900	1,456
1901	1,493
1902	1,760
1903	1,771
1904	1,676
1905	1,528
1906	1,462
1907	1,473
1908	1,543
1909	1,505
1910	1,504
1911	1,484
1912	1,364
1913	1,343

NUMBERS OF 3RD CLASS BOATS: 1882 0; 1894 0; 1903 4; 1913 5.

(ix) RAMSGATE

YEAR	NUMBER
1873	609
1874	653
1875	775
1876	745
1877	648
1878	680
1879	722
1880	712
1881	676
1882	558
1883	600
1884	482
1885	386
1886	674
1887	712
1888	737
1889	724
1890	769
1891	760
1892	755
1893	759
1894	799
1895	816
1896	838
1897	844
1898	743
1899	604
1900	548
1901	553
1902	656
1903	676
1904	712
1905	718
1906	738
1907	752
1908	738
1909	731
1910	746
1911	707
1912	688
1913	672

NUMBERS OF 3RD CLASS BOATS: 1882 0; 1898 0; 1903 41; 1905 45; 1913 51.

(x) SCARBOROUGH

YEAR	NUMBER
1873	1,292
1874	1,283
1875	1,062
1876	1,172
1877	1,136
1878	1,128
1879	844
1880	647
1881	946
1882	987
1883	836
1884	856
1885	860
1886	749
1887	760
1888	660
1889	720
1890	706
1891	655
1892	631
1893	618
1894	631
1895	662
1896	684
1897	697
1898	658
1899	571
1900	566
1901	573
1902	554
1903	619
1904	539
1905	582
1906	628
1907	690
1908	686
1909	671
1910	660
1911	677
1912	642
1913	645

NUMBERS OF 3RD CLASS BOATS: 1882 0; 1898 0; 1903 9; 1905 17; 1913 16.

(ii) GREAT YARMOUTH

YEAR	NUMBER
1873	4,368
1874	6,436
1875	3,468
1876	3,665
1877	3,505
1878	3,055
1879	2,710
1880	2,651
1881	2,047
1882	2,073
1883	2,728
1884	2,663
1885	2,659
1886	3,347
1887	2,920
1888	3,423
1889	3,604
1890	2,842
1891	2,337
1892	2,116
1893	2,092
1894	2,261
1895	3,103
1896	3,361
1897	3,107
1898	2,843
1899	2,512
1900	1,954
1901	1,778
1902	1,927
1903	2,193
1904	2,310
1905	2,457
1906	2,451
1907	2,665
1908	2,714
1909	2,697
1910	2,721
1911	2,691
1912	2,717
1913	2,792

NUMBERS OF 3RD CLASS BOATS: 1882 33; 1884 0; 1894 0;1898 0; 1903 46; 1905 115; 1909 180; 1913 209.

(xii) TOTAL NUMBER OF MEN AND BOYS EMPLOYED ON FISHING BOATS REG'D UNDER M/SHIPPING AND SEA FISHERIES ACTS UK INC. C.I. AND I.O.M

YEAR	SAIL	STEAM	TOTAL
1885	15,793	1,029	16,822
1886	15,926	1,598	17,524
1887	16,326	1,965	18,291
1888	19,009	2,288	21,297
1889	18,684	2,671	21,355
1890	17,316	3,196	20,512
1891	16,806	4,342	21,148
1892	16,190	4,945	21,135
1893	16,077	5,618	21,695
1894	15,452	6,287	21,739
1895	14,696	6,685	21,381
1896	14,184	7,869	22,053
1897	13,335	8,795	22,130
1898	11,961	10,504	22,465
1899	10,364	12,016	22,380
1900	8,599	13,711	22,310
1901	7,580	14,412	21,992
1902	7,297	15,573	22,870
1903	7,066	16,931	23,997
1904	6,991	17,467	24,458
1905	7,005	18,477	25,482
1906	7,152	20,309	27,461
1907	6,922	22,961	29,883
1908	6,776	25,439	32,215
1909	6,617	25,909	32,526
1910	6,268	27,005	33,273
1911	5,460	28,567	34,027
1912	5,022	29,948	34,970
1913	4,622	31,175	35,797