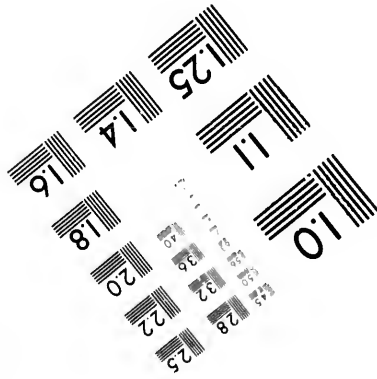
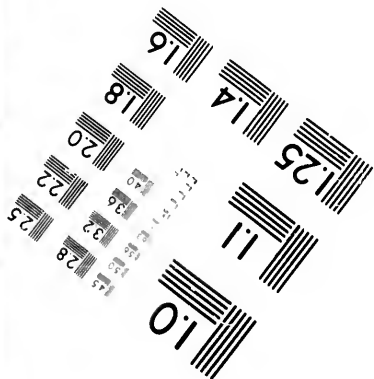
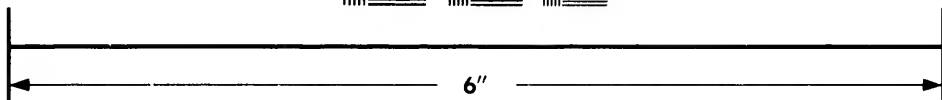
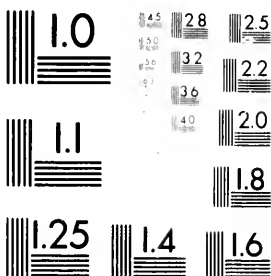


# IMAGE EVALUATION TEST TARGET (MT-3)



Photographic  
Sciences  
Corporation

23 WEST MAIN STREET  
WEBSTER, N.Y. 14580  
(716) 872-4503

**CIHM/ICMH  
Microfiche  
Series.**

**CIHM/ICMH  
Collection de  
microfiches.**



Canadian Institute for Historical Microreproductions

Institut canadien de microreproductions historiques

**1980**

# Technical and Bibliographic Notes/Notes techniques et bibliographiques

The institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured covers/  
Couverture de couleur
- ☐ Covers damaged/  
Couverture endommagée
- ☐ Covers restored and/or laminated/  
Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/  
Le titre de couverture manque
- ☐ Coloured maps/  
Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/  
Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/  
Planches et/ou illustrations en couleur
- ☐ Bound with other material/  
Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion  
along interior margin/  
La reliure serrée peut causer de l'ombre ou de la  
distortion le long de la marge intérieure
- ☐ Blank leaves added during restoration may  
appear within the text. Whenever possible, these  
have been omitted from filming/  
Il se peut que certaines pages blanches ajoutées  
lors d'une restauration apparaissent dans le texte,  
mais, lorsque cela était possible, ces pages n'ont  
pas été filmées.
- ☐ Additional comments:/  
Commentaires supplémentaires:

- ☐ Coloured pages/  
Pages de couleur
- ☐ Pages damaged/  
Pages endommagées
- ☐ Pages restored and/or laminated/  
Pages restaurées et/ou pelliculées
- ☐ Pages discoloured, stained or foxed/  
Pages décolorées, tachetées ou piquées
- ☐ Pages detached/  
Pages détachées
- ☐ Showthrough/  
Transparence
- ☐ Quality of print varies/  
Qualité inégale de l'impression
- ☐ Includes supplementary material/  
Comprend du matériel supplémentaire
- ☐ Only edition available/  
Seule édition disponible
- ☐ Pages wholly or partially obscured by errata  
slips, tissues, etc., have been refilmed to  
ensure the best possible image/  
Les pages totalement ou partiellement  
obscurcies par un feuillet d'errata, une pelure,  
etc., ont été filmées à nouveau de façon à  
obtenir la meilleure image possible.

☒ This item is filmed at the reduction ratio checked below/  
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
								✓			

The copy filmed here has been reproduced thanks to the generosity of:

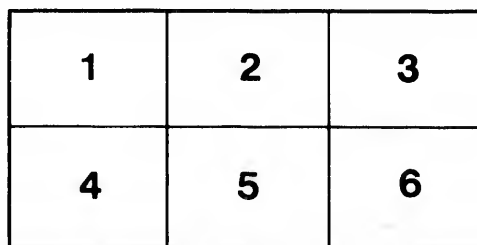
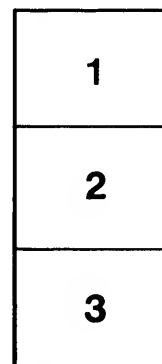
National Library of Canada

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol → (meaning "CONTINUED"), or the symbol ▼ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



L'exemplaire filmé fut reproduit grâce à la générosité de:

Bibliothèque nationale du Canada

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole → signifie "A SUIVRE", le symbole ▼ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.



7

# FISHERIES.

BY

E. W. H. HOLDSWORTH, F.L.S., F.Z.S.,

AUTHOR OF "DEEP SEA FISHING AND FISHING BOATS;"

AND THE

## LAW RELATING TO FISHERIES.

BY

EDMUND ROBERTSON,

BARRISTER-AT-LAW.

---

*Montreal:*

LOVELL PRINTING AND PUBLISHING COMPANY.

1879.

Entered according to Act of Parliament of Canada, in the year one thousand eight hundred and seventy-nine, by  
ADAM & CHARLES BLACK, Publishers, Edinburgh, Scotland, in the Office of the Minister of Agriculture, at Ottawa.

## PREFATORY NOTE.

---

SOME account is here given of the Sea Fisheries which are carried on in the colder waters on both sides of the Atlantic Ocean, the methods of working and the productive character of those around the British Islands being more particularly described. The various conditions under which the Fisheries are worked in the British seas are to be met with also in the waters of British North America, and there is no apparent reason why the same methods should not be used in both. In the belief, therefore, that the people of the Dominion have a special interest in the subject, the following details of the working of the beam-trawl, and other methods in use on the British coasts, are now offered to their notice.

LONDON, *January* 21, 1879.





## FISHERIES

UNDER the heading Sea Fisheries, which form the particular subject of the present article,<sup>1</sup> may be included the various operations engaged in for the capture of the different forms of marine life which, in some manner or other, minister to the wants or convenience of man. The most important of these fisheries—those only, in fact, to which the title strictly belongs, and which have more or less widely occupied attention from probably the earliest times—are carried on chiefly by hook and line or net, with the object of obtaining fish for the purposes of food; and this main division of the general subject will be here considered.

Although little or nothing is known of the methods of fishing on our coasts in very early times, there can be no doubt that in England, as in all maritime countries, fish has always been eagerly sought after as an easily procurable article of food. The abundance of herrings and mackerel, for instance, on the coasts at regular seasons of the year, could not have failed to attract attention; and Swinden, in his *History and Antiquities of Great Yarmouth*, expresses his belief that the herring fishery began there soon after the year 495. In Scotland also there is evidence that the herring fishery was systematically carried on from a very early date. Precise records of other fisheries do not go back so far as that of the herring; but there is no reason for believing that cod and kindred fishes were not taken by the hook and line very many centuries ago, and, like the herring, were subjected to some ready mode of curing either with salt or by drying in the open air. In comparatively recent times all the fisheries have been largely developed, and none more so than that known as beam-trawling, a method of fishing which had probably attracted little notice a hundred years ago, but is now the most regularly productive and important on the English coast. Many circumstances have combined to encourage the working of sea fisheries as a national industry. The great extent of coast-line surrounding the British Islands provides ready access to the sea to a numerous population who become familiar from their youth with seafaring pursuits; and to such occupations large numbers betake themselves with instinctive aptitude, either as fishermen or sailors. In many cases early associations lead them to devote themselves to such fisheries as are within reach of their native villages; in others, they may become alternately sailors and fishermen, shipping for a few months every year on a trading voyage, and returning home in time to take part in the herring or some other temporary but profitable fishery; whilst in the case of the deep-sea trawling or cod fishery, they learn to become as good sailors as they are fishermen, for they have often to remain at sea in decked vessels for weeks at a time in all kinds of weather.—they must keep on their fishing ground, and must trust to their knowledge of seamanship to battle with the furious gales to which they may be at any time exposed when thus far away from shelter. Inducements to become fishermen are not wanting to this coast population. Nowhere are the best kinds of sea fish more abundant than in temperate and moderately high latitudes; and in this respect the British Islands are most advantageously situated, the seas surrounding them being frequented throughout the year by a variety of fishes always in request for the market, besides producing countless shoals of other kinds which only come within reach of the fishermen at particular seasons of the year. And great

as may sometimes be the supply of fish during the continuance of favourable weather, it is rarely that the demand for it is exceeded at the present day; for all the markets of the country are brought within reach by the facilities provided for rapid transport from the fishing ports by the extensive system of coast and inland railways now in operation. Fishermen, therefore, always find a market for their produce; and although it is to be feared that many of them obtain but a small proportion of the price for which their fish is ultimately sold to the consumer, the majority of them are enabled to live more comfortably than formerly, and to save enough to keep their fishing gear in good working order, and in many cases to pay for improved and larger boats.

There is no doubt that the fisheries fluctuate a good deal from year to year; and it is often the case that they may be good on one part of a coast when they are bad on another. The important herring fishery on the coasts of Scotland is a marked example of this, as must be familiar to all persons who have given any attention to the subject. Thus it not unfrequently happens that when the fishery on the east side is particularly successful, a scarcity occurs on the west coast, or *vice versa*. Again, in some years the fish are equally abundant or scarce on both coasts. These fluctuations are observed in even small districts of a line of coast, and one part of a season may be good and another bad in the same locality. Precisely the same variations occur on all the coasts of the British Islands, and with all kinds of fishes. Undoubtedly, weather is one of the most important elements in the question of success; and a generally stormy season has a marked effect in the diminished quantity of fish landed. It tells both in reducing the number of fishermen at work, and in driving the fish from their usual haunts. It is only quite recently that attention has been directed to the subject of temperature as affecting the movements of certain fishes towards or from the surface of the sea, and this will be further noticed when we speak of the herring fisheries. Apparently trifling circumstances may in some cases materially affect the catch of fish. Thus the sea fishery for pilchards on the coast of Cornwall has fluctuated exceedingly during the last 50 or 60 years for which returns are in existence; but however abundant these fish may be on the coast, the seas cannot catch them unless the shoals come quite close to the land in localities where these nets can be worked. Enormous hauls of pilchards have been made in particular years, whilst in others the fishermen have waited week after week without a chance of wetting their nets, although the drift-net fishermen at some little distance from the land have been meeting with fair success. The large apparent element of chance in the success of our fisheries cannot be better expressed than by the general hope of the fishermen for "good luck."

Great changes have taken place in the fishing trade within the last 20 or 30 years, more especially in that for fish sent fresh to the market. Excluding herrings and cod, which to a great extent were consigned to the curer as soon as possible after they were caught, a large proportion of the fish formerly taken on our coasts was disposed of within a short distance of the place where it was landed. A good many turbot and soles were forwarded by light carts or coaches to the nearest railways as these gradually extended in different directions from London; but the people near the coast were, a generation or two ago, the principal consumers of fish, and the supply was comparatively scanty, for the fishing boats were small, and there was little inducement to fish on a large scale when the

<sup>1</sup> This does not include CORAL, PEARL, SALMON, SPONGE, and WHALE FISHERIES.

markets within reach were so few. All this has been completely changed, and the main agent in the work has been the great extension of railways throughout the length and breadth of the land. Next to railways as a means of facilitating the transit of fish to all the markets, the use of ice for packing the fish has become of great importance, so much so in fact that without its employment it would be impossible to carry on the North Sea trawl fishery during summer at the distance from land at which it is generally worked, and where some of the most productive grounds are situated. Its special importance in this fishery will be further noticed when we speak of the general system of beam-trawling; but we may here mention that without the use of ice a large proportion of the fish now sent long distances by railway would never reach their destination in a condition fit for the table. The idea of using ice in connexion with the fish trade was first put into a practicable shape by Mr Samuel Hewett. At the present time about 30,000 tons of ice are imported annually from Norway into Hull, which is only one of the large North Sea trawling stations, for the sole purpose of preserving fish, either on board the fishing smacks or during its transit to market. With the exception of herrings, pilchards, and sprats, a large proportion of the fish now caught on the English coast is put into ice almost as soon as taken out of the water. Much of it is at once so packed on board the trawlers; it is brought on shore sometimes after several days, and sold in the wholesale markets; it is then repacked in ice and forwarded to other markets, where it is purchased by the fishmongers, who have a stock of ice at home ready to receive it; and there it remains, if properly taken care of, till wanted, sufficient only to make an attractive display being laid out at one time for sale.

The question of how long our present large supply of sea fish is likely to continue is one of much interest, and the answer to it depends on whether or not our fisheries are carried on in such a manner as to cause more destruction of fish life than can be compensated for by the vast reproductive powers of those fishes which escape the nets and hooks of the fishermen. For more than fifty years past the cry has been periodically raised that our fisheries are being ruined. The general complaint has been of the wasteful destruction of spawn and very young fish by beam-trawling and sear nets; and in 1863 the outcry was so loud that a Royal Commission was appointed, not only to examine this question, but also to inquire into the general condition of all our sea fisheries,—the special objects of inquiry being the state of the supply of fish, and the questions whether the methods of fishing in use involved a wasteful destruction of fish or spawn, and whether existing fishery restrictions operated injuriously on the fisheries. On these points the commissioners, after taking evidence all round the British Islands, were enabled to give a very decided opinion. They reported that the supply of fish generally had largely increased, that the methods of fishing involved no waste of young fish that could be prevented without interfering with the general fisheries, that spawn was not destroyed by the nets, and that all fishery restrictions should be removed except such as were desirable for protecting and keeping order among the fishermen. The recommendations of the commissioners were embodied in an Act of Parliament known as The Sea Fisheries Act 1868, by which, with one or two small exceptions relating to herring fishing on the west coast of Scotland, previous Fishery Acts were repealed, and fresh regulations made having reference to the registration of fishing boats, keeping order among drift-fishermen and beam-trawlers, and providing a close time for oysters in the English Channel. The main object of the Act was to carry out a convention between the British Islands and France, for the better ordering of the fisheries

in the seas adjoining the two countries. The Act came into force in England on the 1st of February 1869, but circumstances have hitherto prevented any date being fixed for carrying out the convention on the part of the French. Great advantage has undoubtedly been gained by British fishermen from the substitution of the present simple fishery regulations for the numerous Acts previously existing, many of which had long been obsolete; but the Royal Commission, which was issued virtually to inquire into the alleged destruction of fish spawn on the ground by beam-trawlers, would probably have never come into existence had the facts then been known which have since come to light about the spawning habits of most of our edible fishes. These facts are so important that a short notice of them may be given here.

Fishermen are in the habit of asserting with perfect confidence that fishes of almost every kind they are accustomed to catch have certain grounds which they frequent at particular seasons for the purpose of depositing their ova. The herring is known to spawn on the ground,—at all events the spawn is found there in irregularly shaped lumps adhering to the bottom. It has therefore been concluded that all kinds of fishes have the same habits in this respect. Yet no one has been able to speak positively of having ever seen any fish spawn taken from the ground except that of the herring. Various soft and gelatinous substances are brought on shore by the sear nets, and commonly go by the name of spawn among the inshore fishermen; but that they are not fish spawn is perfectly well known to any one who has given attention to the variety of curious animal organisms inhabiting the sea.

It was stated by Professors Huxley and Allman in 1867, before the select committee of the House of Commons on the Sea Coast Fisheries (Ireland) Bill, as within their personal knowledge, that fish ova had been found floating at the surface of the sea, and that the ova they had met with were in all cases alive, and some of them in an advanced state of development. Reference was at the same time made to the observations then recently recorded by Norwegian naturalists on the spawning habits of the common cod, leading to the belief that spawning at the surface was by no means uncommon with our sea fishes. These investigations have been systematically carried on during the last ten years, under the direction of the Swedish Government, by Professor G. O. Sars of the University of Christiania, and have resulted in some unexpected discoveries. The seas in the neighbourhood of the Lofoten Islands on the coast of Norway had long been known to be a great place of resort for cod during the spawning season; and in 1864 Professor Sars commenced his work there, and by means of a small surface towing net he obtained plenty of the ova of the common cod (*Gadus morhua*) floating at the surface; examples in various stages of development were procured, the young fish were successfully hatched out, and the species identified beyond a doubt. Subsequent observations fully confirmed the accuracy of the conclusions previously arrived at that the cod spawn was not deposited on the ground but floated freely at or near the surface. In 1865 the same observations were made on the ova of the haddock (*Gadus aeglefinus*), and it was satisfactorily proved that they went through all their stages of development while floating at the surface, in precisely the same manner as in the case of the cod. Sars was at first inclined to believe this development of the ova while floating was peculiar to the members of the *Gadidae* or cod family, in its restricted sense; but in the summer of 1865 he visited the southern coast of Norway during the season for mackerel, and found abundant evidence of the same rule obtaining in that widely distinct fish. In the case of the mackerel, the spawning actually

takes place at the surface; but with the cod family we believe the operation has not been so distinctly observed. The ova, however, are undoubtedly met with at the surface and at a short distance below it. Entirely subversive as these discoveries of Professor Sars are of the popular notions about fish-spawning, it is even more unexpected to find that both he and M. A. W. Malm of Gothenburg have independently ascertained that the ova of that essentially ground-fish the plaice (*Pleuronectes platessa*) follow the same rule of floating at the surface. Other kinds of floating ova were also obtained by Sars, some of which he succeeded in hatching; and he has completely identified the gurnard (*Trigla*) and the garfish (*Bellone*), in addition to those before mentioned. It is evident, then, that the floating of fish ova during the development of the embryo must be taken as the general rule in several large and distinct families of sea fish. Sars has pointed out that the development takes place at the bottom in the case of those fishes especially whose ova are cemented together by a glutinous secretion, or fastened in lumps to foreign bodies, such as Algae, Hydroids, &c. He mentions as examples of this, among others, the herring (*Clupea*), the capelan (*Osmerus*), the species of *Cottus*, *Liparis*, &c.

It is particularly worthy of notice that, according to these observations of the Norwegian naturalists, all the important kinds of fish taken by our line fishermen and beam-trawlers, and the mackerel among such as are caught by the drift-nets, may be reasonably included among the species whose spawn floats at or near the surface of the sea, and their ova cannot therefore be liable to the slightest injury by any method of fishing which is carried on upon or near the ground. For if that be the rule with the spawn of the cod and haddock there can hardly be a doubt about its being so likewise with the ova of ling, coal-fish, whiting, pollack, hake, and that northern species, the tusk, all belonging to the same family. Again, turbot, holibut, brill, soles, plaice, dabs, and flounders are all closely allied, and there can scarcely be a doubt that the same rule applies to all which Sars and Malm have established in the case of the plaice, one of the most typical of this group of fishes. The gurnard family must also be included in this category; the spawn of the red mullet, we believe, has been observed floating in aquariums; and the dory, from its close affinity to the mackerel, may be expected to follow the same rule. On the other hand, we know that the spawn of the herring is commonly found at the bottom, although it by no means follows that the parent fish is there when the ova are excluded; for the full herring is frequently taken in drift nets which are very near the surface, and these nets are often covered with small lumps of spawn. At the same time the specific gravity of herring spawn is greater than water, and it sinks to the bottom sooner or later if nothing intercepts it. There is no evidence of its ever floating at or near the surface as is the case with that of the cod. In fact, the aggregation of the ova into masses of various sizes, and the glutinous substance in which the ova are embedded, by which they are enabled to adhere firmly to anything with which they may come in contact, point to their remaining in a fixed position during the process of development. It might have been anticipated that the other members of the herring family—the pilchard and sprat, for instance—would also have spawned on the ground, but, so far as we are aware, their ova have never been found there. Indeed, nothing is known of the spawning habits of the sprat, although this little fish has the roe well developed in December or January, when it is found in the greatest abundance on our coast, and comes nearest to the shore. The spawning of the pilchard is a matter of some little interest. The late Mr Jonathan Couch, who probably devoted

more time to the study of the habits of this fish than any other ichthyologist, states his belief that the pilchard spawned at the surface, and the ova became mixed with a large quantity of tenacious mucus which spread out like a sheet on the water and kept them floating. If this should be confirmed, it will prove that even in the case of agglutinated masses of ova, development may naturally take place in them far away from the bottom. There appears to be little doubt that the pilchard spawns far out at sea, as they are on chance occasions taken in spawning condition in the mackerel drift-nets early in the year; and when, some months later, the shoals of pilchards approach the land the roe shows no signs of development. These circumstances favour the idea that pilchards are surface spawners, as believed by Mr Couch.

There are several other kinds of edible fish of whose spawning habits we have no definite knowledge, but enough has been discovered of the habits of most of the fish which are valuable for the purposes of food, to show that there need be no anxiety about their spawn being destroyed by any of the methods of fishing in ordinary use. The only apparent exception to this statement is in the case of the herring, whose spawn it has been alleged has been destroyed by the beam-trawlers. But if the beam-trawlers wish to avoid t-uring their nets in pieces, they must work where the ground is smooth; and in the few precise localities where it has been positively ascertained that the herring does spawn, the general character of the bottom is rough. That is the ground specially worked over by the line fishermen for haddock, cod, turbot, and other fishes, which come there in numbers for the sake of feeding on the herring spawn. There is a popular idea that all fish spawn is of a most delicate nature, and quickly loses its vitality if taken out of the water for a short time, or at all knocked about. This is probably true in those cases in which the ova are separated from each other after exclusion, and float freely in the water; but it is not so with the spawn of the herring, or probably of other fish whose ova are embedded in a tenacious mucus. The experiments of Professor Allman and of Dr M'Bain have shown that herring spawn does not readily lose its vitality under rough treatment, and may even be hatched out after having been exposed to most unnatural conditions. Professor Allman states in his Report to the Board of Fisheries at Edinburgh that some stones covered with spawn were taken from the sea by divers on the 1st of March 1862, not far from the Island of May. Some of this spawn was forwarded to him and came into his possession after being kept in only a small quantity of water for two entire days. He says:—

"With the view of determining whether development would proceed in confinement, I placed some of this spawn in a glass jar with sea-water, exposing it in a window looking to the east. The several stages of development were regularly passed through, and on the 15th of March the embryo was fully formed, energetic movements were performed by it in the ovum, and it seemed ready to escape into the surrounding water. On the 16th some of the embryos had actually escaped, and were now about four-tenths of an inch in length. They were of crystalline transparency, and swam about with great activity, and with the remains of the yolk, reduced now to a very small volume, still adhering to them. The specific characters had, of course, not yet become established, and the little fish afforded no further evidence, beyond what we already possessed, to enable us to identify it with the young of the herring."

The young fish lived nearly a month in confinement, but the specific characters were not even then sufficiently perfected to identify the fish with certainty. There could be no reasonable doubt, however, that the spawn was that of the herring. After some account of other discoveries of spawn, he thus concludes his report:—

"It was shown by these experiments that the vitality of the spawn was in no way injured by detaching it from the spawning

bed, so that if it be returned to the sea before it suffers any prolonged exposure to the air, development will proceed apparently unchecked. These specimens, indeed, which underwent development in my possession, had not only been removed from the ground, but had been kept for many hours in a scanty supply of water before I received them; and even after they came under my care, they were necessarily placed in conditions very different from those to which they would have been exposed if they had been allowed to remain in their natural habitat,—and yet, with all these disadvantages, development proceeded uninterruptedly.”

**Registration of Fishing Vessels.**—Under the Sea Fisheries Act 1868, all vessels and boats engaged in fishing for the purpose of sale must be registered at the custom-house, and must be marked on the bow with letters denoting the port to which they belong, and their registered number. Thus, Grimsby is represented by the letters G Y, Peterhead by P D, and Galway by G. The fishing boats are divided into three classes,—the first class including everything of 15 tons and upwards, the second class all boats under 15 tons navigated otherwise than by oars only, that is, sometimes by sails and sometimes by oars, and the third class those with which oars only are used. The last class is supposed to include only small boats used for harbour fishing; but as there are very few boats in which a sail of some kind is not sometimes hoisted, the customs have a discretionary power to put very small boats into the third class, notwithstanding their occasional use of a sail. The registers for each port are sent to the registrar-general of shipping, and appear in the annual returns published by the Board of Trade. There is great difficulty, however, in obtaining precise accuracy in the returns for many parts of the coast; new boats sometimes escape registration, and boats which have been lost or broken up sometimes remain for a year or so on the list. But, imperfect as these returns undoubtedly are, they are of some value in giving an approximate idea of the number of the fishing craft, and of the average size of those in the first class. It must be remembered, however, that this class includes boats ranging from 15 tons to 70 or 80 tons. The tendency now is to fish farther from the land than formerly, and to use decked instead of open boats; the result is that there is a steady increase in the first class boats, and a diminution in the number of the smaller ones. The following table gives the total number of fishing boats in England, Scotland, Ireland, and the Isle of Man on the register for 1876 and 1877, arranged according to their classes:—

	Years.	First Class.		Second Class.	Third Class.
		Boats.	Tonnage.	Boats.	Boats.
England.....	1876	3,142	121,445	8,777	2,590
	1877	3,425	137,768	7,825	2,014
Scotland.....	1876	2,782	47,743	9,888	1,470
	1877	2,940	51,030	9,326	1,303
Ireland.....	1876	393	9,364	2,802	2,049
	1877	405	9,861	2,817	3,002
Isle of Man.	1876	235	5,017	107	41
	1877	254	5,446	123	11
Totals ...	1876	6,552	183,569	21,574	7,350
	1877	6,770	198,668	19,968	6,349

We will now proceed to give an account of the several valuable fisheries carried on around the coasts of the British Islands, with some details of the appliances in use, and the manner in which they are worked.

**ENGLISH FISHERIES.**—On the coast of England the methods of fishing in general use are more numerous than in the case of either Scotland or Ireland, the fishing grounds are more extensive, and the total supply of fish obtained is larger and more varied in kind. The principal modes of fishing are by the beam-trawl, the drift-net, the sear, the otter-net, and lines. Their relative importance varies to some extent, but trawling and drift-net fishing occupy by far the most conspicuous positions, and lines come next in order.

**Trawling.**—The most characteristic mode of fishing is that known in England as “trawling,” or in Scotland as “beam-trawling,” and consists in towing, trawling, or trawling a flattened bag-net, of from 100 feet long, over the bottom

in such a manner as to catch those fish especially which naturally keep close to or upon the ground. It is very desirable that the name “trawl” should be restricted to this net, presently to be described, as much confusion has been caused by the practice, general in Scotland (which has misled even such writers as Mr Couch, see *Fishes of the British Islands*, iv. 105), of applying the name to that very different kind of net which has for centuries past been almost universally known as the “sear,” “seine,” or “seyne,” and may be traced back through the Saxon *seyne* to the Latin *sayena*, a sweep-net. In the United States and Canada, the word “trawl” is still more misapplied, being given to what is in England commonly called the long line or bulter.

The beam-trawl may be simply described as a triangular, flat, purse-shaped net with the mouth extended by a horizontal wooden beam, which is raised a short distance from the ground by means of two iron frames or heads, one at each end, the upper part of the mouth being fastened to the beam, and the under portion dragging on the ground as the net is towed over the bottom. The beam of course varies in length according to the size of the net, and depends to some extent also on the length and power of the vessel which has to work it. In the large “smacks,” as the trawl-boats have long been called, the beam ranges from 36 to 50 feet in length; and there is rarely anything less than this now used by the deep-sea trawlers. Elm is generally preferred for it, selected if possible from timber grown just of the proper thickness, that the natural strength of the wood may not be lessened by more trimming or chipping than is absolutely necessary. If the required length and thickness cannot be obtained in one piece, two or even three pieces are scarfed together, and the joints secured by iron bands. When the trawl is being hoisted in, the first part of the apparatus taken on board is the large heavy beam, and this is very commonly done when the vessel is rolling and pitching about in a seaway. It is therefore necessary for the sake of safety that the beam should be secured as soon as possible, and in such a position as to be out of the way and at the same time conveniently placed for lowering again when required. All this may be easily effected by having the beam of such a length in proportion to the size of the vessel that when hoisted up, one end of it may come over the taffrail, with the iron head just clear outside, and the fore end in front of one of the shrouds. It then lies on the gunwale of the vessel, and the ends are secured by ropes, the forerigging preventing that end of the beam coming on board, but the iron head passing in between the shrouds. The object or use of the beam is to extend the mouth of the net; but, in order to allow room for the fish to enter, the beam, and with it the back of the net which is laced to it, must be raised a certain distance from the ground. For this purpose the beam is fastened at each end to the top of an iron frame, shaped somewhat like an irregularly formed stirrup, which is fitted to it at right angles by a square socket at the top. By these “heads or irons” the beam is supported at a height of nearly 3 feet from the ground, and, contrary to the popular idea on the subject, never touches the bottom. It could only do so if the trawl were to reach the ground with its back undermost, and then the mouth of the net would close and no fish could enter. The lower part of the trawl-head or iron is straight and flat, just like the corresponding part of a stirrup. It is called the “shoe,” and is the part which slides over the ground as the trawl-beam and following net are towed along. There is a slight variation in the form of the trawl-irons, and one, known as the Barking pattern, from having been adopted at that old trawling station on the Thames, is shaped exactly like a stirrup; but generally the irons are preferred with the aft side straight. We

<sup>1</sup> By a recent order in council all open fishing boats which do not fish beyond three miles from land are exempted from registration. This practically abolishes the third class which has hitherto appeared in the returns.



now have the long beam supported at each end by a more or less stirrup shaped iron fitted at right angles. The next thing to be considered is the net. This was previously spoken of as flattened and purse-shaped. When the net is spread out in the manner it would be when working, the upper part or back has its straight front edge fastened to the beam, but the corresponding lower part or belly is cut away in such a manner that the front margin forms a deep curve extending from the shoe of one trawl-head to the other, the centre of the curve or "bosom," as it is called, being at a considerable distance behind the beam. The usual rule in English trawls is for the distance between the beam and the bosom to be about the same as the length of the beam. In French trawls this distance is generally much less; but in all cases the beam and back of the net must pass over a considerable space of ground when the trawl is at work before the fish are disturbed by much of the lower margin of the net. This lower edge of the mouth of the trawl is fastened to and protected by the "ground-rope," which is made of an old hawser "rounded" or covered with small rope to keep it from chafing, and to make it heavier. The ends of the ground-rope are fastened at each side by a few turns round the back of the trawl-heads, just above the shoe, and the rope itself rests on the ground throughout its entire curve. The fish which may be disturbed by it have therefore no chance of escape at either the sides or back of the net, and as the outlet under the beam is a long way past them, and is steadily moving on, their fate is sooner or later decided by their passing over the ground-rope and finding their way into the funnel-shaped end of the net, from which a small valve of netting prevents their return. The ground-rope is the part which directly bears on the ground, and to prevent the possibility of the fish passing under it, the rope should have some weight in it so as to "bito" well, or press the ground closely. It is, however, always made of old material, so that it may break in case of getting foul of rocks or such other chance obstruction as may be met with on the generally smooth ground where the trawl can only be worked with advantage. If in such a contingency the rope were so strong and good as not to break, there would be serious danger of the tow-rope snapping, and then the whole apparatus might be lost; but the ground-rope giving way enables the net to be cleared and hauled up with probably no more damage to it than the broken rope and perhaps some torn netting. The remaining part of the trawl, extending from the bosom to the extreme end, forms a complete bag gradually diminishing in breadth to within about the last 10 feet, which part is called the "cod or purse," and is closed by a draw-rope or "cod-line" at the extremity when the net is being used. This is the general receptacle for the various fishes which enter the net; and when the trawl is hauled up and got on board the vessel, the draw-rope is cast off and the fish all fall out on the deck.

We must now say a few words about the ingenious contrivances for preventing the escape of the fish which have entered the purse and reached the farthest extremity of the net. It has been mentioned that the body of the net tapers away to the entrance to the purse. It is at this point the opening of the pockets are placed; and they are so arranged that the fish having passed into the purse, and then seeking to escape by returning along its sides, are pretty sure to go into the pockets, which extend for a length of about 15 or 16 feet along the inner side of the body of the net, and there, the more they try to press forward, the more tightly they become packed, as the pockets gradually narrow away to nothing at their upper extremity. These pockets are not separate parts of the trawl, but are made by merely lacing together the back and belly of the net,

beginning close to the margin or side nearly on a level with the bosom, and then carried on with slowly increasing breadth downwards as far as the entrance to the purse. At this point the breadth of the net is divided into three nearly equal spaces, the central one being the opening from the main body of the net into the purse, or general receptacle for the fish, which must all pass through it, and those on each side being the mouths of the pockets facing the opposite direction. The central passage has a valve or veil of netting called the "flapper," which only opens when the fish press against it on their way into the purse. To understand clearly the facilities offered to the fish to enter the pockets, it is necessary to remember that the trawl, when at work, is towed along, with just sufficient force to expand the net by the resistance of the water. But this resistance directly acts only on the interior of the body of the net between the pockets and then on the purse; it does not at first expand the pockets, but tends rather to flatten them, because they are virtually outside the general cavity of the trawl, and their openings face the further end of it. The water, however, which has expanded the body of the net, then passes through the flapper or valve, and enters the purse, which, being made with a much smaller mesh than the rest of the net, offers so much resistance that it cannot readily escape in that direction; return currents are consequently formed along the sides, and those currents open the mouths of the pockets, which, as before mentioned, are facing them; and the fish, in their endeavours to escape, and finding these openings, follow the course of the pockets until they can go no farther. The whole of the net is therefore well expanded, but it is so by the pressure of the water in one direction through the middle, and in the opposite direction at the sides or pockets.

The meshes of an ordinary deep-sea trawl vary in size in different parts of the net, diminishing from 4 inches square near the mouth to  $1\frac{1}{2}$  inches in the cod or purse. The under part of the net, being exposed to more wear and chafing than the upper, is usually made with rather stouter twine; and the purse, being especially liable to injury from being dragged over the ground with a weight of fish and perhaps stones in it, has some protection provided by layers of old netting called "rubbing pieces" laced to its under surface. The French fishermen frequently fasten a stout hide to this part of their trawls with the same object.

A deep-sea trawl, such as has now been described, is therefore an immense bag-net, the largest size being about 50 feet wide at the mouth and about 100 feet long. Many of these nets are much smaller, some of them not having the beam more than 36 feet or even less, and the net reduced in proportion; but there has been a great increase in the size of the trawl-vessels in recent years, and at the same time there has been an enlargement of the nets, although not quite in the same ratio. The trawl is towed over the ground by the trawl-warp, generally a 6-inch rope 150 fathoms long, and made up of two lengths of 75 fathoms each spliced together; one end of this warp is shackled to two other pieces each 15 fathoms long, and called the "spans or bridles," which lead one to each end of the beam, and are shackled to swivel-bolts in front of the iron heads so as to give a fair pull on the whole apparatus.

The great development of the trawl fishery in recent years has led to a vast improvement in the kind of fishing vessels employed in it. Fifty years ago the only deep-sea trawlers were in the west of England, and from Barking on the Thames. They were not nearly the tonnage of many of the vessels now used in the North Sea, but were stout, heavy, seagoing craft of their size, and capable of standing almost any description of weather; and, although comfortable, they were certainly not very fast. At that

date, however, the fish went into consumption at once, instead of being sent one or two hundred miles before it reached the consumer. The increased demand for fish of late years has led to the building of trawlers of the best description, as remarkable for their fast sailing as for other improved qualities. There is racing home now from the fishing grounds to catch the first of the market, and everything is done as quickly as possible to ensure quick distribution and delivery all over the country. The cost of the vessels has of course largely increased, not only from their greater size, but also because of the much higher price now paid for everything used in their construction. In 1862 a new trawl vessel, and what was at that time considered one of the larger class, could be built and fitted out ready for sea for £700 or £800; but it costs from £1200 to £1300 to turn out one of the vessels now commonly used in the North Sea fishery. This includes a supply of everything necessary for fishing, costing about £70 or £80. A proper fit-out consists of a double set of almost every part of the gear, so as to provide against accidents, and generally to save the time which would be lost if the trawler were obliged to return to port before he had done a fair quantity of work. A trawl-net will perhaps last from two to four months, according to the nature of the ground worked upon; but during that time parts of it will have to be renewed. The back of the net, being exposed to the least wear, lasts the longest; the under part will generally require renewing twice, and the cod or purse five or six times, before the net is finally condemned. The additional size now given to the trawl-vessels has led to an alteration in the manner in which they are rigged. The term "smack" has been for a long time applied to those trading and fishing craft which were cutter rigged, and until quite recent years all the trawlers were known as trawl-smacks. It was a convenient rig; the single mast was stepped well forward so as to allow of a large and powerful mainsail, at the same time giving plenty of free space on deck for getting in the net, and stowing it and the long trawl-beam on the top of the bulwark when not at work. But when the size of the vessels was increased to 70 or 80 tons, it was found that the mainsail, enlarged in proportion, wanted a good deal more looking after in bad weather than was convenient, and the heavier main-boom caused a great deal of straining. More hands became necessary on this account than were required for ordinary fishing purposes, and the increased expenses interfered with profitable working. The new trawl-boats were therefore built of greater length, so as to provide room for a small second mast or mizen on which a gaff-sail could be carried, and thus something could be taken off the large mainsail. The result has been very satisfactory; just as much sail is carried as before, but it is not so lofty, and being divided into smaller pieces, it can be handled with greater ease and safety. As a gaff-sail is carried on the mizen, the rig is that of a ketch; had a lug-sail been used instead of a gaff-sail, the vessel would have been what is called "dandy-rigged." The increased length of the vessel in proportion to her size gives many advantages. Space is provided for packing away a considerable quantity of ice, which is a very necessary article in the present mode of working the North Sea trawl fishery; the produce of many fishing days can be properly stowed away and preserved in good condition, and the crew have more roomy and comfortable accommodation,—a point of importance, since at certain seasons they remain at sea for several weeks at a time.

"Barking" the sails is a regular practice with the trawlers, as it is with most other fishermen in England and Scotland. The process consists in mopping them over with a composition of a solution of oak-bark, tar, grease, and

ochre, which acts as a good preservative of the canvas. This is done once in six or eight weeks, and a suitable place is kept for the purpose at all the important fishing stations.

Working the beam-trawl requires some little skill which can only be acquired by experience at sea. A knowledge of the ground and of the direction and times of the tide is essential; for the trawl is towed with the stream, a little faster than it is running, so that there may be just sufficient resistance from the water to expand the net. If it were towed too fast, the pressure of the water against the long transverse beam would tend to lift it from the ground, and then the fish would not enter the net. This important point is regulated by a nice adjustment of the length of tow-rope to the force of the wind and state of the sea; and experience enables the fisherman to tell, by pressing the hand firmly on the warp between the vessel and the water, whether or not the trawl is working steadily over the ground. Lowering the trawl to the bottom is also a matter requiring great care, so that it may reach the ground with the beam above the iron heads and the ground-rope in its proper position below. This can only be managed by first getting the whole apparatus in a proper position at the surface, and then keeping the vessel slowly moving through the water whilst the lowering takes place. If, as sometimes happens in spite of all precautions, the net and beam should twist round while being lowered, and the apparatus should reach the bottom with its back downwards, then the beam would be on the ground and the iron supports above, the mouth of the net would close, and no good could be done with it. The only thing for the fishermen to do under such circumstances is to haul up the trawl and shoot it again. The popular idea that the beam is always dragging on the ground is therefore a mistaken one. The trawl is shot at the beginning of the tide, so that it may be towed for five or six hours, and during that time it will probably pass over from fifteen to twenty miles of ground. As trawlers when engaged in fishing are practically anchored by their trawls, they cannot readily get out of the way of vessels meeting them, and the law admits this view of the case by obliging them at night to carry a single mast-head light as an anchor light, instead of the regulation red and green side-lights for vessels under sail.

When the tide has finished, or the smack has reached the end of its fishing ground, the trawl is hauled up by a winch or capstan. This seldom takes less than three-quarters of an hour in fine weather, and two or three hours if it be rough. The beam is got alongside, and hoisted up and secured; then the net is gathered in, the cod or end of the bag being hoisted in by a tackle, and the cod-rope closing the end being cast off, the whole catch of fish falls out on deck. The fish are immediately sorted and packed away, and the fishermen prepare for another haul, according to the state of the wind and tide.<sup>1</sup>

Trawl-fish are separated for market purposes into two great classes, known respectively as "prime" and "offal." Prime includes turbot, brill, soles, dories, and red mullet, the last being caught in large numbers in summer, especially by the Bristol trawlers. Offal is the name given to plaice, haddocks, whiting, and other kinds of inferior fishes which are caught in great abundance, and usually sell at a low price. The term "offal" was applied to these fish at a time when railways had not come into existence, and purchasers frequently could not be found for the quantity of fish the trawlers would bring to market in one day. This was especially the case with plaice and haddocks when the newly discovered fishing grounds in

<sup>1</sup> Fuller details of the mode of working the beam-trawl will be found in *Deep Sea Fishing and Fishing Boats*, London, 1874.

the North Sea were first worked. A good deal of fish was then wasted, and thousands of haddocks were thrown overboard again as soon as caught, for the fishermen were under orders not to bring ashore more than were likely to be sold whilst fresh. Even in comparatively recent years trawled haddocks were of little value, until the practice of smoking them, as had long been done in Scotland, was adopted at Hull, Grimsby, and other places; and now not a haddock is thrown away if it is in good condition when landed. It may be mentioned that round-fish, such as haddock and whiting, always suffer more or less in appearance when caught by the trawl, as they are liable to be knocked about by the crowd of fish in the small end of the net, especially when the trawl is being hauled up. They do not therefore fetch a good price in the wholesale market, whilst haddock and whiting caught by the hook are always in demand, and it need hardly be mentioned that the Scotch haddock, so long famous for their excellence, both fresh and cured, are all caught with hook and line.

The trawling stations in the west of England are Plymouth, and Brixham in Torbay, and this method of fishing has been carried on from both places for probably upwards of 100 years, although the date of its commencement has been by no means accurately ascertained. It is certain, however, that at the beginning of the present century the trawlers were comparatively few, and not half the size of those now at work. Plymouth does not appear to have progressed so steadily in later years as Brixham, and this may be partly caused by the more frequent interruptions from bad weather at the western port. The south-westerly gales so common in winter are felt in all their violence on the fishing ground of Plymouth, and the heavy sea accompanying them sometimes puts a stop to fishing for two or three days at a time. The custom also at Plymouth of only fishing during the day and returning to harbour every evening must materially diminish the chances of the fishing being very profitable, and for some few years past the number of trawl vessels has not averaged more than about 60. At Brixham, where trawling is believed to have originated, and fishing has always been the chief industry, much more enterprise is shown. The trawlers there go to sea on Monday morning and remain at work till the next morning, when they return and land their fish. After an hour or so they again go off, and fish day and night till the next morning, and so on every day till Saturday comes, when, having landed their fish, they come to anchor, get their sails down, and spend the rest of the day in mending their nets and putting everything in order for the next week's work. Sunday is a day of rest for all hands.

The history of the Brixham fishery has a very important bearing on the charges that have been brought against the trawlers of destroying spawn and very young fish, and of gradually exhausting the fishing grounds on which they worked. The Brixham men, as a rule, keep to a particular stretch of fishing ground, extending from the Start Point, just Torbay, towards the neighbourhood of Portland,—practically about twenty miles long and of variable breadth, but mostly from three to eight miles off the land. There is no record of how many trawlers there were at Brixham at the beginning of this century, but it is known that they were few and less than half their present size. In 1852, however, there were 70 of them, 85 in 1863, and in 1872 their number was about 100, besides 20 others which worked on this home ground during the winter; and new vessels are being built every year, not only to make up for losses, but to add to the fleet. This small strip of fishing ground has certainly been worked for more than a hundred years, the fishing smacks have been steadily increasing in number and have more than doubled in size, and yet there is no sign of the ground becoming exhausted. The greater demand for fish has no doubt encouraged the fishermen in their work, for they have obtained better prices for their fish; but if the effects of trawling were the exhaustion of the fishing ground, the Brixham

fishery should have come to an end many years ago. It has, however, never been so prosperous as during the last few years. Every one at Brixham is more or less interested in the success of the fishing; the actual condition of the fishery is generally understood, and the savings of the fishermen and many of the trades-people of the place are invested in it year after year. The trawlers do not work for weekly wages, but on the share principle, and the master is generally owner or part-owner of the vessel. It is consequently the interest of every one on board to do his best to make a successful fishing, and the fact of the owner being in command insures due attention to economy in working, so that, whilst no necessary expense is spared in keeping the sails and gear in proper order, everything is made to last as long as possible.

Brixham has been long considered the "mother-port" of the trawlers, the place where the system of beam-trawling originated; but although Barking, once famous as a fishing station, disputes the honour with her, there is no doubt that Brixham men have led the way in developing this particular method of fishing to its present large proportions. More than forty years ago some of the Brixham vessels went to Ramsgate and fished the grounds at that end of the Channel. Others joined them and permanently settled there, and now there are upwards of 160 sea-going trawlers belonging to the port. Ten years later Hull was colonized from Brixham and Ramsgate, and Grimsby from Hull at a subsequent period; whilst as early as 1818, Brixham smacks and fishermen passed over to Dublin to commence deep-sea trawling in Irish waters. The important rise of Hull as a trawling station dates from 1845, soon after the discovery of the famous Silver Pit, at the south end of the Dogger Bank. Before that time the number of North Sea trawlers was very small; they were only of about half the size of most of the smacks at present; and not enough was known of the fishing grounds to tempt the fishermen so far from land in vessels of such little power. For a long time, however, the line fishery for cod and haddock had been carried on in the neighbourhood of the Dogger, but in vessels specially constructed for the purpose. The Great Silver Pit, so called to distinguish it from a smaller Silver Pit much nearer the land, was first worked over during a very severe winter,—we believe, in 1843. Two fishing grounds called the Well Bank and Botany Gut had been explored and discovered to be very productive; and between them and the Dogger, and bearing true east from Flamborough Head, the Admiralty chart showed a bed of deeper soundings, ranging in some parts from 30 to 40 fathoms, and the whole extending for about sixty miles east and west, and from six to ten miles in breadth. The patch was marked "Outer Silver Pit," and on trying it with the trawl, in the deeper parts at the western end and near the middle, soles were found during that very cold season in almost incredible numbers; the nets hauled up bristling with fish trying to escape through the meshes, and such enormous catches were made as the most experienced fishermen had never before thought possible. Of course it was not long before this remarkable discovery became known, and a migration of trawlers from Brixham and Ramsgate soon took place to Hull as a convenient station from which to work on this promising ground. With the breaking up of the cold weather, however, this extraordinary congregation of soles became dispersed; but more attention was from that time directed to the North Sea fishing generally, and in after years the Silver Pit has again been found very productive whenever the winter has been very severe, or, as the trawlers call it, in "pit seasons." The fact of temperature affecting the distribution of many kinds of fish, shown in such a marked manner in this particular case, is now receiving systematic attention from the Meteorological Society of Scotland in connexion with the herring fisheries, and very important results have apparently been obtained from an inquiry into the same subject on the coasts of Nova Scotia.

The value of the North Sea fishery soon became established, and nothing in the history of our sea fisheries is more remarkable than the rapid but steady development of the system of trawling which has taken place from the Humber ports. The Hull trawlers were 40 in 1845, and most of these were arrivals from the Channel ports, as previously mentioned; but in 1863 they had increased to 270, and in 1877 there were 440 first-class fishing craft, with an aggregate of 26,310 tons, on the Hull register,—these, excepting a few shrimping boats just over 15 tons each, being all trawl-smacks. Another port on the Humber, Great Grimsby, situated nearer the entrance of the river, has made still greater progress. It had for some years been known in connexion with the North Sea cod fishery; and the practice of bringing home the cod alive in welled vessels, and keeping them so till they were wanted for the market, led to the selection of Grimsby, rather than the more important town of Hull, as better suited, on account of the greater purity of the salt water, for preserving the cod in good condition in the floating store chests; and the extension of the Manchester, Sheffield, and Lincolnshire railway to the port provided the facilities for sending away the fish to the various inland markets. In 1856, when the railway was nearly completed, five of the Hull trawlers made Grimsby their headquarters, and in the following year the line was

<sup>1</sup> Froude, in his *History of England*, vol. xii. p. 397 (cabinet edition, 1870), speaks incidentally of trawlers at Brixham so long ago as the time of the Spanish Armada. In his description of the English attack on the Spanish fleet, he says:—"Drake, returning from the chase, came up with her [the 'Capitana,' the admiral's disabled ship] in the morning. She struck her flag, and he took her with him to Torbay, where he left her to the care of the Brixham fishermen. . . . The prize proved of unexpected value. Many casks of real were found in her, and, infinitely more important, some tons of gunpowder, with which the 'Roebuck,' the swiftest trawler in the harbour, flew in pursuit of the fleet." The "Roebuck" is spoken of, in another account of the attack, by Sir Walter Raleigh's ship, and therefore, no doubt, an armed vessel, and we have been unable to find any evidence of there having been trawlers at Brixham at that date (1588).



opened to the town. The advantages of the port at once became evident, and the trawlers rapidly increased from 5 in 1858 to 70 in 1863; in 1872, only nine years later, the number was 248, and there were 82 cod smacks besides. In the return by the Board of Trade of the first-class fishing craft registered at Grimsby for 1877, the number of vessels, including trawlers, cod-smacks, and a few smaller craft engaged in procuring whelks for cod-bait, is officially stated as 505, with an aggregate of 29,924 tons, new measurement, which is more than one-third less than that known as builder's measurement. This gives an average of over 59 tons; but many of these vessels are 70 tons, and even more.

By the courtesy of Mr Reed, the dock-master at Grimsby, we are enabled to give the following return of the quantity of fish sent away by rail from that town in each of the years from 1856 to 1877:—

Years.	Tons.	Years.	Tons.	Years.	Tons.
1856	1,514	1864	11,198	1871	30,857
1857	8,495	1865	13,368	1872	31,193
1858	4,344	1866	15,692	1873	34,876
1859	4,742	1867	19,416	1874	35,134
1860	4,842	1868	21,621	1875	34,881
1861	5,871	1869	24,140	1876	40,165
1862	8,321	1870	26,324	1877	44,378
1863	8,408				

The only break in this increasing series is in 1875, and is readily explained by the fact the herring fishery in that year was a very bad one, and that instead of about 4000 tons of herrings being then landed from Lowestoft and other boats at Grimsby as had been the case for some few years previously, the quantity was very much smaller. Great, however, as has been the increase of fish sent away by rail from Grimsby, especially during the last two years, the returns above given do not represent all the fish landed at the fish-wharf; for a new trade to the Continent has lately sprung up, and fresh fish is exported direct to the following places, the returns being given for the two years in which this trade has been carried on:—

	Year.	Tons.	Year.	Tons.
Hamburg .....	1876	21	1877	111
Rotterdam .....	"	1639	"	2683
Antwerp .....	"	735	"	911

It must be remembered that this great increase of the Grimsby trawl fishery has not been at the expense of Hull and other trawling stations, for, except at Plymouth, where, owing to local causes, the number of trawlers has remained about the same for several years, the others have also more or less largely added to their fleets. Grimsby is indeed comparatively new as a fishing station, but it is fast outgrowing in this particular trade the conveniences which, at the time they were provided, were thought ample for anything that would be required. A special dock of 12 acres in extent was constructed for the use of the fishing vessels; another of 11 acres has lately been finished, as well as a graving dock capable of holding ten smacks at a time. The fish are all landed on a covered pontoon 328 feet long and 48 feet wide; but so crowded has this landing wharf become, that an addition to it is likely to be made. Ice companies have also been established, with steamers of their own constantly bringing ice from Norway for the use of the fisheries. This is largely employed in packing the fish for transit by rail inland; but ice now also forms part of the regular fit-out of the trawlers, more particularly from September to May, when, there generally being plenty of wind, each vessel brings back its own catch of fish. An air-tight compartment is fitted in the hold of the vessel, called the "ice-box," in which from two to four tons of Norwegian ice are placed when she starts on her trip, or "voyage," as it is usually called. As the fish are caught they are stowed away below in bulk, with broken ice between the layers, and this is continued till a good quantity of fish has been collected. Then the vessel returns to port, after an absence of perhaps ten or fourteen days. The fish are taken out loose and put up to auction, the buyers finding the packages; in these the fish are packed with a sprinkling of crushed ice again between the layers, and an extra quantity at the top, which is covered with straw and tied down. From May to September, however, when light winds prevail, a different system is adopted, and the vessels fish in fleets of from twenty to fifty together. Their fish are collected every day by carriers, either steamers or fast-sailing cutters, which receive what each vessel has to send in, and with it a consignment note, or "pot-list," to the wholesale dealer who has to sell it as soon as it reaches the market. All the fish are packed in ice as before, and are repacked in ice when sent away to the fishmonger, who keeps them under the same cooling influence till almost the moment of sale to the consumer; so that from first to last the value of ice in the trawl fishery is almost incalculable. Without this material the supply of trawl fish in a wholesome condition for food would not be a tenth of what it is now, the price would be infinitely greater, and

the various trades benefiting by the trawling system would not be in such a thriving condition as is now the case. The public of course do not get their fish so fresh from the sea as formerly, and there is sometimes a want of flavour about it which is undoubtedly due to long icing; but if the fish be cooked as soon as taken from the ice, it is still wholesome and generally palatable food.

Besides the trawling stations we have more particularly mentioned, Great Yarmouth is of some importance, as, in addition to a considerable fleet of trawlers belonging to the place, many of the Barking smacks also fish from that port; but after what has been already said, there is nothing special to add regarding the trawling from Yarmouth, Lowestoft, Barking, Ramsgate, and some smaller stations.

*Steam trawling.*—An endeavour is now being made on a tolerably large scale to utilize steam in deep-sea trawling. The experiment is not altogether new, it having been tried on the Devonshire coast a few years ago, but without success; for, although steam answered perfectly well in towing the trawl, and saved an immense deal of labour in hauling up the net, and time in going to and returning from the fishing ground, it was found that the expenses were too heavy. About five years ago a steam cutter fish-carrying company was started at Yarmouth, with the intention of using the vessels for either trawling or taking the fish to market; but it appears to have been soon found that it did not pay to use the steam for trawling, and that the vessels would be more profitably employed in the carrying trade. The steam-trawling now being worked is from Shields; and the fact is worthy of note, for it was along this particular part of the east coast—from Sunderland northwards—that the complaints against trawling were so loud in 1863, that the royal commission of that year was appointed to inquire into the working of the trawl system, and they commenced their inquiry at Cullercoats, only three miles north of the present headquarters of steam-trawling. In 1877 it appears that trawling was tried with one or two steam-tugs, which, owing to the badness of the shipping trade, had very little to do; and it was found to be so successful that others fitted out for the same work, until about forty were engaged steadily in this fishery whenever there was nothing to keep them at home. The latest information is that other more suitable vessels are about to begin, and that by way of further experiment fast steamers are to be employed to collect the fish from the trawlers, which will take it to London, it is calculated, in about twenty hours. The best ground fished by these steam-trawlers is said to be north of Newbiggen, and at some little distance from the land. Very fine soles are reported to be taken there, and no doubt the character that part of the coast formerly had for turbot has not been entirely lost. The chief grievance of the Newbiggen fishermen in connexion with this trawling is that their long lines are interfered with; but as they are in the habit of setting their lines, and then leaving them all night to take care of themselves, they can have no just or legal cause of complaint against fishermen who are working another method of fishing in the same neighbourhood, and who have no means of finding out where the lines are after it has become dark. It is well-established law that no one can be held responsible for the loss of fishing gear in the open sea if the owners leave it unguarded.

With regard to trawling grounds, those hitherto worked in the North Sea are principally on the Norfolk and Lincolnshire coasts for the home fishing, whilst the off grounds are about the southern part of the Dogger, and towards the Dutch coast. Some localities are famous for haddocks, others for plaice, while soles are abundant on particular grounds. But there are seasons for each locality when the fish frequenting them become more numerous there. There is good trawling also to be had off Hastings, on the Diamond grounds, as well as on the Varne and the Ridge in mid-channel, and from the North Foreland far into the North Sea. On the western side of England, the Liverpool and Fleetwood trawlers work according to the season between the Isle of Man and the English coast, sometimes going into Carnarvon and Cardigan bays; and the Tenby ground is fished by smacks belonging to Tenby, and by several from Brixham during the summer months.

The number of sea-going trawlers now working on the English coasts cannot be less than between 1700 and 1800, and of these upwards of 1300 regularly fish in the North Sea. Taking a low average of five hands to each vessel, we have nearly 9000 men and boys engaged in this fishery, and trained to a regular sailor's life.

*Drift Fisheries.*—The next in importance to trawling among the English fisheries is that carried on with drift-nets for mackerel, herrings, and pilchards. It is undoubtedly the most common method of net-fishing on the coasts of the British Islands, but nowhere is it so general as in Scotland. There are, however, some consider-

<sup>1</sup> The great increase of large trawlers within the last few years has naturally led to a more extended field of work, and many of them now go much further to sea than formerly.

able drift fisheries on the eastern and southern coasts of England, and the important mackerel fishery is mainly at the western end of the Channel. The value of that mode of fishing, technically known as "drifting or driving," will be understood when it is remembered that it is the only method by which such fishes as herrings, mackerel, and pilchards, which generally swim at or near the surface, can be readily caught in the open sea, at any distance from the land, and in any depth of water, so long as there is sufficient for the floating of the nets in the proper position. The term "drift-net" is derived from the manner in which the nets are worked. They are neither fixed nor towed within any precise limits of water, but are cast out or "shot" at any distance from the land where there are signs of fish, and are allowed to drift in whichever direction the tide may happen to take them, until it is thought desirable to haul them in. The essential principle of the working of the drift-net is that it forms a long wall or barrier of netting hanging for a few fathoms perpendicularly in the water, but extending for a great length horizontally, and that the fish, meeting these nets and trying to pass them, become meshed; they force their heads and gill-covers through the meshes, but can go no farther; and as the gill-covers catch in the sides of the mesh, the fish are unable to withdraw and escape. Whether it be mackerel, herring, or pilchard, the manner in which the net works is the same; the variations which exist relate only to the difference in habits and size of the fish sought after.

We will first speak of the Yarmouth herring fishery, one of the most important English drift fisheries, and the one of which we have the oldest records. The thriving town of Great Yarmouth in Norfolk is said to have been the resort of fishermen during the herring season as early as the 6th century, and there is no reason for believing that the fishery with which its name has been so long associated was ever carried on by any other method than drift-nets, as at the present day. An immense deal of information about the early records of the herring fishing at Yarmouth and other places has been compiled and published by Mitchell in his book on *The Herring*,<sup>1</sup> and to him we must refer our readers for numerous historical details on the subject; but we may mention that, according to authorities quoted by him, Yarmouth was erected into a burgh by Henry I. in 1108, the annual payment for this privilege being "ten milliers of herrings." The fishery was then evidently recognized as being well-established, and herrings as the special trade of the town. A quaintly written account also of the origin of Yarmouth, as given by Manship (who wrote in 1619), is quoted in the following note by Swinden<sup>2</sup> in his history of the town:—

"And now by pregnant probabilities, it is my opinion very clear, that from the landing of Cerdick (one of the Saxon adventurers) in anno 495, now 1124 years past, this sand, by the defluxion of tides, did by little and little lift its head above the waters; and so in short time after, sundry fishermen, as well of this kingdom, viz., of the Five Ports (being then the principal fishermen of England), as also of France, Flanders, and the Low Countries, yearly about the feast of St Michael the Archangel, resorted thither, where they continued in tents, made for the purpose, by the space of forty days, about the killing, trimming, salting, and selling of herrings, to all that thither came for that purpose; whereunto did resort the merchants of London, Norwich, and other places to buy herrings during the season, and then departed; as those fishermen who kill fish at Wardhouse use to do at this present. So in short time after, as that sand became firm land, and that thereby traffic began more and more to be increased, men finding the same to be a commodious place to dwell and inhabit in, did for that purpose gather themselves together, to have a continual residence therein, and began to build houses, of which came streets, and of those streets this flourishing townshipp."

Without placing entire faith in Manship's conclusions, however, there is sufficient evidence of the antiquity of the Yarmouth herring fishery; and as it keeps up its repute at the present day, and has indeed considerably increased in recent years, some details of its working may be acceptable. The nets used in the drift-fishing were formerly all made of hemp or flax, but for some years past cotton has almost entirely superseded these materials. Cotton nets are manufactured at Bridport, Manchester, Musselburgh, and other places, and are about 30 yards long and 9 or 10 yards deep. One of the long edges of the net, called the "back," is fastened to a rope corked at regular intervals, whose purpose is to keep that part of the net uppermost. The number of such nets used by each vessel depends chiefly on her size, and ranges from 80 to 130, or even more. They are fastened together end to end, and thus united form what is called a "train, fleet, or drift of nets," often extending to a length of more than a mile and a quarter. The size of the mesh was at one time regulated by law, and the smallest dimensions allowed in herring nets were one inch "from knot to knot along the line," or, to speak more concisely, one inch square. Under the present fishery regulations, however, it is wisely left to the fishermen to choose a mesh of such a size as will be most effective in catching the fish, and their practical good sense does not often lead them astray in this matter. With herrings of average size the inch mesh is found to do the most profitable work. An exception to this freedom from restriction to any particular sized mesh exists, however, on one part of the west coast of Scotland, and to this we shall direct attention when we speak of the Scotch fisheries. Twine nets are coarser than those made of cotton, and the material not being so flexible, machinery cannot be satisfactorily used in their manufacture; they are therefore netted by hand, and are made in narrower pieces called "deepings," which are laced together one below the other to make up the required depth. The labour of hauling in these nets is of course more severe than with cotton, on account of their greater weight and faculty of absorbing the water; and the comparative stiffness of the mesh is not so favourable to the capture of the fish when they strike the net. On the other hand, it was objected to the cotton nets that the thread was so fine as to cut into the fish which were meshed, and to tear off their heads as the nets were hauled in. Whatever force there may be in this objection, the advantages in time and labour saved both in making and working cotton nets have practically decided in their favour, and cotton is now almost universally employed in all our drift-fisheries. The object of the cork-rope is, as we have said, to keep that edge of the net uppermost, but in the ordinary net the corks are only sufficient for that purpose, and will not prevent its sinking. This is provided against by the use of buoys, or "bowls," as they are called, one being attached by a rope to each net, and by lengthening or shortening this rope the net can be kept at any distance below the surface that may be considered best for catching the fish. It is always a matter of uncertainty at what depth the fish may be found, and a good deal of judgment is needed in sinking the nets, if there are no signs of the fish being near the surface. It is found convenient to colour these bowls so as to mark the divisions of the fleet of nets. The first net, or the one nearest the fishing boat, is marked by a small white bowl, called the "puppy," and at the end of the next four nets is a "dan," or buoy with a pole carrying a small flag. The rest of the nets are marked in four divisions; at the first quarter from the pole is a bowl painted one quarter red and three quarters white; the next is half red and half white; and at the beginning of the last division the bowl is three quarters red and one quarter white. All the rest of the bowls from the beginning to the

<sup>1</sup> *The Herring; its Natural History and National Importance* (1864).

<sup>2</sup> *History and Antiquities of Great Yarmouth*, p. 5 (1772).

end of the train of nets are entirely black. The only part of the gear in connexion with the long string of nets is the warp, a stout rope to which each net is fastened by two smaller ropes called "seizings," and long enough to allow the warp to hang down near the foot of the nets. This warp has a twofold purpose: it prevents the loss of the nets if by any chance a vessel should pass through and cut them when near the surface, an accident not unlikely to happen, as the nets are only used at night and extend a considerable distance, often in the course of trading vessels going up and down the coast; and it is by means of the warp the nets are hauled in, the strain being thus brought evenly, by means of the seizings, on each separate net. The Yarmouth drift boats are the largest used for this kind of fishing on any part of our coasts. They are fine decked vessels of about 36 tons, the largest being upwards of 52 feet on the keel, with about 17 feet beam and 7 feet depth of hold. The universal rig has long been that of a lugger, with two masts only, and they carry a jib, a large dipping fore-lug, and a mizen with a topsail. The mizen-mast is always kept standing, but the fore-mast is made to lower backwards when fishing is going on, so as to enable the vessel to ride easier, as at that time she is head to wind and without any sail that can steady her. The mast is not lowered on to the deck, however, but, as is the practice with all large drift-boats, the head is supported on a wooden crutch 10 or 12 feet high, in the Yarmouth vessels called a "mitch-board." In this manner the mast lies very snug, and does not interfere with the room on deck. The interior of the vessel is fitted up with separate spaces for the nets, warp, fish, and salt, of which last a quantity is always taken to sprinkle the fish with before they are stowed away. These boats carry as many as ten or twelve men, as the labour of hauling in the nets is considerable; but more than half the crew are landmen who are mainly employed at the capstan by which the warp and nets are got in. Strength, and not nautical knowledge, is required for this work; and all the important part of the fishing—the deciding where to work and at what depth to place the nets—is the business of the experienced fishermen.

Drift-net fishing is with rare exceptions only carried on at night. The time for commencing is just before sunset, and the nets are then got into the water by the time it is dark. When the vessel has arrived at what from certain indications, such as numerous seabirds or possibly fish playing at the surface, or even without any special signs to guide the fishermen—may be thought a likely place for fish, for there is a great deal of speculation in the matter, the vessel is sailed slowly before the wind, and if possible across the tide; then the net is shot or thrown out over the vessel's quarter, the men being distributed at regular stations, some hauling up the net from below, others throwing it over and taking care that it falls so that the foot is clear of the corked back; others, again, looking after the warp which has to be paid out at the same time, and seeing that the seizings are made fast to it in their proper places. When it is all overboard, and about 15 or 20 fathoms of extra warp, called the "swing-rope," given out, the vessel is brought round head to wind by the warp being carried to the bow; the sails are then taken in, the mast lowered, a small mizen set to keep the vessel with her head to the wind, and the regulation lights are hoisted to show that she is fishing. A few of the hands remain on deck to keep a look out, and the vessel and nets are left to drift wherever the wind and tide may take them. It is very rarely that there is an absolute calm at sea; and if there is the faintest breath of air stirring, the fishing boat will of course feel it more than the buoys supporting the nets; she will consequently drift faster, and

being at the lee end of the train, will have a constant pull upon them, and so keep them extended almost in a straight line, so that every portion of the nets hangs clear and free from folds. If there is a great deal of wind more swing-rope is allowed, so that the nets may not be dragged through the water or any undue strain be thrown on the warp, as the more warp there is out the greater spring there is in it, and the less danger of its breaking. The first net in the train is called the "look-on" net, and frequently after an hour or so, that one is hauled in to see if any fish have been taken, and if so, in what part of the net. If it has been allowed to sink too low, that will be shown by the fish being only in the upper part of the net, or *vice versa*. Such an examination of one of the nets (called in Scotland by the name of "preeing") also sometimes discloses the fact that dog-fish are unpleasantly abundant, and this makes it desirable to haul in the nets very soon, as these pests of the fisherman do a great deal of mischief to both the fish and the nets if they are allowed to remain long in the water. The operation of hauling in the nets is carried on in the same systematic manner as in the case of shooting them. The laborious part of the work is now performed by the "capstan-men," whose duty it is to heave in the warp, the regular fishermen looking after the net as it comes on board, and shaking out the fish, which is at once sprinkled with salt and stowed away in the fish room.

After a day or two, depending on the success or failure of the fishing, the vessel returns to port; and the general practice since the opening of the extensive covered fish market by the side of the Yarmouth haven is for the luggers to go into the river and deliver their cargoes direct into the market. It is at times, however, a difficult matter to enter the haven, and then the old practice of landing the fish on the beach in front of the town is resorted to. The landing is effected by means of large "ferry-boats," which go off loaded with baskets of a peculiar shape, called "awills," each one capable of holding 500 herrings, and put them on board the lugger which is anchored at a short distance from the shore. The fish are then counted rapidly into the baskets, which are placed, when full, in the ferry-boat, and as soon as she is loaded she returns and is laid broadside on to the beach. A set of strong, active fellows, known as "beachmen," at once go to work, and two men taking each basket between them in their arms, soon carry up the fish to the carts waiting to take them either to the market or direct to the curing houses. The situation of the market by the side of the haven is very convenient; and, if required, more room can be easily provided by adding some of the vacant land immediately adjoining it, and with the same river frontage. The market was completed only in 1867, and although the Yarmouth fishery has been carried on continuously for many centuries, it is only since the opening of the new market that an accurate account has been kept of the quantity of herrings landed there.

The following statement shows the number of lasts of fish received at the market during each of the ten years 1868-77, and as a "last" of herrings contains 13,200 fish, some idea will be gained of the produce of the Yarmouth fishery, without taking into consideration what is landed elsewhere by Yarmouth boats:

Years.	Lasts.	Years.	Lasts.
1868	15,098	1873	18,796
1869	13,608	1874	17,724
1870	19,420	1875	11,820
1871	19,008	1876	12,824
1872	14,450	1877	18,900

The following is the mode of counting herrings on almost all parts of the east coast of England:—

4 herrings	= 1 warp.	
33 warps	= 1 hundred	= 132 fish
10 hundreds	= 1 thousand	= 1,320 "
10 thousands	= 1 last	= 13,200 "

Only 80 warps or 120 fish, however, go to a "hundred" of mackerel.

It will be observed that considerable fluctuations have taken place in the produce of the Yarmouth fishery during the last ten years; and there is no doubt that they have been almost entirely caused by variations of weather during the herring season.

A few words must be said here about the manufacture of bloaters and red herrings, which has made Yarmouth famous all over the world. The same mode of curing herrings is now adopted in many other parts of England and in Scotland, but the time spent on the operation is not in all cases the same.

As soon as the herrings are brought to the curing houses at Yarmouth, the fish are all washed to get rid of the salt they were sprinkled with on board the fishing boats, and then, without being gutted, or any other preparation, they are again put into salt, which is generally brought from Liverpool. Their subsequent treatment depends on whether they are to be made into red herrings or bloaters. The latter—Yarmouth bloaters, *par excellence*—are generally selected fish, full-roed and of the best quality. The finest are made in October and part of November, when the home fishery is going on, and they should be cured as soon as possible after they are taken out of the water. Strictly speaking, a bloater is nothing more than a herring that has been only slightly cured; it is kept in salt from twelve to eighteen hours, and then smoked for about twenty-four hours. But as any herring can be made into what may be called a bloater, and there being always a demand for them, their manufacture is carried on throughout the season with the best fish that can be obtained; and we need hardly say that bloaters are to be had all over the country, and cured in various places, which come far short in excellence of the selected Yarmouth fish. A properly cured bloater is ready for the market at once, and the sooner it appears on the breakfast table the better it is likely to taste. In the last few years some bloaters have been prepared at Yarmouth with even less curing than that we have spoken of, but they will not bear keeping very long. It is the practice at Yarmouth to keep the fish in salt for fourteen days if they are to be made into "red, well-cured, or high-dried herrings"; they are then washed and hung in wood-smoke for another fortnight. The curing is mainly done by women, and after the fish have been taken out of the salt and washed, they are "rived" or strung in "spits," or thin sticks, about  $4\frac{1}{2}$  feet long, which are thrust under one gill-cover and out at the mouth. Twenty-five fish are put on each stick. The spits are then taken to the smoke-room, a lofty chamber, perhaps about 16 feet square, having a series of wooden frames reaching from floor to roof, with small transverse beams, called "loves," beginning at a distance of six or seven feet from the ground, and running, one above the other, from one side of the room to the other. The frames are four feet apart, and the spits are placed in rows between them, the ends of the spits resting on opposite loves. The roof is made of tiles, uncemented, so as to allow a good draught through the room, which when filled contains three lasts of fish. About sixteen fires are made on the stone floor of this room, the fuel generally being oak billets, which give a high colour to the fish. Ash timber, producing a different colour, is used in some cases, to suit the fancies of particular foreign markets. When the room has been thus filled with spits of fish, the fires are lighted and kept burning for two days; they are then let out, and the fish allowed to drip for a day; the fires are again kept alight for two days, and the process of alternately drying and dripping is continued for a fortnight, when the herrings are considered thoroughly cured, or high-dried, and are fit for packing. For the export trade they are packed in barrels, each of which should hold 650 good-sized fish, or a larger number of smaller ones. The manufacturer's name and the number of fish are marked on each barrel. The export trade is to Italy, the Greek islands, and the Levant. The time employed in curing these herrings is longer than is given in Scotland, but in some cases only half the usual time is allowed, and such fish are sent by steamer to the Mediterranean, where they are soon disposed of; but it is not considered safe generally to consign any but "well-cured" herrings to the foreign markets, especially in warm climates. For the home market both bloaters and "reds" are packed as a rule in flat boxes.

The drift fishery for herrings is carried on more or less along the whole east coast of England, throughout the English Channel, and to a small extent on the Welsh and western side of England. The seasons for this fishery differ, however, on different parts of the coast. It commences on the Northumberland coast in the latter part of July, becoming later as we go southward; at Yarmouth and Lowestoft the home fishery is in October and November; but a spring fishing has been made for some years past at Lowestoft, beginning at some distance from the land, and gradually coming nearer as the season advances. It is a fishery that has given rise to much complaint on account of the generally small size of the fish then caught. In the Channel herring fishing goes on during November

and December, and at the extreme west in the early part of the year. It is not a very important fishery there, however, and the attention of the fishermen is soon entirely given to the more lucrative fishing for mackerel, which may be said to have its headquarters at the mouth of the Channel, although the fish gradually advance eastward as the summer goes on.

The mackerel drift fishery is worked practically in the same manner as that for herrings, but a larger mesh is of course required, and about an inch and a half square has been found most suitable. That, however, is not the only difference between mackerel and herring nets. It is the special habit of mackerel to keep near the top of the water, and the nets are consequently so well corked as to float at the surface. It is also unnecessary to have the same depth of netting as when herring fishing, and what is saved in this direction is added to the length. A full train of mackerel nets as used by the large Yarmouth drift-boats is as much as  $2\frac{1}{2}$  miles long, or double that of a herring fleet. Twine was long used in their manufacture, but cotton has taken its place generally whenever new nets were required. Mackerel first appear in deep water south and south-west of the British Islands, and are sometimes caught as early as January many miles west of Scilly, but the general Cornish fishery does not usually begin till towards the end of February, and it extends into June. May, June, and July are the months in which the mackerel drift fishery is carried on farther up the Channel, and at the later part of that season in the southern portion of the North Sea. The important fishery for mackerel is, however, on the Cornish coast, and thither resort fishing boats from Yarmouth, Lowestoft, and the various Channel ports, and, in company with the famous Mounts Bay luggers, devote themselves to the ingathering of this great harvest of the sea. Many thousands of tons of mackerel are landed at the western ports during the season, particularly at Plymouth and Penzance, and are sent away by rail to the London and other markets.

The pilchard drift fishery is worked in the same manner as that for herrings, but rather a smaller mesh is used, and herring nets which have shrunk too much for their original purpose are often usefully employed for the capture of pilchards. This fishery begins in July and continues till September. It is mostly worked on the coast of Cornwall, but during the last few years a great many of these fish have been taken along almost every part of the south coast of Devon. Pilchards may be regarded in England as essentially Cornish fish; there is very little sale for them out of their proper county, but there they are looked upon almost as one of the necessities of life, and every household likes to have a store of salted pilchards for winter use. These are all the produce of the drift nets, the fish taken by the seans being cured for export to the Mediterranean. A new industry in connexion with the pilchard fishery has been recently established at Newlyn in Mounts Bay, and at Mevagissey, further to the eastward. This is the manufacture of "sardines" in precisely the same manner as has long been carried out on the French coast. The so-called "sardines," caught so largely in the Bay of Biscay, being nothing but young pilchards, there seemed no reason why the Cornish fish if treated in the same way as the French should not turn out as good. Curing establishments were therefore set up at the two places named, and measures having been taken to ensure a thorough knowledge of the French mode of curing, "Cornish sardines," or "pilchards in oil," were prepared, and with so much success that orders for them are now received for more than the present limited means of manufacture can supply.

*Seam Fisheries.*—Seam or seine nets are used on the English coasts chiefly for the capture of mackerel and



pilchards, but sprats and various other fish are occasionally taken by them. The particular fishery with which this net is most commonly associated is that for pilchards at St Ives, on the north coast of Cornwall, where seans are kept in readiness for working on a very large scale. For a long course of years St Ives Bay has been more or less visited by shoals of pilchards, generally during the months of October and November. These fish are found in abundance off the south-west of Ireland rather earlier in the year, and it appears as if the shoals were returning towards the Bay of Biscay, when they arrive on the north coast of Cornwall in October. In their course southwards some of them enter St Ives Bay and sweep around it, and if, in doing so, they come within a certain range of part of the shore, the seans are brought into play, and large captures of fish may be made. The seaning ground is on the western side of the bay, and extends southwards for nearly three miles from the bar. It is divided into six stations or "stems," by marks or boundaries on the land, in positions fixed by a local Act.<sup>1</sup> These stems have each a name, and no fishing boats besides those employed in the sean fishery are allowed to fish or anchor within a certain distance of the stems between an hour before sunrise and the same period after sunset from the 25th of July to the 25th of December; and any passing boats must keep near the shore. Under favourable circumstances the fishery is likely to be so valuable and of such general advantage to the town that the Act of Parliament regulating the proceedings is strictly carried out with the approval of all concerned. For this reason also no seans below a certain size are allowed to be used, so that the danger of disturbing a large body of fish, and perhaps frightening them into deep water without having secured a good haul, may be as much as possible avoided. The smallest sean of legal size at St Ives is 160 fathoms along the cork-rupe, with a depth of 8 fathoms at the middle or bunt and 6 fathoms at the ends or wings. Some of the seans are as much as 200 fathoms long, and the mesh in all is three-quarters of an inch square throughout the net. The object is not to mesh the fish as in a drift-net, but to inclose them. What we have described is the sean proper, but there is another of smaller size and different proportions which also takes part in the fishery. This is called a tuck-sean, and is only 70 to 80 fathoms long, but it is 8 fathoms at the wings and 10 fathoms in the middle or bunt. Besides these there are other nets called stop-nets, which are practically only additions which can be made to the principal sean, and which are so used when the sean is being worked. As there are about 250 seans at St Ives, and only six stations in which they can be used, some arrangement is necessary to prevent confusion and interference, and this and other details are the subject of special regulations. The seans are all registered, and many of them belong to companies. Several boats are employed when a sean is to be shot. The largest, called the sean-boat, is about 32 feet on keel, with plenty of room for carrying the net; she has six men for rowing and two for shooting the sean. Two tow-boats about 24 feet long, and each carrying a stop-net, with a crew of six men, make up the working party; but besides these there is a small boat called the "volyer" or "lurker," from which the master seamer directs all the proceedings. The position of the shoals of fish is pointed out by men called "huers," who are selected from the sharpest and cleverest of the fishermen. There are generally two of them on the hill above each station, and when they see the shoals of fish, looking like the shadow of a cloud on the water, they signal with a large white canvas ball to the boats waiting below in the stations. These men remain on duty for three hours at

a time, and receive £3 a month, and one hogshhead out of every hundred hogshheads of fish landed. When the shoal has come within a convenient distance of one of the stations, the boats containing the sean and stop-sean, which have been previously joined together, commence shooting the nets at the same time, the larger net being thrown out in a direction parallel with the shore, while the stop-sean is shot in front of the shoal as the boat is rowed towards the land. The two boats ultimately turn towards each other, and gradually bring the ends of the nets together, thus cutting off and surrounding as many fish as they can. The second stop-net is joined to the first if there is a probability of its being wanted. The nets are then fastened together at the point of meeting, and the circle gradually contracted until all the fish are inclosed by the single large sean. The ends being securely joined and the stop-nets taken away, the circle of netting with the inclosed pilchards is slowly hauled towards the shore, into some quiet place as much as possible out of the run of the tide, till the weighted foot of the net touches the bottom, and there it is safely moored. The fish cannot now escape, and if the haul be a large one several days may elapse before they are all taken out. "Tucking" the fish is the next operation, and this is performed with the tuck-sean, which we described as being very deep in the middle. It is shot in the ordinary way with one boat, but inside the other sean, and as it is hauled in, the foot of the bunt is raised so as to bring the fish to the surface, whence they are dipped out in large baskets and put into attendant boats to be carried on shore. This is of course the exciting moment of the day, and all the town is astir, and taking part in the general rejoicing. Landing and carrying the fish to the curing houses is done by men termed "blowers," who are paid in proportion to the catch of fish. The seamen receive certain wages in money and a share of the fish, and every household does a little curing on its own account. The great bulk of the fish, however, goes into the houses of the large curers, who are generally the proprietors of the seans.

Women are employed in the curing, which consists in packing the pilchards in alternate layers of coarse salt and fish on the stone floor of the curing house, until the "bulk," as it is called, has reached a height of five or six feet. The fish remain here a month, and the oil and brine draining from the mass are carried off by gutters in the floor to a cistern. When the fish have been sufficiently salted they are washed and packed with the heads outwards in hogshheads, and a "rose" of fish in the middle to keep the level. Gradual pressure is now applied on top of the fish, until the contents of the cask have been reduced one-third in bulk, and a large quantity of oil squeezed out; this escapes through the sides of the hogshhead, the hoops not being at first very tightly driven. The cask is filled up three times before the pressing is finished, and then, after eight or nine days, the hogshhead of fish should weigh four hundredweight gross. The average number of fish in each hogshhead is 2500, and sometimes as many as 1000 hogshheads have been taken at one haul of the sean. The largest single catch recorded at St Ives was 5500 hogshheads actually landed, and on that occasion great numbers of fish were lost besides. The fluctuation in the seapilchard fishery at St Ives is very great from year to year; and it would appear remarkable, if the success of the fishery did not almost entirely depend on whether or not the shoals came into that part of the bay where alone the seans can be used. The St Ives seanfishing has been unsuccessful for the last four years, less than 10,000 hogshheads having been cured in each of those periods; but in the "Pilchard Circular" issued by Messrs G. C. Fox & Co. of Falmouth, giving an account of the fishery season of 1877, it is said that "considerable bodies of fish visited the coast, but did not come into the stems where seimes might have inclosed them."<sup>2</sup> The

<sup>1</sup> It is difficult to suggest any satisfactory explanation of the fact, though large shoals of pilchards are every year observed passing the north coast of Cornwall, it is only in particular years that great numbers of these fish enter St Ives Bay and come within reach of the seamen. It might seem that the streams, containing drainage from mining works, which fall into the bay, would pollute the water, and tend to turn back the fish, but there is much less mining in the neighbourhood now than formerly. The fishermen's idea that the state and direction of the tides, when a shoal of fish is near the entrance to the bay, affect the course of the shoals appears more plausible, for it must

<sup>2</sup> 4 and 5 Vict. c. 57.

chards cured by the sean owners at St Ives are all sent to the Italian markets; and we have to thank Messrs Fox for the following statistics of shipments since 1815. The fluctuations are almost entirely due to the variations in the great sean fisheries:—

*Export of Pilchards to Italian Ports from 1815 to 1877.*

Year.	Hogsheads.	Year.	Hogsheads.	Year.	Hogsheads.
1815	15,000	1837	15,349	1859	3,289
1816	20,000	1838	7,580	1860	4,891
1817	24,000	1839	12,856	1861	11,075
1818	1,700	1840	23,472	1862	17,554
1819	2,900	1841	9,805	1863	20,677
1820	800	1842	20,735	1864	22,439
1821	2,700	1843	8,859	1865	9,929
1822	9,128	1844	13,976	1866	14,294
1823	24,109	1845	30,607	1867	15,832
1824	7,611	1846	34,187	1868	19,968
1825	12,651	1847	41,923	1869	16,148
1826	10,670	1848	7,391	1870	6,549
1827	5,238	1849	25,568	1871	45,883
1828	26,018	1850	25,530	1872	1,138 <sup>2</sup>
1829	700	1851	26,738	1873	18,406
1830	22,010	1852	15,238	1874	51,019
1831	28,648	1853	21,276	1875	619 <sup>2</sup>
1832	31,930	1854	8,845	1876	7,548
1833	10,937	1855	8,108	1877	7,837
1834	25,295	1856	18,885		9,908
1835	20,833	1857	16,921		9,477
1836	15,762	1858	18,479		

The special sean fisheries for mackerel are along the Chesil Beach near Portland, and on the Sussex coast, at and near Brighton; but they do not call for particular notice.

**Stow-net Fishery.**—This fishery appears to be entirely confined to the Solent, inside the Isle of Wight, the estuary of the Thames, and the Wash, between the Norfolk and Lincolnshire coasts. It is especially for the capture of sprats, although many young herrings are sometimes caught, and it is worked most extensively at the entrance of the Thames. The stow-net is a gigantic funnel-shaped bag having a nearly square mouth, 30 feet from the upper to the lower side, and 21 feet wide. It tapers for a length of about 90 feet to a diameter of 5 or 6 feet, and further diminishes to about half that size for another 90 feet to the end of the net. The whole net is therefore about 180 feet or 60 yards long. The upper and lower sides of the square mouth are kept extended by two wooden spars called "balks," and the lower one is weighted so as to open the mouth of the net in a perpendicular direction when it is at work. The size of the meshes varies from an inch and three-eighths near the mouth to half an inch towards the end, where, however, it is again slightly enlarged to allow for the greater pressure of the water at that part. The mode of working the net is very simple. Oyster smacks are commonly used in this fishery, although shrimping boats are also employed in it in the Thames. The smack takes up a position at the first of the tide where there are signs of fish, or in such parts of the estuary as are frequented by the sprats during that part of the season; she then anchors, and at the same moment the net is put overboard and so handled that it at once takes its proper position, which is under the vessel. It is kept there by a very simple arrangement. Four ropes leading, one from each end of the two balks, and therefore from the four corners of the mouth of the net, are united at some little distance in front, forming a double bridle, and a single mooring rope leads from this point of union to the vessel's anchor; so that the same anchor holds both the vessel and the net. The net is kept at any desired distance from the bottom by means of two ropes, one from each end of the upper balk to the corresponding side of the smack, where

it is made fast. The open mouth of the net is thus kept suspended below the vessel, and the long mass of netting streams away astern with the tide. The strain of this immense bag-net by the force of the tide is often very great, but if the vessel drags her anchor, the net being made fast to the same mooring, both keep their relative positions. Here they remain for several hours till the tide slackens, the vessel's sails being all taken in, and only one hand being left on deck to keep watch. The way in which the fish are caught hardly requires explanation. The sprats, swimming in immense shoals, are carried by the tide into the open mouth of the net and then on to the small end, where they are collected in enormous numbers; from this there is no escape, as the crowd is constantly increasing, and they cannot stem the strong tide setting into the net. The first thing to be done in taking in the net is to close the mouth, and this is effected by means of a chain leading from the bow of the vessel through an iron loop in the middle of the upper balk down to the centre of the lower one, and by heaving in this chain the two balks are brought together and ultimately hoisted out of the water under the vessel's bowsprit. The net is then brought alongside and overhauled till the end is reached, and this is hoisted on board. The rope by which it is closed having been cast off, the sprats are then measured into the hold of the vessel by about three bushels at a time, until the net has been emptied. The quantity of sprats taken in this manner by many scores of fishing craft during the season, which lasts from November to February, is in some years simply enormous; the markets at Billingsgate and elsewhere are inundated with them, and at last they can only be disposed of at a nominal price for manure; and in this way many hundreds of tons are annually got rid of. The stow-boats do not generally take the fish on shore, but market boats come off to them and buy the fish out of the vessel's hold, and carry it away. The mode of working is the same in the Solent and the Wash as that we have described in the Thames, and large quantities of sprats are landed by the Southampton boats.

"Whitebait," or young herrings, as they should properly be called, are caught in the Thames by a net which is practically nothing else but a very small stow-net, and it is worked in essentially the same manner.

**Line Fisheries.**—Hand-lining and long-lining are worked more or less all round the British Islands, and various kinds of fish, such as cod, haddock, whiting, coalfish, pollack, bream, and conger are taken regularly on the English coast, some being more abundant in one part and some in another. The cod fishery in the North Sea, however, is the one specially deserving notice; it has been carried on in a systematic manner, and on rather a large scale for a great number of years. Welled smacks were in use at Harwich as early as 1712, and in them the cod were brought alive into port just as they are at the present day. The idea of keeping the fish alive appears to have been taken from the Dutch fishermen, and in the interval between 1712 and 1715 three vessels fitted for that purpose were built, but very inferior to those afterwards constructed.<sup>3</sup> In the year 1720 the number had increased to 12, and in 1735 to 30. Of that number Mr Nathaniel Saunders, the progenitor of several generations of fish-factors and salesmen at Billingsgate, had six, and with four of these, which were very superior to the other two, he visited the coast of Scotland in the course of his fishing expeditions, and was at that time the chief medium for conveying goods to and from the north of Scotland. In 1766

be remembered that, though the fishery season lasts several months, it is only at intervals that the nets are put into the water, and the tide may be unfavourable when the fish are heading towards the bay. It is quite clear that, as the sean fisheries of 1871 and 1873 were the most successful on record, there has been no gradual diminution of pilchards from over-fishing.

<sup>1</sup> A fishery for pilchards has recently been established along the coast of Galicia, and Spanish pilchards, cured in the same manner as the Cornish fish, are making their way in the Italian markets.

<sup>2</sup> Previous season's fish.

<sup>3</sup> Our notice of the early history of the cod fishery as carried on from Harwich is taken from a statement prepared by Mr Groom of Harwich, and given to the Royal Sea Fisheries Commissioners in 1864.

a Mr Orlibar, a fishing smack owner at Harwich, made the first attempt to fish for cod with long lines on the Dogger Bank; and although he was at first very unsuccessful, he persevered, and was so fortunate that in 1774 the number of smacks had increased to 62, of which 40 went regularly to the Dogger to fish with long lines. In 1788 there were 78 smacks, and in 1798 the number had increased to 96. About this time a few attempts were made at Gravesend, Greenwich, and Barking to construct smacks of a similar description, and the Harwich fishery gradually declined. Afterwards the three places on the Thames increased their connexion with this fishery, and Barking especially became an important station, not only for cod-boats, but also for trawlers. Many cod vessels were likewise owned at Gravesend and Greenwich, and these two towns for many years had stores of live cod in chests floating in the river. Great changes have, however, taken place in recent times; the Thames water became so impure that the cod could not be kept alive in it for many days, and ultimately the storing of the fish there was altogether given up. The Harwich river was still used for that purpose, and is so now, although there are but few cod-boats belonging to the place; but the opening of the railways on the east coast gradually brought Grimsby into notice, and its position in relation to the fishing grounds was found so convenient that it gradually became, and there is every reason to believe it will remain, the headquarters of the North Sea cod fishery.

The special feature in this fishery which distinguishes it from all other line fishing on the coast of the United Kingdom is the systematic use of welled vessels, in which the cod are kept alive until they are brought into port. These welled smacks are built for the purpose, the well not being a tank fitted into any suitable vessel, but a part of the original construction of the hull. Two strong water-tight bulkheads are built entirely across the vessel from keelson to deck, enclosing a large space just in the centre of the smack. This is the "well"; and a constant supply and circulation of the water from the sea is kept up within it through large auger holes bored in the bottom of the vessel, in that part of it between the bulkheads. The vessel is in fact built in three compartments, and the water has access to the central one through the holes made at the bottom of it. The entrance to the well is on deck through a hatchway, the four sides of which are carried down for about three feet to what is called the well-deck, above the level of the water-line, extending all round the hatchway to the bulkheads and sides of the vessel. The object of this lower deck is to keep the level of the water within certain limits when the vessel is rolling about or pressed down under sail. The cost of these welled smacks is about £300 more than that of the ordinary "dry-bottomed" vessels of the same size. The working expenses of a cod smack are also much heavier than in a trawler. Each of these line boats carries from nine to eleven hands, of whom as many as six or seven are apprentices of various ages; and the system of payment by shares, so general with the trawlers, is here only adopted in the case of the captain, who gets 9 per cent. of the proceeds of the voyage, the mate receiving 2s. per week, the men 2s., and the apprentices from £5 to £12 a year, according to their length of service. Provisions are found by the owner, entirely or nearly so. Both hand lines and long lines are used in this fishery, depending on season and locality. A complete set of long lines consists of about fifteen dozen, or 180 lines, 40 fathoms in length, each supporting 26 hooks on smaller short lines called "anoda," which are fastened to the main line a fathom and a half apart. A "string" of lines of this description is 7200 fathoms long, or nearly eight miles, and has 4680 hooks. Whelks or "buckies" are always used for bait where they can be procured in sufficient

quantities, and in the regular long-line season each smack takes about 40 wash<sup>1</sup> of whelks with her for the voyage, and about half that quantity as the season draws to a close in March. The whelks are preserved alive in net bags, and are kept in the vessel's well till wanted, when the shells are broken and the tough fleshy animals extracted. Baiting the large number of hooks used gives plenty of employment to the large crew of the smack. The lines are shot at sunrise or earlier if the weather is fine and there is light enough to see what is being done. The smack is put under easy sail, and kept as much as possible with the wind free, so long as a course can be sailed across the tide, which is important, as then, as the line is paid out, the smooch drift clear of it. The lines are neatly coiled, and with the baited hooks are laid in trays all ready for running, each tray containing from 12 to 16 pieces of line, and as the vessel sails slowly along, the whole length of line is gradually put overboard. A small anchor at every 40 fathoms keeps the line steady on the ground, and its position at the two ends and at every intermediate mile is marked by a conical buoy or "dan," with a staff passed through it and carrying a small flag. When after a few hours the tide has nearly come to an end, the smack, which meanwhile has been hove to in the neighbourhood of the last buoy, gets the end of the line on board and works in short tacks along its course, the line being hauled in, and the fish taken off the hooks as she proceeds. When the wind is very light a boat is used for hauling in the line, and the fish are kept alive in the stern of the boat, which is partitioned off so as to form a watertight division. In any case the strong and lively fish are transferred as soon as possible to the ship's well, and dead fish, or those which do not appear likely to live in the well, are stowed away in ice. The season for long-lining is during winter, and the fishery is carried on both on the Dogger Bank and on well-known ground off the coast of Norfolk. In April this fishery comes to an end, and a few of the smacks go away hand-lining to Iceland and the Faroe Islands, salting the fish they catch there, and usually landing it at Shetland. In July hand-line fishing for cod begins in the home waters, and is continued till October, the commencement of the long-line fishery of which we have just spoken. The July fishery is at a distance of from 10 to 30 miles from the coast, as the approach of the herrings to the land at that time causes a great gathering of cod in their neighbourhood. The smack is hove to when hand-lining, and each man works with a single line furnished with from two to six hooks. On the return of the vessel to Grimsby after a few days, the fish are taken out of the well by means of long handled landing nets, and are put into wooden chests which are kept floating in the fish-dock. These chests are 7 feet long, 4 feet wide, and 2 feet deep, and are constructed so that there is a free circulation of the water through them. The water in the dock at Grimsby being quiet, the chests are made with the ends square; but at Harwich, another storing place for live cod, the chests are moored in the tideway, and have the ends boat-shaped, so as to offer less resistance to the stream. There are about 400 of these chests in use at Grimsby during the height of the cod season, and as many as from 15,000 to 20,000 live cod in them at a time. There is a great advantage in thus storing these fish, as they can always be sent quite fresh to market, and only as many forwarded as there is a demand for. Killing the cod for market is a strange scene, and it goes on daily during the season. Each chest will hold from 40 to 100 cod according to their size, and when the fish are wanted, a chest is hauled alongside a bulk kept in the dock for the

<sup>1</sup> A wash is a stamped measure capable of holding twenty-one quarts and a pint of water.

purpose, and hoisted up just clear of the water; the top is then opened, and a man steps into the chest and lifts the fish out, seizing them by the head and tail, and throwing them on the deck of the hulk. It is often difficult work to get hold of the struggling and slippery cod, but one after another they are taken out and handed over to the executioner on the deck of the hulk; he grasps the fish tightly behind the head with his left hand, holding it down on the deck, and giving a few heavy blows with a short bludgeon on the nose, kills it at once. The dead fish rapidly accumulate in a heap, whence they are taken on shore to be packed in bulk in the railway trucks waiting by the side of the market to receive them. The fish thus killed and packed reach Billingsgate early the next morning, and are known in the trade as "live cod"; they fetch the highest prices; and there is something in the manner in which they are killed which enables them to be properly crimped many hours after their death.

**SCOTCH FISHERIES.**—The important fisheries on the coast of Scotland are drift-fishing for herrings, and line-fishing for cod, haddock, ling, and some other kinds. Besides these there is in particular localities sear or "trawl" fishing for herrings, and for sprats or "garvies."

**Herring Fishery.**—We will first speak of this special fishery, which from its profitable character, extensive range, and the employment it gives to vast numbers of the coast population, both afloat and on shore, ranks as one of the most important fisheries of the United Kingdom, as it is also one of the great harvests of Scotland.

The herring season on the Scotch coast does not commence everywhere at exactly the same time, although the principal fishing is always during the summer months, the winter fishings being local and rather uncertain. The earliest herrings are taken on the west coast, and are generally first met with outside a line between the Butt of Lewis and Cape Wrath during April. In May the herrings come into the Minch and work their way southwards; but they sometimes enter the Minch at the south end of the islands, and in 1870 in particular, there was a large fishery near South Uist and Barra, but mostly on the Atlantic side, some miles south-west of Barra Head. It is rarely, however, that herrings are taken on the western side of the outer Hebrides, and the great fishery may be said to lie between those islands and the mainland. The fish remain in these waters in greater or less abundance till nearly the end of September, but May and June are the most productive months of the season, and during that period a great number of boats from the east coast go to the western side to take part in this early fishery. As July approaches the order of proceeding is reversed: the time is near for commencing the great fishery on the east coast, and one by one the boats which had come from that side return to their own waters, and many others from the western districts accompany them. The eastern fishery begins about the middle of July, and continues until about the end of September, commencing at the north and extending gradually southwards as the season advances. Many changes in the importance of particular districts as centres of this fishery have taken place in the course of years. For a long time Wick was the leading fishing and curing station on the east coast, sending out 1000 boats daily during the best of the season; but recently the fisheries from Peterhead and Fraserburgh have been unusually successful, and they have taken the principal position on the east coast for the extent of their curing operations.

Drift-fishing is the method by which most of the Scotch herrings are taken, the use of sears or "trawls" being practically confined to a few localities on the west coast so far as regards the herrings, although they are employed on the eastern side for the capture of garvies. Cotton

nets are now universally used, and the manner of working them is precisely the same as we have already described in our account of the Yarmouth fishery; but there has been a considerable increase in both the size and number of the nets worked by each boat. This has been due to several causes. The lightness of cotton nets compared with those of hemp formerly in use enables a larger quantity of netting to be easily handled by the same number of men, and thus more catching power is provided. Then it is desirable to make up a certain weight of nets in proportion to the size of the boats, that they may not drift too fast and drag the nets through the water; for all the strain that is needed on a fleet of nets is as much as will keep them extended in as near a straight line as may be. The fisheries have in late years been carried on far out at sea, and a remarkable change from open to decked fishing boats has taken place, a change that had for a long time been earnestly recommended to the fishermen for their own sakes, and to prevent the great loss of life which had so frequently occurred when the open boats were overtaken by bad weather. This change led to larger boats being built, capable of using an increased quantity of fishing gear. There are thus many reasons for the additional netting now generally employed, without resorting to the idea that it has become necessary owing to herrings having gradually diminished in the seas. We may here mention that the official returns of Scotch fishing boats have of late years shown a steady diminution in their number, but it will be found on examination that the falling off has been only in the second and third class boats, and that those of the first class have been increasing. In the last report issued by the Board of Fisheries, that for 1876, a decrease of 109 boats is recorded; but at the same time it is stated that there were 181 fishermen and boys more than in the previous year, and the estimated value of the boats, nets, and lines, had increased by as much as £35,719. The size of the fishing boats is limited unfortunately by the general absence of natural deep-water harbours where they would be most useful, so that no very great increase in their tonnage can be conveniently made; and although first-class boats are taking the place of those which were in the second, the change does not involve an addition of more than four or five tons in one of the larger craft. Fourteen tons was a common size for a large second-class boat, and as anything over 15 tons ranks in the first class, the new ones of 17 or 18 tons are all included under that head. There is little difference at first sight in the appearance above water of most Scotch fishing boats, but there are many distinctions below the water-line in accordance with local ideas. As a rule, excepting on parts of the west coast, the boats are sharp at both ends and have a great deal of beam, but they differ much in depth and in the extent of rise to the floor. The Buckie boats have long been remarkable for their peculiar build and rig, having a low and broad midship section with a flat or rather hollow floor; they are very fine at both ends, and have considerable rake of both stem and stern post. They are commonly known as "scaffy" boats. Another peculiarity in these boats was that they carried a mizen lugsail in addition to the large fore and main lugs which were the usual working sails of the general run of Scotch fishing craft. Fishermen as a class are most unwilling to make any change in their style of boats or methods of fishing; but when decked boats were fairly tried on the Scotch coast, their advantages could not fail to be acknowledged; and as it was found that profitable fishing<sup>1</sup> could be carried on with them in weather such as was dangerous

<sup>1</sup> As evidence of the advantage of using large-decked boats, the following extract from the fishery officer's report from Eyemouth is quoted by the Hon. B. F. Primrose, the energetic and obliging secretary to the Board of Fisheries, in his *Annual Report* for 1876:—



for open boats, the change from undecked to decked fishing boats gradually gained favour, and is now very general. This alteration, however, involved an important change in the rig of the boats in the doing away with the main lug, a sail which for many years had given a distinctive character to the Scotch fishing boats. In our notice of the Yarmouth luggers we mentioned that when the vessel was fishing, the foremast was lowered on to a crutch on deck, so that the vessel might ride easier and not roll about, as the weight of the standing mast would be likely to make her do. This is the practice with all drift-fishing boats; but in decked boats there is a difficulty in doing this with a second mast, and if it were done there would be so much more hamper upon or near the deck and in the way of the fishermen: as to cause much inconvenience. The mainmast has therefore been done away with, and the necessary after-sail is provided by means of a mizen, which, being outside the stern, has plenty of power when wanted, and is out of the way of the fishermen. The fore-lug is made larger than it used to be, so that there is still plenty of canvas, and the general rig of the boats is now just what has been for a very long time adopted by the English fishermen as the most convenient for drift-fishing. Steam-tugs have been advantageously used in towing the fishing boats towards and from their fishing ground; but such a system could hardly be generally applied to the vast fleet of boats which collect in certain years at some of the stations.

The fluctuations in the herring fishing are very remarkable, but they are not more so on the coast of Scotland than on that of Norway and elsewhere. Indeed, Norway and Sweden afford instances unparalleled in Britain of the disappearance of herrings from particular districts, and their return in the most unexpected manner after a long course of years (see p. 26). On the coast of Scotland, the changes which take place in the fishery consist in an increase or decrease at particular districts rather than a total disappearance from any one of them. The most marked failure in recent years is in the Firth of Forth, where the summer fishing has now been given up, only a small winter fishing being carried on. At Wick, also, for a great number of years the most important station on the east coast, the herring fishing has been more or less diminishing, whilst at the same time Fraserburgh, only about 70 miles distant from it, has gradually assumed an unexampled importance. It is true that in 1876 there was an immense falling off in the quantity of fish landed at the latter port, but it was a bad year at almost every station on the east and west coasts, and the almost general decrease arose not from any apparent scarcity of fish, but from the boats being frequently kept in harbour by a continuance of very bad weather during the fishing season, or being unable from the same cause to work their nets when they reached their regular grounds. There is some reason for believing the alleged scarcity of herrings near the land is not so great as has been supposed. Successful fishing many miles out at sea has attracted large numbers of boats from the home waters, and the catches inshore have been consequently much diminished; still the general opinion appears to be well founded that the fish have not entered the firths and lochs in the last few years to the same extent as they used to do. That the fisheries, taken as a whole, have been gradually increasing is shown by the carefully prepared statistics of the Board of

<sup>a</sup> The crews who had large-decked boats, and perseveringly followed out the fishing were successful; while those crews about Berwick and Spittal who were not so well prepared did little good. Many of the Eyemouth and Coldingham boats made from £200 to £300 for the season, several from £400 to £500, and a few from £500 to £700 each. The Berwick and Spittal crews, on the other hand, who fished with open boats and inferior netting, made only from £60 to £120. Evidence to the same effect is given from Anstruther, and similar records have appeared in former reports.

Fisheries; and it is desirable to point out that the great increase in the quantity of netting now used is to some considerable extent counterbalanced by the shorter time the nets are in the water; for the boats go long distances to sea, and they have to leave off fishing earlier in order to bring in their fish in good time to the curers. It may appear strange that after the lapse of centuries during which the herring fishery has been regularly carried on, so little knowledge should have been gained of the habits of this valuable fish; but it must be confessed that at the present moment we can say nothing positively about what brings the herring towards the land, why at one time they will "strike" the nets, and at another they will apparently not go near them—in short, what are the particular influences which regulate their movements. Of course, the old idea that these fish come into shoal water in order to deposit their spawn is the one still generally received, and we will not venture to say it is incorrect; but if it be true that the spawning fish come in for that purpose, that cannot be the inducement in the case of the "maties" or fish which show no development of the milt or roe. Yet both these herrings do precisely the same. Mackerel differ from herrings in spawning at the surface, and it has been abundantly proved that their ova float during the whole period of development; still we find that mackerel in full spawning condition, and half-grown fish also, are mixed up in the same shoals at the time when they approach the land. Thus we find the habits of surface-spawners and ground-spawners are alike in this respect, yet the common explanation of the visits of the spawning herring will not apply in the case of the mackerel, or even in that of the "mattie." With respect to the causes which induce the herrings to keep near the surface, or to remain at some little depth, a step seems to have been taken in the right direction in the observations now being made of the possible relation of the temperature of the sea to the higher or lower movements of the fish. Good service was done by the late Marquis of Tweeddale when he provided a number of deep-sea thermometers for the use of the fishery officers and fishermen, whose observations are reported weekly to the Meteorological Society of Scotland, and come under the careful scrutiny of the secretary, Mr Alexander Buchan. It is early yet to expect any definite results from this inquiry, as it has only been carried on for four or five years; but the observations hitherto made point to a high degree of temperature in the sea being unfavourable to fishing, and show that, when the sea is found to be colder in any one district than in that on either side of it, the herrings are more abundant and the fishery is more successful in the colder than in the warmer water. It is also stated that the influence of thunderstorms had been perceptible in each year; and that if a thunderstorm of some magnitude had extended over a large portion of the east of Scotland, good takes of fish might be made on that day, but on the following day few if any fish would be caught over that part of the coast, unless at the extreme verge of a deep part of the sea, as if the fish were retreating thither. Observations on the influence of winds and the temperature of the sea have also been made by the Dutch fishermen; and Herr von Freeden of Hamburg believes, from an analysis of these observations, that a temperature of from 53° to 57° F. is most favourable for the herring fishery, and that the chances of success diminish with higher or lower temperatures. Should these conclusions be confirmed, it is quite possible that the fishermen may be enabled, by a trial of the temperature of the sea at different depths, to determine how far their nets should be sunk to give them a fair hope of a successful fishing, instead of working, as they do now, very much on the chance system, often finding that they have been too high or too low for the principal part of the shoal.

The important system of curing herrings in the wet state, or, as it is properly called, as "white herrings," is more completely worked on the east coast than on the west. The whole process of curing is carried on under the supervision of the Board of British White Herring Fishery, which was established by the Act, 48 Geo. III. c. 110 (1808), and, with some slight changes in its organization and additions to its duties, has continued its labours to the present time. Its particular duties are to inspect the curing, and to see that the proper regulations are duly carried out; to place the Government brand on the barrels when desired, according to the quality of the cure; to see that the regulations for registering the fishing boats are duly attended to; to maintain order on the fishing grounds; to lay out to the best advantage a special grant of money for improving or building fishery harbours; and to prepare accurate statistics of the fisheries. Many years ago curing according to this system was done at some of the English ports,—hence the word British in the title of the board; but for some little time past "white herrings" have practically only been prepared in Scotland, and the now ordinary name of "Fishery Board, Scotland," fairly expresses the geographical limits within which its duties are performed at the present day. The general out-door work of the board is performed by a body of men who are well known by the title of fishery officers; and it is essential that they should have been brought up as coopers, an important part of their duties being to see that barrels of a proper size and make are used for the packing of the cured herrings, and that they are securely headed and driven before they are sent abroad. The various duties these officers have to perform, and the careful training they have had in them, have resulted in the board gradually obtaining a staff of men by whose intelligence and experience a vast store of information about everything connected with the working of the Scotch fisheries has been collected. Each man is placed in charge of a district of the coast, and the detailed reports they make to the secretary form the basis of the valuable and instructive reports of the Commissioners of the Fishery Board annually presented to Parliament.

The operation of curing the herrings begins as soon as they are landed, and the busy scene which is presented at the large curing stations when this work is going on has been well described in the eighth edition of the *Encyclopædia Britannica*.

All along the inner harbour, and in almost every street and quay, of the town of Wick, as well as within many large inclosed yards and covered buildings, there are numerous square boxes as big as ordinary-sized rooms, the containing sides, however, being only two or three feet high. Into these huge troughs the herrings are carried from the boats as soon as possible after they arrive. Thoro they are all tumbled in aelter-skelter, in a long-continued stream of fish, until the boats are emptied or the troughs are filled. Then come troops of sturdy females of various ages and complexions, each armed with knife in hand, who range themselves around the fishery chambers; the process of gutting immediately commences, and is carried on with such ceaseless and untiring activity that the unaccustomed eyes can scarcely follow the quickness of their manipulations. One woman will eviscerate about two dozen of herrings in a minute; and when nearly 2000 of them are working at that rate, with but brief intermission from early morning till the close of day, the amount of disembowelling may be more easily imagined than described. This important process is effected in the following manner. The practitioner takes a herring in her left hand, its back lying in her palm, and inserts the point of her knife into the near side of the neck, bearing well down upon the backbone, and making the weapon protrude a little through the other side. She then gives the knife a turn, and pulling it outwards and upwards, with an opposing pressure of the thumb, she draws forth in the first place the gills, stomach, and intestinal canal, and tosses them into an adjoining barrel. She then inserts the knife a second time, and by a peculiar twitch removes what is called the crown gut or cæcal appendages and liver. There are thus two actions performed, each of which seems to occupy about a second of time. This is the ordinary Scotch practice. The Dutch method is somewhat different. They leave in the crown gut, and so with them a single pull suffices to remove whatever is to be taken away. This latter method is partially followed in this country, as being best adapted for the Continental market, where it is believed that the crown gut has a powerful influence in improving the flavour of the fish, and where the appearance of the herring is held to be injured if it is removed. These fair gutters usually work together in little companies of two or three, so that while one is filling a measure with her gutted fish, another carries them off to be *roused*, as it is called, that is, cast into vats or barrels, then sprinkled with salt, then more herrings and more salt, and next a brawny arm plunged among them far above the elbow, thus mingling them together, and so on till the space is

filled. They may lie a longer or shorter time in this state, according to the supply of labour at command, and the immediate necessities of gutting and rousing; but the next usual step in the routine is for a third hand to remove those herrings from the second vat or vessels, and re-salt and pack them carefully, every successive row crossing at right angles that which precedes it. Herrings intended for the foreign market are usually arranged with their backs downwards, while those for the Irish market are preferred when packed flat, or more upon their sides. Each row gets a fresh sprinkling of salt until the barrel is filled. The head of the cask is then laid loosely on, the contents being allowed to settle down, or *pine*, as it is called, for a time,—which they soon do so considerably as to admit of each cask receiving another row or two, with additional salt, before being closed by the cooper. The barrels should then be headed up, tightened in the hoops, laid upon their sides, and placed under cover, so as to be shaded from the sun's rays, which are injurious to the fish. They should also be rolled half over every second or third day, until they are bung-packed; which process, if the after intention is to receive the official brand of the Board of Fisheries, must not be sooner performed than after the lapse of ten free days from the date of capture. Sir Thomas Dick Lauder\* thus describes the final operations:—"When the pickle has been sufficiently poured off, a handful of salt, if required, should be thrown around the inside of the barrels, and the herrings should be pressed close to the inside of the casks, and additional fish, of the same description and date of cure, should be packed in until the barrel is properly filled; after which it should be flagged, headed, blown, and tightened, and the curing marks scratched upon the sides. The barrel may then have its pickle poured in, and be finally bunged up."

The cured herrings are separated into four classes:—"Full," or fish having large milt or roe—in fact, those which are nearly or quite ready to spawn; "Matties,"\* or fat fish, in which the milt or roe is quite undeveloped; "Spent," or shotten, those which have recently spawned, and consequently are in very poor condition, having neither the fat of the matties nor the roe of the full fish; and "Mixed," consisting of fish of all kinds, or unsorted. For these four classes the Board of Fisheries gives distinct brands, denoting the quality and description of fish in each barrel; but the crown full brand, given only to "full" fish properly cured, is the one in special request. It denotes the finest production of the system of the British white herring cure. Branding is quite optional on the part of the curer; but in any case this method of curing can only be carried on under inspection, and barrels of a particular size must be used for packing the fish in. It is one of the anomalies of the system, however, that although it is absolutely forbidden to use barrels of other than a certain specified size, there is not the slightest restriction as to the quality or condition of the fish to be packed in them, so long as the Government brand is not desired for them. Any refuse fish may be cured and packed, but the barrel must be of a certain size. The advantages or disadvantages of the branding system have been often discussed, and it has been frequently condemned as opposed to the general policy of making the sale of an article dependent on its merits alone; it has been contended that the Government is not justified in giving a certificate of the quality of cured herrings more than of any other manufactured article, and in no other case would such a guarantee be given. To this it is replied that there is a demand for "white herrings" in numerous and distant European markets; that without the Government brand a barrel of herrings would in some places rarely be sold unless the contents were first examined; and that the disturbance and exposure of the fish would lessen their value when they were ultimately unpacked at the end, possibly of a distant journey. They may pass through many hands before they finally reach the consumer, and each person would be anxious to satisfy himself of their quality. There is no doubt that the brand facilitates the sale under such circumstances, but at the same time it cannot be disputed that thousands of barrels are sold on the Continent every year with no other guarantee than that of the curer's name. Up to the year 1859 no charge was made for branding; but since then a fee of fourpence per barrel has been paid, and the proceeds practically count against the expense of the board. It was believed in some quarters that the alleged value of the brand was really not so great as to make the curers willing to pay for it,

\* *Directions for taking and curing Herrings, and for the curing of Cod, Ling, Turbot, and Hake*, by Sir Thomas Dick Lauder, Bart., Edinburgh, 1818.

\* "Matties" is a corruption of the Dutch *maatjes*, the term applied to herrings in which the roe is small or undeveloped. Its significance, however, is doubtful, and the nearest approach we can find to the word is *maatje* (Frisian *maat*), a small measure, which it seemed might possibly refer to the small size of the undeveloped milt or roe, as compared with the bulky proportions of those organs in the full fish. But our inquiries on the subject from authorities, both in England and the Netherlands, have failed to elicit any definite explanation. The Dutch separate their herrings into three classes, as we do, according to the condition of the reproductive organs, viz.—"Vol," full of roe; "Maatjes," with the roe undeveloped; and "Yen," empty or shotten. *Maatjes* are generally fat fish, but herrings are in that condition only when the roe is very small. As the breeding season advances, the fat is gradually absorbed, and the fish become *vol*; and when the spawn, then fully matured, is deposited, the herrings are called *pin*, or *empty*.

† When the fish are brought on shore from the fishing boats, the quantity is ascertained by a "cran" measure, which should hold 45 gallons of ungutted herrings; each cran of such fish is expected to furnish enough good cured and gutted herrings to fill a "barrel" having a capacity of 37 gallons,—the difference between the two measures being usually accounted for by the broken fish unsuitable for curing, and the less space occupied by the gutted fish.

and consequently the system might be quietly got rid of by the curers ceasing to make use of it. The result has been precisely the reverse; and the argument against the continuance of branding on the ground of the expenses in connexion with it has been considerably weakened by the fact that the system is now to a large extent self-supporting.

The following table shows the amount of fees collected in the years 1859-77, in accordance with the Act 21 and 22 Vict. c.p. 69 (1858):—

Year.	Fees Collected.	Year.	Fees Collected.	Year.	Fees Collected.
1859	£2614 12 0	1866	£1158 10 -	1873	£7254 11 6
1860	3845 4 0	1867	3290 7 0	1874	9625 19 6
1861	4422 9 0	1868	3491 0 10	1875	8729 18 6
1862	5578 10 8	1869	4076 7 8	1876	4216 8 6
1863	4614 18 6	1870	4389 18 10	1877	6629 18 4
1864	3623 4 0	1871	5777 4 8		
1865	3613 1 8	1872	7045 10 6		

On the west coast of Scotland the herring fishery is also of great importance, and, as we have previously mentioned, it begins earlier than that on the eastern side. There is a good deal of curing in the Stornoway district, but the brand is in little favour. It is alleged that the western fish, especially those caught early in the season, are more delicate than those taken on the east coast, and will not bear the close packing requisite for ensuring the proper weight in each barrel if it is to receive the brand. The real explanation is doubtless that the curers are anxious to catch the market as soon as possible, and will not allow the number of days for the fish to be in pickle before sending them away that is necessary according to the branding regulations. These early cured fish are maties or fat herrings, and are chiefly sent to the Russian market. A very large quantity of the western fish caught later in the season is, however, sent to market in the fresh state; they are sprinkled with salt and loosely packed in barrels, and quickly taken by special steamers to Glasgow and to Liverpool. These fish are given under the head of "bulk" in the published returns by the Fishery Board, and, being slightly salted, are included among the "cured fish," although not with those which have been gutted and have gone through the regular preparation for export. On arrival at the home markets they may be readily sold as fresh herrings, after the sprinkling of salt has been washed off.

It is on the western coast that the question of a close time for herrings has been so much discussed, and unfortunately in 1860 an Act (23 and 24 Vict. c. 92) was passed by which a close time was established there. The bill was brought in at the instance of some of the curers at Glasgow and other places, principally on the west coast. By this Act herring fishing was entirely prohibited from the 1st of January to the 31st of May on any part of the coast between Ardnamurchan Point and the Mull of Galloway on the south, and from the 1st of January to the 20th of May between Ardnamurchan and Cape Wrath on the North. Not a herring was allowed to be taken during the close season for the purpose of sale, or to be used as bait, or to keep the fishermen from starvation; and it appears that this cruel prohibition was to be enforced that the markets might not be supplied with fish which were not of the best quality, but yet were sufficiently good to command an easy sale, and therefore to lower the prices the curers would otherwise have obtained from the regular summer fishery. It was professed that the early fishing broke up the shoals before they entered the Minch, and therefore diminished the supply in June and July; and it was said that many of the fish caught between January and May were unwholesome and unfit for food. But an inquiry into all the circumstances of the case clearly showed that the promoters of the Act for establishing close time were the curers alone, who held meetings of their own body, and, without consulting the fishermen, pressed forward a measure which sacrificed every one's interest to their own. It was one of the most unhappy episodes in the history of the Scotch fisheries; but fortunately the effects of the close time were soon made known, and after a short experience it was found impossible to enforce a law which brought misery and starvation to the homes of a coast population, many of whom previously could only manage to obtain a bare subsistence by hard and unremitting toil. The law remained practically in abeyance for a time, and no prosecutions for infringing it were carried on pending the result of the report of the royal commission in 1862 on herring trawling. In 1864 this question of close time came also before the royal commission for inquiring into the condition of the sea fisheries generally; and such overwhelming evidence of the evil effects of the close time was brought before the commissioners that, in anticipation of their complete report, they did not hesitate to bring the subject before the Government, with the view to some relief being given before the question could be finally disposed off. This resulted in instructions being given not to enforce the law; and in the following session of parliament a bill was passed by which close time was entirely abolished north of Ardnamurchan Point. This included all the inner and outer Hebrides, where the restriction had been so severely felt. South of that

part of the coast close time was continued as before, with the exception of January, which became free to the fishermen. By subsequent legislation (the Sea Fisheries Act, 1868) this close time has been done away with beyond the three mile limit, so that at the present time herring fishing is entirely free everywhere around the British Islands except within three miles of that part of the coast of Scotland which lies between Ardnamurchan Point and the Mull of Galloway; and the difficulties of enforcing the law there are so great that the close time has now only a nominal existence. Another commission which has been recently engaged in inquiring into the state of the herring fisheries of Scotland has also reported against the utility of close time.

The fisheries of the west coast of Scotland have unfortunately given rise to much bitter feeling among those who are interested in them, either as fishermen or curers, and nothing has caused so much social disturbance as the quarrels between the drift-fishermen and those who have been using the sear-net, or, as it is called in Scotland, the "trawl," for catching herrings. The localities in which these disputes have specially taken place are Loch Fyne and the Kyles of Bute, but more particularly in the former long famous waters. We have already described the general mode of working the sear, when speaking of the English fisheries, and we will only now repeat that this method of fishing consists in shooting a long sheet of netting in a semicircle, both ends of which are most commonly hauled on shore until the whole net with the inclosed fish is landed; but sometimes a boat is used as the fixed point at which the ends of the net are made to meet, and into which the net is hauled as before. In the former case the net is used as a ground-sear, in the latter as a circle-net. Both are equally objected to by the drift fishermen, who, until about the year 1838, had fished Loch Fyne according to the old established method. The trawl was then introduced, and on several occasions a gunboat has been required to keep order between the fishermen when both modes of fishing were being carried on. Loch Fyne, as we have said, was the special scene of these disputes, and one common complaint by the drift fishermen was that the trawls intercepted the fish at the entrance to the loch, and broke up the shoals, so that the herrings did not find their way to the upper water, where it was alleged there always used to be plenty of fish at the proper season. There were complaints also that fish of all sizes were caught by the trawl, those which were too small to be stopped by the drift nets and those too large to be meshed in them—the "mother fish," as some of the fishermen called them. Then it was said that the trawlers sometimes made such enormous hauls that only a portion of the catch could be saved, and, besides other sin laid to their charge, it was finally stated as the crowning offence—one that really explained the principal opposition to the trawlers—that they lowered the price of herrings to a considerable extent by the large supplies they could with little expenditure of time and trouble sometimes throw into the market, and so prevented the driftmen from obtaining the better prices they had commonly got from their smaller catches.

The result of these several complaints was that in 1851 an Act (14 and 15 Vict. c. 26) was passed to put an end to trawling for herrings on the coast of Scotland; but that not proving effective, more stringent measures were brought to bear on the fishermen in 1860 (23 and 24 Vict. c. 92) and 1861 (24 and 25 Vict. c. 72), and fishing with the trawl was completely suppressed. So strong a feeling existed, however, among a large body of the fishermen and others that the complaints against trawling were unjust, and the prohibition injurious to the interests of the public as well as to the fishermen immediately affected by it, that in 1862 a royal commission was appointed especially to inquire into the subject; and in 1864 the question was independently considered by two of the members of the general Sea Fisheries Commission, the third commissioner being purposely absent from the second inquiry, as he had taken part in the proceedings of the previous one. The conclusions arrived at by the two commissions, after hearing a great deal of evidence from both sets of fishermen, were decidedly adverse to the opponents of trawling, and were to the effect that the herring fishery in Loch Fyne had suffered no diminution by that method of working; on the contrary, it had really been progressive, when the periods of comparison were made sufficiently long to correct the annual fluctuations, which were always considerable in this as in all other herring fisheries. They say:—"The selected years of bad fishing, brought as proofs that trawling was destroying the fishery, have, when examined, no application to the question, as an equal number of years of quite as bad fishing are found in every decennial period before the system of trawling had been discovered. . . . Trawling for herring has been an important means of cheapening fish to the consumer, by the large and sudden takes, and has thrown into the market an abundant supply of wholesome fresh fish at prices which enable the poor to enjoy them without having to come into competition with the curer. It is this circumstance which, in our opinion, has produced the demand for repressive legislation, for the gains of the drift-net fishermen are much affected by the sudden and

<sup>1</sup> Report of the Royal Sea Fisheries Commissioners, p. 43 (1866).

great captures of the trawler, who, working with less capital and with a more productive kind of labour, is able to undersell the drift fishermen, and to derange the market for the eurus."

It happened that in 1860, the last year of trawling before its complete suppression, the fishing in Loch Fyne was the largest ever known there; in 1861 it fell off, but in 1862 it was again very large, and that was followed by fluctuations as before, although the drift fishermen then had it all their own way. The recommendations of the two commissions were embodied in an Act (30 and 31 Vict. c. 52) passed in 1867, by which any kind of herring net with what was then the legal mesh was permitted, and trawls so constructed again came into use. By the Sea Fisheries Act, 1868, all restrictions as to the size of mesh were done away, but as that Act only applies to fishing beyond the three mile limit, the Act of 1867 still regulates the fishing in Loch Fyne. It chanced that from 1868 to 1874 the produce of this loch gradually fell off from 46,813 barrels to 6984 barrels; the herrings did not go to the upper waters of the loch in the same numbers as before, and we need hardly say that the drift fishermen accounted for it mainly by the fact that trawling had again been permitted. The drift fishermen had little belief in the two commissions which had reported that trawling had done no harm; but in 1874, when matters were at their worst, three Scotch gentlemen of position, who were likely to command the confidence of the fishermen, formed themselves into a private committee to inquire into the causes of the failure in Loch Fyne. The results of their inquiry are given in their own words:—"The fact cannot be explained away that the fish seem to be at present disinclined to enter other narrow waters where trawling is unknown." The idea, however, that the opinions of these gentlemen would be received with respect has proved to be a mistaken one; and the fact that three inquiries had resulted in the same conclusions seemed only to make these fishermen the more determined to clamour against trawling. In 1877 a fourth commission was appointed; its object was to examine into the condition of the Scotch herring fisheries generally, and the state of the Loch Fyne fisheries was therefore once more investigated. Yet, notwithstanding that the produce of this loch had increased from 6984 barrels in 1874 to 15,097 in 1875, and to 34,471 in 1876, with a further increase in 1877, so far as the returns had been made up at the time, all the old statements were again brought forward by the drift men. But the facts against them appear to have been too strong, and this last commission, like the three previous ones, has declined to recommend that trawling should be suppressed.

There is abundant evidence in the records for a great number of years that the annual produce of Loch Fyne has been subject to large fluctuations. But if we compare successive periods of ten years each we shall find that not only are the average total catches in recent years far in excess of those in earlier times, but the average for each boat has very largely increased. The following official record for periods of ten years is very instructive:—

Period.	Average No. of Boats.	Average No. of Barrels.
1827-1836	800	8,469
1837-1846	850	7,388
1847-1856	896	10,943
1857-1866	558	33,096
1867-1876	479	25,661

The average for the ten years 1857-1866 was much raised by the enormous catch of 79,893 barrels in 1862, whilst the small number of 6984 barrels only being taken in 1874 has materially lowered the average for the last ten years.

If we now look at the produce of the fishery on the whole west coast of Scotland for the last thirty years, taking the average in periods of ten years as before, we find the following:—

Years.	Average Catch.	Highest Catch.	Lowest Catch.
1847-1856	85,837	109,806	56,206
1857-1866	122,164	173,827	83,218
1867-1876	156,988	226,087	83,892

The quantities here given are in barrels, as usual; and the figures in this and the preceding return are taken from the statistics carefully prepared by Mr George McEach, assistant inspector under the Board of Fisheries, and furnished by him to the commission in 1877. He had been 27 years in the service of the board, and for the last 14 years the whole of the west coast fisheries had been under his inspection.

There is nothing that enables us better to understand the actual condition of a fluctuating industry like our sea fisheries than accurate records of its annual produce. In this respect Scotland, owing to

<sup>1</sup> The Report of these gentlemen is given in full and ably discussed in the *Annual Report for 1876 of the Board of Fisheries.*

the careful labours of her Board of Fisheries, is in a far more fortunate position than either England or Ireland; and the following tables taken from the last report of the Fishery Board will readily show, by the comparison of any two selected series of years, the gradually increasing importance of the Scotch herring fishery, notwithstanding the fluctuations arising from unfavourable weather and other natural causes. We may add that considerable quantities of herrings which are sold in the local markets and consumed whilst quite fresh, do not appear in the board's returns, but those which are slightly salted for transit by ship to the great markets are so included. The quantities are in barrels, as before.

ABSTRACT showing the total quantity of White Herrings cured, branded, and exported, year by year, in so far as brought under cognizance of Fishery Officers, from the 1st of June 1809 to the 31st of December 1877; distinguishing the export to Ireland, to the Continent, and to places out of Europe. The periods for which each return is made end on the 5th of April down to 1844; from that year to 1852, on the 5th of January; and afterwards on the 31st of December; hence two returns were published in 1852. There were no returns for England after January 1850, or for the Isle of Man after January 1869.

Periods.	Total Cured.	Total Branded.	Exported			Total Exported.
			To Ireland.	To the Continent.	Out of Europe.	
1810	90,185	84,701	26,014	...	7,834	35,848
1811	91,927	85,962	28,212	...	9,931	38,143
1812	111,519	58,430	30,417	4,730	27,572	62,620
1813	153,488	70,927	47,980	11,046	40,699	100,726
1814	110,542	38,184	43,981	23,843	61,309	118,408
1815	109,139	63,576	40,035	25,801	65,778	141,505
1816	105,663	116,408	39,436	62,068	107,468	169,986
1817	102,343	140,018	36,341	44,492	67,856	138,628
1818	227,691	138,088	83,886	43,896	65,037	192,339
1819	240,894	270,922	80,704	62,335	85,125	227,102
1820	285,419	309,700	102,302	88,109	105,616	295,986
1821	442,193	863,572	125,445	66,524	79,836	291,805
1822	316,524	263,205	102,719	84,753	77,485	214,956
1823	248,869	200,110	64,528	38,002	75,914	170,445
1824	302,180	396,611	115,747	40,281	82,632	238,659
1825	347,063	270,944	96,408	30,927	70,577	202,116
1826	279,233	294,422	121,366	28,167	67,519	217,071
1827	288,406	228,606	78,735	10,701	70,970	166,496
1828	399,778	279,317	109,108	24,399	78,081	211,559
1829	325,979	294,207	107,651	29,290	69,944	206,975
1830	329,537	218,418	80,680	24,302	67,072	181,654
1831	436,870	237,065	130,300	61,525	72,947	264,903
1832	302,680	167,880	128,458	31,100	87,541	217,499
1833	416,964	168,758	114,137	47,556	68,991	229,684
1834	431,831	178,670	140,251	85,852	66,367	272,061
1835	277,317	85,078	73,860	34,600	60,705	158,805
1836	497,814	192,317	108,060	46,451	55,989	278,393
1837	387,829	114,192	102,068	46,777	39,530	190,265
1838	407,774	141,633	139,095	67,388	38,674	235,158
1839	556,269	158,659	149,926	64,670	24,854	239,730
1840	543,945	162,281	157,559	82,516	19,847	259,822
1841	557,262	184,189	150,517	90,951	8,988	250,137
1842	607,345	190,222	187,053	91,069	6,718	284,736
1843	625,419	169,718	165,327	120,116	10,802	301,460
1844	665,359	182,968	127,770	181,353	3,798	313,516
1845	629,032	140,632	120,292	143,764	2,326	266,375
1846	532,646	142,478	127,027	113,878	2,468	243,394
1847	607,561	146,778	102,685	148,385	4,765	255,714
1848	662,748	148,500	102,690	142,532	3,369	290,181
1849	644,368	153,944	78,262	108,040	3,892	249,994
1850	770,088	213,386	78,889	207,108	4,226	304,258
1851	844,009	172,024	60,138	198,468	2,367	266,908
1852	594,031	201,838	81,240	102,059	205	204,304
1853	498,787	160,159	60,414	221,979	1,138	283,526
1854	778,030	248,136	95,839	242,863	4,438	342,630
1855	886,562	211,844	121,883	237,808	1,919	361,696
1856	706,703	280,581	97,877	244,029	858	432,214
1857	609,986	223,361	89,670	220,741	1,106	347,011
1858	586,818	218,899	58,584	307,275	1,851	367,160
1859	636,124	233,874	79,054	269,819	1,831	360,204
1860	491,487	158,678	68,882	203,349	748	272,979
1861	581,193	201,918	86,418	201,408	748	371,070
1862	606,828	265,347	61,595	308,384	394	366,318
1863	890,904	364,712	70,879	429,162	847	494,910
1864	654,816	276,880	72,074	338,074	2,612	407,761
1865	643,650	217,392	65,420	307,292	1,805	364,007
1866	621,738	216,785	60,626	280,626	1,912	352,701
1867	654,146	249,010	47,319	328,272	4,474	380,066
1868	825,268	817,421	42,384	432,994	3,345	478,704
1869	651,438	269,402	43,414	323,479	1,850	368,744
1870	675,143	244,922	32,342	346,763	2,197	381,533
1871	853,160	299,381	41,224	460,094	2,970	500,558
1872	626,475	346,688	46,947	602,534	2,724	551,736
1873	773,859	422,731	24,147	529,540	1,948	649,631
1874	639,238	435,274	32,465	533,681	1,861	688,008
1875	1,000,841	617,536	28,177	706,967	4,209	737,147
1876	842,960	623,789	38,434	624,137	3,399	680,970
1877	508,197	252,079	30,333	378,740	1,850	400,428
1878	847,718	387,795	16,985	643,908	1,962	641,955

N.B.—In the six years ending 5th April 1818 the bounty on herrings cured guted was two shillings per barrel, while there was a bounty at the same time of two shillings and eightpence per barrel, payable by the excise on the exportation of herrings, whether cured guted or unguted, but which ceased on the 1st June 1813; in the eleven years ending 5th April 1826 the bounty on herrings cured guted was four shillings per barrel; in the four succeeding years the bounty was reduced one shilling per barrel each year till the 5th of April 1830 when it ceased altogether, and has not since been renewed.



**Garvie or Sprat Fishing.**—This is carried on to some extent at the upper end of the Firth of Forth, and in the Beaully Firth. In the former locality the garvies are caught by means of trawls (seans), and the principal fishing is on the western side of Inchgarvie. In the Beaully Firth drift-nets are used, and only fish of fair size are taken. Complaints have long been made in both places of the capture of young herrings with the garvies, and the herring fishers have done their best to get the garvie fishery put a stop to; but fortunately they have not succeeded, for this fishery gives profitable employment to a good many fishermen, and there is not a particle of proof that the herring fishing farther out has suffered from the occasional capture of young herrings with the garvies. Sprats are not in much demand in the Scotch markets, and almost all that are taken in the localities mentioned are sent by rail to London. We are sorry to say that the old fallacy of the sprat being nothing but a young herring still prevails among some of the fishermen and curers.

**Line Fisheries.**—The capture of cod, haddock, ling, and saithe or coalfish is general around the coast of Scotland; and the tusk or torsk, a northern species of the cod family, and in shape like a short-bodied ling, is taken in some numbers at the Shetlands, and a few at the outer Hebrides. Long lines are in use for haddock, ling, and tusk, and also for cod on many parts of the coast; but at the Shetlands hand lines are employed for cod and saithe, and also at Faroe and Iceland. At Newhaven, Eyemouth, and other places in the neighbourhood in the Firth of Forth, two sizes of long line are regularly worked in the proper season. The smaller or haddock lines have from 800 to 1000 hooks each, or even more, on snoods 14 inches long and 2½ feet apart, and mussels and lug worms are used as bait. Some little interest is attached to the state of this fishery, as it is an important one in Scotland, and a few years ago it was said to have fallen off very much. But it appears there are still plenty of haddocks on the coast, and now that larger and decked boats are used, and the fishermen are consequently more independent of weather, very large takes are not uncommon. In one week in January 1876 the Eyemouth boats were at sea six times, and landed 20,000 stones of haddocks, which sold at 2s. per stone, producing in that short period no less than £2000. The season lasts here from October to April, and the average gain for the season by each boat usually ranges from £400 to £600. There is a considerable trade in smoked haddocks, particularly from Eyemouth, and the curing consists in soaking the fish in pickle for half an hour, and then hanging them for about four hours in some hardwood smoke. The village of Findon, between Stonehaven and Aberdeen, has long been famous for first preparing the fish known as "Finnan haddies." Their peculiar flavour, which has made them so popular, arises from their being hung in peat smoke. They are cured in the cottages, and some little variation in the time in pickle and in smoke is made according to the time they are intended to keep. This manufacture is now carried on at many places besides Findon. The cod or "great lines" are of the same description as those used for haddock fishing, but have longer snoods, and the hooks farther apart. It is unnecessary to speak of the manner in which these long-lines are worked, as we have fully described it in our notice of the North Sea cod fishery. A vast quantity of line fish is sent to the fresh market, but the great importance of this Scotch fishery is due to the large extent to which curing operations are carried on, and more especially in the distant districts such as the Shetlands and the outer Hebrides.

Curing is performed in two ways—dry and in pickle. The latter method consists in packing the fish, after they have been split open, gutted, and part of the backbone and the head removed, with layers

of salt in barrels; but when to be cured dried, these fish, perhaps caught as far off as the Faroe Islands or Iceland, and landed at the Shetlands, are unpacked, washed, and spread out either on stages or on the beach, and exposed for some days to the air and sun, due attention being given to them to ensure their being evenly dried. When thoroughly cured, they are kept in a cool dry place, until wanted for shipment. The fish caught near the coast are salted as soon as landed, and afterwards treated as the others. The produce of the Shetland fishery is large in itself; but the return of fish cured in those islands is greatly increased by the supplies of fish in pickle landed there for curing by the Grimsby and Shetland smacks, which go every year to Faroe, Iceland, and other more or less distant fishing grounds.

A great deal of the cod and some of the ling go to the Spanish markets, and a little to Australia; but the ling and tusk are chiefly sent to Dublin, Glasgow, and Leith, and the saithe to Belfast, Leith, and Dundee.

ABSTRACT showing the Total Quantity of Cod, Ling, Hake, Saithe, and Tusk, cured and exported, year by year, *in so far as brought under cognizance of Fishery Officers*, from the 10th of October 1820, when the system for encouragement and improvement of the Cod and Ling Fishery commenced, to the 31st of December 1877. The periods for which each Return is made end on the 5th of April 1821 to 1844; from that year to 1852 on the 5th of January, and afterwards on the 31st of December. Two Returns, therefore, appear for 1852 in the tables. The collection of Returns for England ceased from the 5th of January 1850, when also the Launching and Branding of Cod and Ling came to an end; and there were no Returns for the Isle of Man after January 1869.

Years.	Cured dried.	Cured in pickle.	Exported dried.	Years.	Cured dried.	Cured in pickle.	Exported dried.
	Cwts.	Barrels.	Cwts.		Cwts.	Barrels.	Cwts.
1822	...	...	19,578	1851	90,668	6,032	22,504
1823	...	...	19,398	1852	92,083	7,019	17,141
1824	...	...	23,098	1852	102,970	6,886	16,904
1825	...	...	14,087	1853	106,601	6,122	22,650
1826	69,136	5,621	7,281	1854	109,484	6,168	18,557
1827	95,161	9,025	14,051	1855	113,561	6,316	29,154
1828	82,515	6,142	13,208	1856	110,504	6,642	29,629
1829	81,521	6,819	20,637	1857	104,608	4,338	24,710
1830	101,914	8,838	16,369	1858	95,596	4,684	32,152
1831	37,674	2,950	11,320	1859	118,383	5,362	35,923
1832	50,293	3,779	30,168	1860	115,688	4,359	32,221
1833	58,461	6,407	14,751	1861	82,944	4,118	26,961
1834	62,710	6,522	16,268	1862	100,657	7,735	32,569
1835	44,132	3,767	10,632	1863	129,725	7,337	53,736
1836	38,040	6,270	10,992	1864	107,758	7,363	46,461
1837	66,892	7,273	10,165	1865	112,807	7,678	44,928
1838	84,996	10,303	22,166	1866	115,819	9,357	47,753
1839	85,279	10,621	26,701	1867	119,638	10,819	46,225
1840	93,560	6,653	29,656	1868	113,831	9,650	52,463
1841	91,494	9,480	30,550	1869	135,585	10,319	51,864
1842	55,619	6,638	23,298	1870	145,288	9,948	56,400
1843	77,207	6,431	21,737	1871	119,060	9,288	54,171
1844	92,813	5,123	25,476	1872	145,976	11,940	53,631
1845	83,919	1,726	28,815	1873	100,716	12,361	79,101
1846	92,323	6,037	29,252	1874	143,466	6,754	60,913
1847	90,781	6,341	34,435	1875	167,788	5,503	81,889
1848	86,624	6,247	25,652	1876	111,457	6,109	59,665
1849	85,463	6,810	22,698	1877	187,200	5,619	75,968
1850	98,093	6,588	24,154				

*N.B.*—The books of the Fishery Board do not show the total quantity of cod, ling, &c., cured till the year commencing 5th April 1825. The bounty from the earliest date in this abstract to the 5th of April 1830, was four shillings per cwt. for fish cured dried, and two shillings and sixpence per barrel for fish cured in pickle, taken by the crews of vessels or boats not on the tonnage bounty; while the bounty for vessels licensed for the cod and ling fishery, on the tonnage bounty, was fifty shillings per ton, for tonnage and cargo, to the 5th of July 1826, diminishing to six shillings annually to the 5th of April 1830, when the bounties altogether ceased.

In 1877<sup>1</sup> the number of fishing boats in Scotland was 14,623, and of fishermen and boys 45,890, and the estimated value of the boats, nets, and lines employed in the herring and cod and ling fisheries was £1,178,412, being an increase over the numbers for 1876 of 76 boats and 627 fishermen and boys, and also an increase of £50,418 in the estimated value of boats, nets, and lines.

**IRISH FISHERIES.**—After a continuous depression of 30 years, during which the number of boats and fishermen was reduced to less than a third, the Irish sea fisheries showed some indications of an improvement in 1876, the last year<sup>2</sup> for which the inspectors have published their annual report.

<sup>1</sup> Report of Fishery Board, Scotland, for 1877.

<sup>2</sup> Since the above was in type the Inspectors' Report for 1877 has been published. They state that there has been an apparent decrease of no less than 583 fishing boats and 3300 fishermen and boys since 1876; but, as in previous years, they do not appear to have much confidence in the accuracy of the returns. The herring fisheries were

The difficulty in ascertaining the precise number of boats and fishermen on some of the wilder parts of the coast is so great, however, notwithstanding the important fact that the coastguard is employed in collecting the information, that, as the inspectors tell us, the returns even at the present time cannot be taken as quite trustworthy. There was, however, an apparent increase of 46 craft and 585 fishermen, and this seemed certainly the most encouraging report that had reached us for many years. But an analysis of the return shows that this increase is more apparent than real. The inspectors conveniently divide the boats with their crews into three classes independently of tonnage, and this plan enables us in some measure to understand who are included under the head of fishermen. The divisions come under the following heads, and we give the returns for 1875 and 1876 for the sake of comparison:—

Year.	Solely Fishing.		Mostly Fishing.		Occasionally Fishing.	
	Boats.	Men.	Boats.	Men.	Boats.	Men.
1875	1341	6241	602	1870	3976	14,997
1876	1283	6105	644	2248	4038	15,340

The total number of boats and men in 1876 was—boats 5965, and fishermen 23,693, being a slight increase in both over the previous year. But there is a falling off in the number of regular fishermen, and the increase is only in those who devote part of their time to fishing. We have it on the authority of the inspectors that the men in the third division, or occasional fishermen, are not employed in that occupation on an average for more than one month in the year, and yet we find the boats in this division form more than two-thirds, and the men nearly the same proportion, of the total numbers in Ireland.

The history of the Irish fisheries shows that great fluctuations have taken place at various times, but the last great decline undoubtedly dates from the period of the famine in 1846, and those who have been long acquainted with the west coast fishermen in particular believe that their present depressed state is entirely the result of that disastrous time. Local assistance has been given time after time with only a temporary improvement; and now the experiment is being tried of advancing money from the Irish Reproductive Loan Fund to enable the fishermen to provide the necessary gear for fishing. The applications for loans have been, as was expected, far in excess of the amount available for the purpose, and in very many cases no security could be obtained that the money would be expended in the manner proposed. No doubt some good will be done by these loans, but much lasting advantage is not to be expected from the system. Emigration has carried off thousands from the country, and mainly from the west coast, where, however, the majority of the fishermen were little more so than in name, and fishing was never allowed to interfere with sea-weed cutting, farming, and any chance occupation. There is this to be said, however, that on very many parts of the west coast of Ireland the weather is frequently so bad, and the seas so stormy that fishing cannot be carried on with any regularity; and when favourable times arrive, the neglected boats and fishing gear are too often unfit for use. On the east and south coasts things are in a better condition; important fisheries for herrings and mackerel in their seasons there provide profitable employment not only for Irish fishermen, but for large numbers of Cornish, Scotch, and Manx fishing boats, which until the last year or two have far outnumbered the native craft. There is plenty of fish to be caught on the Irish coasts; and the

better than in 1876, those for mackerel and pilchard not so good; but the total quantity and value of the herrings, mackerel, and cod consigned to the English markets exceeded those of the year before.

influence of the strangers is telling on many of the Irish fishermen, and leading them to improvement in their boats and all that relates to carrying on their work.

The principal methods of fishing in Irish waters are trawling, drift-fishing, and line fishing; there is also a little done with seines and trammel nets.

*Trawling.*—Dublin is the headquarters of the deep-sea trawlers, and possesses a fleet of about 50 smacks, ranging from 30 to 50 tons, and working chiefly from that station. Deep-sea trawlers were first used from Dublin in 1818, when, as previously mentioned, some Brixham boats and fishermen were brought over. The fishing was found to be profitable, and the fleet of smacks was gradually increased until it reached its present size. The trawlers work throughout the year when they can get sufficient hands, but the light summer weather is not very suitable for them; and the attractions of the herring fishery and profitable employment on board yachts take away a great many men for several weeks from their ordinary occupation. The principal trawling grounds lie within a triangular space between Dublin and Dundrum Bays and the Isle of Man, and consist of a number of patches differing in shape and extent, which are worked over, either on the inner or outer grounds, according to the season. The Isle of Man ground, lying in deep water, and a favourite place for soles, is usually fished from March to July. In January there is a partial migration of the trawlers to the south of Ireland, and a very productive fishing place known as the Saltee ground, and about south-west from the Saltee lightship, near Waterford, is worked by them with advantage. Farther out at sea, at a distance of 30 or 40 miles from the land, and without any very clearly defined limits, is what has long been spoken of as the Nymph Bank.<sup>1</sup> Extraordinary results have been anticipated from fishing this ground, and no doubt there is plenty of fish upon it; but there are difficulties in working it properly, partly on account of many scattered rocks which interfere with trawling on it generally, and partly because of a want of organization for bringing in the fish and sending them to market. For a long time the greatest difficulty encountered was from the local fishermen, who would not work in a deep-sea trawler, or allow one to use her nets anywhere within the headlands, although the weather was too bad to go outside. Companies have been formed for trawling from Waterford harbour, but the determined hostility of many of the native fishermen, and the fears of others in consequence, have done more to discourage trawling there on a large scale than anything else. English crews have been tried, but it is not surprising that they should be unwilling to remain in a locality where the feeling against them was so strong. Matters seem to have improved of late, but a good deal of enterprise is needed to carry on the fishing in the way in which it might be done. Trawling is worked in the shoaler parts of Waterford harbour by the local fishermen; and the complaint made by them that the large trawlers did so much mischief in destroying the young fry, whilst the small boats habitually worked where the young fish were most abundant, was not too absurd to be listened to by the inspecting commissioner of fisheries a few years ago. A bye-law was therefore established (probably with the object of preserving the peace) to keep the large trawlers beyond a certain depth of water, and the small ones then had it all their own way inside. Under

<sup>1</sup> Mr Fraser mentions that in 1726 a proposal was made by Mr William Doyle, hydrographer, for supplying the large English markets with fish preserved in well-boats, from the southern coast of Ireland, and particularly from a fishing ground he states he had discovered, unto which he gave the name of Nymph Bank, from a vessel called the "Nymph," which he employed in the examination of this fishing ground.—*Review of Domestic Fisheries*, p. 4 (1818).

the present more enlightened system of inspection the tendency is happily to remove restrictions to fishing rather than to make them; and the results of a systematic search for spawn in the Irish bays are reported to have been such as to refute completely the charges brought against the trawlers of destroying it.

**Drift Fishing.**—Two of the most important fisheries in Ireland are those for herrings and mackerel. That for herrings is carried on more or less on many parts of the coast, but its chief seat is in the Irish Channel, with Howth, the northern point of Dublin Bay, and Ardglass, opposite the Isle of Man, for its headquarters. The fishery begins at the end of May or beginning of June, and lasts well into September, or in some parts into October. By July it is in full work, and the two stations above mentioned are then the scene of unusual life and activity, for a very large proportion of the fish landed there is at once packed and sent off fresh to the English and Scotch markets. A little curing is done at Howth, but it better answers the purpose of the Irish people to send their own fish fresh to market, and to import cured fish from Scotland. The question of introducing the branding system into Ireland has recently been considered by the inspectors of fisheries, and inquiries were held on various parts of the coast in order to find out the general feeling about it. The inspectors say, however, in their report for 1876 — "With regard to branding, we felt it our duty to report that under existing circumstances we were unable to recommend extension of the system to Ireland—there being, firstly, no *bona fide* desire for it existing amongst the Irish fisherman or curers; and, secondly, that the fish caught in Ireland and sold fresh realized a much higher price to the captors than the price received by the fishermen in Scotland and cured for the foreign markets, and that no material benefit would therefore really be derived from such extension."

Ireland is in fact well off in having a market across the channel for any quantity of fresh fish she may send over; and a large proportion of the herrings and trawl fish caught on the east coast, and almost all the mackerel taken in the Kinsale fishery are at once despatched there. The drift fisheries are, as before mentioned, by no means monopolized by the Irish fishermen, but are taken part in by a large number of strangers. The inspectors in their report for 1876 tell us that "the highest number of boats of each country at Howth during the season was—Cornish 206, Irish 209, Scotch 224, Manx 133. At Ardglass the highest average number that fished during one day (23d July) was—Scotch 140, Manx 20, Irish 42, Cornish, 19." These figures show a slight increase in the Irish boats over those in previous years. The east coast fishermen have of late shown many signs of improvement; and the better boats and steady industry of the Manx, Scotch, and Cornish fishermen have not been without their use as examples of how to work the fisheries with profit.

Kinsale has in recent years come into notice as the great station for the mackerel fishery. This fishing begins early in March and goes on till about the end of June, thus immediately preceding the herring season. In 1876 there were 217 English and Manx boats, 13 Scotch, and 133 Irish engaged in this fishery, besides more than 60 large French luggers, the last-mentioned boats salting their fish as soon as caught, and returning home when they have made their cargo. The mackerel fishery is a very important one for Kinsale, as it gives employment, not only to the fishermen, but to numerous other persons of various descriptions. The mackerel are almost all packed in ice and sent to England. During the season of 1876 there were 7 steamers and 11 cutters in this carrying trade,—the former at a monthly expense of £350 to £400 for each vessel, besides paying all dues, coals, and pilotage; and 4400 tons of ice were

imported solely for the package of the fish. The mackerel are packed in boxes containing a "hundred," or six score of fish in each, and the official returns show a total capture of 139,083 boxes full in the season of 1876. The prices ranged from 12s. to £5 per box in the course of the regular season; but some boats made a large catch afterwards in July, when there was little demand for the fish, and prices then went as low as 3s. per 100.

The following is a summary of the quantity of herrings, mackerel, and cod exported from Ireland to the under-mentioned places in England during 1876:—

	Herrings.	Mackerel.	Cod.
	Boxes of 2 cwt.	Boxes of 2 cwt.	Boxes of 2 cwt.
London .....	31,606	29,500	11,882
Nottingham .....	3,552	2,770	4,829
Bradford .....	6,977	3,805	3,001
Manchester .....	17,555	9,721	9,854
Sheffield .....	7,819	5,583	2,465
Wolverhampton .....	5,521	4,078	2,098
Leeds .....	6,998	5,282	2,953
Liverpool .....	21,763	14,017	12,000
Birmingham .....	12,204	4,894	5,987
Total .....	113,995	79,650	55,069

Herrings valued at £2 per box.....£227,990

Mackerel,<sup>1</sup> 139,083 boxes at an average of 16s. per box 111,266

Cod at £3 per box..... 165,207

Total value.....£504,463

It will be seen from the above figures that the Irish fisheries are by no means wanting in importance, and it is much to be regretted that the fishermen of the country do not take a larger share in working them. The produce of the deep-sea trawl fishery is also very valuable, but we can give no return of the considerable quantity of trawl-fish sent to England.

It has been a matter of surprise to many that no systematic attempt has been made to catch the large shoals of pilchards which annually visit the south coast of Ireland. The prejudice of the Irish fishermen against pilchards has been so great as to almost dishearten the inspectors in their repeated endeavours to bring this fishery into notice. Whilst the great Cornish sear fisheries have been languishing because the shoals of pilchards have not come into the bays within reach of the nets, they have been in plenty on parts of the Irish coast. One of the inspectors (Mr Brady) has been untiring in his exertions to procure every kind of information about the catching and curing of pilchards in the Cornish fashion, in the hope of its leading to the establishment of curing stations in Ireland, but little progress has yet been made. The inspectors, however, continue to be hopeful in the matter, and in their report for 1876 they say:—"No efforts have yet been made to cure for the Continental markets, but some have been cured for home consumption on various parts of the coast. By degrees this fish is being regarded with more favour by the country people, and if they continue to frequent our coast as they have now done for some years, there is little doubt but that a considerable trade will result, as they come more into favour."

We have now referred to all the important Irish sea fisheries. It may be added that line-fishing is more or less general around the coast, and is perhaps more systematically attempted on the north and west sides than elsewhere.

**MANX FISHERIES.**—The fisheries carried on from the Isle of Man do not call for special notice, as they are practically those of the Irish sea, and in which the industrious Manxmen always take a prominent part.

<sup>1</sup> 139,083 boxes of mackerel were recorded, and most of them were exported, but the returns of exports are incomplete.

**MINOR BRITISH FISHERIES.—Crab and Lobster Fisheries.**

—The demand for these crustaceans has increased so much within the last few years that the supply from the coasts of Britain has been insufficient, and from 400,000 to 600,000 lobsters have for some little time been annually imported from Norway. They travel without much loss in vessels fitted with wells; and for journeys lasting no longer than two or three days they will live very well if packed with wet seaweed in boxes. The places from which the principal home supplies are sent to the large markets being now mostly within easy reach of railways, there is little occasion to use welled vessels for collecting them.<sup>1</sup> The English markets are mainly supplied from Cornwall and the south coast of England, from the Orkneys and Hebrides in Scotland, and from the west coast of Ireland. Besides these about 200,000 come from France, the fishery for them being in the neighbourhood of Cherbourg, and a few from Sweden. The means adopted for catching lobsters and crabs in the British Islands are either circular basket-work "pots" with a mouse-trap entrance at the top, or cages covered with netting and with one or two entrances as in the pots. These cages are commonly called "creels." Crabs are taken in most abundance in the west and south of England, and more or less generally on the east coast, and in Scotland and Ireland, those from parts of Devon and Cornwall being the finest which are sent to market. There is a general disposition on the part of the fishermen to submit to some law limiting the size of both crabs and lobsters to be offered for sale, so as to put a stop to the falling off in these fisheries, which is apparent on some parts of the coast. A close time is objected to, as no month in the year is generally suitable, and "berried" lobsters are so valuable for the market that if they had to be returned to the sea the fishermen would lose a great part of their present profits. A limit to the size allowed to be sold seems therefore to be the best means of protecting these fisheries; and such a law is now enforced on the coast of Norfolk.

**Shrimp and Prawn Fisheries.**—The most important of these fisheries are carried on in the estuary of the Thames, Pegwell Bay near Ramsgate, and Morecambe Bay on the Lancashire coast, but they are more or less general wherever suitable ground is met with. Leigh is the headquarters of the Thames shrimpers. They fish with a net mounted very much like a beam-trawl, but having a long, straight piece of wood at the lower part of the mouth to work over the ground instead of the ordinary ground-rope. This is in fact like the common form of hand-shrimping net, but so fitted as to be towed instead of pushed. Ordinary trawls are used for prawns or "red shrimps," and in some other places for true shrimps. The supply of shrimps from Leigh sometimes amounts to 2000 gallons in a day.

**Shellfish:—Oysters, Mussels, Whelks, Periwinkles.**—The oyster fisheries of the British Islands have been in a failing condition for some few years past, owing to a deficiency of spat, the cause of which has been the subject of active controversy, not only between rival theorists, but also among practical fishermen. Over-fishing has been regarded by many as the main cause of the decrease, and it may possibly have helped to make matters worse than they would otherwise have been; but it is difficult to explain in this manner the fact that, in England, Scotland, and Ireland, there has been a general failure of spat for some years past, on all kinds of ground and under every condition, in public and private beds, and whether they have been carefully protected, as in the case of old established private companies, or left to the working of the general public, except

during a definite close time, more or less enforced. In Ireland, where there are regulations for close time, and restrictions as to the size of oysters allowed to be sold, and where in some cases all fishing has been stopped for two or three years, the decrease of oysters has been as decided as in England or Scotland; and Mr Blake, until recently one of the inspectors of Irish fisheries, and chairman of the oyster commission in 1868, stated in his evidence given before the select committee of the House of Commons in 1876 that the decline in the oyster fisheries was due to the bad spatting seasons, and to the great increase of dredging; "but if the spatting went on as it formerly did, the amount of dredging would not be of much importance."

The bulk of English supplies is obtained from the oyster beds of private companies, of which the Whitstable company is the most ancient, having worked from time immemorial on their present ground on the south shore of the entrance to the Thames. In 1793 they purchased from the lord of the manor the exclusive right of fishing there. The company is a corporation of fishermen governed by elected members of their own body. The men are paid for the daily work done by them, and each member of the company also receives his share of the profits on the sale of the oysters. A great part of their employment, besides dredging and keeping their own ground clean and free from vermin, consists in dredging for spat in the public portion of the river for the purpose of laying it down on their own beds. A general failure of spat, such as there has been in recent years, is therefore not only felt by them on their own limited ground, but they suffer from the scarcity in what may be called their reserves. The Whitstable company is, however, only one among many which occupy the shores of the Thames estuary and the small rivers which flow into it. The oysters thus laid down or bred in these situations become remarkable for the thinness of their shells, and the good flavour and comparatively large size of their contents, and are what are known as "natives." There are numerous companies or individual proprietors engaged in cultivating oysters on various parts of the coasts, but at the present time they are, we believe, all more or less suffering from deficiency of spat. Channel or deep-sea oysters are generally large and coarse, and do not fetch more than one tenth of the price given for the more delicate "natives." Attempts at the artificial cultivation of oysters have not met with much success.

**Mussels and whelks**, while in some request for food among the lower classes, are in especial demand for the purposes of fish-bait, and the value of mussels in this respect has recently led to a more careful protection of the older banks, and some attempts at the cultivation of new ones. Whelks are particularly valuable in the North Sea cod fishery, and a number of vessels at Grimsby are regularly engaged in fishing for them. A mode of catching them is by means of shallow hoop-nets baited with refuse fish, and sunk to the bottom on suitable ground; in these the whelks collect in large numbers, and are caught without any difficulty. A considerable supply is also obtained from the oyster dredgers; and at the mouth of the Thames they are caught largely by using "trots" or "bulters"—long-lines of small dimensions; but instead of having baited hooks, they have common small shore-crabs threaded on the snoods, about twenty on each; these are seized by the whelks and so firmly held whilst being devoured that the line may easily be hauled in without disturbing the numbers found on every snood. *Periwinkles* are all procured between tide marks, and are of course collected by hand. The London market is mainly supplied from the western islands of Scotland, the Orkneys, the Shetlands, and parts of the Irish coast.

<sup>1</sup> Report of Commission on Crab and Lobster Fisheries, p. ii. (1877).



**BRITISH NORTH AMERICAN FISHERIES.**<sup>1</sup>—The principal fisheries coming under this head are for cod, herring, and mackerel, including the long-famous cod fishery of Newfoundland. The fisheries of the Dominion of Canada are chiefly carried on with open boats, and consequently are to a great extent, though subject to some variation, what may be called shore fisheries. The proportion, as given by Professor Hind, of the shore fisheries to the deep-sea fisheries, in which decked vessels are employed, is 4 to 1, so that "by far the largest proportion of the fishing industry of the Dominion is pursued in coastal waters, and much of it rarely extends beyond the limit of three marine miles from the coast line." The following table shows the number of boats and vessels, with the aggregate number of men employed in each, in 1876:—

	Boats	Men.	Vessels.	Men.
Nova Scotia .....	9,585	18,093	653	6,049
New Brunswick .....	3,850	7,322	463	1,794
Quebec .....	5,815	10,777	256	1,219
Prince Edward Island ..	991	3,831	7	35
Total .....	20,241	40,023	1,397	9,097

In the Newfoundland fisheries boats and vessels are also used, but the deep-sea fishery is scarcely distinct from that pursued in coastal waters, or within the three-mile limit from the shore. The total number of boats employed at Newfoundland in 1874 was 18,611, and the number of persons engaged in catching and curing fish 45,854, while the number of vessels was 1197, with an aggregate of 61,551 tons, and manned by 8394 fishermen sailors. These vessels, however, include the large number used for sealing. The number of "fishing rooms" or portions of the shore set apart for the curing and storing of fish was 8902 in the same year. The numbers of fishing craft, men, and fishing rooms in 1874 showed a considerable increase over those for 1869. Professor Hind, in speaking of the large proportion of inshore fishing, says:—"The changeable character of the weather on the British American coast, the sudden and unexpected occurrence of fogs, the variations of currents produced by tides, the long experience of the dangers attending fishing in open boats some distance from the land, the pecuniary resources of the fishermen, conjointly with the abundant fish resources of the coastal waters, have combined to limit the industry of the British American fishermen in a great measure to the immediate vicinity of the shore line, and within easy reach of harbours. This is particularly the case with Newfoundland." This inshore fishery, however, depends for its success on the supply of bait fishes, especially the capelan and herring; and, as in every kind of fishery, there are years when migratory fish, those which more or less change their quarters at particular seasons, vary in abundance in certain localities, and sometimes forsake one part of a coast and go to another, so the important fisheries dependent on these movements are subject to fluctuations. The cod, in fact, there follow the bait-fishes precisely as, on the English coast, the cod and coalfish become most numerous near the land when the shoals of herrings come closest in. On the coasts of British North America the fishing interest is almost entirely concerned with species whose natural habitat is in cold waters; and as an immense area of fishing water is there influenced by the Labrador current, it is not surprising that cod, halibut, herring, mackerel, and others should be found in abundance on these coasts. The mackerel has also an extensive range

south along the coast of the United States; but the Labrador current is little felt south of Cape Cod, its influence being there almost destroyed by the Gulf Stream. The really cold-water species are therefore mainly found in the Dominion seas; and the fact that American fishermen so systematically work there for them is the ground on which the Dominion claim for compensation from the United States Government was based. The sum recently awarded to the colony by the arbitrators is much less, however, than the amount of the claim.

The methods of fishing in use in the Dominion and Newfoundland waters are of the same kind as in the British Islands, with the exception of beam-trawling, which seems to be practically unknown on the American coasts. Herrings are taken by drift-nets, anchored nets, and seines; mackerel by seines and hook and line; capelan by seines; and cod and its allies by long lines or butlers—there, strange to say, known as "trawls."

Professor Hind states (at p. 58 of pt. 1 of his report) that the aggregate number of barrels of herrings caught in Dominion and Newfoundland waters in 1874 may be put down at—

Dominion waters .....	534,307 barrels
Newfoundland waters .....	271,382 "

Total ..... 805,689 barrels

This number does not include the quantities used for manure or bait; and he adds:—"A million barrels of herring each year, and gradually increasing, will fairly represent the quantity of this fish taken from British American seas." In the same year 164,879 barrels of mackerel were taken in Dominion waters, of which 80 per cent. were caught on the coast of Nova Scotia. The mackerel fishery at Newfoundland appears to have been very small for some years; and the fishermen do not now seem to be well provided with the means of catching them; but there is reason to believe that this fishery might be largely increased in the Dominion waters if more attention were given to it. There is a very great demand for mackerel in the American market. The Newfoundland and Dominion cod fisheries are, as we have mentioned, almost entirely inshore fisheries, and the abundance or scarcity of capelan or other fishes there used as bait materially affects the success of the fishery, for if the bait fishes do not come inshore, there is no attraction for the cod. In the deep-sea fishery on the banks, the case is different; but they are almost neglected by the Dominion and Newfoundland fishermen, for reasons previously stated. The produce of the inshore cod fisheries, although fluctuating, shows no signs of being exhausted. The following table, it is believed, represents with tolerable accuracy the catch of cod and allied fishes on the Dominion coasts in the years stated:—

Year.	Quintals.	Year.	Quintals.
1869	730,928	1873	1,405,804
1870	801,553	1874	1,278,499
1871	964,131	1875	1,193,579
1872	1,372,207		

The export of dried cod in quintals from Newfoundland in the years 1869-1876 was:—

Year.	Quintals.	Year.	Quintals.
1869	1,204,086	1873	1,369,205
1870	1,213,737	1874	1,609,724
1871	1,328,726	1875	1,186,235
1872	1,221,156	1876	1,364,068

The British American fishery for lobsters is of some importance, and cod roes and livers are among the valuable articles of export.

<sup>1</sup> An elaborate and in many respects valuable Report, by Professor Henry Youle Hind, M.A., of the Fishery Commission, Halifax, published so recently as 1877, has largely supplied us with materials for our notice of the fisheries of British North America.

The French fisheries at Newfoundland are carried on both on the banks and near the island, the craft employed being of various sizes, ranging from vessels averaging about 170 tons down to open boats. The following table<sup>1</sup> gives the number of craft of all kinds and the total number of men in each year from 1867 to 1874 :—

Year.	Vessels, &c.	Men.	Year	Vessels, &c.	Men
1867	304	7178	1871	665	5295
1868	774	6552	1872	865	5620
1869	806	6452	1873	899	6036
1870	833	6397	1874	847	5621

Of the numbers of fishing craft here given about 70 per cent. are boats. The produce of the French Newfoundland fishery in 1872 was said to be 10 million francs.

**UNITED STATES FISHERIES.**—These may be divided into warm-water and cold-water fisheries, the latter being for the most part carried on in British American waters. The cod fishery, formerly prosecuted off the coast of New England, in the cold water north of Cape Cod, is said to have seriously decreased, and it is believed by Professor Baird, the commissioner of fish and fisheries, that the failure is largely due to the diminution of alewives and other bait-fishes, caused by the numerous dams and obstructions in the rivers in which these fishes were accustomed to spawn. The young fish formerly produced in such myriads are now said to be comparatively few, and the cod and allied fishes consequently have less food to attract them to the old haunts. As there is no reason to suppose that cod, as a species, are diminishing in numbers, the conclusion obviously is that they are seeking other feeding grounds. The warm-water fisheries include the pursuit of a variety of fishes, but the "scup," a kind of bream, and the "blue-fish," both migratory species, are those whose capture is thought of most value. Although almost all the shore fisheries are said to be decreasing,<sup>2</sup> Professor Baird, in his elaborate reports to the United States Government, does not seem to be quite clear as to an effectual remedy. The pounds and weirs are said to be very destructive to spawning fish, but they supply a large quantity of fish to the markets. The scourge of the American coast appears to be the blue-fish, "destroying ten times as many fish as they really need for food, and leaving in their track the surface of the water covered with the blood and fragments of the mangled fish."<sup>3</sup> Professor Baird estimates that in 1871 there were 100 millions of these fish on part of the American coast, and that each one destroyed twenty fish per day; and as the blue-fish season lasts from 120 to 150 days, some idea may be formed of the extent of the mischief caused by them. Fortunately the blue-fish is in great request as an article of food, and about a million and a quarter were captured in 1871, or, as estimated, one in a hundred of those on the coast. To the blue-fish Professor Baird assigns the very first position among the injurious influences that have affected the supply of fishes on the coast. The agency of man he places next,—the pounds and weirs along-shore catching spawning fishes, and the dams and other obstructions in the rivers preventing certain species from ascending

to their proper spawning grounds. He proposed to limit the working of the pounds and weirs to a certain number of days in each week, and to do away as much as possible with the river obstructions. The blue-fish is beyond control.

The estimated value of the United States sea fisheries in 1876 was—

Warm-water fisheries.....	\$3,274,138
Cold-water ".....	9,756,683
	\$13,030,821

The comparative value of the cold-water fisheries of the United States and of British North America for the years 1870-6 is shown in the following table<sup>4</sup>—the greater portion of the value in the United States return being from fish caught in British American waters :—

Year.	United States.	British North America.
1870	\$5,313,967	\$14,260,298
1871	11,482,410	16,086,081
1872	9,526,647	16,524,644
1873	8,348,185	18,793,953
1874	9,522,553	20,193,596
1875	10,747,579	18,193,214
1876	9,756,683	18,707,328

The oyster fisheries of the United States are on a very large scale, and the coast line generally appears to abound with suitable localities for the production of these favourite mollusks. The oysters are all of a more or less elongated form, and of large size, sometimes growing to a length of 12 or 15 inches. They are obviously more suitable for cooking than for consumption in a natural state; and it is therefore not surprising that they are unable to compete with the favourite "native" in the English market. The trade in oysters in the principal cities of the United States in 1859 was estimated as follows :—

	Barrels.
Virginia (State).....	1,050,000
Baltimore.....	3,500,000
Philadelphia.....	2,500,000
New York.....	6,950,000
Fair Haven.....	2,000,000
Other cities.....	4,000,000
Total.....	20,000,000

**NORWEGIAN AND SWEDISH FISHERIES.**—The important fishery of Norway is that for cod, and the special seat of it is at the Lofoden Islands. In 1876<sup>5</sup> the fishery was very successful, more than 22 millions of fish having been taken, a larger catch than in any previous year since 1860, excepting 1875. Of this number about 16 millions of fish were salted, and most of the remainder dried. The average price on the spot was £1, 6s. 8d. per 100. The Finmark cod fishery in the same year fell off very much, as will be seen by the following returns for the years 1872-6 :—

1872.....	11,500,000 cod.
1873.....	16,000,000 "
1874.....	17,500,000 "
1875.....	19,750,000 "
1876.....	3,500,000 "

The catch of Norway mackerel in 1876 was 1,800,000 fish, and the estimated produce of the herring fishery in that year was 400,000 barrels; but the spring or winter herring disappeared about 1874, and the market has since been supplied with the large northern herring. A remarkable instance of the capricious movements of the herring

<sup>1</sup> Report on Newfoundland and Labrador Fisheries, 1875, by Captain Erskine, R.N.

<sup>2</sup> Professor Baird says at page 19 of Part I. of his Report—"It is by no means to be inferred from our remarks as to the scarcity of fish that fewer are actually caught now than formerly at any time, the contrary, perhaps, being the case, since by means of the improved methods of capture, in the way of pounds and nets, an immense supply is taken out at certain seasons of the year, so as frequently to glut the markets. The scarcity is better shown by the great difficulty experienced by line fishermen in securing a proper supply throughout the year, on grounds where they were formerly able to catch all they needed for their own use and for sale."

<sup>3</sup> Baird. Report for 1871 and 1872, part i. p. 28.

<sup>4</sup> Report of Fishery Commission, Halifax, part ii. p. 63.

<sup>5</sup> Report by Lieutenant P. de Broca to the French Government, 1862, given in Report by Prof. Baird, pt. iii. p. 282 (1876).

<sup>6</sup> Consular Reports, part I., 1877.

has just been reported<sup>1</sup> by Mr F. W. Duff, the British consul at Gothenburg, to the Foreign Office. He states that "great shoals of herrings of the large kind which disappeared from this coast in 1809 have now made their appearance again north of Gothenburg, on the coast in this country. The first appearance of the herring took place at Christmas (1877), when whales were seen following the shoals of herrings towards the coast." This is by no means the first time that herrings have returned to a particular locality after an interval of very many years.

**FRENCH AND DUTCH FISHERIES.**—The French fisheries on the coast of the Channel are of much the same kind as those on the English side—trawling, drifting, and line-fishing. Trawling is carried on to a considerable extent from Boulogne, Treport, Calais, and some other places where there is convenient access to railways; and recently two companies have been established for trawling with steamers along the sandy coast between Arcachon and the mouth of the Gironde. On the coast of Brittany the long-standing fishery for sardines, or, as they really are, young pilchards, is regularly worked. It is remarkable that this fishery is almost entirely dependent for its success on a good supply of cod-roses, in which a large trade with Norway and other places is carried on solely for this purpose, the separated ova of the cod being freely scattered among the sardine nets in order to attract the fish. French and Dutch vessels work regularly in the North Sea for herrings and cod, and the French fish in large numbers along the east coast of England in company with English boats during the herring season. They also take part in the Kinsale mackerel fishery. The French fisheries at Newfoundland have been already noticed; considerable attention is also given by the French to the cod fishery at Iceland. About 200 French vessels visited Iceland in 1877, and during the five years 1872–6 the average annual produce of about 120 vessels from Dunkirk alone was 5 million kilos. of fish, and of oil about 600,000 kilos.<sup>2</sup>

The French oyster fisheries have for many years received considerable attention, and at Arcachon especially great success appears to have attended the cultivation of the beds. Eighty-five per cent. of the oysters obtained from these fisheries are said to be the produce of four or five breeding grounds, Auray and Arcachon being the most prolific. The total produce of all the French oyster fisheries in 1875 reached the enormous number of 97,227,000 oysters.<sup>3</sup>

**ECHINUS FISHERY.**—On the French and Italian coasts of the Mediterranean the *echini* or sea-eggs, animals belonging to the echinoderm or star-fish tribe, are regularly collected for the market, and are in great request among the poorer classes of the population. They are eaten uncooked, the egg-shaped spiny shell being divided into two parts by a single cut with a knife, and the soft and slippery contents then readily extracted. The echini form part of the various marine productions well known at Naples as *frutti di mare*.

**TRIPANG FISHERY.**—The tripang or *bêche de mer* belongs to the order *Holothuriadae* or sea-cucumbers. Representatives of the group are found in British seas, but by no means so abundantly or of such general large size as in tropical waters. Several species go under the commercial name of "tripang"; they are collected among almost all the islands of the Indian Archipelago down to New Guinea and Australia, and also on the north coast of Ceylon. In shape the tripang resembles a cucumber, but with a circle of short branched tentacles at one end, and surrounding the mouth. The colour is generally black, more or less variegated with red or orange, and although sluggish in its

movements, the animal has great power of contracting and altering its form. Coral reefs are favourite haunts of the tripang, and it is found in both deep and shallow water. The only preparation it receives after being gutted consists in drying in the sun and smoking over a wood fire. Macassar is the centre of the tripang trade, but the whole produce of the fisheries goes to China, and the trade is entirely in the hands of native merchants.

#### Law relating to Fisheries.

Fish in English law fall under the general principles of the law as to animals *feræ naturæ*. All mankind, says Blackstone, had by the grant of the Creator an original right to pursue them; and this natural right still continues unless so far as it is restrained by the civil law. Accordingly everybody has a right to take fish in the seas, in public rivers, or in private rivers belonging to himself. In private (i.e., non-navigable) rivers the right of fishery belongs *prima facie* to the owners of the land on either side, in public or navigable rivers to the public at large. In both, however, an exclusive right of fishery may exist, by which the presumptive right is excluded; and this, in the case of public rivers, can only take place by grant of the crown. Since Magna Charta the crown can no longer make such grants—at least such seems to be the better interpretation of the words in the statute.

These various rights are more or less roughly distinguished in English law as follows. A common fishery is the right of fishing in the sea and public rivers open to all the public. A several fishery is the exclusive right of an individual, derived through or on account of ownership of the soil. A free fishery is an exclusive right of fishing in public water, derived from royal grant. A common of fishery is the right of fishing "in another man's water," like common of pasture, &c. These rights include fish of all descriptions, with this exception that the crown has an old prerogative right to the whale and sturgeon, which, "when thrown ashore or caught near the coast, are the property of the sovereign on account (as it is said in the books) of their superior excellence." A curious distinction is made between the whale and the sturgeon—*De sturione observetur quod rex illum habebit integrum; de balæna vero sufficit si rex habeat caput et regina caudam*.

As to the mode in which fish may be caught there does not seem to be any restriction at common law. It is a question, however, whether a weir, "by which is meant a fixed structure on the bed of the river, the object of which is, either by means of an apparatus which then catches them or by impeding their progress, to prevent all or nearly all the fish from passing upwards,"<sup>4</sup> is not illegal at common law. In the case of a public river a structure of this sort would be objectionable on the ground of its impeding the navigation, and in a case relating to the River Severn the judges held that the crown could not derogate from the public right of navigation by any grant to erect weirs in a public river. The legal writer from whom we have quoted above, while stating that no case had arisen directly on the point in England, Scotland, or Ireland, is of opinion that "both weirs and fixed nets, and all other apparatus which prevent fish passing to or fro are illegal at common law and form a good ground of action," even although they may not obstruct navigation. "Though one riparian owner may, by fishing by net or rod at all hours and by means of servants and assistants, almost use up the fish as effectually as by keeping fixed nets, this kind of user could not properly be a cause of action, just as one owner who has a large number of cattle could not be liable to an action at the suit of another who has no cattle, and so makes no use of the water. But it is otherwise where a total obstruction occurs. Hence, even independently of any statute, any fixed apparatus in a river or stream which prevents the fish going up to the other riparian owners is a good cause of action at common law, as it deprives him of one of the natural riparian rights."

A considerable number of statutes have been passed on the subject of fisheries, the most important of which are those relating to salmon.

A short Act was passed in 1876 enabling boards of conservators to fix a close term for trout, commencing not earlier than 2d September, nor later than 2d November, and extending over 123 days. A bill for the protection of freshwater fish has passed through parliament during the present session (1878). Sections 8 and 9 of the Salmon Fishery Act 1861 (which relate to fishing with light spears and other prohibited instruments, and to using roe as a bait) shall, as amended by the subsequent Salmon Fishery Acts, apply to trout and char in all waters within the limits of the Act, which are the same as the limits of the Salmon Act. For all other freshwater fish, not migrating to or from the open sea, a close season is established from 1st March to 31st May, both

<sup>1</sup> Commercial Reports, No. 2, 1878 (Herring Fishery).

<sup>2</sup> Consular Reports, part v., 1877.

<sup>3</sup> See a Report by Major Hayes to the Lord-Lieutenant of Ireland, 1878, which contains an immense amount of valuable information.

<sup>4</sup> Fishery Laws of the United Kingdom, by James Paterson, London, 1863.

inclusive. Fishing for or dealing in freshwater fish during this close season is subjected to a penalty not exceeding 40s. for the first or £5 for the second offence, recoverable on summary conviction before two justices. The Fisheries (Dynamite) Act is extended to private waters.

The Act 40 and 41 Vict. c. 62 is an Act to amend the law relating to the fisheries of oysters, crabs, and lobsters, and other sea fisheries. The sale of oysters is prohibited, in the case of "deep sea oysters," between 15th June and 4th August; in other cases between 14th May and 14th August. Oysters taken in foreign waters, or preserved in tins, or intended for the purpose of oyster cultivation are not within this section. The Board of Trade has power to temporarily prohibit or restrict dredging for oysters on certain banks. Crabs measuring less than 4½ inches across the back, or carrying spawn attached to the tail, &c., or having recently cast the shell may not be sold, except for bait. Lobsters measuring less than 8 inches "from the tip of the back to the end of the tail, when spread as far as possible flat," may not be sold. Oysters are also specially dealt with by the "Sea Fisheries Act, 1898," which is an Act to carry into effect a convention between England and France concerning the fisheries in the seas adjoining the British Islands and France, and to amend the laws relating to British sea fisheries.

*International Law.*—As between different nations, fishing in the high seas is common to all, while fishing in the territorial waters of any particular state (i.e., within three miles of the coast) is limited to the subjects of that state. Between France and England the rights of fishing in the seas adjacent to both countries are regulated by the convention and Act of Parliament cited above. Between

England and the United States questions of great importance have arisen as to their respective rights of fishing in North American waters. Mutual concessions were made by treaties in 1818, 1804, and 1871. The last was the Treaty of Washington, by which "the inhabitants of the United States are to have in addition to their rights under the treaty of 1818, in common with British subjects, for ten years from the date of the treaty and until the end of two years after notice has been given by either party, the right to take fish of every kind except shell-fish on the sea coasts and shores, and in the bays, harbours, and creeks of the provinces of Quebec, Nova Scotia, and New Brunswick, and the colony of Prince Edward's Island, and of the several islands thereto adjacent, without being restricted to any distance from the shore, with permission to land upon the said coasts and shores and islands, and also upon the Magdalen Islands for the purpose of drying their nets and curing their fish." Salmon and shad fisheries and all other fisheries in the rivers and mouths of rivers are reserved for British subjects. Exactly similar rights are granted to British subjects on the eastern sea coasts and shores of the United States north of the 39th parallel of north latitude. But inasmuch as the English Government insisted that the privileges granted to the United States were of greater value than those conceded to England, it was agreed that commissioners should be appointed to determine the amount of any compensation which ought to be paid to the English Government in consideration of such excess. The commissioners have recently made an award finding the sum of £1,000,000 to be due from the United States to England. Certain places designated in the abrogated treaty of 1854 are to be excepted from the operation of the treaty as "places reserved from the common right of fishing."

