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The Pandalus and Nephrops Fisheries of the ICES and ICNAF Areas

compiled by:

Erik Smidt,
Danish Institute for Fishery
and Marine Research,
Charlottenlund Slot,
DK-2920 Charlottenlund,
Denmark.

and

H.J. Thomas,
Marine Laboratory,
P.O. Box 101,
Victoria Road,
Aberdeen AB9 8DB,
Scotland.

edited by:

F.A. Gibson,
Department of Agriculture
and Fisheries,
Fisheries Division,
3, Cathal Brugha Street,
Dublin 1,
Ireland.

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INTRODUCTION

During the course of discussions at a meeting of the Shellfish and Benthos Committee of ICES held in Dublin in 1969, it became clear that there was a need for compilation of information about the Pandalus and Nephrops fisheries of the ICES and ICNAF areas. The members recommended that all possible data should be assembled and presented at the 1970 meeting and this was endorsed by the Consultative Committee. Dr. E. Smidt (Denmark) and Dr. H.J. Thomas (Scotland) were appointed to compile the Pandalus and Nephrops data, respectively. However, all the data were not available in 1970, and the Consultative Committee recommended that outstanding information should be made available for the mid-term meeting of the Liaison Committee in 1971. The Liaison Committee recommended that the material so far collected should be collated in readiness for publication in the Cooperative Research Series.

In the case of the Pandalus borealis fisheries data in varying degree have been submitted by Denmark, Germany, Iceland, Norway, Sweden (ICES area), and by Greenland, Canada and the USA (ICNAF area). In addition, information of fisheries for Pandalus montagui, has been supplied by the UK.

In the case of Nephrops norvegicus fisheries data have been supplied by Belgium, Denmark (including Faroe), France, Germany, Iceland, Ireland, Norway, Spain, Sweden and the UK. Comprehensive data for Iceland (Eiriksson, 1970) and for England (Symonds, ICES contribution, 1971) are set out elsewhere and that information is only abstracted here along with the less detailed submissions by the remaining countries. Abstracts have been included from published data for Faroe (Joensen, 1964), Germany (Aker and Tiews, 1965) and Spain (Estadist, Pesca, Madr. 1962-9).

Certain unpublished data, which were submitted and which could not conveniently be incorporated into the main statement, are set out as an appendix.

FISHERIES FOR Pandalus borealis

Fishing Boats, ICES area.

It has not been possible to compile detailed descriptions of the boats used in these fisheries, so that a general appraisal is given

in this section, by country.

Denmark. The boats used in the Danish fishery range in length from 12 to 27.5 m (40-90 ft). They include typical cutter type vessels as used in the Danish trawl fisheries, having gross registered tonnages (GRT) from 20 to 150 tonnes.

Germany. The boats used in the German fishery range from 20 to 24 m (60-80 ft). They are typical of the normal high seas cutters, having GRT from 50 to 100 tonnes and having engines of 120 to 200 hp.

Iceland. The boats used in the Icelandic fishery are mostly small. Their hp has risen from an average 81 in 1962 to 95 in 1970, although over this period the GRT only increased from 13.2 to 13.6.

Norway. Approximately 95% of the boats used in the Norwegian fishery range in length from 9 to 18 m (30-60 ft) having GRT from 10-50.

Sweden. The most of the boats in the Swedish fishery range from 12 to 21 m (40-70 ft) having GRT from 20-75. These crafts are powered by engines of 120 to 400 hp. All use echosounders and 20% to 25% have radar installed.

Fishing Boats, ICNAF area.

Canada. In the northern Gulf of St. Lawrence, boats have a GRT from 33 to 127 (average 55). Their length range from 13 to 23 m (44-76 ft) (average 13 m or 60 ft). Corresponding figures for the Bay of Fundy are: GRT 50 to 130 (average 62); length 17 to 26 m (55-85 ft), average 19.5 m (64 ft); and hp range from 150 to 510 (average 300). All boats are side trawlers.

Greenland. All boats in Greenlandic waters are side trawlers, like those of Denmark. The most common sizes are in the range from 15 to 25 GRT, although several reach 50 GRT. One Faroese stern trawler (about 200 GRT) has been trawling prawns in offshore waters since 1969.

USA. Most of the boats in the US prawn fisheries have been converted from other types of fishing such as groundfish or lobster trawling. A few, built specifically for prawn fishing, have been brought up from the Gulf of Mexico and a few have been built locally for prawn trawling. The fleet, therefore, consists of the following types of boats: Regular groundfish side trawlers 14 to 23 m (45-75 ft); with 120 to 380 hp engines and having 2-4 crew men; southern Gulf of Mexico side or stern trawlers of 20 to 23 m (65-75 ft); lobster boats of 9 to 12 m (28-40 ft); lobster-prawn boats 14 to 17 m (45-54 ft) and up to 225 hp, side or stern rigged (Table 15).

Fishing Gear, ICES area.

Small meshed otter trawls of various designs, but almost exclusively side trawls are used by boats of all countries. (By inter-Scandinavian law, a minimum mesh size of 34 mm internal stretched mesh has been in force for Denmark, Norway and Sweden since 1953, but the Swedish fishermen generally use 38 to 40 mm mesh size).

Denmark. The most usual net used is a long armed trawl with a headline 44 to 52 m (135-160 ft). Also, some short armed Swedish "vinge" trawls are in use, having headlines from 42 to 56 m (130-170 ft). The material of these nets is mostly synthetic fibres.

Germany. The nets used in the German fishery are designed to fish specifically for Pandalus and have cod-ends with an internal mesh size of 30 mm stretched.

Iceland. In the Icelandic fishery, specially designed Pandalus trawls with a headline of 30 m (93 ft) are in use. These trawls, prior to 1967 had a headline of 20 m (60 ft) and until 1962 used a mesh size of 25.4 mm, but since then have increased in mesh size to 32.8 mm. Formerly, some Danish type prawn trawls were used, but they proved to be unpopular because they caught large by-catches of herring and capelin. Since 1967, the nets have adopted more sophisticated designs.

Norway. Small trawls are used in the fjords and larger trawls in the offshore grounds.

Sweden. The most of the nets used by Swedish boats are of the short-armed "vinge" trawl variety, of different size and similar to Norwegian trawls, however, a few Swedish boats use an older long-armed trawl, as described by Höglund and Dybern (1966) and Dybern (1966).

Fishing Gear, ICNAF area.

Canada. The gear most commonly used is the "Yankee" trawl with a 18 m (60 ft) footrope and a 24 m (80 ft) headrope, usually constructed of a uniform 38 mm stretched mesh courlene.

Greenland. The Danish type trawl is used, but with mesh sizes normally of 40 to 44 mm stretched.

USA. The most common gears in use are various types of otter trawl such as the 50 to 70 trawl, 15 m (50 ft) headrope and 21 m (70 ft) footrope, with mesh size in the wings, square and belly of 51 mm, and 44 to 48 mm stretched in the cod-end, using either chain or roller gear, depending on the bottom. Furthermore, about 50 prawn traps

were used very successfully in the 1969/70 season, and their use is expected to increase.

Fishery Areas, ICES area.

Denmark. The Danish fishery for Pandalus was developed in 1931 and based on the Kattegat and Skagerrak (ICES sub area IIIa), but was later expanded into the North Sea (ICES sub area IVa). In 1960, fishing was pursued in the Fladen Ground (ICES sub area IVa) and at present the largest quantities are landed from these grounds. The depth of water in which these fisheries take place ranges from 150 to 250 m in the Kattegat/Skagerrak and is about 150 m in the Fladen area.

Germany. A limited fishery commenced in 1966, chiefly in the Farn Deep (ICES sub area IVb), but later extended to the Fladen Ground (ICES sub area IVa). The depth of fishing in the Farn Deep is from 80 to 100 m and from 120 to 140 m in the Fladen area.

Iceland. The fishing of Pandalus in Icelandic waters commenced in 1936 (ICES sub area Va). However, fishery statistics commenced in 1955. Originally, the fishing was confined to the Ísafjardardjup (1936) and Arnarfjörður (1938) fjords on the north west coast. New stocks were located in the Húnaflói in 1965, in Reydarfjörður (east coast) in 1968 and in Breidafjördur in 1969. Most Icelandic fishing grounds are located in depths from 60 to 150 m.

Norway. The Norwegian Pandalus fishery is the oldest in the ICES area dating from 1898, when it commenced in the Oslo fjord. However, at present the main fisheries are centred in the Skagerrak (ICES sub area IIIa), in inshore waters on the west coast as far as Finmark (ICES sub area IVa) and east of North Cape (ICES sub areas IIa and I), (see also Rasmussen, 1967). According to Rasmussen (1953) the fishing depths range from 100 to 330 m. As recently as 1970, extensive prawn grounds were discovered in the Barents Sea, by Norwegian biologists. These grounds, which extend as far north as Spitsbergen vary in depth from 300 to 400 m and have yielded catches ranging from 50 to 180 kg per hour of trawling (Rasmussen and Øynes 1970, Strøm and Rasmussen 1970).

Sweden. The Swedish fisheries for Pandalus were started in 1902. Today, about 80% of the catches are taken in the Skagerrak (ICES sub area IIIa), and 20% in the northern North Sea (ICES sub area IVa).

Fishery Areas, ICNAF area.

Canada. The fishery has been concentrated in two main areas; the northern Gulf of St. Lawrence (ICNAF Divisions 4S and 4T) with

fishing depths of 150 to 325 m, and the southern area at the mouth of the Bay of Fundy (Division 4X) in depths of 45 to 110 m, and off southwestern Nova Scotia (Division 4W) in depths of 150 to 180 m (see also Squires 1961).

Greenland. The fishery located at the south west coast (ICNAF Subarea 1, Divisions A-F) was started on a small scale in one fjord at Holsteinsborg in 1935. After 1945, the fishery expanded rapidly, as many new and rich grounds were found, and at present it is of the same order of size as the Danish home fishery (Table 1). The richest exploited grounds are in the Disko Bay area in depths mostly of 320-400 m, where by far the largest Greenland catches are made (Smidt 1965). In recent years an offshore fishery has been developing in depths of about 500 m, but these rich stocks are as yet only lightly exploited.

USA. Off the coasts of Maine and Massachusetts a minor Pandalus fishery has existed since 1938 (Divisions 5Y and 5Zw), but it was only after the expanding of the fishery in the Gulf of Maine (Division 5Y) in 1962 it has increased so much that it is now the largest Pandalus fishery in the world.

During the earlier period (1938-1962) the fishery was close to shore in depths seldom exceeding 100 m. Since the early 1960's the fishing depths vary with the seasonal location of Pandalus (mainly females), ranging from shallow waters in winter (January to March) to the offshore waters of 200 m or greater depths at the other times of the year.

Landings of Pandalus borealis.

The total annual landings of Pandalus borealis (metric tons) in the various ICES and ICNAF countries are shown in Table 1, from 1946 to 1970 (excluding Icelandic catches from 1946 to 1954 for which data are not available).

ICES area.

Denmark. The Danish fishery has increased steadily over the period from 288 tons in 1946 to 4217 tons in 1970, and with a peak of 5434 tons in 1969 (Tables 1 and 2).

Germany. The German fishery is of recent origin, commencing in 1966, with landings of 53 tons followed by 46 tons in 1967, 42 tons in 1968, but no fishery in 1969 and 1970.

Iceland. Apart from the period of no records from 1946 to 1954, the Icelandic fishery has been divided into two periods. In the first of these, catches rose from 390 tons in 1955 to 1207 tons in 1961. However, in 1962 the catch fell to 541 tons but recovered by 1965 to become 971 tons, since when it has expanded to 4510 tons in 1970 (Tables 1 and 3).

Norway. The Norwegian fishery has been subject to considerable fluctuation. It remained the largest ICES fishery throughout the period reviewed, commencing at 2054 tons in 1946 and passing through a gradual expansion to reach its peak in 1963 when 11 705 tons were landed. Since 1964, the fishery has been depressed, until by 1970 it had fallen to 7597 tons (Tables 1 and 4).

Sweden. Like the Norwegian and Danish fisheries, those of Sweden steadily increased from 795 tons in 1946 to 5725 tons in 1962, then like the Norwegian (but unlike the Danish) the catches here dropped to their lowest point since 1965, to become 2740 tons by 1970 (Table 1).

ICNAF area.

Canada. Of three ICNAF countries Canada is the newest participant in the Pandalus fishery, commencing in 1965 with 7 tons but expanding rapidly to 2026 tons by 1970 (Tables 1 and 14).

Greenland. Prawns have been caught by Greenlandic trawlers throughout the period from 1947 when 47 tons were landed. In a manner similar to that of the Danish catches, the Greenlandic catches have increased annually at a steady rate so that by 1970, 8429 tons were landed.

USA. The US fishery has been subject to very considerable fluctuation. During the first year of recorded catch, in 1947, 88 tons were landed. From this time up to 1953 the catches were small and variable and from 1954 to 1957 there were no recorded landings. The records recommenced in 1958 with 2 tons but during the next 11 years they have risen very rapidly from 7 tons in 1959 to 12 766 tons in 1969, in which year the US fishery became the largest in the North Atlantic. In 1970, 10 615 tons were landed (Table 1 and 8).

The Fishing Season, ICES area.

Denmark. The Danish fishery is pursued during every month of the year, with peak catches from April to July and with lowest catches in December and January. The monthly catches for the years 1965 to 1968

(together with the mean catch for the period) are given in Table 5 for all fishing areas combined.

Germany. No data are recorded for monthly landings by German trawlers.

Iceland. An example of the pattern of monthly catch in Icelandic waters is shown below for the year 1968, in metric tons (Table 6).

Table 6. Monthly landings of Pandalus in Iceland during 1968.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
220	387	292	418	15	2	-	-	31	411	434	175

These figures suggest that the main Icelandic fishery takes place from October to April.

Norway. In southern Norway, Pandalus trawling goes on throughout the year. In northern Norway, catches are very small in winter, due to lack of sunlight and short daylight periods.

Sweden. Like the Danish and southern Norwegian Pandalus fisheries, the Swedish one is carried on throughout the year.

The Fishing Season, ICNAF area.

Canada. The Canadian fisheries are pursued throughout the year as is shown by the data in Table 7. The figures in Table 7 show that where the fishery is now most actively pursued, it takes place in the winter/spring period from January to April (see also Table 14).

Greenland. The Greenlandic fishery in the northern area, Disko Bay, normally ceases from January to March annually, but is continued during all other months of the year. In some years, it has been possible to fish during the winter months, and in the southern fjords, fishing is usually possible all the year round.

USA. The US fisheries were not pursued throughout the year, until 1969, catches being very low in all years from May to August. The pattern of monthly catches since 1962 (rounded to the nearest metric ton) are shown in Table 8.

By-Catches.

Exact information on by-catches from the commercial trawlers are difficult to obtain, but valuable information from fishery research are available. As seen from Tables 9-14, the by-catches from experimental fishing are generally bigger than those from commercial fishing, which means that considerable quantities are discarded by commercial fishing.

By-catches controlled by Danish, German and Swedish biologists amounted to 58-95% by weight, while in the German commercial landings the by-catches were only 3-18%.

ICES area.

Denmark. In 1969 the Danish R/V DANA made some experimental hauls with commercial prawn trawl. The results (catch and by-catch) are presented in Table 9.

Germany. Data on the composition of catches from German commercial Pandalus fishery in the North Sea in 1966-68 are presented in Table 10, and a summary of data from experimental and commercial fishing is given in Table 11. More detailed data on composition of catches from experimental fishing were given in an ICES paper by Aker, Kühlmorgen-Hille and Tiews (1966).

Iceland. There are usually no by-catches of commercial value except in Breidafjördur (Table 12, A and B), where prawns are only 26.7% of the total weight landed. All the fish species listed in the tables are of marketable size, but "other species" may include undersized of the species listed. In all other regions than Breidafjördur there are hardly any by-catches, and nothing but prawns is landed. Information on by-catch are therefore scarce and only gathered from experimental fishing in other regions, where the following fish species were fished: Gadus morhua, Melanogrammus aeglefinus, Merlangius merlangus, Pleuronectes platessa, Clupea harengus, Mallotus villosus (Skúladóttir 1970). Quantity by weight was not given, but as far as it can be seen from numbers and lengths of fish specimens the quantity was mostly small, presumably less than 10%. According to Sigurdsson and Hallgrímsson (1965) non-commercial species, for example Boreogadus esmarki, form the greatest part of the by-catch where it is outstandingly high.

Norway. There are no information of quantities of by-catch by weight, but Hjort and Ruud (1938) give a list of invertebrate and fish species. Nephrops norvegicus is common, and considerable quantities are landed. Most common fish species are: Raja radiata, Etmopterus spinax, Chimaera monstrosa, Argentina sphyraena, A. silus, Gadus morhua, Melanogrammus aeglefinus, Trisopterus minutus, Merlangius merlangus, Boreogadus esmarki, Gadiculus thori, Micromesistius Poutassou, Urophysis blennoides, Merluccius merluccius, Onos cimbrius, Lycodes vahli, Sebastes marinus, Hippoglossoides platessoides, Glyptocephalus cynoglossus. In fine-meshed gear Myxine glutinosa is common. Further,

some rare or occasional species are listed.

Sweden. About 20 cutters are engaged in the research work of the Fisheries Laboratory (Lysekil), and they give dayly information on their fishery. The results in 1969 from the Skagerrak and the northern North Sea are rather typical for all deep sea prawn trawlers, and as seen in Table 13 the by-catches amount to 58% by weight in the Skagerrak and to 71% in the North Sea.

ICNAF area.

Canada. Information on by-catch is given in Table 14. At present, the fishery in the northern Gulf of St. Lawrence is primarily a redfish fishery with prawn as a by-catch. The Bay of Fundy fishery is primarily a prawn fishery, although at times appreciable quantities of groundfish are taken.

Greenland. There are large by-catches of many fish species, and on some grounds there are considerable by-catches of the crab Chionoecetes opilio. Below is given a list of fish species, of which the most frequent are Reinhardtius hippoglossoides, Hippoglossoides platessoides, Sebastes marinus, Lycodes spp., and Raja radiata, but no figures of quantity by weight can be given.

Fish species in Greenland prawn trawl catches: Myxine glutinosa, Centroscyllium fabricii (southernmost fjords), Raja radiata, Mallotus villosus, Paralepis rissoi kroyeri, Myctophum glaciale, Bathylagus benedicti, Lampanyctus crocodilus, Stomias boa ferox, Macrurus fabricii, Gadus morhua, Gadus ogac, Melanogrammus aeglefinus, Boreogadus saida, Molva byrkelange (southernmost fjords), Gaidropsarus argentatus, Brosme brosme, Lycodes vahli, L. seminudus, L. eudipleurostictus, L. spp., Lumpenus maculatus, L. lampretaeformis, Anarhichas minor, A. lupus, A. latifrons, Sebastes marinus, Artediellus uncinatus, Gymnocanthus tricuspis, Icelus bicornis, Triglops pingeli, Leptagonus decagonus, Aspidophoroides monopterygius, Liparis liparis, Careproctus reinhardti, Eumicrotremus spinosus, Reinhardtius hippoglossoides, Hippoglossoides platessoides, Glyptocephalus cynoglossus (southernmost fjords).

USA. The following fish species are listed as by-catch from sampling cruises (unpublished data from Ronald Rinaldo): Myxine glutinosa, Carcarias taurus, Squalus acanthias, Raja ocellata, Clupea harengus, Alosa pseudoharengus, A. aestivalis, Osmerus mordax, Merluccius bilinearis, Gadus morhua, Melanogrammus aeglefinus, Urophysis tenuis, U. chuss, Reinhardtius hippoglossoides, Enchelyopus cimbrius, Hippoglossoides platessoides, Paralichthys dentatus, Pseudopleuronectes

americanus, Glyptocephalus cynoglossus, Citharichthys arctifrons, Menidia menidia, Syngnathus fuscus, Sebastes marinus, Myoxocephalus octodecemspinosus, Lumpenus lampretaeformis, Cryptacanthodes maculatus, Lophius americanus.

Effort, ICES area.

Information on effort and on catch per unit effort are somewhat scarce, and the contributions from different countries are heterogenous and difficult to compare. However, very good information are available from the Icelandic and Swedish prawn fishery.

Denmark. Catch per hour trawled by the R/V DANA in various regions in 1969 are shown in Table 9. However, the figures are not representative for the commercial fishery as the experimental fishing was spread over different areas whereas commercial fishing will be concentrated on places rendering the largest catches. During the experimental fishing the two largest catches in the Fladen Ground area were 222 and 62 kg per hour, and in the area of the northeastern North Sea and western Skagerrak they were 21 and 14 kg per hour. There are no information on numbers of commercial cutters, catch per unit of effort nor other effort data from the commercial fishery.

Germany. Data on catch per unit of effort were obtained from experimental fishing in 1964-65 (Aker, Kühlmorgen-Hille and Tiews 1966). During April-July 1964 Pandalus catches per hour increased from east to west in Skagerrak from 8.4 to 21.6 kg, and very low catches, amounting to only 5.1 kg per hour, were obtained in the western Skagerrak in October 1965 when also Scandinavian fishermen had abnormally low catches in the same area. Catches on the northern and middle part of Fladen Ground during 1965 amounted, on an average, to 22 kg per hour, and on the southern part of the ground to more than 28 kg per hour. The best catches were made in the Farn Deep area with average catches of 49.6 kg per hour in 1965. Seven commercial cutters were fishing for Pandalus in July-August 1966, two in September 1966 and in May-September 1967, and only one boat in 1968 on the Fladen Ground. In 1969 no cutters were fishing.

Iceland. Numbers of hours trawled in different areas in the years 1968-69 are shown in Table 3. The mean catches per hour for all the years were in Arnarfjördur 112 kg, in Ísafjardardjup 128 kg, in Húnaflói 223 kg, in other areas 74 kg, and in all areas 136 kg. Up to 52 boats have been fishing in 1969, but generally some 30-40 boats were fishing in the season.

Norway. There are no information as to catch per unit of effort or other effort data available. Many of the boats and fishermen are also engaged in other seasonal fisheries, for instance cod and herring fishery, besides the Pandalus trawling, and figures as to time spent on Pandalus fishing alone cannot be given. In 1960 Norway had 1493 vessels engaged in Pandalus trawling, and a total of 3154 persons were engaged, of which 891 in the Skagerrak area (sub area IIIa), 847 on the west coast (IVa), 1294 between Stad and North Cape (IIa), and 122 in the Finmark east of North Cape (sub area I).

Sweden. Table 13 gives the effort as fishing days and fishing hours in 1969 for about 20 trawlers. Since there are about 200 Swedish trawlers in total the numbers of days and hours may approximately be ten times as high. In Skagerrak (sub area IIIa) the mean catches per day were 86 kg and per hour 8.8 kg, and in the North Sea (IVa) they were 217 kg and 14.8 kg respectively.

Effort, ICNAF area.

Canada. There are no systematic data available on fishing effort. The number of boats fishing prawns has varied appreciably with possibly 15-20 participating in the northern Gulf fishery and about 25 boats fishing in the Bay of Fundy. Some seasonal exchange of boats between the areas occurs. Hauls are usually of 2-3 hours' duration, and individual trips vary from 1 to 3 days.

Greenland. About 130 potential prawn cutters are fishing in Greenland waters, and most of them are periodically engaged in prawn trawling. Catch of prawns per hour trawled varies very much from area to area and from season to season. Most stable fishing is found on the rich grounds in Disko Bay with about 115 kg per hour as normal by experimental fishing. The commercial fishery rendered somewhat lower catches (in 1969 about 100 kg per hour at the beginning and about 60 kg per hour at the end of the season). In the southern fjords catches per hour are considerably lower and much more varying. On the offshore grounds very good catches of very big prawns have been taken.

USA. Numbers of boats in various years are shown in Table 15, and catch per unit effort in various seasons are shown in Table 16. The average catch per boat per fishing day in various seasons has varied from 0.6 to 1.3 metric tons.

THE *Pandalus montagui* FISHERY IN THE UNITED KINGDOM

Information are given by P.J. Warren (see also Simpson, Howell, and Warren 1970). Populations of the pink shrimp, *Pandalus montagui*, occur in three main areas of England, the Thames Estuary, the Wash, and Morecambe Bay. For some years the stocks in the Thames Estuary have been too small to support a commercial fishery, but in the Wash and Morecambe Bay small fleets of boats trawl the inshore grounds (depths about 20 to 100 m) for pink shrimp. The Wash and Morecambe Bay also support commercial stocks of brown shrimp, *Crangon crangon*. These two species are usually landed separately, but official statistics for both areas group them together under a common heading of "shrimps". The annual yields for both species together fluctuate between 900 and 3700 metric tons, and it is estimated that in the Thames area 80% of the total catch was *P. montagui* while in the Morecambe Bay the species only account for about 5% of the total catch.

Trawling is carried out by 30-50 feet boats (40-100 hp) equipped with boilers for cooking the catch. Most boats are using beam trawls, but also some small otter trawls are used. Mesh size between 19 and 25 mm is employed.

A mixed population of *Pandalus borealis* and *P. montagui* occurs in the area of the Farn Deep off the north east coast of England. *P. borealis* forms the majority of this population which fluctuates in strength in successive years. English trawlers have shown little interest in this stock although an active fishery for *Nephrops* is pursued in the same area.

A very comprehensive bibliography on Pandalidae has recently been published (Scrivener and Butler 1971).

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REFERENCES

Aker, E., G. Kühlmorgen-Hille and K. Tiews, 1966. Experimental Pandalus Fishing in the Skagerrak and in the North Sea in 1964 and 1965. ICES C.M. 1966/M:2.

Dybern, Bernt I., 1966. On the Relative Effectiveness of Different Sizes of the Vinge-Trawl, used in the Swedish Fishery for the Deep Sea Prawn, Pandalus borealis. ICES C.M. 1966/M:13.

Hjort, J. and J.T. Ruud, 1938. Deep Sea Prawn Fisheries and their Problems. Hvalrådets Skrifter, 17, Oslo.

Horsted, S.A. and Erik Smidt, 1956. The Deep Sea Prawn (Pandalus borealis Kr.) in Greenland Waters. Medd. Danm. Fisk.- og Havundersg., 1(11) :1-118.

Höglund, Hans and Bernt I. Dybern, 1966. Decreasing Catches in the Swedish Fishery for Pandalus borealis. ICES C.M. 1966/M:12.

Jensen, Aage J.C., 1965. Pandalus borealis in the Skagerrak (Length, Growth and Changes in the Stock and Fishery Yields). Rapp. P.-v. Reun. Cons. perm. int. Expl. Mer, 156 (18):109-111.

Poulsen, Erik M., 1970. On the Deep Sea Prawn in the North Sea-Skagerrak. Medd. Danm. Fisk.- og Havundersg., N.S. 7 (1):1-22.

Rasmussen, Birger, 1953. On the Geographical Variation in Growth and Sexual Development of the Deep Sea Prawn (Pandalus borealis Kr.) Rep. Norwegian Fish. Invest., 10 (3):1-160.

Rasmussen, Birger, 1967. The fishery for deep sea prawn in Norway. Mar. Biol. Ass. India, Proc. Sympos. Crustacea, IV:1437-1441.

Rasmussen, Birger and Per Øynes, 1970. Forsøksfiske etter reker. Barentshavet i mars-april 1970. Fiskets Gang, 32:587-593,(in Norwegian).

Scrivener J.C. and T.H. Butler, 1971. A Bibliography of Shrimps of the Family Pandalidae, Emphasizing Economically Important Species of the Genus Pandalus. Fish. Res. Board Canada, Techn. Rep. No. 241.

Sigurdsson, Adalsteinn and Ingvar Hallgrimsson, 1965. The Deep-Sea Prawn (Pandalus borealis) in Icelandic Waters. Rapp. P.-v. Reun. Cons. perm. int. Explor. Mer, 156 (17):105-108.

Simpson, A.C., B.R. Howell and P.J. Warren, 1970. Synopsis of biological data on the shrimp Pandalus montagui Leach, 1814. FAO Fish. Rep. No. 57, Vol. 4:1225-1249.

Skúladóttir, Unnur, 1968. Increasing catches of Pandalus borealis in Icelandic waters. ICES C.M. 1968/K:15.

Skúladóttir, Unnur, 1970. The Deep Sea Prawn (Pandalus borealis) Fisheries in Icelandic Waters. ICES C.M. 1970/K:21.

Smidt, E., 1969. Pandalus borealis in Greenland Waters: Its Fishery and Biology. FAO Fish. Rep. No. 57, Vol. 3:893-901.

Squires, H.J., 1961. Shrimp survey in the Newfoundland fishing area 1957 and 1958. Fish. Res. Board Canada, Bull. No. 129.

Strøm, Albert and Birger Rasmussen, 1970. Forsøksfiske etter reker i Barentshavet og Svalbardområdet i juni-august 1970. Fiskets Gang, 32:587-593, (in Norwegian).

Table 1. Total annual landings (metric tons) of deep sea prawns.

Year	I C E S Area					I C N A F Area		
	Denmark	Germany	Iceland	Norway	Sweden	Canada	Greenland	USA
1946	288	-	+	2 054	795	-	-	-
1947	387	-	+	1 920	791	-	42	88
1948	468	-	+	1 856	767	-	54	12
1949	462	-	+	2 092	736	-	25	4
1950	478	-	+	2 312	743	-	175	3
1951	536	-	+	2 728	758	-	124	26
1952	408	-	+	3 095	1 165	-	228	47
1953	691	-	+	3 764	1 305	-	313	17
1954	628	-	+	4 962	1 350	-	388	-
1955	753	-	390	5 825	1 547	-	566	-
1956	771	-	772	6 317	1 545	-	527	-
1957	1 051	-	500	7 071	2 124	-	671	-
1958	1 561	-	768	7 270	2 154	-	742	2
1959	2 191	-	1 068	9 706	3 214	-	949	7
1960	2 580	-	1 396	9 617	4 039	-	1 789	40
1961	3 175	-	1 207	10 110	4 462	-	2 545	30
1962	4 448	-	541	10 908	5 725	-	3 362	176
1963	4 735	-	733	11 705	5 161	-	3 108	254
1964	3 602	-	692	11 203	4 654	-	3 770	422
1965	5 073	-	971	10 454	3 867	7	5 051	949
1966	4 697	53	1 763	7 415	1 788	102	5 378	1 748
1967	4 791	46	1 417	8 383	1 930	478	5 644	3 151
1968	5 175	42	2 431	7 201	2 025	978	5 604	6 567
1969	5 434	-	3 318	6 353	1 822	1 142	6 631	12 766
1970	4 217	-	4 510	7 597	2 740	2 026	8 429	10 615

+ Figures for Icelandic landings before 1955 not available.

NB. Since 1964 Danish cutters have landed about 200 tons per year in Sweden, which figures are included in the Swedish statistic given above. Furthermore it is noted that there are some smaller differences between this table and Tables 3 and 4 because the figures in Table 1 are taken from the official statistics while the figures in Tables 3 and 4 origin from fisheries research.

Table 2. Annual Danish catches (metric tons) of deep sea prawns in different areas in the years 1960-69.

Year	North Sea Sub area IVa	Skagerrak Sub area IIIa	Kattegat Sub area IIIa
1960	216	2 238	126
1961	1 228	1 741	206
1962	1 609	2 315	524
1963	1 491	2 792	452
1964	1 079	2 111	412
1965	3 302	1 628	143
1966	3 033	877	787
1967	3 932	790	69
1968	4 284	866	25
1969	4 836	598	-

Table 3. Total catch (metric tons) and effort (hours trawled) by area of Icelandic deep sea prawn fishery for the years 1966-69.

	Arnar-fjördur		Ísafjar-dardjup		Húnaflói		Other areas		TOTAL	
Year	tons	hours	tons	hours	tons	hours	tons	hours	tons	hours
1966	256	2 781	1 271	11 312	263	1 378			1 790	15 471
1967	187	2 117	891	9 030	429	1 604			1 507	12 751
1968	499	4 150	1 557	10 610	394	1 039	6	+	2 451	15 799
1969	602	4 694	1 780	11 943	814	4 490	80	1 086	3 276	22 215

Table 4. Annual Norwegian catches (metric tons) of deep sea prawns in different areas in the years 1960-69.

Year	Kattegat and Skagerrak Sub area IIIa	Northern North Sea Sub area IVa	Norwegian Sea Sub area IIa	Barents Sea Sub area I
1960	2 706	2 471	3 724	716
1961	3 100	3 192	2 983	835
1962	3 737	3 394	3 147	630
1963	3 844	4 179	3 345	337
1964	3 357	4 130	3 356	360
1965	2 135	3 534	4 120	665
1966	935	1 581	3 867	1 032
1967	1 186	1 613	4 284	1 300
1968	778	1 908	3 572	943
1969	795	945	3 680	1 050

Table 5. Danish landings (metric tons) of deep sea prawns by month from 1965-68.

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1965	40	201	580	906	607	741	728	516	339	329	71	15
1966	47	234	470	466	557	694	664	587	360	280	146	92
1967	129	106	150	958	749	907	574	648	309	116	120	25
1968	63	370	434	699	911	738	787	632	333	60	55	93
Mean	70	228	409	757	706	770	688	596	335	196	98	56

Table 6. See page 7.

Table 7. Monthly catch (metric tons) of deep sea prawns by Canadian boats by area (ICNAF Divisions), from 1965-69 (rounded up to nearest ton).

Year	Area	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1965	4T	-	-	-	-	-	-	2	-	3	3	-	-
	4X	-	-	-	-	-	-	-	+	-	-	-	-
1966	4T	-	-	-	-	6	7	5	18	4	8	37	14
	4X	-	-	-	-	1	-	-	-	-	-	-	3
1967	4T	-	-	-	3	10	38	42	36	48	14	35	2
	4X	15	3	23	124	74	-	-	-	-	-	1	8
	4W	-	-	-	-	-	-	-	-	-	-	1	-
1968	4S	-	-	-	-	-	51	66	69	57	42	5	-
	4T	-	-	-	-	13	-	-	3	-	-	-	-
	4W	-	-	-	2	5	2	1	1	2	1	1	-
	4X	60	99	120	182	100	-	-	-	-	7	3	21
1969	4S	-	-	-	15	99	79	75	91	70	26	7	-
	4T	-	-	-	-	-	2	-	-	-	-	-	-
	4X	222	142	130	162	17	-	-	-	-	-	5	-

Table 8. Landings (metric tons) of deep sea prawns in Maine by months from 1962 to 1969.

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1962	43	73	38	+	+	-	-	-	-	-	+	7
1963	57	141	41	+	+	+	-	-	-	+	-	5
1964	65	168	158	12	-	-	-	-	-	+	-	17
1965	156	332	410	23	+	-	-	-	-	-	+	20
1966	163	550	916	27	-	-	-	-	-	-	1	81
1967	455	747	1 434	259	3	-	-	-	-	-	30	214
1968	782	1 394	2 301	841	47	-	-	16	46	137	256	695
1969	1 675	2 757	4 137	1 189	30	95	71	51	155	222	181	429

+ less than 500 kg reported
- no catches reported

Table 9. Catch and by-catch (kg per hour and per cent) from Danish experimental prawn trawlings in the Skagerrak and the North Sea in July 1969.

Area:	NE North Sea and W Skagerrak		Coral and Viking Banks		Fladen Ground		E of Orkney and Shetland Islands	
Depths in m:	203-297		218-254		118-168		112-170	
No. of hauls:	6		10		11		7	
	kg/hr	%	kg/hr	%	kg/hr	%	kg/hr	%
Pandalus borealis	10.0	7.6	6.4	6.3	37.4	24.7	4.6	4.8
By-catch	121.1	92.4	94.6	93.7	114.4	75.3	91.6	95.2
Total	131.1	100.0	101.0	100.0	151.8	100.0	96.2	100.0
By-catch								
Argentina silus	6.1	4.7	16.6	16.4	0.8	0.5	1.0	1.0
Micromesistius poutassou	88.2	67.0	40.8	40.4	0.2	0.1	-	-
Melanogrammus aeglefinus	1.2	0.9	8.6	8.5	50.0	33.0	15.2	15.8
Gadus morhua	15.0	11.4	0.4	0.4	4.6	3.0	6.0	6.2
Merlangius merlangus	-	-	0.2	0.2	2.6	1.7	4.8	5.0
Pollachius virens	2.6	2.0	4.2	4.2	-	-	-	-
Boreogadus esmarki	0.2	0.2	10.2	10.1	38.4	25.3	33.4	34.7
Merluccius merluccius	1.0	0.8	1.8	1.8	0.2	0.1	0.4	0.4
Molva molva	0.4	0.3	3.0	3.0	1.2	0.8	-	-
Gadiculus thori	0.4	0.3	3.8	3.8	0.2	0.1	3.0	3.1
Lycodes + Onos sp.	0.6	0.5	0.8	0.8	0.6	0.4	0.2	0.2
Lumpenus sp.	-	-	0.2	0.2	0.8	0.5	0.6	0.6
Sebastes marinus	0.2	0.2	0.8	0.8	0.2	0.1	0.2	0.2
Hippoglossoides platess.	0.6	0.5	1.2	1.2	7.0	4.6	15.8	16.4
Pleuronectes cynoglossus	1.0	0.8	0.6	0.6	0.6	0.4	1.6	1.7
Limanda limanda	0.2	0.2	0.2	0.2	0.6	0.4	0.4	0.4
Microstomus kitt	-	-	0.2	0.2	0.2	0.1	0.2	0.2
Lophius piscatorius	1.6	1.2	0.2	0.2	3.8	2.5	3.6	3.7
Others	1.8	1.4	0.8	0.8	2.4	1.6	5.2	5.4

Table 10. Catch and by-catch (in per cent by weight) from German commercial prawn trawlers in the North Sea.

Area:	Farn Deeps		Fladen Ground
Year:	1966	1967	1968
Month:	JUL-OCT	MAY-SEP	JUN-SEP
No. of boats:	7	1	1
	%	%	%
Pandalus borealis	81.8	82.6	97.0
Total by-catch	18.2	17.4	3.0
Nephrops norvegicus	5.6	4.7	0.2
Raja sp.	+	-	+
Somniosus microcephalus	-	-	0.4
Clupea harengus	+	-	0.2
Merluccius merluccius	+	0.2	-
Gadus morhua	10.3	10.6	1.6
Melanogrammus aeglefinus	0.6	0.1	0.1
Merlangius merlangus	0.3	-	-
Pollachius virens	+	-	-
Molva molva	0.1	0.5	+
Brosme brosme	-	-	+
Scomber scombrus	+	-	-
Anarhichas lupus	+	0.2	0.1
Hippoglossus hippoglossus	0.1	0.1	-
Psetta maxima	0.2	0.1	-
Limanda limanda	+	-	-
Pleuronectes platessa	0.2	0.2	+
Microstomus kitt	0.4	0.1	-
Glyptocephalus cynoglossus	0.2	0.3	+
Platichthys flesus	+	0.1	0.1
Solea solea	-	+	-
Lophius piscatorius	+	0.2	0.1

+ less than 0.1 per cent

Table 11. Composition (per cent by weight) of German experimental and commercial prawn trawl catches

Area:	Experimental catches				Commercial catches	
	Farn Deeps	Fladen Ground	Skagerrak		Farn Deeps	Fladen Ground
Year:	1965	1965	1964	1965	1966-67	1968
Month:	JUL-SEP	APR-JUL	JUL-AUG	OCT		
	%	%	%	%	%	%
Pandalus borealis	21	32	37	6	82	97
Nephrops norvegicus	-	-	-	-	5	-
Fish	79	68	63	94	13	3

Table 12. Catch and by-catch from the Icelandic prawn fishery.

	A Total Icelandic catches in 1969		B Landings from Breidafjördur in OCT 1969-JAN 1970	
	Metric tons	%	Metric tons	%
Pandalus borealis	3263.2	94.1	26.7	26.8
Nephrops norvegicus	0.9	+	-	-
Gadus morhua	105.7	3.0	49.7	49.7
Melanogrammus aeglefinus	17.5	0.5	7.7	7.7
Molva byrkelange	0.2	+	0.3	0.3
Sebastes sp.	7.7	0.2	0.2	0.2
Pleuronectes platessa	30.9	0.9	1.1	1.1
Unidentified by-catch	41.9	1.2	14.2	14.2
Total by-catch	204.8	5.9	73.2	73.2

Table 13. Catch and by-catch (kg per day and per cent) taken by about 20 Swedish prawn trawlers in 1969 in Skagerrak and northern North Sea.

Area:	Skagerrak (Sub area IIIa)		North Sea (Sub area IVa)	
No. of Days fished:	1317		137	
No. of hours fished:	12877		2017	
	kg	%	kg	%
Pandalus borealis	113 120	41.4	29 796	28.6
By-catch for human consumption:		11.8		13.4
Sharks (mostly Squalus acanth.)	291	0.1	306	0.3
Raja sp.	-	-	170	0.2
Clupea harengus	335	0.1	2 405	2.3
Clupea sprattus	1 110	0.4	-	-
Anguilla anguilla	6	+	-	-
Merluccius merluccius	1 706	0.6	621	0.6
Gadus morhua	15 908	5.8	4 732	4.5
Melanogrammus aeglefinus	878	0.3	150	0.2
Merlangius merlangus	320	0.1	226	0.2
Pollachius virens	90	+	387	0.4
Pollachius pollachius	3 770	1.3	167	0.2
Molva molva	2 184	0.8	2 201	2.1
Anarhichas lupus	11	+	-	-
Psetta maxima	3	+	-	-
Scophthalmus rhombus	1	+	-	-
Hippoglossus hippoglossus	458	0.1	552	0.5
Limanda limanda	-	-	12	+
Pleuronectes platessa	508	0.1	-	-
Microstomus kitt	131	+	1	+
Glyptocephalus cynoglossus	5 072	1.8	995	1.0
Lophius piscatorius	992	0.3	943	0.9
Cyclopterus lumpus	45	+	15	+
Not specified	61	+	-	-

(contd)

Table 13 (contd).

Area:	Skagerrak (Sub area IIIa)		North Sea (Sub area IVa)	
No. of days fished:	1317		137	
No. of hours fished:	12877		2017	
	kg	%	kg	%
By-catch for animal consumption:		28.0		48.7
Sharks	5	+	1 415	1.4
Raja sp.	1 595	0.5	3 075	3.0
Chimaera monstrosa	526	0.1	-	-
Clupea harengus	2 713	0.8	-	-
Clupea sprattus	168	+	-	-
Argentina silus + sphyraena	5 320	1.9	3 095	3.0
Anguilla anguilla	-	-	1	+
Coryphænoides rupestris	5 260	1.9	3 225	3.1
Merluccius merluccius	702	0.2	-	-
Trisopterus minutus	2 517	0.8	1 650	1.6
Merlangius merlangus	37	+	-	-
Boreogadus esmarki	10 596	3.8	3 950	3.7
Micromesistius poutassou	41 534	15.2	27 435	26.3
Gadiculus thori	2	+	-	-
Onos cimbrius	651	0.2	168	0.2
Lycodidae	187	+	-	-
Sebastes sp.	32	+	2	+
Cyclopterus lumpus	152	+	-	-
Hippoglossoides platessoides	579	0.2	-	-
Lophius piscatorius	254	+	-	-
Not specified	6 650	2.4	6 705	6.4

(contd)

Table 13 (contd).

Area:	Skagerrak (Sub area IIIa)		North Sea (Sub area IVa)	
No. of days fished:	1317		137	
No. of hours fished:	12877		2017	
	kg	%	kg	%
By-catch not used:		19.2		9.3
Sharks	1 126	0.4	228	0.2
Raja sp.	2 400	0.8	643	0.6
Clupea harengus	1 752	0.6	-	-
Clupea sprattus	243	+	-	-
Merluccius merluccius	1 001	0.4	2	+
Gadus morhua	380	0.1	-	-
Melanogrammus aeglefinus	263	+	90	0.1
Merlangius merlangus	1 011	0.3	-	-
Anarchichas lupus	3	+	-	-
Pleuronectes platessa	12	+	-	-
Glyptocephalus cynoglossus	602	0.2	218	0.2
Hippoglossoides platessoides	225	+	5	+
Microstomus kitt	1	+	-	-
Platichthys flesus	6	+	-	-
Chimaera monstrosa	205	+	74	0.1
Argentina silus + sphyraena	6 760	2.5	705	0.7
Coryphaenoides rupestris	10 004	3.6	448	0.4
Trisopterus minutus	2 425	0.8	240	0.2
Boreogadus esmarki	2 001	0.7	402	0.4
Micromesistius poutassou	23 357	8.5	4 515	4.3
Gadiculus thori	41	+	-	-
Onos cimbrius	91	+	141	0.1
Sebastes sp.	59	+	203	0.2
Cyclopterus lumpus	655	0.2	-	-
Lophius piscatorius	31	+	-	-
Lumpenus sp.	244	+	52	+
Eutrigla gurnardus	28	+	-	-
Brosme brosme	10	+	-	-
Somniosus microcephalus	150	+	-	-
Not specified	361	0.1	1 845	1.8

Table 14. Canadian landings and by-catch (metric tons) by ICNAF divisions, by months.

Year	Area	Tonnage	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Area total	Annual total	Species
1965	4T								1.5		2.5	2.7			6.7		
	4X									0.2					0.2	6.9	Prawn
1966	4T					5.9	6.9	5.1	17.7	3.8	7.7	37.2	13.8		98.1		
	4X						0.8							2.6	3.4	101.5	Prawn
1967	4T					3.2	9.8	38.3	41.9	36.3	47.8	14.3	35.2	1.5	228.3		
	4X		15.2	3.0	23.1	124.0	74.0						0.6	8.3	248.2		
	4W												1.2		1.2	477.7	Prawn
1968	4S	26-50					55	47	67	61	47	36	5		318		Prawn
						2	88	703	1061	1201	930	487	121	25	4618		Redfish
						3	103	159	115	157	226	136	78	1	978		Cod
						3	50	78	66	79	93	60	34	1	464		Others
		51-150						4	9	8	10	6			37		Prawn
						11	306	2541	3904	4022	4918	2677	1801	184	20364		Redfish
						4	45	102	104	124	73	159	154	14	779		Cod
						4	51	95	153	200	113	88	92	22	818		Others
1968	4T	26-50					13			3					16		Prawn
							96	131	316	259	251	150	56	9	1268		Redfish
							14	30	61	47	20	43	9	1	225		Cod
							49	28	42	17	12	12	6		166		Others
1968	4W	51-150				2	5	2	1	1	2	1	1		15		Prawn
						2	4	1	1						8		Others
1968	4X	0-25	11	12	12	15	5					2			57		Prawn
			4		2	35	105	265	178	210	66	9	2	1	877		Haddock
			3	1	2	176	159	76	102	77	54	31	8	2	691		W.flounder
			9		6	49	102	71	121	53	26	13	19	42	511		Others
		26-50	7	59	62	109	23							2	262		Prawn
						14	5							1	20		Others
		51-150	42	28	46	58	72					5	3	19	273	978	Prawn
			3		3	13	27					20	5	31	102		Others

(contd)

Table 14 (contd).

Year	Area	Tonnage	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Area total	Annual total	Species
1969	4S	26-50				15	77	45	52	52	40	8	2		291		Prawn
							28	262	409	444	473	224	125		1965		Redfish
							7	27	36	21	27	15	60		193		Cod
							3	22	19	22	20	16	33		135		Others
		51-150					22	34	23	39	30	18	5		171		Prawn
						43	115	1470	3110	3127	3758	2563	1358	223	15767		Redfish
							53	146	191	57	82	150	268	17	964		Cod
						1	34	102	99	119	64	87	105	23	634		Others
1969	4T	26-50						2							2		Prawn
1969	4X	26-50	79	33	43	56	1								212		Prawn
			12	2	6	32									52		Others
		51-150	143	109	87	106	16						5		466	1142	Prawn
			32	18	19	42	13	6							130		Others

Table 15. Number of New England prawn vessels.

Year	Maine		Massachusetts		Total
	Large	Small	Large	Small	
1964	17	12	2	1	32
1965	18	16	3	1	38
1966	16	13	10	1	40
1967	44	23	21	1	89
1968	---------- No Data Available ----------				
1969	89	134	40	2	265
1970	96	191	46	3	336

Table 16. USA catch per unit effort (Maine only).

Fishing season	a) Total landings (metric tons)	b) Boat-days	Metric tons per boat-day
1965-66 (6 months)	1 676.2	1 304	1.3
1966-67 (7 months)	2 979.8	3 530	0.8
1967-68 (7 months)	4 851.4	5 920	0.8
1968-69 (11 months)	11 033.6	10 630	1.0
1969-70 (12 months)	8 197.8	13 250	0.6

a) Bureau of Commercial Fisheries, Office of Statistical Services.

b) Unpublished data from Ronald Rinaldo, Maine Department of Sea and Shore Fisheries.

THE NEPHROPS FISHERIES OF THE ICES AREA

Type of Boats and Gear.

Iceland. The Norway lobster fishery is undertaken by trawlers, mainly side trawlers. The average size of boat engaged has been increasing from around 50 GRT in 1964 to 70 GRT in 1969. In 1969 the range was from 21 to 204 GRT with 90 to 600 hp engines, the average being around 320 hp. The Nephrops trawl has long wings and a wire foot rope. The average head line is of 41 m. The net has a minimum mesh size of 80 mm.

Norway. Nephrops are caught by prawn trawls of 36 mm or 30 mm mesh.

Sweden. The Nephrops fishery is by trawlers of 30 to 50 GRT with engines generally from 100 to 200 hp. Most boats use fish trawls with a mesh size in the cod-end of 70 mm. Some boats are allowed to fish inside territorial limits using 60-65 mm mesh size.

Denmark. Vessels of about 20-100 GRT are the same as those used for other trawl fisheries in Danish waters. The Nephrops catch arises as part of the landings from industrial fishing using gears designed for this fishery but also special trawls with larger meshes constructed for Nephrops fishing are used in some areas.

Faeroe. Up to six small cutters of maximum 40 hp are permitted to fish for Norway lobsters on the grounds in the fjords and sounds at about 40-80 m depth, using special Nephrops trawls.

Germany. The bulk of the Nephrops landings are made by Baltic cutters measuring 14 to 19 metres and with engines from 90 to 150 hp. Some landings are also made by larger cutters. Those measuring 19 to 24 metres are equipped with engines from 90 to 200 hp. Norway lobsters constitute a by-catch in fisheries mainly directed at other species and the gears employed are dictated by the other fishing requirements. The cod-end mesh sizes mostly range from 60 to 70 mm.

Belgium. As with Germany, Norway lobsters constitute a by-catch in fisheries mainly directed at other species.

Ireland. The Irish Nephrops fishery is undertaken mainly by boats of 15 to 18 m of about 30 GRT with engines averaging about 100 hp. A few boats up to 23 m are also engaged. The nets are of about 50 mm mesh size or less.

United Kingdom. The main Norway lobster fishery is undertaken by Nephrops trawlers of 12-20 m with engines generally of 60-250 hp. There is also a creel fishery for Nephrops at the west coast of

Scotland by boats of 9 to 12 m with engines of 50-80 hp.

The legal minimum mesh size for Nephrops trawls is 70 mm except in the Irish Sea where nets of up to 50 mm mesh are permitted for vessels fishing wholly for Nephrops.

France. The Norway lobster landings derive in part from the fishery directed at the capture of white fish but mainly from trawlers fishing primarily for Nephrops. Vessels are of three classes:

Small Nephrops trawlers of about 28.4 GRT, 14.9 m long and of 155 hp. These fish statistical square VIII.

Large Nephrops trawlers of about 75 GRT, 19 m long and of 280 hp fishing statistical squares VIIe, f and j.

Semi-industrial trawlers of about 126 GRT, 25 m long and of 440 hp. These fish statistical squares VIIb, d and g. Nets used in the Nephrops fishery have a cod-end mesh of 50 mm.

Spain. Norway lobsters constitute a by-catch in trawl fisheries mainly directed at other species. The gears employed are dictated by the other fishing requirements.

Landings.

The landings by countries and ICES statistical areas are given in Table 17. The Icelandic Nephrops fishing season extends from May to October. Fishing around Faeroe is allowed only from 15th June to 14th August. The Icelandic data on landings and catch per unit effort, by months and square, in 1969, are given in Table 18, and similar data for the United Kingdom fishery in the Northern and Central North Sea (IVa, IVb and VIa respectively) are given in Table 19. The data, furnished by the remaining countries, on seasonal variation in landings and efforts are summarised in Table 20. Monthly landings in Spain are set out in Table 21.

By-catch.

Details of the white fish species, taken in the Nephrops fisheries of various countries are given in Table 22. More detailed data, showing seasonal and area differences in the United Kingdom fishery, are given in Table 23.

Further information on landings.

See Appendix Tables I-VI.

REFERENCES

Aker, E. and K.Tiews, 1965. The German Nephrops fishery. Rapp. P.-v. Cons. perm. int. Explor. Mer, 156:147-149.

Eiriksson, H., 1970. The Nephrops fishery of Iceland 1958-1969. ICES, C.M. 1970/K:5.

Estadist. Pesca, Madr. 1962-69.

Joensen, J.S., 1964. Fiskeriet efter dybvandshummer ved Færøerne. Skr. Danm. Fisk.- og Havundersg., (25):2932.

Symonds, D.J., 1971. The Nephrops fisheries of England and Wales. ICES, C.M. 1971/K:18.

Table 17. The annual catch of Norway lobsters (in metric tons) by country and by statistical area, 1954 to 1969.

	Va2	Vb1	IIIa					IVa				IVb			IV a,b	IV c	Va	VIa				VIIa				VIIb,c VIId,e		VIIf	VIIg,h,j,k			VII, VIII			Mediterranean Spain
	Iceland	Faeroe	Norway	Sweden	Denmark	Germany	Total	Norway	Belgium	United Kingdom	Total	Belgium	United Kingdom	Total	Germany	Belgium	Belgium	Belgium	Ireland	United Kingdom	Total	Belgium	Ireland	United Kingdom	Total	Ireland	Belgium	Belgium	Belgium	Ireland	Total	France	Spain	Total	
1954	-	3	19	584	-	40	643	-	+	316	316	-	255	255	15	-	3	-	-	29	29	-	-	228	228	-	-	-	-	-	-				
1955	-	2	121	651	-	70	842	-	1	210	211	140	834	974	5	49	192	-	-	70	70	-	212	249	461	-	+	10	36	-	36				
1956	-	2	72	722	-	73	867	+	2	337	339	139	682	821	2	51	134	1	9	56	66	-	197	202	399	-	1	1	37	2	39				
1957	-	51	187	384	-	51	1 072	2	4	345	351	131	1 004	1 135	1	85	306	-	15	43	58	-	330	258	588	-	4	24	86	-	86				
1958	728	91	87	679	-	94	860	1	3	297	301	41	694	735	+	23	565	-	25	162	187	-	569	386	955	14	-	30	131	-	131				
1959	1 404	96	60	654	1 529	96	2 339	6	15	595	616	195	853	1 048	1	50	580	+	12	738	750	-	734	303	1 037	-	+	3	92	1	93				
1960	2 081	73	68	716	2 228	115	3 127	1	5	538	544	121	757	878	1	32	443	+	2	930	932	-	392	175	567	3	-	11	146	-	146	8 141			
1961	1 490	35	51	691	1 446	108	2 296	-	7	765	772	371	1 079	1 450	1	75	321	+	11	1 564	1 575	6	688	282	976	3	1	5	95	13	108	8 450			
1962	2 662	39	49	511	1 661	90	2 311	3	2	898	903	590	794	1 384	+	62	154	2	1	1 950	1 953	3	649	163	815	2	-	8	45	188	233	7 849	1 626	9 475	1 049
1963	550	78	13	560	1 746	111	2 430	3	8	921	932	151	867	1 018	+	39	510	3	-	2 098	2 101	1	1 061	118	1 180	2	3	13	36	431	467	8 288	1 710	9 998	944
1964	3 521	54	102	782	2 228	141	3 253	1	21	1 543	1 565	107	1 121	1 228	3	17	586	1	33	2 677	2 711	29	540	144	713	81	1	4	20	366	386	9 185	2 468	11 653	690
1965	3 706	49	142	550	1 732	56	2 480	9	2	1 033	1 044	86	1 345	1 431	+	10	409	-	1	3 159	3 160	8	558	114	680	79	1	+	20	163	183	7 424	3 065	10 489	711
1966	3 465	43	19	436	1 140	23	1 618	2	4	1 438	1 444	113	2 791	2 904	4	22	546	-	4	2 943	2 947	1	888	236	1 125	87	-	1	19	268	287	8 557	3 576	12 133	624
1967	2 731	36	17	554	1 458	60	2 089	-	1	1 387	1 388	241	2 150	2 391	5	23	208	+	2	3 846	3 848	2	748	69	819	49	-	-	1	126	127	7 338	4 109	11 447	562
1968	2 489	-	84	613	1 711	64	2 472	-	2	1 500	1 502	249	2 026	2 275	+	46	157	-	11	4 570	4 581	+	906	90	996	17	-	-	2	559	561	7 929	4 047	11 976	430
1969	3 512	23	75	-	-	-	75	-	+	1 577	1 577	221	1 800	2 021	-	43	180	-	6	5 499	5 505	3	941	172	1 116	3	+	+	2	424	426	10 718	4 237	14 955	412

Table 18. The monthly landings of Norway lobsters in Iceland during 1969 (in metric tons) and the catch, kg/hr, by statistical square.

Area Va 2 Statistical Square Nos.	May		June		July		August		September		October		Overall	
	m. tons	kg/hr	m.tons	kg/hr	m. tons	kg/hr	m. tons	kg/hr	m. tons	kg/hr	m. tons	kg/hr	m. tons	kg/hr
106-126	8.1	33	42.0	29	22.4	22	65.3	34	13.5	31	-	-	151.3	30
146	141.0	54	176.1	34	168.8	35	178.9	41	20.7	14	0.2	7	685.7	37
147	37.2	52	73.7	38	155.8	37	97.1	44	14.8	12	0.8	6	379.4	36
148	13.9	36	44.0	41	27.7	34	100.6	47	0.4	10	-	-	186.6	42
152	7.9	98	192.8	53	228.2	48	19.2	40	1.2	31	-	-	449.3	50
153	43.4	57	90.9	53	71.4	48	5.6	20	-	-	-	-	211.3	50
154	54.1	74	101.8	47	18.1	18	2.5	11	-	-	-	-	176.5	43
169	42.1	45	68.3	25	336.8	39	25.7	27	20.3	25	-	-	493.2	35
170	13.4	33	28.5	25	25.2	33	7.5	18	15.5	18	2.5	10	92.6	24

Table 19. The monthly landings (metric tons) of Norway lobsters in the United Kingdom during 1969, by trawl and seine from stated areas, and the catch (kg/hr) by statistical area.

Area	January		February		March		April		May		June		July		August		September		October		November		December		Overall	
	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr	m.tons	kg/hr
IVa	121.5	26.6	37.2	10.5	29.8	12.3	36.5	32.3	81.7	16.4	153.9	18.3	173.2	19.4	412.6	31.6	422.9	23.6	69.7	16.5	19.1	11.8	17.1	9.0	1575.2	21.7
IVb	170.0	21.5	47.0	14.1	103.3	26.8	140.3	27.9	39.8	17.1	53.3	21.6	55.9	16.2	103.8	24.2	201.5	24.1	275.7	23.2	179.1	21.7	147.6	20.1	1517.4	22.1
VIa North of 57°30'N	110.0	11.7	115.2	12.9	167.8	15.8	138.3	13.8	141.7	17.4	73.5	15.0	184.9	26.3	172.1	20.8	60.6	12.8	50.5	13.2	67.1	13.0	103.4	11.7	1385.1	15.4
VIa South of 57°30'N	89.5	13.3	70.8	16.5	189.7	22.4	374.0	21.1	535.9	26.1	447.6	24.1	585.9	29.5	580.1	28.7	384.8	25.3	377.6	26.1	166.4	18.7	97.3	15.7	3899.6	24.2
Overall	432.4	17.2	263.2	13.6	683.0	28.9	469.3	14.1	799.0	22.2	728.3	21.2	999.9	25.5	1268.6	27.7	1016.3	23.5	659.0	22.7	337.5	17.3	315.7	15.4	7972.2	21.6

Table 20. The landings (metric tons) and the catch (kg/hr) by country and by month for the years 1960 to 1969.

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Overall and mean catch kg/hr
ICELAND Va2	1960 m.tons	-	-	-	-	11.6	289.0	320.2	88.9	1.0				710.7
	kg/hour					126	93	85	58	16	-	-	-	83
	1962 m.tons	-	-	-	-	279.1	631.4	535.0	194.1	3.9	-	-	-	1 643.5
	kg/hour					100	84	68	62	57				77
	1963 m.tons	-	-	-	-	214.0	1 364.8	831.6	796.2	79.8	-	-	-	3 286.4
	kg/hour					130	101	75	74	58				88
	1964 m.tons	-	-	-	-	492.9	1 163.5	708.3	216.3	8.2	-	-	-	2 589.2
	kg/hour					107	71	60	35	47				66
	1965 m.tons	-	-	-	-	295.7	739.2	946.6	284.3	18.8				2 284.6
	kg/hour					85	57	72	51	54				64
	1966 m.tons	-	-	-	-	352.7	913.3	865.4	445.6	29.0				2 606.0
	kg/hour					83	64	56	59	61				62
	1967 m.tons	-	-	-	-	260.6	534.2	892.0	362.7	100.0				2 149.5
	kg/hour					53	40	44	40	26				42
	1968 m.tons	-	-	-	-	63.0	529.9	833.1	443.2	215.0	35.7			2 119.9
	kg/hour					23	29	33	31	24	17			30
	1969 m.tons	-	-	-	-	385.6	925.1	1 275.5	524.7	89.6	3.6			3 204.1
	kg/hour					54	40	41	39	17	9			40
DENMARK areas IIIa and IVb	1965 m.tons	31	162	212	84	56	182	179	128	360	269	70	12	1 745.0
	1966 m.tons	60	43	14	33	40	153	92	66	209	252	165	25	1 152.0
	1967 m.tons	13	38	6	22	39	207	176	262	348	132	181	71	1 495.0
	1968 m.tons	23	75	51	48	99	208	192	161	309	375	95	101	1 737.0
GERMANY (Kattegat) IIIa	1962 m.tons	0.1	0.3	0.3	0.5	1.3	16.4	22.2	12.6	12.8	7.9	0.7	0.8	75.9
	1963 m.tons	0.1	-	-	0.1	1.2	20.3	22.1	22.3	22.1	6.8	1.9	0.6	97.5
	1964 m.tons	0.6	0.3	0.2	0.1	9.0	29.4	28.6	17.0	15.1	10.1	8.1	0.5	119.0
	1965 m.tons	0.2	0.4	-	1.3	2.7	15.9	6.6	2.8	5.7	4.6	0.6	0.1	40.9
	1966 m.tons	-	-	-	-	0.3	3.3	6.5	1.0	2.7	0.8	-	0.6	15.2
	1967 m.tons	0.1	0.3	-	-	1.5	15.6	12.2	8.5	11.7	2.9	0.1	-	52.9
	1968 m.tons	0.6	0.1	-	-	1.0	21.7	8.3	5.6	17.4	6.8	0.3	0.1	61.9
	1969 m.tons	-	-	-	0.1	-	3.3	2.4	5.3	2.2	0.7	0.1	0.2	14.3
IRELAND areas VIIa, g, j	1967 m.tons	18.3	18.3	23.4	50.8	40.6	85.3	24.4	52.8	37.6	40.6	37.6	23.4	451.1
	1968 m.tons	72.1	34.5	54.9	59.9	39.6	121.9	98.6	21.3	61.0	86.4	48.8	29.5	728.5
	1969 m.tons	20.3	23.4	38.6	54.9	45.7	99.6	155.5	103.6	99.6	105.7	71.1	20.3	831.1
UNITED KINGDOM area VIIa	1966 m.tons	-	-	-	-	6.5	27.2	79.1	25.0	6.0	-	-	-	143.8
	1967 m.tons	-	-	-	-	3.0	12.1	11.1	7.2	0.7	-	-	-	34.1
	1968 m.tons	-	-	-	-	5.6	7.6	19.7	8.1	4.7	-	1.8	1.5	49.0
	1969 m.tons	1.1	-	1.0	0.4	5.5	38.3	32.7	17.9	3.7	-	-	-	100.6

Note: The landings for Iceland relate to data for which effort measurement was available and are less than the total landings given in Table 17. Landings for United Kingdom relate only to area VIIa.

Table 21. Landings (metric tons) of Norway lobsters in Spain by year and by month for the Atlantic and Mediterranean areas.

Area	Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Area Total	Overall Total
Atlantic	1962	43.7	70.5	69.5	123.2	186.0	272.7	244.5	193.7	138.8	128.3	102.1	53.5	1 626.5	2 675.2
Mediterranean	"	36.4	30.1	61.2	40.2	96.5	85.8	358.6	117.0	74.4	58.8	48.3	44.4	1 048.7	
Atlantic	1963	51.0	94.0	40.3	72.4	235.9	218.5	269.1	237.4	169.2	132.8	100.8	88.6	1 710.0	2 654.3
Mediterranean	"	43.2	48.7	81.2	65.9	92.3	106.6	144.1	112.6	61.6	70.9	72.1	45.1	944.3	
Atlantic	1964	118.3	138.5	86.2	149.5	299.4	305.1	343.9	366.1	183.7	129.4	149.5	198.8	2 468.4	3 158.4
Mediterranean	"	39.9	51.1	59.5	55.0	86.4	77.7	89.9	74.8	43.0	38.3	45.4	29.0	690.0	
Atlantic	1965	116.0	115.3	160.7	191.8	370.6	361.5	642.0	373.1	221.3	212.9	125.1	175.1	3 065.4	3 776.0
Mediterranean	"	33.5	43.1	58.4	70.9	111.3	83.7	94.1	69.3	38.4	36.3	30.5	41.1	710.6	
Atlantic	1966	151.9	155.0	163.0	260.5	429.0	432.0	587.9	472.6	268.4	201.7	187.9	266.5	3 576.5	4 200.4
Mediterranean	"	45.4	50.3	61.7	69.2	59.0	69.0	71.9	64.5	41.0	25.0	28.0	38.9	623.9	
Atlantic	1967	196.2	183.3	199.5	325.5	415.2	585.9	721.6	563.3	271.7	195.3	176.1	275.1	4 108.7	4 670.6
Mediterranean	"	46.5	36.9	58.7	41.5	50.6	56.6	79.3	62.6	34.5	31.2	26.3	37.2	561.9	
Atlantic	1968	200.2	173.1	174.0	276.0	435.3	460.5	661.3	583.4	322.7	302.8	232.7	225.5	4 047.5	4 477.2
Mediterranean	"	29.1	35.9	34.8	35.8	34.3	50.6	50.6	44.1	32.4	40.5	22.0	19.6	429.7	
Atlantic	1969	204.6	178.1	194.4	330.9	492.8	542.7	648.7	509.1	348.8	252.5	259.0	275.2	4 236.8	4 649.2
Mediterranean	"	28.4	30.5	40.6	41.7	38.2	48.1	45.6	50.7	27.3	22.4	17.5	21.4	412.4	

Table 22. The annual landings of Norway lobsters (whole weight) and the by-catch (metric tons) together with the species composition of the by-catch kg/100 kg Nephrops, by country.

	Iceland	Germany	Sweden	Scotland	England area IVb only	Ireland
	1969	1967	1969	1969	1969	1969
Norway lobster m.tons	3 470	19	17	6 431	405	831
By-catch m.tons	10 636	13	187	6 569	798	1 926
Species	kg/100kg Nephrops					
Cod	64.9	Present	283.4	19.7	26.7	56.8
Haddock	11.3	Present	136.6	26.6	73.3	18.1
Whiting	-	Present	35.3	18.7	32.6	91.6
Saithe (Coalfish)	9.6	Present	25.3	-	-	-
Hake	-	Present	74.0	4.1	-	-
Pollack (Lythe)	-	Present	275.8	-	-	14.7
Ling	84.1	Present	13.4	-	-	-
Torsk	+	-		-	-	-
Catfish	2.6	Present	1.8	-	-	-
Redfish	72.7	-		-	-	-
Monk (Angler)	21.3	Present	5.6	7.5	-	-
Gurnard	-	-	0.6	-	-	-
Conger	-	-	0.1	0.5	-	-
Plaice	4.1	Present	60.0	2.6	15.5	3.3
Lemon Sole	1.4	Present	14.9	0.8	4.1	-
Witch	4.0	-	1.8	3.1	-	-
Sole	-	-	0.1	-	-	-
Dab	-	-	11.2	0.4	-	-
Halibut	3.1	Present	0.2		-	-
Megrim	3.0	-		0.8	-	-
Turbot	-	Present	0.1		-	-
Brill	-	Present	0.1		-	-
Skate (Rays)	1.7	-		6.6	3.7	-
Dogfish	-	-	13.4		10.7	-
Unspecified	23.2	-	99.2	10.7	30.2	47.3
Industrial	-	-	52.0			
Total	307.0	70.6	1 104.9	102.1	196.8	231.8

Note: the Nephrops data for Germany are converted to whole weight from tail weight data.

Table 23. The catch, kg/hr, of Nephrops and the by-catch species, by United Kingdom Nephrops trawlers, for 1969, by months, for the areas IVa (A), IVb (B), VIa north of 57°30'N (N) and VIa south of 57°30'N (S).

	January				February				March				April				May				June			
	A	B	N	S	A	B	N	S	A	B	N	S	A	B	N	S	A	B	N	S	A	B	N	S
Nephrops	26.6	21.4	11.7	13.3	10.5	13.5	12.9	16.5	12.3	26.7	15.8	22.4	32.3	28.2	13.8	21.1	16.4	17.1	17.4	26.1	18.3	21.6	15.0	24.1
Cod	7.4	18.3	12.6	9.8	14.7	18.1	13.7	10.6	22.7	5.9	12.3	6.5	10.4	7.0	8.5	3.9	1.8	7.3	7.2	4.4	1.3	3.5	7.6	3.8
Haddock	3.7	12.0	2.6	3.6	7.8	15.0	3.9	3.6	7.3	11.3	5.2	2.8	8.9	4.2	5.6	2.4	2.1	10.9	10.5	3.0	1.2	11.2	9.2	4.0
Whiting	2.4	8.7	30.2	7.9	0.5	12.2	30.4	4.5	0.2	6.6	29.7	4.3	4.6	1.3	17.5	4.4	1.3	1.5	11.0	3.5	1.8	1.7	9.4	3.2
Saithe	0.1		1.6	10.9	1.4		1.6	4.0	1.6		2.9	0.3	0.4	+	1.3	0.8	0.1	0.1	1.2	0.5	0.1		1.5	0.8
Hake	0.6	+	2.1	2.7	0.5	+	2.1	2.3	0.8	+	2.2	1.5	0.4		1.9	1.1	0.4		1.7	1.4	0.5		2.1	1.2
Lythe (Pollack)			1.0	+		+	1.7	0.2	+	+	2.8	0.5	+	+	1.2	0.2	+	+	1.0	0.3	+		0.5	0.2
Ling	0.1	+	1.0	+	0.1		1.2	0.1	0.5	+	1.2	0.8	0.3	+	0.7	0.1	0.2		0.3	0.1	0.1		0.2	+
Monk (Angler)	1.4	0.1	4.3	0.4	0.5	+	4.1	2.5	5.4	0.1	5.2	11.7	3.2	0.1	4.4	3.7	2.0	+	3.2	2.9	1.2	+	2.8	2.2
Conger	0.5		0.5				0.2	0.1			0.1	0.4	+		+	0.2	+		+	0.1	+		+	+
Plaice	3.1	2.5	1.1	1.2	1.4	2.3	1.2	1.3	1.5	3.8	0.6	0.7	0.6	1.7	0.5	0.4	0.2	1.2	0.4	0.2	0.3	0.9	0.2	0.3
Lemon Sole	1.6	1.0	0.5		1.3	1.1	1.2	+	1.6	1.9	2.2	0.2	0.8	0.7	1.5	0.1	0.3	0.1	1.0	+	0.3		0.4	+
Witch	0.3	+	1.1	0.2	0.3	+	1.2	1.1	0.6	0.1	1.5	2.6	0.8	+	1.0	1.2	0.7	+	1.7	1.7	0.6		1.6	1.4
Dab	0.2	+	+		0.4	+	+	+	0.7	0.1	+		0.4	0.3	+	+	0.2	0.6	+	+	0.2	0.2	+	+
Halibut	+	+	+	+	+	+	0.6	+	0.2	+	0.1	+	0.1	+	0.1	+	0.2	+	0.2	+	0.1	+	0.1	+
Megrim			0.9	+	+		1.3	0.5	0.4		1.7	0.6	0.5		1.6	0.4	0.7		1.5	0.2	0.6		1.3	0.2
Skate	1.7	1.2		3.4	2.1	0.3	1.9	6.5	4.4	0.7	3.1	6.7	3.0	0.2		3.6	1.5	0.1	1.9	1.8	1.1	+	1.4	1.1
Dogfish			8.7	1.8			0.6	1.5	+		+	+	0.2		+	0.2	0.3		+	0.2	+		0.2	0.4
Unspecified		2.3				0.9				1.9				0.7				0.1						

	July				August				September				October				November				December			
	A	B	N	S	A	B	N	S	A	B	N	S	A	B	N	S	A	B	N	S	A	B	N	S
Nephrops	19.4	16.2	26.3	29.5	31.6	24.2	20.8	28.7	23.6	24.0	12.8	25.5	16.5	23.2	13.2	26.1	11.8	21.7	13.0	18.7	9.0	20.0	11.7	15.7
Cod	2.0	6.5	5.4	2.4	0.5	3.0	6.5	2.2	1.0	2.4	9.5	3.1	1.1	2.2	7.8	3.2	2.1	2.5	9.5	6.3	15.5	7.8	11.4	9.8
Haddock	4.0	24.0	8.9	5.4	1.7	26.5	9.3	4.2	2.5	20.9	6.6	2.7	9.8	25.5	5.1	1.0	6.3	20.9	7.8	1.2	11.9	25.5	6.2	1.4
Whiting	6.2	5.8	12.3	2.8	3.3	4.5	22.9	3.1	1.7	6.0	27.3	2.5	4.4	8.6	16.3	3.9	11.7	11.5	22.3	3.7	8.9	11.9	27.7	5.9
Saithe	0.1		0.8	0.6	0.1		1.5	1.3	0.1		5.7	2.3	+	+	2.0	4.4	+	+	0.6	7.0	0.3		0.6	11.3
Hake	0.6	+	1.6	1.6	0.6		1.1	1.4	1.0	+	1.3	1.3	0.9	+	1.4	1.1	0.3		1.5	1.6	0.2		1.2	2.5
Lythe (Pollack)			0.8	0.3	+		1.3	0.3	+		1.0	0.1			0.9	+			1.0	+	+	+	1.0	+
Ling	0.2		0.1	+	+		0.3	0.1	0.1		0.4	+	0.1		3.3	+	0.2		2.7	+	0.2	+	1.7	+
Monk (Angler)	1.5	+	1.9	1.4	0.9	0.3	1.8	1.1	1.2	0.2	2.6	1.1	1.4	0.1	4.0	1.3	1.5	+	0.5	1.5	2.1	+	5.9	0.5
Conger	+		+	+			+	0.1			+	0.2			0.5	0.4		+	0.7	0.8	0.2		0.3	0.5
Plaice	0.5	1.8	0.3	0.3	0.2	1.6	0.4	0.3	0.4	2.0	0.4	0.5	1.1	1.5	0.7	0.4	1.3	0.7	0.2	0.4	2.4	2.1	1.0	0.8
Lemon Sole	0.8	+	0.3	+	0.4	0.2	0.5	+	0.3	0.2	0.4	+	0.1	0.2	0.2	+	+	0.1	+	+	0.3	0.2	0.1	+
Witch	1.5		1.2	0.9	0.5	+	1.3	0.9	0.4	+		0.6	0.6	+	0.9	0.3	0.2	+	1.5	0.4	0.2	+	1.2	0.3
Dab	0.2	0.2	+	+	0.2	+	+	+	0.2	+	+	+	0.6	+	0.1	+	0.4	+	+	+	0.2	+	+	+
Halibut	0.2	+	0.1	+	0.1	+	0.3	+	0.1	+	0.3	+	+	+	0.1		+	+	+	+	+	+	+	
Megrim	1.1		0.9	0.2	0.4		1.7	0.1	0.5		2.4	0.1	+		0.5	+			1.8	+			2.2	+
Skate	3.8	+	1.3	0.9	1.0	0.1	1.6	1.2	1.7	0.1	1.6	1.3	1.1	0.2	2.6	1.3	2.2	0.1		2.2	2.0	0.3	2.8	2.2
Dogfish	+		+	0.5			+	0.5	0.1	0.8	+	2.1	4.6	3.6	1.2	2.2	0.4	+	4.2	4.9	0.9	0.7	18.5	3.9
Unspecified										2.1				2.6				2.5				3.0		

APPENDIX TABLES

Appendix Table I

Danish landings of Nephrops (in metric tons) by month in 1968 in the main fishing ports.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Skagen	21	57	39	40	54	71	67	73	75	200	47	64	808
Frederikshavn	-	1	-	-	16	48	34	28	22	6	2	1	158
Hirtshals	-	2	7	5	7	20	2	1	3	21	3	3	74
Grenå	1	2	1	-	-	-	4	4	19	14	3	1	49

Appendix Table II

The landings (metric tons) of Nephrops and the percentage Nephrops of total catch at the chief Irish ports, 1967 to 1969.

	1967		1968		1969	
	m. tons	% total	m. tons	% total	m. tons	% total
East						
Clogherhead	150	29.1	133	27.6	8	2.6
Dalbriggan	171	37.8	163	42.0	151	35.5
Skerries	390	36.4	498	36.9	585	38.2
Howth	36	1.0	49	1.2	185	4.6
South						
Clonakilty*	11	100.0	201	100.0	26	100.0
Unionhall	38	10.7	67	19.8	22	8.7
Schull	5	12.8	23	9.7	18	29.9
Castletownbere	60	7.9	231	23.6	246	20.0

* N.B. At Clonakilty Nephrops landed expressly for one shellfish merchant during very limited period of the year.

Appendix Table III

Annual landings (metric tons) of Nephrops at main Irish ports on Celtic Sea coast (Carnsore Point-Dunmore Head) 1961-1969.

Year	Total	Kilmore Quay	Duncannon	Ballinagoul	Clonakilty	Unionhall	Schull	Bantry	Castletownbere	Ballinskilligs	Valentia	Dingle
1961	13	-	-	-	-	12	+	+	-	-	-	-
1962	188	+	-	1	-	65	4	3	105	-	-	5
1963	431	-	-	3	-	33	46	64	271	+	-	16
1964	366	-	-	+	-	47	19	20	197	-	-	4
1965	163	-	-	+	-	25	3	37	98	-	-	-
1966	268	-	-	3	-	15	9	33	207	-	-	6
1967	126	-	-	9	11	38	5	-	60	-	+	1
1968	559	-	-	4	201	67	23	-	231	5	20	9
1969	424	26	51	7	26	22	18	-	246	9	8	1
Season		All during July	All during Apr.-Aug.	See App. Table IV	Mar. - May (1967) Aug. - Nov. ('68, '69)	See App. Table IV	See App. Table IV	Mainly Jan. - Apr.	See App. Table IV	Irregular	Mainly Apr. - June	Mainly Nov. - Apr.

Appendix Table IV

Landings of Nephrops by month at selected Irish ports on Celtic Sea Coast
(Figures = metric tons; L = landings; LL = peak landings)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Ballinagoul (aggregate, 1961-1969)												
'61-9	7	1	11	+	-	-	2	-	-	-	1	4
1970	-	-	-	2	3	13	7	3				
Unionhall												
1965	-	-	-	-	7	+	7	+	1	4	2	3
1966	-	-	-	3	8	-	-	1	+	1	3	-
1967	-	-	1	7	4	4	2	-	2	7	6	5
1968	1	26	1	1	3	9	-	3	6	6	-	10
1969	2	3	2	-	7	1	-	4	-	-	2	1
1970	-	-	-	-	19	4	17	3				
Schull												
1965	-	+	-	-	+	1	+	1	-	-	1	-
1966	-	-	1	-	4	2	-	1	+	-	+	+
1967	+	-	1	-	+	3	-	-	-	-	1	-
1968	+	3	3	+	-	-	-	1	4	12	-	-
1969	-	-	3	7	4	-	-	+	1	2	-	-
1970	-	-	1	-	9	-	1	-				
Castletownbere												
1962			L								L	L
1963				L	L	L	L	L				L
1964	L	L	L									
1965	4	21	14	5	2	18	15	4	2	6	4	1
1966	4	3	52	14	13	16	67	18	10	2	4	2
1967	2	4	11	6	4	21	4	2	1	2	2	1
1968	4	22	41	43	6	46	26	+	3	11	21	7
1969	6	23	27	34	20	12	64	18	8	17	11	6
1970	1	9	-	67	106	121	92	10				
Skerries												
1960				LL	L	L	L	L				
1961			L	L	L	LL	L	L	L			
1962			L	L	L	L	L	L	L	LL		
1963			L	L	L	L	LL	L	L	L		
1964				L					LL	L	L	
1965			L	L	L	L	L	LL	L	L		
1966							L	L	LL	L		
1967	16	14	12	45	37	64	20	51	37	39	36	21
1968	68	12	14	17	34	76	72	21	58	75	27	22
1969	14	-	11	21	25	87	91	85	91	88	60	14

Appendix Table V

Landings (metric tons) of Norway lobsters in the principal French ports, 1960 to 1969.

Port of Landing	Manche Mer du Nord	Douarnenez	Le Guilvinec	Concarneau	Lorient	Les Sables d'Olonne	La Rochelle	Autres ports atlantiques	Total
Main fishing areas	VII d, e	VII f,g,j	VII f, g VIII a	VII a,b,g,j	VII b,f,g,j VIII a	VIII	VII a,f,g VIII		
Year									
1960	77	85	1 448	3 398	1 975	194	486	526	8 141
1961	106	107	1 445	3 416	2 076	211	536	553	8 450
1962	29	105	913	3 954	1 918	178	456	296	7 849
1963	27	529	1 380	2 685	2 254	253	573	587	8 288
1964	13	611	1 453	2 983	2 121	532	593	879	9 185
1965	26	770	1 048	2 855	1 523	318	462	422	7 424
1966	23	1 103	1 849	2 951	1 534	293	557	247	8 557
1967	12	1 169	1 505	2 364	1 115	254	707	213	7 338
1968	?	1 269	2 100	2 048	1 403	?	500	?	7 929
1969	?	1 248	4 200	1 617	1 774	?	800	?	10 718

Appendix Table VI

Landings (metric tons) of Norway lobsters, by month, at

A. Douarnenez: principally from the Smalls, South of Ireland and St. George's Channel

B. Concarneau: principally from the North grounds (N) off South-west Ireland, in St. George's Channel and the Irish Sea, but also from the Gulf of Gascogne (G).

C. Lorient: by larger Nephrops trawlers and semi-industrial trawlers from the North grounds (N), the Smalls, the Irish coasts and St. George's Channel but principally by smaller Nephrops trawlers fishing locally and in the Gulf of Gascogne (G).

			January	February	March	April	May	June	July	August	September	October	November	December
A Douarnenez	1966		?	?	?	84.4	127.6	144.6	104.8	64.4	65.5	?	102.8	121.6
	1967		70.5	115.5	84.6	173.8	157.7	146.3	128.8	82.2	38.9	48.3	105.2	121.8
	1968		86.8	125.5	139.0	143.2	144.6	70.2	119.9	88.3	56.7	72.9	87.0	140.1
	1969		79.7	126.4	154.1	148.9	174.8	106.8	87.5	61.9	34.2	71.6	88.8	113.7
B Concarneau	1965	N	33.6	206.3	270.0	313.6	298.0	376.7	465.0	137.1	123.5	163.1	70.4	69.8
		G	2.8	18.7	27.0	38.3	36.7	47.6	40.0	36.7	50.4	21.8	6.0	3.2
	1966	N	102.3	145.7	304.9	238.6	287.0	355.7	341.0	181.6	171.2	263.5	227.0	173.3
		G	2.1	4.0	20.8	18.8	25.8	11.3	18.8	10.7	8.2	11.0	12.3	10.5
	1967	N	102.7	9.4	105.8	344.3	321.0	326.4	358.8	215.2	87.3	71.4	130.7	172.4
		G	1.6	0.2	17.1	17.8	24.2	22.0	20.2	13.5	8.2	5.8	5.2	3.1
	1968	N	82.5	227.9	233.9	260.7	292.1	8.6	175.1	168.7	67.6	104.9	150.1	180.7
		G	8.5	10.0	10.6	18.1	11.4	0	8.7	8.8	3.2	11.7	8.7	4.2
	1969	N	101.1	113.2	159.3	177.6	228.5	202.3	138.9	85.0	22.6	57.1	72.9	102.7
		G	8.5	9.7	18.1	11.7	20.1	16.2	15.9	13.6	10.3	14.7	5.9	5.2
C Lorient	1966	N	65.1	50.3	113.1	81.4	206.3	116.0	127.8	183.0	140.7	114.8	132.3	52.1
		G	2.6	5.6	31.1	36.7	78.5	55.5	49.8	27.2	11.3	13.2	11.8	6.4
	1967	N	47.7	10.9	35.5	108.2	191.2	167.6	136.0	113.9	62.8	37.7	51.4	51.4
		G	1.4	0.4	15.2	41.2	100.9	34.2	24.6	20.0	8.6	6.3	8.4	5.0
	1968	N	39.6	59.0	82.8	72.6	110.3	49.3	140.6	177.4	113.3	81.8	54.9	73.7
		G	14.8	21.6	25.5	56.4	37.4	43.7	35.0	32.8	11.8	23.7	20.3	24.2
	1969	N	40.7	65.4	94.6	120.5	95.8	129.2	136.9	177.0	109.9	70.9	?	?
		G	24.3	28.5	61.0	63.9	96.3	74.1	54.7	56.1	39.6	47.6	?	?