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International Council for the Exploration of the Sea

C.M.1977/F:8 - APPENDIX
Demersal Fish (Northern) Committee

REVIEW OF SOME FISH RESOURCES WITHIN THE NEAFC CONVENTION AREA

This Report has not yet been approved by the International Council for the Exploration of the Sea; it has therefore at present the status of an internal document and does not represent advice given on behalf of the Council. The proviso that it shall not be cited without the consent of the Council should be strictly observed.

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Preamble

The distribution, biology, and state of exploitation of the following fish stocks, with reference to the 200-mile fishery zones, are dealt with in this Appendix:

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Distribution with Reference to Fishery Zones - Summary

Cod, haddock and whiting

Cod, haddock and whiting landings come mainly from Division IIIa, and from Sub-areas IV, VI and VII. In addition, some relatively small quantities are recorded from Sub-area VIII.

Throughout the area a number of stocks can be identified between which the degree of mixing is relatively small. For all three species, the stocks located in Divisions IVa and IVb are distributed partially in the EEC fishery zone and partly in the Norwegian zone. There is also a connection between stocks in the Skagerrak and those in nearby North Sea waters.

Table 1 shows percentages of the total Sub-area IV catches of cod, haddock and whiting estimated as being taken in the Norwegian zone of the North Sea.

All three species spawn in the spring. Eggs and larvae, as well as juvenile fish, are pelagic for the first year or more. The pelagic stages spawned in Division IVa are distributed partly in the EEC fisheries zone, and partly in the Norwegian zone. For the haddock and whiting in the Skagerrak, the drift of pelagic stages from the North Sea is important. It is not certain if this is important for cod also. No estimates are available of the proportions distributed in each of these zones during the pelagic stage.

To a large extent, the fish taken in Norwegian coastal waters belong to stocks independent of those found elsewhere. Cod, haddock and whiting found in the Skagerrak on the Danish side of the median line between Denmark and Norway belong partly to the North Sea stocks of those species. Fish found in the Kattegat are probably independent of fish in the North Sea, but may mix to a certain extent with fish found in the Skagerrak. Some cod, haddock and whiting are taken by Sweden, mainly from Swedish waters. These fish probably belong to stocks that are more widely distributed in the Skagerrak and Kattegat.

The catches of cod, haddock and whiting taken in Sub-area VIII are all believed to come from the EEC fishery zone.

Cod, haddock and whiting are all found on Rockall Bank (Division VIb). The stocks there appear to be quite independent of other cod, haddock and whiting stocks.

Other species

Other species dealt with in this report are rays and skates, sea breams, gurnards, catfish, monkfish(angler) , greater weever and lumpsucker. Not enough is known about these species to describe:

(a) their movements in relation to the boundaries of national zones, or

(b) their state of exploitation.

Details of their biology and general distribution are described in the text below. Average landings for the period 1966-75 and percentage of the landings taken from different fishing areas are given in Table 2. Details of the quantities landed from various areas are given in Tables 3-10.

1. COD

1.1 Skagerrak and Kattegat (Division IIIa)

The cod taken from Division IIIa come from Norwegian, Swedish, Danish and international waters. From 1966-75 annual landings have fluctuated between 13 000 and 32 000 tons. Since 1969 landings have increased, and the value for 1975 was 32 000 tons.

There are several cod stocks within Division IIIa. The cod found in Norwegian coastal waters appear to be independent of all other cod stocks. Tagging experiments have shown an interchange of cod between the North Sea and the Danish side of the median line between Denmark and Norway in the Skagerrak. There appears to be no migration of cod between the North Sea and the Kattegat.

1.2 North Sea (Sub-area IV)

1.2.1 General

There is a considerable amount of literature on North Sea cod and most of the relevant aspects of its biology and fishery have recently been summarised by Daan (1975).

1.2.2 Spawning times and areas

Our current knowledge of spawning areas is summarised in Figure 1 (from Daan, 1975). Cod eggs may be found over almost the entire area of the North Sea, with the exception of the continental coastal areas. Concentrations of eggs occur in several well-defined areas and additional evidence of spawning grounds is provided by data on catches of mature cod (Graham, 1934). In addition to the information given in Daan's (1975) chart, the (Flamborough) spawning area off the English NE coast has been confirmed and delimited by a series of English plankton surveys in 1976.

The peak of egg density is in February in the south and in March in the north, with range in occurrence from January to April.

1.2.3 Juvenile fish distribution

An international survey of 0-group gadoids has been in operation since 1974 and prior to this there was work by individual nations, notably by Scotland. The surveys have not covered the south-eastern North Sea nor inshore areas but in the remainder, the areas of highest density are off the Danish coast, Tail End of Dogger, Ling Bank, Bressay Area and east coast of England and Scotland. From shrimp trawl surveys and fisheries, 0-group cod are known to be abundant in inshore areas in the German Bight, along the Dutch coast, and in some English estuaries.

There is also an international survey for I-group gadoids and Figure 2 shows the average distribution (1965-75) of I-group and II-group cod. The highest concentrations occur along the coastal areas of Denmark, Federal Republic of Germany and the Netherlands. I-group cod are less widespread in the northern North Sea, although local concentrations do occur, e.g. in the Bressay Area.

1.2.4 Distribution and migrations of adult stock

Numerous tagging experiments have been made and a summary of results was made in 1971 (ICES, 1971). In all experiments the centres of density of recaptures were located close to the areas of release, or they moved seasonally and returned close to the liberation area. In no case was there a tendency for the centre of density to move progressively away from the release area during successive years.

Fish tagged in the central North Sea and Southern Bight showed the most movement, and here 95% of the recaptures were within a radius of approx. 140 miles of the release area after 3 years.

With the possible exception of cod along the English NE coast, the Scottish coast (where movement is more restricted and parallel to the coast), and the Norwegian coast, the tagging results suggest that there is a continuous distribution in the North Sea, with intermixing over distances of up to about 140 miles. Table 1 gives estimates of the proportion of the Sub-area IV cod stock taken in the Norwegian zone.

1.2.5 Exploitation

From the beginning of the century up to 1965 the total catch fluctuated between 60 and 100 thousand tons. After 1965 landings rose sharply to a peak of 350 thousand tons in 1972, since then they have declined to an estimated 209 thousand tons in 1976 (Tables 1.1, 1.2 and 1.6 of the Report). The available evidence suggests that the main cause of the increased landings in the late 1960s/early 1970s was an increase in recruitment.

In recent years age groups 1-4 have contributed over 90% of the catch in number (2 year olds predominant) and 80% by weight (3 year olds predominant). The VPA indicates that 2 year olds are subject to maximum exploitation, while younger and older age groups have lower F values. The mean fishing mortality rate on two group fish and older has been between 0.6 and 0.9 in recent years. The maximum yield per recruit with the present exploitation pattern is obtained at an F value of between 0.3 and 0.4 at an M value of 0.2.

1.3 Sub-Area VI

Within Sub-area VI, the cod stock at Rockall (Division VIb) is quite independent of the cod stocks in Division VIa. Within Division VIa, cod are found on the shelf to the west of the British Isles in depths up to about 300 m. There is probably more than one cod stock in Division VIa, but lines of demarcation have not yet been established.

Spawning takes place in spring. In Division VIa a principal spawning concentration is to the west of the Outre Hebrides. It is likely that eggs and larvae are carried in a clockwise direction around the Scottish northwest coast. It is not certain how far the young are transported however.

Annual landings from Sub-area VI fluctuated between 10 000 and 25 000 tons between 1966 and 1976. During this period the maximum landings occurred in 1967 and 1968. From 1970 to 1975, landings fluctuated around 14 000 tons without apparent trend.

From 1970-73 the rate of fishing mortality (F) has averaged 0.5 for fish aged 2 years and older.

1.4 Irish Sea and Bristol Channel (Divisions VIIa and VIIf)

1.4.1 Spawning times and areas

The spawning season is late February to early April. There are 3 main spawning grounds: off Carlingford Lough in the northwest Irish Sea, southwest of St Bees Head in the northeast Irish Sea and west of Hartland point in the Bristol Channel.

1.4.2 Juvenile fish distribution

0-group cod probably occur in most rocky coastal areas throughout the Irish Sea. The eggs and larvae from the Carlingford Lough spawning are carried south along the Irish coast and those from St. Bees onto the English and Scottish coasts to north and east. I-group cod start to be caught commercially during the late summer when they may occur in concentrations, particularly along the Irish coast.

1.4.3 Distribution and migrations of adult stock

Tagging experiments on the 3 main spawning grounds show that there is virtually no movement of mature fish between them. After spawning, the St. Bees fish remain chiefly in the area between the Solway Firth, the Isle of Man, and the Cumberland coast but a few fish are recaptured in the Clyde to the north and from south of the Irish Sea.

Spawning fish tagged off Carlingford Loch show a well-marked migration to the south, with a high proportion of recaptures from southeast Ireland during the summer months.

Less information is available on the Bristol Channel spawners, but most recaptures have been from within 90 miles of the release area.

Studies of meristic characters have also indicated that there is little mixing between the 3 spawning stocks, particularly between the two stocks in the northern Irish Sea.

1.4.4 Exploitation

Annual catches in Divisions VIIa+f have been around 9 000 - 10 000 tons since 1967, compared to an average of around 4 000 tons for the period 1960-66. The increase was due to a series of good year classes.

The fisheries for cod follow a regular seasonal pattern, with the highest catchability and peak catches during the spawning season. At this time there are intensive directed fisheries on the 3 main spawning grounds mentioned above. During the summer months the catch rates fall, and there are no directed fisheries. In September, catch rate starts to rise and directed fisheries again occur, mainly along the Irish coast and in Belfast Lough. These latter fisheries are mainly for I-group cod, and are particularly intensive in years of good recruitment.

Fishing mortality since 1968 has averaged 0.8 - 0.9 on the fully exploited age groups, according to the VPA. With the present exploitation pattern the maximum yield per recruit is taken at an F value of 0.3.

1.5 Sub-Area VIII

Relatively very small landings of cod are recorded from Sub-area VIII. The cod caught here all come from the northern part of the area and can be regarded as belonging to stocks entirely located within EEC waters.

2. HADDOCK

2.1 Division IIIa, Sub-Areas IV, VI and VII

2.1.1 General

Haddock is a continental shelf species of the northeast and northwest Atlantic. The distribution is similar to that of cod, except that in the cold most northerly part of the North Atlantic, haddock occur only occasionally and not in great quantities.

Within the EEC zone, haddock are widely distributed in Sub-areas IV and VI, but only taken in relatively small quantities in Sub-area VII.

2.1.2 Spawning times and areas

Spawning occurs in spring, the principal concentrations being in Divisions IVa and VIa. Eggs and larvae are pelagic and are mainly concentrated between 10 and 40 m depth. In the northern North Sea, the centres of larval concentrations are mainly to the west of the boundary between the Norwegian and EEC zones. The larvae are found extending into the Norwegian zone as far east as longitude 3°E in the north and also over the Ling Bank area in the south.

2.1.3 Juvenile fish distribution

During their first summer, haddock are still pelagic. During this stage in the life history the principal concentrations within the North Sea occur north of latitude 58°30' and as far east as 3°E. As in the case of the larvae, the pelagic juvenile stages are distributed partly in the EEC zone and partly in the Norwegian zone. O-group individuals have also been taken pelagically to the west of Shetland and Orkney but at this latitude, the distribution of pelagic stages has only been investigated as far west as longitude 5°W.

In near waters haddock, the demersal way of life is adopted some time between 6-18 months of age. By 12 months of age, juvenile haddock can be found over most of the North Sea, but tend to be concentrated primarily in the northwestern North Sea, north of a line drawn from latitude 54°30' on the western side of the North Sea, to the mouth of the Skagerrak on the east.

2.1.4 Distribution and migration of adult stocks

Tagging experiments suggest that haddock in the EEC zone may be subdivided into a number of stocks. Precise lines of demarcation have not been drawn but certain regions can be recognised, between which there appears to be relatively little mixing of individuals.

In Sub-area VIII, relatively very small quantities of haddock are taken, and it is unlikely that any of these are taken from outside the EEC zone.

For all practical purposes, haddock in Division VIa and Sub-Areas VII and VIII may be treated as occurring in the EEC zone, and that in Sub-Area IV as occurring both in the EEC and Norwegian zones.

2.1.5 Exploitation

The North Sea fishery is mainly carried out by seine and trawl. From 1923 to 1963 (excluding the war years) North Sea haddock landings averaged 97 000 tons annually. During the 1960s, good year classes caused landings to increase, and in 1969 and 1970 the landings exceeded 600 000 tons. It is not possible to predict whether, in the long term, landings will decline to a level nearer the pre-1960 average, or whether they will continue to fluctuate at a higher level than this.

The present age of first exploitation for haddock is about 2 years. Mesh assessments for Sub-area IV haddock show that an increase in mesh size should lead to an increase in the yield per recruit, small long-term gains being predicted for an increase in mesh size to about 85 mm (manila).

A reduction in effort should also increase the yield per recruit for Sub-area IV haddock, although the gains expected in this way might be quite small.

Estimates of the fishing mortality rate (F) of haddock in Division VIa suggest that this is about 0.5 for fish aged 2 years and older.

2.2 Rockall(Division VIb)

There is a haddock fishery on Rockall Bank. The stock there appears to be an independent one.

2.3 Haddock Stocks that occur in more than one Fishery Zone

There are two regions where haddock occur in more than one fishery zone. These are:

2.3.1 Division IVa

Here the pelagic juvenile and the demersal adult stages are distributed partly in EEC waters and partly in the Norwegian fishery zone.

Table 1 gives estimates, for some countries, of the percentages of the total Sub-area IV landings that come from the Norwegian zone of the North Sea.

2.3.2 Skagerrak

Most of the haddock taken from the Skagerrak come from within the Danish 12-mile limit and from the waters between the Danish 12-mile limit and the median line between Denmark and Norway. These haddock are probably part of the North Sea haddock stock.

A relatively very small quantity of haddock is taken from the Norwegian zone of the Skagerrak. These are thought to be independent of other haddock stocks.

3. WHITING

3.1 Skagerrak and Kattegat (Division IIIa)

3.1.1 Life history

Part of the pelagic larvae and young found in the area have been carried there by currents from the North Sea, but spawning also takes place locally. The first few individuals are found at the bottom in July but the main recruitment to the bottom stage takes place in August-September. New recruits also appear in December, probably coming from eggs and larvae found at the edge of the Norwegian Deep in September. Dense shoals of 0-group fish are found in shallow water in the autumn, and during the winter they migrate into deeper water. The growth rate corresponds to that found in the northern North Sea.

3.1.2 Exploitation

The whiting catches in the Division are dominated by O- and I-group fish and fluctuate from year to year depending on year class strength. The increased level of recruitment observed in the North Sea has not influenced the catches in the Skagerrak and Kattegat. The mean catch from 1951 to 1960 in the Division was about 19 000 tons against 21 000 tons in 1966-75 (Tables 1.1 and 1.4 of the Report).

Under NEAFC Recommendation 6 vessels not exceeding 150 bhp are allowed to land undersized whiting from the Division without restriction as to quantity.

3.2 North Sea (Sub-Area IV)

3.2.1 Life history

The spawning season of the whiting in the North Sea is long, eggs are found in the southern part in January and small larvae are still found in the northern part in September. The pelagic life tends to be longer for this species than for other members of the cod family, and O-group fish of a length of 10 cm may still be found pelagically. Whiting usually mature before they are 4 years old, and a few males mature at age one year. A North Sea whiting grows from about 17 cm as 1 year old to about 38 cm as a 5 year old.

3.2.2 Exploitation

In the 1950s the mean yield was 75 000 tons. In the 1960s the recruitment to the fisheries increased, resulting in a mean yield for 1966-75 of 148 000 tons with a maximum of 216 000 tons in 1969 (Tables 1.1, 1.4 and 1.8 of the Report). A considerable part of the catch is taken as by-catch in Recommendation 2 fisheries. If all countries changed to 80 mm mesh, it is expected that the total catch would be increased by about 50 000 tons. The gain would, however, be unevenly distributed among countries. Keeping the fishing pattern unchanged but reducing the fishing mortality by 40% should result in a sustainable yield of about 150 000 tons (assuming the average recruitment is the same as the average recruitment for the period 1962-73).

3.2.3 Nominal catch with reference to fishery zones

Of the Danish catch in 1975 8 000 tons came from the Norwegian zone.

Estimates for various countries of the percentages of Sub-area IV whiting coming from the Norwegian zone are given in Table 1.

3.3 Sub-Area VI

3.3.1 Life history

The whiting fished in this Sub-area probably come from several separate stocks. All of them seem to be characterised by a very fast growth, and a 5 year old whiting in this Sub-area is about 42 cm in length.

3.3.2 Exploitation

From an annual catch of 6 000 to 8 000 tons in the early 1960s, the yield rose to 19 000 tons in 1965 and has remained at this higher level since then. A 40% reduction of the fishing mortality should result in a 5-10% increase in the yield per recruit.

3.4 Irish Sea (Division VIIa)

3.4.1 Life history

In the Irish Sea spawning occurs from February to June with a peak in April. When 4-5 months old and a length of 7-8 cm, the young appear in shallow water. After staying for nearly 1 year in the nursery area the fish migrate to the open sea. At the end of their second season of growth the majority of the whiting mature for the first time; and in the early spring they join a spawning migration to the northern part of the area.

An Irish Sea whiting attains a length of about 19 cm at the end of its first year and about 40 cm when it is 5 years old.

3.4.2 Exploitation

At certain times of the year, the fish aggregate to form dense local concentrations which provide the basis for seasonal fisheries; the most important of these is the fishery off Counties Dublin and Down starting in October and declining during the first quarter of the year. The catch is made almost entirely by trawlers and is based predominantly on I- and II-group fish. Large quantities of undersized whiting are being taken, mostly in the autumn, as a by-catch in the *Nephrops* and industrial fisheries.

During the last 30 years the catches have fluctuated between 6 000 tons and 20 000 tons without any trend. The total mortalities are relatively high but it appears that the yield per recruit may be about maximum for the existing exploitation pattern.

3.4.3 Nominal catch with reference to fishery zones

The whole catch is taken within the zone of the EEC fisheries jurisdiction.

3.5 English Channel (Divisions VIId,e)

3.5.1 Life history

Spawning takes place from February to July. The larvae are most numerous near Plymouth in May. The available evidence suggest that the growth rate is faster than in the North Sea.

3.5.2 Exploitation

The catches have fluctuated between 1 300 tons and 11 000 tons since 1945.

3.6 Sub-Area VIII

Spawning takes place from the end of January to the end of June. No definite spawning areas are recognised. Individuals from the new year class are first found at the bottom in May in rather shallow water (less than 50 m). Whiting in this area grow from 18 cm in their first winter to 43 cm at their fifth birthday.

The whiting taken from this Sub-area probably all come from the EEC fishery zone.

4. SKATES AND RAYS (Tables 2 and 3)

4.1 General

The grouping "skates and rays" as listed in Bulletin Statistique includes a large number of species of the genus *Rajidae.* In general, there is no record published anywhere of what species are landed from ICES Sub-areas. The most common species caught in northern waters (Sub-areas I, II and XIV and Divisions IVa and Va) is probably *R. radiata.* The percentage species compositions of rays landed from Divisions VIa by Fleetwood trawlers and from Divisions VIIa and VIIf by Milford Haven trawlers are given below:

Percentage species composition of rays landed from Division VIa by Fleetwood trawlers and from Divisions VIIa and VIIf by Milford Haven trawlers.

Species	Division VIa	Division VIIa	Division VIIf
R. batis	8.5	0.6	+
R. brachyura	51.6	14.9	10.8
R. clavata	12.8	34.9	24.9
R. circularis	4.8	0.2	+
R. fullonica	0	0.4	0
R. microocellata	0	0.4	11.0
R. montagui	15.5	36.2	47.8
R. naevus	6.8	12.4	5.6
Years	1961-62	1961-62	1968-71

In the southern half of Division IVb and in IVc *R. clavata* and *R. montagui* occur in the approximate ratio 7:3 with *R. brachyura* occurring occasionally.

4.2 Biology and Life Histories

The von Bertalanffy growth coefficient (K) for Rajidae is of the order 0.2 - 0.3; 50% maturity for females occurs at 0.8 maximum length. Maximum recorded lengths for several species of rays are given below:

Maximum length of rays and usual depth range

Species	Maximum length (cm)	Depth range (m)
R.batis	237	30 - 600
R. fullonica	110	35 - 550
R. radiata	76	20 - 900
R. naevus	70	1 - 150
R. circularis	120	70 - 275
R. montagui	75	25 - 120
R. clavata	85	1 - 33
R. brachyura	113	20 - 100

The only species for which growth rates have been determined are *R. clavata*, *R. brachyura* and *R. montagui*.

4.2.1 Spawning times and areas

Rays are oviparous, producing relatively large eggs from which young, resembling the adult, hatch. For species for which the spawning period has been recorded, it lasts from February to September for *R. clavata* in the southern North Sea and throughout the year for *R. naevus* in the Celtic Sea. There is a seasonal annual cycle with a maximum rate of egg laying approximately in the month when the sea temperatures are highest. Either side of this the rate of egg laying declines, apparently ceasing altogether below some minimum sea temperature, which may be different for each species. The estimated average annual production by a mature female is 140 eggs for *R. clavata* and 90-100 for *R. naevus*. The maximum observed rate of egg laying for *R. clavata* is 1 egg/24 h and for *R. naevus*, *R. montagui* and *R. brachyura* 0.5 egg/24 h. The annual production by mature females of the last two species is therefore probably of the order of 100 eggs.

Mature female rays store sperm in the shell gland. There is little evidence that mating aggregations occur but no evidence that there are specific spawning areas except that eggs are probably laid on hard, rocky ground.

4.2.2 Juvenile fish distribution

There is no larval stage. Juvenile rays are found in the vicinity of rocky ground in the English and Bristol Channels but there is no evidence that specific nursery areas exist.

4.2.3 Distribution and migrations of young and adult stocks

Tagging experiments on *R. brachyura*, *R. montagui*, *R. clavata*, *R. naevus*, and *R. microocellata* around the British Isles show that both young and adult rays (which occur together on the same grounds) disperse slowly away from the release areas, with many rays being recaptured close to the point of release after several years. The only evidence of migration is of small inshore movement by *R. clavata* in the southern North Sea in spring and an offshore migration in autumn. This is probably temperature-related.

Different species of ray have different ground preferences and some (notably *R. microocellata* and *R. undulata*) are common over small areas (of the order of tens of square kilometres) and almost entirely absent from the surrounding areas. Different species of ray also have different depth preferences (see text table above). Thus, relative species composition may change markedly from fishing ground to fishing ground within the same ICES Division.

In general, each species of ray in each ICES Division can be considered as forming a unit stock, although populations of rays at the extremeties of the Division may be effectively isolated from each other.

4.3 Exploitation

4.3.1 Fisheries

In most areas rays form a very small proportion of the total catch and are not the subject of directed fisheries. The only fisheries for rays that can be described as 'directed' are those by the Milford Haven trawlers in the Irish Sea and Bristol Channel.

4.3.2 History of yields

In all areas there has been a decline in the catches since the early 1960s. Catch per unit effort, using hours fishing by English and Welsh motor trawlers, has been calculated for ICES Divisions VIIa, VIId,e, VIIf and VIIg-k. Elsewhere, English and Welsh fishing effort is directed at other species and as rays occur only in parts of the Divisions (particularly in Divisions IVb,c and VIa) catch per unit effort data are meaningless. In Divisions VIIa, VIIf and VIIg-k, catches per unit effort were fairly steady until 1965, since when they have declined rapidly. In Divisions VIId,e the same pattern is shown except that catches rates started to decline in 1962.

It is difficult to interpret these data. Part of the stability in the landings probably resulted from switching from the species that are most acceptable for processing on the market (ease of skinning and ratio of processed to unprocessed weight) to those which are less acceptable. Such a switch is possible because the ratio of the different species differs between grounds. Now all species are equally acceptable. There is evidence for the Irish Sea and Bristol Channel stocks of rays both from mortality rates calculated from tagging experiments combined with fecundity data and from length composition data that these stocks of rays are failing to replace themselves and that this is the major reason underlying the decline in catch per unit effort.

4.3.3 Regulatory measures

There are none. The present minimum mesh sizes afford no conservation to the stocks in the NEAFC Area, as newly hatched rays are retained by legal minimum size cod-end meshes. As well defined nursery areas do not exist they cannot be designated as conservation areas. It is unlikely that conservation measures could be applied to rays because of the adverse effects on the landings of other species, except that minimum landing sizes would be effective if survival of discarded rays were sufficiently high. This point is being investigated at the Fisheries Laboratory, Lowestoft.

5. SEA BREAMS

5.1 Summary

Sea breams are mainly found along the western edge of the continental shelf in Division VIa and in Sub-areas VII, VIII and IX. Only very small quantities are recorded from the North Sea (Tables 2, 4 and 5).

There are four species, but only two are important in the catches. These are *Pagellus bogaraveo* (Table 11) and *Spondyliosoma cantharus* (Table 12).

Sea breams are found in the EEC zone, and in Spanish and Portuguese waters. They are also found where the EEC zone joins the Spanish waters and where Spanish and Portuguese waters meet. Not much is known about the movements of this species across the boundaries between national zones.

Little is known about the state of exploitation of sea breams. Juveniles are pelagic and the larger individuals are demersal. During the last 3-4 years an increase in pelagic fisheries has increased the rate of exploitation of juveniles.

5.2 Résumé en français traitant de "Sea Breams"

5.2.1 Introduction

Sous le qualificatif de "Sea breams" sont regroupées plusieurs espèces de sparidés dont les plus représentatives sont par ordre d'importance:

Pagellus bogaraveo (Brunnich 1768)

Spondyliosoma cantharus (Linné 1758)

Pagellus erythrinus (Linné 1758)

Sparus aurata (Linné 1758)

le *Pagellus bogaraveo* étant de loin la plus péchée.

Les dorades sont en général des poissons des mers chaudes fréquentant surtout les fonds rocheux. On les trouve en Méditerranée, le long des côtes européennes de l'Atlantique orientale depuis Madère et les Iles Canaries jusqu'en Norvège; ils sont beaucoup plus rares au nord de la Manche et pratiquement absents en Mer du Nord. Ils se pêchent donc dans les eaux portugaises, espagnoles, françaises et anglaises et vivent le plus généralement dans les eaux profondes de l'Atlantique entre 200 et 500 mètres mais gagnent les côtes dès l'apparition de l'été. Ils se déplacent en bancs et, en fonction de la bathymétrie, sont regroupés par classes de même taille; la stratification des tailles s'observe à la fois pendant la migration d'été et celle d'hiver. (13 à 22 cm sur des fonds < 50 m; 18 à 33 cm sur les fonds voisins de 100 m; 22 à 45 cm sur les fonds supérieurs à 100 m).

Condition hydrologiques optimales: salinité 35.5‰; température comprise entre 11 et 14°.

Répartition bathymétrique: de la surface (oeufs, larves et juvéniles) jusqu'à 500 mètres.

5.2.2 Croissance (*Pagellus bogaraveo*) - Gueguen 1969

La croissance est relativement rapide pendant les premières années mais dès la 9ème année on observe un ralentissement important.

Croissance linéaire

de 1 à 5 ans $$L_t = 39.8 \left[1 - e^{-0.243\,(t + 0.38)}\right]$$

de 5 à 20 ans $$L_t = 56.8 \left[1 - e^{-0.092\,(t + 2.92)}\right]$$

1 an	11 cm	5 ans	29.0 cm
2 ans	17.6	6 ans	32.0
3 ans	22.0	7 ans	34.0
4 ans	26.0	8 ans	36.0

Croissance pondérale

de 1 à 5 ans $W_t = 861 \left[1-e^{-0.243(t + 0.38)}\right]^{3.137}$

de 5 à 20 ans $W_t = 2628 \left[1-e^{-0.0921(t + 2.92)}\right]^{3.137}$

Relation taille/poids

$$W = 0.0082\, L^{3.137}$$

Longevité 18 à 20 ans.

Relation poids/âge

	Lt	Pds
3 ans	22 cm	140 g
6 ans	32	430
10 ans	39.5	840
14 ans	45	1250

5.2.3 Ponte (époque et lieux)

Olivier (1928) résume les époques et les lieux de ponte de la dorade (accores du plateau continental) comme suit:

- la ponte a lieu de janvier à septembre parfois même jusqu'en octobre/novembre, à une époque variable suivant les régions;
- elle est précoce dans le sud: c'est de janvier à fin avril qui a lieu le frai dans le Golfe de Gascogne;
- dès décembre il peut y avoir maturation des glandes genitales;
- en Méditerranée la dorade fraye plus tard: de mai à juillet;
- des organes sexuels ne sont bien differenciés que sur des poissons mésurant 19 à 20 cm, âgés approximativement de 4 ans;
- la ponte n'apparait qu'à l'âge de 5 ans:

  une ♀ de 31 cm contient 70 000 oeufs
  une ♀ de 38 cm contient 200 000 oeufs
  une ♀ de 41 cm contient 500 000 oeufs;
- les oeufs du Pagellus bogaraveo sont pélagiques; ceux du Spondyliosoma cantharus sont démersaux.

5.2.4 Larves

- les larves et les juvéniles sont pélagiques;
- Olivier en a capturé près de la côte dans le Golfe de Gascogne;
- Williamson a observé des oeufs et des embryons près des Orcades et des Shetlands de mai à septembre; sur la côte de l'Angleterre on trouve en été des dorades de petite taille;

- dès le mois de janvier on peut observer sur les côtes françaises atlantiques des formes juvéniles de 2 à 3 cm de longueur; on les retrouve en été et en automne mesurant 8 à 10 cm; à la fin de l'automne devenant plus sensibles au froid elles gagnent les profondeurs;
- des concentrations pélagiques importantes se rencontrent en été à proximité des côtes au niveau des fonds rocheux;
- des formes larvaires ainsi que les juvéniles sont plus independants que les adultes à l'égard de la salure et de la température de l'eau.

5.2.5 Migration

Espèce atlantique tantôt démersale, tantôt pélagique quand elle pond se dispense de vivre sur le fond mais espèce toujours sensible à des conditions physico chimiques précises; sa position verticale dépend du régime hydrologique, de l'abondance de la nourriture et de l'intensité lumineuse. Très sensible au froid cette espèce s'éloigne des côtes aux premiers froids et se retire jusqu'aux accores du plateau continental; les jeunes et les adultes se déplacent également. D'après Le Danois (1929) les migrations des profondeurs vers le plateau continental correspondrait à une transgression des eaux océaniques chaudes et salées, une partie des stocks de dorade rencontrerait ces mouvements verticaux des eaux transgressives en marche et progresserait avec elles.

Cas particulier du Pagellus bogaraveo:

D'après les travaux de Desbrosses et de Guéguen basés soit sur les déplacements des pêcheries ou soit sur les résultats de marquages il apparaît que le cycle migratoire est intimément lié aux variations de température: la dorade ne vient à la côte qu'au printemps et dès la fin de l'automne, avant les premiers froids, regagne les fonds là où la température est plus stable et la luminosité moindre; de plus la dorade est lucifuge elle se tient en profondeur durant le jour et gagne la surface de la tombée de la nuit à l'aube.

Latitudinalement les déplacements peuvent se résumer comme suit:

- de novembre à janvier la concentration des poissons débute sur les côtes ibériques;
- de mars à avril on observe un départ ou une dispersion des gros poissons vers le nord; les plus petits les ayant précédé depuis un mois;
- en mai le poisson atteint la bordure du plateau celtique (Petite Sole - Grande Sole);
- dès juin les poissons se dispersent sur le plateau celtique (VIIe - VIIf) et arrivent sur la côte occidentale de l'Irlande (VIIb) en juillet-août;
- en septembre sur le Banc Porcupine (VIIc) on observe une augmentation des rendements correspondant selon toute vraisemblance à une augmentation de densité de la concentration;
- le mouvement de retour vers le sud a lieu à l'automne; il passe de nouveau par les Divisions VIIe, VITf et VITg pour se terminer dans le Golfe de Gascogne (VIIIa) en décembre.

En résumé: séjour estival: sur le plateau celtique
séjour hivernal: sur les côtes ibériques.

- Desbrosses (1932) émet l'hypothèse de l'existence d'une concentration hivernale (décembre-janvier) dans les parages de la Grande Sole qui se traduirait par un frai précoce entre le 15 février et la fin mars;
- d'autres auteurs ademettent l'existence à chaque latitude d'un déplacement des poissons des grands fonds (300 à 500 m) jusque sur le rebord du plateau continental (150 à 250 m) par un mouvement à peu près dirigé de l'ouest vers l'est, du large vers la terre, avec une dispersion des poissons entre deux eaux sur le plateau continental (mars).

5.2.6 Production

Les Tableaux 4 et 5 établis à partir des informations publiées dans le Bulletin Statistique du CIEM nous donnent la ventilation des captures de dorades en fonction des pays et des secteurs de 1966 à 1974. Il apparaît:

- que l'Espagne, la France et le Portugal sont les nations qui pêchent la plus grande quantité de dorade;
- que entre 1966 et 1970 la production de l'Espagne représentait en moyenne à elle seule pres de 64% des tonnages déclarés;
- que les données déclarées par les pays ibériques sont probablement sousestimées et leur ventilation en fonction des secteurs imparfaites; certaines années elles sont parfois même absentes;
- qu'il est impossible de faire une étude sérieuse de l'évolution des captures depuis 1966; toutefois entre 1966 et 1970 nous remarquons que la production totale annuelle ne présente pratiquement aucune fluctuation et se stabilise aux environs de 28 000 t/an. Dès 1971 les valeurs les plus fantaisistes sont rapportées 7 934 t en 1971, 42 103 t en 1972, 19 511 t en 1973 et 8 955 t en 1974. Toutes ces modulations sont impiétables à un report des captures par les pays ibériques;
- qu'à partir de 1969 l'Union Soviétique pêche des tonnages non négligeables (voisins de 600 tonnes);
- que la pêche de la dorade se pratique tout le long du plateau continental depuis l'Espagne jusqu'aux Shetlands;
- que les secteurs les plus productifs sont ceux du Golfe de Gascogne et des côtes ibériques (plus de 80% des apports) viennent ensuite, à un degré bien moindre, les Divisions VIId-e et VIIg,k (plus de 11% des apports).

Dans le but d'essayer de localiser les secteurs préferentiels où se pratique la pêche des deux espèces de dorade les plus représentées nous donnons à titre d'exemple les apports de Pagellus bogaraveo débarqués à Lorient et la Rochelle (Tableau 11) et ceux de Spondyliosoma cantharus débarqués à Boulogne (Tableau 12).

- pour la Bogaraveo les sous-secteurs les plus productifs sont VIIIc, VIIh, VIa et VIIIa puis VIIj et VIIb, les autres ne représentent dans les apports qu'une proportion infirme (1.8 à 0.02%);
- pour la Cantharus les sous-secteurs les plus productifs sont de loin le VIId (42.8%) et le VIIe (53.4%).

5.2.7 Gestion (C.E.E.)

5.2.7.1 Problèmes posés avec les pays tiers

(a) définir de façon précise les frontières maritimes avec les pays ibériques non adhérents de la CEE;

(b) connaître de façon précise les captures et leur ventilation en fonction des secteurs CIEM car les flotilles espagnoles et portugaises travaillent tout le long du plateau continental depuis l'Espagne jusqu'à l'Irlande sans faire de déclarations précises sur l'origine de leurs apports;

(c) impossibilité de connaître avec exactitude les captures soviétiques probablement sousestimées compte tenu de l'effort déployé pendant ces dernières années;

(d) depuis 1972 on assiste dans les ports atlantiques français (La Rochelle - Lorient et Concarneau) à une diminution des apports qui peut être attribuée d'une part à l'exploitation traditionnel des navires français et espagnols travaillant au chalut de fond, mais sans doute aussi à l'accroissement de l'effort des espagnols pêchant à la palangre et au filet maillant et plus récemment à l'énorme intensification de l'activité des chalutiers soviétiques en Mer Celtique.

5.2.7.2 Problèmes internes aux pays de la CEE

(a) le développement du chalutage pélagique, activité totalement libre, tant en ce qui concerne les maillages utilisés que le nombre de navires autorisés ou les lieux de pêche entrainera vraisemblablement un accroissement rapide de la surexploitation et ce d'autant plus que la croissance est lente;

(b) si les captures n'avaient pas connu jusqu'à présent une décroissance plus spectaculaire, c'est parce que les jeunes individus par leur comportement surtout pélagique, échappaient aux chaluts traditionnels or maintenant on retrouve ces jeunes poissons dans les apports d'où danger de déstruction des stocks;

(c) la préscription actuelle d'un maillage de 60 mm est encore trop faible pour une protection efficace du stock;

(d) définir une taille marchande convenable supérieure à celle actuellement en vigueur (18 cm pour le *Pagellus bogaraveo*; 12 cm pour le *Spondyliosoma cantharus*) qui soit en accord avec la croissance et la maturité sexuelle.

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6. GURNARDS

Gurnards are widely distributed, the principal catches being recorded from Sub-areas IV, V, VI, VII, VIII and IX (Table 6).

There are two species, of which the principal one represented in the landings is the grey Gurnard (*Trigla gurnardus* L.).

6.1 EEC Zone

Gurnards spawn in the North Sea from April to August, the peak time occurring about July. Spawning occurs widely over the area and generally inshore in shallow sandy waters such as the Moray Firth. The eggs are pelagic, as are the larvae, and though not a great deal is known about growth at this time, it appears that they take to the bottom of the sea at a length of about 4 cm when they are about 15 weeks old. Growth is rapid, a length of 10 to 12 cm being attained in the first year of life and maturity in the third year when the fish are about 24 cm long. Although the distribution is wide (extending from the English Channel to Iceland and the Norwegian north coast) the main stocks appear to be on grounds situated between 56°N and the Shetlands.

6.2 Non EEC Zones

Outside the EEC zone, the distribution is wide, extending from Iceland to the Portuguese coast.

Very little is known about the interrelationships between stocks in different fisheries zones, except that stocks at Iceland can be assumed to be independent of those in other waters.

6.3 State of Exploitation

Unknown.

7. CATFISH

Normally catfish are found in waters deeper than 20 m. Spawning takes place from December to February. The eggs form large clumps amongst stones and weeds on the sea bed. From an early age, catfish live on the bottom. Although having a general geographical distribution in the northern Atlantic (from the Arctic to the north of France), most of the catches originate from the central North Sea (67%) with mean annual landings of about 1 302 tons. The other areas of some importance are the northern North Sea (23%) and Division IIIa (10%). Catches from 1966-75 are given in Table 7.

The state of exploitation is unknown.

8. MONKFISH (ANGLER)

8.1 Life History

Monkfish are rare in extremely shallow waters and are not usually found in less than 18 m. Spawning takes place from mid-February to July in deep offshore waters, the eggs being shed in ribbon-like, gelatinous sheet. The larvae and young fish have a planktonic life.

8.2 Exploitation

The monkfish have recently become an important commercial fish. The principal fishing areas are in Divisions VIa and VIIg-k and in Sub-area VIII, although catches have also been reported from other areas (Table 8). In Sub-area VIII the highest proportion of the catch has been taken by France and Spain, but it is not possible to define the exact boundaries of the catch area. In Divisions IIIa, IVa and IVb where the catches of Denmark, Norway and Sweden represent about 17% of the grand total, some or all of this proportion could be taken outside the EEC limits.

The state of exploitation is unknown. Mean catches and proportion of the catch per area (period 1966-75 from Bulletin Statistique) are given in Table 2.

9. GREATER WEEVER

The greater weever is found in northern waters and mainly at the depth of 30-100 m. It is a demersal fish which buries itself in the sand. Spawning takes place from June to August, resulting in the production of pelagic eggs from 1 - 1.1 mm in diameter.

Commercial landings have been reported in very small quantities by Belgium, Denmark, Netherlands and Sweden. Most of the catch comesfrom Divisions IVa and IIIa (Tables 2 and 9), but from the available statistics it is not possible to define the exact origin of the catches with reference to national fishery zones.

The state of exploitation is unknown.

10. LUMPSUCKER

10.1 Life History

Spawning takes place in February-March in shallow water (1-5 m). After hatching,small lumpsuckers remain in shallow water for a year, in which time they reach a length of 6-8 cm. Small individuals have also been caught pelagically. Sexual maturity is reached at a length of 30 cm and the fish then reappear in shallow water to spawn. Individuals in the size groups between these lengths have never been captured. It is now a generally accepted hypothesis that they spend this stage (as well as later periods between spawning times) pelagically in the northern North Sea and the Atlantic. A few specimens (lengths over 30 cm) have been caught in the area NE of the Faroes over depths of 2 000 m.

From tagging experiments it is known that lumpsuckers spawn more than once and that some of them return to the same spawning place in successive years.

The fish which spawn at Iceland, northern Norway and the Danish shores probably belong to different stocks.

10.2 Exploitation

The fishery is exclusively carried out in inshore waters during the spawning season. Catches fluctuate from year to year (Table 10) mainly due to differences in prices.

The state of exploitation is unknown.

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Appendix Table 1. Percentages of Sub-Area IV landings coming from the Norwegian zone of the North Sea (estimates provided by members of the Working Group).

Species / Country	Cod	Haddock	Whiting
Belgium	<5	<5	<5
Denmark[1]	25	35	13
France	0.5	1.2	0.5
Germany, Federal Rep. of [2]	6	26	13
Netherlands	1-5	10-25	4-10
Norway[3]	80	60	50
Poland[2]	30	30	15
UK (England)	N.A.	N.A.	N.A.
UK (Scotland)[4]	27	24	9
USSR	N.A.	N.A.	N.A.

1) Based on 1975 data.

2) Approximate figures for 1970-73.

3) Average figures 1972-76.

4) Values for 1974 and 1975.

N.A. Not available to the Working Group.

Appendix Table 2. Various species.
Average landings (1966-75) and percentage of landings from different areas.

Species	Rays and skates		Gurnards		Angler		Sea breams		Catfish		Lumpsucker		Greater weever	
Areas	tons	%	tons	%	tons	%	tons	%	tons	%	tons	%	tons	%
IIIa	88	0.3	-	-	162	0.6	-	-	184	9.5	531	70.6	19	74.5
IV	6 189	19.2	1 474	16.9	2 681	9.1	366	1.5	1 755	90.5	221	29.4	7	25.5
VI	3 660	11.4	267	3.1	2 803	9.5	469	1.9	-	-	-	-	-	-
VII	14 940	46.3	5 250	60.2	12 486	42.4	4 267	16.9	-	-	-	-	-	-
VIII	4 293	13.3	750	8.6	9 926	33.7	12 047	47.8	-	-	-	-	-	-
IX	1 610	5.0	931	10.7	1 379	4.7	7 908	31.3	-	-	-	-	-	-
X	11	-	-	-	-	-	151	0.6	-	-	-	-	-	-
V	1 406	4.4	48	0.5	-	-	-	-	-	-	-	-	-	-
XIV	16	0.1	-	-	-	-	-	-	-	-	-	-	-	-
Total	32 213	100.0	8 720	100.0	29 437	100.0	25 208	100.0	1 939	100.0	752	100.0	26	100.0

Appendix Table 3. RAYS AND SKATES.
Division IIIa and Sub-areas IV, VI, VII, VIII, IX, X, V and XIV.
Nominal catch in metric tons, 1966-75 (Bulletin Statistique).

Areas \ Year	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
IIIa	97	100	168	73	56	68	67	91	75	86
IV	8 233	7 474	7 702	7 716	5 667	5 758	5 482	5 201	4 480	4 176
VI	3 905	3 819	3 753	3 789	3 514	3 422	3 866	3 583	3 473	3 477
VII	16 019	16 740	17 275	17 603	15 441	14 733	13 241	12 892	11 729	13 722
VIII	5 787	5 769	6 052	5 729	5 185	3 322	2 968	3 935	3 184	999
IX	2 222	2 029	2 207	1 848	1 698	1 309	1 036	1 264	1 107	1 378
X	3	-	1	3	-	13	8	20	29	35
V	253	1 641	1 838	1 850	1 708	1 682	1 483	1 576	1 008	1 021
XIV	89	2	3	3	2	-	1	4	3	54
Total	36 608	37 574	38 999	38 614	33 271	30 307	28 152	28 566	25 088	24 948

Appendix Table 4. SEA BREAMS.
Sub-areas IV, VI, VII, VIII, IX and X.
Nominal catch in metric tons x), 1966-75.

Areas \ Year	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
IV	160	840	989	1 079	392	45	21	49	51	36
VI	401	779	289	186	59	221	196	183	384	1 993
VII	1 953	3 226	2 748	3 406	3 658	3 654	3 742	5 132	3 463	11 690
VIII	13 235	13 142	14 766	14 382	12 465	3 948	26 416	9 896	3 480	8 739
IX	9 774	9 715	9 468	9 146	9 249	66	11 513	3 627	1 563	14 962
X	82	97	57	94	77	-	168	592	14	326
Total	25 605	27 799	28 317	28 293	25 900	7 934	42 056	19 479	8 955	37 746

x) The Working Group data.

Appendix Table 5. SEA BREAMS.
Total catch in the ICES statistical area, metric tons, by countries.[x)]

Country \ Year	1966	1967	1968	1969	1970	1971	1972	1973	1974
Belgium	6	6	18	18	22				
France	5 404	7 990	7 070	8 533	6 161	7 256	7 984	8 440	7 676
Poland								12	61
Portugal	1 778	1 891	2 230	2 388	3 961		1 453	1 195	1 195
Spain	18 239	18 054	19 100	17 277	15 112		32 231	9 154	
UK(England & Wales)	332	207	237	90	42	36	51	53	23
USSR				210	633	642	384	657	
Total	25 759	28 148	28 655	28 516	25 931	7 934	42 103	19 511	8 955

x) The Working Group data.

Appendix Table 6. GURNARDS.
Sub-areas IV, VI, VII, VIII, IX and V.
Nominal catch in metric tons, 1966-75 (Bulletin Statistique).

Areas \ Year	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
IV	639	955	1 896	1 372	1 390	1 447	1 716	1 690	1 875	1 765
VI	267	172	284	212	125	99	258	562	320	372
VII	771	729	5 259	5 191	6 213	7 800	6 864	7 870	6 225	5 574
VIII	-	-	1 327	1 141	1 239	490	798	479	1 301	727
IX	717	1 077	1 431	1 065	832	1 027	692	949	644	874
V	13	12	37	25	7	8	330	20	15	9
Total	2 407	2 945	10 234	9 006	9 806	10 871	10 658	11 570	10 380	9 321

Appendix Table 7. CATFISH.
Division IIIa and Sub-area IV.
Nominal catch in metric tons, 1966-75 (Bulletin Statistique).

Year / Areas	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
IIIa	128	132	127	146	148	166	179	179	185	451
IV	1 317	1 239	1 217	1 326	1 412	1 765	2 069	2 453	2 456	2 299
Total	1 445	1 371	1 344	1 472	1 560	1 931	2 248	2 632	2 641	2 750

Appendix Table 8. MONKFISH (ANGLER).
Division IIIa, and Sub-areas IV, VI, VII, VIII and IX.
Nominal catch in metric tons, 1966-75 (Bulletin Statistique).

Year / Area	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
IIIa	224	138	136	137	111	119	125	140	202	291
IV	2 796	2 169	2 587	2 038	1 257	1 669	2 062	2 894	4 231	5 106
VI	1 097	1 103	1 289	1 354	2 102	1 703	3 182	9 348	3 652	3 198
VII	791	912	8 931	10 339	10 441	13 762	21 817	17 553	20 414	19 897
VIII	8 059	10 021	15 066	16 064	15 873	15 186	6 418	3 039	4 003	5 531
IX	2 146	2 081	2 164	1 940	1 478	1 202	537	927	698	616
Total	15 113	16 424	30 173	31 872	31 262	33 641	34 141	33 901	33 200	34 639

Appendix Table 9. GREATER WEEVER.
Division IIIa and Sub-area IV.
Nominal catch in metric tons, 1966-75 (Bulletin Statistique).

Year / Area	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
IIIa	-	-	-	-	-	-	114	82	-	-
IV	-	-	-	-	-	1	33	17	16	-
Total	-	-	-	-	-	1	147	99	16	-

Appendix Table 10. LUMPSUCKER.
Division IIIa and Sub-area IV.
Nominal catch in metric tons, 1966-75 (Bulletin Statistique).

Year / Area	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
IIIa	1 088	716	370	379	578	271	309	497	598	499
IV	137	203	27	576	303	246	159	137	214	211
Total	1 225	919	397	955	881	517	468	634	812	710

Appendix Table 11. Pagellus bogaraveo (Brunnich 1768).
Production totale des 5 années[x] 1971 à 1975.
(Metric tons).

	IVa	VIa	VIb	VIIa	VIIb	VIIc	VIIe	VIIf	VIIg	VIIh	VIIj	VIIk	VIIIa	VIIIb	VIIIc	IXa
La Rochelle		574.5		3.13	402.79	3.82	133.65	228.65	21.6	1628.71	591.35	3.19	1294.1	101.87	4509.79	68.47
Lorient	69.33	1763.67	7.46		199.82	48.81	1.58	17.0	18.35	1292.43	583.41		1012.07	5.24	70.6	196.89
Total	69.33	2338.17	7.46	3.13	602.61	52.63	135.23	245.65	39.95	2921.14	1174.76	3.19	2306.17	107.11	4580.39	265.36
%	0.47	15.74	0.05	0.02	4.05	0.35	0.91	1.65	0.27	19.67	7.91	0.02	15.53	0.72	30.83	1.79

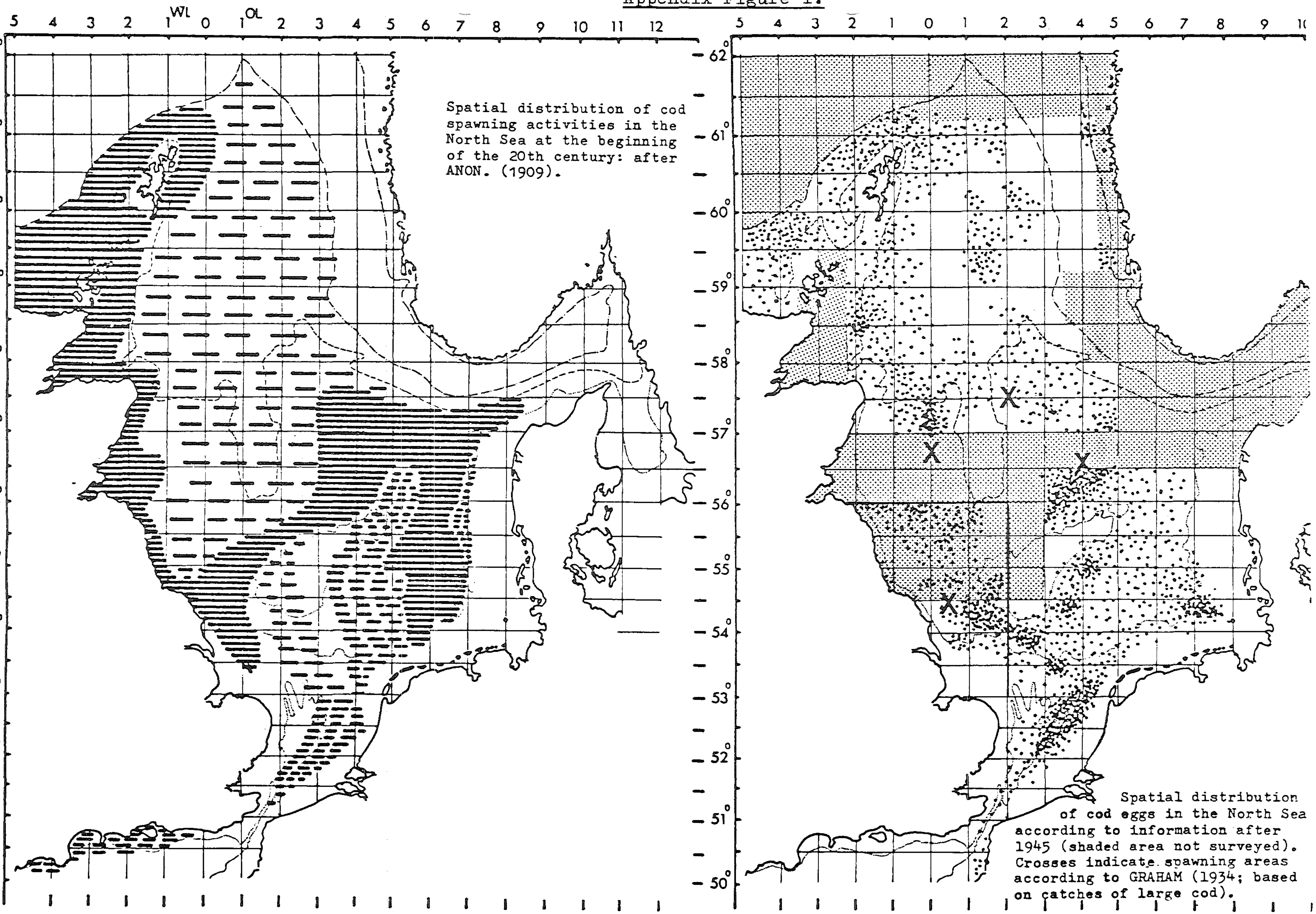
x) The Working Group data.

Appendix Table 12. Spondyliosoma cantharus[x] (metric tons).
Boulogne et autres ports.

	IVc	VIIa	VIId	VIIe	VIIf	VIIg	VIIh	Total
1976	83.4	0.6	1104.7	1378.3	1.6	0.9	10.0	2579.5
%	3.23	0.02	42.83	53.43	0.06	0.03	0.39	

x) The Working Group data.

Appendix Figure 1.

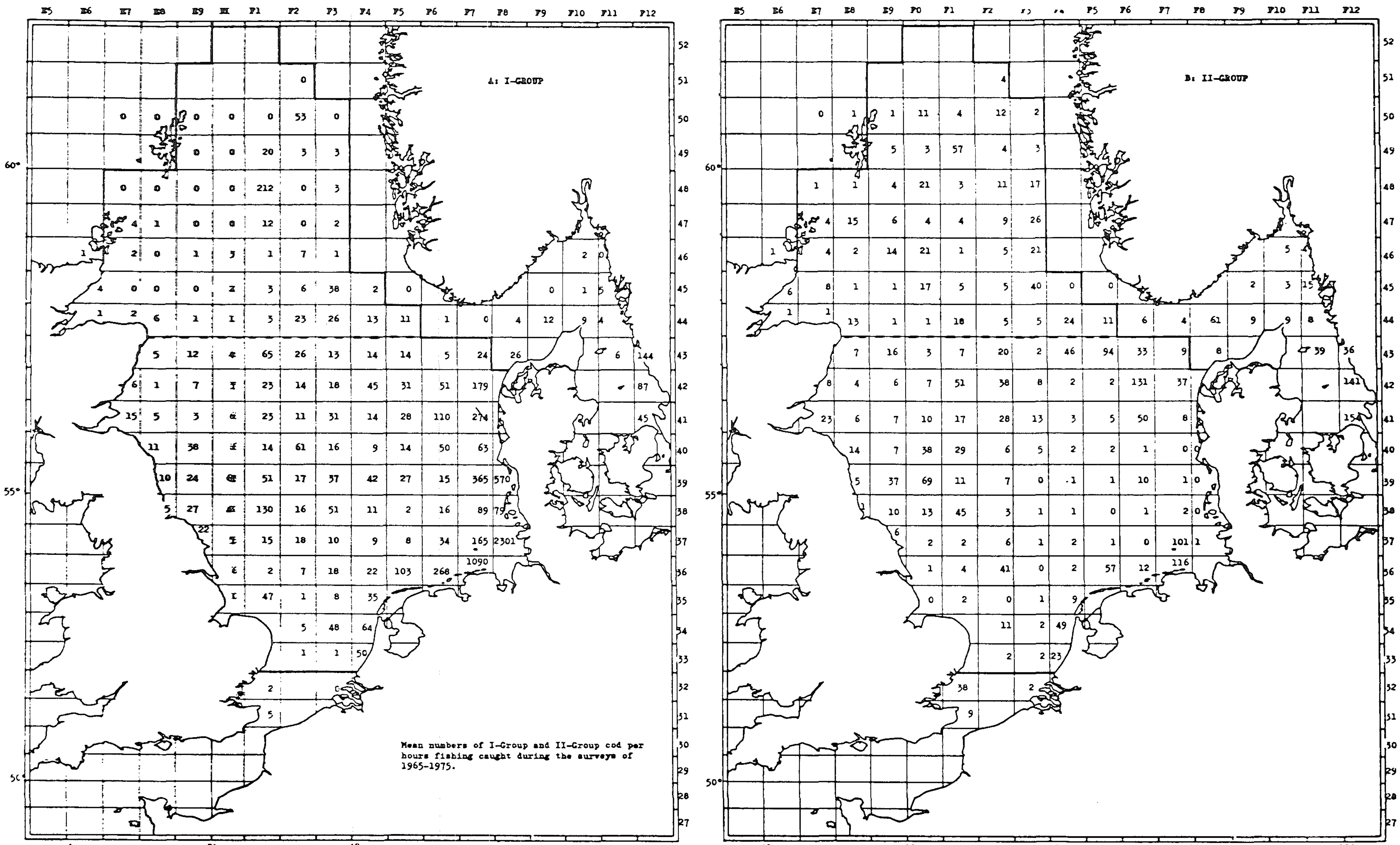


Spatial distribution of cod spawning activities in the North Sea at the beginning of the 20th century: after ANON. (1909).

Spatial distribution of cod eggs in the North Sea according to information after 1945 (shaded area not surveyed). Crosses indicate spawning areas according to GRAHAM (1934; based on catches of large cod).

Source: Daan (1975).

Appendix Figure 2.



Source: ICES, C.M.1976/F:5.