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REPORTS ON THE RESULTS OF THE ICES COORDINATED MONITORING PROGRAMME, 1980 AND 1981

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INTRODUCTION

This report gives the results for the samples taken in 1980 in connection with the ICES Coordinated Monitoring Programme. This is the seventh year of the programme, under which member countries of ICES submit the results of their analyses for certain contaminants in samples of fish and shellfish collected annually from a number of specified areas in the North Atlantic.

The programme began in 1974 as a follow-up to the 1972 baseline survey of the concentrations of contaminants in fish and shellfish of the North Sea (results published in Coop. Res. Rep. No. 39 (1974), which showed that certain areas, particularly the coastal areas around the North Sea and the Southern and German Bights, were more contaminated than elsewhere in the North Sea. It was agreed that the results of national monitoring studies conducted in the identified areas should be submitted to ICES for inclusion in an annual report. In 1974 and 1975, only the above-mentioned areas were covered by the programme. However, in 1976 the geographical range was extended following the 1975 baseline survey of contaminant levels in fish and shellfish of the North Atlantic. The areas studied included the North Sea, the Irish Sea, certain coastal areas in the Northeast Atlantic including off the coast of Iceland, and several areas in the Northwest Atlantic off the coasts of Greenland and Canada. Later, areas were included off the coast of Portugal and the northeast coast of the United States. The results of these studies are published in Coop. Res. Rep. Nos. 69 (1977) and 95 (1980).

On the basis of the results of the baseline survey, the following areas were identified as being contaminated to such an extent as to require monitoring: the Irish Sea, the German Bight and Southern Bight of the North Sea; the estuaries of the Thames, Forth, Rhine, Scheldt, and Clyde; and certain parts of the Gulf of St. Lawrence and the New York Bight. Additionally, it was agreed that because there was very little information about the Skagerrak, Kattegat and Oslofjord and the area off Portugal, further results should be obtained for these areas.

Initially, only data on species of fish and shellfish sampled in the baseline study were to have been accepted for inclusion in the monitoring programme. This requirement has, however, been waived on certain occasions to permit the inclusion of information on other species maintained in national or other international programmes. Regardless of species, particular procedures for the preparation of samples prior to analysis and for the reporting of results should be used. These procedures are developed and expanded from time to time. Those which applied to the 1980 programme are reported in Annex II of Coop. Res. Rep. No. 84 (1979).

The quality of the data submitted under this programme is controlled by periodic intercalibration exercises on the analyses of heavy metals and organochlorine residues in biological materials. Only results, the validity of which can be verified by the performance of that laboratory in a recent intercalibration exercise, are included in a coordinated monitoring report. The results of the intercalibrations applicable to the trace metal data in this report can be found in Coop. Res. Rep. No. 111 (1982); for organochlorine pesticides, the intercalibration results are published in Coop. Res. Rep. No. 108 (1981) and for PCBs, intercalibration results are published in Coop. Res. Rep. No. 115 (1982).

Reports of the results for the previous years of this programme have been published as follows: 1974 - Coop. Res. Rep. No. 58 (1977); 1975 and 1976 - Coop. Res. Rep. No. 72 (1977); 1977 - Coop. Res. Rep. No. 98 (1980); 1978 and 1979 - Coop. Res. Rep. No. 126 (1983).

RESULTS

For 1980, data were received from Belgium, Denmark, England/Wales, the Federal Republic of Germany, Ireland, the Netherlands, and Sweden. Results were also received from Spain, but as the laboratories submitting the data had not participated in an intercalibration exercise, these results could not be accepted for compilation in this report. Most of the data received were for cod (Gadus morhua) and European flounder (Platichthys flesus), but results were also received for plaice (Pleuronectes platessa), common sole (Solea solea), common dab (Limanda limanda), European hake (Merluccius merluccius), and Atlantic herring (Clupea harengus). Data were also submitted on blue mussels (Mytilus edulis) and common shrimp (Crangon crangon). The locations of the sampling areas are shown in Figures 1 and 2.

The response is fairly similar to that received in 1979, however, in 1980 no results were received for areas in the Northwest Atlantic.

The discussion of the results below relates to mean concentrations, unless otherwise indicated. Although some comparisons are made with the results obtained in previous years of the programme, it must be strongly emphasized that these differences in many cases may only be apparent, since the sampling procedures followed have in the main probably not been rigorous enough to show anything other than gross changes.

It should be noted that, based on the results of the first six years of the programme, i.e., from 1974 to 1979, revisions have been made in the protocols for sampling, sample preparation, and reporting. These have been published in Coop. Res. Rep. No. 126 (1983). However, owing to the rather long lead time needed to implement such revisions in a monitoring programme, the new protocols will not be used extensively until sampling is carried out in 1982.

METALS IN FISH

The data submitted from the analyses of heavy metal concentrations in fish muscle are shown in Table 1a, and the results from similar analyses of fish livers are given in Table 1b.

Results were submitted for five samples of cod, three from the Southern Bight of the North Sea and two from the Irish Sea. The mean concentrations of mercury in cod muscle ranged from 0.04 - 0.15 mg/kg on a wet weight basis. The upper end of this range is somewhat lower than that in previous years (e.g., 0.06 - 0.34 mg/kg in 1979), but results were also reported on fewer samples in 1980. However, as in the previous year, the sample which contained the fish with the highest individual concentration of mercury (0.55 mg/kg) was caught in the Irish Sea.

Three samples of plaice were studied, two from the Southern Bight of the North Sea and one from the Irish Sea. The mean mercury concentrations in muscle ranged from 0.04 - 0.14 mg/kg, which is slightly lower than the ranges reported in recent previous years (e.g., 0.05 - 0.30 mg/kg in 1978).

The individual fish with the highest mercury concentration (0.28 mg/kg) was taken, as in the previous two years, from the Irish Sea, but this concentration was somewhat lower than those found previously (0.78 mg/kg in 1979, and 0.65 mg/kg in 1978). As has been found previously, the concentrations of mercury in the muscle tissue of plaice and cod are very similar.

The average mercury concentrations in seven samples of flounder from coastal areas around the Southern Bight of the North Sea were reported from 0.15 to 0.46 mg/kg. These figures are typical in that they reflect the higher mercury contamination of flounder muscle in relation to cod and plaice muscle. The concentrations are also very similar to those found in previous years.

The results of mercury analyses of two samples of sole muscle, one from the Southern Bight of the North Sea and the other from the Irish Sea, were virtually identical: 0.27 and 0.26 mg/kg, respectively.

This is the first year for which data have been submitted for dab. One sample was taken from the southwestern Kattegat for which a mean mercury concentration of 0.055 mg/kg in muscle was reported.

Although in previous years the results reported on mercury concentrations in fish liver have been somewhat lower than those in fish muscle, the results from 1980 do not show such a clear difference. For cod and plaice liver, mean mercury concentrations ranged from 0.03 - 0.17 mg/kg, virtually identical to the range for muscle tissue. The mercury concentrations in flounder and sole livers were somewhat higher, ranging from 0.06 - 0.35 mg/kg and mirroring the higher mercury concentrations in the muscle of these species.

Cadmium concentrations in both muscle and liver tissues were generally reported to be below the limits of detection of the methods of analysis used. To measure cadmium in fish tissues, a detection limit of 0.001 mg/kg or less is needed. The positive values obtained showed mean cadmium concentrations in muscle tissue in the range 0.003 - 0.010 mg/kg, while concentrations in liver tissue were considerably higher, ranging from 0.03 to 0.26 mg/kg. Most of these data are for flounder. Given the problems encountered with cadmium analysis in fish tissues, it is impossible to evaluate the scattered values available on cadmium concentrations in fish.

Similarly, the difficulties in analysing the low concentrations of lead in fish tissues have resulted in few positive values being reported. To determine lead concentrations in fish tissues, a detection limit of 0.01 mg/kg or less is needed as well as special handling to avoid contamination of the samples. The results available meeting these criteria show mean concentrations of lead in the muscle of cod, flounder and sole ranging from 0.03 - 0.13 mg/kg, except for one sample of sole from the Irish Sea which was reported to contain 0.2 mg/kg. Some of the concentrations of lead reportedly found in fish muscle are much higher than those reported in previous monitoring reports or in other literature. Work carried out under carefully controlled conditions suggests that typical concentrations of lead in fish muscle tissue fall in the range 0.01 to 0.1 mg/kg. The concentrations reported higher than this are, therefore, indicative of contamination, although it is not possible to state at this stage whether this is true in-tissue contamination or whether it simply represents on-tissue contamination after sampling. The mean concentrations reported for lead in the liver of cod and flounder were 0.11 - 0.19 mg/kg, while one sample of plaice from the Southern Bight of the North Sea was reported to contain 0.4 mg/kg of lead in the liver.

The results for copper in fish muscle were similar to those reported for 1979, with all mean values below 0.5 mg/kg. No differences were apparent between species nor between sampling areas. In the liver tissue of cod, plaice, and dab, the mean copper concentrations ranged from 2.2 to 6.2 mg/kg, except for one sample of cod from the Dutch coast, which was reported to contain 14.5 mg/kg copper in the liver. The main range of copper concentrations was similar to the levels observed in 1979. For flounder, however, copper concentrations in the liver were considerably higher, ranging from 9.8 - 28 mg/kg. Most of these samples were taken from the Dutch coast.

Zinc concentrations in the muscle of cod, plaice, flounder, and sole ranged from 3.6 - 11 mg/kg. This is similar to the results reported in previous years. The mean concentrations reported for zinc in cod liver ranged from 17 - 25 mg/kg, similar to the results reported in 1978 (results in 1979 were slightly lower). As in previous years, zinc concentrations in plaice liver were slightly higher, at 23 - 32 mg/kg, and concentrations in flounder liver were similar, at 15 - 35 mg/kg. The zinc concentration in the one sample of dab was 19 mg/kg.

METALS IN SHELLFISH

Table 1c contains the results reported for metals in shellfish, with Table 1c[1] containing values on a wet weight basis and Table 1c[2] containing values on a dry weight basis. Data were reported on 23 samples of blue mussel; most samples were taken from the coasts of the Netherlands and Ireland. Mercury concentrations in whole soft bodies of mussels ranged from 0.03 - 0.17 mg/kg wet weight; two values were reported only on a dry weight basis: 0.08 - 0.41 mg/kg. The lowest concentration was reported in a sample taken off the Danish coast in the southern Kattegat, while the highest concentration was found in a sample from the Dutch side of the Ems Estuary. With the exception of this highest concentration, these mercury concentrations are similar to those found earlier in mussels (e.g., concentrations of 0.02 - 0.09 mg/kg wet weight in 1977). Cadmium concentrations in mussels were generally reported in the range 0.12 to 2.8 mg/kg wet weight; however, three samples taken from the Western Scheldt Estuary were reported to contain considerably higher concentrations of cadmium, up to 12.8 mg/kg wet weight. The cadmium levels reported here were marginally higher than those reported earlier (e.g., values of 0.2 - 2.0 mg/kg wet weight in 1978 and 0.2 - 1.4 mg/kg wet weight in 1977). Lead concentrations were reported from 0.4 - 2.0 mg/kg wet weight; the highest concentrations were in samples from the Western Scheldt Estuary. The concentrations of copper in mussels fell within a fairly narrow range, i.e., 2.6 - 4.4 mg/kg wet weight. Zinc concentrations in mussels were reported from 10 to 36 mg/kg wet weight.

Results were reported for six samples of shrimp (Crangon crangon) which were taken from the coasts of Belgium and the Netherlands. The concentrations of mercury in the tail muscle were 0.06 - 0.32 mg/kg wet weight. Cadmium concentrations were reported to range from 0.005 to 0.017 mg/kg wet weight, while lead was found in concentrations of 0.05 - 0.34 mg/kg wet weight. The concentrations reported for copper were in the range 4.9 - 10 mg/kg, and zinc concentrations were 6.8 - 20 mg/kg wet weight. No clear differences in the concentrations of any of these trace metals in shrimp could be discerned among the areas sampled.

ORGANOCHLORINE PESTICIDE AND PCB RESIDUES IN FISH

The data reported on concentrations of organochlorine pesticide and PCB residues in fish muscle are presented in Table 2a[1] on a wet weight basis and in Table 2a[2] on a fat weight basis.

The mean concentrations of dieldrin reported in the muscle of cod, sole and flounder were in the range 0.001 - 0.02 mg/kg wet weight, while the concentrations in the muscle of two samples of plaice were slightly higher at 0.04 mg/kg wet weight each. On a fat weight basis, dieldrin concentrations in the muscle of cod, sole and one sample of flounder were in the range 0.2 - 1.0 mg/kg fat weight, while in plaice and the other sample of flounder, dieldrin concentrations were higher, ranging from 4 - 20 mg/kg fat weight.

Concentrations of individual residues of the DDT group in the muscle tissue of cod, plaice, flounder, sole and herring were reported on a wet weight basis as follows: 0.0015 - 0.012 mg/kg for p,p'-DDE, 0.0004 - 0.03 mg/kg for p,p'-TDE, and 0.0007 - 0.05 mg/kg for p,p'-DDT. Mean total DDT concentrations were in the range 0.0008 - 0.08 mg/kg wet weight. The highest concentrations of most of these residues were reported for a sample of plaice from the Southern Bight of the North Sea. On a fat weight basis, the concentrations of DDT group residues in the muscle of these species of fish generally showed a wider range: 0.2 - 0.6 mg/kg fat weight for p,p'-DDE, 0.06 - 7.3 mg/kg for p,p'-TDE, 0.12 - 5.0 mg/kg for p,p'-DDT and 0.08 - 13.9 mg/kg for Σ DDT. Of these values, a sample of flounder from the Southern Bight of the North Sea (off the coast of England) had the highest reported concentrations on a fat weight basis for nearly all the DDT residues, followed by the sample of plaice mentioned above, also from the Southern Bight of the North Sea.

The mean concentrations of PCBs reported on a wet weight basis in the muscle of cod, plaice, flounder, sole, dab and herring ranged between 0.01 and 0.09 mg/kg, with the exception of a sample of flounder from the Southern Bight of the North Sea (off the coast of Belgium) which was reported to contain 0.22 mg/kg. On a fat weight basis, most PCB concentrations in the muscle tissue of these species of fish fell in the range 1.3 - 12 mg/kg. The exceptions were the sample of flounder from the Southern Bight of the North Sea off the coast of England (mentioned in the previous paragraph as containing high DDT concentrations), which was reported to have a PCB concentration of 24 mg/kg fat weight, and a sample of plaice from the Southern Bight of the North Sea (a different sample from that mentioned in the previous paragraph) which was reported to contain 34 mg/kg fat weight.

The data submitted on organochlorine concentrations in fish liver are presented in Table 2b[1] on a wet weight basis and in Table 2b[2] on a fat weight basis.

The mean concentrations of dieldrin in the liver of six samples of flounder were generally in the range 0.005 - 0.047 mg/kg wet weight, except for one sample of flounder from the Southern Bight of the North Sea which was reported to contain 0.29 mg/kg. Concentrations of dieldrin in the livers of three samples of plaice and one sample of hake were reported in the range 0.09 - 0.12 mg/kg wet weight, while for six samples of cod liver, the reported mean concentrations were 0.12 - 0.86 mg/kg. The highest mean value for dieldrin in cod liver, found in a sample from the Southern Bight of the North Sea, was somewhat higher than values reported for cod liver in previous years, e.g., in 1979 the highest concentration reported was 0.35 mg/kg wet weight (in cod livers from the Irish Sea) and in 1978 the highest

concentration was 0.27 mg/kg wet weight (in cod livers from the German Bight). Concentrations of dieldrin reported in previous years for cod livers from similar areas in the Southern Bight of the North Sea were 0.32 mg/kg in 1979 and 0.14 mg/kg in 1978. On a fat weight basis, dieldrin concentrations in the livers of cod, flounder and hake were generally reported in the range 0.034 - 0.45 mg/kg, with the exception of the sample of cod from the Southern Bight of the North Sea, mentioned above, which was reported to contain 2.2 mg dieldrin/kg fat weight, and the sample of flounder from the Southern Bight of the North Sea, also mentioned above, for which the concentration reported was 4.9 mg/kg. Dieldrin concentrations in plaice livers ranged from 0.36 - 1.4 mg/kg fat weight.

The results reported on analyses for the individual residues of the DDT group showed mean concentrations in cod liver ranging from 0.02 - 0.51 mg/kg wet weight, with the highest concentrations mainly in a sample from the central North Sea.

Concentrations of individual DDT residues in the livers of plaice, flounder, and hake were reported to be from 0.02 to 0.22 mg/kg on a wet weight basis. Mean Σ DDT concentrations in cod liver were reported in the range 0.35 - 1.4 mg/kg wet weight; they were somewhat lower in plaice, flounder, and hake liver (maximum of 0.45 mg/kg wet weight). These concentrations are generally somewhat lower than those reported in previous years. On a fat weight basis, the maximum concentration of individual DDT isomers in the livers of all species was 1.5 mg/kg, with the exception of one of the samples of flounder liver from the Southern Bight, for which a maximum concentration of 5.4 mg/kg fat weight was reported, which was for p,p'-DDD. The maximum mean Σ DDT concentration on a fat weight basis was 2.6 mg/kg in the livers of all species, with the exception of the sample of flounder mentioned above for which a Σ DDT of 7.6 mg/kg fat weight was reported.

Mean concentrations of PCBs in the livers of plaice and dab were below 1 mg/kg wet weight. In hake and flounder liver the concentrations were somewhat higher, ranging between 0.4 and 3.9 mg/kg, while concentrations in cod liver were still higher, from 0.4 - 13.2 mg/kg wet weight. As in the previous two years, the highest PCB concentrations were reported in samples of fish taken from the Southern Bight of the North Sea. Mean PCB concentrations on a fat weight basis ranged from 0.3 to 5.2 mg/kg in the livers of plaice, dab, and hake; for flounder liver, PCB concentrations were in the range 4.5 - 19 mg/kg, while concentrations in cod liver ranged from 0.8 - 23.5 mg/kg fat weight.

Concentrations of hexachlorobenzene (HCB) in the livers of five samples of flounder and one sample of hake were reported from 0.05 to 0.089 mg/kg wet weight, while for three samples of cod liver the HCB concentrations reported were slightly higher, 0.09 - 0.19 mg/kg. Concentrations of α-hexachlorocyclohexane (α-HCH) in these liver samples followed a similar pattern at marginally lower concentrations; α-HCH in flounder and hake liver ranged from 0.01 - 0.04 mg/kg, while the concentrations in cod liver were 0.07 - 0.09 mg/kg.

ORGANOCHLORINE PESTICIDE AND PCB RESIDUES IN SHELLFISH

Data submitted on organochlorine residues in shellfish are presented in Table 2c[1] on a wet weight basis and in Table 2c[2] on a fat weight basis.

Results of the analysis of DDT residues in mussels (Mytilus edilus) were submitted for two samples, one from the Swedish coast of the Kattegat and the other from the coast of Belgium; the Σ DDT concentrations in these samples were 0.0024 and 0.013 mg/kg wet weight, respectively.

The concentrations of PCBs were determined in 18 samples of mussels, most of which were from the coast of the Netherlands. PCB concentrations were reported in the range 0.025 - 0.26 mg/kg wet weight.

Eleven samples of shrimp, mostly from the coast of the Netherlands, were analyzed for PCBs. The results showed PCB concentrations in the range 0.02 - 0.08 mg/kg wet weight.

SUMMARY

Results of the analysis of trace metal and organochlorine contaminants in fish and shellfish sampled from various areas in the Northeast Atlantic in 1980 have been presented. Owing to the fact that different areas and fish stocks are sampled from year to year, it is difficult to compare the data received for 1980 with those from previous years. However, there appears to be no notable changes in the concentrations of trace metals and organochlorine residues in the organisms studied over the past five years of the programme.

Table 1a. Metals in Fish Muscle

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age/ year class (mean)	Concentration (mg/kg wet weight) Hg min / max / MEAN / s.d.	Cd min / max / MEAN / s.d.	Pb min / max / MEAN / s.d.	Cu min / max / MEAN / s.d.	Zn min / max / MEAN / s.d.	Cr min / max / MEAN / s.d.	Ni min / max / MEAN / s.d.
		1980												
COD (Gadus morhua)														
IVc 34 F2	England/ Wales	Sep	19	26-66 (38)	190-2888 (703)	15 F 4 M	2-4 yrs (2.3)	0.01 0.12 0.04 0.007	<0.1 <0.1 <0.1 -	<0.2 0.5 <0.2* -	<0.2 0.4 0.3* 0.02	3.0 4.1 3.6 0.07		
IVc 32 F1	"	May	20	25-44 (32)	163-1037 (382)	11 F 9 M	1-2 yrs (1)	0.11 0.20 0.15 0.005	<0.1 <0.1 <0.1 -	<0.2 <0.2 <0.2 -	<0.2 0.5 0.2* 0.02	3.5 4.5 4.0 0.06		
IVc 31 F2	Belgium	Sep	20	31-46 (37.6)	278-1095 (615)	12 M 8 F	1-2 (1.4)	0.05 0.23 0.14 0.04	<0.005 0.009 <0.005 -	<0.10 0.105 0.026 0.021	0.20 0.51 0.28 0.06	3.6 8.6 4.6 1.1	<0.01 0.07 0.03 0.02	0.10 0.25 0.18 0.06
VIIa 35 E6	England/ Wales	Sep	23	26-42 (33)	206-819 (438)	16 F 7 M	1 yr	0.02 0.55 0.15 0.02	<0.1 <0.1 <0.1 -	<0.2 1.8 <0.6* 0.11	<0.2 0.4 0.3* 0.01	2.8 4.6 3.7 0.09		
VIIa 36 E3 36 E4 35 E3 35 E4	Ireland	Nov	41	36.5-72.0 (52.6)				0.04 0.22 0.08 0.05	0.003 0.05 0.01 0.01	0.026 0.16 0.081 0.029	0.04 0.46 0.18 0.11	2.9 6.2 3.9 0.8		

*Mean includes some values under the detection limit.

Table 1a. Metals in Fish Muscle (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age/ year class (mean)	Concentration (mg/kg wet weight) Hg min / max / MEAN / s.d.	Cd min / max / MEAN / s.d.	Pb min / max / MEAN / s.d.	Cu min / max / MEAN / s.d.	Zn min / max / MEAN / s.d.	Cr min / max / MEAN / s.d.	Ni min / max / MEAN / s.d.
		1980												
PLAICE (Pleuronectes platessa)														
IVc 34 F2	England/ Wales	Sep	20	28-37 (31.6)	198-620 (366)	12 F 8 M	2-4 yrs (2.3)	0.03 0.10 0.04 0.003	<0.1 <0.1 <0.1 -	<0.2 <0.2 <0.2 -	<0.2 0.3 0.2* 0.01	4.4 8.7 6.6 0.29		
VIc 32 F1	"	Jul	10	24-29 (27)	175-302 (237)	6 M 4 F	2-3 yrs (2.3)	0.07 0.17 0.10 0.008	<0.1 <0.1 <0.1 -	<0.2 <0.2 <0.2 -	0.2 0.5 0.4 0.03	4.7 7.9 6.2 0.32		
VIIa 35 E6	"	Sep	20	20-30 (26)	115-362 (219)	12 F 8 M	2-3 yrs (2.2)	0.07 0.28 0.14 0.01	<0.1 <0.1 <0.1 -	<0.2 0.6 0.2* -	<0.2 0.4 0.2* 0.01	4.6 7.5 6.3 0.18		
FLOUNDER (Platichthys flesus)														
IVc 32 F1	England/ Wales	May	50	15-39 (24.7)	35-450 (145)	30 F 20 M	2-8 yrs (3.6)	0.07 0.54 0.26 0.02	<0.1 <0.1 <0.1 -	<0.2 0.3 0.2* -	<0.2 0.7 0.4 0.02	6.0 19 11 0.44		
IVc 31 F2	Belgium	Sep	19	26-44 (34)	182-825 (452)	11 F 8 M	2-8 yrs (4.4)	0.18 0.98 0.46 0.21	<0.005 0.036 0.010* 0.008	0.016 0.092 0.048 0.022	0.26 0.58 0.32 0.08	5.5 14.9 8.7 2.8	<0.1 0.15 0.02* -	0.15 0.30 0.22 0.05

*Mean includes some values under the detection limit

Table 1a. Metals in Fish Muscle (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age/ year class (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
		1980												
FLOUNDER (Platichthys flesus)		(cont'd)												
IVc 31 F3 (Western Scheldt Estuary)	Netherlands	Aug	10	26-31 (29.5)	240-430 (303)	5 M 5 F	1975-1978 (1976)	0.09 0.32 0.19 0.09	0.004 0.013 0.006 0.003	0.06 0.21 0.13 0.05	0.27 0.45 0.33 0.06	6.2 10.7 7.8 1.2	0.15 0.76 0.36 0.18	
IVc 32 F3 (N. of Goeree)	"	Sep	8	22-32 (27)	110-390 (229)	2 M 6 F	1976 1978 (1977)	0.12 0.49 0.20 0.12	0.003 0.008 0.005 0.001	0.03 0.09 0.07 0.02	0.33 0.58 0.44 0.10	5.0 7.6 6.0 1.0	0.30 0.74 0.44 -	
IVc 33 F4	"	Aug	9	31-39 (34.7)	340-820 (522)	2 M 7 F	1975-1977 (1976)	0.11 0.31 0.20 0.06	0.003 0.011 0.007 0.003	0.08 0.16 0.13 0.03	0.20 0.44 0.32 0.08	5.2 7.9 6.3 1.0	0.16 1.32 0.40 -	
IVc 35 F5 (Dutch Shallows-West Wadden Sea)	"	Sep	10	28-35 (31.5)	215-500 (359)	3 M 7 F	1975-1977 (1976)	0.20 0.71 0.36 0.15	0.004 0.008 0.006 0.001	0.06 0.14 0.10 0.02	0.22 0.47 0.34 0.08	3.0 4.5 3.8 -	0.13 0.55 0.32 0.12	
IVb 36 F6 IVc 35 F6 (Ems Estuary-Oude Wester Eems (N))	"	Aug	10	21-27 (24.5)	110-220 (167)	2 M 8 F	1978	0.13 0.17 0.15 0.02	0.002 0.003 0.003 0.000	0.07 0.18 0.12 0.04	0.34 0.63 0.45 -	6.3 10. 8.0 -	0.10 0.78 0.36 0.21	

Table 1a. Metals in Fish Muscle (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age/ year class (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
		1980												
COMMON SOLE (Solea solea)														
IVc 32 F1	Belgium	Jun	20	25-36 (30)	133-428 (247)	12 M 8 F	4-9 yrs (5)	0.14 0.46 0.27 0.08	<0.005 0.006 <0.005 -	<0.010 0.035 0.016* 0.008	0.23 0.48 0.37 0.06	3.9 6.3 4.5 0.6	0.06 0.14 0.09 0.02	0.04 0.10 0.07 0.02
VIIa 36 E5	"		20	26-41 (32)	164-786 (348)	12 F 8 M	4-23 yrs (7)	0.08 0.50 0.26 0.10	<0.005 <0.005 <0.005 -	0.057 0.51 0.20 0.13	0.15 0.44 0.26 0.07	4.1 7.2 4.8 0.7	0.02 0.07 0.05 0.01	0.15 0.27 0.20 0.03
COMMON DAB (Limanda limanda)														
IIIc 40 G0	Denmark	Oct	19	24-29 (26)	155-237 (200)	16 M	2-5 yrs (3.4)	0.020 0.225 0.055 0.046						

*Mean includes some values under the detection limit

Table 1b. Metals in Fish Liver

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age/ year class (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
COD (Gadus morhua)		1980												
IVc 34 F2	England/ Wales	Sep	19(2)	26-66 (38)	190-2888 (703)	15 F 4 M	2-4 yrs (2.3)	0.03 0.10 0.06 -	<0.1 <0.1 <0.1* -	<0.2 0.2 0.2* -	3.0 20. 6.8 -	15 44 25 -		
IVc 32 F1	"	May	20(2)	25-44 (32)	163-1037 (382)	11 F 9 M	1-2 yrs (1)	0.05 0.11 0.08 -	<0.1 <0.1 <0.1* -	<0.2 <0.2 <0.2* -	3.3 7.5 5.6 -	14 22 20 -		
IVc 31 F2	Belgium	Sep	20(1)	31-46 (37.6)	278-1095 (615)	12 M 8 F	1-2 yrs (1.4)	0.03 0.21 0.08 0.04						
IVc 35 F5	Netherlands	Oct	10(1)	57-61 (59)	1400-2200 (1830)	7 M 3 F	1978 yr. class	0.03 0.17 0.09 0.06	0.02 0.13 0.05 0.04	0.04 0.19 0.11 0.06	8.9 30. 14.5 -	10.7 38. 22.1 8.9	<0.02 <0.02 <0.02 -	
VIIa 35 E6	England/ Wales	Sep	23(2)	26-42 (33)	206-819 (438)	16 F 7 M	1 yr	0.10 0.23 0.17 -	<0.1 <0.1 <0.1 -	<0.2 <0.2 <0.2 -	3.4 8.5 6.2 -	13 22 18 -		
VIIa 36 E3 36 E4 35 E3 35 E4	Ireland	Nov	35(1)	38-72				0.01 0.08 0.03 0.01	0.003 0.14 0.028 0.023	0.07 0.36 0.13 0.06	0.47 6.92 3.09 1.47	10.4 22.8 17.2 4.4		

(1) Each liver analysed individually
(2) Livers bulked into several sub-samples prior to analysis
* Mean includes some values under the detection limit

Table 1b. Metals in Fish Liver (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age/ year class (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
		1980												
PLAICE (Pleuronectes platessa)														
IVc 34 F2	England/ Wales	Sep	20(2)	28-37 (31.6)	198-620 (366)	12 F 8 M	2-4 yrs (2.3)	0.03 0.05 0.04 -	<0.1 <0.1 <0.1 -	<0.2 <0.2 <0.2 -	1.8 3.5 2.5 -	20 25 23 -		
IVc 32 F1	"	Jul	10(3)	24-29 (27)	175-302 (237)	6 M 4 F	2-3 yrs (2.3)	0.06	<0.1	0.4	2.2	24		
VIIa 35 E6	"	Sep	20(2)	20-30 (26)	115-362 (219)	12 F 8 M	2-3 yrs (2.2)	0.08 0.14 0.10 -	<0.1 <0.1 <0.1 -	<0.2 <0.2 <0.2 -	4.2 6.0 5.0 -	30 34 32 -		
FLOUNDER (Platichthys flesus)														
IVc 32 F1	England/ Wales	May	50(2)	15-39 (25)	35-450 (145)	30 F 20 M	2-8 yrs (4.4)	0.20 0.60 0.20 -	<0.2 0.5 0.2* -	<0.2 <0.2 <0.2 -	7.5 17. 9.8 -	25 36 35 -		
IVc 31 F2	Belgium	Sep	19(1)	26-44 (34)	182-825 (452)	11 F 8 M	2-8 yrs (4.4)	0.13 0.88 0.33 0.24						

(1) Each liver analysed individually
(2) Livers bulked into several sub-samples prior to analysis
* Mean includes some values under the detection limit

Table 1b. Metals in Fish Liver (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age/ year class (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
		1980												
FLOUNDER (cont'd)														
IVc 31 F3 (Western Scheldt Est.)	Netherlands	Aug	10(3)	26-31 (29.5)	240-430 (303)	5 M 5 F	1975-1978 (1976)	0.14	0.17	0.15	17.	15.	0.04	
IVc (N.of Goeree)	"	Sep	8(3)	22-32 (27)	110-390 (229)	2 M 6 F	1976-1978 (1977)	0.11	0.24	0.12	17.	33.	0.04	
IVc 33 F4	"	Aug	9(3)	31-39 (34.7)	340-820 (522)	2 M 7 F	1975-1977 (1976)	0.09	0.07	0.16	10.	18.	0.12	
IVc 35 F5 (Dutch Shallows West Wadden Sea)	"	Sep	10(3)	28-35 (31.5)	215-500 (359)	3 M 7 F	1975-1977 (1976)	0.28	0.26	0.15	23.	30.	0.75	
IVb 36 F6 IVc 35 F6 (Ems Estuary-Oude Wester Eems (N))	"	Aug	10(3)	21-27 (24.5)	110-220 (167)	2 M 8 F	1978	0.06	0.05	0.19	28.	28.	0.09	
COMMON SOLE (Solea solea)														
IVc 32 F1	Belgium	Jun	20	25-36 (30)	133-428 (247)	12 M 8 F	4-9 yrs (5)	0.17 0.66 0.35 0.14						
COMMON DAB (Limanda limanda)														
IIIc 40 G0	Denmark		19	24-29 (26)	155-237 (200)	16 M	2-5 yrs (3.4)		0.008 0.998 0.101 0.227		1.33 5.70 3.08 1.05	12.8 31.8 19.4 4.8		

*All livers bulked into one sample and homogenized prior to analysis

Table 1c[1]. Metals in Shellfish (on a wet weight basis)

Source	Country	Date of collection	Number analysed	Size (mean) (mm)	Concentration (mg/kg wet weight) Hg	Cd	Pb	Cu	Zn	Cr	Ni
		1980									
[1)] BLUE MUSSEL (*Mytilus edulis*)											
VIIa 36 E3 (Boyne Estuary)	Ireland	Apr	20		0.07	0.298					
VIIa 35 E3 (Dublin Bay)	"	Aug	20		0.097	2.70					
VIIa 33 E3 (Waterford Harbour)	"	Apr	20		0.07	0.50					
VIIg-k 32 E1 (Cork Harbour)	"	Apr	20		0.08	0.40					
VIIb,c 34 E0 (Shannon Estuary)	"	Feb	30		0.052	2.5					
IVc 31 F3 (W. Scheldt-Flushing)	Netherlands	May	50	36-56 (45)	0.05	0.69	1.2	3.3	23.	1.9	
"	"	Oct	50	32-55 (43)	0.04	1.1	1.3	4.3	20.	1.8	
IVc 31 F3 (W. Scheldt-Pas van Terneuzen)	"	May	50	36-56 (43)	0.05	2.8	0.90	3.8	17.	1.1	
"	"	Oct	50	39-56 (46)	0.10	7.4	2.0	4.0	31.	3.1	
IVc 32 F4 (W. Scheldt-Zuidergat)	"	May	50	31-56 (41)	0.05	6.6	0.70	3.6	15.	1.6	
"	"	Oct	50	34-52 (42)	0.07	12.8	1.1	3.6	35.	0.8	

[1)] Whole soft body-analysed in bulk

Table 1c[1]. Metals in Shellfish (on a wet weight basis) (cont'd)

Source	Country	Date of collection	Number analysed	Size (mean) (mm)	Concentration (mg/kg wet weight)						
					Hg	Cd	Pb	Cu	Zn	Cr	Ni
		1980									
BLUE MUSSEL (cont'd)											
IVc 32 F3 (E. Scheldt-Hammen)	Nether-lands	Apr	50	47-67 (60)	0.03	0.39	0.80	3.4	15.	0.9	
"	"	Oct	50	45-66 (52)	0.05	0.39	0.55	3.8	13.	1.0	
IVc 33 F4 (Meetpost Noordwijk)	"	Apr	50	65-80 (76)	0.07	0.37	0.66	4.4	36.	3.2	
"	"	Oct	50	48-69 (57)	0.04	0.71	0.78	4.3	22.	0.59	
IVc 35 F5 (Dutch Shallows-Wadden W.Sea)	"	Apr	50	45-70 (58)	0.06	1.0	0.66	2.7	13.	1.1	
"	"	Oct	50	43-64 (52)	0.05	0.12	0.69	3.8	15.	2.0	
IVb 36 F6 (Ems Estuary-Borkum)	"	Apr	50	31-58 (43)	0.03	0.34	0.40	4.2	16.	2.4	
IVc 35 F6 (Ems Estuary-Oude Wester Eems (N))	"	Apr	50	30-58 (42)	0.03	0.33	0.42	3.5	20.	1.6	
"	"	Oct	50	36-52 (43)	0.06	0.33	0.74	3.6	9.9	3.3	
IVc 35 F6 (Ems Estuary-Bocht van Watum (S))	"	Apr	50	42-70 (60)	0.17	0.48	0.51	2.6	21.	2.6	

Table 1c[1]. Metals in Shellfish (on a wet weight basis) (cont'd)

Source	Country	Date of collection	Number analysed	Size (mean) (mm)	Concentration (mg/kg wet weight) Hg	Cd	Pb	Cu	Zn	Cr	Ni
		1980									
[1)] COMMON SHRIMP (Crangon crangon)											
IVc 31 F3 (W.Scheldt-W.of Breskens)	Nether-lands	Apr	109	50-79 (64)	0.32	0.012	0.21	5.7	6.8	0.15	
"	"	Oct	100	51-75 (62)	0.13	0.013	0.21	5.9	14.	0.03	
IVc 32 F4 (Maasvlakte)	"	Apr	100	51-80 (63)	0.12	0.010	0.26	6.6	7.8	0.12	
"	"	Oct	100	51-80 (62)	0.19	0.014	0.21	5.7	21.	0.02	
IVc 33 F4 (Meetpost Noordwijk)	"	Apr	139	50-80 (61)	0.08	0.015	0.21	5.4	8.3	0.30	
"	"	Oct	100	55-77 (68)	0.07	0.009	0.14	9.3	10.	0.04	
IVc 35 F5 (Dutch Shallows-Western Waddensea)	"	Apr	109	49-67 (53)	0.18	0.007	0.34	4.9	16.	0.26	
"	"	Oct	100	51-75 (59)	0.06	0.010	0.17	6.7	12.	0.13	
IVc 35 F6 (Ems Estuary-Oude Wester Eems (S))	"	Apr	100	50-65 (53)	0.08	0.005	0.31	5.7	10.8	0.23	
"	"	Oct	157	44-70 (51)	0.06	0.010	0.14	10.	17.	0.12	
IVc 31 F2	Belgium	Sep	2000[(2)]		0.13	0.017	0.051	7.8	19.6	0.11	0.05

[1)] Tail-muscle - analysed in bulk

[(2)] Analysed in samples of 100 shrimps

Table 1c[2]. Metals in Shellfish (on a dry weight basis)

Source	Country	Date of collection	Number analysed	Size (mm)	Concentration (mg/kg dry weight)						
					Hg	Cd	Pb	Cu	Zn	Cr	Ni
		1980									
BLUE MUSSEL (Mytilus edulis)											
IIIc 40 G0	Denmark	Oct	42	69.7 mm I 8.4 mm	0.078	1.9					
IVc 31 F2	Belgium	Sep	1 000(2)		0.41	2.5	2.8	8.4	195	3.7	

(1) Whole soft body analyzed in bulk

(2) Analyzed in samples of 50 mussels

Table 2a[1]. Organochlorines in Fish Muscle (wet weight basis)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
							% fat	HCB	α-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.		min max MEAN s.d.	
		1980														
COD (Gadus morhua)																
IVc	34 F2	England/ Wales	Sep	19[3]	26-66 (38)	190-2888 (703)	15F 4M 2-4 yrs (2.3)			<0.002	0.004	<0.002	0.010	0.016*	0.09	5.6
IVc	32 F1	"	May	20[3]	25-44 (32)	163-1037 (382)	11F 9M 1-2 (1)			0.010	0.006	<0.002	<0.002	0.01*	0.03	3.0
IVc	31 F2	Belgium	Sep	20[1]	31-46 (37.6)	278-1095 (615)	12M 8F 1-2 yrs (1.4)	0.69 0.92 0.79	0.001 0.003 0.002 0.0006	0.001 0.002 0.002 0.0004	0.001 0.003 0.002 0.0006	0.003 0.006 0.004 0.001	0.001 0.003 0.001 0.001	<0.001 <0.001 <0.001	0.004 0.009 0.005 0.002	0.025 0.148 0.060 0.037	12.0
VIIa	35 E6	England/ Wales	Sep	23[3]	26-42 (33)	206-819 (438)	16F 7M 1 yr				0.002	<0.002	<0.002	<0.002	<0.006	<0.05	
21 E.Kattegat	44 G1	Sweden	Nov 1979	20[1]	24-35.5 (30-)	135-400 (260)		0.51 0.67 0.58				0.0007 0.0032 0.0015 0.0007	0.0002 0.0007 0.0004 0.0002	0.0002 0.0014 0.0007 0.0003	0.0012 0.0049 0.0026 0.0011	0.008 0.027 0.015 0.006	5.8
PLAICE (Pleuronectes platessa)																
IVc	34 F2	England/ Wales	Sep	20[3]	28-37 (31.6)	198-620 (366)	12F 8M 2-4 yrs (2.3)			0.040	0.003	0.030	0.050	0.080	0.02	0.25
IVc	32 F1	"	Jul	10[3]	24-29 (27)	175-302 (237)	6M 4F 2-3 yrs (2.3)			0.040	0.003	<0.002	<0.002	<0.007	0.07	

(1) Each tissue analysed individually
(3) Tissues bulked into one sample and homogenized prior to analysis
* Mean includes same values under the detection limit

Table 2a[1]. Organochlorines in Fish Muscle (wet weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class		% fat min / max / MEAN / s.d.	HCB min / max / MEAN / s.d.	α-HCH min / max / MEAN / s.d.	Dieldrin min / max / MEAN / s.d.	DDE min / max / MEAN / s.d.	TDE min / max / MEAN / s.d.	p,p'DDT min / max / MEAN / s.d.	Σ DDT	PCBs min / max / MEAN / s.d.	PCB / Σ DDT
								Concentration (mg/kg wet weight)									
		1980															
PLAICE (Pleuronectes platessa) (cont'd)																	
VIIa 35 E6	England/ Wales	Sep	20(3)	20-30 (26)	115-362 (219)	12F 8M	2-3 yrs (2.2)				<0.002	0.004	0.020	0.008	0.030	0.05	1.7
FLOUNDER (Platichthys flesus)																	
IVc 32 F1	"	May	50(2)	15-39 (24.7)	35-450 (145)	30F 20M	2-8 yrs (3.6)				0.009	0.007	0.008	0.004	0.019	<0.01	
											0.030	0.010	0.050	0.010	0.067	0.09	
											0.020	0.009	0.023	0.007	0.039	0.04	1.0
											0.006	<0.001	0.014	<0.001	0.015	0.03	
IVc 35 F7	Germany Fed.Rep.of	Jun	10(1)	23-31 (26)	131-409 (218)	6M 4F	1975-1977 yr-class	0.58								0.048	
								1.55								0.166	
								0.92								0.084	
								–								–	
IVc 31 F2	Belgium	Sep	19(1)	26-44 (34)	182-825 (452)	11F 8M	2-8 yrs (4.4)	0.94	0.001	0.0005	0.001	0.001	0.002	<0.001	0.003	0.060	
								2.70	0.005	0.004	0.006	0.005	0.004	<0.001	0.009	0.371	
								1.73	0.003	0.002	0.003	0.003	0.003	<0.001	0.006	0.220	36.7
									0.001	0.001	0.001	0.001	0.001		0.002	0.090	
IIIa 46 G1	Sweden	Sep	20(1)	22-28 (24)	190-370 (248)	13F 7M		0.54				–	0.0004	–	0.0004	0.008	
46 G0								1.81				–	0.0028	–	0.0028	0.110	
								0.94				–	0.0008	–	0.0008	0.034	42.5
													0.0008		0.0008	0.027	
COMMON SOLE (Solea solea)																	
IVc 32 F1	Belgium	Jun	20(1)	25-36 (30)	133-428 (247)	8F 12M	4-9 yrs (5)	0.64	0.0002	0.0006	0.002	0.001	0.001	0.001	0.003	0.029	
								1.29	0.0025	0.0015	0.004	0.008	0.007	0.006	0.021	0.080	
								0.86	0.001	0.001	0.003	0.005	0.004	0.002	0.011	0.058	5.3
									0.001	0.0003	0.001	0.002	0.002	0.001	0.005	0.019	

(1) Each tissue analysed individually
(2) Tissues bulked into several sub-samples prior to analysis
(3) Tissues bulked into one sample and homogenized prior to analysis
* Mean includes same values under the detection limit

Table 2a[1]. Organochlorines in Fish Muscle (wet weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	% fat	HCB	α-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							Concentration (mg/kg wet weight)									
COMMON DAB (Limanda limanda)																
IIIc 40 G0	Denmark	1980 Oct	19(3)	24-29 (26)	155-237 (200)	16F 3M 2-5 yrs (3.4)	0.55								0.01	
ATLANTIC HERRING (Clupea harengus)																
21 44 G1 E.Kattegat	Sweden	Sep	20(1)	16-19 (17)	38-77 (53)		1.07				0.002	0.002	0.003	0.002	0.019	
							16.2				0.025	0.029	0.030	0.084	0.10	
							5.01				0.012	0.008	0.008	0.029	0.055	1.9
											0.007	0.008	0.009	0.023	0.020	

(1) Each tissue analysed individually

(3) Tissues bulked into one sample and homogenized prior to analysis

Table 2a[2]. Organochlorines in Fish Muscle (fat weight basis)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT min max MEAN s.d.	Σ DDT	PCBs min max MEAN s.d.	PCB / Σ DDT
		1980														
COD (Gadus morhua)																
IVc	34 F2	England/ Wales	Sep	19(3)	26-66 (38)	190-2888 (703)	15F 4M 2-4 yrs (2.3)			-	0.4	-	1.0	1.6	9	5.6
IVc	32 F1	"	May	20(3)	25-44 (32)	163-1037 (382)	11F 9M 1-2 yrs (1)			1.0	0.6	-	-	1.0	3	3.0
IVc	31 F2	Belgium	Sep	20(1)	31-46 (37.6)	278-1095 (615)	12M 8F 1-2 yrs (1.4)	0.69 0.92 0.79	0.08 0.36 0.20 0.09	0.17 0.30 0.22 0.05	0.11 0.40 0.20 0.08	0.39 0.68 0.50 0.10	0.10 0.39 0.18 0.10	- - -	0.49 1.07 0.69 0.21	3.1 16.1 7.2 4.1	10.4
VIIa	35 E6	England/ Wales	Sep	23(3)	26-42 (33)	206-819 (438)	16F 7M 1 yr				0.2	-	-	-	-	-	
21	44 G1	Sweden	Nov. 1979	20(1)	24-35.5 (30)	135-400 (260)		0.51 0.67 0.58				0.12 0.56 0.26 0.11	0.04 0.12 0.06 0.03	0.04 0.24 0.12 0.05	0.21 0.86 0.44 0.18	1.4 4.8 2.6 2.6	5.9
PLAICE (Pleuronectes platessa)																
IVc	34 F2	England/ Eales	Sep	20(3)	28-37 (31.6)	198-620 (366)	12F 8M 2-4 yrs (2.3)				4.0	0.3	3.0	5.0	8.0	2	0.25
IVc	32 F1	"	Jul	10(3)	24-29 (27)	175-302 (237)	6M 4F 2-3 yrs (2.3				20.	1.5	-	-		34.	

(1) Each tissue analysed individually

(3) Tissues bulked into one sample and homogenized prior to analysis

Table 2a[2]. Organochlorines in Fish Muscle (fat weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat	HCB	α-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
		1980					min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.		min max MEAN s.d.	
PLAICE (cont'd)																
VIIa 35 E6	England/ Wales	Sep	20(3)	20-30 (26)	115-362 (219)	12F 8M 2-3 yrs (2.2)				-	0.4	2.0	0.8	3.0	5	1.7
FLOUNDER (Platichthys flesus)																
IVc 32 F1	England/ Wales	May	50(2)	15-39 (24.7)	35-450 (145)	30F 20M 2-8 yrs (3.6)				4.5 15. 8.2 3.4	2.3 5.0 3.6 0.78	4.0 13. 7.3 2.8	2.0 5.0 3.0 1.0	9.5 17. 13.9 2.2	2.5 45. 24. -	1.7
IVc 35 F7	Germany Fed.Rep.of	Jun	10(1)	23-31 (26)	131-409 (218)	4F 6M 1975-1977 year class	0.58 1.55 0.92 -								4.53 23.1 9.71 -	
IVc 31 F2	Belgium	Sep	19(1)	26-44 (34)	182-825 (452)	11F 8M 2-8 yrs (4.4)	0.94 2.70 1.73	0.11 0.21 0.16 0.04	0.04 0.27 0.14 0.09	0.10 0.26 0.17 0.05	0.11 0.40 0.20 0.10	0.10 0.28 0.16 0.06	- - -	0.21 0.68 0.36 0.15	6.1 18.0 12.3 5.3	34.2
IIIa 46 G1	Sweden	Sep	20(1)	22-28 (24)	190-370 (248)	13F 7M	0.54 1.81 0.94				- - -	0.02 0.37 0.08 0.08	- - .	0.02 0.37 0.08 0.08	0.85 8.1 3.6 2.1	45.0

(1) Each tissue analysed individually
(2) Tissues bulked into several sub-samples prior to analysis
(3) Tissues bulked into one sample and homogenized prior to analysis

Table 2a[2]. Organochlorines in Fish Muscle (fat weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class		Concentration (mg/kg fat weight)									
								% fat	HCB	α-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
								min	min	min	min	min	min	min	min	min	
								max	max	max	max	max	max	max	max	max	
								MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	
								s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	
		1980															
COMMON SOLE (Solea solea)																	
IVc 32 F1	Belgium	Jun	20(1)	25-36	133-428	8F	4-9	0.64	0.03	0.08	0.23	0.20	0.10	0.10	0.40	3.8	
				(30)	(247)	12M	yrs	1.29	0.24	0.22	0.47	1.15	0.74	0.59	2.48	12.1	
							(5)	0.86	0.10	0.12	0.32	0.55	0.38	0.25	1.18	6.9	5.8
									0.08	0.05	0.09	0.26	0.24	0.16	0.66	2.9	
COMMON DAB (Limanda limanda)																	
IIIc 40 G0	Denmark	Oct	19(3)	24-29	155-237	16F	2-5	0.55								1.8	
				(26)	(200)	3M	yrs										
							(3.4)										
ATLANTIC HERRING (Clupea harengus)																	
21 44 G1	Sweden	Sep	20(1)	16-19	38-77			1.07				0.04	0.04	0.08	0.04	0.44	
				(17)	(53)			16.2				0.71	0.56	0.70	2.0	2.3	
								5.01				0.29	0.19	0.21	0.69	1.3	1.9
												0.17	0.18	0.21	0.54	0.53	

(1) Each tissue analysed individually

(3) Tissues bulked into one sample and homogenized prior to analysis

Table 2b[1]. Organochlorines in Fish Liver (wet weight basis)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)								
							% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT Σ DDT min max MEAN s.d.	PCBs min max MEAN s.d.	PCB / Σ DDT
		1980													
COD (Gadus morhua)															
IVc	34 F2	England/ Wales	Sep	19(2)	26-66 (38)	190-2888 (703)	15F 4M	2-4 yrs (2.3)			0.030 0.24 0.12 0.028	0.20 0.60 0.33 0.046	0.020 0.24 0.078 0.024	0.020 0.90 0.18 0.092	0.26 1.3 0.60 0.12	2.0 11. 5.3 1.1	8.8
IVc	32 F1	"	May	20(2)	25-44 (32)	163-1037 (382)	11F 9M	1-2 yrs (1)			0.52 1.2 0.86 0.080	0.04 0.27 0.15 0.03	0.040 0.57 0.34 0.065	0.090 0.23 0.17 0.021	0.21 0.90 0.66 0.085	1.9 3.9 2.7 0.24	4.1
VIIa	35 E6	"	Sep	23(2)	26-42 (33)	206-819 (438)	16F 7M	1 yr			0.002 0.24 0.17 0.060	0.02 0.06 0.04	<0.002 0.46 0.33 0.11	0.080 0.22 0.17 0.031	0.24 0.72 0.53 0.10	<0.05 1.0 0.35 0.22	0.66
IVb	39 F4	Nether-lands	Feb	27(3)	(96)	-		(6 yrs)	53.6	0.09	0.08	0.19	0.51	0.28	0.34	1.4	4.4[a]	3.1
IVc	35 F5	"	Oct	21(3)	(63)	(2710)		(3.5 yrs)	58.8	0.13	0.07	0.16	0.16	0.20	0.11	0.54	8.1[a]	15.0
IVc	35 F5	"	Oct	10(1)	57-61 (59)	1400-2200 (1830)	3F 7M	1978-year class	6.9 61.5 37.4 19.3								0.84 7.8 4.5[b] 2.5	

(1) Each liver analysed individually
(2) Livers bulked into several sub-samples prior to analysis
(3) Livers bulked into one sample and homogenized prior to analysis
(a) PCB concentration obtained by extrapolation of concentrations of 17 individual PCB components
(b) PCB concentration is sum of 22 individual chlorobiphenyl compounds

Table 2b[1]. Organochlorines in Fish Liver (wet weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
							% fat	HCB	α-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.		min max MEAN s.d.	
		1980														
COD (cont'd)																
IVc 34 F4	Netherlands	Oct 1979	25[3]	(74)	(4690)	(4)	56.2	0.19	0.09	0.23	0.47	0.30	0.15	1.1	13.2[a]	12.0
21 44 G1 (Kattegat)	Sweden	Sep	20[1]	23-38 (25.5)	191-275 (229)		7.43 55.7 23.1				0.033 0.465 0.226 0.128	0.013 0.257 0.091 0.068	 0.223 0.035 0.075	0.045 0.83 0.35 0.25	0.59 2.9 1.6 0.68	4.6
PLAICE (Pleuronectes platessa)																
IVc 34 F2	England/ Wales	Sep	20[2]	28-37 (31.6)	198-620 (366)	12F 8M 2-4 yrs (2.3)				0.090 0.13 0.12 0.010	0.005 0.060 0.021 0.013	<0.002 0.11 0.053 0.026	0.030 0.15 0.12 0.029	0.090 0.27 0.19 0.041	0.03 0.22 0.10 0.04	0.53
IVc 32 F1	"	Jul	10[3]	24-29 (27)	175-302 (237)	4F 6M 2-3 yrs (2.3)				0.23	0.030	0.22	0.20	0.45	0.60	1.3
VIIa 35 E6	"	Sep	20[2]	20-30 (26)	115-362 (219)	12F 8M 2-3 yrs (2.2)				0.02 0.11 0.086 0.022	<0.002 0.050 0.033 0.011	0.005 0.34 0.22 0.074	<0.002 0.030 0.21 0.007	0.009 0.42 0.27 0.090	<0.05 0.09 0.07 0.009	0.26
FLOUNDER (Platichthys flesus)																
IVc 32 F1	England/ Wales	May	50[2]	15-39 (25)	35-450 (145)	30F 20M 2-8 yrs (4.4)				0.12 0.46 0.29 0.098	0.020 0.050 0.033 -	0.19 0.24 0.22 0.015	0.020 0.20 0.080 0.030	0.30 0.45 0.33 0.02	0.10 0.97 0.42 0.28	1.3

(1) Each liver analysed individually
(2) Livers bulked into several sub-samples prior to analysis
(3) All livers bulked into one sample and homogenized prior to analysis
(a) PCB concentration obtained by extrapolation of concentrations of 17 individual PCB components

Table 2b[1]. Organochlorines in Fish Liver (wet weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)								
							% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT Σ DDT min max MEAN s.d.	PCBs min max MEAN s.d.	PCB / Σ DDT
FLOUNDER (cont'd)		1980													
IVc 31 F3 (Western Scheldt Estuary)	Netherlands	Aug	10(3)	26-31 (29.5)	240-430 (303)	5F 5M 1975-1978 (1976)	17.5	0.010	0.015	0.038			0.072	0.79[b]	11.0
IVc 32 F3 (N. of Goeree)	"	Sep	8(3)	22-32 (27)	110-390 (229)	6F 2M 1976-1978 (1977)	14.7	0.050	0.011	0.022			0.093	1.62[b]	17.4
IVc 33 F4	"	Aug	9(3)	31-39 (34.7)	340-820 (522)	7F 2M 1975-1977 (1976)	21.1	0.089	0.032	0.030			0.120	3.94[b]	32.8
IVc 35 F5 (Dutch Shallows-West Wadden Sea)	"	Sep	10(3)	28-35 (31.5)	215-500 (359)	7F 3M 1975-1977 (1976)	15.3	0.009	0.013	0.005			0.047	1.72[b]	36.6
IVb 36 F6 IVc 35 F6 (Ems Estuary-Oude Wester Eems (N))	"	Aug	10(3)	21-27 (24.5)	110-220 (167)	8F 2M 1978	18.0	0.052	0.012	0.047			0.128	1.07[b]	8.4

(3) Livers bulked into one sample and homogenized prior to analysis

(b) PCB concentration is sum of 22 individual chlorobiphenyl compounds

Table 2b[1]. Organochlorines in Fish Liver (wet weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
							% fat	HCB	α-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.		min max MEAN s.d.	
		1980														
COMMON DAB (Limanda limanda)																
IVb 36 F8	Germany, Fed.Rep.	Jun	10(1)	23-29 (25)			9.9 37.8 20.5								0.44 1.79 0.96	
EUROPEAN HAKE (Merluccius merluccius)																
VIIe 28 E4	Netherlands	Mar	32(3)	(46)	(790)	(3.5) yrs	57.2	0.05	0.04	0.10	0.12	0.06	0.10	0.30	2.5[a)]	8.3

(1) Each liver analysed individually

(3) Livers bulked into one sample and homogenized prior to analysis

(a) Total PCB concentration obtained by extrapolation of concentration of 17 individual PCB components

Table 2b[2]. Organochlorines in Fish Liver (fat weight basis)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)								
							% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT Σ DDT min max MEAN s.d.	PCBs min max MEAN s.d.	PCB / Σ DDT
		1980													
COD (Gadus morhua)															
IVc 34 F2	England/ Wales	Sep	19(2)	26-66 (38)	190-2888 (703)	15F 4M 2-4 yrs (2.3)				0.11 1.1 0.45 0.13	0.67 2.7 1.2 0.23	0.063 1.1 0.29 0.11	0.071 2.5 0.56 0.26	0.86 4.9 2.1 0.46	5.5 52. 19. 4.8	9.0
IVc 32 F1	"	May	20(2)	25-44 (32)	163-1037 (382)	11F 9M 1-2 yrs (1)				1.4 2.8 2.2 0.18	0.078 0.53 0.38 0.060	0.078 1.8 0.97 0.24	0.25 0.65 0.42 0.054	0.4 2.7 1.8 0.32	4.3 13. 7.1 1.2	3.9
VIIa 35 E6	"	Sep	23(2)	26-42 (33)	206-819 (438)	16F 7M 1 yr				<0.02 0.63 0.41 0.14	0.05 0.12 0.10 0.016	<0.02 1.2 0.80 0.28	0.16 0.58 0.42 0.095	0.59 2.0 1.3 0.31	< 2.0 0.76 0.42	0.6
IVb 39 F4	Netherlands	Feb	27(3)	(96)	-	(6 yrs)	53.6	0.16	0.16	0.36	0.94	0.52	0.63	2.6	8.2[a]	3.2
IVc 35 F5	"	Oct	21(3)	(63)	(2710)	(3.5 yrs)	58.8	0.22	0.12	0.36	0.28	0.34	0.18	0.91	13.8[a]	15.2
IVc 32 F3	"	Oct	10(1)	57-61 (59)	1400-2200 (1830)	3F 7M 1978 year class	6.9 61.5 37.4 19.3	0.017 0.150 0.072 0.041	<0.010 0.093 0.064 0.030	0.055 0.490 0.252 0.136				0.47 3.30 1.54 -		
IVc 34 F4	"	Oct 1979	25(3)	(74)	(4690)	(4 yrs)	56.2	0.330	0.15	0.41	0.83	0.53	0.26	2.0	23.5[a]	11.8

(1) Each liver analysed individually
(2) Livers bulked into several sub-samples prior to analysis
(3) Livers bulked into one sample and homogenized prior to analysis
a) PCB concentration obtained by extrapolation of concentrations of 17 individual PCB components

Table 2b[2]. Organochlorines in Fish Liver (fat weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat	HCB	α-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.		min max MEAN s.d.	
		1980														
COD (cont'd)																
21 44 G1 (Kattegat)	Sweden	Sep	20(1)	23-28 (25.5)	191-275 (229)		7.43 55.7 23.1				0.34 2.18 1.10 0.49	0.13 1.71 0.42 0.30	< 1.00 0.14 0.29	0.46 3.8 1.7 0.95	2.4 16. 8.2 3.2	4.8
PLAICE (Pleuronectes platessa)																
IVc 34 F2	England/ Wales	Sep	20(2)	28-37 (31.6)	198-620 (366)	12F 8M 2-4 yrs (2.3)				0.55 2.2 1.4 0.38	0.050 0.30 0.16 0.054	<0.02 1.9 0.8 0.25	0.15 2.6 1.5 0.53	0.45 4.7 2.5 0.94	0.15 3.7 1.4 0.78	0.56
IVc 32 F1	"	Jul	10(3)	24-29 (27)	175-302 (237)	4F 6M 2-3 yrs (2.3)				1.2	0.15	1.1	1.0	2.3	3.0	1.3
VIIa 35 E6	"	Sep	20(2)	20-30 (26)	115-362 (219)	12F 8M 2-3 yrs (2.2)				0.069 0.48 0.36 0.10	<0.02 0.22 0.13 0.047	0.017 1.3 0.88 0.58	<0.02 0.12 0.08 0.03	0.031 1.6 1.1 0.36	< 0.39 0.29 0.05	0.26
FLOUNDER (Platichthys flesus)																
IVc 32 F1	England/ Wales	May	50(2)	15-39 (25)	35-450 (145)	30F 20M 2-8 yrs (4.4)				4.2 5.5 4.9 0.36	0.36 0.83 0.65 0.14	2.9 7.9 5.4 1.3	0.30 5.0 2.2 1.4	4.4 15. 7.6 3.1	2.3 15. 7.1 4.0	0.93

(1) Each liver analysed individually
(2) Livers bulked into several sub-samples prior to analysis
(3) All livers bulked into one sample and homogenized prior to analysis

Table 2b[2]. Organochlorines in Fish Liver (fat weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat	HCB	α-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.		min max MEAN s.d.	
		1980														
FLOUNDER (cont'd)																
IVc 31 F3 (Western Scheldt Estuary)	Netherlands	Aug.	10[3]	26-31 (29.5)	240-430 (303)	5F 5M 1975-1978 (1976)	17.5	0.056	0.085	0.22				0.41	4.5[b]	11.0
IVc 32 F3 (N. of Goeree)	"	Sep	8[3]	22-32 (27)	110-390 (229)	6F 2M 1976-1978 (1977)	14.7	0.34	0.073	0.15				0.63	11.[b]	17.5
IVc 33 F4	"	Aug	9[3]	31-39 (34.7)	340-820 (522)	7F 2M 1975-1977 (1976)	21.1	0.42	0.15	0.14				0.57	19.[b]	33.3
IVc 35 F5 (Dutch Shallows-West Wadden Sea)	"	Sep	10[3]	28-35 (31.5)	215-500 (359)	7F 3M 1975-1977 (1976)	15.3	0.057	0.086	0.034				0.31	11.[b]	35.5
IVb 36 F6 IVc 35 F6 (Ems Estuary-Oude Wester Eems (N))	"	Aug	10[3]	21-27 (24.5)	110-220 (167)	8F 2M 1978	18.0	0.29	0.067	0.26				0.71	5.9[b]	8.3

(3) Livers bulked into one sample and homogenized prior to analysis

(b) PCB concentration is sum of 22 individual chlorobiphenyl compounds

Table 2b[2]. Organochlorines in Fish Liver (fat weight basis) (cont'd)

Source	Country	Date of collection	No. analysed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT min max MEAN s.d.	Σ DDT	PCBs min max MEAN s.d.	PCB / Σ DDT
		1980														
COMMON DAB (Limanda limanda)																
IVb 36 F8	Germany, Fed. Rep.	Jun	10(1)	23-29 (25)			9.9 37.8 20.5								1.6 7.8 5.2	
EUROPEAN HAKE (Merluccius merluccius)																
VIIe 28 E4	Netherlands	Mar	32(3)	(46)	(790)	(3.5) yrs	57.2	0.09	0.07	0.17	0.21	0.11	0.17	0.53	4.4[a]	8.3

(1) Each liver analysed individually

(2) All livers bulked into one sample and homogenized prior to analysis

a) PCB concentration obtained by extrapolation of concentrations of 17 individual PCB components

Table 2c[1]. Organochlorines in Shellfish (wet weight basis)

Source	Country	Date of collection	Number analysed	Size (mean) (mm)	Concentration (mg/kg wet weight)									
					% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT min max MEAN s.d.	Σ DDT	PCBs min max MEAN s.d.	PCB / Σ DDT
		1980												
*BLUE MUSSEL (Mytilus edulis)														
IIIa 46 G1	Sweden	Sep	77		0.88	0.0002			0.0018	-	0.0006	0.0024	0.025	10.4
IVc 31 F3 (W. Scheldt-Flushing)	Nether-lands	May	50	36-56 (45)	0.95								0.07[b]	
"	"	Oct	50	32-55 (43)	1.82								0.12[b]	
IVc 31 F3 (W. Scheldt-Pas van Terneuzen)	"	May	50	36-56 (43)	0.58								0.07[b]	
"	"	Oct	50	39-56 (46)	0.78								0.11[b]	
IVc 32 F4 (W. Scheldt-Zuidergat)	"	May	50	31-56 (41)	0.88								0.18[b]	
"	"	Oct	50	34-52 (42)	0.90								0.19[b]	
IVc 32 F3 (E. Scheldt-Hammen)	"	Apr	50	47-67 (60)	0.86								0.08[b]	
"	"	Oct	50	45-66 (52)	1.48								0.07[b]	
IVc 33 F4 (Meetpost Noordwijk)	"	Apr	50	65-88 (76)	1.89								0.12[b]	
"	"	Oct	50	48-69 (57)	2.46								0.25[b]	

*Whole soft body - analysed in bulk
b)PCB concentration is sum of 22 individual chlorobiphenyl compounds

Table 2c[1]. Organochlorines in Shellfish (wet weight basis) (cont'd)

Source	Country	Date of collection	Number analysed	Size (mean) (mm)	Concentration (mg/kg wet weight)									
					% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT Σ DDT min max MEAN s.d.		PCBs min max MEAN s.d.	PCB Σ DDT
		1980												
*BLUE MUSSEL (Mytilus edilus)		(cont'd.)												
IVc 35 F5 (Dutch Shallows-W. Wadden Sea)	Netherlands	Apr	50	45-70 (58)	1.83								0.08[b]	
"	"	Oct	50	43-64 (52)	1.46								0.11[b]	
IVb 36 F6 (Ems Estuary-Borkum)	"	Apr	50	31-58 (43)	1.35								0.04[b]	
IVc 35 F6 (Ems Estuary - Oude Wester Ems (N))	"	Apr	50	30-58 (42)	1.84								0.04[b]	
"	"	Oct	50	36-52 (43)	0.70								0.06[b]	
IVc 35 F6 (Ems Estuary - Bocht van Watum (S))	"	Apr	50	42-70 (60)	1.34								0.03[b]	
IVc 31 F2	Belgium	Sep	150		3.0	0.002	0.003	0.006	0.007	0.006	<0.001	0.013	0.26	

*Whole soft body - analysed in bulk

b) PCB concentration is sum of 22 individual chlorobiphenyl compounds

Table 2c[1]. Organochlorines in Shellfish (wet weight basis) (cont'd)

Source	Country	Date of collection	Number analysed	Size (mean) (mm)	Concentration (mg/kg wet weight)									
					% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT Σ DDT min max MEAN s.d.		PCBs min max MEAN s.d.	PCB / Σ DDT
		1980												
*COMMON SHRIMP (Crangon crangon)														
IVc 31 F3 (W.Scheldt - W. of Breskens)	Netherlands	Apr	109	50-79 (64)	0.63								0.02[b]	
"	"	Oct	100	51-75 (62)	2.2								0.08[b]	
IVc 32 F4 (Maasvlakte)	"	Apr	100	51-80 (63)	0.47								0.03[b]	
"	"	Oct	100	51-80 (62)	0.71								0.04[b]	
IVc 33 F4 (Meetpost Noordwijk)	"	Apr	139	50-80 (61)	0.52								0.03[b]	
"	"	Oct	100	55-77 (68)	0.70								0.03[b]	
IVc 35 F5 (Dutch Shallows - Western Waddensea)	"	Apr	109	49-67 (53)	1.04								0.02[b]	
"	"	Oct	100	51-75 (59)	0.82								0.03[b]	
IVc 35 F6 (Ems Estuary - Oude Wester Eems (S))	"	Apr	100	50-65 (53)	0.95								0.02[b]	
"	"	Oct	157	44-70 (51)	0.79								0.02[b]	
IVc 31 F2	Belgium	Sep	150		1.9	0.002	<0.002	0.001	0.003	<0.001	<0.001	0.003	0.039	

*Tail muscle - analysed in bulk
b)PCB concentration is sum of 22 individual chlorobiphenyl compounds

Table 2c[2]. Organochlorines in Shellfish (fat weight basis)

Source	Country	Date of collection	Number analysed	Concentration (mg/kg fat weight)									
				% fat min max MEAN s.d.	HCB min max MEAN s.d.	α-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT min max MEAN s.d.	Σ DDT	PCBs min max MEAN s.d.	PCB Σ DDT
		1980											
BLUE MUSSEL (Mytilus edilus)													
IIIc 40 G0	Denmark	Oct	42	6.7								<1.2[x)]	
IIIa 46 G1	Sweden	Sep	77	0.88	0.02			0.20		0.07	0.27	2.8	10.4
IVc 31 F2	Belgium	Sep	150	3.0	0.07	0.10	0.21	0.23	0.20	-	0.43	9.15	21.3
COMMON SHRIMP (Crangon crangon)													
IVc 31 F2	Belgium	Sep	150	1.9	0.13	-	0.05	0.23	-	-	0.23	9.1	39.6

x) Value expressed on a dry weight basis

Figure 1 Areas sampled in the Northeast Atlantic in 1980.

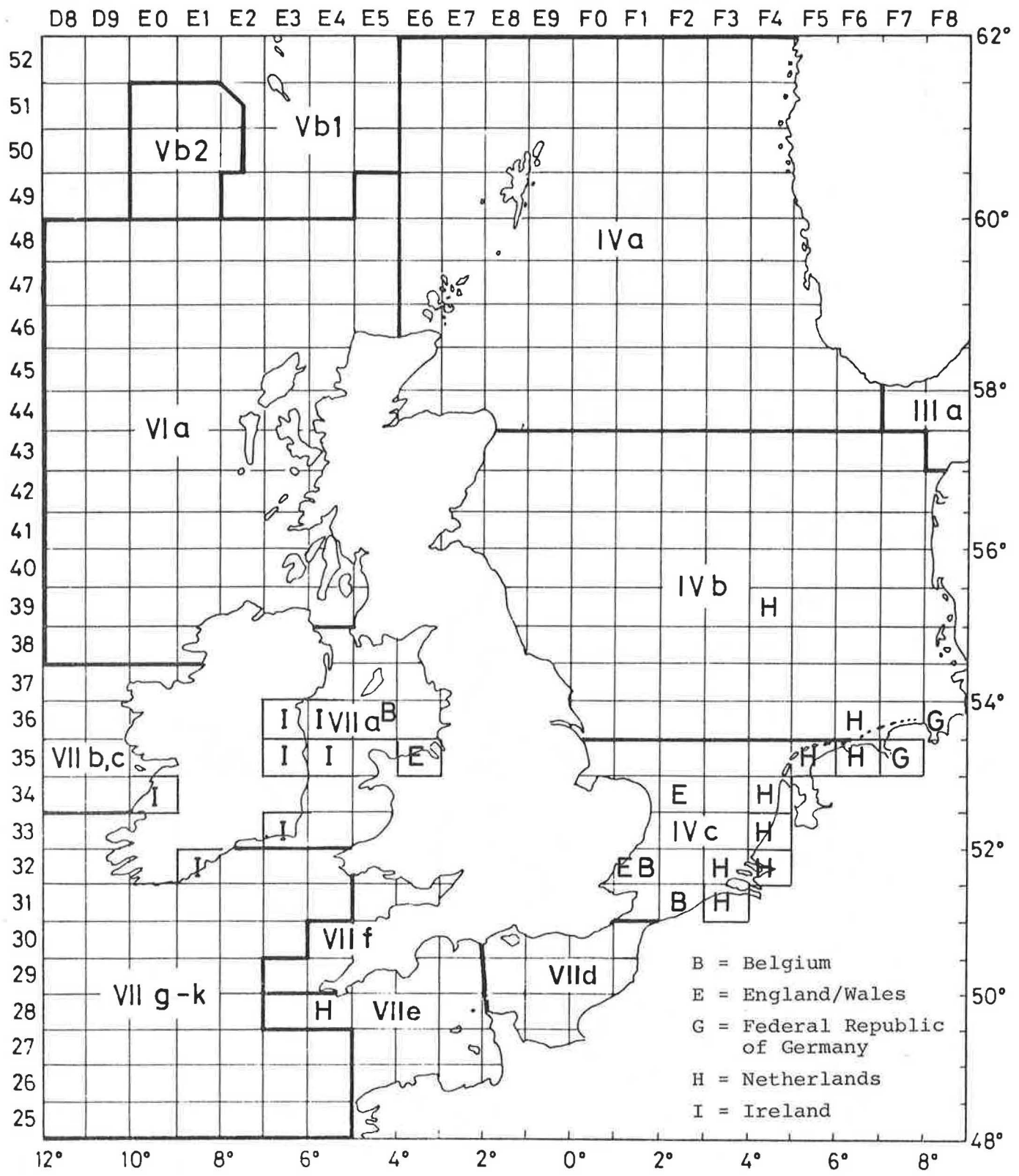
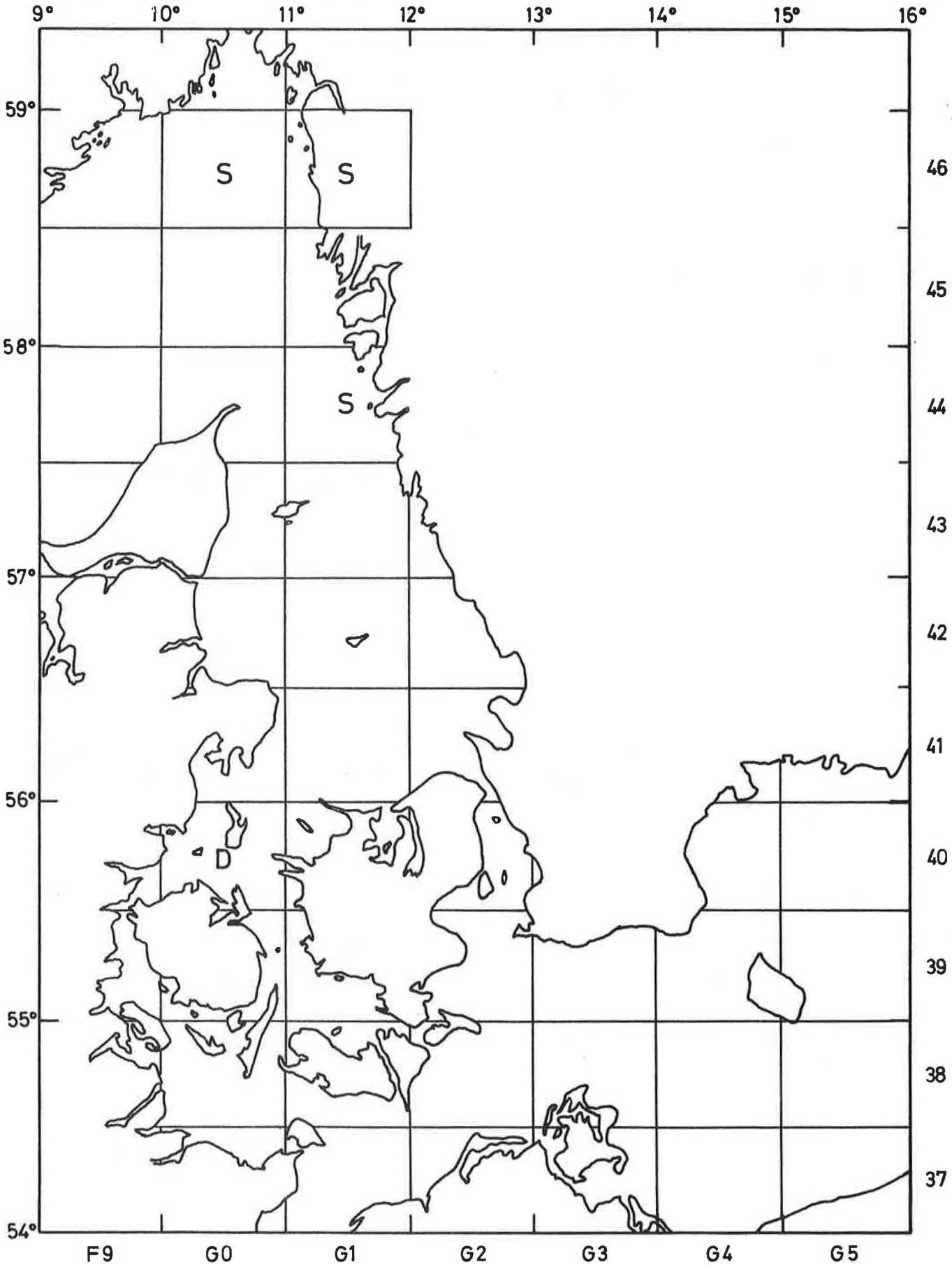


Figure 2 Areas sampled by Denmark (D) and Sweden (S) in 1980.



THE ICES COORDINATED MONITORING PROGRAMME, 1981

This report presents the results for 1981 of the analyses for trace metals and organochlorines in samples of fish and shellfish collected in connection with the ICES Coordinated Monitoring Programme. According to this programme, member countries of ICES submit the results of their analyses for certain specified contaminants in samples of fish and shellfish which are collected annually from a number of specified areas in the North Atlantic.

This is the eighth and final year of the Coordinated Monitoring Programme, which has been conducted since 1974. The full history of the programme is given in the report on the 1980 results of the Coordinated Monitoring Programme (see p.1, this volume). As stated in the above-mentioned report, particular procedures have been developed and recommended for the composition and preparation of samples of fish and shellfish prior to analysis and for reporting the results obtained under the programme to ICES. These procedures have been amended and expanded from time to time. The most recent Coordinated Monitoring procedures, those which applied to the 1981 programme, are contained in Annex II to the 1978 Report of the ICES Advisory Committee on Marine Pollution (Coop. Res. Rep. No. 84 (1979)).

As a result of a review of the results obtained during the first six years of the Coordinated Monitoring Programme, which was conducted in 1979-1980 (and published in Coop. Res. Rep. No. 126 (1984)), a new programme was developed to replace the Coordinated Monitoring Programme. This new programme, entitled the Cooperative ICES Monitoring Studies Programme, is based on revised recommended procedures for the composition of samples of fish and shellfish, and the reporting of results, that have been devised individually for each of the three aims of monitoring using fish or shellfish as indicator species agreed within ICES. These aims of monitoring are:

(1) the provision of a continuing assurance of the quality of marine foodstuffs with respect to human health;

(2) the provision over a wide geographical area of an indication of the health of the marine environment in the entire ICES North Atlantic area;

(3) the provision of an analysis of trends over time in pollutant concentrations in selected areas, especially in relation to the assessment of the efficacy of control measures.

A full description of the monitoring procedures to meet each of these three objectives has been published in Coop. Res. Rep. No. 126 (1984). The new Cooperative ICES Monitoring Studies Programme began in 1982 and the results will be published in the Cooperative Research Report series. It should be noted that these new procedures were not required to be followed in 1981 and, as is emphasized later in this report, this imposes certain constraints on the extent to which comparisons can be drawn.

Laboratories submitting data for inclusion in this monitoring report must participate in periodic intercalibration exercises on the analyses of heavy metals and organochlorine residues in biological materials, so that the quality of data produced by each laboratory may be verified. The results of the intercalibration exercises applicable to the various types of data in this report can be found as follows: (1) for trace metal data - Coop. Res.

Rep. No. 111 (1982), (2) for data on organochlorine pesticides - Coop. Res. Rep. Nos. 108 (1981) and 115 (1982), and (3) for data on PCBs - Coop. Res. Rep. No. 115 (1982).

RESULTS

Data were received for 1981 from Belgium, Denmark, England/Wales, the Federal Republic of Germany, Ireland, the Netherlands, Norway, and Sweden. The following species of fish were analysed: cod (Gadus morhua), plaice (Pleuronectes platessa), flounder (Platichthys flesus), dab (Limanda limanda), common sole (Solea solea), whiting (Merlangius merlangus), herring (Clupea harengus), sprat (Sprattus sprattus), Atlantic mackerel (Scomber scombrus), and European eel (Anguilla anguilla). The shellfish analysed were: blue mussel (Mytilus edulis), common shrimp (Crangon crangon), and oyster (Crassostrea gigas). The locations of the sampling areas are shown in Figures 1 and 2.

The discussion of the results below relates to mean concentrations only, unless otherwise indicated. Although some comparisons are made with the results reported in previous years of the programme, it must be strongly emphasized that these differences in many cases may only be apparent, because (1) the stipulated sampling procedures have not in the main been rigorously followed and (2) the level of agreement between data produced by different laboratories places certain constraints on the degree of valid comparisons possible. The overall result is that the data exchanged under this programme will only reveal gross (order of magnitude) changes with time or similar scale differences between areas. In no case are comparisons statistically significant.

METALS IN FISH

The results submitted on the analyses of trace metals in fish muscle are presented in Table 1a and the data on similar analyses of fish liver are given in Table 1b.

Data were submitted on seven samples of cod. Average mercury concentrations in muscle were reported from 0.05 - 0.37 mg/kg wet weight. This is similar to the concentration ranges reported in previous years. The highest mercury concentration found in the muscle of an individual fish was 0.67 mg/kg in a cod taken from the Irish Sea (Liverpool Bay). This is also similar to results from earlier years, when the highest concentrations of mercury were found in cod from the Irish Sea.

Seven samples of plaice were analysed. The average mercury concentrations in the muscle of these fish ranged from 0.04 to 0.22 mg/kg on a wet weight basis. The highest average concentration was reported in a sample taken from the eastern part of the Irish Sea (Liverpool Bay), in which the fish with the highest individual mercury level (0.67 mg/kg) was also found. These results are similar to those reported in the previous year.

Data were reported on six samples of flounder. The average mercury concentrations in muscle were in the range 0.02 - 0.30 mg/kg, with the highest values in samples from the Southern Bight of the North Sea.

Results submitted on a sample of dab from the eastern part of the Irish Sea showed an average mercury concentration in muscle of 0.31 mg/kg, while a

sample of dab from the Kattegat was reported to contain an average mercury concentration of 0.07 mg/kg in muscle.

The average mercury concentrations in the muscle of the three samples of common sole analysed fell in a narrow range (0.25 - 0.30 mg/kg), while for two samples of whiting the average mercury concentrations were virtually identical (0.22 and 0.23 mg/kg) in the muscle tissue. In one sample of herring, the mean mercury concentration in muscle was reported as 0.015 mg/kg.

The concentrations of mercury in the liver tissue did not vary geatly from species to species in the data reported for 1981. The overall range of average mercury concentrations in the species analysed was 0.03 - 0.20 mg/kg wet weight. The concentrations in flounder and sole liver were at the upper end of this range, as also was the concentration in the liver of a sample of cod from the eastern Irish Sea.

The cadmium concentrations in fish muscle tissue were generally reported to be below the limits of detection of the analytical methods used. Only one positive value was reported for cadmium in fish muscle; this was an average concentration of 0.017 mg/kg (wet weight) in a sample of cod from the Irish Sea. Concentrations of cadmium in fish liver tissue are higher than those in muscle tissue, so more data were available for liver. One value was reported for cadmium in cod liver, namely, 0.033 mg/kg wet weight in a sample from the Irish Sea. Data on four samples of plaice liver showed a concentration range of 0.106 - 0.126 mg/kg. Values submitted on cadmium in the liver of three samples of flounder and one sample of dab ranged between 0.035 and 0.4 mg/kg.

As with cadmium, the difficulties of analysing the low concentrations of lead in fish tissues, coupled with problems of sample contamination, have resulted in few positive values being reported for lead. The results available on the concentrations of lead in the muscle tissue of cod, flounder, and sole show levels generally in the range 0.012 - 0.064 mg/kg, except for one sample of cod from the Irish Sea which was reported to contain 0.29 mg/kg. In liver tissue, lead concentrations in four samples of plaice were 0.086 - 0.196 mg/kg and in one sample of flounder 0.051 mg/kg.

The concentrations of copper reported in fish muscle tissue were similar to those reported in previous years. All values were below 0.5 mg/kg and there were no apparent differences between species or between sampling areas. In liver tissue, copper concentrations were similar in plaice, dab, and whiting, ranging from 2.3 - 6.2 mg/kg wet weight. In cod liver, the copper levels were 10.0 - 10.6 mg/kg, while in flounder liver the concentrations were marginally higher (11.3 - 14.0 mg/kg).

The concentrations of zinc in the muscle tissue of all species of fish analysed ranged between 3.0 and 11.1 mg/kg, with flounder containing concentrations at the upper end of this range. These results are similar to those reported in earlier years. In liver tissue, the lowest zinc concentrations were found in whiting (5.0 mg/kg), while the livers of cod and sole were reported to contain slightly higher concentrations (23 - 28 mg/kg). Plaice (with the exception of one sample containing 8.0 mg/kg), flounder and dab had zinc concentrations of 31 - 47 mg/kg in the liver tissue.

METALS IN SHELLFISH

The data reported on trace metal concentrations in shellfish are presented in Table 1c[1] on a wet weight basis and in Table 1c[2] on a dry weight basis.

Table 1c[1] gives the overall results of analyses of 17 samples of Crangon crangon taken from the coast of Belgium. Mercury concentrations averaged 0.2 mg/kg wet weight; this value is slightly higher than those reported in previous years (0.13 mg/kg in 1980 and 0.03 - 0.12 mg/kg in 1979). The average cadmium concentration in Crangon was reported as 0.015 mg/kg wet weight, while the average lead concentration was given as 0.05 mg/kg wet weight. Mean copper and zinc concentrations in Crangon were reported to be 12.6 mg/kg and 24.2 mg/kg wet weight, respectively.

The results of analyses of six samples of blue mussels from Norway, two from Sweden and four from Ireland are also given in Table 1c[1]. Mercury concentrations were reported in the range 0.016 - 0.09 mg/kg wet weight, with the lowest concentration in a sample from the Swedish coast on the Kattegat and the highest concentration from Grenlandsfjord/Helgerofjord in Norway. Cadmium concentrations in the six Norwegian samples and two of the Irish samples ranged from 0.25 to 1.2 mg/kg wet weight, with the highest value again reported for the sample from Grenlandsfjord/Helgerofjord.

A mercury concentration of 0.04 mg/kg wet weight was reported for a sample of oysters from Cork Harbour, Ireland, while a cadmium concentration of 0.23 mg/kg was reported for a different sample of oysters from this site.

In Table 1c[2] the results are given for analysis of eleven samples of blue mussels and one sample of oysters on a dry weight basis. Mercury concentrations in mussels were reported to range from 0.074 to 0.67 mg/kg dry weight. Values of cadmium were reported in the range 1.0 to 8.7 mg/kg dry weight. Results for lead, copper, and zinc were only reported for two samples from Sweden and an overall mean of 12 samples from the Belgian coast. Lead concentrations ranged from 1.0 to 3.4 mg/kg, copper from 7.0 to 9.5 mg/kg, and zinc from 68 to 138 mg/kg dry weight. In all three cases, the concentrations from the coast of Belgium were higher than those from Sweden.

ORGANOCHLORINE PESTICIDE AND PCB RESIDUES IN FISH

The data submitted on concentrations of organochlorine pesticide and PCB residues in fish muscle tissue are presented in Table 2a[1] on a wet weight basis and in Table 2a[2] on a fat weight basis.

The concentrations of dieldrin in the muscle of cod, plaice, flounder, dab, and mackerel were at or below 0.007 mg/kg on a wet weight basis, while dieldrin concentrations in herring and sprat ranged from 0.007 to 0.015 mg/kg wet weight. Dieldrin values in the two samples of whiting were 0.03 and 0.04 mg/kg wet weight. These levels were similar to those reported in 1980. The highest concentration of dieldrin, 0.10 mg/kg wet weight, was reported in a sample of eel. On a fat weight basis, the dieldrin concentrations in the muscle of all fish species except eel were at or below 0.3 mg/kg, which is lower than the values reported in 1980 on a fat weight basis. For eel, dieldrin was reported at 0.81 mg/kg on a fat weight basis.

Concentrations of the individual residues of the DDT group were reported from 0.001 - 0.05 mg/kg wet weight in the muscle of cod, plaice, flounder, dab, sole, whiting, herring, sprat, and mackerel. The Σ DDT levels for these species ranged from 0.006 - 0.09 mg/kg wet weight. These values are similar to the results reported the previous year. For the sample of eel, individual DDT residue concentrations were reported to range from 0.015 to 0.072 mg/kg wet weight with a Σ p,p'DDT of 0.14 mg/kg. On a fat weight

basis, the highest concentration of an individual DDT group residue (p,p'DDE) was 0.55 mg/kg among the values reported for the fish except eel; the maximum Σ DDT concentration was 0.80 mg/kg fat weight. For eel, the Σ p,p'DDT concentration was reported to be 1.1 mg/kg fat weight. As with dieldrin, the concentrations reported on a fat weight basis are lower than those reported in 1980, although the wet weight based concentrations are virtually the same as in the previous year.

PCB concentrations in the muscle of cod, plaice, flounder, dab, sole, and whiting were reported in the range <0.001 - 0.168 mg/kg on a wet weight basis, with the concentrations in flounder at the upper end of this range. In the muscle tissue of herring, sprat, and mackerel, the PCB concentrations (obtained by extrapolation from the concentrations of 18 individual PCB components) were reported in the range 0.075 to 0.22 mg/kg wet weight, while for eel muscle tissue the PCB concentration obtained by this method was 3.3 mg/kg. On a fat weight basis, PCB concentrations in cod, plaice, and dab muscle ranged from 1.3 to 9.2 mg/kg, with values in plaice at the higher end of this range. For the muscle of herring, sprat, and mackerel, PCB concentrations obtained by extrapolation from the concentrations of 18 individual PCB components were reported generally in the range 0.9 to 2.3 mg/kg on a fat weight basis, although one sample of mackerel was reported to contain 7.4 mg/kg fat weight. In flounder muscle, the concentrations of PCBs were slightly higher than in those of most of the other species reported here on a fat weight basis, showing a range of 9.1 - 21 mg/kg. The highest PCB concentration (extrapolated from 18 PCB components) was reported for eel, 26.2 mg/kg fat weight.

Concentrations of γ-hexachlorocyclohexane (γ-HCH) were reported for the muscle tissue of herring, sprat, and mackerel in the range 0.001 to 0.005 mg/kg on a wet weight basis, while on a fat weight basis γ-HCH was reported from 0.023 - 0.16 mg/kg in these species. Hexachlorobenzene (HCB) was also analysed in the muscle tissue of herring, sprat, and mackerel, with reported concentrations in the range 0.002 - 0.004 mg/kg on a wet weight basis and 0.022 - 0.15 mg/kg on a fat weight basis. HCB concentrations in the muscle of one sample of eel were reported to be considerably higher than in the other species, namely, 0.78 mg/kg on a wet weight basis (6.1 mg/kg fat weight).

The data on the concentrations of organochlorine residues in fish liver are given in Table 2b[1] on a wet weight basis and in Table 2b[2] on a fat weight basis.

The concentrations of dieldrin reported in the livers of cod, plaice, dab, sole, whiting, and hake were in the range 0.08 - 0.52 mg/kg on a wet weight basis. Dieldrin concentrations in cod and whiting liver were at the higher end of this range. The dieldrin concentrations reported for flounder on a wet weight basis were slightly lower than those reported for the other species, at 0.015 - 0.03 mg/kg. With the exception of one sample each of plaice and sole, dieldrin concentrations in fish liver on a fat weight basis were from 0.15 - 1.25 mg/kg. For the one sample of sole liver, the concentration of dieldrin was 5.4 mg/kg fat weight, while the sample of plaice from the Thames Estuary was reported to contain 3.4 mg/kg fat weight.

The results reported for the individual residues of the DDT group on a wet weight basis indicated concentrations in plaice and flounder liver of <0.03 - 0.18 mg/kg, with a maximum Σ DDT for these species of 0.36 mg/kg. Individual DDT isomer concentrations in dab, sole, and hake liver were 0.09 - 0.39 mg/kg wet weight, with Σ DDT levels up to 0.72 mg/kg. Results

reported for cod and whiting liver were in the range 0.10 - 0.74 mg/kg wet weight for the individual residues and 0.5 - 1.7 mg/kg for total DDT. On a fat weight basis, the concentrations in the various species are grouped in a somewhat different manner. At the lower end are plaice, dab, and hake, containing individual DDT residue concentrations in liver of 0.17 - 0.63 mg/kg fat weight and Σ DDT from 0.91 to 1.29 mg/kg. Cod, flounder, and whiting livers all contained similar concentrations; individual residue levels were between 0.21 and 1.9 mg/kg fat weight, while Σ DDT was reported from 0.9 - 4.5 mg/kg. The highest concentrations on a fat weight basis were reported for the one sample of sole liver, in which individual residue levels fell between 1.71 and 5.56 mg/kg and Σ DDT was 10.3 mg/kg fat weight.

The concentrations of PCBs reported in the liver of plaice, flounder, dab, and hake were at or below 2.0 mg/kg wet weight, while in the liver of cod, sole, and whiting somewhat higher PCB concentrations were reported, 1.4 - 8 mg/kg wet weight. On a fat weight basis, PCB concentrations in the liver tissue of most of the species studied were below 24 mg/kg, however one sample of plaice liver contained 30 mg/kg and the one sample of sole 46 mg/kg fat weight.

Concentrations of HCB were reported for three samples of cod liver and one sample of hake liver. These values were in the range 0.04 - 0.12 mg/kg wet weight (0.09 - 0.25 mg/kg fat weight).

ORGANOCHLORINE PESTICIDE AND PCB RESIDUES IN SHELLFISH

Data on organochlorines in shellfish are presented in Table 2c[1] on a wet weight basis and in Table 2c[2] on a fat weight basis.

Data on PCB concentrations (wet weight basis) were submitted for ten samples of mussels, in the range 0.02 - 0.15 mg/kg, with the lowest value on the Swedish coast of the Skagerrak and the highest on the coast of Belgium. In one sample of Crangon from the Belgian coast, a PCB value of 0.034 mg/kg wet weight was reported. For the samples for which values on a fat weight basis were reported, PCB concentrations ranged from 0.8 to 6.2 mg/kg.

Σ DDT concentrations were reported for four samples of mussels and the one sample of Crangon; the range was 0.003 - 0.013 mg/kg wet weight (0.21 - 0.5 mg/kg fat weight). Concentrations of γ-HCH in the three samples of mussels taken by Sweden were reported from 0.048 - 0.054 mg/kg on a fat weight basis.

SUMMARY

The data submitted for 1981 on concentrations of trace metals and organochlorine residues in ten species of fish and three species of shellfish have been presented and discussed briefly. In comparison with previous years, data were submitted on fewer samples of certain species, especially cod, and covering a somewhat narrower geographical range. On the basis of these data, keeping in mind the difficulties of comparing data from different laboratories and samples taken in different years, there do not appear to be notable changes in the concentrations of trace metals or organochlorines in the organisms studied over the past few years. It must be noted, however, that any comparisons made have been on a non-statistical basis.

Table 1a Metals in Fish Muscle

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min / max / MEAN / s.d.	Cd min / max / MEAN / s.d.	Pb min / max / MEAN / s.d.	Cu min / max / MEAN / s.d.	Zn min / max / MEAN / s.d.	Cr min / max / MEAN / s.d.	Ni min / max / MEAN / s.d.
		1981												
COD (Gadus morhua)														
IVc 32F1 (Thames Estuary)	England/ Wales	Oct	21	41-70 (51.6)	730-3596 (1489)	M(13) F(8)	2-4 (2.2)	0.05 0.17 0.10 0.007			<0.2 0.3 <0.2 -	2.7 4.1 3.3 0.1		
IVc 31F2	Belgium	Nov	20	39-62 (53)	586-2817 (1735)	M(9) F(11)	1-2 (2)	0.03 0.23 0.12 0.06	<0.005	<0.010 0.025 0.012 0.007	0.15 0.28 0.21 0.04	3.48 5.10 4.22 0.43	<0.01 0.02 - -	<0.01 0.09 - -
VIIa 35E6 (Liverpool Bay)	England/ Wales	Oct	10	37-75 (50)	498-4443 (1661)	M(4) F(6)	1-4 (1.9)	0.22 0.67 0.37 0.04			<0.2 0.7 <0.4 -	3.0 4.0 3.6 0.1		
VIIa 36E3 36E4 35E3 35E4	Ireland	Nov	35	38.5-71 (49.9)				0.016 0.188 0.091 0.050	0.001 0.086 0.017 0.022	0.144 0.441 0.288 0.070	0.02 0.65 0.20 0.14	1.56 4.18 3.08 0.68		
IIIa 43G1	Sweden	Sep	20	25-27.5 (26.4)	185-224 (209)	M(8) F(12)	2-5 (2)	0.031 0.095 0.053						
IIa 48G0 (Solbergstrand)	Norway	Dec	10	28-63 (44)	155-2160 (955)	M(3) F(5)	1-3 (1.8)	0.014 0.116 0.050 0.031	0.005 0.051 0.015 0.014					

Table 1a Metals in Fish Muscle (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
		1981												
COD (cont'd)														
IIIa 47G0 (Færder)	Norway	Dec	10	46-58 (51)	840-1710 (1228)	M(2) F(8)	2	0.038 0.098 0.073 0.016	<0.005 0.008 <0.006 0.001					
PLAICE (Pleuronectes platessa)														
IVc 32F1	England/ Wales	Jul	18	22-31 (24.6)	129-343 (170)	M(12) F(6)	3-4 (3.2)	0.005 0.12 0.08 0.005			<0.2 0.3 <0.3 -	3.0 10.0 7.0 0.4		
IIIa 44F9	Denmark	Aug	20	24.9-32.5 (27.9)	157-376 (229)		2-4 (3.3)	0.032 0.064 0.045 0.009						
IIIa 43F8	Denmark	Aug	10	24.8-32.2 (26.8)	159-312 (199)	M(6) F(4)	3-4 (3.2)	0.042 0.106 0.072 0.017						
IVb 41F7	Denmark	Aug	20	21-32.5 (27.1)	148-306 (216)	M(6) F(14)	2-5 (2.8)	0.027 0.061 0.042 0.010						
IVb 40F7	Denmark	Aug	13	23-28.6 (25.2)	123-241 (161)	M(5) F(8)	2-7 (2.8)	0.028 0.215 0.053 0.050						

Table 1a Metals in Fish Muscle (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
		1981												
PLAICE (cont'd)														
IVb 36F8	Germany, Fed. Rep. of	May/ June	20	22-30 (26)	107-250 (180)			0.04 0.10 0.06 0.02						
VIIa 35E6	England/ Wales	Oct	25	26-38 (30.3)	209-880 (361)	M(7) F(18)	2-8 (3.6)	0.09 0.67 0.22 0.03			<0.2 3.3 <0.6 -	3.0 8.0 6.0 0.2		
FLOUNDER (Platichthys flesus)														
IIIa 48G0	Norway	Dec	8	30-63 (38)	340-780 (470)		4-6 (4.4)	0.040 0.168 0.077 0.043	<0.005 0.052 <0.015 0.016					
IIIa 46G1	Sweden	Oct	20	14.5-22 (18.1)	52-238 (115)	M(7) F(13)	2-5 (4)	0.009 0.042 0.020						
IVb 41F7	Denmark	Feb	10	23.5-33 (28.7)	170-465 (311)	M(2) F(8)	3-6 (4.2)	0.026 0.186 0.074 0.053						
IVb 36F8	Germany, Fed. Rep. of	May/ Jun	20	15-28 (20)	37-245 (92)			0.05 0.20 0.08 0.03						

Table 1a Metals in Fish Muscle (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
		1981												
FLOUNDER (cont'd)														
IVc 31F2	Belgium	Apr	20	26-42 (31)	185-730 (354)	M(12) F(8)	1976-1979 year classes	0.11 0.58 0.30 0.16	<0.005 0.012 <0.005 -	<0.010 0.100 0.021 0.021	0.22 0.49 0.34 0.07	4.80 22.11 11.06 4.77	<0.01 <0.01 <0.01 -	0.01 0.10 0.04 0.04
IVc 32F1	England/ Wales	Jul	25	27-39 (30.9)	172-612 (287)	M(5) F(20)	3-6 (4.1)	0.14 0.36 0.26 0.01			<0.2 0.6 <0.4 -	3.0 12.0 8.0 0.5		
DAB (Limanda limanda)														
VIIa 35E6	England/ Wales	Oct	25	18-26 (21)	80-253 (115)	M(16) F(9)	3-5 (3.6)	0.18 0.71 0.31 0.03			<0.2 0.5 <0.3 -	2.0 10.0 6.0 0.4		
IIIa 43G1	Sweden	Sep	20	17.5-23.5 (20.7)	90-241 (161)	M(6) F(14)	3-9 (5)	0.033 0.147 0.070 -						
HERRING (Clupea harengus)														
IIIa 43G1	Sweden	Sep	20	14.5-17 (15.5)	31-52 (42)	M(2) F(18)	2-3 (2)	0.012 0.022 0.015 -						

Table 1a Metals in Fish Muscle (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.	Cr min max MEAN s.d.	Ni min max MEAN s.d.
		1981												
COMMON SOLE (Solea solea)														
IVc 32F2	Belgium	May	20	25-39	113-492	M(10)	3-20	0.12		<0.010	0.12	4.03	<0.01	0.01
				(31.4)	(275)	F(10)	(6.2)	0.79		0.055	0.36	7.41	0.03	0.10
								0.27	<0.005	-	0.25	5.09	<0.01	0.02
								0.15			0.06	0.88		0.03
VIIa 36E5	Belgium	May	20	24-43	129-1065	M(9)	4-24	0.04		<0.010	0.14	3.52	<0.01	0.03
				(31.2)	(337)	F(11)	(7.0)	0.58		0.292	0.35	6.39	0.04	0.22
								0.25	<0.005	0.064	0.25	4.94	<0.01	0.07
								0.14		0.078	0.06	0.79	-	0.05
VIIa 35E6	England/ Wales	Oct	25	21-26	83-187	M(19)	3-4	0.09			0.2	3.0		
				(23.4)	(129)	F(6)	(3.3)	0.69			0.7	6.0		
								0.30			<0.4	5.0		
								0.03			-	0.2		
WHITING (Merlangius merlangus)														
IVc 32F1	England/ Wales	Nov	25	24-44	138-746	M(4)	2-6	0.08			<0.2	2.0		
				(35.4)	(392)	F(21)	(3.7)	0.46			0.5	6.0		
								0.23			<0.3	3.0		
								0.02			-	0.2		
VIIa 35E6	England/ Wales	Oct	25	22-49	89-992	M(3)	1-4	0.07			<0.2	2.0		
				(27.3)	(187)	F(15)	(1.6)	0.66			0.3	15.0		
						*I(7)		0.22			<0.2	4.0		
								0.03			-	0.6		

*Immature

Table 1b Metals in Fish Liver

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.
		1981										
COD (Gadus morhua)												
IVc 32F1 (Thames Estuary)	England/ Wales	Oct	21*	41-70 (51.6)	730-3596 (1489)	M(13) F(8)	2-4 (2.2)	0.03			10.0	28.0
IVc 31F2	Belgium	Nov	10	39-60 (51)	586-2362 (1550)	M(2) F(8)	1-2 (2)	0.02 0.10 0.05 0.03				
VIIa 35E6 (Liverpool Bay)	England/ Wales	Oct	10*	37-75 (50)	498-4443 (1661)	M(4) F(6)	1-4 (1.9)	0.18			10.6	23.0
VIIa 36E3 36E4 35E3 35E4	Ireland	Nov	19	46.5-71 (56)				0.016 0.087 0.041 0.020	0.002 0.144 0.033 0.040			
IIIa 48G0 (Solberg-strand)	Norway	Dec	10(Cd) 5(Hg)	28-63 (44)	155-2160 (955)	M(3) F(5)	1-3 (1.8)	<0.02 0.07 <0.04 0.02	0.03 0.34 0.12 0.11			
IIIa 47G0 (Færder)	Norway	Dec	10	46-58 (51)	840-1710 (1228)	M(2) F(8)	2+	0.030 0.141 0.073 0.038	0.03 0.30 0.10 0.08			

*Tissues bulked into one sample and homogenized prior to analysis.

Table 1b Metals in Fish Liver (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.
		1981										
COD (cont'd)									on a dry weight basis			
IIIa 43G1	Sweden	Sep	20	25-27.5	185-224	M(8)	2-5		0.06	0.07	10	51
				(26.4)	(209)	F(12)	(2)		0.70	0.48	41	158
									0.20	0.26	25	114
									-	-	-	-
PLAICE (Pleuronectes platessa)									on a wet weight basis			
IVc 32F1	England/ Wales	Jul	18*	22-31	129-343	M(12)	3-4	0.08			4.0	8.0
				(24.6)	(170)	F(6)	(3.2)					
IIIa 44F9	Denmark	Aug	20	24.9-32.5	157-376		2-4		0.069	0.070	1.28	24.1
				(27.9)	(229)		(3.3)		0.179	0.232	5.90	46.8
									0.115	0.134	2.87	35.9
									0.029	0.044	1.08	5.08
IIIa 43F8	Denmark	Aug	10	24.8-32.2	159-312	M(6)	3-4		0.085	0.070	1.86	29.8
				(26.8)	(199)	F(4)	(3.2)		0.177	0.118	2.65	39.3
									0.126	0.086	2.28	33.6
									0.027	0.016	0.30	3.17
IVb 41F7	Denmark	Aug	20	21-32.5	148-306	M(6)	2-5		0.043	0.061	1.21	19.0
				(27.1)	(216)	F(14)	(2.8)		0.211	0.278	7.80	36.8
									0.106	0.123	2.91	30.8
									0.037	0.051	1.38	5.04
IVb 40F7	Denmark	Aug	13	23-28.6	123-241	M(5)	2-7		0.052	0.078	1.91	26.5
				(25.2)	(161)	F(8)	(2.8)		0.285	0.290	8.96	38.1
									0.110	0.169	3.28	33.2
									0.065	0.069	1.80	3.30

*Tissues bulked into one sample and homogenized prior to analysis.

Table 1b Metals in Fish Liver (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.
		1981										
PLAICE (cont'd)												
VIIa 35E6	England/ Wales	Oct	25**	26-38 (30.3)	209-880 (361)	M(7) F(18)	2-8 (3.6)	0.08 0.17 0.11 0.02			4.4 7.6 6.2 0.6	23.0 74.0 47.0 9.0
FLOUNDER (Platichthys flesus)												
IIIa 48G0	Norway	Dec	8	30-63 (38)	340-780 (470)		4-6 (4.4)		0.12 0.62 0.31 0.16			
IVb 41F7	Denmark	Feb	10	23.5-33 (28.7)	170-465 (311)	M(2) F(8)	3-6 (4.2)		0.009 0.314 0.090 0.091	0.028 0.097 0.051 0.020	4.97 31.9 11.3 7.70	27.5 53.4 37.0 7.35
IVb 36F8	Germany, Fed. Rep. of	May/ June	20	15-28 (20)	37-245 (92)				0.019 0.063 0.035 0.011			
IVc 31F2	Belgium	Apr	20	26-42 (31)	185-730 (354)	M(12) F(8)	1976-1979 year classes	0.03 0.62 0.20 0.16				
IVc 32F1	England/ Wales	Jul	25*	27-39 (30.9)	172-612 (287)	M(5) F(20)	3-6 (4.1)	0.16	0.4		14.0	34.0

*Tissues bulked into one sample and homogenized prior to analysis.
**Tissues bulked into 5 sub-samples of 5 livers each prior to analysis.

Table 1b Metals in Fish Liver (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg wet weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.
		1981										
FLOUNDER (cont'd)									on a dry weight basis			
IIIa 46G1	Sweden	Oct	20	14.5-22 (18)	52-238 (115)	M(7) F(13)	2-5 (4)		0.08 0.53 0.21	0.14 0.34 0.24	1.5 58 23.4	58 200 108
DAB (Limanda limanda)												
IIIa 43G1	Sweden	Sep	20	17.5-23.5 (20.7)	89.6-241 (161)	M(6) F(14)	3-9 (5)		0.04 0.84 0.38 -	0.08 0.36 0.18 -	2.7 38 15.5 -	32 100 62 -
									on a wet weight basis			
VIIa 35E6	England/ Wales	Oct	25**	18-26 (21)	80-253 (115)	M(16) F(9)	3-5 (3.6)	<0.01 0.21 <0.14 -			0.6 14.0 8.4 2.9	24.0 44.0 35.0 4.0
COMMON SOLE (Solea solea												
VIIa 35E6	England/ Wales	Oct	25*	21-26 (23.4)	83-187 (129)	M(19) F(6)	3-4 (3.3)	0.15	0.3		-	24.0
WHITING (Merlangius merlangus)												
IVc 32F1	England/ Wales	Nov	25*	24-44 (35.4)	138-746 (392)	M(4) F(21)	2-6 (3.7)	0.10			5.6	5.0

*Tissues bulked into one sample and homogenized prior to analysis.
**Tissues bulked into 5 sub-samples of 5 livers each prior to analysis.

Table 1b Metals in Fish Liver (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex	Age (yrs) (mean)	Concentration (mg/kg dry weight) Hg min max MEAN s.d.	Cd min max MEAN s.d.	Pb min max MEAN s.d.	Cu min max MEAN s.d.	Zn min max MEAN s.d.
		1981										
WHITING (cont'd)												
VIIa 35E6	England/ Wales	Oct	25*	22-49 (27.3)	89-992 (187)	M(3) F(15) I(7)	1-4 (1.6)	0.10			3.8	5.0
HERRING (Clupea harengus)									on a dry weight basis			
IIIa 43G1	Sweden	Sep	20	14.5-17 (15.5)	31.3-51.8 (42.3)	M(2) F(18)	2-3 (2)		0.18 1.02 0.62 -	0.08 0.39 0.10 -	5.5 17 10.3 -	68 117 81 -

*Tissues bulked into one sample and homogenized prior to analysis.

Table 1c[1] Metals in Shellfish (on a wet weight basis)

Source	Country	Date of collection	No. in sample	Size (mm) (mean)	Mean concentration (mg/kg wet weight) Hg	Cd	Pb	Cu	Zn	Cr	Ni
		1981									
COMMON SHRIMP (Crangon crangon)											
IVc 31F2	Belgium	Apr	1700[1]		0.20	0.015	0.05	12.6	24.2	0.10	0.19
BLUE MUSSEL (Mytilus edulis)											
IIIa 48G0 (Oslofjord - Solbergstrand)	Norway	Dec	100	35-50 (42)	0.035	0.25					
IIIa 48G0 (Oslofjord - Rødtangen)	Norway	Oct	50	30-50 (40)	0.04	0.4					
IIIa 47G0 (Oslofjord - Mølen)	Norway	Oct	50	35-50 (42)	0.04	0.3					
IIIa 47G0 (Oslofjord - Færder)	Norway	Dec	50	30-50 (39)	0.03	0.4					
IIIa 47F9 (Grenlands fjords - Langesundsfjord)	Norway	Mar	50		0.09	1.2					
IIIa 46F9 (Grenlands fjords - Helgerofjord)	Norway	Mar	50		0.04	0.7					
IIIa 46G1 (Skagerrak)	Sweden	Dec	20[2]	80-106 (91)	0.011 0.044 0.023 -						
IIIa 43G1 (Kattegat)	Sweden	Oct	20[2]	65-88 (75)	0.010 0.031 0.016 -						

[1] Analyzed in sub-samples of 100 shrimp each.
[2] Whole soft bodies of mussels analyzed on an individual basis.

Table 1c[1] Metals in Shellfish (on a wet weight basis) (cont'd)

Source	Country	Date of collection	No. in sample	Size (mm) (mean)	Mean concentration (mg/kg wet weight) Hg	Cd	Pb	Cu	Zn
		1981							
BLUE MUSSEL (cont'd)									
VIIa 36E3 (Boyne Estuary)	Ireland	Sep	30			0.31			
VIIa 33E3 (Waterford Harbour)	Ireland	Sep	30			0.28			
VIIa 36E3 (Boyne Estuary)	Ireland	Apr	30		0.05				
VIIa 33E3 (Waterford Harbour)	Ireland	Apr	30		0.05				
OYSTER (Crassostrea gigas)									
VIIg-k 32E1 (Cork Harbour)	Ireland	Sep	30			0.23			
VIIg-k 32E1 (Cork Harbour)	Ireland	Apr	30		0.04				

Table 1c[2] Metals in Shellfish (on a dry weight basis)

Source	Country	Date of collection	No. in sample	Size (mm) (mean)	Mean concentration (mg/kg dry weight)					
					Hg	Cd	Pb	Cu	Zn	Cr
		1981								
BLUE MUSSEL (Mytilus edilus)										
IIIa 48G0 (Oslofjord - Solbergstrand)	Norway	Dec	100	35-50 (42)	0.18	1.4				
IIIa 48G0 (Oslofjord - Rødtangen)	Norway	Oct	50	30-50 (40)	0.21	2.2				
IIIa 47G0 (Oslofjord - Mølen)	Norway	Oct	50	35-50 (42)	0.15	1.4				
IIIa 47G0 (Oslofjord - Færder)	Norway	Dec	50	30-50 (38)	0.16	2.1				
IIIa 47F9 (Grenlands fjords - Langesundsfjord)	Norway	Mar	50		0.67	8.7				
IIIa 46F9 (Grenlands fjords - Helgerofjord)	Norway	Mar	50		0.25	4.2				
IIIa 46G1 (Skagerrak)	Sweden	Dec	20[2]	80-106 (91)	0.084	0.54	0.58	5.4	47	
					0.396	2.21	5.65	9.3	147	
					0.136	1.12	1.81	7.2	93	
					-	-	-	-	-	
IIIa 43G1 (Kattegat)	Sweden	Oct	20[2]	65-88 (75)	0.051	0.31	0.44	3.8	38	
					0.140	7.30	2.08	13	140	
					0.074	1.62	1.02	7.0	68	
					-	-	-	-	-	
IVc 31F2	Belgium	Sep	600[1]		0.35	1.3	3.4	9.5	138	4.5
VIIa 36E3 (Boyne Estuary)	Ireland	Sep	30			1.2				

[1] Whole soft bodies of mussels analyzed in 12 samples of 50 mussels each.
[2] Whole soft bodies of mussels analyzed individually.

Table 1c[2] Metals in Shellfish (on a dry weight basis) (cont'd)

Source	Country	Date of collection	No. in sample	Size (mm) (mean)	Mean concentration (mg/kg dry weight)					
					Hg	Cd	Pb	Cu	Zn	Cr
		1981								
BLUE MUSSEL (cont'd)										
VIIa 33E3 (Waterford Harbour)	Ireland	Sep	30			1.2				
OYSTER (Crassostrea gigas)										
VIIg-k 32E1 (Cork Harbour)	Ireland	Sep	30			1.0				

Table 2a[1] Organochlorines in Fish Muscle (on a wet weight basis)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min	min	min	min	min	min	min	min	min	
							max	max	max	max	max	max	max	max	max	
							MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	
							s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	
		1981														
COD (Gadus morhua)																
IVc 31F2	Belgium	Nov	20	45-62	1093-2817		0.65			0.001	0.002	0.001		0.003	0.015	
				(55)	(1746)		0.88			0.002	0.006	0.002		0.009	0.040	
							0.76			0.0015	0.004	0.0015		0.007	0.024	3.4
							0.08			0.001	0.001	0.001		0.002	0.007	
IVc 32F1 (Thames Estuary)	England/ Wales	Oct	20*	41-70 (51.6)	730-3596 (1489)	M(13) F(8) 2-4 yrs (2.2)				0.007	0.009	<0.002	<0.002	<0.013	0.08	
VIIa 35E6 (Liverpool Bay)	England/ Wales	Oct	10*	37-75 (50)	498-4443 (1661)	M(4) F(6) 1-4 yrs (1.9)				0.007	0.02	0.05	0.02	0.09	<0.001	
IIIa 48G0 (Oslofjord - Solbergstrand)	Norway	Dec	10	28-63 (44)	155-2160 (955)	M(3) F(5) 1-3 yrs (1.8)	0.37								0.01	
							0.50								0.03	
							0.43								0.016	
							-								0.008	
IIIa 47G0 (Oslofjord - Færder)	Norway	Dec	10	46-58 (51)	840-1710 (1228)	M(2) F(8) 2 yrs	0.34								0.01	
							0.57								0.03	
							0.46								0.013	
							-								0.007	
PLAICE (Pleuronectes platessa)																
IVb 36F8	Germany, Fed.Rep.of	May	10	22-27 (24)	116-192 (143)	M(6) F(4)	0.67								0.054	
							1.51								0.126	
							1.04								0.093	

*Tissues bulked into one sample and homogenized prior to analysis.

Table 2a[1] Organochlorines in Fish Muscle (on a wet weight basis) (cont'd)

Source		Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)										
								% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
								min	min	min	min	min	min	min	min	min	
								max	max	max	max	max	max	max	max	max	
								MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	
								s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	
			1981														
PLAICE (cont'd)																	
IVc	32F1	England/ Wales	Jul	18*	22-31 (24.6)	129-343 (170)	M(12) F(6) 3-4 yrs (3.2)				<0.002	<0.002	<0.002	<0.002	<0.006	<0.05	
VIIa	35E6	England/ Wales	Oct	25*	26-38 (30.3)	209-880 (361)	M(7) F(18) 2-8 yrs (3.6)				0.003	<0.001	0.003	<0.001	<0.005	0.02	
FLOUNDER (Platichthys flesus)																	
IVb	35F8 36F8	Germany, Fed.Rep.of	Jun	10	22-29 (24.5)	109-258 (156)		0.62 0.98 0.79								0.030 0.310 0.168	
IVc	31F2	Belgium	Dec	20	26-41 (30)	180-760 (360)		0.60 1.26 0.79 0.23			0.001 0.004 0.002 0.001	0.002 0.005 0.003 0.001	0.001 0.004 0.002 0.001		0.003 0.010 0.006 0.002	0.059 0.245 0.131 0.057	21.8
IVc	32F1	England/ Wales	Jul	25*	27-39 (30.9)	172-612 (287)	M(5) F(20) 3-6 yrs (4.1)				0.003	<0.002	0.005	0.02	<0.027	0.03	
IIIa (Oslofjord - Solbergstrand)	48G0	Norway	Dec	8	30-63 (38)	340-780 (470)	4-6 yrs (4.4)	0.50 1.2 0.85 -								0.01 0.17 0.06 0.06	

*Tissues bulked into one sample and homogenized prior to analysis.

Table 2a[1] Organochlorines in Fish Muscle (on a wet weight basis) (cont'd)

Source		Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
								% fat min max MEAN s.d.	HCB min max MEAN s.d.	γ-HCH min max MEAN s.d.	Dieldrin min max MEAN s.d.	DDE min max MEAN s.d.	TDE min max MEAN s.d.	p,p'DDT min max MEAN s.d.	Σ DDT min max MEAN s.d.	PCBs min max MEAN s.d.	PCB / Σ DDT
			1981														
DAB (Limanda limanda)																	
VIIa	35E6	England/ Wales	Oct	25*	18-26 (21)	80-253 (115)	M(16) F(9) 3-5 yrs (3.6)				0.002	<0.002	0.002	0.003	<0.007	0.04	
COMMON SOLE (Merlangius merlangus)																	
VIIa	35E6	England/ Wales	Oct	25*	21-26 (23.4)	83-187 (129)	M(19) F(6) 3-4 yrs (3.3)					<0.002	<0.002	<0.002	<0.006	<0.05	
WHITING (Merlangius merlangus)																	
IVc	32F1	England/ Wales	Nov	25*	24-44 (35.4)	138-746 (392)	M(4) F(21) 2-6 yrs (3.7)				0.03	<0.002	<0.002	<0.002	<0.006	0.03	
VIIa	35E6	England/ Wales	Oct	25*	22-49 (27.3)	89-992 (187)	M(3) F(15) I(7) 1-4 yrs (1.6)				0.04	<0.002	<0.002	<0.002	<0.006	<0.05	
ATLANTIC HERRING (Clupea harengus)																	
VIIg-k	32E2	Nether-lands	May	25*	(28)	(197)		10.4	0.003	0.004	0.007	0.011	0.005	0.008	0.024[2]	0.11[1]	
IVb	36F4	Nether-lands	May	25*	(22)	(90)		8.2	0.004	0.005	0.013	0.009	0.006	0.008	0.023[2]	0.19[1]	

*Tissues bulked into one sample and homogenized prior to analysis.
[1] PCB concentration obtained by extrapolation of concentrations of 18 individual PCB components.
[2] Σ p,p'-DDT only.

Table 2a[1] Organochlorines in Fish Muscle (on a wet weight basis) (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
		1981														
SPRAT (Sprattus sprattus)																
VIIg-k 32E2	Netherlands	May	25*	(13.5)	(20.5)		10.0	0.002	0.003	0.007	0.007	0.004	0.010	0.021[2]	0.09[1]	
IVb 37F5	Netherlands	May	25*	(12)	(15)		8.3	0.004	-	0.015	0.011	0.010	0.013	0.034[2]	0.19[1]	
ATLANTIC MACKEREL (Scomber scrombrus)																
VIIg-k 32E2	Netherlands	May	25*	(30)	(218)		5.0	0.002	0.001	0.004	0.005	0.002	0.007	0.014[2]	0.075[1]	
IVc 34F4	Netherlands	May	25*	(30)	(219)		3.0	0.004	0.005	0.005	0.007	0.003	0.006	0.016[2]	0.22[1]	
EUROPEAN EEL (Anguilla anguilla)																
IVc 32F4	Netherlands	May	25*	(25)	(69)		12.6	0.780	n.d.	0.100	0.072	0.057	0.015	0.14[2]	3.30[1]	

*Tissues bulked into one sample and homogenized prior to analysis.
[1]PCB concentration obtained by extrapolation of concentrations of 18 individual PCB components.
[2]Σ p,p'-DDT only.
- = below detection limit.
n.d. = not determined.

Table 2a[2] Organochlorines in Fish Muscle (on a fat weight basis)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
		1981														
COD (Gadus morhua)																
IVc 31F2	Belgium	Nov	20	45-62 (55)	1093-2817 (1746)		0.65 0.88 0.76 0.08			0.12 0.35 0.21 0.10	0.25 0.80 0.55 0.20	0.10 0.30 0.21 0.15		0.35 1.10 0.80 0.35	1.66 5.61 3.25 1.10	4.1
IIIa 48GO (Oslofjord - Solbergstrand)	Norway	Dec	10	28-63 (44)	155-2160 (955)	M(3) F(5) 1-3 (1.8)	0.37 0.50 0.43 -								1.8 9.0 4.0 2.4	
IIIa 47GO (Oslofjord - Færder)	Norway	Dec	10	46-58 (51)	840-1710 (1228)	M(2) F(8) 2 yrs	0.34 0.57 0.46 -								1.0 6.8 2.6 1.7	
PLAICE (Pleuronectes platessa)																
IVb 36F8	Germany, Fed. Rep. of	May	10	22-27 (24)	116-192 (143)	M(6) F(4)	0.67 1.51 1.04								4.11 12.71 9.24	
VIIa 35E6	England/ Wales	Oct	25*	26-38 (30.3)	209-880 (361)	M(7) F(18) 2-8 yrs (3.6)				0.30	-	0.30	-	-	2.0	
FLOUNDER (Platichthys flesus)																
IVb 35F8 36F8	Germany, Fed. Rep. of	Jun	10	22-29 (24.5)	109-258 (156)		0.62 0.98 0.79								3.30 38.27 21.13	

*Tissues bulked into one sample and homogenized prior to analysis.

Table 2a[2] Organochlorines in Fish Muscle (on a fat weight basis) (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
		1981														
FLOUNDER (cont'd)																
IVc 31F2	Belgium	Dec	20	26-41 (30)	180-760 (360)		0.60 1.26 0.79 0.23			0.08 0.26 0.17 0.07	0.21 0.73 0.45 0.14	0.12 0.33 0.19 0.08		0.35 1.10 0.65 0.22	8.3 32.3 16.9 7.5	26.0
IIIa 48GO (Oslofjord - Solbergstrand)	Norway	Dec	8	30-63 (38)	340-780 (470)	4-6 (4.4)	0.50 1.2 0.85 -								1.3 34.4 9.1 11.7	
DAB (Limanda limanda)																
VIIa 35E6	England/ Wales	Oct	25*	18-26 (21)	80-253 (115)	M(16) F(9) 3-5 yrs (3.6)				0.07	-	0.07	0.10	-	1.3	
ATLANTIC HERRING (Clupea harengus)																
VIIg-k 32E2	Nether- lands	May	25*	(28)	(197)		10.4	0.023	0.023	0.065	0.107	0.045	0.077	0.230[2]	1.1[1]	
IVb 36F4	Nether- lands	May	25*	(22)	(90)		8.2	0.044	0.60	0.155	0.107	0.069	0.099	0.280[2]	2.3[1]	
SPRAT (Sprattus sprattus)																
VIIg-k 32E2	Nether- lands	May	25*	(13.5)	(20.5)		10.0	0.022	0.028	0.068	0.068	0.038	0.100	0.240[2]	0.9[1]	

*Tissues bulked into one sample and homogenized prior to analysis.
[1] PCB concentration obtained by extrapolation of concentrations of 18 individual PCB components.
[2] Σ p,p'-DDT only.
- = below detection limit.

Table 2a[2] Organochlorines in Fish Muscle (on a fat weight basis) (cont'd)

Source		Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
								% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
								min	min	min	min	min	min	min	min	min	
								max	max	max	max	max	max	max	max	max	
								MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	
								s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	
			1981														
SPRAT (cont'd)																	
IVb	37F5	Netherlands	May	25*	(12)	(15)		8.3	0.047	-	0.185	0.137	0.121	0.154	0.410[2]	2.3[1]	
ATLANTIC MACKEREL (Scomber scombrus)																	
VIIg-k	32E2	Netherlands	May	25*	(30)	(218)		5.0	0.031	0.026	0.074	0.095	0.047	0.142	0.280[2]	1.5[1]	
IVc	34F4	Netherlands	May	25*	(30)	(219)		3.0	0.147	0.161	0.179	0.225	0.117	0.210	0.550[2]	7.4[1]	
EUROPEAN EEL (Anguilla anguilla)																	
IVc	32F4	Netherlands	May	25*	(25)	(69)		12.6	6.1		0.81	0.56	0.45	0.12	1.1[2]	26.2[1]	

*Tissues bulked into one sample and homogenized prior to analysis.
[1] PCB concentration obtained by extrapolation of concentrations of 18 individual PCB components.
[2] Σ p,p'-DDT only.
- = below detection limit.

Table 2b[1] Organochlorines in Fish Liver (on a wet weight basis)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
		1981														
COD (Gadus morhua)																
IVc 31F2	Belgium	Nov	20	45-62 (55)	1093-2817 (1746)		47.5 68.8 58.0 5.1			0.10 0.35 0.20 0.07	0.13 0.27 0.20 0.05	0.06 0.90 0.30 0.10		0.20 1.20 0.50 0.15	4.77 8.96 6.72 1.9	13.4
IVc 32F1 (Thames Estuary)	England/ Wales	Oct	21	41-70 (51.6)	730-3596 (1489)	M(13) F(8) 2-4 yrs (2.2)				0.06 1.0 0.23 0.05	<0.002 0.65 <0.24 -	0.03 0.91 0.24 0.05	0.02 0.68 0.22 0.04	0.12 2.1 <0.60 -	<0.05 8.1 <3.9 -	
VIIa 35E6 (Liverpool Bay)	England/ Wales	Oct	10	37-75 (50)	498-4443 (1661)	M(4) F(6) 1-4 yrs (1.9)				0.32 0.82 0.51 0.06	0.10 0.84 0.47 0.08	0.17 1.1 0.60 0.12	0.05 0.65 0.37 0.06	0.57 2.0 1.4 0.2	0.2 11.0 5.6 1.0	4.0
IIIa 48G0 (Oslofjord - Solbergstrand)	Norway	Dec	10	28-63 (44)	155-2160 (955)	M(3) F(5) 1-3 yrs (1.8)	13.3 63.8 39.0 -								0.6 8.9 4.0 2.5	
IIIa 47G0 (Oslofjord - Færder)	Norway	Dec	10	46-58 (51)	840-1710 (1228)	M(2) F(8) 2 yrs	23.3 49.9 36.5 -								1.1 5.1 2.7 1.4	
IVc 34F4	Netherlands	Dec	25*	(71)	(4130)	(3 yrs)	46.5	0.120	0.040	0.150	0.29	0.10	0.13	0.52[2]	8.0[1]	
IVb 38F4	Netherlands	Feb	25*	(87)	-	(5 yrs)	56.3	0.08		0.36	0.36	0.17	0.31	0.93	2.7[1]	2.9

*Tissues bulked into one sample and homogenized prior to analysis.
[1] PCB concentration obtained by extrapolation of concentrations of 18 individual PCB components.
[2] Σ p,p'-DDT only.

Table 2b[1] Organochlorines in Fish Liver (on a wet weight basis) (cont'd)

Source		Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)										
								% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
								min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
			1981															
COD (cont'd)																		
IVa	44F0 47F3	Nether-lands	Feb	25*	(77)	-	(4.5 yrs)	52.1	0.04		0.08	0.22	0.11	0.19	0.57	1.4[1]	2.4
PLAICE (Pleuronectes platessa)																		
IVb	36F8	Germany, Fed. Rep. of	May	10	22-27 (24)	116-192 (143)	M(6) F(4)	2.37 6.23 4.23								0.263 2.08 0.978	
IVc	32F1	England/ Wales	Jul	18**	22-31 (24.6)	129-343 (170)	M(12) F(6) 3-4 yrs (3.2)				0.11 0.12 0.12 0.005	0.01 0.04 0.03 0.02	-	<0.002 0.06 <0.03 -	-	0.19 0.60 0.40 0.21	
VIIa	35E6	England/ Wales	Oct	25**	26-38 (30.3)	209-880 (361)	M(7) F(18) 2-8 yrs (3.6)				0.09 0.11 0.10 0.01	0.08 0.09 0.09 0.005	0.15 0.20 0.18 0.03	0.08 0.12 0.10 0.02	0.31 0.41 0.36 0.05	0.7 0.8 0.75 0.05	2.1
FLOUNDER (Platichthys flesus)																		
IVc	31F2	Belgium	Dec	20	26-41 (30)	180-760 (360)		6.1 11.8 8.3 3.1			0.012 0.020 0.015 0.006	0.04 0.06 0.05 0.01	0.030 0.070 0.045 0.015		0.07 0.13 0.10 0.03	1.4 2.0 1.8 0.3	18.0

*Tissues bulked into one sample and homogenized prior to analysis.
**Partially bulked liver samples.
[1] PCB concentration obtained by extrapolation of concentrations of 18 individual PCB components.

Table 2b[1] Organochlorines in Fish Liver (on a wet weight basis) (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
		1981					min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
FLOUNDER (cont'd)																
IVc 32F1	England/ Wales	Jul	25**	27-39 (30.9)	172-612 (287)	M(5) F(20) 3-6 yrs (4.1)				0.03 0.03 0.03 0.00	0.06 0.14 0.09 0.03	0.04 0.08 0.06 0.01	0.04 0.06 0.05 0.006	0.15 0.27 0.19 0.04	0.7 0.9 0.8 0.07	4.2
IIIa 48G0 (Oslofjord - Solbergstrand)	Norway	Dec	8	30-63 (38)	340-780 (470)	4-6 yrs (4.4)	5.5 23.1 13.1 -								0.26 2.3 1.1 0.8	
DAB (Limanda limanda)																
VIIa 35E6	England/ Wales	Oct	25**	18-26 (21)	80-253 (115)	M(16) F(9) 3-5 yrs (3.6)				0.06 0.11 0.09 0.01	0.11 0.19 0.15 0.02	0.06 0.15 0.12 0.02	0.03 0.15 0.09 0.03	0.21 0.40 0.35 0.05	1.5 2.4 2.0 0.2	5.7
COMMON SOLE (Solea solea)																
VIIa 35E6	England/ Wales	Oct	25*	21-26 (23.4)	83-187 (129)	M(19) F(6) 3-4 yrs (3.3)				0.38	0.21	0.12	0.39	0.72	3.2	4.4
WHITING (Merlangius merlangus)																
IVc 32F1	England/ Wales	Nov	25*	24-44 (35.4)	138-746 (392)	M(4) F(21) 2-6 yrs (3.7)				0.38 0.60 0.52 0.04	0.41 1.1 0.74 0.13	0.09 0.65 0.22 0.11	0.36 0.87 0.68 0.10	1.0 2.5 1.7 0.3	5.4 12.0 7.8 1.1	4.6

*Tissues bulked into one sample and homogenized prior to analysis.
**Partially bulked liver samples.

Table 2b[1] Organochlorines in Fish Liver (on a wet weight basis) (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg wet weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min	min	min	min	min	min	min	min	min	
							max	max	max	max	max	max	max	max	max	
							MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	
							s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	
		1981														
WHITING (cont'd)																
VIIa 35E6	England/ Wales	Oct	25**	22-49 (27.3)	89-992 (187)	M(3)				0.14	0.44	0.48	0.09	1.1	4.0	
						F(15)				0.41	0.70	0.95	0.13	1.5	8.0	
						I(7)				0.26	0.54	0.69	0.11	1.2	5.4	4.5
						1-4 yrs (1.6)				0.04	0.05	0.08	0.01	0.1	0.7	
EUROPEAN HAKE (Merluccius merluccius)																
VIIg-k 29EO	Netherlands	Apr	25*	(39)	(411)	(2.5) yrs	49.0	0.04		0.09	0.09	0.11	0.19	0.45	1.6[1]	3.6

*Tissues bulked into one sample and homogenized prior to analysis.
**Partially bulked liver samples.
[1] PCB concentration obtained by extrapolation of concentrations of 17 individual PCB components.

Table 2b[2] Organochlorines in Fish Liver (on a fat weight basis)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
		1981														
COD (Gadus morhua)																
IVc 31F2	Belgium	Nov	20	45-62 (55)	1093-2817 (1746)		47.5 68.8 58.0 5.1			0.20 0.65 0.35 0.12	0.22 0.50 0.35 0.09	0.10 1.50 0.52 0.20		0.35 2.10 0.90 0.30	7.8 17.4 11.7 4.1	13.0
IVc 32F1 (Thames Estuary)	England/ Wales	Oct	21	41-70 (51.6)	730-3596 (1489)	M(13) F(8) 2-4 yrs (2.2)				0.10 1.64 0.60 0.10	- 2.03 - -	0.05 2.03 0.64 0.13	0.04 1.83 0.60 0.12	- 5.9 - -	- 25.0 - -	
VIIa 35E6 (Liverpool Bay)	England/ Wales	Oct	10	37-75 (50)	498-4443 (1661)	M(4) F(6) 1-4 yrs (1.9)				0.55 1.78 1.18 0.15	0.27 2.40 1.09 0.23	0.45 2.5 1.37 0.28	0.09 1.38 0.83 0.14	0.98 5.6 3.3 0.4	0.5 27.5 13.0 2.8	3.9
IIIa 48G0 (Oslofjord - Solbergstrand)	Norway	Dec	10	28-63 (44)	155-2160 (955)	M(3) F(5) 1-3 yrs (1.8)	13.3 63.8 39.0 -								4.8 21.5 10.1 5.3	
IIIa 47G0 (Oslofjord - Færder)	Norway	Dec	10	46-58 (51)	840-1710 (1228)	M(2) F(8) 2 yrs	23.3 49.9 36.5 -								2.7 42.8 11.0 12.3	

Table 2b[2] Organochlorines in Fish Liver (on a fat weight basis) (cont'd)

Source		Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
								% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
								min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
			1981														
COD (cont'd)																	
IVc	34F4	Netherlands	Dec	25*	(71)	(4130)	(3 yrs)	46.5	0.25	0.10	0.31	0.63	0.22	0.27	1.10[2]	17.0[1]	
IVb	38F4	Netherlands	Feb	25*	(87)	-	(5 yrs)	56.3	0.14		0.27	0.65	0.31	0.55	1.6	4.8[1]	3.0
IVa	44F0 47F3	Netherlands	Feb	25*	(77)	-	(4.5 yrs)	52.1	0.10		0.15	0.41	0.21	0.37	1.1	2.7[1]	2.4
PLAICE (Pleuronectes platessa)																	
IVb	36F8	Germany, Fed. Rep. of	May	10	22-27 (24)	116-192 (143)	M(6) F(4)	2.37 6.23 4.23								4.74 81.25 29.59	
IVc	32F1	England/ Wales	Jul	18**	22-31 (24.6)	129-343 (170)	M(12) F(6) 3-4 yrs (3.2)				0.79 6.0 3.4 2.6	0.05 0.29 0.17 -	- 0.43 - -	- - -		4.3 9.5 6.9 2.6	
VIIa	35E6	England/ Wales	Oct	25**	26-38 (30.3)	209-880 (361)	M(7) F(18) 2-8 yrs (3.6)				0.34 0.38 0.36 0.02	0.28 0.33 0.31 0.03	0.63 0.63 0.63 0.00	0.33 0.38 0.36 0.03	1.28 1.29 1.29 0.005	2.2 3.3 2.8 0.6	2.2

[1] PCB concentration obtained by extrapolation of concentrations of 17 individual PCB components.
[2] Σ p,p'-DDT only.
*Tissues bulked into one sample and homogenized prior to analysis.
**Partially bulked liver samples.

Table 2b[2] Organochlorines in Fish Liver (on a fat weight basis) (cont'd)

Source	Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
							% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
							min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
FLOUNDER (Platichthys flesus)		1981														
IVc 31F2	Belgium	Dec	20	26-41 (30)	180-760 (360)		6.1 11.8 8.3 3.1			0.11 0.25 0.20 0.08	0.35 0.82 0.55 0.26	0.23 0.68 0.45 0.15		0.58 1.50 1.00 0.40	16.7 32.4 23.2 8.2	23.2
IVc 32F1	England/ Wales	Jul	25**	27-39 (30.9)	172-612 (287)	M(5) F(20) 3-6 yrs (4.1)				0.50 1.00 0.75 0.14	1.50 2.33 1.94 0.24	1.00 1.67 1.33 0.19	0.83 1.50 1.22 0.20	4.00 5.00 4.50 0.29	15.0 23.3 18.6 2.5	4.1
IIIa 48G0 (Oslofjord - Solbergstrand)	Norway	Dec	8	30-63 (38)	340-780 (470)	4-6 yrs (4.4)	5.5 23.3 13.1 -								1.8 42.1 12.2 14.0	
DAB (Limanda limanda)																
VIIa 35E6	England/ Wales	Oct	25**	18-26 (21)	80-253 (115)	M(16) F(9) 3-5 yrs (3.6)				0.17 0.28 0.24 0.02	0.26 0.53 0.40 0.06	0.17 0.38 0.30 0.05	0.08 0.35 0.22 0.06	0.58 1.11 0.91 0.12	3.5 6.4 5.1 0.7	5.6
COMMON SOLE (Solea solea)																
VIIa 35E6	England/ Wales	Oct	25*	21-26 (23.4)	83-187 (129)	M(19) F(6) 3-4 yrs (3.3)				5.43	3.00	1.71	5.56	10.28	45.7	4.4

*Tissues bulked into one sample and homogenized prior to analysis.
**Partially bulked liver samples.

Table 2b[2] Organochlorines in Fish Liver (on a fat weight basis) (cont'd)

Source		Country	Date of collection	No. analyzed	Length (cm) (mean)	Weight (g) (mean)	Sex and age or year class	Concentration (mg/kg fat weight)									
								% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
								min	min	min	min	min	min	min	min	min	
								max	max	max	max	max	max	max	max	max	
								MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	
								s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	s.d.	
			1981														
WHITING (Merlangius merlangus)																	
IVc	32F1	England/ Wales	Nov	25**	24-44 (35.4)	138-746 (392)	M(4)				0.95	1.05	0.22	0.88	2.4	13.8	
							F(21)				1.49	2.8	1.33	2.18	5.3	30.0	
							2-6 yrs				1.25	1.8	0.49	1.65	4.0	19.1	4.8
							(3.7)				0.09	0.3	0.21	0.22	0.5	3.0	
VIIa	35E6	England/ Wales	Oct	25**	22-49 (27.3)	89-992 (187)	M(3)				0.33	0.92	1.12	0.20	2.3	8.3	
							F(15)				0.95	1.42	1.86	0.30	3.5	14.8	
							I(7)				0.57	1.17	1.48	0.24	2.8	11.5	4.1
							1-4 yrs				0.10	0.09	0.14	0.02	0.3	1.2	
							(1.6)										
EUROPEAN HAKE (Merluccius merluccius)																	
VIIg-k	29E0	Netherlands	Apr	25*	(39)	(411)	(2.5) yrs	49.0	0.09		0.18	0.19	0.23	0.38	0.91	3.3[1]	3.6

*Tissues bulked into one sample and homogenized prior to analysis.
**Partially bulked liver samples.
[1] PCB concentration obtained by extrapolation of concentrations of 17 individual PCB components.

Table 2c[1] Organochlorines in Shellfish (on a wet weight basis)

Source	Country	Date of collection	Number analyzed	Size (mm) (mean)	Concentration (mg/kg wet weight)										
					% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
					min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
		1981												
BLUE MUSSEL (Mytilus edulis)														
IVc 31F2	Belgium	Aug	150		2.37			0.004	0.003	0.009		0.013	0.15	11.5
IIIa 48G0 (Oslofjord - Solbergstrand)	Norway	Dec	100	35-50 (42)									0.10	
IIIa 48G0 (Oslofjord - Rødtangen)	Norway	Oct	50	30-50 (40)									0.05	
IIIa 47G0 (Oslofjord - Mølen)	Norway	Oct	50	35-50 (42)									0.09	
IIIa 47G0 (Oslofjord - Færder)	Norway	Dec	50	30-50 (38)									0.04	
IIIa 47F9 (Grenlands fjords - Langesundsfjord)	Norway	Mar	50										0.04	
IIIa 46F9 (Grenlands fjords - Helgerofjord)	Norway	Mar	50										0.04	
IIIa 46G1	Sweden	Dec	50		1.54							0.0036	0.024	6.7
IIIa 46G1	Sweden	Dec	50		1.48							0.0031	0.021	6.8
IIIa 44G1	Sweden	Oct	50		1.88							0.0041	0.028	6.8
COMMON SHRIMP (Crangon crangon)														
IVc 31F2	Belgium	Sep	150		1.54			0.001	0.002	0.002		0.005	0.034	6.8

Table 2c[2] Organochlorines in Shellfish (on a fat weight basis)

Source	Country	Date of collection	Number analyzed	Size (mm) (mean)	Concentration (mg/kg fat weight)										
					% fat	HCB	γ-HCH	Dieldrin	DDE	TDE	p,p'DDT	Σ DDT	PCBs	PCB / Σ DDT
					min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	min max MEAN s.d.	
		1981												
BLUE MUSSEL (Mytilus edulis)														
IVc 31F2	Belgium	Aug	150		2.37			0.19	0.11	0.37		0.50	6.2	12.4
IIIa 46G1	Sweden	Dec	50		1.54		0.054					0.23	1.6	7.0
IIIa 46G1	Sweden	Dec	50		1.48		0.052					0.21	1.4	6.7
IIIa 44G1	Sweden	Oct	50		1.88		0.048					0.22	0.8	3.6
COMMON SHRIMP (Crangon crangon)														
IVc 31F2	Belgium	Sep	150		1.54			0.05	0.13	0.14		0.28	2.1	7.5

Figure 1 Areas sampled in the Northeast Atlantic in 1981.

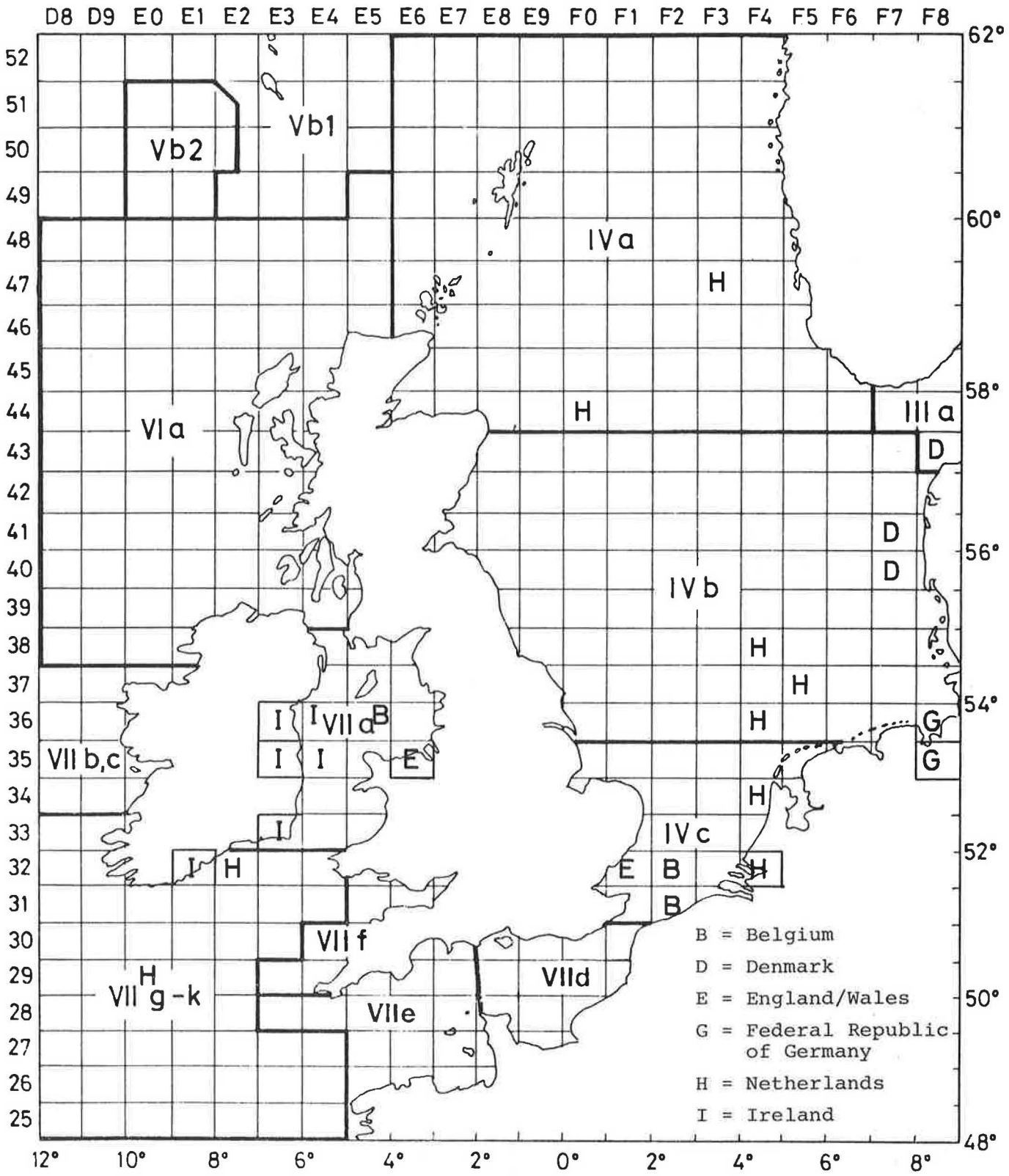
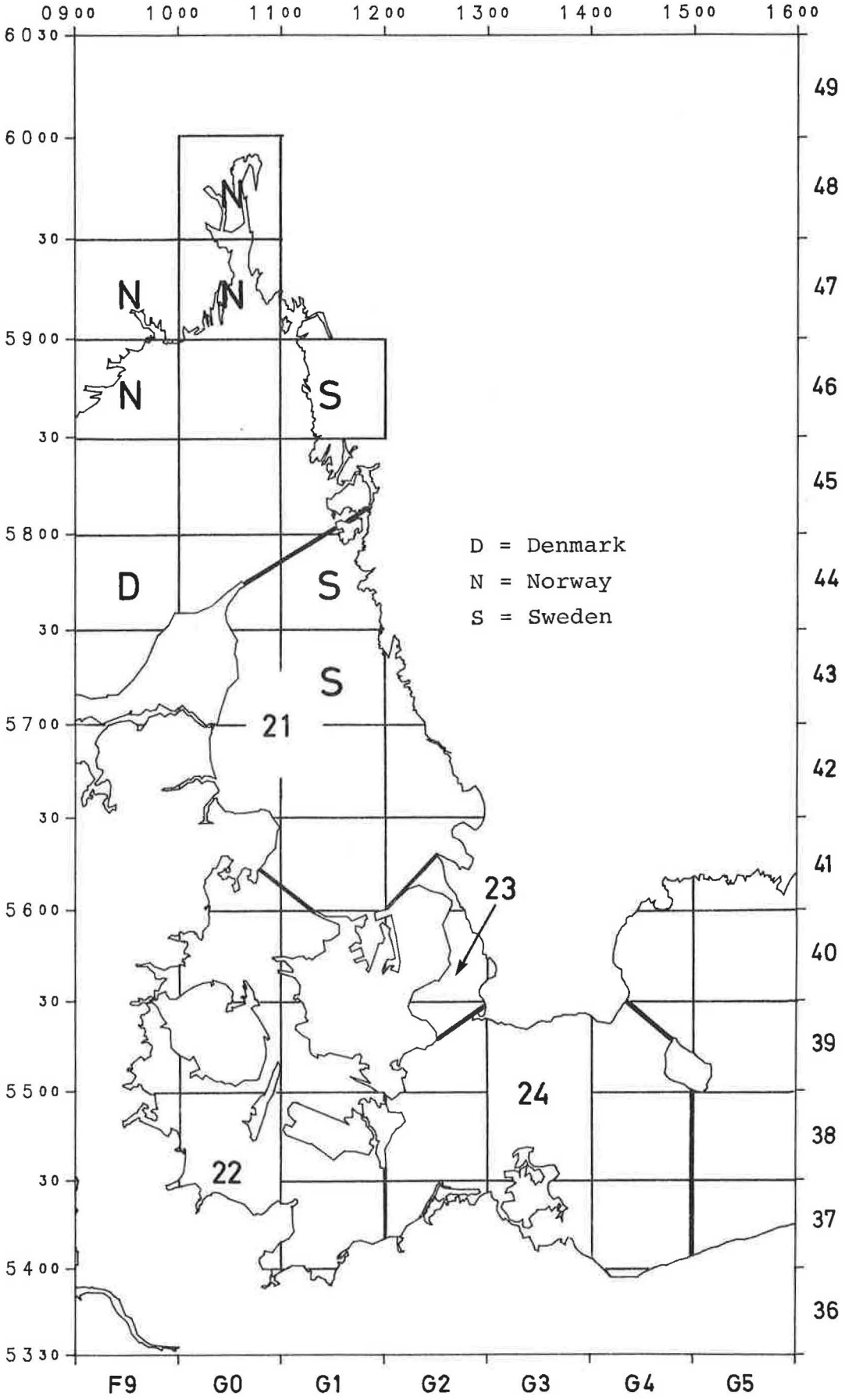


Figure 2 Areas sampled in the Skagerrak and Kattegat in 1981.



Indication of spine colours

Reports of the Advisory Committee on Fishery Management	Red
Reports of the Advisory Committee on Marine Pollution	Yellow
Fish Assessment Reports	Grey
Pollution Studies	Green
Others	Black

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