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REPORT OF THE WORKING GROUP ON

THE ASSESSMENT OF THE STOCKS OF HAKE

Charlottenlund Slot, 8-10 February 1973

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x) General Secretary,
ICES,
Charlottenlund Slot,
DK-2920 Charlottenlund,
Denmark.

Report of the Working Group on the Assessment of the Stocks of Hake

Charlottenlund Slot, 8 - 10 February 1973

<u>Participants:</u>	R W Blacker	U.K.
	J Dardignac, Convenor	France
	B W Jones	U.K.
	R Jones	U.K.
	R Robles	Spain.

1. Terms of Reference

At the 60th Statutory Meeting of ICES in 1972 it was decided (C.Res.1972/2:18) that the Hake Working Group, which met in 1969 be reconvened to:

- (a) bring up to date its previous assessments,
- (b) study the effects of the closed areas in the Bay of Biscay,
- (c) formulate a joint programme of research on the hake.

2. Landings, Effort and Landings per Unit Effort

2.1 Landings (Table 1)

No breakdown of total landings into ICES divisions has been possible, and so the landings from Subareas VI, VII, VIII and IX have been treated as a single entity as in the previous Report.

Table 1 shows revised landings from these Subareas for the period 1953-71.

During recent years the nominal total landings have fluctuated around 70 000 tons.

2.2 Fishing Effort (Tables 2 and 3)

Estimates of fishing effort have been revised and brought up to date for French and English vessels, and they are shown in Tables 2 and 3.

During the period 1955-64 the total effort by French vessels increased by 128%. After 1964 total French effort has continued to increase due to a further increase of 70% in the effort of "artisans", but during this period the effort by "hauturiers" has fluctuated without any tendency to increase. Although the total French effort has increased, the amount directed primarily at hake has probably not increased in proportion.

The English effort in Regions VIIa, VIIf-k and VIa has remained low and is not directed primarily at hake.

2.3 Landings per Unit Effort (Table 4)

Estimates of landings per unit effort by French and English vessels have been revised and updated, and these are given in Table 4.

Landings per unit effort by English trawlers have continued to decline in Division VIa, but since 1964 the catch per unit effort of English trawlers in Regions VIIf-k has fluctuated around the 1964 level.

Landings per unit effort by French vessels declined from 1955 to 1966 but since then they have fluctuated around a constant level.

3. Length Compositions (Tables 5-7)

Length compositions of hake landed at Milford Haven have been updated and are tabulated for the period 1968-71 in Table 5 (data for the period 1951-67 were given in the previous Report).

Length compositions per mille for French, Scottish and Spanish landings are given in Table 6. For France these figures refer to landings at La Rochelle in 1969 and 1970. For Scotland the figures only refer to landings by seiners and light trawlers in the Clyde port of Ayr in 1971 and 1972. These vessels are likely to land a larger proportion of small hake than trawlers fishing grounds further offshore in Division VIa. For this reason, the total numbers landed as given in Table 7 will be overestimated.

Spanish length data refer to landings at the ports of Santander, Pasajes and Ondarroa.

These data, together with Portuguese data from the previous Report, were used for the estimates of total numbers landed in each length group which are given in Table 7.

4. Discards (Table 8)

No further data on discards at sea are available, except for French vessels. In 1971 and 1972 measurements were made at sea on board "artisans" from the ports of southern Brittany (Table 8). The results suggest that the percentage of hake discarded by these vessels might have been more than 90% by numbers. However, it is thought that the percentage discarded in other parts of the Bay of Biscay and in the Celtic Sea might not have been so great.

5. Cod-End Mesh Sizes (Table 9)

Further mesh size data collected at sea by French inspectors on board Spanish trawlers and French "artisans" from southern Brittany are shown in Table 9.

For Spanish trawlers the mesh sizes in use appear to have increased since 1967 and during the years 1970-72 have been around 55 mm. Measurements from French "artisans" from southern Brittany during the years 1969-72 averaged 37.7 mm.

6. Assessments

Assessments of the effect of various increases in mesh size have been made in a similar way to those in the previous Report.

The data required are:

1. Length compositions
2. Selectivity data
3. Growth data
4. Mortality data
5. Discards
6. Recruitment.

6.1 Length compositions

The length composition data in Table 7 were used for the assessments.

6.2 Selectivity data

On the basis of the information available to the Working Group the following values were adopted for the mesh sizes in use:

French "artisans"	40 mm
French "hauturiers" and semi-industrials	63 mm
Portugal	43 mm
Spain	55 mm
U.K.	80 mm

In the previous assessments, selection factors of 3.6 - 4.6 were adopted. For this Report a value of 3.6 was taken as being more likely to represent the value for the nets in use.

Assessments were made for increase of mesh size to 50 mm for "artisans" (the legal mesh size for Nephrops fishery) and 65 mm for other vessels (the legal mesh size in Region III).

6.3 Growth data (Table 10)

Values for mean length and weight at each age are given in Table 10.

6.4 Mortality estimates (Table 11)

Some estimates of the instantaneous mortality rate, based on French market sampling data, are given in Table 11.

For "hauturiers" values of Z were around 0.5 - 0.8 and were calculated for age groups 6-9. For "artisans" values of Z averaged 0.8 - 1.3, and were calculated for age groups 3-6, but these values are likely to be overestimates because of emigration of hake from the grounds fished by the "artisans".

For assessment purposes it was decided to adopt values of $E = 0.6$ and $M = 0.3$. It was thought that this combination of values ought to underestimate any benefits expected from an increase in mesh size.

Pope and knights (in preparation) have made assessments of total mortality rates in Division VIa. In the absence of any age determinations a growth rate of 10 cm per year was assumed for these calculations. The values of the coefficient of total mortality which were obtained ($Z = 1.0 - 1.4$) suggest that the fishing mortality is high. French data based on market sampling suggest a lower value of about 0.8.

6.5 Discards

Calculations were made assuming French "artisans" discarded 30% by numbers. Since this is regarded as an underestimate of the rate of discarding, the effect would be for the assessments to underestimate the potential benefits.

6.6 Recruitment

There was evidence from the length compositions per unit fishing effort for the English fishery in Division VIa which suggests that recruitment of fish in the length range 45-65 cm since 1963 had been much poorer than in the previous four years. In the Bay of Biscay French data suggest that the 1967 year class is strong. Also there are indications that the 1970 year class is good.

6.7 Results

6.7.1 Immediate losses

The results of the updated assessments are set out in Tables 12 and 13. Table 12 shows the immediate losses that would be expected, if mesh sizes were increased to 50 mm for French "artisans" and to 65 mm for all other vessels in Region 3.

With a 50 mm mesh French "artisans" would lose 6% of their landings. With a 65 mm mesh in Region 3 there would be no losses for French "hauturiers" or U.K. vessels.

Portuguese vessels would lose 23% of their landings on the basis of their more recent length compositions compared with an 8% loss calculated in the previous Report on the basis of length composition data collected over a longer period. Spanish vessels would lose 8%.

6.7.2 Long-term effect

Long-term effects have been calculated on the assumption that French "artisans" increased their mesh size to 50 mm while all other vessels in Region 3 increased theirs to 65 mm. U.K. vessels have been assumed to retain their existing mesh sizes. The results are shown in Table 13.

The calculations have been based on two alternative assumptions:

A) that fish are stationary. Here it has been assumed that any benefit from a release of fish would accrue to the vessels that had spared them; B) that fish disperse uniformly over Subareas VI, VII, VIII and IX. Here it has been assumed that fish released by any gear are potentially available to benefit all other gears.

According to both assumptions, the overall effect for all gears would be to increase the landings by 7%. According to assumption A) any benefit would be most likely to accrue to Portuguese and Spanish vessels. According to assumption B) Portuguese vessels might lose up to 11% of their landings (due to emigration of fish from Subarea IX. French "artisans" would gain up to 10% under assumption A), and for these vessels, the potential gains might be lost due to emigration of fish. Spanish vessels might be expected to gain 7%. U.K. vessels and French "hauturiers" would do best under this assumption and might gain up to 16% from fish released by other classes of vessels.

Whilst these benefits have been assessed at a minimal level, the Group wishes to emphasize their approximate nature.

7. The Closed Areas in the Bay of Biscay

Since January 1, 1970, two areas in the Bay of Biscay have been closed to fishing as a measure for protecting hake nursery grounds (Figure 1). The Working Group has taken account of the following data in considering the effect on the fisheries of this closure:-

- 7.1 Commercial landings per unit effort
- 7.2 Changes in mesh size
- 7.3 Data from French research vessel surveys
- 7.4 Estimates of total numbers of young hake determined in the course of the assessments.

7.1 Commercial landings per unit effort

It was noted that landings per unit effort of several classes of fishing vessels had stopped declining in recent years. However, it was felt that this could not necessarily be attributed to the closure of these areas because: (a) the landings per unit effort stopped declining three years before the closures came into force, and (b) there were good year classes in 1967 and 1970, which could have benefitted the fishery.

7.2 Changes in mesh size

The increase in mesh size used by Spanish vessels since 1968 was noted. It was not possible to say precisely what effect this might have had on the landings. Any effect, however, should have been beneficial.

7.3 French research vessel surveys

The French research vessel "Thalassa" made observations both inside and outside the northern closed area in February, May and August 1972. The mean catches per hour of I, II and III groupshake combined are shown in Table 14. (A further survey was made in November 1972, but the data were not available for the meeting).

The following inferences were made:

- (i) the greatest concentrations of young hake were found in a depth of 100 m. These grounds were situated some distance to the east of the closed area,
- (ii) the mean catches of hake per hour inside the closed area were greater than those outside the area in the same depths. However, this cannot necessarily be ascribed to the closure

- (ii) as the difference may be attributable to differences
ctd. in the nature of the bottom. (It should be noted that
young hake are found mostly on muddy bottom).

7.4 Estimates of total number of young hake

Estimates made during the course of assessments indicated that to account for the total landings of hake by all countries the recruitment of I-group hake must be at least 500 million fish annually. On the basis of the catches obtained by "Thalassa", it was estimated that not more than 3% of the total stock of I-group hake could be located within this particular closed area (See Appendix I for further details).

7.5 Conclusions

It was concluded that:

- (a) the closed areas are too small to be effective.
- (b) the northern area at least is situated some distance to the west of the area of the greatest concentration of young hake, and for this reason it is likely to be even less effective than it might have been.
- (c) any benefits that might accrue from the adoption of closed areas could be more effectively achieved by an increase in mesh size.

8. Joint Programme of Research

The Working Group discussed the benefits which might come from a programme of cooperative research. It was agreed that further information was needed on:

- 8.1 the degree of interchange, if any, between the hake in the various fisheries. In other words, are there separate stocks within the area from VIa to IX? This information is needed so that the benefits from increases in mesh size can be correctly allocated to the various fisheries. For example, will an increase in the mesh size used in the Portuguese fisheries in Division IX benefit the fisheries in Division VIII, and will conservation measures taken in the Bay of Biscay affect the fisheries elsewhere?
- 8.2 nursery grounds and spawning grounds in all areas, but especially those outside the Bay of Biscay.

9. Recommendations

1. The Working Group repeats its previous recommendation that more countries should collect catch and effort data in a more detailed form than at present.
2. The Group recommends that all institutes should give high priority to the collection of length and, if possible, age composition data of hake caught or landed by each kind of commercial vessel.
3. The Group recommends that a cooperative research programme be initiated to answer the questions posed in Sections 8.1 and 8.2.
4. The Group recommends that when sufficient data have been collected, it should meet again to make further assessments. The Group wishes to emphasize that it sees no prospect of providing more reliable advice until significantly better data are available.

Calculation of the Proportion of the Total Stock of I-Group Fish
within the Closed Area

Total hake landings by all countries amount to 381×10^6 fish of 2 or more years in age.

To account for this value an annual recruitment of at least 500×10^6 of I-group fish is needed. This value can be compared with an estimate of the number of one-year-old hake taken in the more northerly part of the closed areas, based on cruises by "Thalassa". For example, if "Thalassa" trawl is towed at 7 km per hour and sweeps out an area 20 m wide, the area swept per hour is equivalent to

$$\frac{7 \times 20}{1000} = 0.14 \text{ km}^2/\text{hr.}$$

From research vessel surveys the mean catch per hour of I-group hake is 114, the total stock of I-group hake in the closed area is, therefore, equivalent to

$$\frac{114 \times 5000}{.14} = 4.6 \times 10^6.$$

If the gear is 30% efficient, this can be increased to 15×10^6 fish as an overestimate. - The area of the closed region is 5650 km^2 .

This is only $\frac{15}{500} \times 100 = 3\%$ of the total stock of I-group fish and this is probably an overestimate, since the value of 15×10^6 is likely to be overestimated while the value of 500×10^6 fish is likely to be an underestimate.

Alternatively, it can be noted that not all of the 500×10^6 I-group fish will be located within the Bay of Biscay. The 15×10^6 fish in the closed area will therefore be equivalent to more than 3% of the Bay of Biscay stock. An exact calculation cannot be made, however, since the proportions of the total stock within the Bay of Biscay is unknown.

Table 1. Total Landings of Hake from Subareas VI, VII, VIII and IX.
(Thousands of tons, round fresh)

Year	Portugal	Spain ^{x)}	France ⁺)	England	Scotland	Other Countries	Total
1953	2.9	41.1	27.5	18.4	2.2	0.3	92.4
1954	3.0	41.5	26.5	14.9	1.9	0.2	88.0
1955	2.7	51.9	31.9	12.4	2.3	0.5	101.7
1956	1.9	38.5	32.1	12.1	1.7	0.3	86.1
1957	2.8	42.8	31.9	10.2	1.5	0.3	89.5
1958	3.8	40.3	35.5	9.7	1.2	0.3	90.8
1959	3.6	42.8	37.0	7.0	1.1	0.3	91.8
1960	3.8	46.1	40.4	6.9	1.4	0.4	99.0
1961	4.7	47.5	39.3	5.5	1.7	0.5	99.2
1962	5.1	37.5	36.9	6.3	3.1	0.5	89.5
1963	5.8	46.0	31.1	5.5	2.3	0.3	91.0
1964	6.4	39.8	31.2	4.2	1.6	0.3	83.5
1965	7.9	32.9	27.5	3.5	1.7	0.4	73.9
1966	6.0	30.3	22.4	2.3	2.0	0.4	63.4
1967	7.6	33.9	26.7	2.1	1.5	0.5	72.3
1968	7.2	37.6	21.5	2.2	1.5	0.4	70.4
1969	6.6	31.7	20.7	1.3	1.2	0.5	62.0
1970	9.3	40.2	24.9	0.9	1.2	0.5	77.0
1971	8.0	na	22.8	0.6	1.1	0.7	-

x) Spanish data raised from landed weights for Subarea VIII given in "Bulletin Statistique". (Raising factor 1.17).

+) French data 1955-67 revised since 1969 Working Group Report.

na = not available.

Table 2.

Estimates of total fishing effort by French vessels registered in the ports of the Atlantic coast (10^5 HP days). Revised values.

Year	
1955	225.3
1956	261.7
1957	300.4
1958	331.5
1959	359.7
1960	393.0
1961	395.9
1962	428.5
1963	450.7
1964	514.8
1965	564.5
1966	565.6
1967	548.8
1968	507.7
1969	550.9
1970	649.8
1971	604.8

Table 3.

Estimates of fishing effort by English trawlers in various sub-regions. (Millions of ton-hours, motor trawler units).

Year	VIa	VII f-k	VII a
1955	29	21.4	2.4
1956	30	8.6	4.1
1957	30	8.2	5.4
1958	37	17.4	6.3
1959	35	9.3	6.9
1960	37	4.8	5.1
1961	32	4.5	5.2
1962	30	3.7	5.9
1963	29	3.4	5.9
1964	30	4.2	5.7
1965	30	3.4	6.2
1966	25	3.7	5.1
1967	23	3.9	6.0
1968	24.5	4.1	4.4
1969	20.6	4.1	6.4
1970	12.4	3.4	5.0

Table 4. Estimates of the landings of Hake per unit effort expressed as percentages of the 1961 value.

Year	England ¹⁾		Portugal ²⁾	France ³⁾
	Via	VIIIf-k	IXa	Via, VII, VIII, IXa
1955	208	197		142.8
1956	224	127		123.4
1957	212	132		106.9
1958	165	65		107.9
1959	119	118		103.7
1960	115	112	94	103.5
1961	100	100	100	100
1962	125	115	97	86.6
1963	112	109	115	69.5
1964	91	56	140	61.0
1965	78	62	176	49.0
1966	53	44		39.9
1967	46	41		49.0
1968	43	54		42.6
1969	31	41		37.8
1970	37	57		32.4
1971	25			38.0

Table 5. Length composition of Hake landed at Milford Haven (U.K.) from Divisions VIIIf-k (Numbers/100 hrs fishing).

Length	1968	1969	1970	1971
25-29	+	+	16	4
30-34	39	35	232	45
35-39	112	72	157	100
40-44	98	75	60	109
45-49	50	54	24	53
50-54	33	36	19	24
55-59	25	19	12	9
60-64	18	13	9	5
65-69	11	7	5	3
70-74	8	6	3	2
75-79	4	4	2	2
80-84	2	3	1	1
85-89	1	1	1	1
90-94	1	+	+	1
95-99	+	+	+	+
100-104	+	+	+	+
105+	-	+	+	+
Total	404	325	542	358

1) Tons/million ton hours (motor trawl units)

2) Kg/hours fishing.

3) Kg/days absence/100 H.P.

Table 6. Hake length compositions per mille.

Length Groups	France 1969 and 1970		Portugal 1967 ^x)	Scotland 1971 and 1972	Spain North coast Port, 1972	Mean Weight (kg)
	"Artisans"	"Hauturiers" and Semi-industrials				
10-14	-	-	9	-	9	.01
15-19	-	-	235	-	180	.03
20-24	121	1	375	-	475	.07
25-29	446	24	204	51	143	.14
30-34	288	78	85	569	54	.23
35-39	96	132	55	196	38	.35
40-44	28	164	21	76	30	.52
45-49	10	164	8	30	15	.73
50-54	3	147	6	18	17	1.00
55-59	2	116	2	36	16	1.32
60-64	2	80		17	11	1.70
65-69	2	44		3	6	2.16
70-74	1	21		2	3	2.69
75-79	1	10		1	1	3.30
80-84		5			0.2	4.00
85-89		5				4.79
90-94		3				5.68
95-99		3				6.68
100-104		2				7.79
105+		1				9.02
Total	1 000	1 000	1 000	999	1 000	
$\Sigma n \bar{w}$ (kg)	211.96	998.85	126.15	377.61	187.18	
RF to total Landings	24.702 x 10 ⁶	18.585 x 10 ⁶	68.966 x 10 ⁶	3.178 x 10 ⁶	214.8 x 10 ⁶	
Total Tons (1970-71)	5 236	18 564	8 700	1 200	40 200	

x) From previous report (Anon., 1969).

Table 7. Hake. Total numbers landed (in thousands).

Length Group	Mean Weight (kg)	France		Spain	England ^{x)}	Scotland	Portugal	Total
		"Artisans"	"Hauturiers" and Semi-industr.					
10-14	.01			1 900			621	
15-19	.03			38 700			16 207	
20-24	.07	2 989	19	102 000			25 862	
25-29	.14	11 017	446	30 700	2	162	14 069	
30-34	.23	7 114	1 450	11 600	37	1 808	5 862	
35-39	.35	2 371	2 453	8 200	43	623	3 793	
40-44	.52	692	3 048	6 400	36	242	1 448	
45-49	.73	247	3 048	3 200	38	95	552	
50-54	1.00	74	2 732	2 600	53	57	414	
55-59	1.32	49	2 156	3 400	66	114	138	
60-64	1.70	49	1 487	2 400	74	54		
65-69	2.16	49	818	1 300	79	10		
70-74	2.69	25	390	600	68	6		
75-79	3.30	25	186	200	43	3		
80-84	4.00		93		25			
85-89	4.79		93		16			
90-94	5.68		56		11			
95-99	6.68		56		6			
100-104	7.79		37		5			
105+	9.02		19		4			
Total		24 702	18 585	213 200	605	3 178	68 966	329 000
Corresponding Weight landed (1 000 tons) 1970-1971		5.2	18.6	40.2	1.2	1.2	8.7	

x) Includes IVa.

Table 8. French "artisans" from South Brittany.

Hake length composition No./10 hrs fishing (measured at sea, before discarding).

Length Groups	Year 1971 (average Apr + Jul + Nov)	Year 1972 (4th quarter)
5 - 9	8	3
10 - 14	238	423
15 - 19	1 054	1 520
20 - 24	270	497
25 - 29	45	132
30 - 34	22	199
35 - 39	7	218
40 - 44	1	144
45 - 49	1	30
50 - 54	1	31
55 - 59	1	41
60 - 64	1	37
65 - 69	-	12
70 - 74	-	12
75 - 79	-	5
80 - 84	-	2
85 - 89	-	2

Table 9. Mesh measurements at sea by French inspectors.

Mesh Size (mm)	Spanish Trawlers						French "artisans" from South Brittany 1969-1972
	1967	1968	1969	1970	1971	1972	
20 - 24			2				4
25 - 29		1	3	1		2	1
30 - 34	1	6	9	9		2	12
35 - 39	3	4	4	2	2	4	32
40 - 44	14	7	8	1	5	2	21
45 - 49	6	1	16	14	5	2	4
50 - 54	1		3	21	29	8	
55 - 59			2	12	88	26	
60 - 64	2	1	45	17	16	13	
65 - 69		1	8				
> 70			1		1		
Average Mesh Size	44.5	40.4	53.1	51.4	56.0	53.9	37.7

Table 10. Mean length and weight at age of Hake from the Bay of Biscay (1965 - 67). Weight data were calculated from the relationship: $W = 0.00513 L^{3.074}$

Age Group	Males		Females		Sexes Combined	
	Mean Length (cm)	Mean Weight (kg)	Mean Length (cm)	Mean Weight (kg)	Mean Length (cm)	Mean Weight (kg)
1	11.0	0.01	11.0	0.01	11.0	0.01
2	19.6	0.05	19.6	0.05	19.6	0.05
3	28.1	0.15	28.0	0.14	28.0	0.14
4	36.5	0.33	36.7	0.33	36.6	0.33
5	43.4	0.55	43.6	0.56	43.5	0.56
6	50.9	0.90	51.4	0.93	51.2	0.92
7	57.0	1.28	60.2	1.52	58.7	1.40
8	62.3	1.68	66.7	2.08	65.1	1.93
9	65.6	1.97	72.7	2.71	69.6	2.37
10	70.7	2.48	82.0	3.92	80.1	3.65
11	69.0	2.31	84.3	4.27	79.6	3.58
12			88.3	4.93	88.3	4.93

Table 11. French total mortality estimates (Z) from market sample data from La Rochelle.

Divisions	Age Groups Years	"Artisans"		"Hauturiers"				Weighted Mean
		3/4	4/5	5/6	6/7	7/8	8/9	
VIa, VIIb, c and k	1968-69			.85	.82	.73	.80	.81
VIIe, f,h, and j	1968-69				.61	.84	1.18	.76
	1969-70				.50	.71	.98	.64
	Average				.55	.77	1.08	.70
VIIIa, b	1968-69				.71	.93	1.07	.82
	1969-70				.72	.83	1.22	.80
	Average				.71	.88	1.14	.82
VIIIc - IXa	1968-69				.31	.52	.80	.46
	1969-70				.53	.53	.91	.60
	Average				.42	.53	.85	.53
VIIIa, b	1968-69	1.99	1.37	1.58				1.86
	1969-70	.61	.55	1.70				.65
	Average	1.30	.96	1.64				1.26
VIIg	1968-69	.75	1.21	1.09				.90
	1969-70	.45	.52	2.47				.64
	Average	.60	.86	1.78				.77

Table 12. Immediate losses in % (by weight) for increases in mesh size to 50 mm by French "artisans" and to 65 mm for other vessels in Region 3.

France - "Hauturiers"	negligible
France - "Artisans"	6
Portugal	23
Spain	8
England	0
Scotland	0
All Gears	8

Table 13. Long-term gains in % (by weight) for increases in mesh size to 50 mm by French "artisans" and to 65 mm for other vessels in Regions 3.

- A = assuming that fish are stationary and that fish released only benefit the gear that releases them.
- B = assuming that fish released spread uniformly over Sub-areas VI, VII, VIII and IX do benefit all gears.

Country and Gear	A	B
France - "Hauturiers"	0	+16
France - "Artisans"	-1	+10
Portugal	+1	-11
Spain	+7	+7
England	0	+16
Scotland	0	+16
All Gears	+7	+7

Table 14. Bay of Biscay - Hake survey 1972.

Mean catch per hour: February, May and August samples
(I, II and III Groups combined).

Depth (m)	70	85	100	110	120	130	140	150	All Depths
47°25'N	630.5	452.0	615.5	824.5	415.0	72.0	10.5	2.5	377.8
47°05'N	18.0	85.0	1702.0	1176.5	586.0	361.5	32.0	54.0	501.9
46°45'N	159.3	638.7	934.3	707.7	1161.0	520.7	438.3	3.0	595.0
46°20'N	98.7	571.0	1083.0	979.3	632.7	440.3	141.3	0.5	514.8
All lines	207.1	470.3	1068.7	906.3	738.3	375.0	182.4	12.0	507.7
Within Closed Area					931.0	457.0	438.3		
Outside Closed Area					545.6	293.0	72.7		

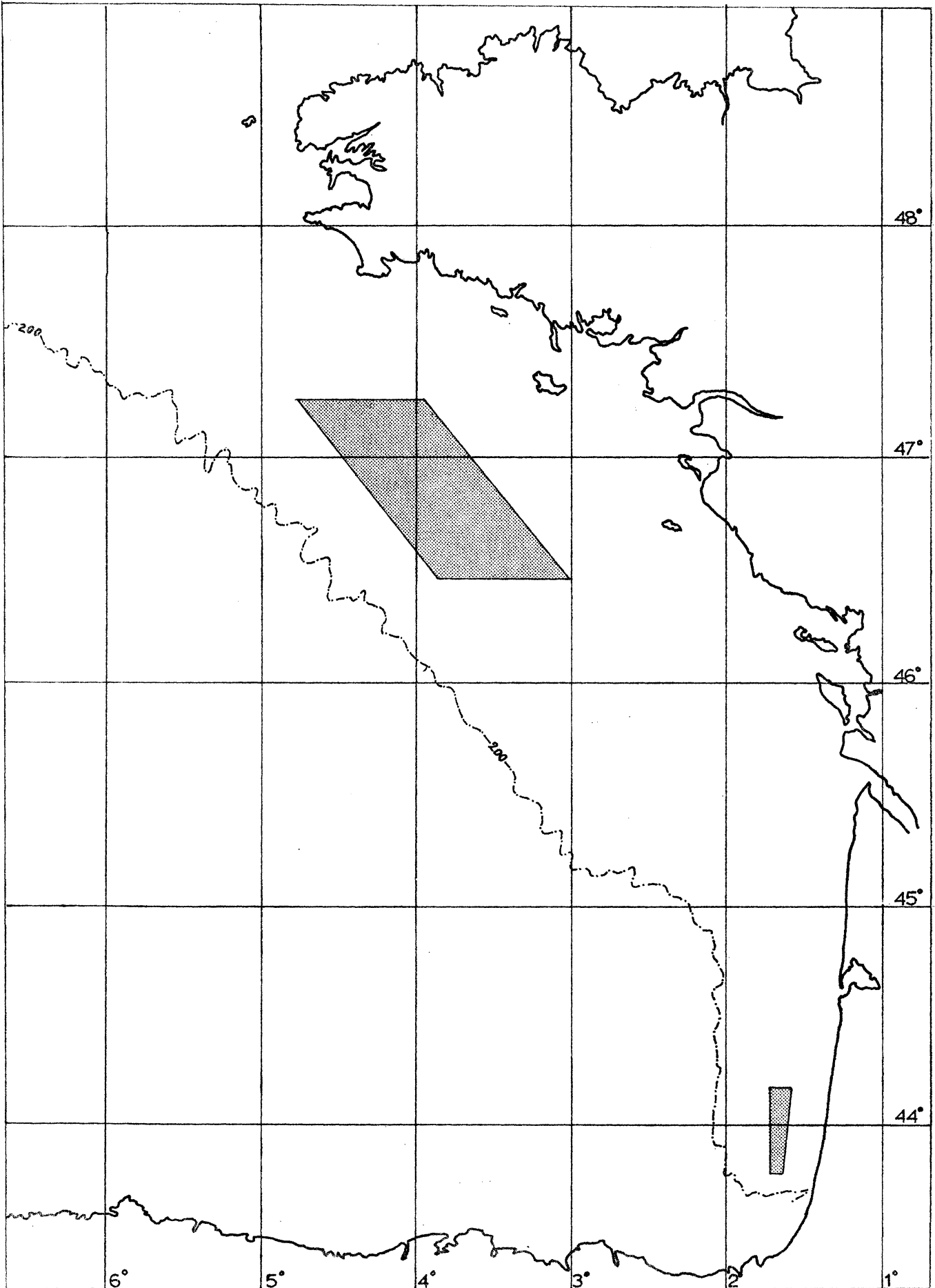


fig.1: Closed areas in the Bay of Biscay