



Serial No. 1659  
(D. a. 65)

ICNAF Res. Doc. 66-37

ANNUAL MEETING - JUNE 1966

Portuguese Research Report, 1965

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During 1965 Portuguese catch of cod in the ICNAF area amounted to 197,157 metric tons as indicated below:

Subareas	1	2	3	4	Total
Otter Trawl	2,737	72,836	34,649	14,665	124,887
Line					
Dory vessel	57,946	-	14,324	-	72,270
Total	60,683	72,836	48,973	14,665	197,157

The otter trawlers operated in four subareas and the catches are almost double those made by the line fishery, which was carried out mainly in Subarea 1.

A decrease in total catch of about 14,100 tons from 1964 is due to the very low catches made by both otter trawl and dory vessels in Subarea 3, that the increased catches in Subareas 1 and 2 could not quite make up for.

This report presents the status of the fisheries in the four subareas where the Portuguese fleet fished and includes observations made from commercial trawlers in Subareas 2 and 3. From these, there are data on lengths, ages, stage of maturity and probable age at first maturity. Samples were taken at random before discarding the undersized fish; for the age/length keys the same procedure is followed as in our previous report (ICNAF Annual Meeting, Research Document 14/65). Detailed information on the samples will be included in the Sampling Yearbook for 1965.

Subarea 1

A. Status of the Fisheries

I. Cod

In this subarea the otter trawl fishery has been of minor importance. Nevertheless, we must point out that the best results came from Div. 1B (1,461 t) and 1D (1,218 t) between May and September. Fishing in Div. 1C, 1E and 1F, at the same time, gave only 58 tons.

The dory vessels were active in Div. 1B, 1C and 1D with very good results in Div. 1B where the landings were 29,848 t, almost 50% of the total landed in the subarea. In 1D and 1C, 17,490 t and 10,608 t respectively were caught. Best catches in Subarea 1 were made in June and July.

Subarea 2

A. Status of the Fisheries

I. Cod

As in previous year, only otter trawlers were fished in this subarea. The total catch (72,836 t) represents an important increase of 31,686 t from 1964. Catches in Div. 2J, 2H and 2G were 57,992, 14,382 and 462 t respectively.

The highest production has been obtained during the second and fourth quarters of the year.

Samples for biological study were obtained in Div. 2G, 2H and 2J from 19 March to 31 August as follows:

<u>Sample Group</u>	<u>Sample numbers</u>	<u>Date</u>	<u>Depth (m)</u>	<u>No. lengths</u>	<u>No. aged</u>
<u>Div. 2G</u>					
A	9	28 Mar.	370	400	0
<u>Div. 2H</u>					
B	4-8	19-27 Mar.	240-400	625	225
<u>Div. 2J</u>					
C	1-3	15-17 Mar.	290-420	175	100
D	10-24 (25-30)	4-25 Apr.	250-370	2,425	102
E	(32, 34, 35 (37-43)	1-31 May	170-400	2,900	126
F	44-49	1-15 June	195-290	1,300	37
G	50-56	24-31 Aug.	170-250	875	218

a. Lengths (Fig. 1). Lengths ranged from 25 to 97 cm classes. Mean lengths were A - 55.5, B - 50.3, C - 50.6, D - 52.8, E - 52.1, F - 51.2 and G - 51.9.

b. Ages (Fig. 1). In March the most important age-groups were the VI, VII and VIII in Div. 2H and VI and VII in Div. 2J.

From April onward in Div. 2J the most important age-groups are VI, VII, VIII and IX (1959, 1958, 1957 and 1956 year-classes). Age-group III (1962 year-class) appeared for the first time in April with age-groups up to XXIII. However, in March the number of fish aged was comparatively small. In August age-groups IV-IX are still strong but the older ones are diminishing.

Mean ages are as follows: B - 7.5; C - 6.6; D - 8.1; E - 7.9; F - 7.7 and G - 6.6 years.

c. Growth is shown in the following table of average lengths (figures in brackets are numbers of fish)

<u>Year-class</u>	<u>2H Age-group</u>	<u>1st Quarter</u>
1960	V	38.9 (5)
1959	VI	45.6 (24)
1958	VII	47.2 (53)
1957	VIII	53.2 (90)
1956	IX	57.9 (35)
1955	X	60.1 (9)
1954	XI	65.8 (6)
1953	XII	58.0 (1)
1952	XIII	- -
1951	XIV	55.0 (2)

Division 2J

Year class	Age group	1 <sup>st</sup> Quarter			2 <sup>nd</sup> Quarter		3 <sup>rd</sup> Quarter
		Mar.	Apr.	May	June	Aug.	
1962	III	-	28.4	29.1	28.9(4)	34.7(9)	
1961	IV	38.8(2)	36.2	35.2	35.0(26)	39.1(31)	
1960	V	42.4(11)	39.4	39.0	38.8(18)	46.6(33)	
1959	VI	47.7(40)	46.1	46.3	45.8(34)	50.6(42)	
1958	VII	52.0(34)	49.0	49.5	48.9(29)	55.8(29)	
1957	VIII	62.0(8)	53.4	53.6	53.6(47)	58.3(37)	
1956	IX	56.0(4)	56.9	56.1	56.4(31)	59.2(22)	
1955	X	64.0(1)	62.6	60.6	60.9(14)	63.8(6)	
1954	XI	-	62.5	61.1	61.0(10)	68.7(3)	
1953	XII	-	66.7	63.3	63.1(8)	59.4(2)	
1952	XIII	-	67.8	65.0	64.2(8)	68.6(2)	
1951	XIV	-	63.8	62.3	61.5(9)	-	
1950	XV	-	69.2	66.7	66.7(7)	-	
1949	XVI	-	70.8	67.5	68.4(8)	70.0(1)	
1948	XVII	-	79.7	78.6	79.6(4)	79.0(1)	
1947	XVIII	-	69.7	69.4	68.2(3)	-	
1946	XIX	-	91.8	80.2	83.4(3)	-	
1945	XX	-	82.0	82.0	82.0(1)	-	
1944	XXI	-	-	-	-	-	
1943	XXII	-	-	-	-	-	
1942	XXIII	-	88.0	-	- (1)	-	

d. Stage of maturity (Fig. 2). In Div. 2H in March about 75% of the males and 40% of the females were in the spawning stage. About 50% of the females were still in the developing stage.

In Div. 2J the males were spawning between March and June, while the females spawned principally from March to May.

e. Age at first maturity

Div. 2H												
Age-group	♂♂					♀♀						
	1st spawn.	VI	VII	VIII	IX	?	Total	VI	VII	VIII	?	Total
V	-	-	-	-	3	-	3	-	-	2	-	2
VI	-	-	-	-	20	-	20	-	-	4	-	4
VII	4	3	-	-	31	1	39	1	2	11	-	14
VIII	2	10	2	-	43	2	59	1	9	3	18	31
IX	-	2	6	1	8	1	18	-	4	1	10	17
X	-	1	2	2	2	-	5	-	1	-	1	4
XI	-	-	1	1	1	-	2	-	-	1	2	4
XII	-	-	-	-	-	-	-	-	1	-	-	4
XIII	-	-	-	-	-	-	-	-	1	-	-	1
XIV	-	1	-	-	-	-	-	-	-	-	-	-
No. observed	6	17	11	2	108	4	148	2	17	5	48	77

Div. 2J															
Age-group	♂♂						♀♀								
	1st spawn.	VI	VII	VIII	IX	X	?	Total	VI	VII	VIII	IX	X	?	Total
III	-	-	-	-	-	-	-	9	-	-	-	-	-	-	4
IV	-	-	-	-	-	-	9	28	-	-	-	-	-	-	31
V	-	-	-	-	-	12	13	25	-	-	-	-	-	-	37
VI	-	-	-	-	-	58	-	58	3	-	-	-	-	1	57
VII	-	-	-	-	-	40	-	40	2	3	-	-	-	47	
VIII	1	4	3	8	30	15	3	43	2	11	1	-	-	31	
IX	1	3	8	1	1	2	1	30	-	2	5	-	-	18	
X	-	-	1	1	1	4	-	5	1	2	4	1	-	5	
XI	-	-	2	-	-	-	-	6	-	1	-	-	-	5	
XII	-	-	-	-	-	1	-	1	-	1	2	1	1	2	
XIII	-	-	-	-	-	2	-	3	-	-	2	3	-	1	
XIV	-	-	-	-	-	-	-	1	-	-	1	3	2	2	
XV	-	-	-	-	-	2	-	3	-	-	1	2	-	4	
XVI	-	1	-	-	-	2	1	4	-	-	1	1	-	5	
XVII	-	-	1	-	-	1	-	2	-	-	1	1	-	3	
XVIII	-	-	-	-	-	1	-	1	-	-	-	-	-	1	
XIX	-	-	-	-	-	1	-	1	-	-	2	-	-	2	
XX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
XXIII	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
No. observed	2	18	15	3	1	208	23	260	8	20	19	12	5	16	
															322

Subarea 3

A. Status of the Fisheries

I. Cod

As mentioned, the catch in this subarea during 1965 was much less than in 1964. The differentials for the otter trawl catch was 38,251 t and for the line trawl catch 15,376 t.

The otter trawlers operated mainly in Div. 3K and 3L with success from April to October. Otter trawl catches totalling 2,592 t were also made in Div. 3M, 3N, 3O and 3Pn. The dory vessels fished in Div. 3L, 3N, 3O and 3P with catches in 3L amounting to 12,735 t.

Samples for biological study were obtained in Div. 3K, 3L and 3N from 6 June to 4 September as follows:

<u>Sample Group</u>	<u>Sample nos.</u>	<u>Date</u>	<u>Depth (m)</u>	<u>No. lengths</u>	<u>No. aged</u>
<u>Div. 3K</u>					
A	36-39	28-31 July	185-275	675	72
B	46-57	1-28 Aug.	160-290	2,400	255
<u>Div. 3L</u>					
C	2-9 12; 13	6-30 June	150-230	1,050	485
D	14-19 21-35	1-26 July	170-340	3,350	365
E	58	4 Sept.	150	100	22
<u>Div. 3N</u>					
F	10-11	26-27 June	150-280	250	122

a. Lengths (Fig. 3). Lengths ranged from 19 to 133 cm classes. Mean lengths were A - 58.7, B - 52.4, C - 66.0, D - 55.0, E - 62.2 and F - 53.8.

b. Ages (Fig. 3). In Div. 3K ages range from 2 to 16 years with a marked dominance of the V, VI, VII and VIII age-groups (1960, 1959, 1958 and 1957 year-classes).

In Div. 3L the difference in age composition of the September sample is probably due to the small number of age readings available.

For June and July age-groups IV, V, VI, VII and VIII (1961, 1960, 1959, 1958 and 1957 year-classes) were abundant.

In Div. 3N in June age-groups IV, V, VI and VII (1961, 1960, 1959, and 1958 year-classes) were abundant.

Mean ages were as follows: A - 7.1; B - 6.0; C - 8.2; D - 6.2; (E - 7.1); F - 5.8 years.

c. Growth is shown in the following table of average lengths (figures in brackets are numbers of fish).

Year class	Age Group	Div. 3K	
		3 <sup>rd</sup> Quarter July	August
1963	II	29.2	26.1 (7)
1962	III	35.4	34.0 (33)
1961	IV	40.7	40.6 (59)
1960	V	44.0	47.0 (45)
1959	VI	54.0	52.9 (48)
1958	VII	60.3	59.1 (44)
1957	VIII	64.8	63.8 (47)
1956	IX	68.9	68.0 (19)
1955	X	75.5	72.5 (9)
1954	XI	73.0	73.0 (2)
1953	XII	75.3	70.9 (3)
1952	XIII	82.7	80.6 (4)
1951	XIV	79.4	91.6 (4)
1950	XV	86.0	79.0 (2)
1949	XVI	73.0	73.0 (1)

Year class	Age Group	Div. 3L	
		2 <sup>nd</sup> Quarter June (cm)	3 <sup>rd</sup> Quarter July (cm) September (cm)
1963	II	33.9 (4)	25.3 - (8)
1962	III	34.6 (21)	33.9 41.0 (41)
1961	IV	42.3 (48)	41.8 44.6 (55)
1960	V	47.6 (70)	49.2 51.4 (45)
1959	VI	54.3 (70)	54.5 57.6 (38)
1958	VII	61.5 (89)	60.7 62.1 (68)
1957	VIII	65.1 (45)	63.0 64.4 (35)
1956	IX	72.2 (29)	68.6 70.6 (22)
1955	X	80.5 (33)	79.7 79.4 (27)
1954	XI	87.5 (15)	84.1 83.3 (14)
1953	XII	85.3 (15)	92.7 88.0 (2)
1952	XIII	95.3 (16)	91.2 83.6 (10)
1951	XIV	101.0 (7)	96.2 82.0 (8)
1950	XV	92.0 (7)	98.8 - (3)
1949	XVI	105.8 (4)	102.0 - (3)
1948	XVII	103.1 (4)	105.4 - (3)
1947	XVIII	100.0 (4)	108.6 - (2)
1946	XIX	-	103.0 - (1)
1945	XX	-	-
1944	XXI	114.8 (2)	-
1943	XXII	124.0 (1)	-
1942	XXIII	-	103.0 - (1)
1941	XXIV	106.0 (1)	-

Year class	Age group	Div. 3N	
		2 <sup>nd</sup> Quarter June (cm)	
1962	III	33.9	( 4 )
1961	IV	42.8	(32 )
1960	V	48.5	(19 )
1959	VI	57.6	(31 )
1958	VII	63.5	(22 )
1957	VIII	66.0	( 9 )
1956	IX	65.1	( 2 )
1955	X	83.5	( 2 )
↓			
1940			

d. Stage of maturity (Fig. 4). In Div. 3K in July and August about 50% of the males were in resting or recovering and 50% in developing stages, while in July about 50% of the females were in the resting or recovering stages and 50% in the post-spawning stage and in August 80% were in the resting or recovering stage and 20% in the post-spawning stage.

In Div. 3L in June, July and September 10-20% of the males were still spawning, while very few of the females are spawning in June and July and none in September.

In Div. 3N in June about 60% of the males are in the resting or recovering stage and over 90% of the females are in the resting and recovering stage.

e. Age at first maturity

Division 3K														
	♂♂						♀♀							
	1 <sup>st</sup> Spaw. →	VI	VII	VIII	θ	?	TOTAL	VI	VII	VIII	IX	θ	?	TOTAL
Age Group ↓														
II		-	-	-	6	-	6	-	-	-	-	1	-	1
III		-	-	-	14	-	14	-	-	-	-	19	-	19
IV		-	-	-	32	-	32	-	-	-	-	27	-	27
V		-	-	-	22	-	22	-	-	-	-	23	-	23
VI		-	-	-	22	-	22	-	-	-	-	26	-	26
VII		-	1	-	14	-	15	-	5	-	-	24	-	29
VIII		1	2	-	5	-	8	-	10	4	-	22	2	38
IX		-	1	1	1	-	3	1	4	5	-	4	2	16
X		-	1	2	1	-	4	-	2	-	-	2	1	5
XI		-	-	-	-	-	-	-	1	1	-	-	-	2
XII		-	-	-	-	1	1	-	-	2	-	-	-	2
XIII		-	-	1	-	-	1	-	2	-	1	-	-	3
XIV		-	-	1	-	-	1	-	-	-	2	-	1	3
XV		-	-	-	-	-	-	-	-	-	1	-	1	2
XVI		-	-	-	-	-	-	-	-	1	-	-	-	1
N <sup>o</sup> of obser.		1	5	5	117	1	129	1	24	13	4	148	7	197

Div. 3L

Age Group ↓	♂♂								♀♀							
	1 <sup>st</sup> Spaw. → VI	VII	VIII	IX	X	0	?	TOTAL	VI	VII	VIII	IX	X	0	?	TOTAL
II	-	-	-	-	-	10	-	10	-	-	-	-	-	2	-	2
III	-	-	-	-	-	36	-	36	-	-	-	-	-	26	-	26
IV	-	-	-	-	-	58	-	58	-	-	-	-	-	45	-	45
V	-	-	-	-	-	50	-	50	-	-	-	-	-	65	-	65
VI	-	-	-	-	-	53	-	53	4	-	-	-	-	51	-	55
VII	2	4	-	-	-	62	1	69	-	14	-	-	-	72	2	88
VIII	1	3	2	-	-	25	1	32	-	17	5	-	-	23	3	48
IX	-	10	7	1	-	9	1	28	-	5	3	1	-	13	1	23
X	1	6	13	1	-	11	2	34	-	6	7	1	1	6	5	26
XI	-	-	3	2	-	11	2	18	-	-	2	1	-	7	1	11
XII	-	2	3	2	1	4	-	12	-	-	2	-	-	3	-	5
XIII	-	2	1	4	-	5	-	12	-	2	3	-	-	9	-	14
XIV	-	1	1	2	-	5	1	10	-	-	-	1	-	3	1	5
XV	-	-	1	-	-	7	-	8	-	1	-	1	-	-	-	2
XVI	-	-	-	1	-	1	-	2	-	1	1	1	1	1	-	5
XVII	-	-	-	-	-	2	-	2	-	-	1	2	-	1	1	5
XVIII	-	-	-	1	-	1	-	2	-	-	2	1	1	-	-	4
XIX	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-
XX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
XXI	-	-	-	1	-	-	-	1	-	-	1	-	-	-	-	1
XXII	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	2
XXIII	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
XXIV	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
N <sup>o</sup> of obser.	4	28	31	16	1	350	8	438	4	46	28	10	4	328	14	434

Div. 3N

Age Group ↓	♂♂								♀♀							
	1 <sup>st</sup> Spaw. → VI	VII	VIII	IX	X	0	?	TOTAL	VI	VII	VIII	IX	X	0	?	TOTAL
III	-	-	-	-	-	3	-	3	-	-	-	-	-	1	-	1
IV	-	-	-	-	-	22	-	22	-	-	-	-	-	10	-	10
V	-	-	-	-	-	7	-	7	-	-	-	-	-	12	-	12
VI	-	-	-	-	-	13	-	13	1	-	-	-	-	17	-	18
VII	1	3	-	-	-	7	-	11	-	3	-	-	-	8	-	11
VIII	-	3	-	-	-	-	-	3	-	3	2	-	-	1	-	6
IX	-	-	-	-	-	1	-	1	-	1	-	-	-	-	-	1
X	-	-	1	1	-	-	-	2	-	-	-	-	-	-	-	-
XV	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
N <sup>o</sup> of Obser.	1	6	1	1	-	52	1	62	1	7	2	1	-	40	-	60

Subarea 4

A. Status of the Fisheries

I. Cod

In 1965 only the otter trawlers operated in Subarea 4 and caught 14,665 t which is about the same catch as made in 1964.

In Div. 4R 11,714 t was taken mainly in February and March, in 4Vn 1,790 t from January to July, in 4S 1,006 t in February and March, in 4Vs 88 t from March to July and in 4T 67 t in March.

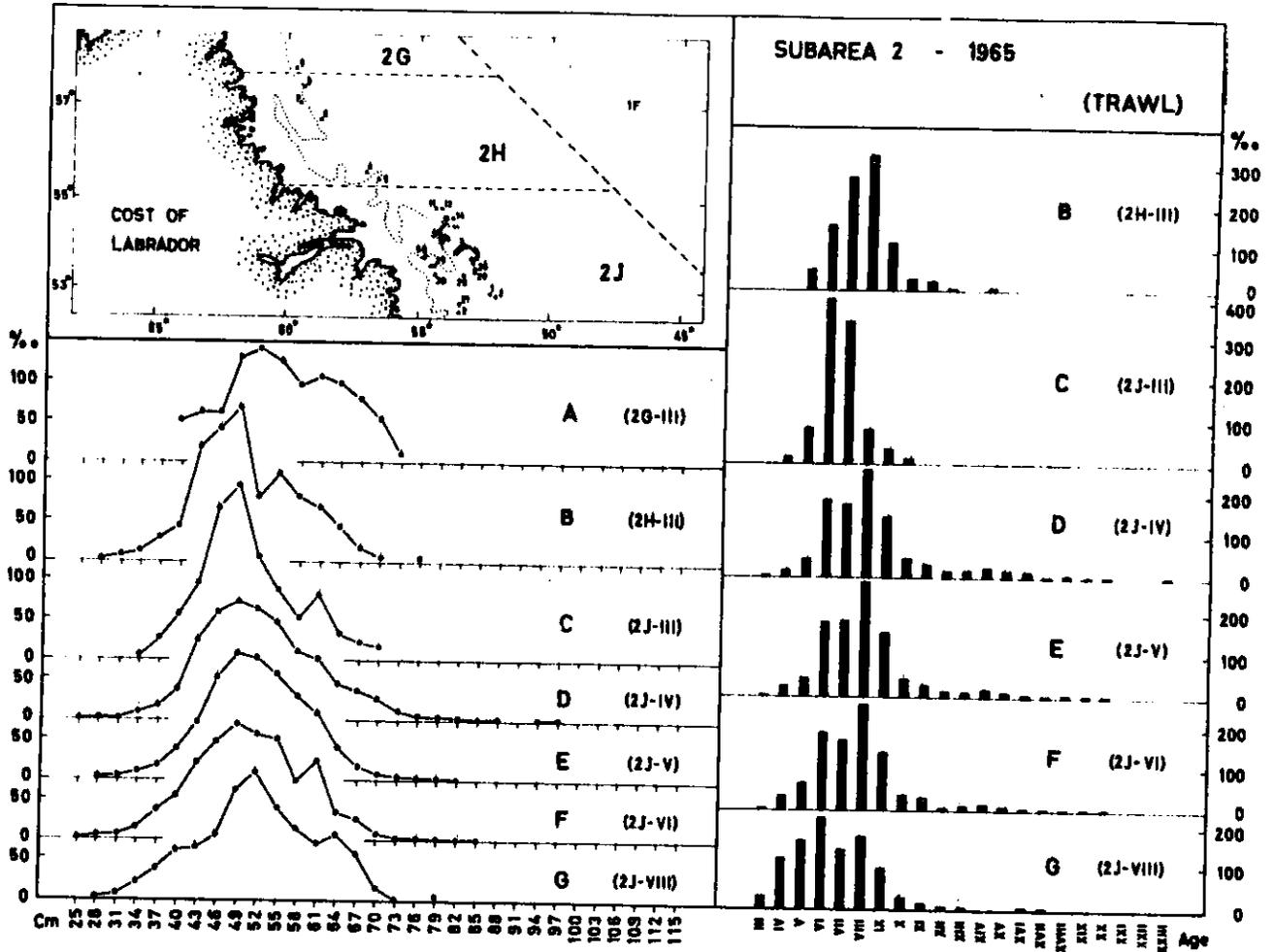


Fig. 1. Cod. Subarea 2. Length and age composition, March-August 1965

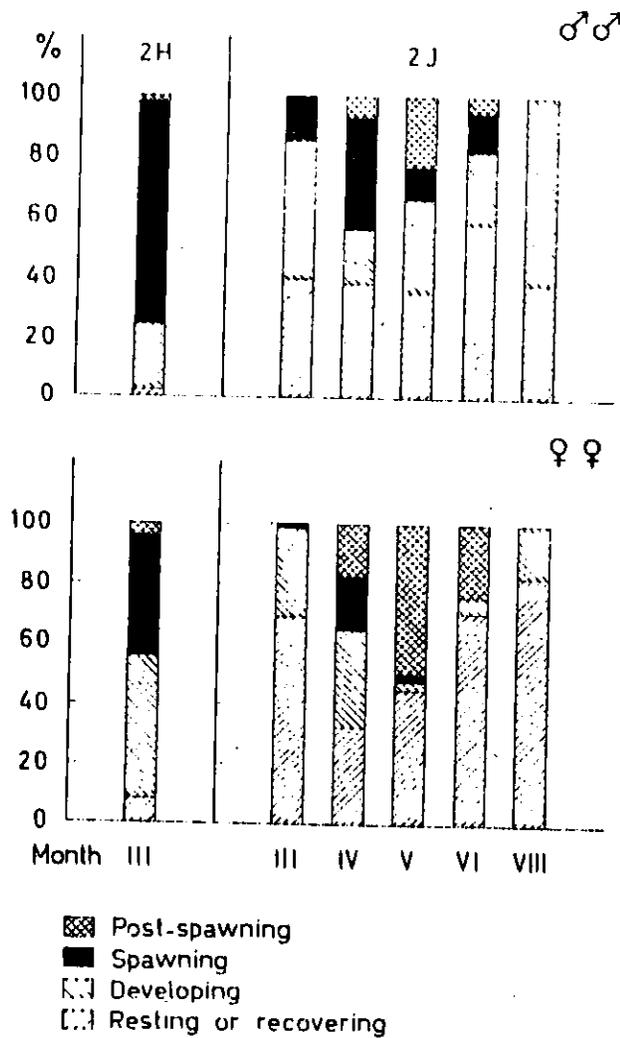


Fig. 2. Cod. Subarea 2. Stages of maturity, 1965.

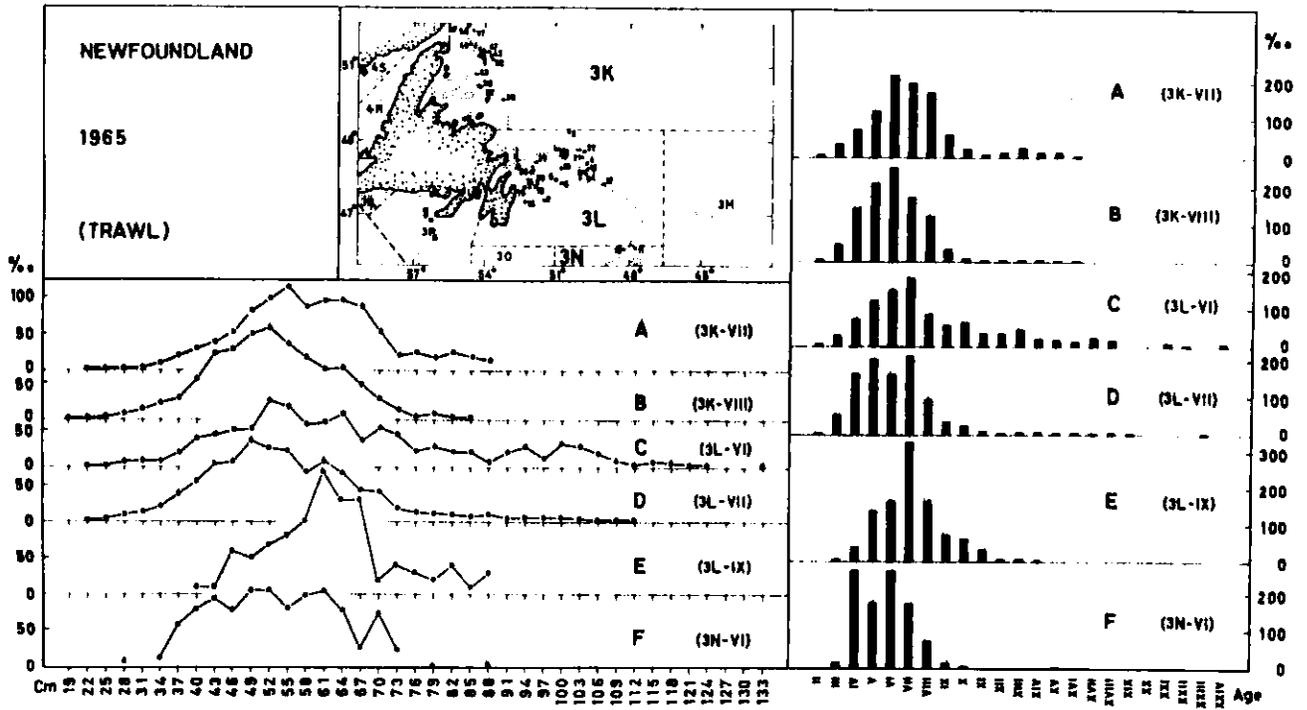


Fig. 3. Cod. Subarea 3. Length and age composition, June-September 1965

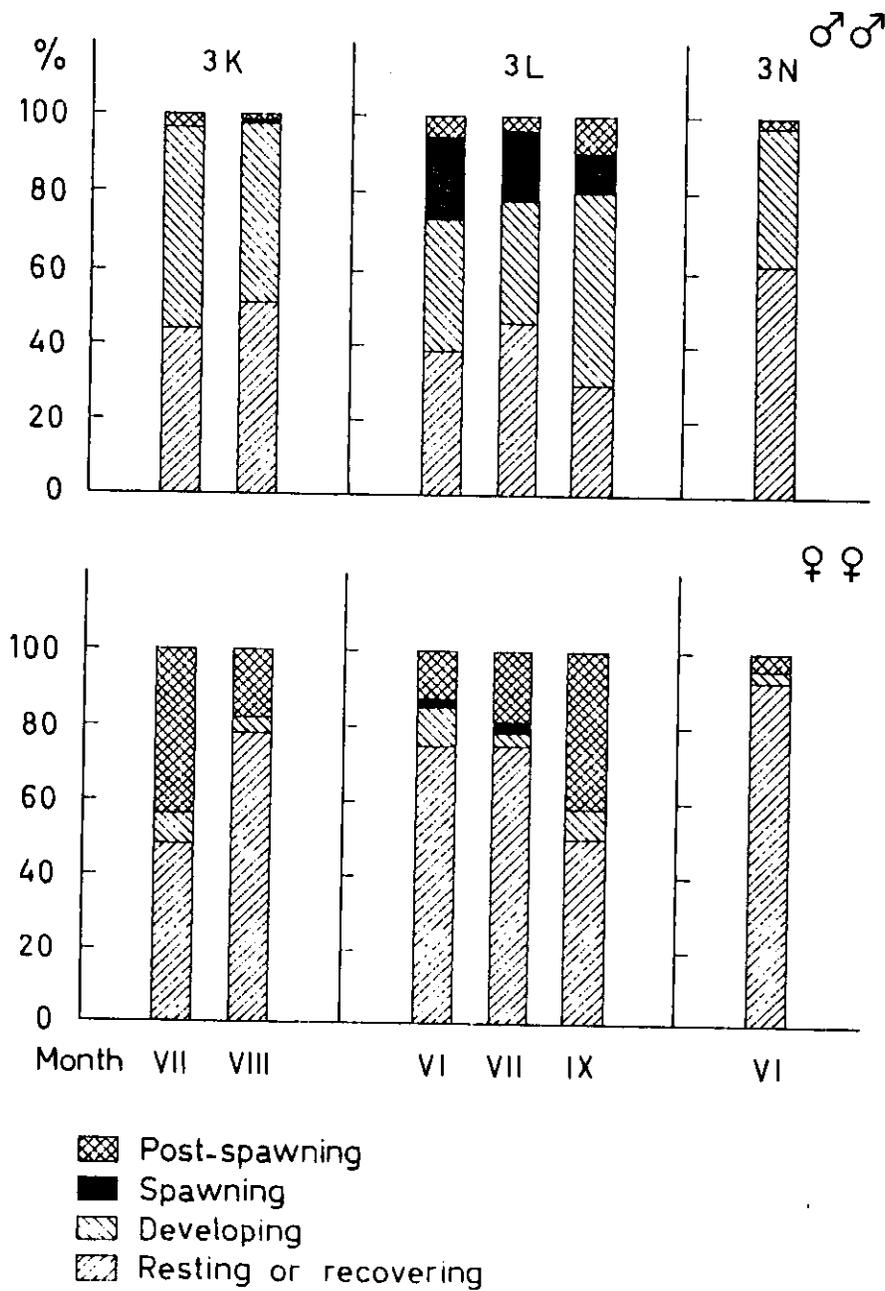


Fig. 4. Cod. Subarea 3. Stages of maturity, 1965.