



Serial No. 2788
(C.c.72)

ICNAF Res.Doc. 72/40

ANNUAL MEETING - JUNE 1972

Portuguese Research Report, 1971

by

Manuel Lima Dias
Instituto de Biologia Maritima, Lisbon

The total Portuguese cod catch in the ICNAF Area in 1971 was 152,557 metric tons (Table 1 and Fig. 1) which was 10,000 tons less than in 1970.

Table 1.

Subarea	Trawl			Line Dory vessel	Gill nets	Total
	Side	Stern	Total			
1	577	728	1,305	2,169	2,821	6,295
2	18,788	15,506	34,294	-	-	34,294
3	52,632	17,797	70,429	14,882	9,369	94,680
4	12,506	4,782	17,288	-	-	17,288
	84,503	38,813	123,136	17,051	12,190	152,557

It should be noted that in 1971 some of the dory vessels changed to gill nets which present more benefits than the dory vessels. The dory vessel catch was slightly bigger than the gill net catch (17,051 tons from dory vessels, against 12,190 from gill netters). The total otter trawl catch of cod decreased in 1971 from 131,884 tons in 1970 to 123,316 tons (Table 1, Fig. 1). The otter trawl fishery was carried out in Subareas 1-4 and took more than four times the tonnage landed from the dory vessel and the gill net fisheries. The greatest decline was in the dory fishery: 30,771 tons in 1970 and 17,051 tons in 1971. As in 1970, the 1971 Portuguese side-trawler landings were greater than by the stern trawlers. Except in Subarea 1, side-trawler landings were also greater than that by the stern trawlers.

Table 2 shows cod catch and effort by side and stern trawlers, dory vessels and gill net vessels by Division and Subarea. Catch and effort by Subareas, months and quarters of the year are shown for side and stern trawlers in Table 3, and for dory vessels and gill net vessels in Table 4. Side and stern otter trawl, dory vessel, gill net and total catches are shown by Subareas in Figure 2 and by months in Figure 3.

The tables and figures show that the trawlers operated in Subareas 1-4 but fished mainly in Subareas 3 and 2, over all quarters of the year. Dory and gill net vessels visited Subareas 1 and 3. The greatest trawler catch was 20,108 tons taken in February (13,848 tons by side trawl and 6,260 tons by stern trawlers). The dory vessels worked over the second and third quarters in Subareas 1 and 3, with the best fishery occurring in August (4,549 tons) and July (4,398 tons) in Subarea 3. The Subarea 1 catch was lower, only 2,169 tons in both quarters of the year (Table 4), than the catch from Subarea 3, where, for the same period, 14,882 tons were landed.

The gill net fishery also took place in Subareas 1 and 3, but over all quarters of the year; mainly in the second and third in Subarea 3, with 4,284 tons and 3,224 tons respectively (Table 4). The gill net landings were only 2,821 tons from Subarea 1, and 9,369 tons from Subarea 3. The best gill net fishery took 2,440 tons in June in Subarea 3 (Table 4). The present report, in addition to reviewing the status of fisheries, presents also data on length, age, maturity and probable age at first maturity, obtained from random sampling on board commercial trawlers before discarding the under-sized fish. Detailed information on length and age samples are included in the ICNAF Sampling Yearbook.

TABLE 2 - COD LANDINGS (METRIC TONS) AND EFFORT BY PORTUGUESE FLEET, BY ICNAF DIVISIONS - (1971)

	Dory Vessel		Gill net				Trawl				Total Trawl		Total General
	Tons	Dor. -hours	Tons	Hours out	Side		Stern		Tons	Hours fishing	Tons	Hours fishing	Tons
					Tons	Hours fishing	Tons	Hours fishing					
LB	4	66					2				8		6
LC	1,224	38,722	2,714	56,715	499	510	575			1,074	980		5,012
LD	941	41,735	107	2,072	78	76	70			148	117		1,196
LE					81		25			81	25		81
total	2,169	80,523	2,821	60,787	577	586	728			1,305	1,130		6,295
2H													
2J					18,788	12,544	4,336	1,877		4,336	1,877		4,336
total					18,788	12,544	15,506	8,111		29,958	18,778		29,958
3K													
3L	13,265	486,832	4,524	137,202	3,758	3,856	1,734			5,492	5,366		5,492
3M					44,199	45,586	12,272			56,467	57,509		74,256
3N					3,673	3,939	3,599			7,272	7,072		7,272
3O	1,617	65,398	4,442	131,500	16	29				16	29		6,075
3Pn			403	11,879	111	228				111	228		514
3Ps					798	673	192			990	790		990
total	14,882	552,223	9,369	280,581	52,632	54,379	17,797			70,429	71,062		94,680
4R													
4Vn					12,467	7,149	4,677			17,144	8,933		17,144
4Vs					21	33	105			126	133		126
total					18	21				18	21		18
total					12,506	7,203	4,782	1,884		17,288	9,087		17,288
total	17,051	632,746	12,190	341,366	84,503	74,712	38,813	27,222		123,316	101,934		152,537

TABLE 3

PORTUGUESE COD CATCH AND EFFORT - TRAWL FLEET 1971

Months Trawl	SUBAREAS								TOTAL	
	Tons	Hours fishing	Tons	Hours fishing	Tons	Hours fishing	Tons	Hours fishing	Tons	Hours fishing
Jan.			5,144	2,733	116	90	19	130	5,279	2,953
Side										
Stern			5,973	2,407	294	170	—	—	6,267	2,577
Total			11,117	5,140	410	260	19	130	11,546	5,530
Febr.			2,879	1,807	470	315	10,499	5,599	13,848	7,681
Side										
Stern			1,478	622	312	145	4,470	1,638	6,260	2,405
Total			4,357	2,429	782	460	14,969	7,197	20,108	10,086
March.					12,241	7,849	1,988	1,514	14,229	9,363
Side										
Stern					2,965	1,725	312	246	3,277	1,971
Total					15,206	9,574	2,300	1,760	17,506	11,334
1 st Quarter			8,023	4,540	12,827	8,254	12,506	7,203	33,356	19,997
Side										
Stern			7,451	3,029	3,571	2,040	4,782	1,884	15,804	6,953
Total			15,474	7,569	16,398	10,294	17,288	9,087	49,160	26,950
April.			4,920	1,892	8,500	7,311			13,420	9,203
Side										
Stern	4	12	2,723	811	312	240			3,039	1,063
Total	4	12	7,643	2,703	8,812	7,551			16,459	10,266
May.	577	586	571	407	6,598	7,984			7,746	8,977
Side										
Stern	724	532	265	137	112	129			1,301	798
Total	1,301	1,118	836	544	6,710	8,113			8,847	9,775
June.			3,028	3,174	6,183	6,541			9,211	9,715
Side										
Stern			947	955	1,456	1,426			2,403	2,381
Total			3,975	4,129	7,639	7,967			11,614	12,096
2 nd Quarter	577	586	8,519	5,473	21,281	21,836			30,377	27,895
Side										
Stern	728	544	3,935	1,903	1,880	1,795			6,543	4,242
Total	1,305	1,130	12,454	7,376	23,161	23,631			36,920	32,137
July.			39	56	7,301	9,199			7,520	9,255
Side										
Stern			592	565	2,784	2,462			3,376	3,027
Total			611	621	10,285	11,661			10,896	12,282
Aug.			126	117	3,428	6,284			3,554	6,401
Side										
Stern			495	432	2,542	2,896			3,037	3,328
Total			621	549	5,970	9,180			6,591	9,729
Sept.			145	127	3,823	4,247			3,758	4,374
Side										
Stern			414	300	4,030	3,805			4,424	4,125
Total			559	447	7,823	8,052			8,182	8,499
3 rd Quarter			290	300	14,942	19,730			14,832	20,030
Side										
Stern			1,501	1,317	9,336	9,263			10,837	10,480
Total			1,791	1,617	23,878	28,993			25,669	30,510
Oct.			203	360	1,867	2,524			2,070	2,884
Side										
Stern			146	299	2,180	2,876			2,326	2,935
Total			349	659	4,047	5,400			4,396	5,819
Nov.			884	952	1,333	1,276			2,217	2,228
Side										
Stern			494	441	799	965			1,293	1,406
Total			1,378	1,393	2,132	2,241			3,510	3,634
Dec.			869	919	782	759			1,651	1,678
Side										
Stern			1,979	1,162	32	44			2,030	1,206
Total			2,848	2,081	813	803			3,661	2,884
4 th Quarter			1,956	2,231	3,982	4,599			5,938	6,790
Side										
Stern			2,629	1,882	3,010	3,685			5,629	5,547
Total			4,575	4,093	6,992	8,844			11,567	12,337
Total Side Trawl	577	586	18,788	12,544	52,632	54,379	12,506	7,203	84,503	74,712
Total Stern Trawl	728	544	15,506	8,111	17,797	16,683	4,782	1,884	38,813	27,222
Total Trawl	1,305	1,130	34,294	20,655	70,429	71,062	17,288	9,087	123,316	101,934

40

Table 4. Cod catch and effort by Portuguese dory vessels and gill net fleet.

Months	SUBAREA 1						SUBAREA 3						SUBAREAS 1+3						SUBAREAS 1+3 TONS
	Line fishery			Gill nets			Line fishery			Gill nets			Line fishery			Gill nets			
	Tons	Dory- -hour	Hours out	Tons	Hours out	Dery- -hour	Tons	Hours out	Dery- -hour	Tons	Hours out	Dery- -hour	Tons	Hours out	Dery- -hour	Tons	Hours out	Dery- -hour	
March							212	6,120				212	6,120			212	6,120		212
1 st quarter							212	6,120				212	6,120			212	6,120		212
April							454	19,019				454	19,019			454	19,019		454
May							2,338	106,839				2,338	106,839			1,390	44,650		3,728
June	1,661	55,047					829	62,232				2,440	63,655			2,440	117,279		4,930
2 nd quarter	1,661	55,047					3,167	169,071				4,264	127,324			4,284	224,118		9,112
July	508	25,476					4,398	155,524				2,012	62,962			2,012	62,962		6,918
August			1,452	25,641			4,549	125,900				642	24,130			4,549	125,900		6,643
September			1,369	34,946			2,768	101,728				570	15,300			2,768	101,728		4,707
3 rd quarter	508	25,476	2,821	60,787			11,715	382,152				3,224	102,392			6,045	408,628		18,268
October												1,649	44,745			1,649	44,745		1,649
4 th quarter												1,649	44,745			1,649	44,745		1,649
T O T A L	2,169	80,523	2,821	60,787			14,882	552,223				9,369	280,581			17,051	632,746		29,241

Subarea 1

A. Status of the fisheries

The otter trawlers took 1,305 tons in Div. 1B, 1C, 1D, and 1F during April and May (Tables 2 and 3, Fig. 3); the best catch was made by the stern trawlers, 728 tons against 577 tons by the side trawlers. The catch in April was very low - only 4 tons. The dory and gill net fisheries were not very important in this Subarea. Dory vessels fishing in June and July only landed 2,169 tons (Table 4); catches from gill nets amounted to 2,821 tons taken in August (1,452 tons) and September (1,369 tons) (Table 4, Fig. 3).

B. Special research studies

Samples for biological study were collected from Div. 1C, 1D, 1E, between 4 and 23 May 1971 as follows:

Div.	Samples	Date	Depth (m)	Lengths ¹	
				No.	Average in cm
1C	A	5-23 May	180-290	525	64.6
1D	B	6-17 May	200-250	325	62.6
1E	C	5-11 May	300-600	150	67.6

¹ Lengths ranged from 43 cm to 103 cm (3-cm classes) (Fig. 4).

Subarea 2

A. Status of the fisheries

Only the otter trawlers fished in this Subarea. A total of 34,294 tons was taken in Div. 2H and 2J. The stern trawlers took 4,336 tons in Div. 2H and 11,170 tons in Div. 2J, while the side trawlers took 18,788 tons in Div. 2J only (Table 2, Fig. 2).

Table 3 and Fig. 3 show that the greatest catch was made in the first quarter, with 15,474 tons landed (8,023 tons by side trawlers and 7,451 by stern trawlers). The highest trawler catch was made in January, 11,117 tons (5,973 by stern trawlers and 5,114 by side trawlers).

B. Special research studies

Samples for biological study were collected from a commercial trawler, in Div. 2J, in the second quarter of the year as follows:

Div.	Samples	Date	Depth (m)	Fish lengths (No.)	Fish otoliths (No.)
2J	A	17-23 April	280-400	975	400
2J	B	29-31 May	260-290	599	100
2J	C	1-13 June	250-320	1,325	200

a. Length composition

Length (Fig. 5) ranged from 34 cm to 121 (3-cm classes); mean lengths were 56.9 cm in sample A (April); 49.6 cm in B (May); and 52.3 cm in C (June).

b. Age composition

Ages ranged from 4 to 19 years with 5, 6, and 7-year-olds dominant, while in April 8-year-olds were also quite well represented; mean ages were 7.2 in sample A; 6.3 in B, and 6.5 in C.

c. Growth

Average length (cm) at age of cod caught by trawl, sampled during the second quarter are shown below.

Div. 2J

Lengths (cm)

<u>Year-class</u>	<u>Age-group</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>No. of fish</u>
1967	IV	43.0	37.4	32.2	2
1966	V	45.1	45.2	44.3	86
1965	VI	51.4	48.6	49.6	235
1964	VII	57.4	54.4	55.0	201
1963	VIII	61.8	59.0	60.2	99
1962	IX	65.4	64.8	65.0	38
1961	X	71.4	68.9	72.3	13
1960	XI	71.9	69.5	71.3	6
1959	XII	70.2	69.6	70.8	7
1958	XIII	72.3	65.2	72.6	4
1957	XIV	80.6	74.6	75.8	6
1956	XV	68.7	64.0	71.2	2
1955	XVI	-	-	-	-
1954	XVII	-	-	-	-
1953	XVIII	-	-	-	-
1952	XIX	76.0	-	76.0	1

d. Stage of maturity

Figure 6 shows that it was possible to identify several stages of maturity in the males and in the females. In both the resting or recovering stage presents a higher percentage in April and May than in June. The other stages were observed in the males with a predominance of the spawning and post-spawning stages; the latter being quite well represented in June. In the females in May the spawning stage was not observed but the developing stage was recorded in about 20%, and the resting or recovering stage varied from 40 to 60% in the three months.

e. Age at first maturity

Only a very low percentage of the otoliths showed a well-defined first maturity ring. However, some of them showed the age at first maturity as 5, 6, and 7, but mainly 6. A very high percentage of the fishes sampled were in the immature stage.

Subarea 3

A. Status of the fisheries

The Portuguese cod fishery was most intensive in this Subarea. The trawlers operated in Div. 3K, 3L, 3M, 3N, 3O, 3P, and 3Ps. Landings in metric tons are shown below:

<u>Div.</u>	<u>Side</u>	<u>Stern</u>	<u>Total</u>
3K	3,758	1,734	5,492
3L	44,195	12,272	56,467
3M	3,673	3,599	7,272
3N	16	-	16
3O	111	-	111
3Pn	798	192	990
3Ps	81	-	81
	52,632	17,797	70,429

The dory vessels visited only Div. 3L and 3N and took 13,265 tons and 1,617 tons, respectively; the gill net fishery took 4,524 tons in 3L, 4,442 tons in 3N, and only 403 tons in 3O (Table 2).

The best trawl catches were in March with 15,206 tons fished (12,241 tons by side trawlers, and 2,965 tons by stern trawlers). The total trawl catch was 70,429 tons,

52,632 tons by side trawlers and 17,797 tons by stern trawlers. The best dory vessel catch occurred in August, 4,549 tons. The total dory vessel catches amounted, in this area, to 14,882 tons (Table 4). The gill net fishery had reasonable catches in the second and third quarters of the year, mainly in June (2,440 tons) and July (2,012 tons). The total gill net catch was 12,190 tons (2,821 tons from Subarea 1 and 9,369 tons from Subarea 3) (Table 2, Fig. 2). The best monthly catch occurred in June (2,440 tons), July (2,012 tons) and October (1,649 tons) (Table 4, Fig. 3).

B. Special research studies

Samples for biological studies were collected from a trawler in Div. 3K and 3L as follows:

Div.	Samples	Date	Depth (m)	No. of lengths	No. of otoliths
3K	A	4-31 July	200-270	525	150
3K	B	1-6 August	230-310	440	65
Total 3K				965	215
3L	C	2-14 April	200-265	1,450	300
3L	D	1-2 May	250	150	150
3L	E	15-28 June	190-240	1,650	250
Total 3L		Second quarter		3,250	700
3L	F	6-29 July	170-285	2,180	200
Total 3L		Second and third quarters		5,430	900
Total Subarea 3				6,395	1,115

a. Length composition

Lengths (Fig. 7) ranged from 25 cm to 133 cm (3-cm classes); mean lengths in the samples were as follows:

A - 55.1 cm; B - 56.2; C - 49.1; D - 52.4; E - 54.7; F - 55.3.

b. Age composition

Ages ranged from 4 to 12 years and were mainly 5, 6, 7 and 8 years. In Div. 3K the dominant ages were 5, 6 and 7 in July, and 6, 7 and 5 in August. Div. 3L, in the second quarter of the year, showed mainly ages 5 and 6. In July, however, the age distribution was not so different from other second quarter distributions. There was also a very good percentage of 4 and 7-year-olds.

Mean ages for each of the samples were:

A - 6.4 years; B - 6.4 years; C - 5.4 years; D - 5.7 years;
E - 5.8 years; F - 5.5 years.

c. Growth

Average length (cm) of cod fished by trawl and sampled during the third quarter as follows:

<u>Div. 3K</u>				
Lengths (cm)				
Year-class	Age-group	July	August	No. of fish
1967	IV	43.9	42.3	3
1966	V	46.0	48.3	35
1965	VI	54.0	54.2	58
1964	VII	59.6	59.5	62

... continued

Div. 3K (continued)

<u>Year-class</u>	<u>Age-group</u>	<u>July</u>	<u>August</u>	<u>No. of fish</u>
1963	VIII	66.0	65.2	34
1962	IX	70.4	70.0	16
1961	X	70.1	66.7	3
1960	XI	72.8	71.2	3
1959	XII	94.0	-	1

Div. 3L

<u>Year-class</u>	<u>Age-group</u>	<u>2nd Quarter</u>				<u>3rd Quarter</u>	
		<u>April</u>	<u>May</u>	<u>June</u>	<u>No. of fish</u>	<u>July</u>	<u>No. of fish</u>
1968	III	35.6	40.0	40.0	2	41.0	10
1967	IV	40.9	43.3	42.3	43	44.8	40
1966	V	46.4	48.4	47.8	224	51.3	60
1965	VI	51.7	52.9	53.1	244	56.2	53
1964	VII	61.6	60.9	62.3	132	65.9	25
1963	VIII	69.6	68.2	69.7	41	70.9	9
1962	IX	77.5	79.0	78.2	8	76.0	2
1961	X	79.2	80.9	84.3	3	-	-
1960	XI	85.0	-	91.0	2	91.0	1
1959	XII	76.0	76.0	76.0	1	-	-

d. Stage of maturity

Figure 8 shows the different stages of maturity (in percentage) observed in males and females during the third quarter of the year. In June or July in Div. 3K, the greater percentage of the fishes observed were in the resting or recovering and spawning stages; the females, showing a reasonable percentage in the spawning stage. The males in June also showed a significant proportion in the post-spawning stage.

In Div. 3L the fish were mainly in the resting or recovering stages and largely females; also there was an important percentage in the spawning, and resting or recovering stages, the post-spawning stages being better represented in the males, mainly in the third quarter of the year.

e. Age at first maturity

As in other Subareas the otoliths aged in Div. 3K and 3L did not show the age at maturity with any certainty. However, it was possible to estimate age at first maturity from some otoliths at age 6 and 7. The larger percentage of the otoliths were of such a condition that the determination of this parameter was not possible.

Subarea 4

A. Status of the fisheries

In this Subarea only the trawlers fished. They took 17,288 tons of which 12,506 tons were by side trawlers and 4,782 by stern trawlers. The vessels fished in Div. 4R, 4Vn and 4Vs but a reasonable tonnage, 17,144 tons, was only landed in 4R (Table 2).

The catches were made only during the first quarter of the year, mainly in February with 14,969 tons landed (Table 3).

The higher catch was made by the side trawler fleet with 10,499 tons in February, against 4,470 tons in the same period by the stern trawler fleet. The total catch by side trawlers was 12,506 tons and by stern trawlers, only 4,782 tons.

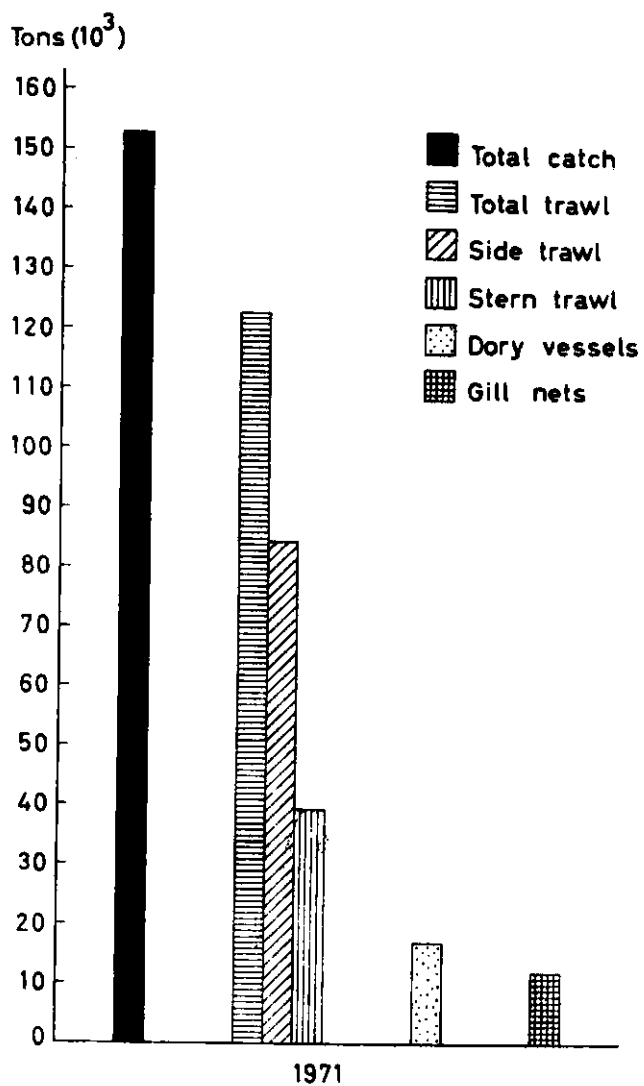


Fig. 1. Cod catch (in tons) by Portuguese fleet in ICNAF Area.

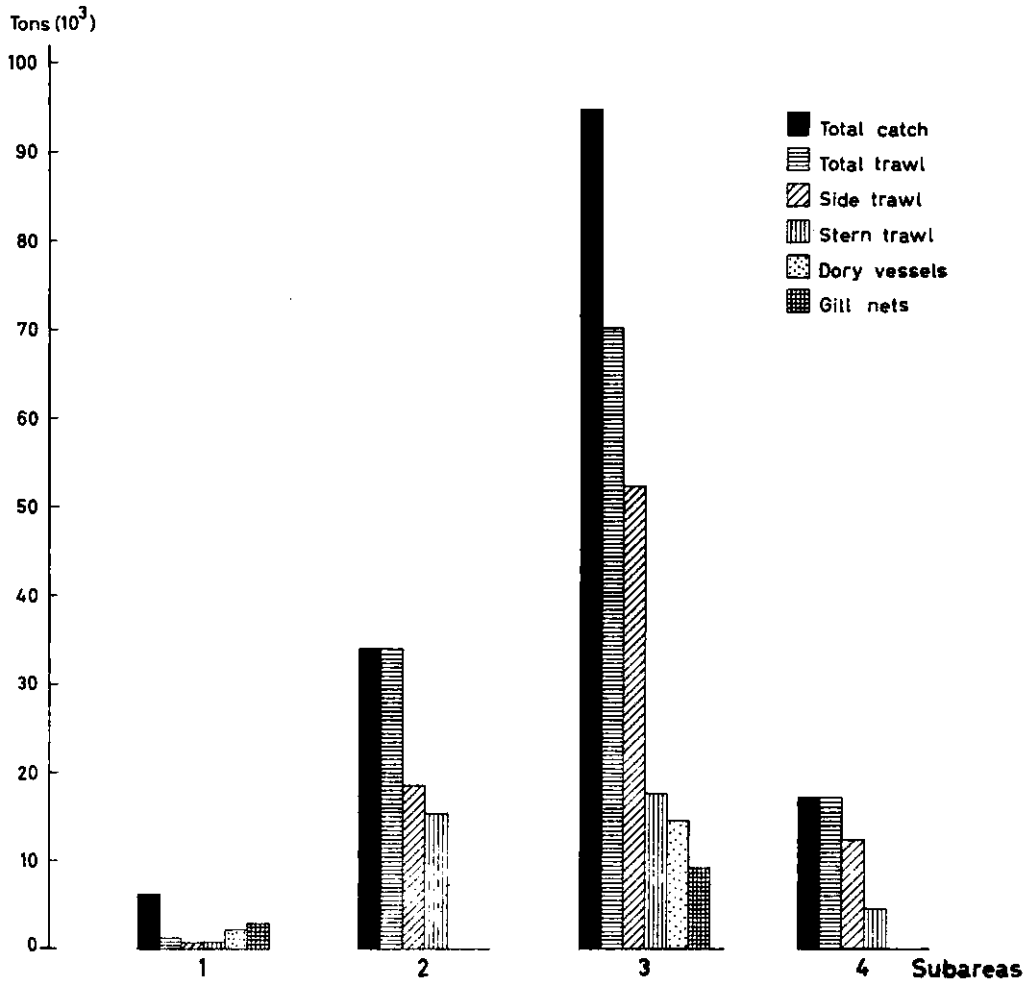


Fig. 2. Cod catch (in tons) by Portuguese fleet by subareas - 1971.

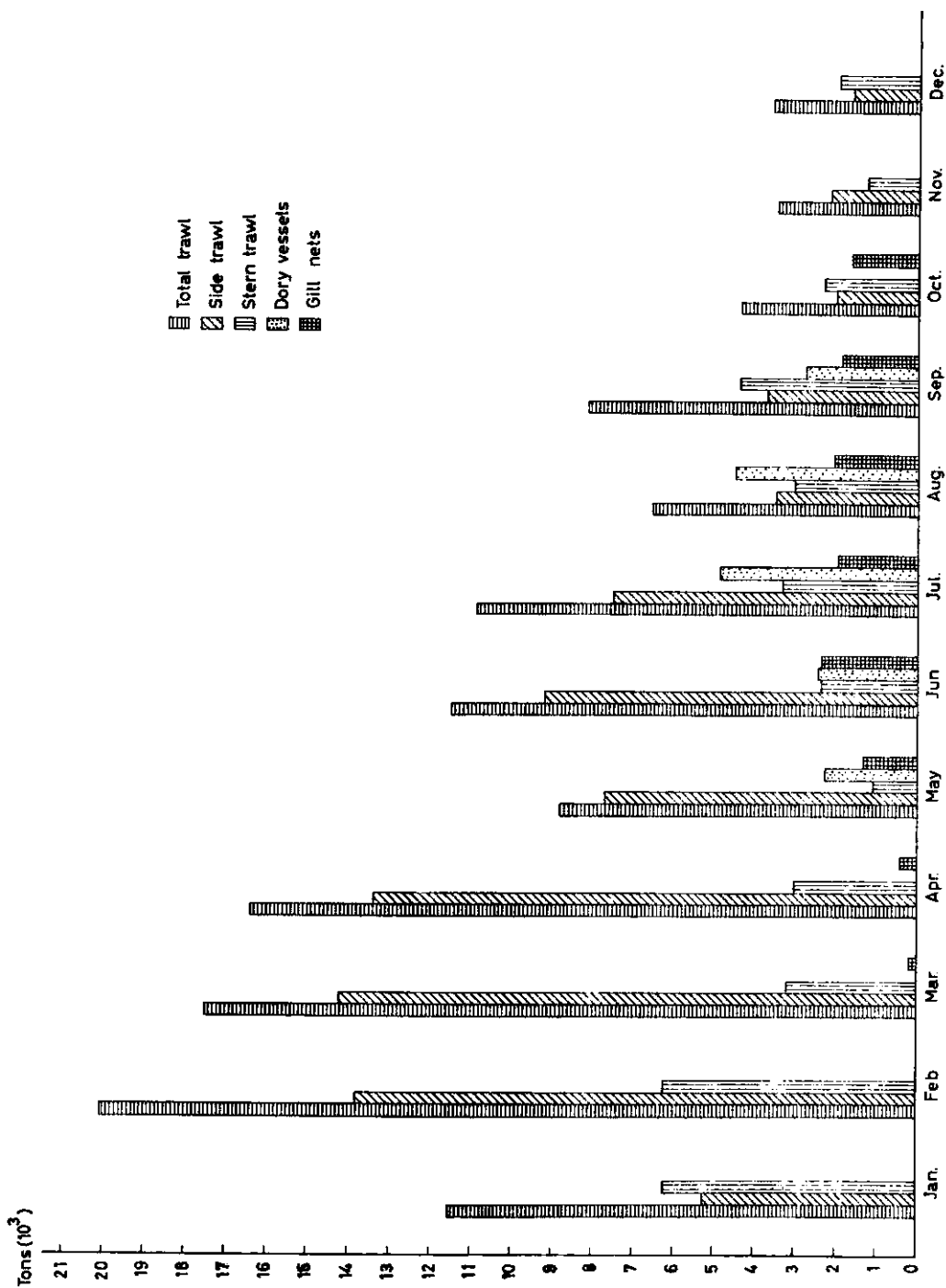


Fig. 3. Total catch of cod (in metric tons) by Portuguese fleet (trawlers, dory vessels and gill nets) by months - 1971.

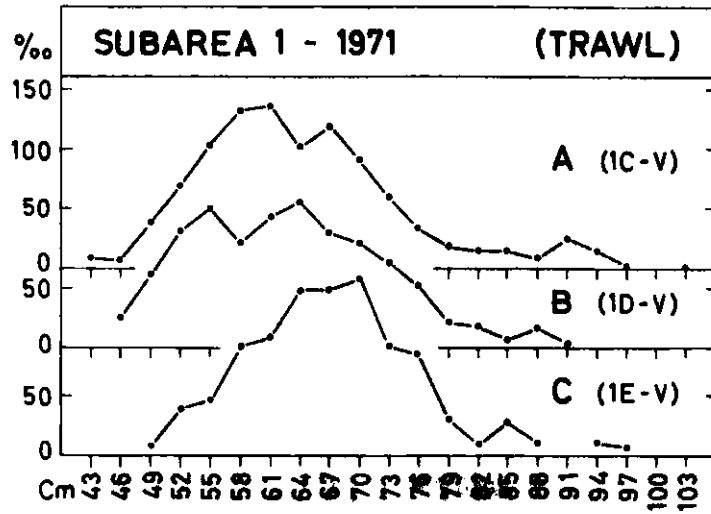


Fig. 4. Length frequencies - cod - otter trawl - Subarea 1, 1971.

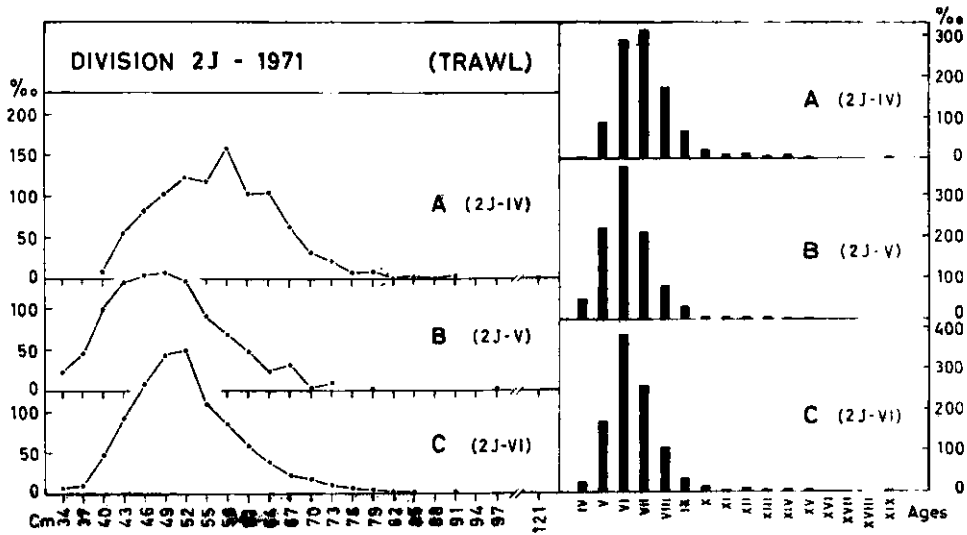


Fig. 5. Length and age frequencies - cod - otter trawl - Div. 2J, 1971.

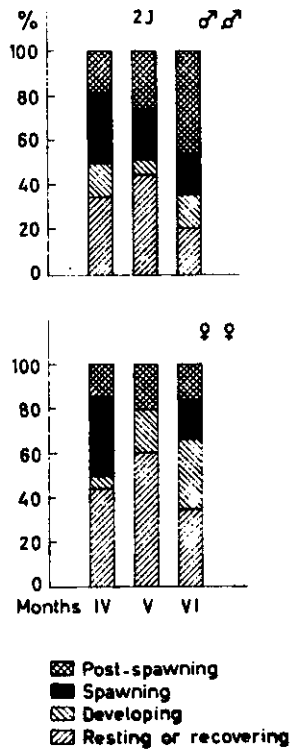


Fig. 6. Maturity - cod - Div. 2J, 1971.

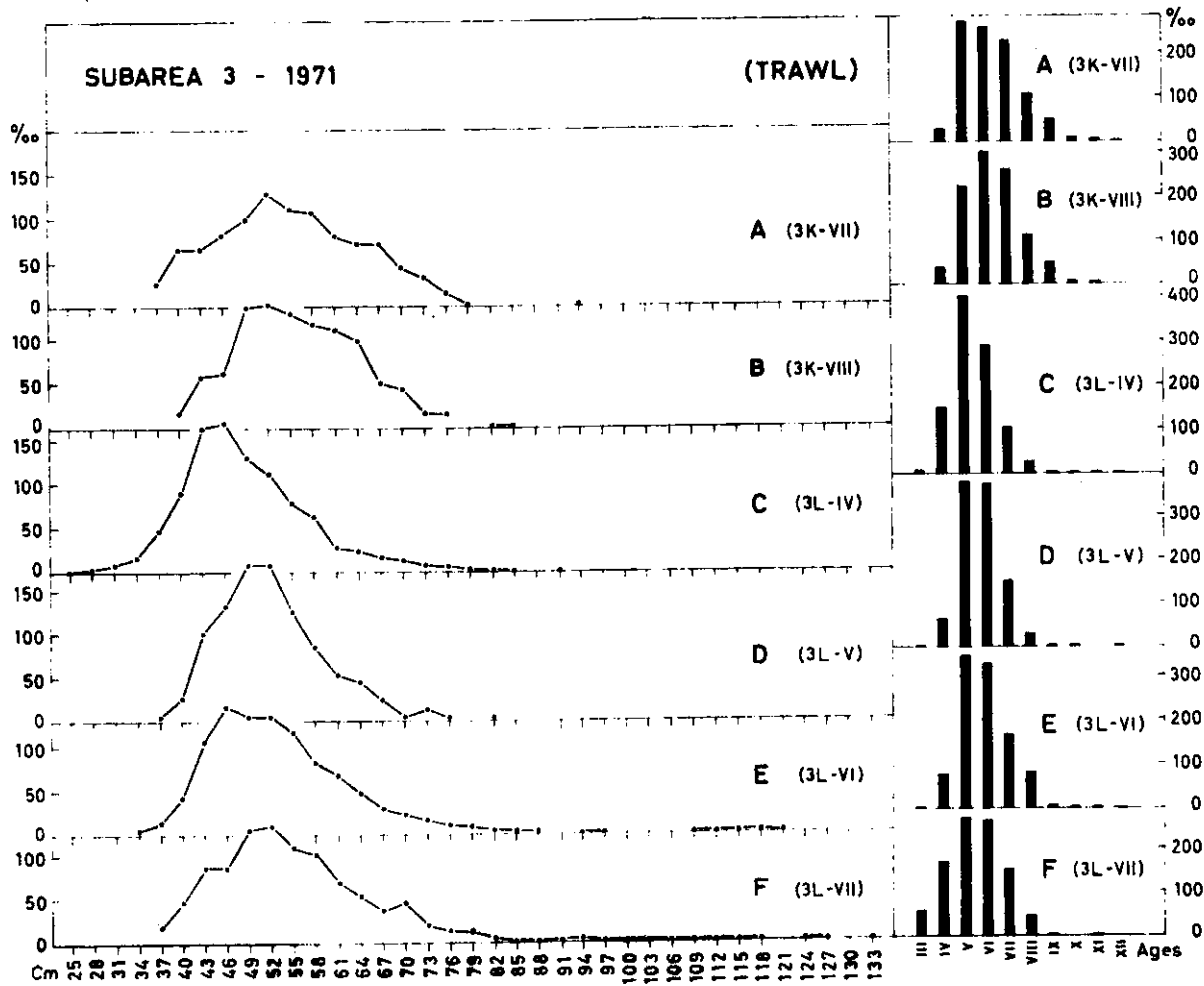


Fig. 7. Length and age frequencies - cod - otter trawl - Subarea 3, 1971.

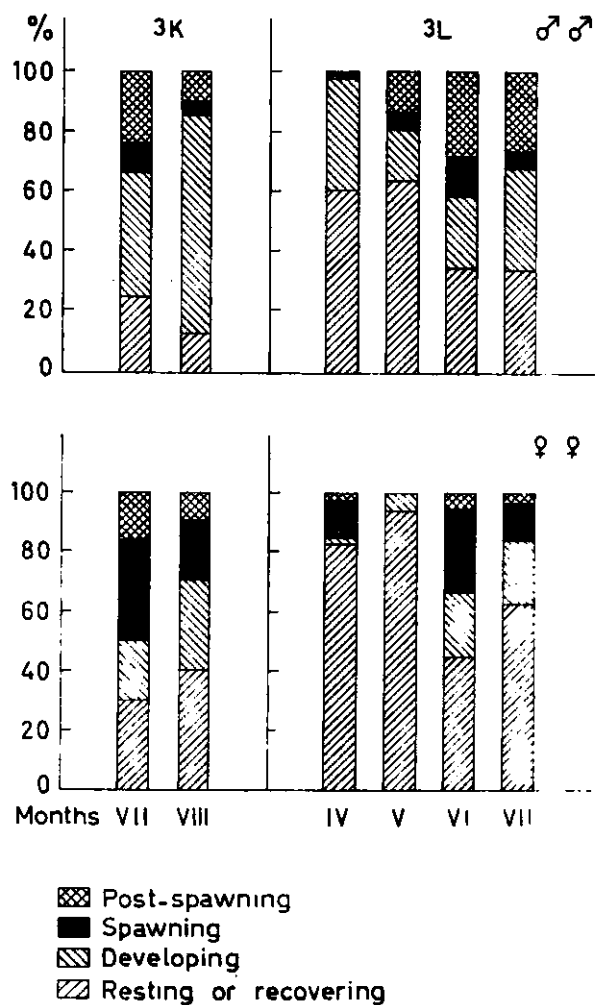


Fig. 8. Maturity - cod - Subarea 3, 1971.