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Canadian mackerel catches and numbers at age in Subarea 4 1975

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CATCH

Canadian catches of mackerel in Subarea 4 indicate a further decline to 9650 metric tons (mt) in 1975 relative to 1974 and 1973 catches of 14600 and 18900 mt, respectively. Much of the decline in 1975 catches can be attributed to lower catches in Division 4T which accounted for less than 22% of the total. Division 4X catches, however, increased over 1974 levels to 45% of the Subarea 4 catch. The majority of the Subarea 4 catch was taken in the second and third quarters (77%) by inshore fixed gears (98%). Catches by gear types, division and quarter are summarized in Table 1.

SAMPLING

A total of 66 length frequency samples were collected from catches in Subarea 4 and, when possible, two fish retained from each half-centimeter interval for detail analysis. Approximately 2200 fish were examined for age, length, weight and associated biological parameters.

BIOLOGICAL PARAMETERS

Since biological samples were selected on a length-stratified basis, it was necessary to weight for length frequency numbers. This was accomplished by reducing individual length frequencies to a per cent and then combining these frequencies on a quarterly basis for Subarea 4 in the same proportion as individual fishing gears were represented in the total quarterly catch. Samples combined in this way yielded combined length frequencies reduced to per mille by quarter.

To obtain length-weight parameters, biological samples (unweighted) were combined by quarter for Subarea 4 and regression curves fitted to mean weight at length data using a logarithmic transformation. This resulted in curves of the form

$$\text{Weight} = A * \text{Length}^B$$

Estimates of age were made from otoliths by counting hyaline (winter) zones excluding the nucleus. Age-group was thus defined as the number of count-edges and year-class as the year sampled minus the age-group.

Age-length keys by quarter were constructed using numbers at age. The mean length of fish in the catch was determined from weighted length frequencies. This length was used to determine mean weight from the length-weight parameters which yielded total numbers when the quarterly catch was divided by mean weight. This total number was then proportioned by the length frequency to arrive at the number of individuals in each length group. Biological samples combined by quarter gave numbers at age in each length group for samples. The proportion of each age group by length interval was applied to the total number caught to arrive at numbers caught by age group and length interval in the catch.

LENGTH FREQUENCY ANALYSIS

Considerable variation in the distribution of lengths between quarters is evident from Figs. 1-3. Catches in quarter 2 were of fish greater than 30 cm, while in quarters 3 and 4, fish less than 30 cm comprised close to 50% of the total. This distribution is similar to that of previous years' catches and is probably influenced by the increased catch in Division 4X.

NUMBERS AT AGE

Tables 2-4 summarize removals by age and length group in Subarea 4 by quarter. A total of 26000×10^9 mackerel were taken in 1975 with 23%, 50% and 27% in quarters 2, 3 and 4, respectively. As suggested by length frequency distributions, year-class composition varied considerably between quarters. Combined year-class compositions are shown below:

	AGE GROUP									
	1	2	3	4	5	6	7	8	9	10+
N	5386	7695	2882	2665	2278	2458	1593	611	154	140
%	20.8	29.8	11.1	10.3	8.8	9.5	6.2	2.4	0.6	0.5

The 1974 and 1973 year classes made up close to 51% of the total catch and the 1971 year class about 10%. The 1967 year class accounted for less than 3% of the total and would appear to be no longer significant in Subarea 4 mackerel catches.

CONCLUSION

While Canadian catches in Subarea 4 declined significantly in 1975, adverse market conditions and low demand combined to reduce effort. A shift in distribution of catches towards Division 4X probably accounts for the higher contribution of 1 and 2 year-old mackerel.

Table 1. 1975 Canadian Mackerel Catches in Subarea 4.

Gear Division	2					Q U A R T E R 3					4					TOTAL
	4T	4V	4W	4X	TOTAL	4T	4V	4W	4X	TOTAL	4T	4V	4W	4X	TOTAL	
Weir	-	-	-	179	179	1	-	-	417	418	-	-	-	62	62	659
Seines	5	-	8	1	14	602	14	-	6	622	8	615	-	6	629	1265
Handline	-	-	1	>1	1	67	104	79	7	257	30	221	26	3	280	538
Traps	2	586	84	1045	1717	1	265	44	929	1239	1	-	73	664	738	3694
Gillnet	432	96	411	320	1259	697	38	50	308	1093	18	-	164	252	434	2786
Misc.	3	>1	81	30	114	246	166	30	80	522	9	25	7	31	72	708
Total	442	683	584	1575	3284	1614	587	203	1747	4151	66	861	270	1018	2215	9650

THOUSANDS OF MACKEREL CAUGHT IN SA 4 IN QUARTER 2

LENGTH GROUP	AGE GROUP										TOTAL	
	1	2	3	4	5	6	7	8	9	10		10+
10-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24-CM	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.
25-CM	5.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.
26-CM	0.	25.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25.
27-CM	0.	77.	0.	0.	0.	0.	0.	0.	0.	0.	0.	77.
28-CM	0.	67.	0.	0.	0.	0.	0.	0.	0.	0.	0.	67.
29-CM	0.	14.	4.	0.	0.	0.	0.	0.	0.	0.	0.	18.
30-CM	0.	27.	51.	0.	0.	0.	0.	0.	0.	0.	0.	78.
31-CM	0.	15.	119.	4.	0.	0.	0.	0.	0.	0.	0.	138.
32-CM	0.	4.	238.	82.	4.	0.	0.	0.	0.	0.	0.	327.
33-CM	0.	5.	170.	325.	31.	10.	0.	5.	0.	0.	0.	546.
34-CM	0.	0.	105.	484.	85.	39.	26.	7.	0.	0.	0.	745.
35-CM	0.	0.	0.	248.	331.	174.	124.	8.	0.	0.	0.	886.
36-CM	0.	0.	0.	99.	346.	316.	178.	59.	20.	0.	0.	1018.
37-CM	0.	0.	0.	36.	190.	362.	263.	72.	18.	9.	0.	951.
38-CM	0.	0.	0.	0.	113.	204.	219.	83.	8.	0.	15.	643.
39-CM	0.	0.	0.	0.	37.	60.	97.	55.	28.	0.	0.	277.
40-CM	0.	0.	0.	0.	5.	30.	25.	30.	25.	30.	10.	153.
41-CM	0.	0.	0.	0.	5.	5.	0.	18.	9.	5.	23.	64.
42-CM	0.	0.	0.	0.	0.	0.	0.	0.	7.	0.	18.	25.
43-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	5.
44-CM	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	2.	5.
45-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTALS	6.	238.	686.	1278.	1147.	1201.	932.	338.	116.	43.	73.	6057.
MEAN L	24.8	28.1	32.2	34.0	36.0	36.7	37.0	37.7	38.8	39.5	40.7	
MEAN W	154.8	233.3	370.5	446.0	536.5	572.8	589.1	628.9	690.1	733.3	813.3	
PERCENT	.1	3.9	11.3	21.1	18.9	19.8	15.4	5.6	1.9	.7	1.2	

THOUSANDS OF MACKEREL CAUGHT IN SA.4 IN QUARTER 3

LENGTH GROUP	AGE GROUP										TOTAL	
	1	2	3	4	5	6	7	8	9	10		10+
10-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19-CM	19.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19.
20-CM	88.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	88.
21-CM	331.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	331.
22-CM	869.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	869.
23-CM	700.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	700.
24-CM	782.	27.	0.	0.	0.	0.	0.	0.	0.	0.	0.	809.
25-CM	481.	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	733.
26-CM	292.	511.	0.	0.	0.	0.	0.	0.	0.	0.	0.	803.
27-CM	45.	882.	0.	0.	0.	0.	0.	0.	0.	0.	0.	928.
28-CM	60.	658.	15.	0.	0.	0.	0.	0.	0.	0.	0.	733.
29-CM	0.	718.	50.	0.	0.	0.	0.	0.	0.	0.	0.	767.
30-CM	0.	351.	153.	11.	0.	0.	0.	0.	0.	0.	0.	515.
31-CM	0.	130.	278.	6.	0.	0.	0.	0.	0.	0.	0.	414.
32-CM	0.	74.	402.	63.	0.	0.	0.	0.	0.	0.	0.	540.
33-CM	0.	10.	391.	291.	0.	0.	10.	0.	0.	0.	0.	703.
34-CM	0.	13.	179.	434.	115.	77.	13.	13.	13.	0.	0.	855.
35-CM	0.	0.	64.	192.	368.	208.	80.	48.	0.	0.	0.	959.
36-CM	0.	0.	0.	86.	361.	361.	120.	34.	0.	0.	0.	962.
37-CM	0.	0.	0.	18.	107.	340.	233.	72.	0.	0.	0.	769.
38-CM	0.	0.	0.	11.	22.	77.	55.	77.	0.	0.	0.	242.
39-CM	0.	0.	0.	0.	0.	0.	12.	18.	12.	0.	0.	49.
40-CM	0.	0.	0.	0.	0.	0.	0.	4.	0.	0.	0.	13.
41-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.
42-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
43-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
44-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
45-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTALS	3667.	3625.	1532.	1112.	973.	1062.	523.	266.	25.	0.	24.	12810.
MEAN L	23.3	27.9	32.1	34.0	35.5	36.1	36.5	36.8	36.4	0	40.1	
MEAN W	125.5	227.3	366.0	443.4	515.5	544.5	561.9	581.7	560.5	0	775.6	
PERCENT	28.6	28.3	12.0	8.7	7.6	8.3	4.1	2.1	2.1	0	0	.2

THOUSANDS OF MACKEREL CAUGHT IN SA 4 IN QUARTER 4

LENGTH GROUP	AGE GROUP										TOTAL	
	1	2	3	4	5	6	7	8	9	10		10+
10-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
16-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20-CM	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
21-CM	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
22-CM	12.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12.
23-CM	10.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.
24-CM	25.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	26.
25-CM	138.	5.	0.	0.	0.	0.	0.	0.	0.	0.	0.	143.
26-CM	415.	24.	0.	0.	0.	0.	0.	0.	0.	0.	0.	439.
27-CM	682.	180.	0.	0.	0.	0.	0.	0.	0.	0.	0.	862.
28-CM	304.	486.	0.	0.	0.	0.	0.	0.	0.	0.	0.	790.
29-CM	61.	1076.	31.	0.	0.	0.	0.	0.	0.	0.	0.	1168.
30-CM	39.	1312.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1351.
31-CM	25.	595.	174.	0.	0.	0.	0.	0.	0.	0.	0.	793.
32-CM	0.	121.	151.	0.	0.	0.	0.	0.	0.	0.	0.	272.
33-CM	0.	22.	196.	65.	0.	0.	0.	0.	0.	0.	0.	284.
34-CM	0.	0.	79.	66.	13.	13.	0.	0.	0.	0.	0.	171.
35-CM	0.	11.	34.	90.	34.	22.	0.	0.	0.	0.	0.	190.
36-CM	0.	0.	0.	54.	68.	68.	0.	0.	0.	0.	0.	189.
37-CM	0.	0.	0.	0.	21.	63.	42.	0.	0.	0.	0.	126.
38-CM	0.	0.	0.	0.	0.	13.	80.	0.	13.	0.	0.	107.
39-CM	0.	0.	0.	0.	22.	7.	7.	7.	0.	0.	0.	44.
40-CM	0.	0.	0.	0.	0.	8.	8.	0.	0.	0.	0.	17.
41-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
42-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
43-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
44-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
45-CM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTALS	1713.	3832.	664.	275.	158.	195.	138.	7.	13.	0.	0.	6996.
MEAN L	26.9	29.5	32.3	34.5	36.2	36.5	37.9	39.0	38.0	0.	0.	
MEAN W	201.3	277.0	373.3	465.6	547.0	563.5	638.1	704.2	645.4	0.	0.	
PERCENT	24.5	54.8	9.5	3.9	2.3	2.8	2.0	.1	.2	0.	0.	

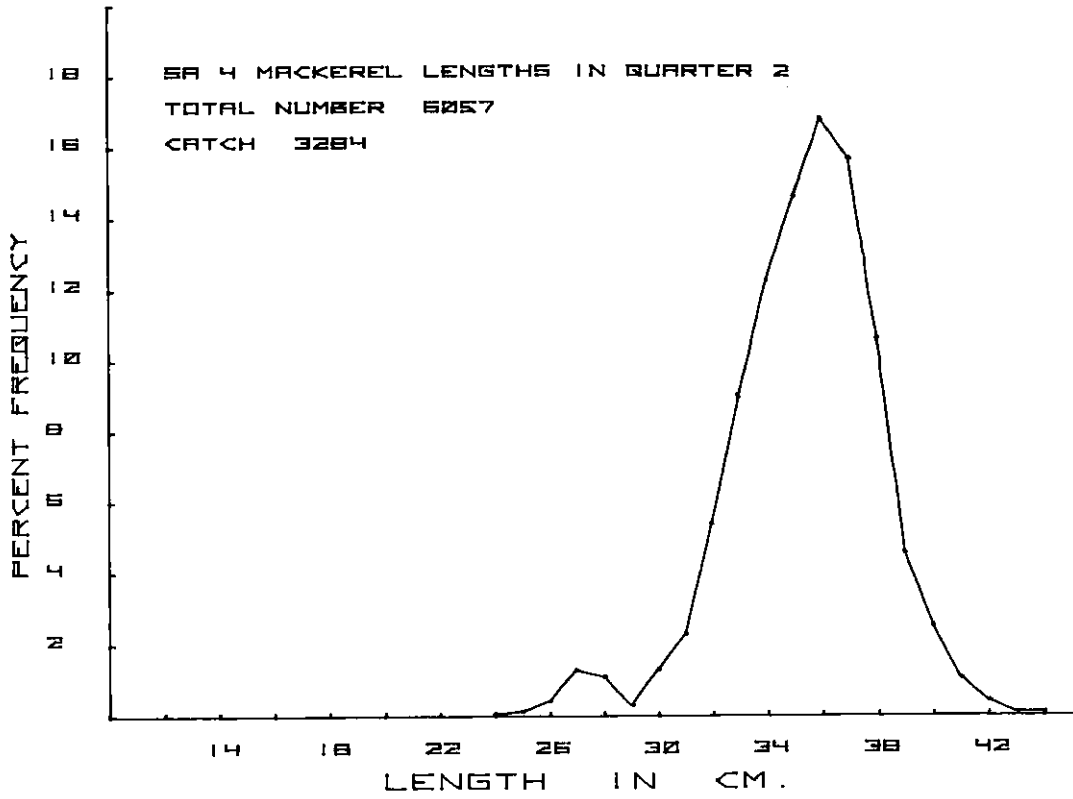


Fig. 1

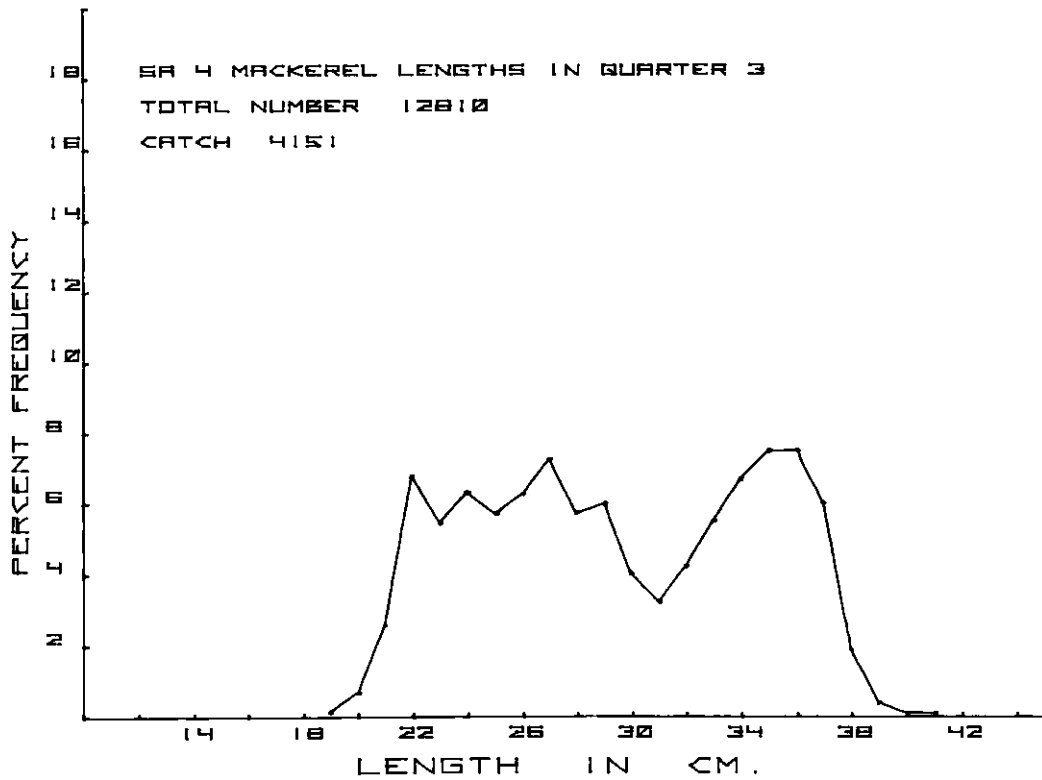


Fig. 2.

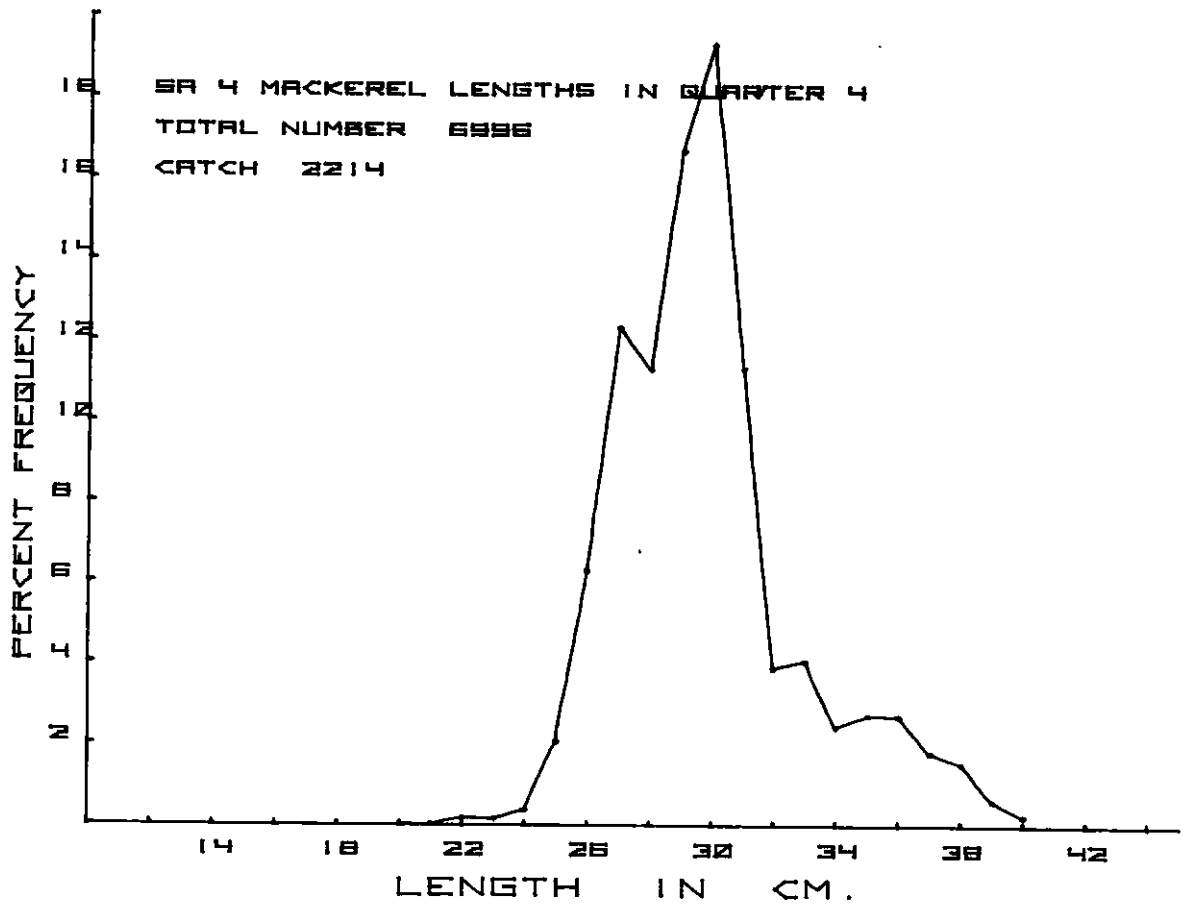


Fig. 3.