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Size and sexual maturity of redfish, type mentella (Sebastes mentella Tr.)
and type marinus (Sebastes marinus L.)
on the fishing grounds off Newfoundland and Nova Scotia, April-June 1965

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Measurements and detailed biological analysis of redfish were made during a research cruise to the fishing grounds off Newfoundland and Nova Scotia from 4 April to 18 June 1965. A total 12,713 redfish, type "mentella", and 414 individuals, type "marinus", were measured. The detailed analysis was made on 1,235 individuals of "mentella" type. Total fish length was measured with an accuracy of 1 cm. In biological analysis only the stage of maturity of gonads was determined by means of arbitrarily accepted 4 groups of maturity:

- I - gonads in resting stage,
- II - gonads with initial stage of development,
- III - gonads with developing larvae and running,
- IV - gonads blood red with single larvae - fish spent.

Stomach contents were determined quantitatively according to generally applied scale of five degrees (0-IV).

The materials were collected mainly on Flemish Cap, over the southwestern slopes of the Great Newfoundland Bank, on St. Pierre Bank, north of Burgeo Bank, on Scatari, Artimon and Banquereau Banks and on Middle Ground. Only single redfish or none occurred in the catches on the Great Newfoundland Bank. Fishing locations are given in Figure 1.

The main object of the cruise was to perform investigations on the selectivity of trawls used by Polish trawlers operating in the ICNAF area. The mesh size in the trawl codends was 108.9 cm to 128.5 cm. Loose covers with mesh 40 mm were applied over the upper part of the codends. For the investigations those fish which were retained in the codends and which escaped into the covers were used.

Occurrence of redfish in the catches

Table 1 shows that redfish were a main component of the catches at depths more than 200 m. For instance, on Flemish Cap, at depths ranging from 280 to 360 m, the catch per hour reached 476.9 kg, of which 392.5 kg was redfish. North of Burgeo Bank (220-260 m) total catch per hour was 331.3 kg and redfish made up 307.8 kg. On both fishing grounds mainly redfish, type "mentella", were landed, while redfish, type "marinus", made up only 5-10% of the total landed weight of fish. On other fishing grounds, only type "mentella" was captured. Comparatively good catch per effort for redfish was obtained on Scatari and Artimon Banks - 147.4 kg and 77.0 kg per hour respectively.

Fish length

The range of length of the fish from the various grounds and mean length values for males and females are given in Tables 2 and 3; length composition of these fish are given in Figs. 2 and 3.

Data presented in these figures and tables show rather large variations in the length of the fish from the various fishing grounds. The largest fish were captured on Flemish Cap. There, the length of males ranged from 18 to 40 cm, the length of females from 17 to 44 cm. Also, mean lengths were high, for males they were 33.7 cm and for females 35.7 cm. Besides, in the catches from this fishing ground about 10% were redfish, type "marinus", with mean length 43.1 cm. On St. Pierre, Scatari, Artimon and Banquereau Banks, mean lengths were 29.1-30.8 cm. In the landings from other fishing grounds, the redfish were smaller,

Sexual maturity

Because of the difficulties in carrying out the investigations at sea, the stage of maturity of females only was determined.(Table IV). The least variation in the stage of the maturity of gonads was observed in females on Flemish Cap and over the southwestern slopes of the Great Newfoundland Bank. In the first case, 98.5% of the females had gonads in the resting stage and only 1.5% of them had spent gonads. It is probable that the fish on this fishing ground had spawned before June and their gonads had reached the resting stage. In the latter case, the fish were of particularly small size and probably did not participate in the spawning. On other fishing grounds the stage of maturity of gonads was more differentiated, since, in most cases, in all four stages of gonads maturity was observed, whereas most of the fish had gonads in stage III. The fish in advanced stage of maturity and fish with gonads running were observed on Scatari and Banquereau Banks. The fish with gonads in stage IV occurred from 0-7% depending on the particular fishing ground.

Feeding

Different stages of stomach content were observed in redfish, type "mentella", on the various fishing grounds. The least amount of food in the stomachs of redfish occurred on Middle Ground, where 93.9% of the fish had empty stomachs. Small amounts of food were noted in the stomachs of redfish, type "mentella", on Flemish Cap, southwestern slopes of the Great Newfoundland Bank and north of Burgeo Bank. Here, 83.8, 83.8 and 79.7% respectively of the fish were found with empty stomachs. The most intensive feeding was observed on Scatari Bank. Only 32% of fish had empty stomachs there, whereas considerable percentages had their stomachs filled in various degrees (II - 24.5%, III - 20.4% and IV - 6.8%). On this fishing ground, the gonads of 81.4% of fish were in stage III. In spite of this their feeding was intensive.

Conclusions

Using trawls with covers there occurred not only normal adult size redfish, type "mentella", but also individuals of smaller size (mean length 30 cm or even less). Redfish of greater mean length (35 cm) were captured only on Flemish Cap. Hence, Polish factory trawlers could only fish commercially on Flemish Cap in the springtime, since fish below 30 cm length is not suitable for the production of fillets.

Table 1. Data from fishing operations off Newfoundland and Nova Scotia, April-June 1965.

Fishing grounds	Date	Depth (m)	Catch per hour	
			Total (kg)	Redfish (kg)
1 Flemish Cap	7.VI	280-360	476,9	392,5
2 Northeastern slopes of Great Newfoundland Bank	31.V 1.VI	88-220	211,3	-
3 Woolfall Bank - eastern part	2.VI	80-84	161,8	-
4 Woolfall Bank - northwestern part	3-5.VI	120-150	404,9	-
5 Middle part of Great Newfoundland Bank	29-30.V	70-90	358,2	-
6 Eastern slopes of Great Newfoundland Bank	17-23.VI	100-180	437,0	-
7 Southeastern slopes of Great Newfoundland Bank	24.V	40-360	219,5	-
8 Southwestern slopes of Great Newfoundland Bank	28-29.IV	100-180	309,5	21,7
9 Green Bank	30.IV	120-	33,3	-
10 St. Pierre Bank	30.IV 1,22-23.V	66-330	227,8	5,2
11 North from Burgeo Bank	20-21.V	220-260	331,3	307,8
12 Scatari Bank	18-19.V	130-180	337,8	147,4
13 Artimon Bank	17.V	80-140	246,1	77,0
14 Banquereau Bank	1-3.V 14-17.V	60-200	278,5	0,8
15 Sable Island Bank	4.V	60-100	53,9	-
16 Middle Ground	27.V	120-180	217,5	11,3
17 Western Bank	11.V	72-108	33,3	-
18 Sambro Bank	9-10.V	100-120	98,0	-

Table 2. Length (in cm) of redfish, type "mentella", in the catches.

Fishing ground	♂		♀		♂ + ♀	
	Range	Mean	Range	Mean	Range	Mean length
Flemish Cap	18-40	33,7	17-44	35,7	17-44	35,0
Southwestern slopes of Great Newfoundland Bank	13-29	17,3	12-39	16,5	12-39	16,8
St. Pierre Bank	15-38	28,2	14-41	30,5	14-41	29,1
North from Burgeo Bank	10-38	20,4	11-42	24,1	10-42	22,7
Soatari Bank	14-37	28,5	18-43	32,5	14-43	29,7
Artimon Bank	18-35	26,7	20-40	30,8	18-40	29,2
Banquereau Bank	19-35	29,5	18-42	33,6	18-42	30,8
Middle Ground	15-28	22,5	15-35	21,1	15-35	24,0

Table 3. Length (in cm) of redfish, type "marinus", in the catches.

Fishing ground	♂		♀		♂ + ♀	
	Range	Mean	Range	Mean	Range	Mean
North from Burgeo Bank	36-50	43,4	38-60	48,4	36-60	46,3
Flemish Cap	34-50	41,8	35-52	45,7	34-52	43,1

Table 4. Percentage of female redfish in the varying stages of sexual maturity.

Fishing ground	Stage of sexual maturity			
	I	II	III	IV
Flemish Cap	98,5	-	-	1,5
Southwestern slopes of Great Newfoundland Bank	95,6	4,4	-	-
St. Pierre Bank	51,1	44,3	3,1	1,5
North from Burgeo Bank	86,7	-	5,8	7,5
Scatari Bank	10,0	4,3	81,4	4,3
Artimon Bank	28,4	4,6	64,2	2,8
Banquereau Bank	28,4	55,6	16,0	0,9
Middle Ground	43,9	20,0	35,1	1,0

Table 5. Percentage of redfish with varying degrees of food in their stomachs.

Fishing ground	Degree of stomach content				
	0	I	II	III	IV
Flemish Cap	83,8	9,8	4,7	1,3	0,4
Southwestern slopes of Great Newfoundland Bank	83,8	2,7	4,7	7,4	1,4
St. Pierre Bank	-	-	-	-	-
North from Burgeo Bank	79,7	6,3	8,1	3,6	2,3
Scatari Bank	32,0	16,3	24,5	20,4	6,8
Artimon Bank	67,2	17,5	9,5	5,3	0,5
Middle Ground	93,9	2,0	1,4	2,7	-
Banquereau Bank	69,4	15,6	12,2	1,4	1,4

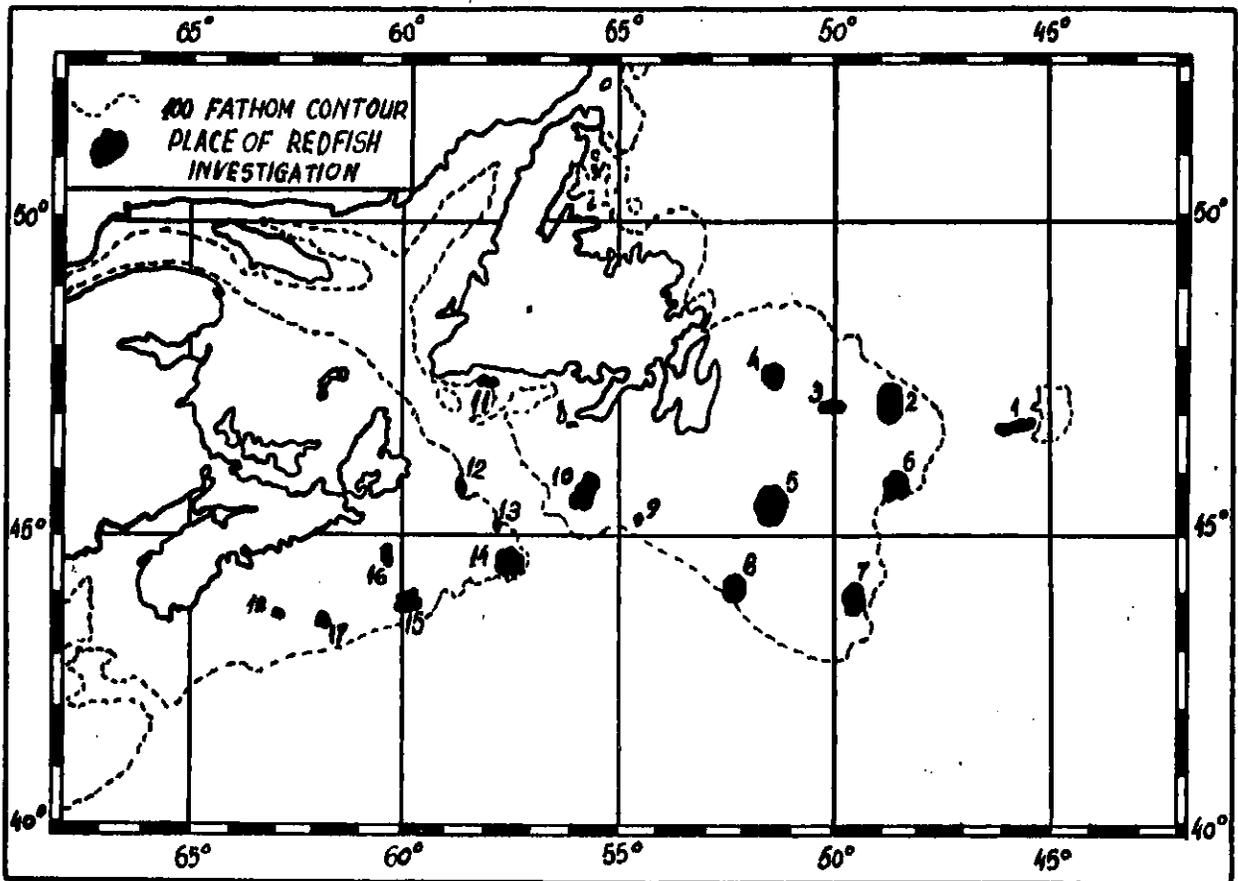


Fig. 1. Locations of redfish investigations, spring 1965.

- 1 - Flemish Cap
- 2 - Northeastern slopes of Great Newfoundland Bank
- 3 - Woolfall Bank - eastern part
- 4 - Woolfall Bank - northwestern part
- 5 - Middle part of Great Newfoundland Bank
- 6 - Eastern slopes of Great Newfoundland Bank
- 7 - Southeastern slopes of Great Newfoundland Bank
- 8 - Southwestern slopes of Great Newfoundland Bank
- 9 - Green Bank
- 10 - St. Pierre Bank
- 11 - North from Burgeo Bank
- 12 - Scatari Bank
- 13 - Artimon Bank
- 14 - Banquereau Bank
- 15 - Sable Island Bank
- 16 - Middle Ground
- 17 - Western Bank
- 18 - Sambro Bank

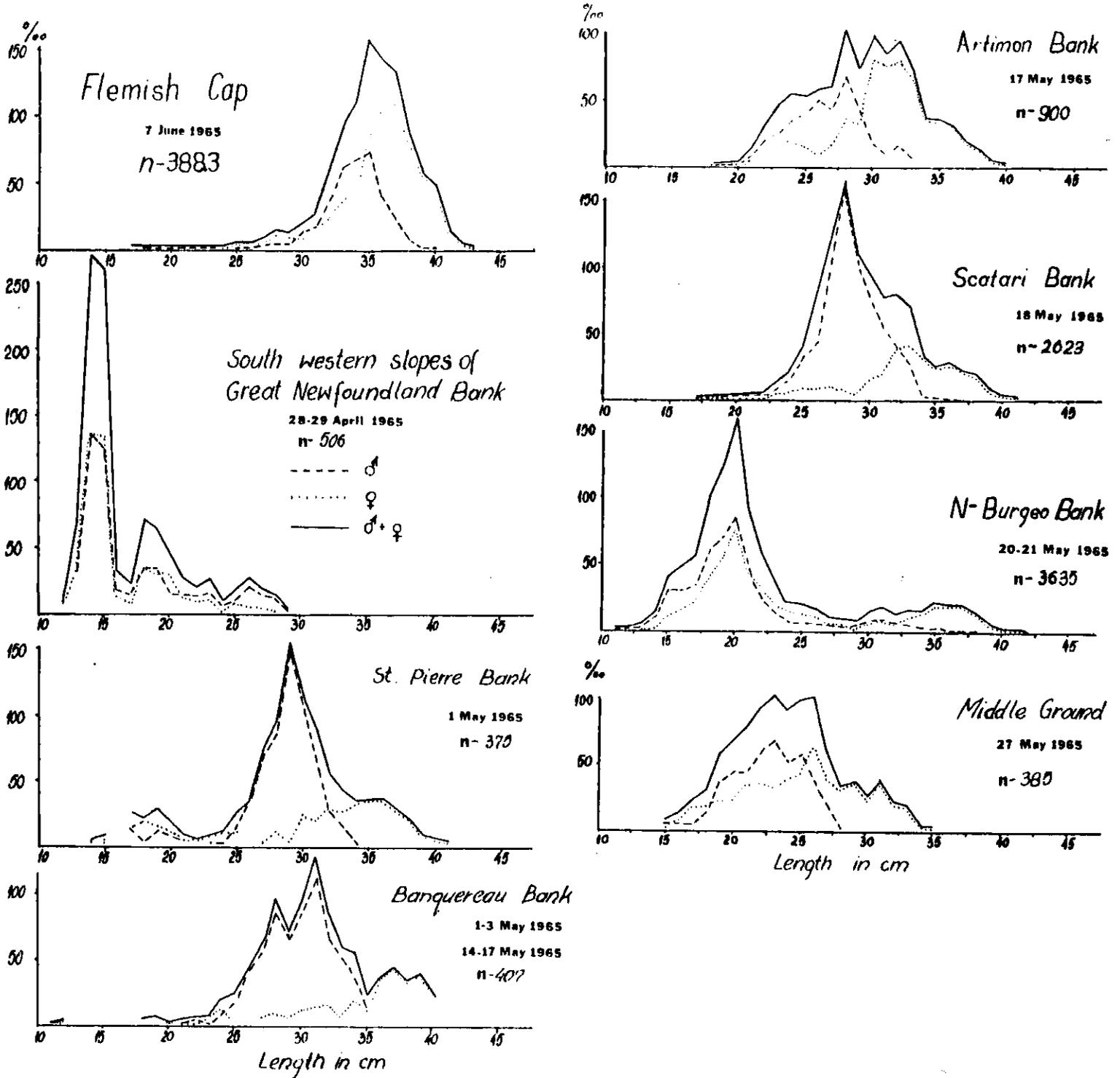


Fig. 2. Length composition of redfish, type "mentella", on the fishing grounds off Newfoundland and over the Scotian Shelf.

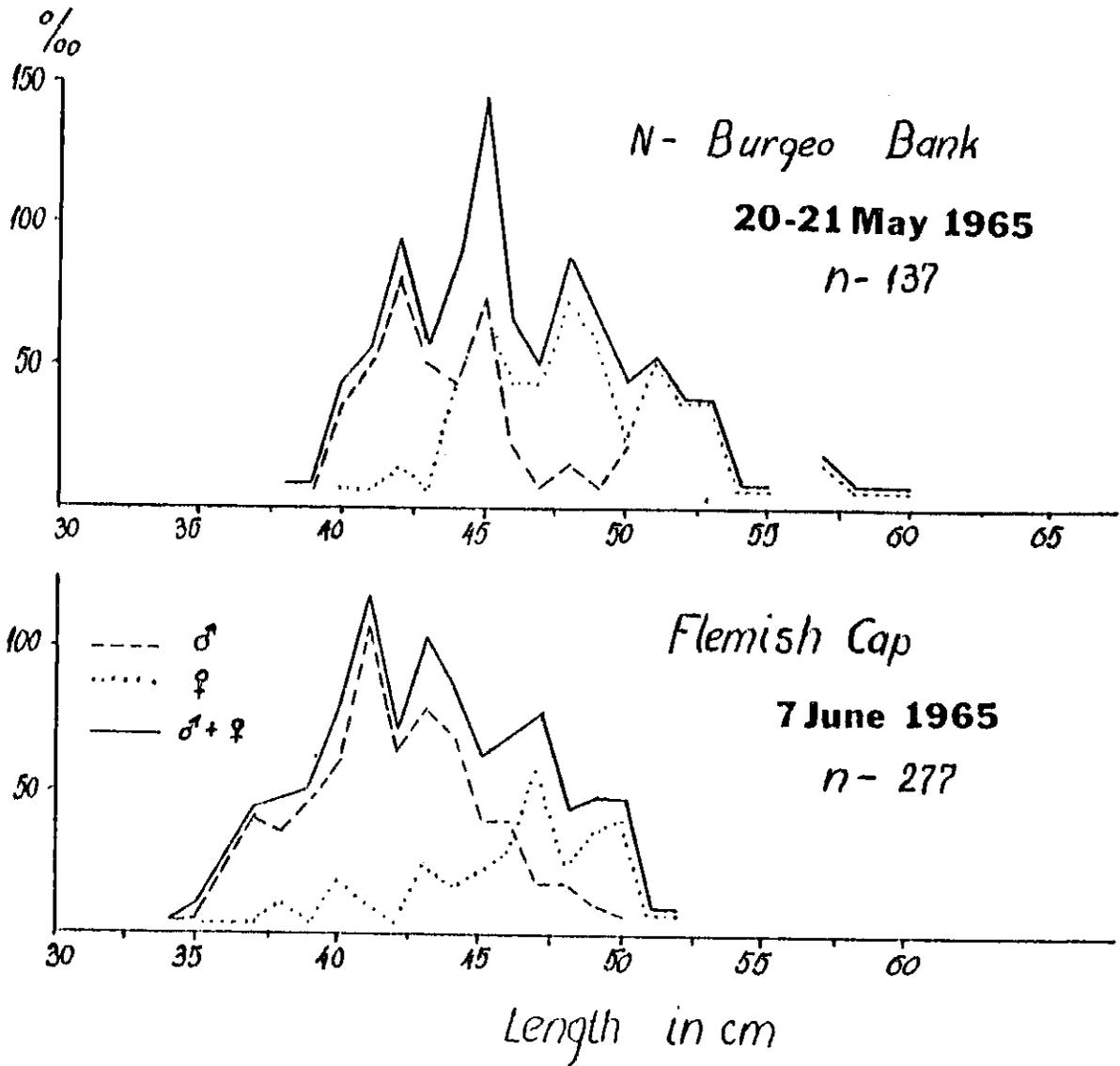


Fig. 3. Length composition of redfish, type "marinus", on the Newfoundland fishing grounds.