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International Council for the

C.M. 1968/17

Exploration of the Sea Demersal Fish (Northern)

Committee

Cod of the Bay of Mecklenburg, the Arkona Sea and the Bornholm Sea  
in 1967 and 1968

by

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As in the previous years the investigated material was obtained from commercial catches with herring trawl in the prespawning and spawning period from January to April and relates to the following numbers of analysed fishes:

	<u>1967</u>	<u>1968</u>
Bay of Mecklenburg	1728	1744
Arkona Sea	2293	1125
Bornholm Sea	1604	3508

In the Bay of Mecklenburg every year the cod fishery is strongly marked in spring in spite of the moderate yields, but in the Arkona Sea our cod fishery is weak, and the most cod is fished in herring fishery. In the Bornholm Basin we began again a fishery on spawning cod at first in 1957 after having stopped it since 1960. In the Bay of Mecklenburg our fishery yielded in 1967 2.5, in the Arkona Sea about 2.6 and in the Bornholm Sea about 2.7 thousand tons of cod. In 1968 our yield of spawning cod in the last area increased as a result of a successful fishery by midwater trawl, however the here cited material only comes from bottom trawling.

The predominant length-classes in the Bay of Mecklenburg (in numbers) in 1966 were the 36 - 48 cm groupes, in 1967 the 33 - 45 cm ones and in 1968 the 24 - 33 cm ones. The middle year-classes 1964 and 1965, followed by the better year-class 1966, caused the dropping of the mean length since 1966 from 43.7 to 40.4 and further to 34.4 cm.

In the Arkona Sea the predominant length-classes rose from 27 - 39 cm in 1966/1967 to 33 - 45 cm in 1968 and the mean length from 33.8 cm in 1967 to 41.6 cm in 1968. Mainly the year-class 1964, being in 1968 more frequent than before, led to the change.

In the Bornholm Sea the first maximum of the length-curve at 18 - 27 cm, being more distinct than the second one in 1968 and also than the first maximum in 1967, reduced the mean length from 33.1 to 28.2 cm. This corresponds with a relative strong 1966 year-class, but isn't fully proved in consequence of the little number of samples.

The distribution in length is shown in Table 1 and 2, giving the number and the weight of fishes. The age composition of the populations is to be seen from Table 3.

From Table 4 follows, that the mean length of the age-groups diminishes from west to east. Since 1967 the cod of the Arkona Sea, known as a quickly growing one, didn't reach the values of the Bay of Mecklenburg. In 1967 probably so cod from the Bornholm Sea were met in the Arkona Basin as shown by  $D_2$ -values too. In the Bornholm Sea the mean length of the age-groups II and III remains nearly 10 cm behind that of the Bay of Mecklenburg. This difference mainly can be reduced to the growth in the first year. In the present material the mesh-selection will somewhat falsify the values of the first year. In the higher age-groups the results of the Bornholm Sea increase by some immigration.

In 1965 an inusual immigration of cod from the east to the Bay of Mecklenburg was taken for granted, causing so low a value of  $D_2$  as 17.82. This mixing in 1966 was retrograde to some extent. As shown in Table 5, in 1967 a normal value of 18.25 for  $D_2$  in the Bay of Mecklenburg was reached again and in 1968 retained, but the values of the Arkona Sea and the Bornholm Sea are continually too much approached to each other.

In 1967 the spawning developed like 1965 and quite normal. It started in the Bay of Mecklenburg in the beginning of February, in the Arkona Sea one month later and in the Bornholm Sea to some extent also in February. The highest intensity was reached in the western area in the beginning of March, in the middle area in the mid of April and in the eastern area from the mid of March onwards.

In 1968 there could be observed a little delay in spawning, not so important as in 1966, but also combined with an early beginning. The spawning started from west to east already in the mid of January, in the first half of February and at the end of February. It reached its full intensity in the same succession not before the mid of March, at the end of April and from the end of March onwards. In the first half of March in all areas an essential but diminishing part of ripening ovaries in stage III (MAIER/BERNER) was noticed. In April stage III practically was absent. Therefore the spawning went on steadily in spite of the little delay in time.

1967	1.2	1.5	1.8	2.1	2.4	2.7
1968	1.1	1.4	1.7	2.0	2.3	2.6
1969	1.0	1.3	1.6	1.9	2.2	2.5
1970	0.9	1.2	1.5	1.8	2.1	2.4
1971	0.8	1.1	1.4	1.7	2.0	2.3
1972	0.7	1.0	1.3	1.6	1.9	2.2
1973	0.6	0.9	1.2	1.5	1.8	2.1
1974	0.5	0.8	1.1	1.4	1.7	2.0
1975	0.4	0.7	1.0	1.3	1.6	1.9
1976	0.3	0.6	0.9	1.2	1.5	1.8
1977	0.2	0.5	0.8	1.1	1.4	1.7
1978	0.1	0.4	0.7	1.0	1.3	1.6
1979	0.0	0.3	0.6	0.9	1.2	1.5
1980	0.0	0.2	0.5	0.8	1.1	1.4

Table 1

Number of fish in particular length-classes in %

length-class cm	Bay of Mecklbg. 1967	1968	Arkona Sea 1967	1968	Bornholm Sea 1967	1968
< 12	0,1	0,1	0,1	-	1,2	0,8
12 - 14	1,6	1,1	2,7	-	3,9	1,6
15 - 17	1,8	3,9	5,7	-	4,4	2,6
18 - 20	1,1	2,6	4,6	0,1	8,0	9,3
21 - 23	1,0	4,1	2,7	-	15,1	21,9
24 - 26	2,5	13,8	5,6	0,4	7,3	22,7
27 - 29	4,1	14,4	9,2	1,2	3,9	13,1
30 - 32	8,9	14,1	14,8	7,7	3,1	6,3
33 - 35	11,5	10,1	16,6	11,6	6,7	4,2
36 - 38	13,0	6,5	11,2	16,5	10,8	3,5
39 - 41	10,6	5,1	9,1	21,0	10,8	3,5
42 - 44	11,1	5,1	6,9	14,5	7,7	4,0
45 - 47	12,2	5,6	4,7	10,9	7,7	2,7
48 - 50	8,9	6,3	2,7	7,5	4,2	1,7
51 - 53	4,1	3,0	1,3	3,6	1,9	1,0
54 - 56	2,6	1,5	0,8	2,2	1,2	0,7
57 - 59	2,0	1,0	0,5	1,1	0,4	0,2
60 - 62	0,9	0,6	0,3	0,5	0,4	0,1
63 - 65	0,3	0,4	0,1	0,4	0,2	0,1
66 - 68	0,4	0,2	0,1	0,3	0,3	-
69 - 71	0,3	0,1	0,2	0,1	0,3	0,1
72 - 74	0,3	0,1	0,1	0,2	0,1	-
> 74	0,7	0,3	0,3	0,3	0,4	0,1

Table 2

Weight of fish in particular length-classes in %

length-class cm	Bay of Mecklbg.		Arkona Sea		Bornholm Sea	
	1967	1968	1967	1968	1967	1968
< 12	-	-	-	-	-	-
12 - 14	0,1	0,1	0,1	-	0,2	0,1
15 - 17	0,1	0,3	0,5	-	0,3	0,3
18 - 20	0,1	0,3	0,9	-	1,2	2,0
21 - 23	0,1	0,8	0,6	-	2,8	7,3
24 - 26	0,5	4,3	1,8	0,1	2,1	11,7
27 - 29	1,2	6,0	4,3	0,4	1,7	10,0
30 - 32	3,6	8,4	9,1	3,0	1,8	6,3
33 - 35	6,0	7,8	13,6	6,2	5,3	5,7
36 - 38	8,7	6,4	11,8	11,0	11,0	6,2
39 - 41	9,2	6,4	12,6	18,1	13,7	7,8
42 - 44	11,5	8,1	11,8	14,9	12,1	11,1
45 - 47	15,6	10,6	9,6	14,1	15,2	9,2
48 - 50	13,5	14,2	6,5	11,9	9,8	7,0
51 - 53	7,6	7,9	3,9	6,2	5,3	4,7
54 - 56	5,3	4,7	2,6	4,5	3,9	4,1
57 - 59	5,0	3,4	2,0	2,7	1,4	1,3
60 - 62	2,4	2,6	1,3	1,5	1,8	0,8
63 - 65	0,9	1,9	0,5	1,0	1,1	1,0
66 - 68	1,5	1,2	0,6	1,0	1,7	-
69 - 71	1,1	0,5	1,3	0,5	2,0	1,2
72 - 74	1,4	0,6	0,7	1,0	0,9	-
> 74	4,6	3,5	3,9	1,9	4,7	2,2

Table 3

Age composition of cod in %

a) in number of individuals

b) in weight

age-group		I	II	III	IV	V	VI	> VI
year-class	1967	1966	1965	1964	1963	1962	1961	< 1961
	1968	1967	1966	1965	1964	1963	1962	< 1962
Bay of Mecklenburg	1967	5,6	37,0	40,7	13,5	2,0	0,8	0,4
	1968	8,4	63,5	18,9	7,8	1,1	0,1	0,2
Arkona Sea	1967	14,6	53,5	26,6	4,2	1,0	0,3	0,1
	1968	0,1	41,7	33,5	20,9	3,3	0,4	0,2
Bornholm Sea	1967	8,0	35,1	39,8	13,7	2,3	0,9	0,2
	1968	6,3	63,0	18,0	11,5	1,1	0,2	0,1
Bay of Mecklenburg	1967	0,4	18,4	46,4	22,7	5,6	3,3	3,2
	1968	0,8	35,9	34,9	20,2	4,7	0,8	2,7
Arkona Sea	1967	1,9	37,7	40,8	10,4	4,7	3,1	1,4
	1968	-	26,2	33,9	29,7	7,0	1,8	1,4
Bornholm Sea	1967	0,4	8,3	48,4	25,9	7,8	6,5	2,7
	1968	0,7	30,2	25,0	34,1	6,0	1,8	2,2

Table 4

Mean length of age-groups in cm

age-group		I	II	III	IV	V	VI	mean
year-class	1967 1968	1966 1967	1965 1966	1964 1965	1963 1964	1962 1963	1961 1962	
Bay of Mecklenburg	1967 1968	17,5 17,6	33,5 30,4	44,3 45,7	50,8 51,6	61,3 61,0	(72,7) (79,5)	40,4 34,4
Arkona Sea	1967 1968	17,6 (19,5)	32,2 36,2	41,6 42,6	49,4 47,9	61,8 55,2	(78,5) (71,3)	33,8 41,6
Bornholm Sea	1967 1968	14,1 15,5	23,1 24,5	39,1 33,8	45,6 43,8	55,8 53,6	(70,8) (63,0)	33,1 28,2

Table 5

Mean values of  $D_2$  (rays of the second dorsal fin)

	1967		1968	
	n	mean	n	mean
Bay of Mecklenburg	460	18,25 ± 0,057	579	18,33 ± 0,056
Arkona Sea	620	17,92 ± 0,053	560	17,90 ± 0,056
Bornholm Sea	510	17,68 ± 0,054	1057	17,59 ± 0,038
Gotland Sea	-	-	165	17,24 ± 0,100

Figure 1

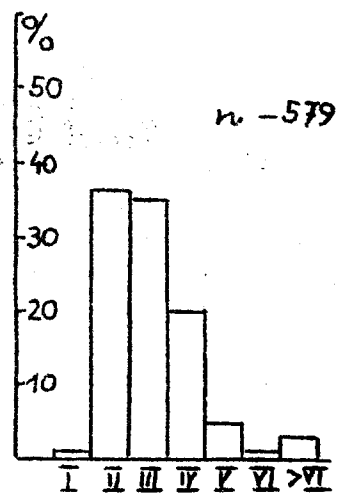
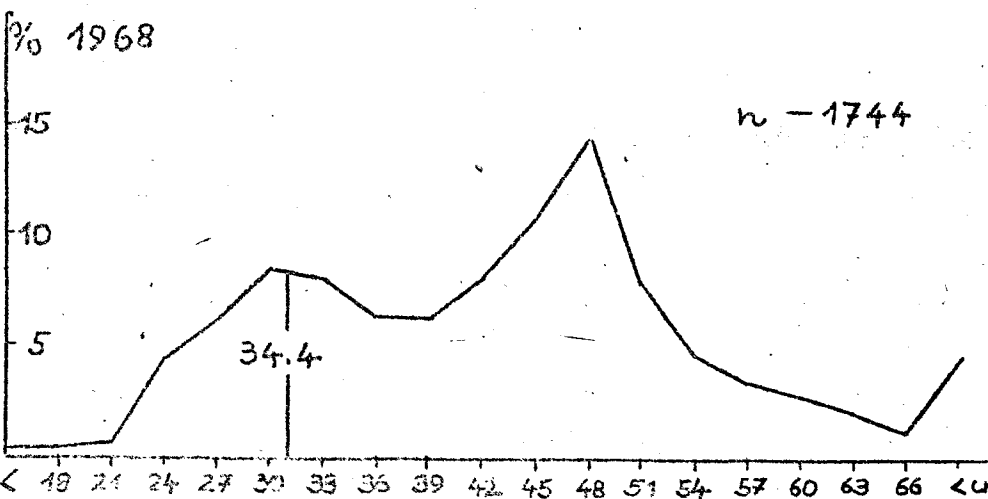
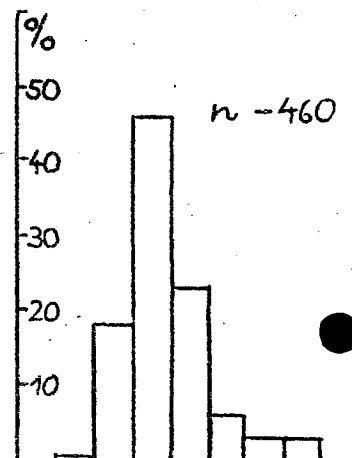
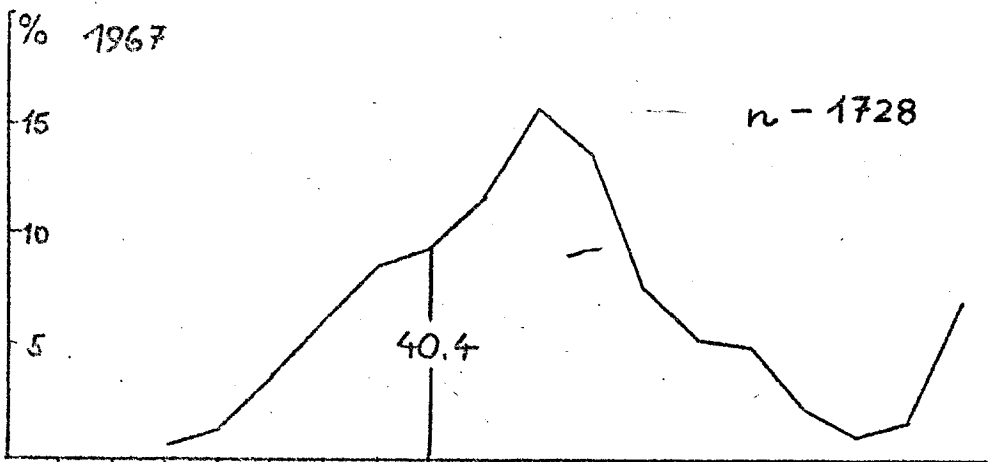
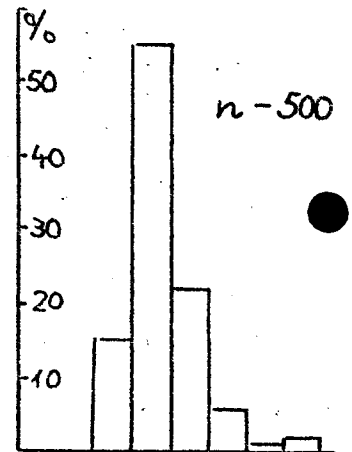
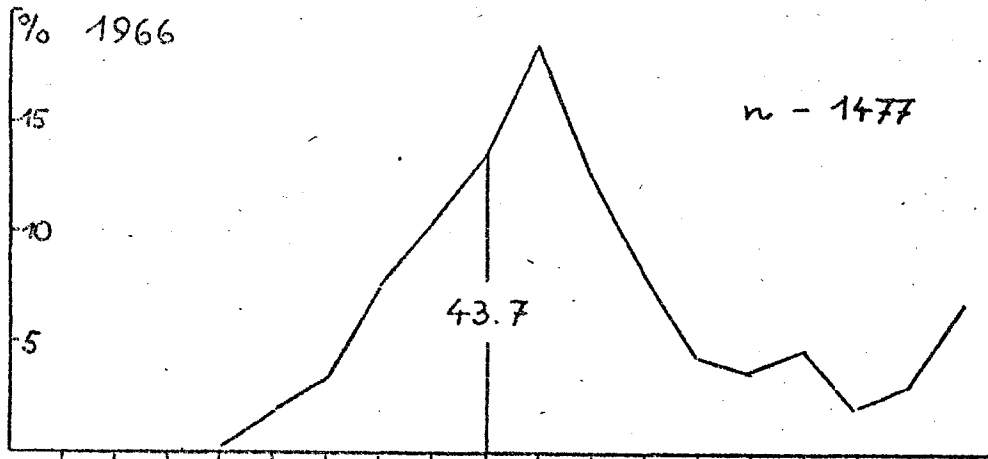
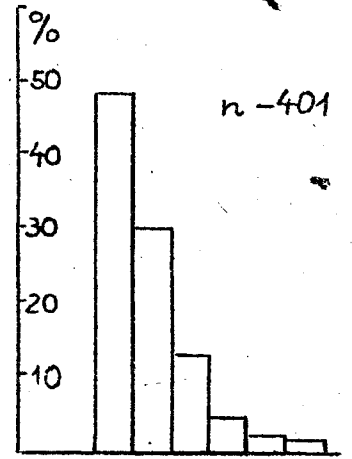
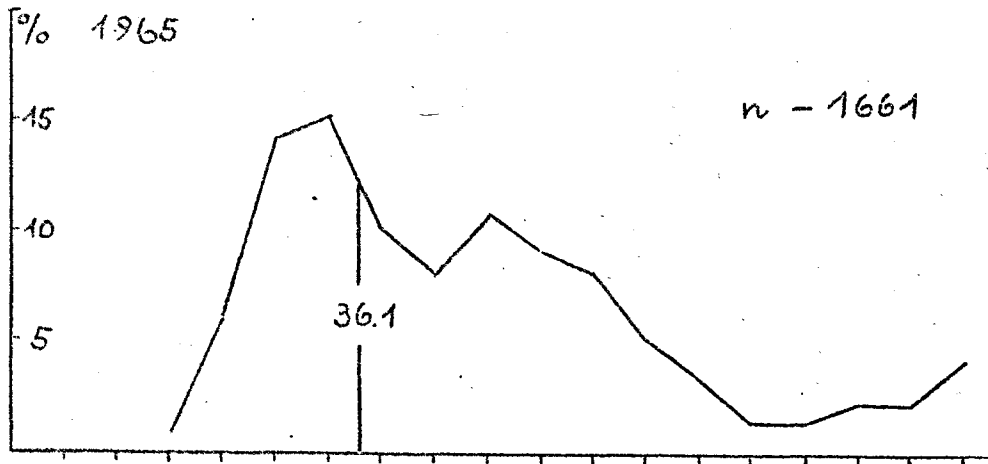
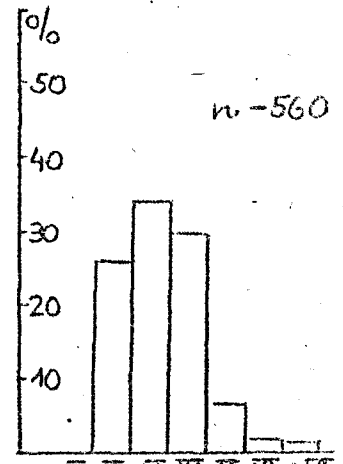
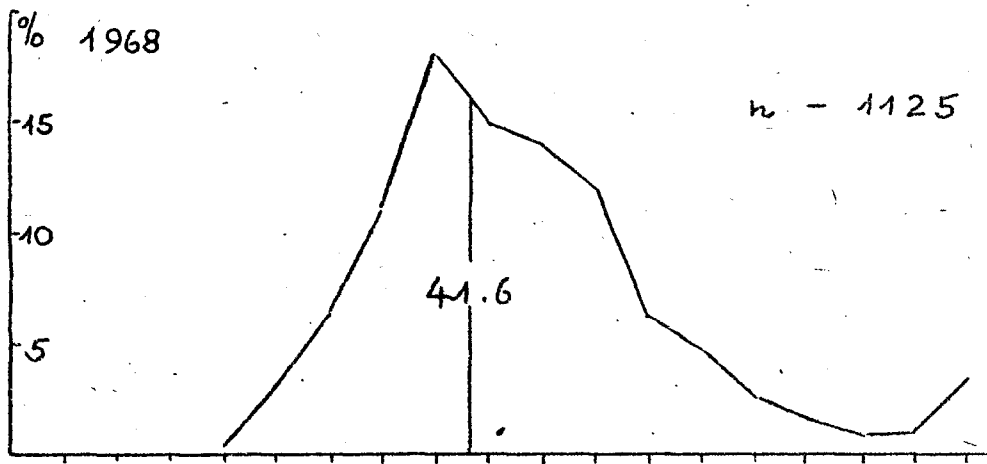
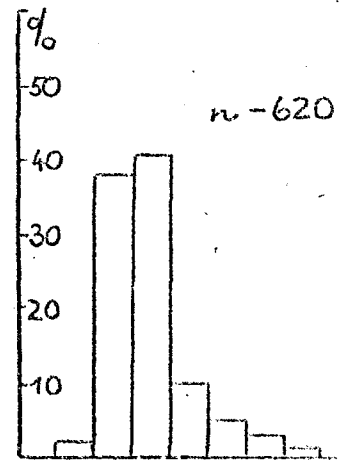
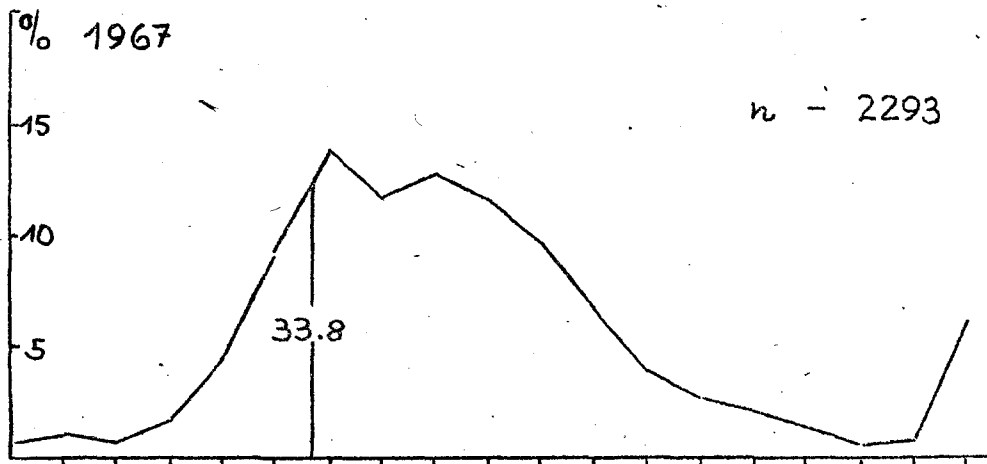
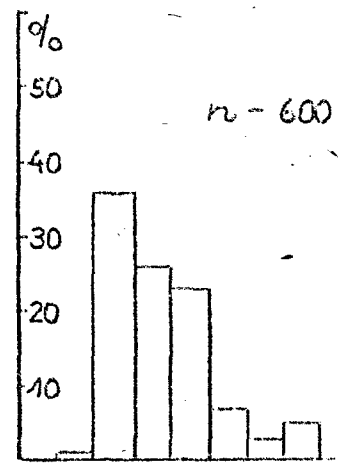
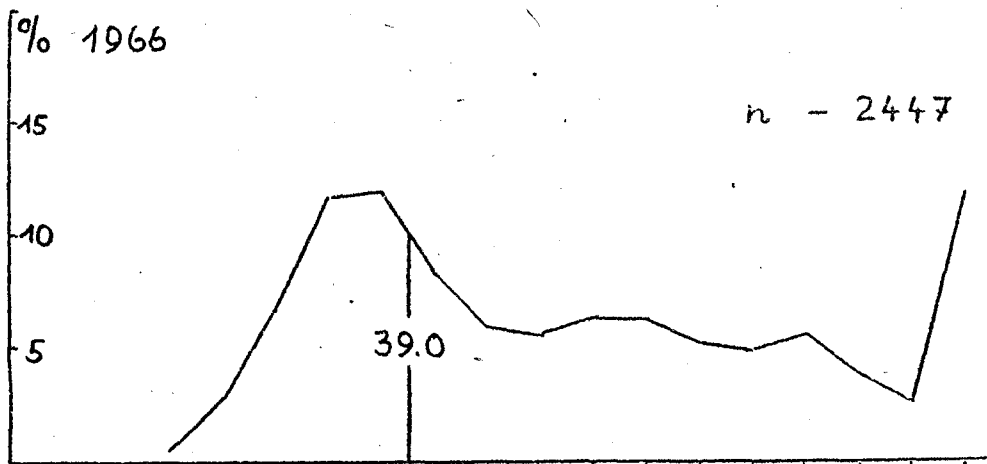
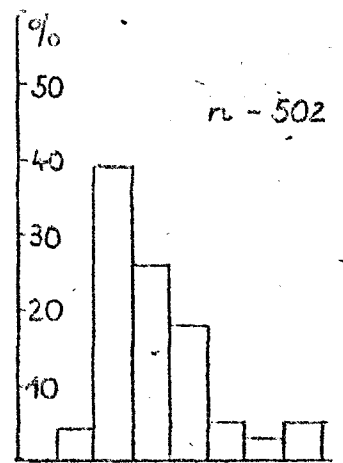
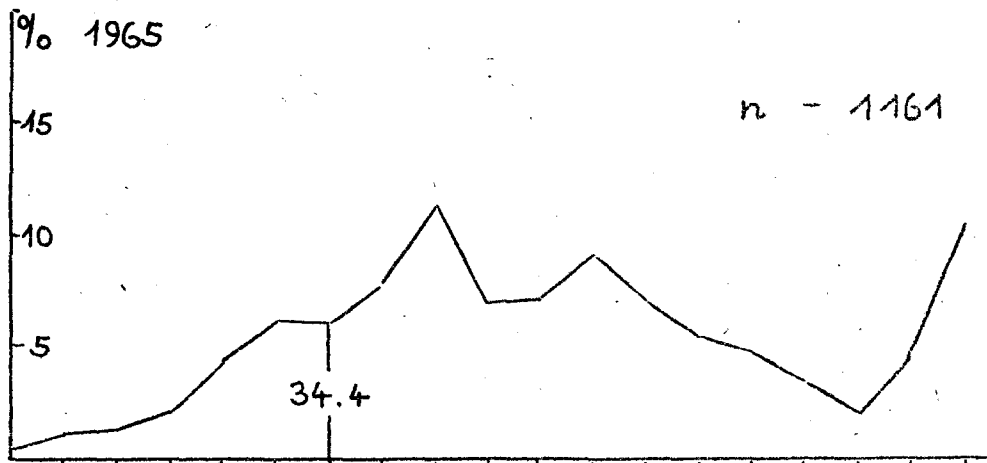




Figure 2



< 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 < 70

I II III IV V VI >VI

Figure 3

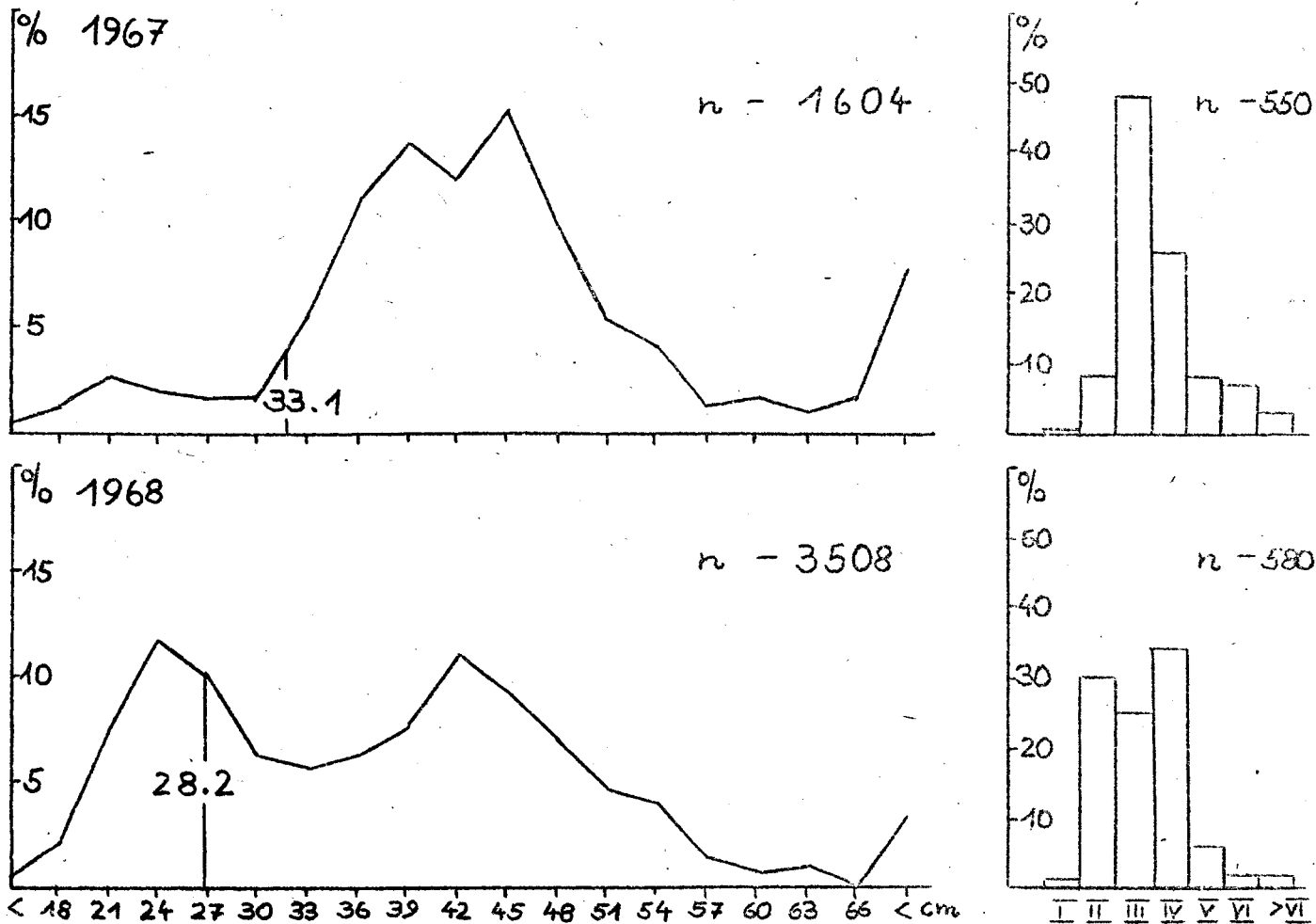


Figure 1 Length - and age - composition of cod catches in the spring of the years 1965 - 1968 in the Bay of Mecklenburg - weight %

Figure 2 Length - and age - composition of cod catches in the spring of the years 1965 - 1968 in the Arkona Sea - weight %

Figure 3 Length - and age - composition of cod catches in the spring of the years 1967 - 1968 in the Bornholm Sea - weight %