

On the Significance of Quantitative Catches with the
Standard Trawl in the Western Baltic

by
F. Thurow



Since the spring of 1956 quantitative catches with the standard trawl generally have been practiced twice a year (spring and autumn) in the Western Baltic. A first report on the results has been submitted to the Special Meeting "Measures for Improving the Stock of Demersal Fish in the Baltic", in the autumn 1957. The quantitative catches are carried out in order to give exact information about composition and recruitment as well as about growth, spawning, maturity, food and quality of demersal fish. As far as these problems are concerned, it is the intention here to give a critical analysis of the results of the German standard trawl investigations.

I. Cod.

It is well known, that there were three rich year-classes in the last decade, namely the 1953, 1954 and recently the 1959, the last one being the strongest.

Table 1. Number of cod per 1 hour's trawling with the standard trawl
in the Western Baltic

year- class	May 56	Oct. 56	May 57	Dec. 57	June 58	Oct. 58	May 59	Oct. 59	June 60	Oct. 60	May 61	Oct. 61	June 62
1950	3												
1951	1	1	0										
1952	3	2	1										
1953	6	7	2		0			0	0				
1954	8	24	15	2	4	1	1	0	0	0	0		
1955	11	36	16	8	5	1		0	0	0	0		
1956		30	7	40	9	5	1	1	1	1	0		
1957				1156	32	42	1	4	1	2	0	0	0
1958					1	46	57	27	7	10	2	3	1
1959							92	30	68	122	18	60	4
1960										280	55	88 34	41 39

A year-class is represented in the catches for 6-8 years (average 7 years). It is normally exhausted after the first 4 years, the number of individuals being very small during the last 3 years of the life-span. Besides, the individuals do not reach a marketable size the first 2 years. Hence there remain only two years of the whole life-span, during which a year-class of cod in the Western Baltic has a marketable size and at the same time is represented in the catches by remarkable numbers.

Table 2. Growth rate of year-classes of cod in the Western Baltic in cm.

year- class	1. year	2. year	3. year	4. year	5. year
1952					58.5
1953				50.4	
1954	16.0	29.8	42.6	54.6	65.2
1955	16.8	31.2	44.0	55.5	64.8
1956	16.9	32.5	47.2	59.7	
1957	15.6	30.8	46.5	62.8	
1958	15.6	33.1	48.7	54.8	
1959	19.2	33.4	43.7		
1960	18.4	29.8			
average	16.9	31.5	45.4	56.2	62.8
increment	16.9	14.6	13.9	10.8	6.6

The two main factors influencing the growth are the food available and the competition of other individuals.

In Table 2 an increasing growth-rate is shown from the 1953 up to the 1958 year-classes. The 1958 year-class shows the highest increment if only the first three years are considered. But the value for the fourth year decreases considerably. And so does the whole growth-rate of the following year-classes. There is no doubt, that the competition of the rich 1959 year-class is responsible for this phenomenon. Furthermore, it is very interesting to notice, that although the individuals of the last year-classes altogether had a bad growth, they nevertheless had a good increment during the first year of life. That, means, there has been enough food even for the rich 1959 year-class.

II. Whiting.

The seasonal yields of whiting follow the same line as cod. There are always better catches during autumn and winter than during summer. In the Western Baltic the life-span of whiting is a very short one, showing an average of 3 1/2 years. There are stocks of some year-classes with five years and others only with two. Since whiting do not reach a marketable size until the end of the second year of life, there remain only 1 1/2 years during which whiting are used for human consumption. But in that stage of life a year-class is already exhausted or has emigrated from the Western Baltic, so that there is no more than one whiting per hour in the standard trawl catches. From a commercial point of view whiting is without interest in the Western Baltic.

Table 3. Number of whiting in a one hours' catch with the standard trawl in the Western Baltic.

year-class	May 56	Oct. 56	May 57	Dec. 57	June 58	Oct. 58	May 59	Oct. 59	June 60	Oct. 60	May 61	Oct. 61	June 62
1952		0											
1953	0	1											
1954	0	7	1										
1955	30	25	2	1		0							
1956		57	7	27	1	3							
1957				318	7	13	0	2					
1958						78	7	4					
1959								37	1	15	1	0	
1960									4	215	1	3	1
1961											0	18	7

In the last decade the strength of the year-classes has continually decreased, the best one being that of 1955.

During the first year of life whiting has a better growth than cod. But there is no evidence, indicating the spawning of the whiting in the Western Baltic, the fry has possibly been transported by the influx from the Kattegat.

Table 4. Growth-rate of whiting in the Western Baltic in cm.

year-class	1. year	2. year	3. year
1958	16.8	29.6	36.4
1959	18.5	28.2	34.3
1960	21.6	30.7	
1961	18.7		
average	18.9	29.5	35.3
increment	18.9	10.6	5.8

III. Dab.

The 1954 and 1958 year-classes were supposed to be especially strong. About 50 individuals of each of these classes, being two years old, have been caught in one hour.

The figures concerning the growth-rate are of no great value, on account of the small number of plaice available for investigation. The actual data seem to point to an increase of the growth-rate, indicating a mean length of about 13, 21 and 29 cm after the first, second and third years of life for the 1953 year-class and a steady increase to about 17, 25 and 30 cm for the 1959 year-class. After the figures, only the higher increment during the first year of life is responsible for the better growth.

The plaice show a life period of some three years, during which the individuals of a year-class are of marketable size.

V. Flounder.

The catches per unit of effort of flounder are always low and usually do not exceed two individuals per hour, sometimes not even yielding a single fish. Higher numbers were caught only during the spawning time (February 60 and February 61), resulting in some 21 and 9 flounder, mostly belonging to the 1957 year-class.

VI. Conclusions

The number of individuals investigated is very important, as far as the value of the results is concerned. For instance, the age-determination of 20 or 30 fish is futile, as the results are supposed to be invalid for the population.

The quantitative fishing in the Western Baltic carried out with an average of about 10 hours' trawling in both spring and autumn, yielded the catches shown in Table 7.

Table 7. Number of fish of 10 hours' trawling in the Western Baltic.

date	flounder	plaice	dab	c o d		w h i t i n g	
				total	more than 2 years	total	more than 2 years
V 1956	7	21	910	310	210	30	4
X 1956	7	73	630	1000	340	900	82
V 1957	14	38	380	680	340	90	26
VII 1958	24	16	220	510	180	70	6
X 1958	48	30	810	950	7	950	32
V 1959	4	63	340	5880	30	70	3
X 1959	7	125	2280	670	50	430	18
VI 1960	6	126	900	770	90	50	6
X 1960	-	179	630	5720	130	200	-
V 1961	10	122	300	720	200	20	-
X 1961	-	12	80	1540	630	240	3
VI 1962	12	98	340	850	460	70	6

It is obvious that a ten hours' catch yields a number of dab and cod sufficient for the determination of the age-composition, which is likely to be valid for the whole stock. And so is the estimation of the length-weight-index, the maturity and the food. On the other hand, the number of plaice, flounder and whiting resulting from a 100 hours' trawling is hardly sufficient for estimations indicating the stock conditions. In this case a close co-operation between investigators in one and the same field would be very useful.

But there is another trouble as far as the validity of the data obtained is concerned. Figure 1 shows the seasonal variations of the catch per unit of effort of the German commercial trawl fisheries of cod in the Western Baltic in 1960 and 1961. The catches vary between 10 and 50 kg depending of the time of the year. It has been pointed out (Thurrow, 1961) that these variations are due to a seasonal migration of the cod and not to fluctuations in the stock. Thus there is a chance, that the curve of the catches each year will follow more or less the same shape. In that case the comparison of the data obtained from catches in one and the same month of successive years ought to indicate the real variations of the stock. On the other hand, the displacement of the investigation to another month may sometimes result in an inexact statement of the conditions of the stock. It is, therefore, recommendable to carry out the catches during February/March and August/September as there are no great fluctuations in these periods.

It is known, that the demersal fish of the Kiel Bay form stocks of their own. Nevertheless there are distinct differences in the yield of the various fishing places. The average catches of cod, plaice and dab in October of the years 1958 to 1961 show Hohwacht Bay to be by far the best fishing place, with yields double of that obtained

on the Stoller Ground and Vejsnäs Rinne and a quarter more than on the Millionenviertel. Catches in the Fehmarn Belt are very bad. In February during the spawning season, Hohwacht Bay is still the best place followed by Vejsnäs Rinne and Millionenviertel as both these places are spawning grounds.

As far as cod is concerned, the individuals of the age-group 0 stay in great numbers in the western and northern part of the Kiel Bay, whereas cod of the age-group I will search for Hohwacht Bay.

The problem is how to average the catch per unit effort figures for the whole Kiel Bay. For the time being it seems best to derive the values as an average of the four places.

In summarising the problems discussed it follows that the quantitative catches in the Western Baltic deliver a good basis for cod and dab investigations. The results are too small for correct estimations of the stock conditions of flounder, plaice and whiting.

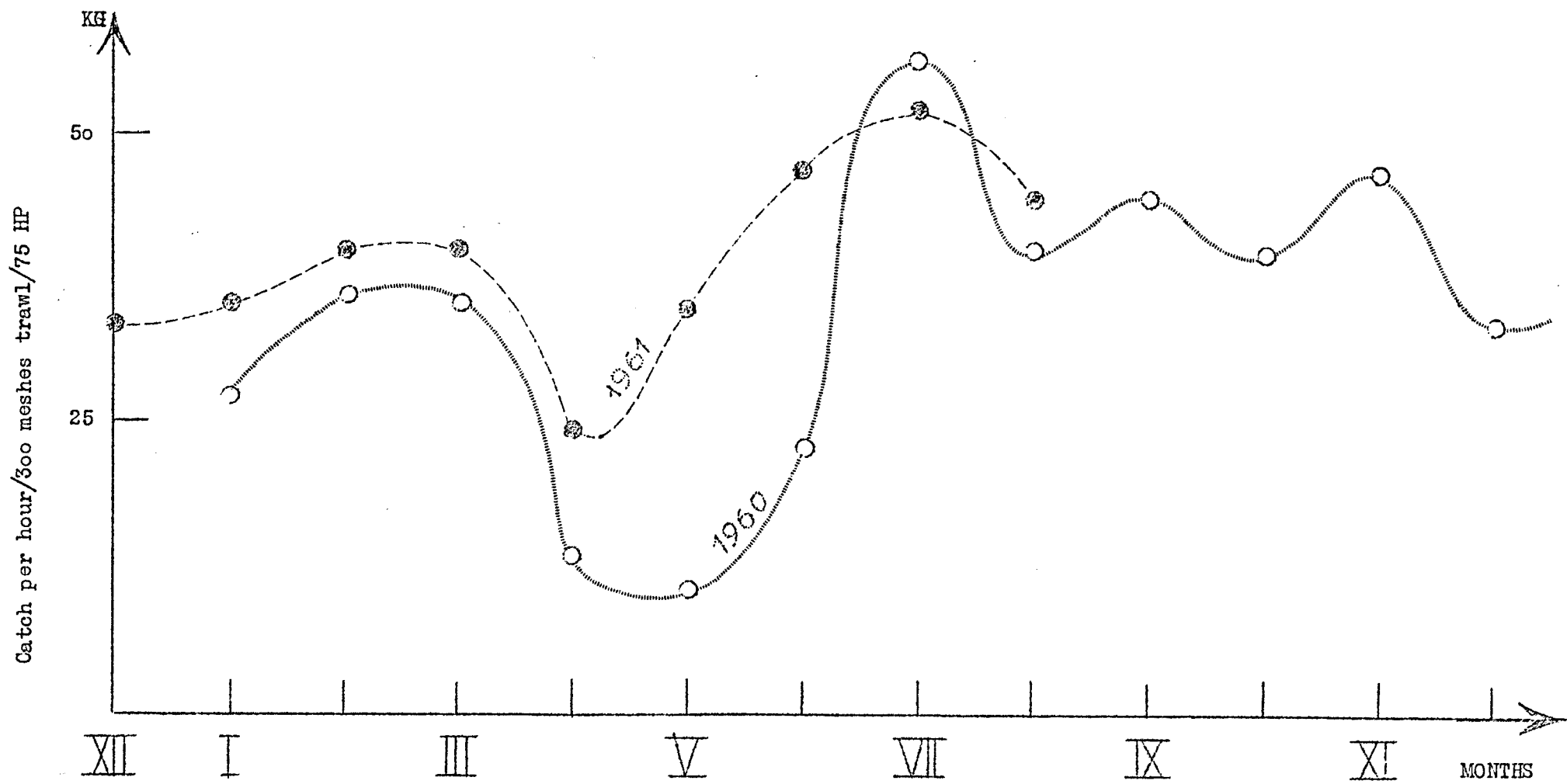


Figure 1. Annual variations of the catch per unit effort of trawl fishing on cod in the Western Baltic, 1960 and 1961.