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Some Characteristics of Cod Catches and Cod Fishery by Midwater Trawl  
in Spring 1968 in the Bornholm Basin

by

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As pointed out in 1957/1958 by BERNER and SCHEMAINDA (1,2), in some of the past years the cod of the central Bornholm Basin lived in pelagial during spawning time. In the years 1955 and 1956 the spawning cod concentrated in a 5 - 15 m high water layer, lying in the centrum 5 - 20 m above the bottom and reaching the bottom only on the borders of the depth. This water layer was limited by the isopleths of 13 - 14 ‰ S and 3 - 4 °C to the top and of 1 ml/l dissolved oxygen to the bottom.

In 1955/1956 bottom trawling concentrated on the borders of the depth, the centrum of the depth being empty of fish for this fishery. A comparison of hydrography and landings of spawning cod from the Bornholm Basin revealed higher landings on more central fishing grounds in years with sufficient aeration of the bottom layer (1952, 1957) than in years with insufficient aeration and cod spawning in pelagial (1953 - 1956). In spite of this fact this state could not be changed in that time, because the midwater trawling of our waters has developed first in the herring fishery of the North Sea in the end of the

fifties of this century. In the Baltic midwater trawling was effected by greater cutters in sprat fishery and after this in herring fishery in the beginning of the sixties. Since 1964 the 17 m-cutters began in midwater trawling on feeding herring too.

Practically since the beginning of the sixties all fishing suppositions for midwater trawling on cod were given, but our fishery concentrated on herring, and cod had lost much of interest. As known the first successful fishing experiment was done in 1966 by the FRV "Anton Dohrn" (3,4). In 1967 our cutters also pointed out the possibility of productive fishing on pelagic concentrations of spawning cod. As a result in the beginning of March 1968 in the Bornholm Basin a midwater trawling on cod set in by some cutters from Sassnitz and continued up to the mid of July. In the same way in 1968 Polish cutters fished on pelagical cod. According to this the proof of pelagic spawning concentrations of cod, established years ago, were of practical use the first time in 1968.

In the current year the hydrographical situation was like that of the cited fifties. At the end of February the oxygen minimum of 1 ml/l was reached at nearly 70 m depth in the northern and at 70 - 80 m depth in the southern Bornholm Basin. About the middle of March the cod concentrated between 65 and 80 m depth and could be trawled pelagically in this layer in day- and nighttime. In daytime little herring and sprat concentrated in a layer above the cod. In the southern Bornholm Basin bottom trawling on cod was also possible in a depth of 70 - 80 m.

Commercial midwater trawling on cod for the first time began at 29<sup>th</sup> February 1968 by one party of cutters. Due to the successful start from 3<sup>rd</sup> March onwards all parties of 26 m-cutters from Sassnitz, fishing in the Bornholm Basin, changed from the pelagic fishery on herring with 30 % cod to the nearly pure pelagic fishery on cod. Later the 24 m-cutters continued this fishery. From March to June midwater trawling on cod was always conducted during 200 - 300 cutter days each month. Since the beginning of July the percents of herring were rising continuously, and on 31<sup>rst</sup> July all cutters changed to midwater trawling on herring.

Nearly all midwater trawling on cod was done in the northern part of the Bornholm Basin. In March some experiments were carried out in the southern Basin too. At the end of May the fishery shifted to the east of the Basin, and since the 3<sup>rd</sup> decade of June the intensity decreased.

In 1968 both cutter types exhibited the following yields/cutter day (in tons) in bottom and midwater trawling in the main fishing grounds of the Bornholm Sea:

	24 m-cutters		26 m-cutters	
	bottom trawl.	midw.trawl.	bottom trawl.	midw.trawl.
January	(0,7)	---	(0,8)	---
February	1,3	---	(1,2)	---
March	2,4	(1,7)	(2,0)	5,1
April	2,9	4,1	3,9	4,5
May	1,2	4,6	2,9	6,0
June	---	6,9	---	---
July	---	1,6	---	---

Less reliable yields are put in brackets. The catches by midwater trawl exceeded the catches for human consumption by bottom trawl to some extent already in the beginning of March, above all due to the better length composition of the pelagic cod. Up to June a permanent rising of the pelagic yields could be observed. Because the pelagic cod cannot arrive at its spawning layers in the central part of the Basin than by immigration from the borders, its concentrations will become more and more dense during spawning time up to a culmination, entering in 1968 between the end of May and the end of June.

As shown in Figure 2, the pelagic cod reached its culmination of spawning in the beginning of June too. Thereafter spawning approached its end, for there didn't be any supply of ripening fishes and the females are predominating already in June. Comparing the Figures 1 and 2 besides the progressive ripening there can be seen the pelagic cod concentrations to be nearly pure spawning concentrations, whilst in bottom trawled cod the portion of ripening stages I - III (scale MAIER/BERNER) doesn't be inessential.

In the length- and age-composition the differences between midwater and bottom trawled cod are very great, as can be seen in Figure 3. Whilst in bottom trawling with the herring codend cods from 21 - 50 cm in length were predominating in weight, in midwater trawling, also with herring codend, only cod from 36 - 59 cm were important. Concerning the age the year-classes 1964 - 1966 were of like importance in bottom catches, but in midwater catches the year-class 1964 predominated and 1965 as well as 1963 were rather important, whereas the year-class 1966 was almost absent. The following values also give a good comparison:

	bottom trawled cod	midwater trawled cod
mean length	28.2 cm	44.9 cm
mean weight	289 g	950 g

The progressive changes in the length- and age-composition of the pelagic cod during spawning time are shown in Figure 4. In spite of the little variation of mean length there can be observed a progressive disappearance of the long and old fishes. The cod of 6 years and more constitut 9 % at the end of March, 6 % at the end of April and no more than 1 % at the beginning of June. Probably these fishes have; apart from catch, finished the spawning early and stay on spawning grounds no longer than up to May.

Special attention may be called to a further difference in the mean length of the age-groups:

age-group	bottom trawled cod	midwater trawled cod
2	24,5 cm	30,3 cm
3	33,8 cm	40,3 cm
4	43,8 cm	46,0 cm
5	53,6 cm	54,3 cm

Here all age-groups have a better growth in pelagic cod than in bottom trawled cod, and the deviations don't equalize before the higher age-groups are reached. Obviously in pelagic cod a selection takes place, which leads to a favoured

immigration of greater fishes in central midwater spawning layers, that is to say both older cods and better grown ones of the same age-groups. This corresponds to a more marked tendency to spawning migrations as well as a general favouring of deep and offshore areas by greater and older fishes. In consequence of this natural selection the midwater trawling on spawning cod becomes a method of catch, which is including a nearly perfect conservation of young cod.

#### Bibliography

- (1) BERNER, M. and SCHEMAINDA, R.: Über den Einfluß der hydrographischen Situation - insbesondere des Durchflutungszustandes - auf die vertikale Verteilung und den Fang der Laichdorschschwärme im Bornholmbecken  
Z. Fischerei 1957, 6 N. F., S. 331 - 342
- (2) BERNER, M. and SCHEMAINDA, R.: Über die Abhängigkeit der Laichdorscherträge im Bornholmbecken von der hydrographischen Situation  
Dt. Fisch. Ztg. 1958, H.3, S. 65 - 70
- (3) TIEWS, K.: Ist eine Schwimmschleppnetzfischerei auf Laichdorsch im Bornholmbecken möglich?  
Das Fischerblatt 1966, H. 8, S. 163 - 168
- (4) MEYER-WAARDEN, P.F. and TIEWS, K.: Studies on Spawning Stock of Cod in the Middle Baltic during 3 Research Cruises of FRV "Anton Dohrn" in 1962, 1964 and 1966  
ICES, C.M. 1967/F: 14, Demersal Fish (Northern) Committee

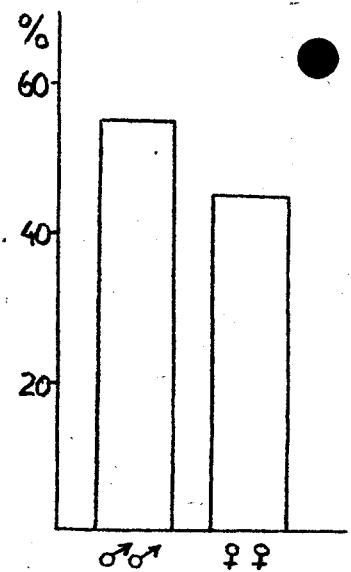
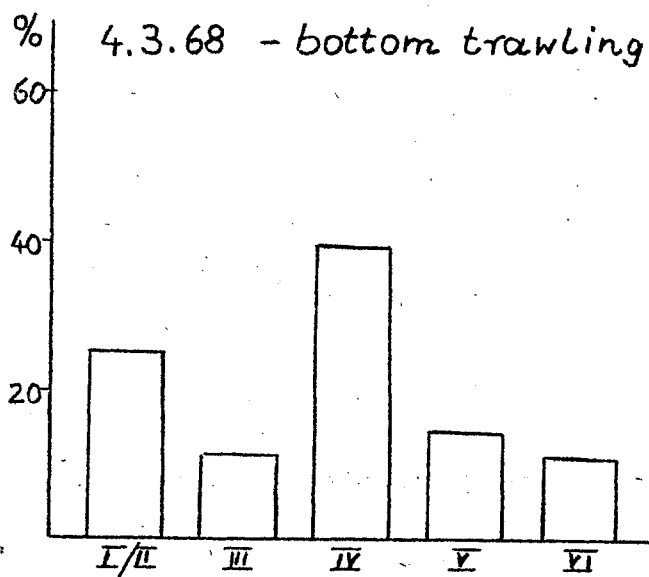
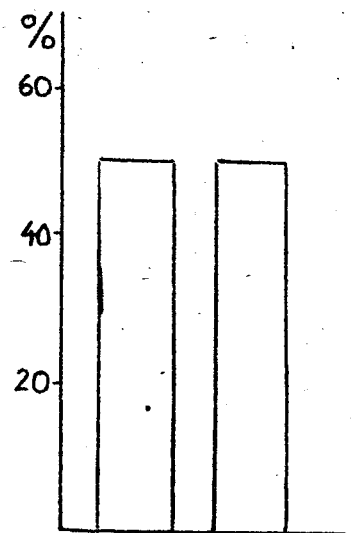
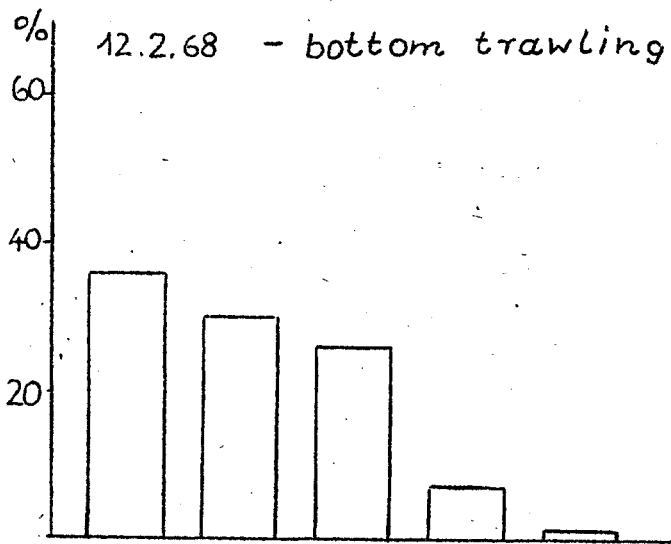
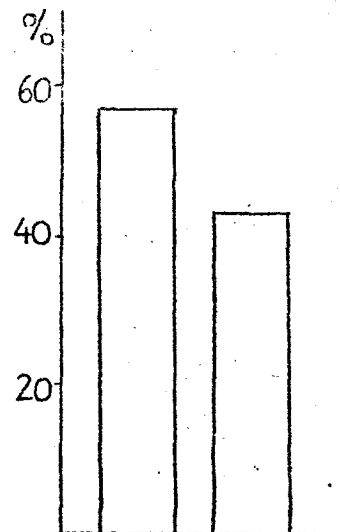
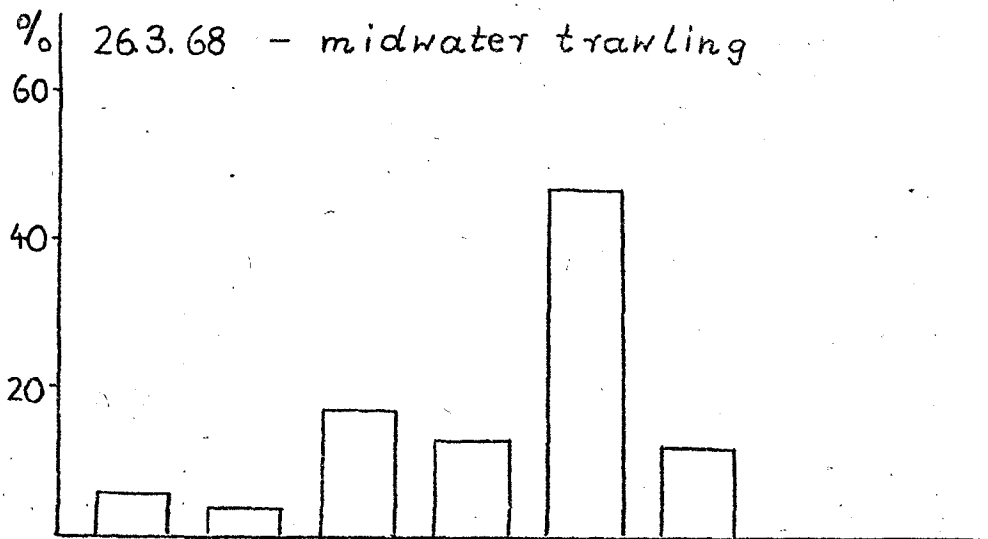
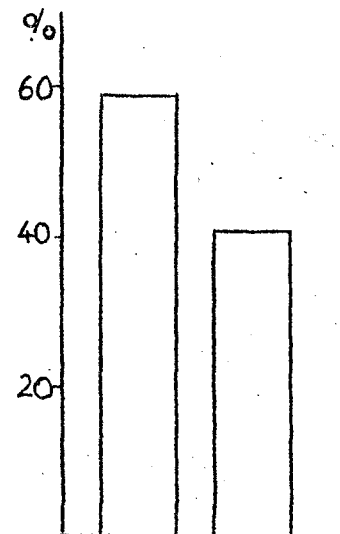
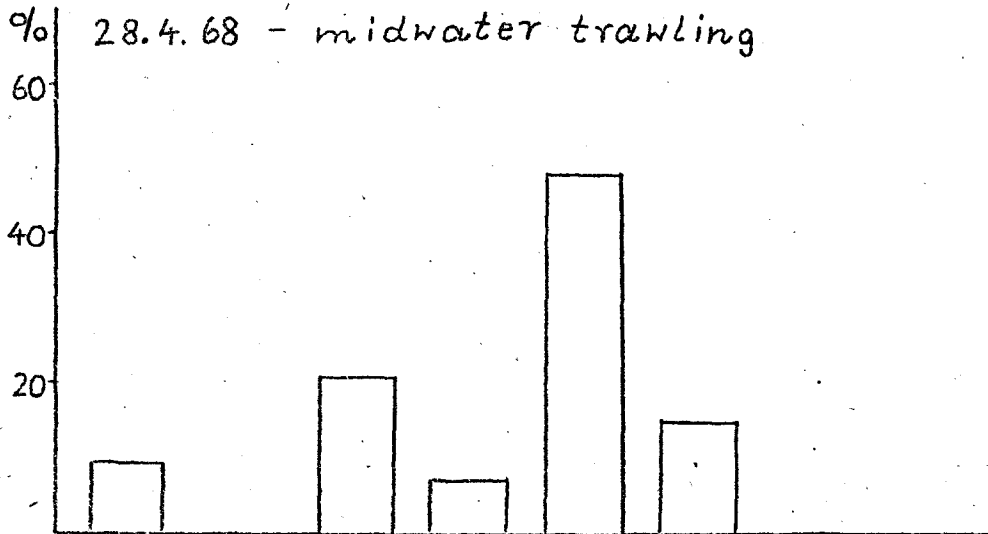


Figure 1 Maturity - composition of successive cod catches by bottom-trawl in the Bornholm Sea

26.3.68 - midwater trawling



28.4.68 - midwater trawling



8.6.68 - midwater trawling

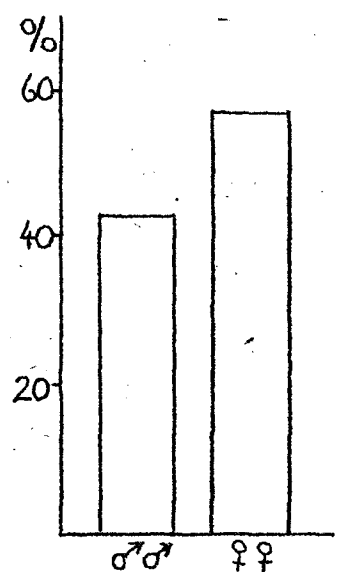
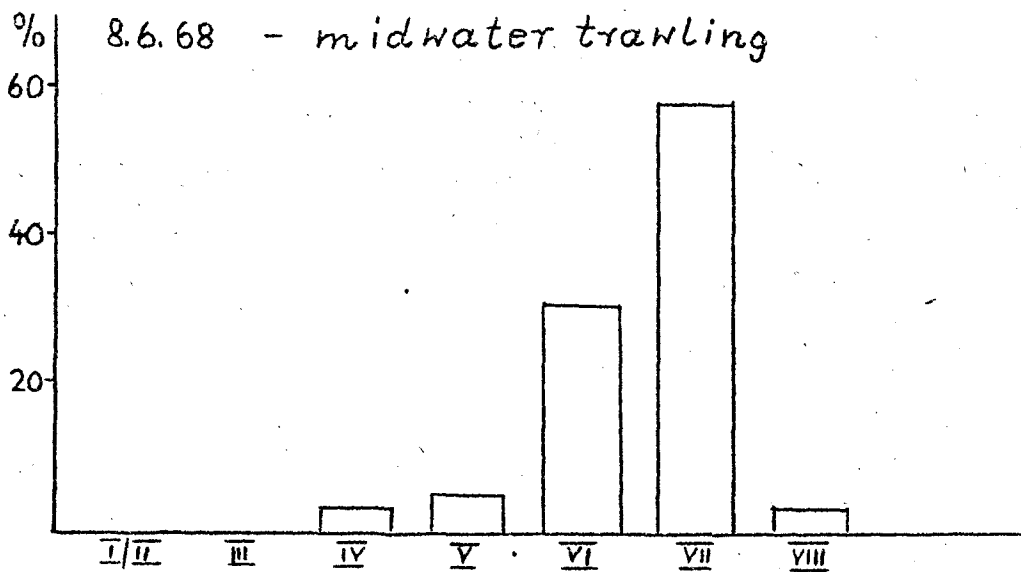


Figure 2 Maturity - composition of successive cod catches by midwater trawl in the Bornholm Sea

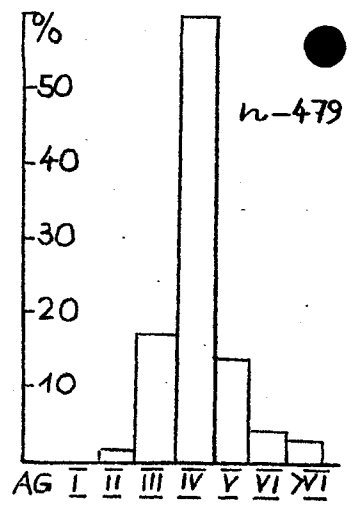
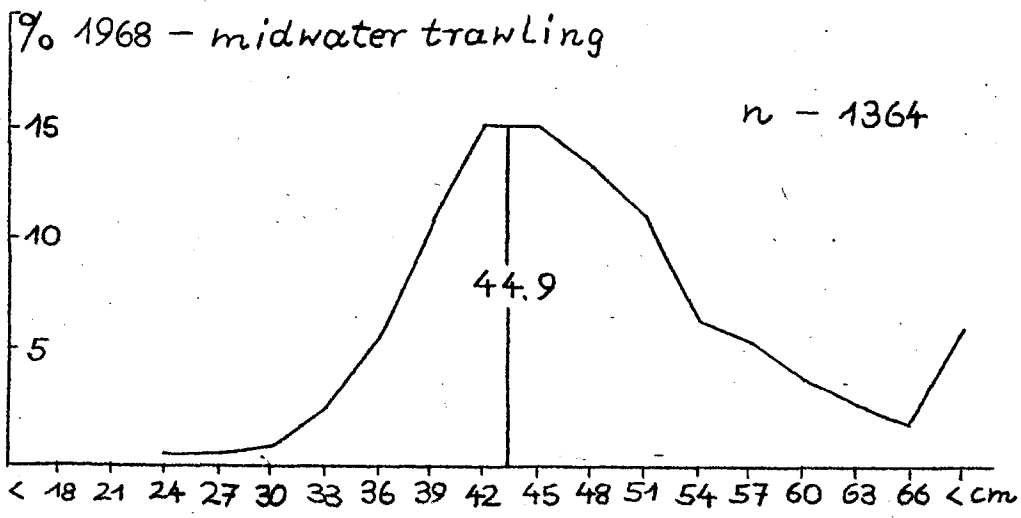
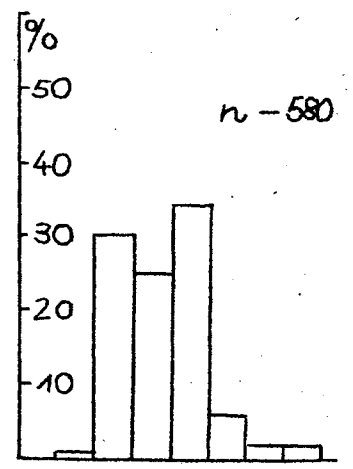
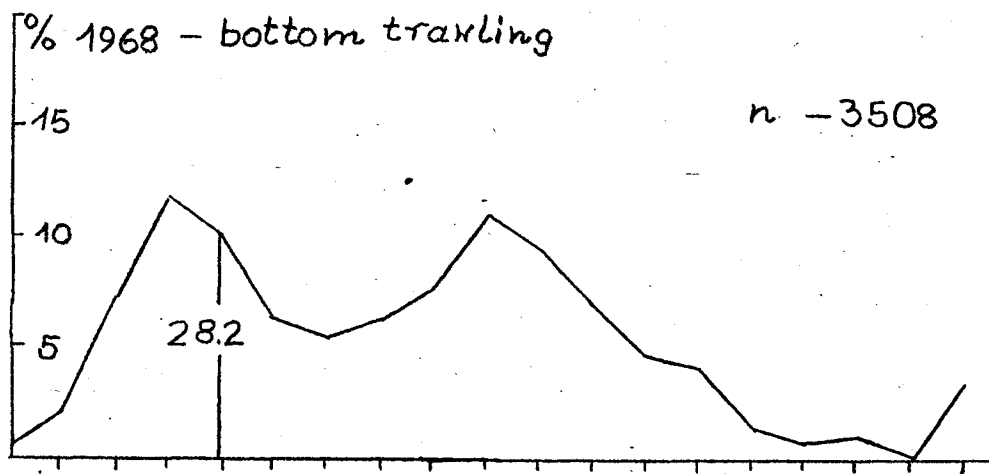


Figure 3 Length - and age - composition of cod catches by bottom - and midwater - trawl in the Bornholm Sea - weight %



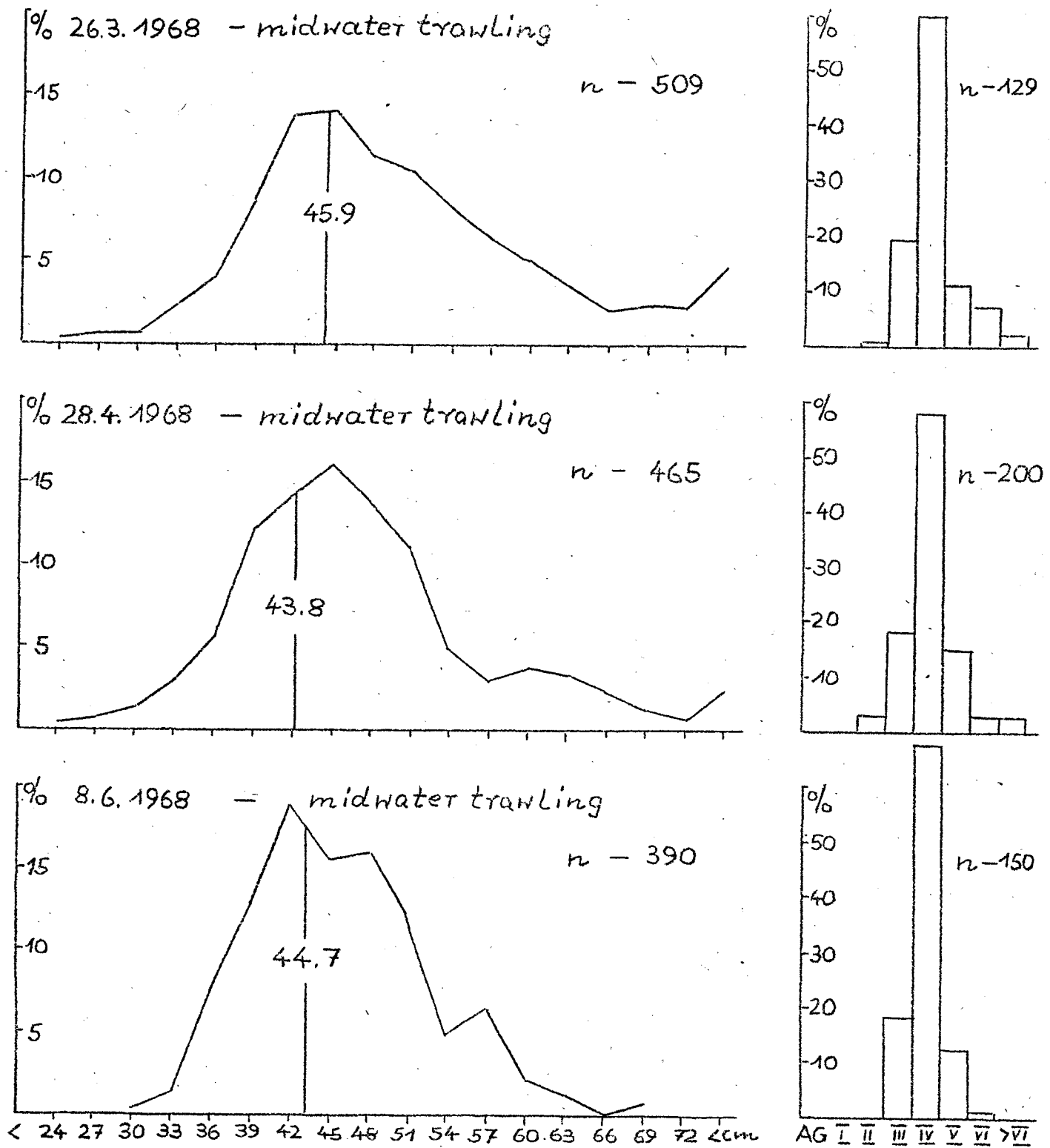


Figure 4 Length - and age - composition of successive cod catches by midwater - trawl in the Bornholm Sea - weight %