



Serial No. 1639
(D. c. 8)

ANNUAL MEETING - JUNE 1966

Investigations on Selectivity of Bottom Trawl Codend, Type BS-2
in relation to Haddock on Georges Bank, 1965

by B. Draganik and Cz. Zukowski

Introduction

Investigations were carried out on the Nova Scotia and Georges Banks to establish the selection factor for otter-trawl codend in relation to haddock. The results may be used as a guide to establishing the minimum mesh size of trawls for commercial fishing of demersal species.

Codend selectivity was determined on a codend marked with symbol BS-2, made of double Stylon twine (Stylon - Polish polyamide fiber) of 3.5 mm diameter. Mean mesh size was 113.7 mm measured wet - mean deviation in size being 2.2 mm. The dimensions of the codend were as follows: length 20 m, width - across both the upper and lower edges - was 5.2 m in the stretched state. The cover with mesh size of 40 mm, measured wet, was applied over the primary netting of the codend described above.

The experiments were conducted aboard R/T Wieczno of 1,375 hp and total length 61 m. Hauls were made at depths ranging between 70-110 m; duration of hauls was 2-3 hours and towing speed about 4.5 knots. Fishing was carried out in August and September 1965, during the daytime only. Mesh size was measured with the standard ICES gauge with a pressure of 4 kg. Length measurements, to an accuracy of 1 cm, were made on the fish which were retained in the codend and which escaped into the cover.

Results

During the cruise 46 hauls were made with the gear to be tested. In view of the low catch per effort for haddock in August on the fishing grounds of the southwestern part of the Great Newfoundland Bank and on the fishing grounds of Nova Scotia, it was not possible to make an accurate estimation of the selection factor. When larger concentrations of haddock were encountered on Georges Bank, 8 good hauls were made. The results of these hauls provide the basis for our calculations.

The selection curve (Fig. 1) was fitted to points representing the percentage of fish retained by the gear at each size interval. From this curve, the length of fish at which 50% are retained (50 percent point) was established as 41.4 cm for haddock. With the codend of 113.7 mm mesh, the selection factor was then calculated to be 3.64.

The 50 percent retention length accepted in the ICNAF area for haddock, with manila codends of mesh size 114 mm, is 37 cm (McCracken, 1964). Using the selection factor for the codend made of double twine 3.5 mm thick and the accepted 50 percent retention length for haddock, the minimum mesh size was calculated from the following formula:

$$\frac{L}{m} = c$$

where L - 50 percent retention length
m - mesh size
c - selection factor.

Substituting the selection factor obtained of 3.64 and the 50 percent retention length of 37 cm, the required minimum mesh size was found to be equal to 101.6 ~~cm~~
mm.

During experiments it was found that the selectivity of fishing gear depends to a considerable degree not only on the length but also on the condition of the fish. In order to establish such a relationship using other than length measurements, fish weights were also determined.

The results were used to determine the relationship between length and weight, both for fish retained in the codend and for those escaped from it into the cover. This was done by ~~the~~ use of ~~Lagler's (1959)~~
^{the} formula:

$$W = KL^n$$

where W - fish weight in grams
L - length in centimeters
K and n - coefficients.

Having solved this equation by substitution for coefficients, found by the method of least squares, the curves characterizing the relation were plotted for both groups of fish (Fig. 2). From the spread of the curves it appears that the fish which were retained in the codend and which were the same length as the fish which escaped had a greater weight.

References

- Cieglewicz, W. and W. Strzyzewski, 1959. Investigations on the selection exercised by trawl gear on Baltic cod as the basis for establishment of protection size of mesh in this gear (In Polish). Prace morsk. Inst. ryback. Gdyni. 10/A, 1959.
- McCracken, F. D., 1964. Minimum mesh sizes and equivalents for different materials to meet ICNAF regulations. Annu. Meet. int. Comm. Northw. Atlant. Fish. 1964. Doc. No. 72, Serial No. 1368 (mimeographed).
- Lagler, F.K., 1959. Freshwater fishery biology B.M.C., Brown Company, Iowa.

Table 1. Selectivity experiments, haddock, Georges Bank, 1965.

Length (cm)	Fish escaped into the cover (no)	Fish retained in the codend (no)	Total (no)	% smoothed
14,4	2		2	
15,4	5		5	
16,4	15		15	
17,4	36		36	
18,4	89	2	91	
19,4	168	8	176	6,0
20,4	404	13	417	5,8
21,4	346	27	373	5,7
22,4	324	20	344	6,6
23,4	231	15	246	7,8
24,4	234	21	255	9,1
25,4	270	22	292	10,2
26,4	216	14	230	11,2
27,4	218	15	233	11,6
28,4	273	26	299	12,2
29,4	342	48	390	13,4
30,4	657	108	765	15,5
31,4	490	135	625	17,6
32,4	474	160	634	19,5
33,4	310	98	408	21,0
34,4	224	78	302	22,0
35,4	301	97	398	23,6
36,4	281	86	367	26,3
37,4	359	137	496	30,7
38,4	352	196	548	35,6
39,4	290	226	516	40,9
40,4	330	295	625	46,0
41,4	204	214	418	51,3
42,4	166	232	398	57,0
43,4	84	201	285	63,1
44,4	47	134	181	69,8
45,4	30	132	162	75,8
46,4	18	94	112	81,1
47,4	8	81	89	85,5
48,4	7	81	88	89,9
49,4	3	73	76	93,4
50,4	-	85	85	96,4
51,4	-	70	70	98,4
52,4	1	80	81	99,7
53,4		53	53	100,0
54,4		59	59	
55,4		56	56	
56,4		32	32	
57,4		54	54	
58,4		47	47	
59,4		29	29	
60,4		27	27	
61,4		10	10	
62,4		12	12	
63,4		12	12	
64,4		10	10	
65,4		9	9	
66,4		5	5	
67,4		4	4	
68,4		1	1	
69,4		5	5	
70,4		2	2	
	7 799	3 757	11 556	

Mesh size in cm 113.7
 50% point length in cm 41.4
 Selection factor 3.64
 Number of hauls 8
 The span between
 25%-75% retention length (cm) 9.3

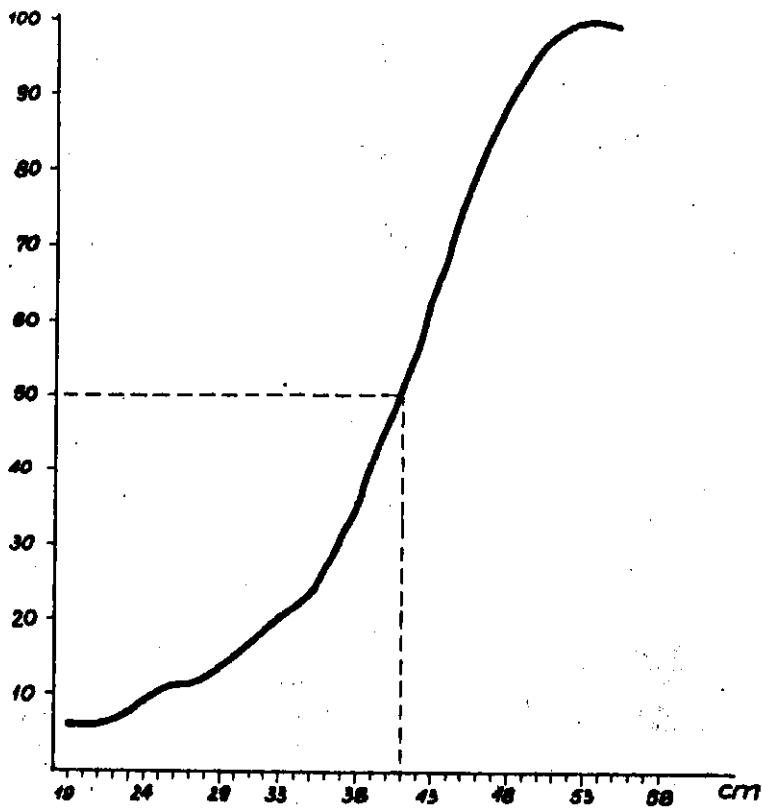


Fig. 1. Selection curve for codend BS-2

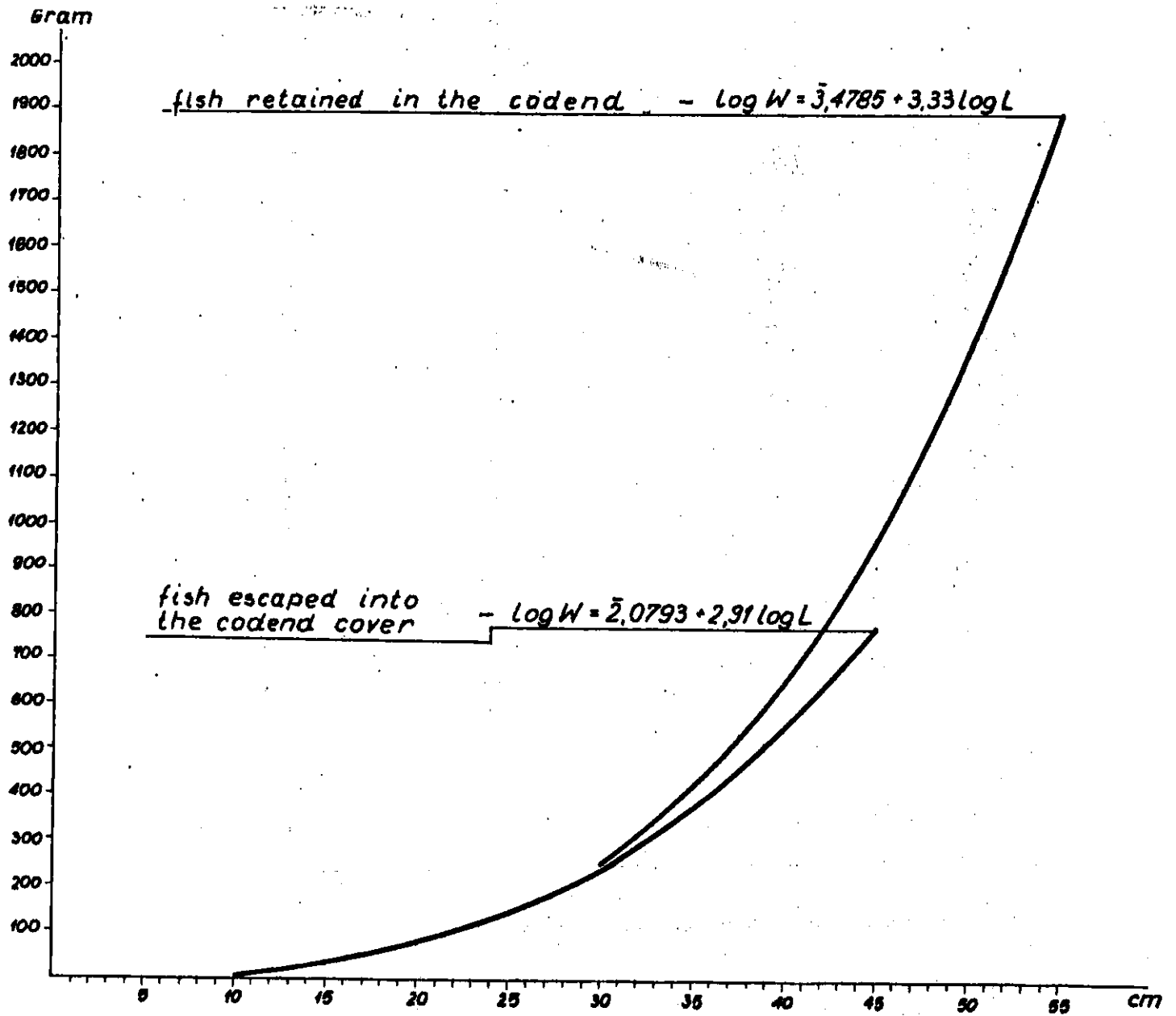


Fig. 2. The effect of codend selectivity on the relation between weight and length of haddock.