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Results on the Greenland halibut survey in Divisions 0B, 1B, 1C and 1D in 1990

by

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Introduction

The Institute for Deep Sea Fisheries and Fish Processing (IfH) Rostock and the Polar Research Institute of Marine Fisheries and Oceanography (PINRO) Murmansk have been cooperating in the stock evaluation of the Greenland halibut (Reinhardtius hippoglossoides WALB.) in the North West Atlantic for years.

From September to December 1990. scientists of the IfH once again participated in such a research voyage. The aim of their investigations was to estimate the mean trawlable biomass (MTB) of the Greenland halibut of the Canadian-West Greenland stock (NAFO 0; 1; 2; 3K) in the sea areas off Canada and West Greenland (NAFO divisions 0B; 1B, C, D; 2G,H).

Material and Methods

In the period from 8th October to 29th November 1990, a ground fish survey according to the NAFO manual was carried out according to the Stratified-Random-Survey. Object of the investigations was the Greenland halibut (Reinhardtius hippoglossoides WALB.) as commercial important species. The individual divisions were treated from north to south, i. e. contrary to the migration of the Greenland halibut. This method has to be applied because of weather conditions.

The divisons were treated as follows:

NAFO Division	Period	Number of Hauls	Treated Depth Range
1 B, C, D	09.10.-22.10.	50	201-1500 m
0B	25.10.-08.11.	65	201-1500 m
2G +)	23.10.-29.11.	22	501-1500 m

+) By reason of time only a part of the Division 2G strata was investigated. Because of only 22 available hauls a calculation was not done. For the same reasons the 2H Division could not be treated at all.

To estimate the Greenland halibut stock one hour hauls were carried out at the individual stations. The used bottom trawl net had following parameters:

net opening width	14 m
vertical net opening	4 m
inlet of codend (mesh size)	12 mm
intended towing speed	3.5 knots

Each haul was evaluated to the commercially important fish species of which representative length measurements were made. With large haul quantities also the number of all fishes being in the respective haul was ascertained. Analyses of samples (weight, sex, maturity, stomach content and material for age determination) completed the length measurements. The weights of the commercially important fish species were ascertained to mean weights per length group separately for males and females.

The fished area per haul formed the basis for the calculation of the mean trawlable biomass.

Results and Discussion

Resulting from the intended towing speed of 3.5 knots the fished area per haul is 0.027 qsm. Such intended towing speed, however, is reached very rarely under the concrete conditions of a survey.

During the 1989 and 1990 surveys, the towing routes (in case of one hour hauls the towing speed is equal to the towing route) for each haul were calculated based on the launching and retrieval positions. From these calculations the following towing speeds per haul result for the investigated divisions:

Division	1B	1C	1D	0B	2G	2H
Mean Towing speed						
1989	-	-	-	3.16	3.37	3.07
1990	3.02	3.06	3.12	3.29	3.52	-

It can be seen from the above comparison that, except for the 2G Division in 1990, the intended towing speed of 3.5 knots was reached in none of the cases. This again, results in underestimation of the mean trawlable biomass at higher towing speeds than 3.5 knots. Towing speeds lower than 3.5 knots cause an overestimation of the MTB. The calculation based on a constant towing speed is according to our investigations not corresponding to the actual existing conditions.

The mean trawlable biomass (MTB) of Greenland halibut for the strata was calculated for each Division and range of depth from the stratified mean catch per tow using the areal method. The applied formula is

$$B = Y_{st} \frac{A}{\bar{a}}$$

where B = MTB (per range of depth by Divisions)

Y_{st} = stratified mean catch per tow

A = sum of strata areas

$\bar{a}$ = area swept per tow

For strata not having been fished mean densities were estimated by values of the bordering strata. A general view of the fished strata (Key of stratum, stratum area, number of tows) is including in Table 1.

The calculated MTB amounted to about 73.6×10^3 m. tons of the Division 0B and 95.6×10^3 m. tons of the Divisions 1B, 1C, 1D in 1990. The calculated MTB values by Divisions, range of depth, and strata area are given in Table 2.

In 1989 the MTB value of the Division 0B amounted to about 79×10^3 m. tons. A comparison with the results of the previous years is impossible, the methods of investigations were different and varying, respectively (see Material and Methods).

Table 1: View of the fished strata NAFO Divisions 0B, 1B, 1C, 1D RV "Kapitan Shaytanov", Oct./Nov. 1991

Key of strata	Division	strata area (nm^2)	range of depth (m)	No. of tows
1	0B	2356	201- 300	3
8	0B	3550	201- 300	3
22	0B	2225	201- 300	3
2	0B	1844	301- 400	3
9	0B	4018	301- 400	5
23	0B	935	301- 400	3
3	0B	2616	401- 500	3
10	0B	1566	401- 500	5
24	0B	1449	401- 500	5
4	0B	4671	501- 750	8
11	0B	2311	501- 750	6
25	0B	2130	501- 750	4
5	0B	2070	751-1000	5
12	0B	943	751-1000	4
6	0B	1975	1001-1250	5
13	0B	343	1001-1250	3
7	0B	1641	1251-1500	3
26	1B	1191	501- 750	2
27	1B	126	401- 500	1
28	1B	145	301- 400	1
29	1B	69	201- 300	-
30	1B	222	751-1000	-
33	1B	190	501- 750	-
34	1B	85	401- 500	-
35	1B	900	301- 400	-
36	1B	1538	201- 300	-
37	1B	863	401- 500	-
38	1B	1834	301- 400	-
39	1B	488	201- 300	-
11	1C	1670	501- 750	3
12	1C	787	751-1000	2
13	1C	151	1001-1250	-
17	1C	1411	751-1000	3
18	1C	487	501- 750	2
19	1C	91	401- 500	2
20	1C	271	301- 400	2
21	1C	488	201- 300	-
26	1C	2356	501- 750	4
27	1C	145	401- 500	2
28	1C	114	301- 400	2
29	1C	102	201- 300	3
11	1D	324	501- 750	1
12	1D	797	751-1000	2
13	1D	1049	1001-1250	3
14	1D	904	1251-1500	3
15	1D	775	1251-1500	3
16	1D	2110	1001-1250	4
17	1D	283	751-1000	2
18	1D	170	501- 750	1
19	1D	45	401- 500	1
20	1D	136	301- 400	1
21	1D	691	201- 300	-
Total				116

Table 2: Mean trawlable biomass (MTB) calculations of Greenland halibut by Divisions, ranges of depth, and strata areas, RV "Kapitan Shaytanov", Oct./Nov. 1991

NAFO Division	range of depth (m)	strata area (nm^2)	(m. tons)
1B,1C,1D	201- 300	3376	393.9
	301- 400	3400	590.7
	401- 500	1355	661.9
	501- 750	6388	17321.6
	751-1000	3500	23171.3
	1001-1250	3310	35342.3
	1251-1500	1679	18140.9
Total	201-1500	23008	95622.6
0B	201- 300	8131	270.2
	301- 400	6797	1685.1
	401- 500	5631	3438.2
	501- 750	9112	22255.4
	751-1000	3013	14517.0
	1001-1250	2318	24267.0
	1251-1500	1641	7135.3
Total	201-1500	36643	73568.3

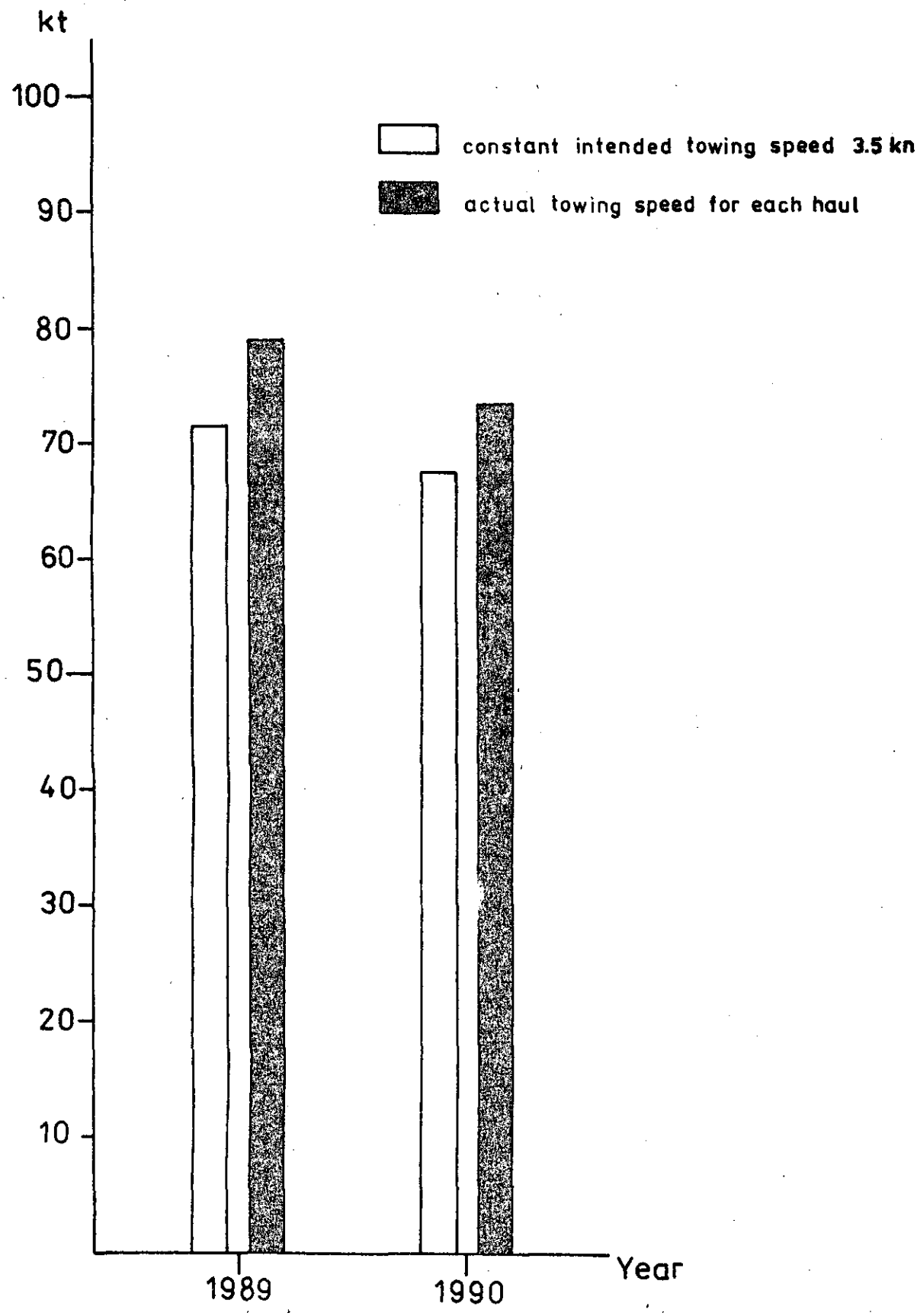

Fig. 1 Calculated biomass of Greenland halibut NAFO - Division 0B