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by

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INTRODUCTION

In 1986 the G.D.R. overall catch in the convention area amounted to 26372,0 tons (Table 1). The results of the total nominal catch by G.D.R. in 1986 was about 8200 higher than in 1985 (increasing about 45 %).

Significant raising occurred in the total yield of Atlantic mackerel in Subarea 5 and 6 (increasing about 70 % in opposite to 1985). In the G.D.R. overall catch the portion of Atlantic mackerel in the Divisions 52w, 6A, 6B and 6C amounted to about 72 % in 1986 (1985 61 %). Besides of dominating of Atlantic mackerel the G.D.R. total nominal catch in the NAFO-area were determined by roundnose grenadier (its portion is 17 % of nominal catch) and Greenland halibut (its portion is 7 % of nominal catch) in 1986 (Tables 1 and 2).

In 1986 the G.D.R. fishery was concentrated in the NAFO-Subareas 2, 3, 5 and 6 (Table 2).

Subareas 2 and 3

A. Status of the Fisheries

The bottom trawl fishery was carried out only in whole area in 1986.

1. Roundnose grenadier directed fishery (NAFO 2H; 3K,L)

In the period from August, 8th to November, 10th a roundnose grenadier directed fishery was carried out by factory stern-trawlers (FAO-code 101) and by stern trawlers of the type "Zubringertrawler" (FAO-code 085).

The fishery was started in the Division 3K around the position 50°40'N; 49°45'W. In August fishing took place mainly south of 50°45'N in depths of about 1200 m. In the period of September/October the fishery shifted northerly a little bit (general position 51°N; 50°W) in depths from 1000 m to 1300 m.

At the beginning the results of fishery were successful. In the period from the middle of August to the end of September the yields were changeable. The c.p.u.e. (catch/hour) amounted to from 0.3 to 1.8 t. In October the fishery went on to be changeable, but nevertheless the c.p.u.e. was higher than before. The results of fishery reached their highest point at the beginning of November. The c.p.u.e. amounted to up to 2.9 tons per hour. Due to reaching the limitation of the by-catch level of Greenland halibut the roundnose grenadier directed fishery was finished at November, 11th.

In 1986 for the first time it was possible to use gears with a codend meshsize ≤ 130 mm deeper than 800 m up to a by-catch level of Greenland halibut from ≤ 30 % and other species from ≤ 10 % respectively. Therefore, this licensed possibility led to a better economical efficiency of fishing catch time. The development of c.p.u.e. (catch per hour in t) and of proportion (%) is given in tables 3, 4 and 5 respectively.

2. Greenland halibut directed fishery (NAFO 2H)

The Greenland halibut directed fishery was started in the Division 2H at November, 13th. At the beginning the results were poor. The portion of roundnose grenadier was important. From November, 20th the catches were more successful based on the progressive immigration of the Greenland halibut from the shallower inshore areas into the deep water layers into the offshore areas. The portion of Greenland halibut in the catches amounted to more than 80 per cent (Table 4 and 6).

The fishery was carried out in depths between 900 and 1300 m. The depth of distribution increased in the course of the season like in the last years. The fishing operations were heavily affected by ice from and after mid-December. The success of fishery decreased. Simultaneously the length composition decreased too.

On the December, 23rd fishing had to be finished due to unsuccessful results.

3. Redfish directed fishery (NAFO 3L)

In the Division 3L exclusively two "Zubringer-Trawler" were fishing in the period from October, 25th to November, 22nd.

They operated in a depth range from 400 - 500 m in the area of a general position of 48°N; 48°W (NE-slope of Grand Bank of Newfoundland). In course of fishery the success increased in spite of obstructions through frequently strong wind and search of fish, respectively (Table 7). Partly it was fished inside and outside of 200 Miles Economical Zone of Canada.

The fishery was finished because the sterntrawlers shifted to the Division 2H (Greenland halibut directed fishery).

B. Special Research Studies

1. Environment

Without data

2. Biological Studies

Roundnose grenadier (*Coryphaenoides rupestris* GUNN.)

Biological samplings for analysis ashore were collected on board of commercial vessels based on a sampling program during the season of grenadier directed fishery. Likewise length measurements were carried out on board of commercial vessels.

In the samples about 97 per cent of all individuals were females - it is a phenomenon.

Following biological characterizations were analysed:

	September	October	November
Length range (L_t cm)	35-60	27-69	35-73
Main length range (L_t cm)	44-48	39-52	39-60
Mean length (L_t cm)	46,7	44,6	49,4
Weight range (g)	125-485	50-885	90-728
Mean weight (g)	288	247	352
maturity stage			
juvenil	63	77	63
maturing virgin/resting	37	23	37

The length-age-distributions were prepared on the base of the NAFO-demands. They were handing over to the NAFO-secretariate.

Greenland halibut (*Reinhardtius hippoglossoides* WALB.)

Aboard of the commercial vessels biological samplings were collected for analysis ashore and for length measurement aboard, respectively. This sampling program were carried out during the roundnose directed fishery and the Greenland halibut directed fishery.

The results of biological analysis are given in length-age keys. These are acquired according to the NAFO directions and are available in the NAFO secretariate.

The length and mass distribution, maturity stage and sex ratio amounted to

- during the roundnose greandier directed fishery (NAFO 2H; 3K,L; period 6.8. - 9.11.86)

. length range (L_t)	34-60 cm	
. main length (L_t)	43-47 cm	
. mean length σ (L_t)	44.6 cm	
. mean length φ (L_t)	48.1	
. weight range	310-1830	
. mean weight σ	803 g	
. mean weight φ	927 g	
. maturity stage (%)	juvenil	9
	maturing virgin	89
	developing	2
. sex ratio (%)	males	72
	females	28

- during the Greenland halibut directed fishery (NAFO 2G; H; period 13.11. - 23.12.86)

. length range (L_t)	38-90 cm
. main length (L_t)	42-68 cm
. mean length σ (L_t)	49.2 cm
. mean length φ (L_t)	62.6 cm
. weight range	540-8920 g
. mean weight σ	1078 g
. mean weight φ	2737 g

By the way following paper of summarized investigations of Greenland halibut were prepared and will present at the special session of the Scientific Council of NAFO named "Biology of Demersal Resources of the North Atlantic Continental Slope, with Emphasis on Greenland Halibut and Grenadiers" in 1987:

- On the distribution and stock limitation of Greenland halibut (*Reinhardtius hippoglossoides* WALB.) in sea area off East Canada and West Greenland
- Investigations of growth of the Greenland halibut stock (*Reinhardtius hippoglossoides* WALB.) off Westgreenland and Canada
- Distribution of the Greenland halibut stock (*Reinhardtius hippoglossoides* WALB.) off Canada and Westgreenland in relation to temperature level.

Subarea 6

A. Status of the fishery

From the end of December 1985 to May 1986 factory trawlers (FAO-Code: 101 and 102) carried out a fishery directed towards mackerel in Divisions 5Zw, 6A, 6B and 6C. The fishing area was between 37°N and 40°N outside of the 20 n.m. zone.

Contrary to the year before the January 1986 and especially the second half of the month was the best fishing period.

Although during the whole season very good unit catches on an average could be realized the fishery was not continuous and steady. Caused by the permanently changing weather conditions the mackerel concentrations were very flying, so that extensive search efforts were necessary.

In 1986 the mackerel formed concentrations of commercial significance more northerly by as in the years before, so that the fishery could be started at about 40°N.

The main fishing places were between Cape May and Hudson Canyon.

The fishery started at the end of December 1985 in the area north-western of the Hudson Canyon with good unit catches near the 20 n.m. line in depths of 30 - 40 m. Up to the third decade of January good mackerel concentrations in Subdivision 6B could be found. After that time up to the middle of February the fishery activities changed more southwards between 37°N and 38°30'N. Up to the end of March the fishing positions had to be changed very often in the area between 37°30'N and 39°45'N.

From the date of March 21, 1986, the catching area changed northwards from 39°N to the Hudson Canyon into deeper water and beginning with the second decade of April up to the end of the fishing period it changed southerly of the Nantucket Shoals.

B. Special Research Studies

1. Environmental Studies

During the whole season the meteorological and hydrological conditions were very changeable. There were occurring wind speeds up to 8/9 Bft and often changing wind directions. By that it could be observed that the mackerel concentrations dissolved during high wind speeds and above all the fishery

broke down at north-easterly and easterly winds. Only after veering of the wind to westerly directions concentrations could again be found after longer search. That happened especially during the month of February, March and April. At the end of the season during May the fishery on the whole became more difficult and worse.

From January till March the water temperature on the surface were mainly between 8 and 10°C. Especially in February, partly in March, cold water pockets with temperatures of 5 to 6°C could be observed, where the mackerel did not concentrate.

During April/May the water temperatures were around 10°C, but increased tremendously in the middle of May (13 - 20°C), that certainly caused the end of the season.

During the time up to the middle of March the main catching depths were between 20 and 50 m, after that time up to the end of the season between 70 and 100 m.

The fishery at night could almost continually be operated (with the exeaption of searching days) and brought better results as the fishery at daytime, which occasionally resulted only in smaller or no catches. Sometimes and especially at the end of the season records were only at night or by the hour.

2. Biological Studies

Mackerel

Biological samplings for analysis ashore were collected on board of commercial vessels during the first quarter of the year. The results of these analyses are represented in Table 8 (length distributions). The length distributions were made on the basis of the NAFO-demands, they were overhanded to the NAFO-secretariate.

Table 1: G.D.R. nominal catches (tons) of species in the NAFO-area for 1985 and 1986

Species	1985	1986
Cod	68.8	8.5
Redfish	773.5	706.1
Roundnose grenadier	3752.3	4569.4
Greenland halibut	2184.5	1866.3
American plaice	1.7	-
NW-atlantic eelpouts	-	1.2
Seabass	-	0.1
Skates and rays, n.e.i.	133.5	202.1
Greenland shark	18.3 ⁺	-
Menhaden n.e.i.	-	11.1
Catfish	0.8	-
Baird's smootheat	111.8	9.3
Atlantic mackerel	11023.9	18904.5
Alwif	21.0	14.9
Spiny dogfish	5.3	-
Witch	34.0	6.8
Long-finned squid	-	2.1
Silver hake	15.5	12.9
Blue antimora	6.4	-
Cat. - requiem sharks	-	38.0
Liveroel sharks	-	0.1
Tuna-like fishes n.e.i.	-	0.4
Marine fishes n.e.i.	-	4.5
Scup	-	10.0
Atl. butterflyfish	1.5	3.7
Common dab	1.0	-
Total	18153.8	26372.0

+ Greenland shark (18.0 t) and other sharks

Table 2: G.O.R. nominal catches (tons) of species by Divisions of eubarea 2, 3 and 6 for 1986

	2H	2	3K	3L	3M	3	SZW	5	6A	6B	6C	6
Cod			1.8	6.7		8.5						
Redfish			133.4	485.2	87.5	706.1						
Roundnose grenadier	83.3	83.3	4479.9	6.2		4486.1						
Greenland halibut	862.7	862.7	986.6	17.0		1003.6						
NW-atlantic eelpouts				1.2		1.2						
Seabass							0.1	0.1				
Skates and rays, n.e.i.	54.4	54.4	31.6	21.1		52.7	35.9	35.9	9.1	13.6	36.4	59.1
Menhadens n.e.i.									0.2	3.0	7.9	11.1
Bairds smoothieat	1.9	1.9	7.4			7.4						
Atlantic mackerel							4016.7	4016.7	8733.1	6094.2	60.5	14887.8
Alewife							7.2	7.2	1.1	4.9	1.7	7.7
Witch			5.2	1.6		6.8						
Long-finned squid									2.1			2.1
Silver hake							12.8	12.8	0.1			0.1
Cat., requiem sharks			0.5			0.5	36.8	36.8	0.7			0.7
Liveroel sharks							0.1	0.1				
Tuna-like fishes n.e.i.							0.4	0.4				
Marina fishes n.e.i.									4.5			4.5
Scup							5.5	5.5	3.0	0.6	0.9	4.5
Atl. butterfish							2.8	2.8	0.9			0.9

Table 3: Development of c.p.u.e. (catches per hour in tons) of Roundnose grenadier (RNG) and Greenland halibut (GHL) for "Zubringer Trawler" (900 - 999,9 BRT) during the period 1981 - 1986

	August		September		October		November		December	
	RNG	GHL	RNG	GHL	RNG	GHL	RNG	GHL	RNG	GHL
<hr/>										
<u>Div. 08</u>										
1981-84			without any activities							
1985	-	-	-	-	-	-	0.01	0.33	-	-
1986			without any activities							
<u>Div. 2G</u>										
1981	-	-	-	-	0.31	0.35	-	-	-	-
1982	-	-	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	0.05	0.09	-	-
1985	-	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-
<u>Div. 2H</u>										
1981	-	-	0.35	0.18	0.11	0.23	0.38	0.56	0.16	0.91
1982	-	-	-	-	0.29	0.32	0.12	0.51	0.10	0.69
1983	-	-	-	-	0.43	0.15	0.21	0.22	0.11	0.61
1984	-	-	-	-	0.17	0.31	0.08	0.47	0.03	0.72
1985	-	-	-	-	-	-	0.05	0.38	0.03	0.36
1986	-	-	-	-	-	-	0.01	0.41	0.05	0.54
<u>Div. 2J</u>										
1981	-	-	-	0.08	0.17	0.19	0.61	0.14	0.33	0.21
1982	-	-	-	-	0.09	0.16	0.21	0.09	-	-
1983	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	0.03	0.02	-	0.01	-	0.03
1985	-	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-
<u>Div. 3K</u>										
1981	-	-	-	-	0.24	0.25	0.49	0.12	-	-
1982	-	-	0.39	0.09	-	-	-	-	0.10	0.09
1983	-	-	0.45	0.18	0.29	0.25	-	-	-	-
1984	-	-	1.10	0.14	1.39	0.07	0.03	-	0.29	0.04
1985	0.66	0.08	0.60	0.10	0.44	0.12	-	-	0.04	0.08
1986	0.93	0.09	0.69	0.14	0.74	0.18	-	-	-	-

Table 4: Development of proportion (%) of Greenland halibut (GHL) and Roundnose grenadier (RNG) by Divisions and Month during the period 1981 - 1986

	June		July		August		September		October		November		December	
	RNG	GHL	RNG	GHL	RNG	GHL	RNG	GHL	RNG	GHL	RNG	GHL	RNG	GHL
Div. 0B														
1981-	without any activities													
1984														
1985	-	-	-	-	-	-	-	-	-	-	4	91	-	-
1986	without any activities													
Div. 2G														
1981	-	-	-	-	-	-	-	-	48	49	-	-	-	-
1982	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-	-	-	33	55	-	-
1985	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Div. 2H														
1981	-	-	-	-	-	-	57	27	25	55	33	46	7	43
1982	-	-	-	-	-	-	-	-	48	51	15	68	10	68
1983	-	-	-	-	-	-	-	-	65	23	38	40	14	79
1984	-	-	-	-	-	-	-	-	31	57	4	81	4	89
1985	-	-	-	-	-	-	-	-	-	-	11	81	7	64
1986	-	-	-	-	-	-	-	-	-	-	8	86	8	87
Div. 2J														
1981	-	-	-	-	-	-	19	25	39	41	62	12	28	15
1982	-	-	-	-	-	-	-	-	24	21	42	12	-	-
1983	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-	11	8	-	-	-	-
1985	-	-	1	97	2	95	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Div. 3K														
1981	-	-	-	-	-	-	-	-	45	36	62	15	5	4
1982	-	-	-	-	-	-	53	12	-	-	79	14	65	9
1983	-	-	-	-	-	-	54	22	43	38	-	-	-	-
1984	-	-	-	-	-	-	73	10	88	4	-	-	64	9
1985	-	-	0	71	83	11	83	13	77	21	-	-	3	6
1986	-	-	-	-	88	11	81	18	75	21	58	29	16	8

Table 5: Mean catch (t/d) and catch composition (%) during the roundnose grenadier directed fishery by "Zubringer-Trawler" (NAFO 2H; 3K, L)

period	catch/day (t)	portion (%)			
		RNG ¹⁾	GHL ²⁾	Redfish	Other
6.8.-10.8.	14.3	89.1	10.5	-	0.4
11.8.-17.8.	14.3	89.0	10.4	-	0.6
18.8.-24.8.	13.8	90.3	9.2	-	0.5
25.8.-31.8.	9.7	83.4	14.6	1.9	0.1
1.9.-7.9.	9.3	84.7	14.9	-	0.4
8.9.-14.9.	14.1	85.3	13.9	-	0.6
15.9.-21.9.	10.8	76.2	22.9	0.6	0.3
22.9.-28.9.	11.6	78.0	20.3	-	1.7
29.9.-5.10.	10.0	61.3	34.8	3.0	0.9
6.10.-12.10.	11.7	73.5	22.7	3.6	0.2
13.10.-19.10.	13.0	83.1	13.6	2.7	0.6
20.10.-26.10.	9.9	71.5	23.7	2.5	2.3
27.10.-2.11.	10.2	69.5	21.8	6.8	1.9
3.11.-9.11.	12.1	59.3	28.7	10.8	1.2

1) RNG Roundnose grenadier

2) GHL Greenland halibut

Table 6: Mean catch (t/d) and catch composition (%) during the Greenland halibut directed fishery by "Zubringer-Trawler" (NAFO 2G,H)

period	catch/day (t)	portion (%)		
		Greenland halibut	Roundnose grenadier	Other
13.11.-16.11.	1.9	58.0	42.0	-
17.11.-23.11.	6.9	84.6	9.0	6.4
24.11.-30.11.	9.3	85.6	4.5	9.9
1.12.-7.12.	7.4	87.1	5.4	7.5
8.12.-14.12.	5.2	81.8	14.2	4.0
15.12.-21.12.	5.5	92.3	6.0	1.7
22.12.-23.12.	2.0	77.0	23.0	-

Table 7: Mean catch (t/h) and portion of redfish (%) during the redfish directed fishery by "Zubringer-Trawler" (NAFO 3L)

period	catch/hour (t)	portion of redfish (%, about)
26.10.-31.10.	0.75	85
1.11.-14.11.	1.6	95
15.11.-22.11.	2.5	98

Table 8: Length distribution (fork length in %) of Atlantic mackerel in catches taken by commercial pelagic trawls, NAFO-Div. 6A, 6B, 6C, January-March 1986

length group(cm)	Div. 6A	Div. 6B	Div. 6C
24			3
25			-
26			13
27		5	59
28		14	75
29		18	62
30	3	19	23
31	84	117	121
32	225	247	236
33	294	255	259
34	161	151	49
35	93	66	36
36	28	33	13
37	20	15	7
38	6	5	13
39	8	4	7
40	24	12	10
41	28	12	7
42	24	14	-
43	2	11	7
44		1	
45		1	