Northwest Atlantic Fisheries Organization

Serial No. N5350 **NAFO SCS Doc. 07/06**

SCIENTIFIC COUNCIL MEETING – JUNE 2007

Russian Research Report for 2006

by

A.A. Vaskov, K.V. Gorchinsky, S.F. Lisovsky, M.V. Pochtar

Polar Research Institute of Marine Fisheries and Oceanography (PINRO)
6 Knipovich Street, Murmansk, 183038 Russia, e- mail: inter@pinro.ru

I.K. Sigaev and V.A. Rikhter

Atlantic Research Institute of Marine Fisheries and Oceanography (AtlantNIRO)
5, Dm. Donskoy Str., Kaliningrad, 236000, Russia, e- mail: west@atlant.baltnet.ru

SUBAREAS 1+2

A. Status of the fisheries

Greenland halibut

The directed trawl fishing for Greenland halibut took place in July-November. In accordance with quota allocation to 2 areas, the fishery off the West Greenland was executed to the north (Div.1A) and to the south (Divs. 1CD) of 68˚N.

In the area to the north of 68˚N, three trawlers carried out fishery during 89 fishing days. The fishery was executed in a relatively small area between 68˚48'N – 69˚49'N and 58 ˚49'W - 60˚24'W at the depth of 900- 1300 m. According to the preliminary data, 565 t of halibut and 2 t of skates were caught. Mean daily fishing efficiency varied from 4.5 to 10.2 per months and in general amounted to 6.4 t; this figure was maximal in June.

In the area to the south of 68˚ N, three trawlers took part in fishery during 151 fishing days. The fishery took place from July to November in the area between 63˚27'N – 64˚30'N and 54˚54'W - 57˚59'W at the depth of 950-1600 m. According to the preliminary data the catch was estimated at 1222 t of Greenland halibut and 3 t of roughhead grenadier. Mean daily fishing efficiency varied from 5.7 to 11.0 per months and in general amounted to 8.1 t. The most efficient fishery was in September October.

According to the preliminary data, in the area off the West Greenland, 1792 t were caught by Russian fleet including 1787 t of the Greenland halibut, 3 t of roughhead grenadier and 2 t of skates (Table 1).

Pelagic deep-water redfish

Russian pelagic fishing of deep- water redfish in Divs.1F, 2HJ was executed at 210-380m depths in August. Participating were 1-15 vessels of STM, RTMS, BMRTPT, BMRTIB- types with the mean fishing efficiency of 13.9 t per a fishing day.

According to the preliminary data the total catch of the pelagic redfish equaled to 4770 t. About 82 % of the total redfish catch were taken in Div. 1F.

Other fish species

There was no direct fishery of other fish species. The by-catch of grenadier, skate and other species amounted to about 0.2%.

B. Special research studies

Biological data on Greenland halibut in Div.1AD and pelagic deep-water redfish in Divs. 1F, 2HJ were collected during the fishery by scientists from PINRO staying aboard research vessels as NAFO observers.

Greenland halibut

In Div.1A halibut 25-91 cm in length was recorded. Immature individuals with a modal length of 41-45 cm prevailed in catches. The mean length of males was 44.6 cm, of females- 47.2 cm. Males prevailed with sex ratio 1.5:1. The intensity of feeding was moderate, the mean index of stomach fullness equaled to 1.0. The main food item was shrimp.

In Div.1D halibut 30-108 cm in length was recorded, fish as long as 48-54 cm prevailed (Table 2). The average length of males was 51,4 cm, of females- 58,8 cm. Sex ratio was approximately 2:1.

Most studied fish were sexually mature by early October; about 12% of fish were prespawning and spawning. 16 items were recorded in halibut feeding. Main food items were squid, shrimp and roughhead grenadier. Feeding was weak. The mean index of stomach fullness equaled to 0.5.

In Div. 1D halibut age varied from 2 to 15 years, predominating were fish aged 5-8 (Table 3).

Deep-water redfish

11060 fish were measured.

In Div.1F the length of deep-water redfish in catches ranged from 23 to 44 cm, the mean length was 35.1 cm (Table 4). Fish 35-37 cm in length made up the bulk of catches. Males-females ratio was 1.2:1.

In Div. 2J deep-water redfish 25-42 cm in length was recorded, the mean length was 34.3 cm. Fish 35 cm long made up the bulk of catches. Males prevailed over females in the ratio 1.5:1.

SUBAREA 3

A. Status of the fisheries

Greenland halibut

Directed fishing of the Greenland halibut was conducted by 4 trawlers during the year. The most important fishing area was the North-Eastern slope and the adjacent area of the Flemish Cap bank (Divs.3LM) between 46˚ - 49˚N and 43˚- 49 ˚W at 660-1970 m depth .

The fishing efficiency varied from 1.1 to 19.4 and in the mean amounted to 5.8 t per day. The mean by- catch was not large, it amounted to 5% including grenadiers - 2%, redfish species - 1%, skates - 1%, other fish species (Atlantic halibut, witch flounder, American plaice, wolffishes, sharks) - 1%.

According to the preliminary data the catch was equal to 1531 t.

Redfish

In 2006 2 vessels of SRTMK-type (1000- 2000 kW) conducted directed fishery of redfish on the Flemish Cap. In July-September, the vessels operated at 250 – 450 m depths. On the whole in the period of fishing the efficiency of these vessels equaled to 18.6 t. Greenland halibut and skates made up the bulk of catches. According to the preliminary data the total catch amounted to 854 t.

In Div. 3O redfish was fished in August-October. One vessel of STM-type (2040 kW) operated at 120- 600 m depth. Witch flounder, hakes, American plaice and halibut made up the bulk of by-catches in redfish fishery. As a whole, in the period of fishing the efficiency of vessels of STM-type was 15,7 t. according to the preliminary data the total catch amounted to 981 t.

Other species

No directed fishery for other fish species was carried out. The by-catch of other fish species in the directed fisheries accounted to 1- 10%.

B. Special research studies

Greenland halibut (Reinhardtius hippoglossoides)

There were no special surveys to estimate the stock of Greenland halibut. Aboard fishing vessels biological data was collected by observers.

Halibut 20-98 cm in length occurred in the catches of fishing vessels (Table 5). The mean length of fish was 43.5 cm. The age of fish determined by scale varied from 3 to 13 years (Table 6). Immature fish aged 5 and 36- 42 cm in length made up the bulk of catches (34%).

Roughhead grenadier (Macrourus berglax)

It is one of the most abundant by-catch species in the fishery of Greenland halibut in Div. 3L. The total length of roughhead grenadier in this Division varied from 24 to 101 cm, the mean length was 49.8 cm (Table 7). Fish as long as 45-50 cm prevailed.

In Div. 3M the fish length distribution varied from 24 to 93 cm, the mean length was 51.5 cm; the modal length was 42-48 cm.

In Div. 3N the fish length varied from 36 to 57 cm. The bulk of catches was made up by individuals 45- 48 cm in length.

In Div. 3O the length of roughhead grenadier varied from 21 to 69 cm, the mean length was 44.3 cm.

On the whole, in Divs.3LMNO roughhead grenadier with 21-101 cm length occurred, the mean length was 49.2 cm.

Acadian redfish (Sebastes fasciatus)

In Div. 3M the length of Acadian redfish varied from 13 to 39 cm, the mean length was 22.8 cm. Fish as long as 19 and 23 cm prevailed (Table 8).

In Div. 3O the length of Acadian redfish was from 13 to 42 cm, the mean length was 24.5 cm. Fish as long as 22-25 cm prevailed.

Deep-water redfish (Sebastes mentella)

In Div. 3L the length of deep-water redfish in by-catches during the Greenland halibut fishery ranged from 20 to 47 cm, the mean length was 30.8 cm (Table 9). Prevalent were fish of 28- 30 cm in length.

In Div. 3M the deep-water redfish length distribution fluctuated from 14 to 42 cm, the mean length was 25.7 cm. The bulk of catches was made up by fish 26-27 cm in length.

In Div.3O the length of deep-water redfish was defined by fish 15- 44 cm in length, the mean length was 25.4 cm. In the catches fish 23- 25 cm were predominating.

Golden redfish (Sebastes marinus)

In Div. 3M the length of golden redfish males was 17- 52 cm, the mean length amounted to 28.3 cm (Table 10). Females as long as 15- 52 cm occurred in catches.

In length group, fish as long as 23- 26 cm predominated, the mean length amounted to 29.7 cm.

American plaice (Hippoglossoides platessoides)

In Div. 3L the length distribution of American plaice in by-catches in the Greenland halibut fishery was characterized by 18- 54 cm fish. Mean length was 35.4 cm. (Table 11).

In Div. 3M the length distribution of American plaice in by-catches in the redfish fishery varied from 28 to 68 cm, the mean length amounted to 40.0 cm. The bulk of catches was made up by fish 34- 38 cm in length.

The length of fish in Div. 3O varied from 14 to 56 cm. Fish 42- 44 cm made up the bulk of catches.

Witch flounder (Glyptocephalus cynoglossus)

In Div. 3L the length distribution of witch flounder in by-catches in the fishery of Greenland halibut was characterized by fish as long as 12-54 cm with the average length of 38.8 cm (Table 12).

On the Flemish Cap witch flounder occurred in small portions.

In Div. 3N minor amounts of fish were found in by catches. The length varied from 28 to 48 cm, the mean one was 37.5 cm.

In Div. 3O the length distribution of witch flounder in by-catches in the fishery of redfish varied from 14 to 54 cm, the mean length was 35.0 cm. Fish 30 –34 cm in length, made up the bulk of catches.

Cod (Gadus morhua)

On the Flemish Cap the length of cod was 42-111 cm, the mean length was 68.9 cm (Table 13). The bulk of catches was made up by fish 66-69 cm in length.

In Div. 3O the length distribution of fish varied from 30 to 87 cm, the mean length was 44.7 cm.

Threebeard rockling (Gaidropsarus ensis)

In Div. 3L the length of studied fish varied from 24 to 54 cm with the average one of 41.0 cm (Table 14). Fish with the size of 39 42 cm made up the bulk of catches.

In Div. 3M the length of fish was from 33 to 48 cm, the average one equaled to 42.3 cm.

White hake (Urophycis tenius)

In Div. 3O the length of males was 21-69 cm, the mean length was 50.2 cm (Table 15). Females occurred in the catches 21-90 cm in length, the mean length was 40.8 cm.
In the general length distribution fish 27-32 cm in length prevailed.

Thorny skate (Amblyraja radiata)

In Div. 3L in the fishery of Greenland halibut the length of this species was from 12 to 69 cm (Table 16).
In Div.3M the length of thorny skate varied from 36 to 78 cm, the mean one amounted to 55.0 cm.
In Div. 3O the length of fish varied from 12 to 120 cm.

Black dogfish (Centroscyllium fabricii)

This species was mainly recorded in by catches in the halibut fishery. In Div. 3L the length of fish varied from 42 to 81 cm, the mean length was 64.1 cm (Table 17). The bulk of catches was made up by fish 63- 66 cm in length.

The distribution length of this species in Div. 3M ranged from 51 to 81 cm, the mean length was 65.2 cm

Northern wolfish (Anarhichas denticulatus)

In Div. 3L the length of northern wolfish varied from 30 to 123 cm, the mean length amounted to 59.7cm (Table 18). The bulk of catches was made up by fish 54- 57 cm in length.

In Div. 3M the length distribution of this species varied from 39 to 102 cm.

Blue hake (Antimora rostrata)

In Divs. 3LMO the length distribution of blue hake varied from 18 to 63 cm, the average length was 39.3 cm (Table 19). Fish 36-39 cm in length made up the bulk of catches.

Atlantic halibut (Hippoglossus hippoglossus)

In Divs. 3LMNO this species occurred as single individuals. The length distribution of .Atlantic halibut was from 62 to 162 cm (Table 20).

Common grenadier (Nezumia bairdii)

In Divs. 3LMO the total length of common grenadier varied from 12 to 42 cm, the mean length was 29.0 cm (Table 21).

Other fish species

In the fishery period occurring as by-catch were Atlantic and spotted wolffishes, roundnose grenadier, chimeras, longfinned hake, Notacanthidae and other fish species.

Special selectivity research

In Div. 3O study of selectivity of bottom trawl bags with a standard mesh size of 90, 120 and 130 mm in relation to redfishes *S. fasciatus* and *S. mentella* was conducted in August-October. The results are presented in the separate paper.

SUBAREA 4

A. Status of the fisheries

In 2006 no fishing activities were carried out in the Scotia shelf area by Russian vessels.

B. Special research studies

1.Environmental researches

a) Hydrographic studies

In 2006 the monitoring of sea surface temperature (SST) in the Labrador and Gulf Stream Currents system was continued while mean monthly SST anomalies at conventional points located on the shelf and in adjacent open sea waters were used (Fig. 1). The analysis of monthly mean sea surface temperature at these points showed continuing SST increase. For the most part the 2006 SST values were significantly warmer than annually and monthly normal and than corresponding values in 2005.

In the Labrador Current (points 1, 4, 6) positive anomalies of SST were observed during all months with the maximum values (2.0°C-2.8°C) in spring-summer and minimum ones (0.1°C-0.8°C) in December-March. In the Labrador Sea (point 2) SST anomalies were positive and ranged from 0.8°C to 1.8°C throughout the year. In the North Atlantic Current branch (points 3, 5, 7) SST was 1.0°C-2.8°C warmer than normal. In the Grand Bank area (points 8, 9) SST was 2.6°C-3.4°C warmer than normal in summer months and 0.8°C-1.6°C warmer in the winter period. On the Shelf of Nova Scotia (point 10) the monthly SST values were either above or near to normal. The highest anomalies were recorded here in June (1.9°C) and in July (1.6°C), the lowest in September (-0.3°C) and in October (0.2°C). On this basis one can assume that temperature conditions in the 2006 spawning season were favorable for the silver hake spawning. On the Scotian shelf (point 11) and in Slope waters (point 12) the SST fluctuations principally depend on the advection of Slope waters to the shelf, i.e. on latitudinal fluctuations of the north boundary of the water mass. It seems likely that SST in January and February at these locations was 1.0°C – 1.4°C warmer normal owing mentioned processes. In other months SST values were near normal on the Shelf slope and ranged from –1.2°C to 1.2°C in the Slope waters. At the north edge of the Gulf Stream front (point 13) SST differed little from normal during the year.

C. Miscellaneous Studies

Analyzed were dynamics and SSB-recruitment relationship for cod in Divsisions 2J+3KL and 3NO and for American plaice in Divisions 3LNO and 3M, whose stocks have been in state of deep depression for more than 15 years. Probable causes for this were discussed. It was assumed that for some stock units including those mentioned above there should be a limit of SSB below which the stock is driven to collapse. The investigation carried out enabled to suggest that there is little chance that cod stocks in Divisions 2J+3KL (offshore component) could be recovered only through natural processes even if no fishery is conducted. Conditions and potential measures that could increase chances of stock recovering were considered.

The detailed description of research fulfilled is submitted to this meeting of the Scientific Council.

TABLE 1. Preliminary catches taken by Russian trawlers in NAFO SA 1-3 in 2006.

Species	Division	Catch, t
Greenland halibut	1A	555
	1B	10
	1C	343
	1D	879
	1ABCD	**1787**
Greenland halibut	3L	1384
	3M	118
	3N	25
	3O	4
	3LMNO	**1531**
Atlantic halibut	**3M**	**1**
American plaice	3L	11
	3M	2
	3N	3
	3LMN	**16**
Yellowtail flounder	**3L**	**1**
Witch flounder	3L	3
	3M	4
	3N	1
	3LMNO	**8**
Roughhead grenadier	**1D**	**3**
	3L	11
	3M	22
	3N	3
	3LMN	**36**
Deep-sea redfish	1F	3926
	2H	256
	2J	588
	1F2HJ	**4770**
Redfish spp.	3L	8
	3M	848
	3N	1
	3O	977
	3LMNO	**1834**
Skate	**1A**	**2**
	3L	12
	3M	5
	3N	2
	3LMN	**19**
Atlantic cod	3M	**1**
White hake	3O	**1**
Wolffish spp.	3L	**1**

TABLE 2. Greenland halibut length composition (ind.) of the Russian trawl catches in NAFO Divs. 1AD in 2006.

Length, cm	1A			1D			Total 1AD		
	Males	**Females**	**Total**	**Males**	**Females**	**Total**	**Males**	**Females**	**Total**
24	2		**2**				2		**2**
26		1	**1**					1	**1**
28									
30	3	1	**4**	3		**3**	6	1	**7**
32	5	1	**6**	5		**5**	10	1	**11**
34	14	12	**26**	5		**5**	19	12	**31**
36	24	11	**35**	13	2	**15**	37	13	**50**
38	51	25	**76**	21	9	**30**	72	34	**106**
40	68	36	**104**	66	27	**93**	134	63	**197**
42	96	40	**136**	126	25	**151**	222	65	**287**
44	66	56	**122**	283	57	**340**	349	113	**462**
46	47	36	**83**	488	116	**604**	535	152	**687**
48	37	28	**65**	787	185	**972**	824	213	**1037**
50	22	16	**38**	1030	259	**1289**	1052	275	**1327**
52	10	16	**26**	1040	328	**1368**	1050	344	**1394**
54	13	15	**28**	847	362	**1209**	860	377	**1237**
56	3	9	**12**	422	309	**731**	425	318	**743**
58	4	6	**10**	218	275	**493**	222	281	**503**
60	3	6	**9**	94	193	**287**	97	199	**296**
62	2	2	**4**	51	181	**232**	53	183	**236**
64	8	1	**9**	28	142	**170**	36	143	**179**
66	8	2	**10**	15	94	**109**	23	96	**119**
68	3	1	**4**	11	89	**100**	14	90	**104**
70	4	1	**5**	7	64	**71**	11	65	**76**
72		4	**4**	5	47	**52**	5	51	**56**
74		5	**5**		43	**43**		48	**48**
76		1	**1**	1	58	**59**	1	59	**60**
78					39	**39**		39	**39**
80		2	**2**		34	**34**		36	**36**
82		2	**2**		28	**28**		30	**30**
84					10	**10**		10	**10**
86					21	**21**		21	**21**
88					18	**18**		18	**18**
90		2	**2**		11	**11**		13	**13**
92					9	**9**		9	**9**
94					11	**11**		11	**11**
96					5	**5**		5	**5**
98					2	**2**		2	**2**
100					1	**1**		1	**1**
102					4	**4**		4	**4**
104					1	**1**		1	**1**
106					1	**1**		1	**1**
108					1	**1**		1	**1**
Total	**493**	**338**	**831**	**5566**	**3061**	**8627**	**6059**	**3399**	**9458**
Mean length, cm	**44.6**	**47.2**	**45.6**	**51.4**	**58.8**	**54.0**	**50.8**	**57.6**	**53.3**

TABLE 3. Greenland halibut age composition of the Russian trawl catches (ind.) in the NAFO Div. 1D in 2006.

Length, cm	Age, years														Total	Weight, g
	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
27	1														**1**	**135.0**
28																
29																
30																
31		3	1												**4**	**211.7**
32		4													**4**	**265.0**
33																
34		8	4												**12**	**295.0**
35		10	10												**20**	**350.0**
36		9	9												**18**	**368.8**
37		5	27												**32**	**385.0**
38		50													**50**	**435.0**
39		19	37												**56**	**440.8**
40		29	49	10											**88**	**520.0**
41		22	76	11											**109**	**543.5**
42		15	62	31											**108**	**599.3**
43			119	60											**179**	**645.6**
44			81	101											**182**	**690.6**
45			105	140	35										**280**	**699.9**
46			30	177	59										**266**	**783.9**
47				301	120										**421**	**833.6**
48				195	292										**487**	**925.5**
49				330	220										**550**	**925.5**
50				444	254										**698**	**990.0**
51				315	315										**629**	**1041.5**
52				346	288	58									**692**	**1163.3**
53				176	351	176									**702**	**1271.9**
54					238	416									**654**	**1261.8**
55					167	333	83								**583**	**1360.7**
56					131	66	197								**394**	**1402.5**
57						291	58								**349**	**1597.5**
58					103	52	1032								**258**	**1573.0**
59					54	82	109								**245**	**1742.2**
60						135	22								**157**	**1888.6**
61					14	28	83	14							**139**	**1818.0**
62						57	77								**134**	**1970.0**
63							65	37							**102**	**2103.6**
64						19	28	28							**75**	**2117.5**
65							52	52							**104**	**2365.0**
66							21	28							**49**	**2553.0**
67						18		35	18						**70**	**2705.0**
68							17	42							**59**	**2785.0**
69								23	23						**45**	**2947.5**
70								43	9						**52**	**3278.3**
71								19	5						**24**	**3699.0**
72								13	13						**26**	**3225.0**
73							4	22	4						**31**	**3535.7**
74									18						**18**	**3765.0**
75									10	20					**30**	**3953.3**
76										29					**29**	**4225.0**
77									16	8	8				**31**	**4590.0**
78											15				**15**	**5000.0**
79									10	10	5				**25**	**4498.0**
80										18					**18**	**4415.0**
81									9		9				**18**	**4847.5**
82										16		5			**21**	**5247.5**
83											9				**9**	**6730.0**
84																
85										4	4				**8**	**6372.5**
86										6		6			**12**	**6682.5**
87										9					**9**	**7335.0**

88										5		9			**14**	**7211.7**
89											4				**4**	**7792.5**
90											4	4			**8**	**7912.5**
91												5			**5**	**8925.0**
92												3			**3**	**8835.0**
93											6				**6**	**9272.0**
94										2	2	2			**6**	**8603.3**
95																
96													2		**2**	**10190.0**
97											3				**3**	**10350.0**
98																
99																
100																
101																
102													3		**3**	**12285.0**
103													1		**1**	**11865.0**
104																
105																
106														1	**1**	**12100.0**
Total	**1**	**174**	**610**	**2637**	**2641**	**1731**	**1848**	**356**	**135**	**127**	**69**	**34**	**6**	**1**	**9437**	
Mean length, cm	**27.0**	**38.4**	**42.2**	**48.9**	**51.7**	**56.1**	**58.7**	**67.1**	**72.9**	**79.8**	**83.3**	**88.1**	**100.2**	**106.0**		
Mean weight, g	**135.0**	**453.7**	**604.3**	**950.2**	**1135.3**	**1478.1**	**1663.1**	**2717.5**	**3628.9**	**4973.1**	**6240.7**	**7389.0**	**11516.7**	**12100.0**		

TABLE 4. Redfish length composition (ind.) of the Russian trawl catches in NAFO Div. 1F. 2J in 2006.

Length. cm	Division 1F			Division 2J			Total		
	Males	**Females**	**Total**	**Males**	**Females**	**Total**	**Males**	**Females**	**Total**
23		1	**1**					1	**1**
24									
25	1	2	**3**				1	2	**3**
26	4	3	**7**		1	**1**	4	4	**8**
27	21	21	**42**	4	6	**10**	25	27	**52**
28	40	44	**84**	6	3	**9**	46	47	**93**
29	71	85	**156**	7	7	**14**	78	92	**170**
30	206	165	**371**	51	25	**76**	257	190	**447**
31	246	175	**421**	51	20	**71**	297	195	**492**
32	343	208	**551**	64	35	**99**	407	243	**650**
33	575	288	**863**	108	58	**166**	683	346	**1029**
34	708	339	**1047**	132	60	**192**	840	399	**1239**
35	984	555	**1539**	166	78	**244**	1150	633	**1783**
36	810	544	**1354**	96	61	**157**	906	605	**1511**
37	792	757	**1549**	68	77	**145**	860	834	**1694**
38	321	572	**893**	17	37	**54**	338	609	**947**
39	221	407	**628**	5	19	**24**	226	426	**652**
40	55	136	**191**	3	12	**15**	58	148	**206**
41	22	38	**60**				22	38	**60**
42	2	16	**18**		1	**1**	2	17	**19**
43		2	**2**					2	**2**
44		2	**2**					2	**2**
Total	**5422**	**4360**	**9782**	**778**	**500**	**1278**	**6200**	**4860**	**11060**
Mean length, cm	**34.8**	**35.5**	**35.1**	**34.0**	**34.7**	**34.3**	**34.7**	**35.5**	**35.0**

TABLE 5. Greenland halibut length composition (ind.) of the Russian commercial trawler catches by month in NAFO Div. 3LMO in 2006.

Length,	Division 3L									
cm	II	III	IV	*V*	VII	VIII	IX	X	XI	Total
20		2								**2**
22		18								**18**
24	4	104		1						**109**
26	2	49	1	2						**54**
28	1	2	5	6	2	1				**17**
30		12	39	64	1	4				**120**
32		62	206	339	1	7		4		**615**
34		181	486	915	4	25	2	4		**1617**
36		480	760	1110	8	64	13	15	1	**2451**
38		1012	1356	1007	35	136	40	54	9	**3649**
40		1455	1932	817	38	191	113	150	45	**4741**
42		1358	2095	659	76	321	219	339	67	**5134**
44		1150	1802	448	58	291	417	631	179	**4976**
46		836	1171	314	79	340	448	695	223	**4106**
48		520	710	239	52	347	406	742	201	**3217**
50		365	375	171	32	128	393	490	78	**2032**
52		254	249	88	20	85	252	359	82	**1389**
54		177	183	55	13	55	215	261	51	**1010**
56		94	94	27	8	25	127	147	32	**554**
58		61	55	17	5	20	67	90	10	**325**
60		38	27	18	1	12	58	52	5	**211**
62		28	20	7	2	4	32	41	2	**136**
64		15	16	6		2	20	20	5	**84**
66		9	10	5		1	10	13	1	**49**
68		10	7	2		2	5	10	3	**39**
70		5	7	3		2	5	5		**27**
72		3	3	1		1	1	8	2	**19**
74		6	3	3	1		8	6	1	**28**
76		5	3				3	3	1	**15**
78		1	2	1			1	5	1	**11**
80							4	4	1	**9**
82		1	5	1			5	4	1	**17**
84						1	2	3		**6**
86		1		1						**2**
88		1	1							**2**
90		1								**1**
92										
94							1			**1**
96										
98						1				**1**
Total	**7**	**8316**	**11623**	**6327**	**436**	**2066**	**2867**	**4155**	**1001**	**36794**
Mean length, cm.	**25.6**	**43.3**	**42.9**	**40.0**	**45.5**	**45.5**	**49.2**	**48.8**	**48.1**	**43.5**

TABLE 5. CONTINUED.

Division 3M						
IV	**V**	**XII**	**VIII**	**IX**	**X**	**Total**
1	1					**2**
2						**2**
11	1					**12**
60	25		2		1	**88**
149	66	1		4		**220**
286	113	1	5	4	2	**411**
566	163	1	6	8	1	**745**
989	208	3	20	13	9	**1242**
1294	287	2	26	17	11	**1637**
1177	351	9	30	13	22	**1602**
964	341	6	48	14	35	**1408**
620	247	8	36	11	49	**971**
344	136	5	25	13	42	**565**
200	75	2	28	10	27	**342**
123	46	4	15	6	45	**239**
55	30	3	18	2	16	**124**
40	17	2	5	5	30	**99**
14	13	2	3		8	**40**
11	5		3	4	5	**28**
3	6	3	1	2	5	**20**
6	4	1	2		3	**16**
3	1		1	1	3	**9**
3					3	**6**
2					2	**4**
1				1		**2**
					1	**1**
					1	**1**
1					1	**2**
6925	**2136**	**53**	**274**	**128**	**322**	**9838**
44.0	**44.7**	**49.6**	**48.2**	**47.2**	**51.9**	**44.1**

TABLE 5. CONTINUED

Division 3O			
VIII	**IX**	**X**	**Total**
		3	**3**
		2	**2**
		4	**4**
5	9	25	**39**
5	13	27	**45**
5	15	19	**39**
15	31	74	**120**
35	41	80	**156**
28	51	129	**208**
38	26	100	**164**
16	30	76	**122**
27	30	87	**144**
19	23	73	**115**
20	22	79	**121**
20	13	72	**105**
12	12	50	**84**
12	7	43	**62**
13	8	26	**47**
11	12	17	**40**
9	4	18	**31**
7	9	10	**26**
8	7	5	**20**
2	3	4	**9**
7	2	5	**14**
1	1	2	**4**
	1	1	**2**
1	1	4	**6**
1	1	1	**3**
1	2	1	**4**
4	1	1	**6**
		1	**1**
	1		**1**
322	**376**	**1039**	**1747**
44.6	**41.9**	**42.0**	**42.0**

TABLE 6. Greenland halibut age composition of the Russian commercial trawler catches in NAFO Divs.3LM in 2006.

Age, years	3 L		3 M		3 LM	
	n	%	n	%	n	%
3	311	0.8	21	0.2	**332**	**0.71**
4	3190	8.7	435	4.4	**3625**	**7.78**
5	15071	41.0	3845	39.1	**18916**	**40.6**
6	12296	33.5	3948	40.1	**16244**	**34.86**
7	4528	12.3	1221	12.4	**5749**	**12.33**
8	1044	2.8	303	3.1	**1347**	**2.89**
9	137	0.4	39	0.4	**176**	**0.37**
10	72	0.2	14	0.1	**86**	**0.18**
11	61	0.2	8	0.1	**69**	**0.14**
12	32	0.1	3	0.0	**35**	**0.07**
13	11	0.0	1	0.0	**12**	**0.02**
Total	**36753**	**100**	**9838**	**100**	**46591**	**100**

TABLE 7. Length composition (ind.) of Roughhead grenadier in Russian trawler catches in NAFO Div. 3LMNO in 2006.

Length. cm	3L	3M	3N	3O	3LMNO
21				2	**2**
24	2	1		1	**4**
27	10	1		4	**15**
30	27	5		11	**43**
33	108	8		26	**142**
36	152	19	54	34	**259**
39	222	37	59	25	**343**
42	332	55	43	22	**452**
45	486	72	55	36	**649**
48	559	50	36	35	**680**
51	295	38	23	14	**370**
54	108	40	13	15	**176**
57	87	36	3	15	**141**
60	67	18		6	**91**
63	78	13		2	**93**
66	70	15		2	**87**
69	52	9		2	**63**
72	56	12			**68**
75	48	9			**57**
78	30	2			**32**
81	20	4			**24**
84	16	1			**17**
87	5	3			**8**
90	3				**3**
93	2	1			**3**
96	1				**1**
102	1				**1**
Total	**2837**	**449**	**286**	**252**	**3824**
Mean length, cm	**49.8**	**51.5**	**44.0**	**44.3**	**49.2**

TABLE 8. Length composition (ind.) of Acadian redfish (*S. fasciatus)* in Russian trawler catches in NAFO Div. 3MO in 2006.

Length, cm	3M	3O	3MO
13	1	1	**2**
14	3	1	**4**
15	9	19	**28**
16	31	150	**181**
17	94	157	**251**
18	201	78	**279**
19	449	124	**573**
20	415	381	**796**
21	394	1660	**2054**
22	410	4247	**4657**
23	449	5879	**6328**
24	431	4674	**5105**
25	360	4241	**4601**
26	308	2880	**3188**
27	254	1940	**2194**
28	150	1414	**1564**
29	90	928	**1018**
30	44	629	**673**
31	36	437	**473**
32	23	258	**281**
33	9	179	**188**
34	4	91	**95**
35	7	52	**59**
36	1	18	**19**
37	1	8	**9**
38	1	3	**4**
39	2	1	**3**
40			
41		1	**1**
42		1	**1**
Total	**4177**	**30452**	**34629**
Mean length, cm	**22.8**	**24.5**	**24.3**

TABLE 9. Length composition (ind.) of deep-sea redfish (S. mentella) in Russian trawler catches in NAFO Div.3LMO in 2006.

Length, cm	3L	3M	3O	3LMO
14		1		**1**
15			1	**1**
16		11	7	**18**
17		46	4	**50**
18		122	13	**135**
19		278	43	**321**
20	1	357	187	**545**
21		354	705	**1059**
22	1	416	1755	**2172**
23	2	548	3056	**3606**
24	9	726	2910	**3645**
25	14	911	3190	**4115**
26	19	1068	2497	**3584**
27	41	1183	1805	**3029**
28	70	963	1360	**2393**
29	79	686	807	**1572**
30	68	449	569	**1086**
31	59	236	401	**696**
32	57	137	262	**456**
33	55	81	210	**346**
34	47	45	120	**212**
35	23	38	105	**166**
36	17	15	69	**101**
37	16	12	36	**64**
38	13	9	61	**83**
39	3	4	26	**33**
40	1	1	13	**15**
41	4	1	6	**11**
42		1	7	**8**
43			2	**2**
44			1	**1**
45				
46	1			**1**
47	1			**1**
Total	**601**	**8699**	**20228**	**29528**
Mean length, cm	**30.8**	**25.7**	**25.4**	**25.6**

TABLE 10. Golden redfish (*S. marinus*) length composition (ind.) of the Russian trawler catches in NAFO Div. 3M in 2006.

Length, cm	Males	Females	Total
15		1	**1**
16		1	**1**
17	1		**1**
18	1	3	**4**
19	10	4	**14**
20	7	6	**13**
21	17	11	**28**
22	17	26	**43**
23	26	22	**48**
24	37	49	**86**
25	61	64	**125**
26	71	62	**133**
27	88	99	**187**
28	107	120	**227**
29	113	125	**238**
30	62	96	**158**
31	22	50	**72**
32	19	27	**46**
33	11	33	**44**
34	10	22	**32**
35	10	20	**30**
36	15	13	**28**
37	13	15	**28**
38	12	16	**28**
39	9	20	**29**
40	5	23	**28**
41	6	22	**28**
42	3	24	**27**
43	1	16	**17**
44		16	**16**
45		15	**15**
46		10	**10**
47		7	**7**
48		5	**5**
49	2	2	**4**
50		2	**2**
51		6	**6**
52	1	3	**4**
Total	**757**	**1056**	**1813**
Mean length, cm	**28.3**	**30.7**	**29.7**

TABLE 11. Length composition (ind.) of American plaice in Russian trawler catches in NAFO Div. 3LMO in 2006.

Length, cm	3L	3M	3O	3LMO
14			1	**1**
16			1	**1**
18	4		3	**7**
20	12		5	**17**
22	39		7	**46**
24	50		4	**54**
26	56			**56**
28	75	2	1	**78**
30	96	5		**101**
32	158	17	2	**177**
34	165	27		**192**
36	156	22	4	**182**
38	132	25	4	**161**
40	82	17	14	**113**
42	69	9	19	**97**
44	57	11	21	**89**
46	45	6	15	**66**
48	28	4	8	**40**
50	13	6	6	**25**
52	13	3	2	**18**
54	5	9	1	**15**
56		2	2	**4**
58				
60		1		**1**
62				
64				
66				
68		1		**1**
Total	**1255**	**167**	**120**	**1542**
Mean length, cm	**35.4**	**40.0**	**40.1**	**36.3**

TABLE 12. Length composition (ind.) of Witch flounder in Russian trawler catches in NAFO Div. 3LMNO in 2006.

Length, cm	3L	3M	3N	3O	3LMNO
12	3				**3**
14	1			8	**9**
16	2			26	**28**
18	3			9	**12**
20	7			15	**22**
22	3			12	**15**
24				22	**22**
26	1			65	**66**
28	2		2	175	**179**
30	5		3	207	**215**
32	10		8	294	**312**
34	35	1	15	202	**253**
36	47		39	131	**217**
38	45	3	25	194	**267**
40	40	4	12	149	**205**
42	41	3	9	131	**184**
44	43	3	2	97	**145**
46	19		3	50	**72**
48	6		1	35	**42**
50	3			11	**14**
52	4			4	**8**
54	3			1	**4**
Total	**323**	**14**	**119**	**1838**	**2294**
Mean length, cm	**38.8**	**40.9**	**37.5**	**35.0**	**35.2**

TABLE 13. Length composition (ind.) of Atlantic cod in Russian trawler catches in NAFO Div. 3MO in 2006.

Length, cm	3M	3O	3MO
30		6	**6**
33		7	**7**
36		26	**26**
39		13	**13**
42	4	15	**19**
45	31	18	**49**
48	29	18	**47**
51	16	6	**22**
54	4	3	**7**
57	3	4	**7**
60	18	2	**20**
63	31	3	**34**
66	40	1	**41**
69	42		**42**
72	34	2	**36**
75	19		**19**
78	21		**21**
81	31		**31**
84	23		**23**
87	18	1	**19**
90	10		**10**
93	4		**4**
96	1		**1**
99	3		**3**
102			
105			
108			
111	1		**1**
Total	**383**	**125**	**508**
Mean length, cm	**68.9**	**44.7**	**62.9**

TABLE 14. Length composition (ind.) of Threebeard rockling in Russian trawler catches in NAFO Div. 3LM in 2006.

Length, cm	3L	3M	3LM
24	1		**1**
27	4		**4**
30	22		**22**
33	65	6	**71**
36	140	18	**158**
39	241	27	**268**
42	214	30	**244**
45	141	23	**164**
48	42	13	**55**
51	7	1	**8**
54	2		**2**
Total	**879**	**118**	**997**
Mean length, cm	**41.0**	**42.3**	**41.1**

TABLE 15. Length composition (ind.) of White hake in Russian trawler catches in NAFO Div. 3O in 2006.

Length, cm	Males	Females	Total
21	**5**	**6**	**11**
24	**3**	**16**	**19**
27	**1**	**62**	**63**
30	**2**	**59**	**61**
33	**1**	**47**	**48**
36	**1**	**39**	**40**
39	**2**	**8**	**10**
42		**10**	**10**
45	**3**		**3**
48	**3**	**2**	**5**
51	**3**	**6**	**9**
54	**1**	**2**	**3**
57	**2**	**5**	**7**
60	**11**	**1**	**12**
63	**9**	**4**	**13**
66	**2**	**5**	**7**
69	**2**	**9**	**11**
72		**8**	**8**
75		**8**	**8**
78		**11**	**11**
81		**6**	**6**
84		**3**	**3**
87		**2**	**2**
90		**1**	**1**
Total	**51**	**320**	**371**
Mean length, cm	**50.2**	**40.8**	**42.1**

TABLE 16. Length composition (ind.) of Thorny skate in Russian trawler catches in NAFO Div. 3LMO in 2006.

Length, cm	3L	3M	3O	3LMO
12	8		1	**8**
15	8		2	**10**
36		1		**1**
39	1	2		**3**
42	1	1		**2**
45	2	6		**8**
48	5	9		**14**
51	4	12	1	**17**
54	10	14	2	**26**
57	8	13	1	**22**
60	11	10	5	**26**
63	3	5	1	**9**
66	1	2	5	**8**
69	1	1	5	**7**
72			3	**3**
75			8	**8**
78		1	4	**5**
81			1	**1**
84			1	**1**
87			2	**2**
90			2	**2**
96			1	**1**
120			1	**1**
Total	**63**	**77**	**46**	**186**
Mean length, cm	**45.6**	**55.0**	**69.7**	**55.4**

TABLE 17. Length composition (ind.) of Black dogfish in Russian trawler catches in NAFO Div. 3LM in 2006.

Length, cm	3L	3M	3LM
42	3		**3**
45	1		**1**
48	8		**8**
51	14	2	**16**
54	25	3	**28**
57	30	15	**45**
60	44	12	**56**
63	83	21	**104**
66	61	16	**77**
69	29	12	**41**
72	27	8	**35**
75	13	3	**16**
78	8	3	**11**
81	3	1	**4**
Total	**349**	**96**	**445**
Mean length, cm	**64.1**	**65.2**	**64.3**

TABLE 18. Length composition (ind) of Northern wolffish (*Anarchichas denticulatus*) in Russian trawler catches in NAFO Div. 3LM in 2006

Length, cm	3L	3M	3LM
30	1		**1**
33	3		**3**
36	6		**6**
39	12	2	**14**
42	11		**11**
45	22	3	**25**
48	18	3	**21**
51	15	2	**17**
54	25	5	**30**
57	22	5	**27**
60	16	5	**21**
63	15	4	**19**
66	7	2	**9**
69	6	3	**9**
72	9	5	**14**
75	1	1	**2**
78	6	2	**8**
81	2	1	**3**
84	1		**1**
87	1	1	**2**
90		2	**2**
93			
96			
99			
102		1	**1**
105	1		**1**
108			
111	2		**2**
114	1		**1**
117			
120			
123	1		**1**
Total	**204**	**47**	**251**
Mean length, cm	**59.7**	**63.7**	**60.4**

TABLE 19. Length composition (ind.) of Blue hake (*Antimora rostrata*) in Russian trawler catches in NAFO Div. 3LMO in 2006.

Length, cm	3L	3M	3O	3LMO
18	1		1	**2**
21			1	**1**
24	2		1	**3**
27	9		7	**16**
30	34		7	**41**
33	58	5	11	**74**
36	66	24	14	**104**
39	63	20	7	**90**
42	32	8	1	**41**
45	34	1		**35**
48	20	1		**21**
51	17			**17**
54	12			**12**
57	8			**8**
60	1			**1**
63	1			**1**
Total	**358**	**59**	**50**	**467**
Mean length, cm	**40.1**	**38.9**	**33.9**	**39.3**

TABLE 20. Length composition (ind.) of Atlantic halibut (*Hippoglossus hippoglossus*) in Russian trawler catches in NAFO Div. 3LMNO in 2006.

Length, cm	3L	3M	3N	3O	LMNO
62		1			**1**
64				1	**1**
66		1		1	**2**
74		1			**1**
76				1	**1**
78				1	**1**
82			1	2	**3**
86				2	**2**
92		1		1	**2**
94				1	**1**
102				1	**1**
104				1	**1**
106				3	**3**
112				2	**2**
116				1	**1**
118		2			**2**
120		1			**1**
122		1		2	**3**
134		1			**1**
136		1			**1**
138	1				**1**
144	1				**1**
146	1				**1**
150		1			**1**
154		1			**1**
162				1	**1**
Total	**3**	**12**	**1**	**21**	**37**
Mean length, cm	**143.2**	**112.7**	**82.5**	**99.4**	**107.4**

TABLE 21.Length composition (ind.) of Common grenadier (*Nezumia bairdii*) in Russian trawler catches in NAFO Div. 3LMO in 2006.

Length, cm	3L	3M	3O	3LMO
12		1		**1**
15		5		**5**
18		13	1	**14**
21		12	9	**21**
24	1	8	17	**26**
27	14	1	19	**34**
30	37		7	**44**
33	37	1	11	**49**
36	13			**13**
39	5			**5**
42	1			**1**
Total	**108**	**41**	**64**	**213**
Mean length, cm	**32.8**	**21.1**	**27.6**	**29.0**

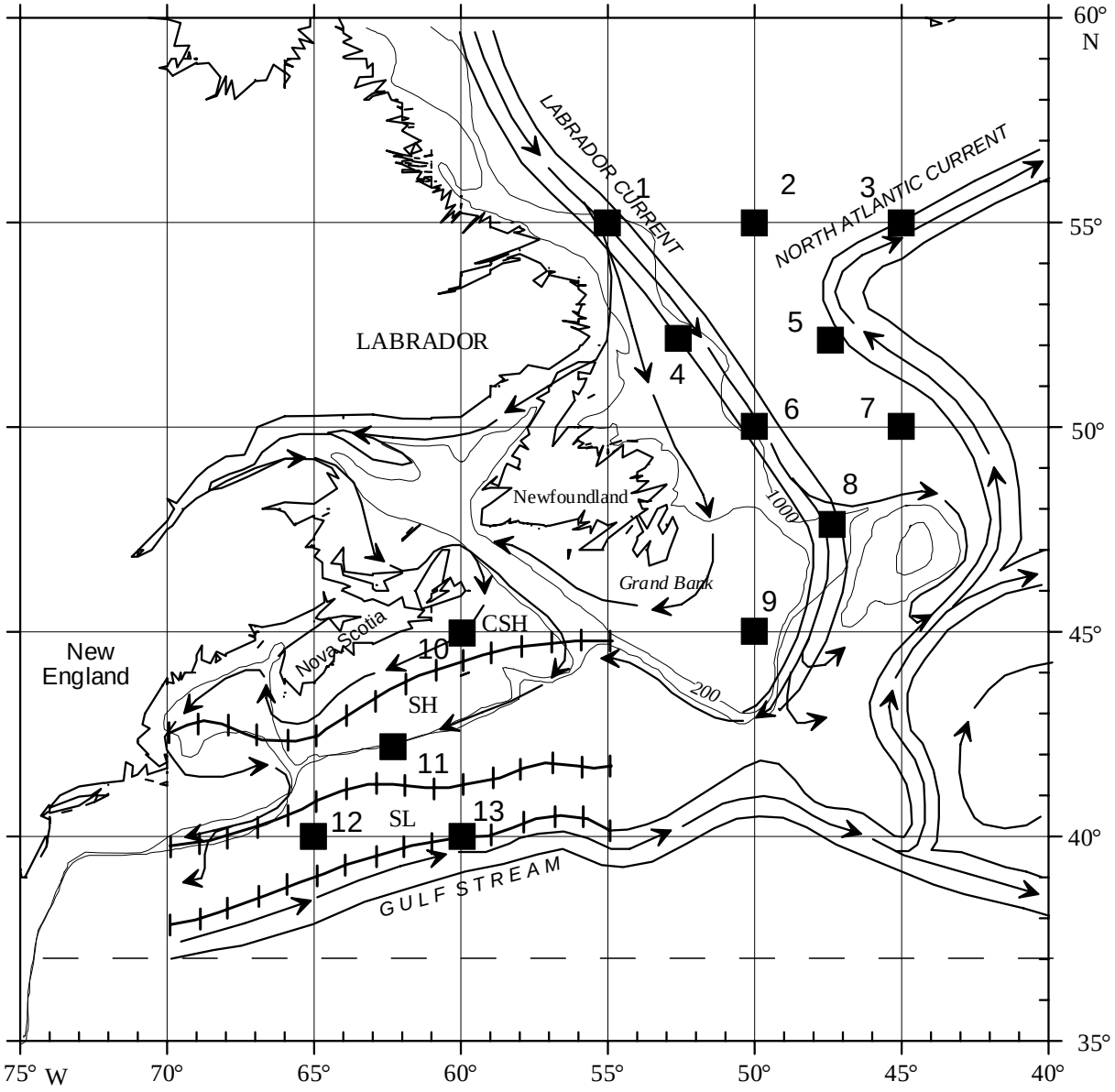

Fig. 1. SST monitoring scheme in the Labrador and Gulfs Stream currents zones and water masses boundaries dynamics at the surface between 55°W and 70°W.