Northwest Atlantic Fisheries Organization

Serial No. N4372 **NAFO SCS Doc 01/11**

SCIENTIFIC COUNCIL MEETING – JUNE 2001

Russian Research Report for 2000

PART I. Research carried out by AtlantNIRO in NAFO Subarea 4
PART II. Report of PINRO Research in the NAFO Areas in 2000

PART I

Research carried out by AtlantNIRO in NAFO Subarea 4

by

Rikhter V. A., and I. K. Sigaev
Atlantic Scientific Research Institute of Marine Fisheries and Oceanography (AtlantNIRO),
5, Dm. Donskoy Str., Kaliningrad, 236000, Russia

A. Fishery State

In 2000 the Russian silver hake fishery in the Scotian shelf area (southwards of SMGL) was carried out at two vessels – mid-tonnage trawler (SRTMK) in January-March and large-tonnage trawler (BMRT) in May-July. According to preliminary data the total catch amounted to about 1500-1600 t. In compliance with the information taken from the observer's report kindly provided to us by PINRO, BMRT catches per hour trawling in May, June and July were 1.36, 1.60 and 0.56 t, respectively, and 18.5,22.0 and 8.3 t per fishing day. In May fishery was carried out in zones 4WX, while in June-July – only in zone 4W. Russian catches per unit effort (CPUE) were close to those of Cuban vessels in 1998 and notably exceeded the same in May-June 1999 (Valdes and Ramos, 2000). Drastic deterioration of the fishing conditions in July was explained by the mass migration of adult hake to the shallow areas for spawning resulted in fish inaccessibility to the foreign fleet. Interannual CPUE fluctuations of foreign vessels having possibility fish only within insignificant part of silver hake distribution area off Nova Scotia seem hardly be caused by the latter abundance fluctuations. Most probably variability of hake distribution and behavior by years as
stipulated by oceanographic factors play the essential role.

In 2002 the hake stock is likely to be at the relatively high level. This is evidenced by AtlantNIRO research data (Sigaev *et al*., 2000; Sigaev, 2000) according to which in 1998-2000 the hydrological conditions on the shelf were favorable to strong year-classes formation, as well as Canadian data of July bottom surveys according to which 1998 and 1999 year-classes were assessed at the level higher than average (DFO, 2000). Therefore, it is reasonable to assume that in 2002 hake fishing conditions will be satisfactory and provide sufficiently high catch efficiency.

B. Special Researches

1. Environment researches

a) Hydrographic studies

In 2000 the hydrological conditions monitoring in the Northwest Atlantic was continued by two characteristics: surface water temperature and water masses boundaries location at the surface. Besides, the annual trends of SST in 2000 was compared to their long-term mean location for 1977-

1996, while water masses boundaries were compared to the long-term mean values for 1962-1991,1995. The analysis of both characteristics mean monthly values revealed the following:

In the open Labrador Sea the mean monthly temperatures were positive and exceeded the normal ones by 0.3-3.5°C.

In the main Labrador stream between 57°30' and 47°30'N positive SST anomalies also predominated. In the Labrador stream northwards of Flemish Cap SST were close to the normal ones in January, February and April while in other months the latter was exceeded in 0.8-2.7°C. On the Grand Bank shelf outside the Labrador Current SST were positive during 2000 and mostly exceeded the long-term means.

In the northeast Scotian shelf area SST exceeded the normal values in 0.9-1.6° C in 2000. At the same time in January-April and November SST was 0.6-1.5°C higher than in 1999. In May-September these were 0.6-2.1°C lower than in 1999.

On the shelf slope and at Golf Stream front SST deviations were also positive in 2000. In the Slope water mass off the shelf positive deviations within 0.6-2.2°C were observed in January-March and in October-November, while the negative ones (close to the normal values) – in April-September and December.

Thus, the data presented evidence that in 2000 the temperature of the surface water in the Labrador Sea and within the Labrador Current and Golf Stream zones including shelves of Grand Bank and Nova Scotia was higher than the long-term means.

Analysis of three water masses location (Cold Shelf water, Slope water and Northern edge of Golf Stream Front) showed that in the area between 50° and 70°W the Cold Shelf water (CSH) and Slope water (SL) boundaries fluctuated synchronously according to the annual wave pattern with the northward shift in winter-spring and southward shift in summer-autumn. In the area between 59° and 55°W the northward shift of the Cold Shelf water was observed while the slope water location was close to the mean long-term evidencing the temperature increase. This situation contributed to increase of the thermal background in this area due to extension of warm Shelf water mass area (SH). During the most years the northern edge of the Golf Stream front was shifted southwards as compared to the mean long-term line.

b) **Biological studies**

4. **Miscellaneous Studies**

The data on fish resources state and dynamics in NAFO area in 1990s were considered in view of expectations for the first five years of the current century. The trends in the basic commercial stock dynamics appeared in the late-1990s allow to hope that in the period to 2005 the total and spawning biomass of Greenland halibut in Subdivisions 2+3, redfish 3M, yellowtail flounder 3LNO, silver hake 4VWX will be increasing.

The warming process observed in the Newfoundland area since 1996 (Drinkwater *et al.*, 2000) seems to become a favorable factor to formation of cod 3NO strong year-classes. This is to some extent confirmed by the results Canadian surveys in 1999 evidencing increase of young fish (1-3 years old) abundance indices (NAFO, 2000). Based on the above considerations it may be assumed that in the first five years of the new century, the cod stock considered would start to recover.

The situation with cap 3NO is still uncertain in view of the total absence of appropriate scientific and commercial information at NAFO disposal. However, sharp abundance fluctuations typical to this species allow to assume that following a relatively long period of depression the capelin stock is able to recover d is at sufficiently high level at present. In general, the results of the study allow concluding that the Northwest Atlantic Ocean importance as the international fishing area will increase during several subsequent years.

References

DFO. 2000. Silver hake on the Scotian Shelf (Div. 4VWX). DFO Science Stock Status Report A3-3.5 (2000).

Drinkwater K. F., E. Colbourne, and D. Gilbert. MS 2000. Overview of environmental conditions in the Northwest Atlantic in 1999. NAFO SCR Doc., No. 21, Serial No.N4250, 89 p.

NAFO. MS 2000. Scientific Council Meeting -June 2000. NAFO SCS Doc., No. 24, Serial No. N4283, 192 p.

Sigaev, I. K. 2000. Interannual variability of sea-surface temperature and dynamics of surface water boundaries in the systems of the Labrador Current and the Gulf Stream. Fisheries and biological research by AtlantNIRO in 1998-1999. Trudy AtlantNIRO, p. 37-56.

Sigaev, I. K., V. A. Rikhter, and P. S. Gasiukov. MS 2000. Russian research report for 1999. Part 1 – Research carried out by AtlantNIRO in NAFO Subarea 4. NAFO SCS DOC., No.9, Serial No. N4221, 22 p.

Valdes, E., and I. Ramos. MS 2000. Cuban Research Report for 1999. NAFO SCS Doc., No. 8, Serial No. N4220, 7 p.

PART II

Report of PINRO Research in the NAFO Areas in 2000

by

A.A. Vaskov, K. V. Gorchinsky, T. M. Igashov, V. M. Kiseleva and S. P. Melnikov
Polar Research Institute of Marine Fisheries and Oceanography
(PINRO), 6 Knipovich Street, Murmansk 183763 Russia

SUBAREA 1

A. Status of Fisheries

Greenland halibut. In 2000, Russian quota for Greenland halibut in the West Greenland area (Div. 1D) constituted 800 tons. The fishery took place from the middle of June to the early December at the depth of 900-1 300 m.

2-3 middle-tonnage trawlers and 1 long-liner participated in the fishery and utilized the whole quota. The average daily efficiency of trawlers was 6-7 tons, that of the long-liner – 3-4 tons.

Sebastes mentella. Fishery for *S. mentella* was carried out in Div. 1F at the depth of 280-350 m from July to October by 4-8 middle- and large-tonnage trawlers. Average daily efficiency of vessels during the fishery period constituted 19.0 tons. By provisional data, total catch constituted 5 259 tons.

Other species. No directed fishery for other species was carried out. By-catch of roughhead and roundnose grenadier and other species during the directed fishery for Greenland halibut constituted usually 5-10%.

B. Special Research Studies

No special environmental research studies or oceanographic observations were performed.

No survey for assessment of Greenland halibut and *S. mentella* stocks were conducted. Biological data on *S. mentella* in Div. 1F during the fishery were collected by Russian observers.

Sebastes mentella. Length of 13.150 specimens was measured and feeding and maturity of 1.562 specimens and age of 998 specimens were analyzed. Length of males caught in Div. 1F ranged from 22 to 43 cm and mean length constituted 34.4 cm (Table 1). The bulk of catches consisted of fish 34-35 cm long at the age of 13-14 (Table 2). The main portion of females consisted of specimens 36-37 cm long at the age of 14-15. As for males, more than 70% of specimens had the 6th stage of gonad development, whereas the majority of females were at stages 3 and 4. Male/female ratio was 1.3:1.

SUBAREA 3

A. Status of Fisheries

Greenland halibut. In 2000, Russian quota of Greenland halibut in 2000 in Div. 3LMNO constituted 3 307 t. From January to May, vessels of different types operated mainly in Div. 3L, where the main part of catch (93%) was taken, and in Div. 3MNO for some time. Fishing depth was 650-1 380 m, the efficiency of catch constituted 0.5-0.7 tons per trawling hour.

By provisional data, Russian catch of Greenland halibut in Div. 3LMNO constituted 3 332 tons.

Redfish. In 2000, the Russian fleet began the directed fishery for redfish on the Flemish Cape bank after withdrawing the quota for Greenland halibut. The main fishery was carried out by vessels of STM- and SRTMK-type, other type vessels fished for redfish episodically. From May to November, the vessels of the Northern Basin caught redfish on the southern slope of the bank, mainly, at the depth of 400-500 m. The main catch of redfish was taken in September/October. In general for the fishing period, the efficiency of STM-type vessels constituted 11.6 tons per a fishing day. By provisional data, total catch constituted 1 809 tons.

In Div. 3O, vessels of STM-, BMRT- and SRTMK-type fished for redfish at the depth of 300-600 m. Due to preliminary data, the catch constituted 2 430 tons. About 70% of total catch were obtained in June/July.

Skate. Directed fishery for skate in Div. 3NO was carried out from May to October by two SRTMK-type vessels. The main part of catch (more than 85%) was taken in Div. 3N at the depth of 50-300 m. Thorny skate (*Raja radiata*) were the main fishing object (more than 95%). The summarized catch of skate in Div. 3NO constituted 3 511 tons. In general, the efficiency of SRTMK-type vessels during the directed fishery for skate constituted 18.6 tons per a fishing day.

In Div. 3LM skate were registered only as a by-catch during the fishery for halibut.

By provisional data, total catch in Div. 3LMNO constituted 3 533 tons.

Other species. No directed fishery for other species was carried out. By-catches of other species during directed fishery are presented in Table 3.

B. Special Research Studies

No special environmental studies or oceanographic observations were carried out.

A trawl survey for Greenland halibut stock assessment was carried out in Div. 3LM from 23 April to 8 May by MI-0703 “Onezhsky”. No survey for assessment of redfish stock was conducted on the Flemish Cap Bank in 2000. Biological data in Div. 3LMNO during the fishery were collected by scientists of PINRO working as NAFO observers onboard vessels. The observers identified species composition of all catches. The biological material collected is presented in Table 4.

Data on length and age composition of groundfish given in this paper apply only to the measured part of catches.

Greenland halibut. Due to results of the trawl survey on stock assessment carried out in Div. 3LM at the depth of 732-1.280 m within the area of 3.5 thou. mile^2, index of abundance of Greenland halibut constituted 36.9 mill. spec., whereas index of biomass – 23.9 thou. tons.

In Div. 3L and 3N, length of Greenland halibut was 24-94 cm, mean length being 42.4 cm and 44.6 cm, correspondingly (Table 5). Similar to 1999, the bulk of catch was made up by fish 40-42 cm long at the age of 5-6 (Table 6). Specimens of these length-age groups dominated in catches during the whole fishing period. By-catch of small-sized halibut (less than 30 cm long) in Div. 3L constituted 0.3% and in Div. 3N – 0.7%.

Length of Greenland halibut caught in Div. 3M varied from 28 to 92 cm (Table 7), mean length constituted 46.4 cm. The bulk of catch was made up by fish 42-44 cm long at the age of 6-7 (Table 6). It was found that the largest halibut were caught in August/October. By-catch of small-sized halibut in Div. 3M constituted 0.09%.

Roughhead grenadier. This is one of the numerous objects by-caught during the fishery for Greenland halibut. Total length of roughhead grenadier in Div. 3L varied from 18 to 99 cm, mean length constituted 43.9 cm. (Table 8). During the whole period of observations, specimens 36-42 cm long were the bulk of catches.

Roughhead grenadier 27 to 72 cm long were found in Div. 3MN. Similar to Div. 3L, the bulk of catches was made up by fish 36-42 cm long.

Mean length of grenadier varied slightly between Divisions.

Sebastes mentella. Length of *S. mentella* in by-catches during the directed fishery for Greenland halibut in Div. 3L varied from 20 to 48 cm, mean length constituted 30.0 cm (Table 9). The main part of fish consisted of specimens 29-30 cm long at the age of 9-10 (Table 10).

In Div. 3M, length frequency of *S. mentella*, summarizing data from both by-catch and directed fishery, was characterized by fishes 14 to 46 cm long at the age 3 to 22. The bulk of catches was made up by fish 27-29 cm long at the age of 8-9.

The bulk of catches taken in Div. 3N was made up by fish 29-31 cm long at the age of 10-11.

Length of *S.mentella* in Div. 3O varied from 14 to 46 cm, mean length constituted 27.5 cm. The bulk of catches was made up by fish 24-26 cm.

American plaice. This is the most numerous object found in by-catch during the directed fishery for Greenland halibut at the depth of 700-1 200 m. Investigations on this species were carried out in Div. 3LNO. Occasional by-catches of this species exceeded sometimes 15% that makes the fishery for Greenland halibut difficult. Length of American plaice by Divisions and months are in Table 11. Fish length in Div. 3LNO varied in general from 20 to 68 cm for the period of observations, mean length being 37.0 cm. The bulk of catches was made up by fish 34-36 cm long. The increase of mean length of fish was registered from Div. 3L to Div. 3O.

Witch flounder. Length of fish caught in Div. 3L ranged from 26 to 56 cm, with mean length of 38.7 cm (Table 12). The bulk of catches was made up by specimens 36-38 cm long. In Div. 3N fish length varied from 28 to 50 cm, mean length was 38.6 cm.

Yellowtail flounder. Biological material was collected in Div. 3NO in May/June. Length of caught fish ranged from 22 to 44 cm, mean length constituted 31.8 cm (Table 13). The bulk of catch in both Divisions consisted of fish 30-32 cm long.

Cod. Length of cod as by-catch in Div. 3L ranged from 36 to 94 cm, mean length constituted 57.6 cm (Table 14), the age was 3 to 9. The bulk of catches was made up by mature specimens 54 to 63 cm long at the age of 5-6 (Table 15).

Cod from 33 to 140 cm long were found in Div. 3O, with mean length 48.2 cm. The bulk of catches consisted of specimens 42-48 cm long at the age of 4-5 from 1996-1995 year-classes.

Red hake. Red hake occurred in catches at the depth from 700 to 1 300 m. Length of examined fish in Div. 3L ranged from 24 to 51 cm, mean length was 37.3 cm (Table 16). Similar to 1999, the bulk of catches was made up by specimens 36 cm long. In Div. 3M, only 16 specimens were measured.

White hake. By-catch of this species in Div. 3O during the fishery for redfish constituted from 1 to 5%. By preliminary data, the total catch of white hake constituted 110 tons from June to August. Fish length ranged from 18 to 78 cm, mean length constituted 42.0 cm (Table 17). The bulk of catches was made up by fish 39-45 cm long.

Thorny skate. Thorny skate occurred in catches in all Divisions at all depths. In Div. 3L, fish length varied from 30 to 78 cm, mean length being 51.1 cm (Table 18). In Div. 3M, a small number of fish were analyzed. This is the most numerous species in Div. 3NO at the depth from 60 to 300 m, where it forms commercial concentrations. In Div. 3N, length of caught specimens varied from 27 to 84 cm, mean length was 54.5 cm. In Div. 3O, length of thorny skate varied from 30 to 84 cm, mean length constituted 53.9 cm.

Black dogfish. This is the most numerous species of sharks in by-catches during the fishery for Greenland halibut. Length of fish in Div. 3L in January/May varied from 30 to 111 cm. The main part of fish was 63-66 cm long (Table 19). A small number of specimens was registered in Div. 3MN.

Other species. Such species as common grenadier, wolffish, roundnose grenadier, spiny eel, longfin cod and other fishes occurred in catches. A small amount of ichthyological material on these species was collected.

SUBAREA 4

A. Status of Fisheries

Silver hake. In April/August, a vessel of BMRT-type fished for silver hake in Div. 4WX by a commercial quota of one of the Canadian companies. Fishing was conducted at the depth of 180-220 m, mean catch was 15.8 tons. Hake constituted 97-99% of catches. Such species as hake, haddock, cod and skate were found in by-catches. By preliminary data, total catch in Div. 4WX constituted 1 169 tons.

B. Special Research Studies

No special environmental studies or oceanographic observations were performed.

Biological information in Div. 4WX during the fishery was collected by an observer.

Silver hake. Length of hake in Div. 4WX ranged from 16 to 40 cm. Males 26-27 cm long and females 28-29 cm long predominated, mean length constituted 26.4 and 28.7 cm, correspondingly. Fishery was based on the mature hake concentrations, which constituted 90-98%. Immature part of the population did not exceed 2-10%.

Table 1. Length composition of Redfish (indiv.) in catches by Russian trawlers in the NAFO Div. 1 F, 2000.

Length, cm	Division 1F		
	Males	Females	Total
22	2	3	6
23	9	7	16
24	11	16	27
25	27	25	52
26	33	47	80
27	54	54	108
28	86	88	174
29	127	125	252
30	193	188	381
31	273	209	482
32	176	247	723
33	941	342	1283
34	1295	472	1767
35	1458	724	2182
36	982	927	1909
37	634	863	1497
38	400	733	1133
39	219	424	643
40	99	200	299
41	36	80	116
42	12	39	51
43	1	6	7
Total	**7368**	**5819**	**13150**
Length av., cm	**34.4**	**35.3**	**34.8**

Table 2. Redfish age composition in the NAFO Div. 1F, %.

Age, years	Division 1F		
	Males	Females	Total
7	0.5	0.3	0.9
8	0.7	0.6	1.5
9	1.2	1.2	2.3
10	2.4	1.6	3.8
11	4.5	2.1	6.4
12	9.4	3.8	12.9
13	13.0	5.5	18.5
14	10.7	8.2	19.2
15	8.9	11.7	21.0
16	3.3	5.7	9.1
17	1.3	2.7	3.9
18	0.1	0.5	0.6
19	+	0.1	0.1
20	-	+	+
Total	**7357**	**5793**	**13150**

Table 3. Preliminary data on catch taken by Russian trawlers in the NAFO Div. 1DF, 3LMNO, 2000.

Species	Division	Catch, t
Greenland halibut	1D	800
	3LMNO	3332
	3L	3113
	3M	103
	3N	86
	3O	30
Atlantic halibut	3LMNO	2
American plaice	3LMNO	318
Yellowtail flounder	3NO	212
Witch flounder	3LNO	98
	3M	6
Roughhead grenadier	3LMNO	211
Redfish spp.	1F	5259
	3M	1808
	3LN	418
	3O	2430
Skate	3LMNO	3533
Atlantic cod	3NO	137
White hake	3NO	110

Table 4. Biological material gathered by observers, 2000.

Species	Division 3L			Division 3M			Division 3N			Division 3O			Division 3LMNO		
	L	B	A	L	B	A	L	B	A	L	B	A	L	B	A
Urophycis chuss	857	391		16	16								**873**	**407**	
Reinhardtius hippoglossoides	35113	7307	1494	5762	1573	427	2378	516	250				**43253**	**9396**	**2171**
Centroscyllius fabricii	249	191		5	2		5	5					**259**	**198**	
Raja hyperborea	29	28		5	4		2	2					**36**	**34**	
Anarhichas minor	5	3		82	59								**87**	**62**	
Raja radiata	523	274		2	2		655	32		590			**1770**	**308**	
Raja spinicauda	40	34		25	25		1	1					**66**	**60**	
Sebastes mentella	6304	1465	771	14168	1769	530	10642	2197	415	14939	2646	1043	**46053**	**8077**	**2759**
Gadus morhua	304	179	179							267	58	50	**571**	**237**	**229**
Hipoglossus hippoglossus	14	14	14				2	2	2				**16**	**16**	**16**
Cyclopterus lumpus	10	8											**10**	**8**	
Anarhichas denticulatus	53	32		1	1		1	1					**55**	**34**	
Sebastes marinus	8			40	24		1						**49**	**24**	
Glyptocephalus cynoglossus	708	352					202	25					**910**	**377**	
Hippoglossoides platessoides	1611	334					431	103		888	138	49	**2930**	**575**	**49**
Macrourus berglax	7320	2211	1833	423	131	50	278	50					**8021**	**2392**	**1883**
Nezumia bairdii	368												**368**		
Lycodes sp.	14												**14**		
Mallotus villosus										242	50		**242**	**50**	
Limanda ferruginea							1270	125	100	343	57		**1613**	**182**	**100**
Melanogrammus aeglefinus	2	2	2							59	25		**61**	**27**	**2**
Urophycis tenuis	1									1055	130		**1056**	**130**	
Merluccius bilinearis										28	28		**28**	**28**	
Coryphaenoides rupestris	236	93		106	25	25							**342**	**118**	**25**
Antimora rostrata	35						85						**120**		
Total	**53804**	**12918**	**4293**	**20635**	**3631**	**1032**	**15953**	**3059**	**767**	**18411**	**3132**	**1142**	**108803**	**22740**	**7234**

L - length measuremets.
B - analysis for feeding and maturity.
A - age sample.

Table 5. Length composition of Greenland halibut (indiv.) in catches by Russian trawlers by months. Div. 3L and 3N, 2000.

Length, cm	3L							3N		
	I	II	III	IV	V	VII	Total	III	VII	Total
24	0	1	0	1	0	0	2	0	1	1
26	0	4	2	2	6	0	14	3	1	4
28	9	26	10	10	27	0	82	10	3	13
30	21	89	44	57	109	0	320	19	2	21
32	51	127	148	190	277	4	797	47	1	48
34	117	286	322	287	455	11	1478	78	2	80
36	279	573	626	474	661	33	2646	184	6	190
38	701	1189	1200	820	1047	85	5042	291	11	302
40	926	1339	1678	984	1152	149	6228	369	19	388
42	899	1210	1676	1017	1215	184	6201	306	29	335
44	645	826	1232	818	938	169	4628	227	33	260
46	402	525	761	531	630	140	2989	162	18	180
48	177	327	413	346	363	100	1726	79	19	98
50	109	187	209	173	186	54	918	71	16	87
52	54	121	124	105	136	41	581	55	6	61
54	31	106	70	60	76	25	368	53	7	60
56	13	83	55	47	59	18	275	43	6	49
58	12	58	41	41	49	20	221	36	2	38
60	11	49	35	18	20	14	147	27	0	27
62	12	22	23	24	21	9	111	28	0	28
64	3	26	18	15	11	7	80	10	0	10
66	3	15	18	11	4	5	56	15	0	15
68	2	15	14	6	7	6	50	12	0	12
70	2	4	11	3	6	3	29	15	0	15
72	0	8	3	5	1	3	20	5	0	5
74	0	2	2	3	6	1	14	10	0	10
76	1	7	3	3	4	2	20	6	0	6
78	1	6	4	3	4	0	18	8	0	8
80	0	1	3	3	3	1	11	7	0	7
82	0	1	3	4	4	1	13	2	0	2
84	1	2	1	3	3	1	11	9	0	9
86	0	1	0	3	2	0	6	2	0	2
88	0	2	0	0	0	0	2	2	0	2
90	0	1	0	0	0	0	1	0	0	0
92	0	0	3	1	0	1	5	3	0	3
94	0	0	1	0	0	2	3	2	0	2
Total	4482	7239	8753	6068	7482	1089	35113	2196	182	2378
Length, av. cm.	42,2	42,5	42,5	42,5	41,9	45,9	42,4	44,6	44,7	44,6

Table 6. Age composition of catches of Greenland halibut by Divisions in 2000, %.

Age	Division			
	3 L	3 M	3 N	3 LMN
3	1,69	0,64	2,06	1,57
4	7,39	2,95	6,73	6,76
5	31,18	19,78	28,01	29,47
6	40,51	36,81	34,90	39,69
7	13,46	21,42	13,29	14,52
8	3,05	9,34	5,63	4,05
9	1,32	4,32	3,45	1,84
10	0,50	1,48	1,43	0,68
11	0,37	1,18	1,26	0,53
12	0,19	0,85	0,97	0,32
13	0,13	0,62	0,71	0,23
14	0,11	0,35	0,67	0,17
15	0,04	0,09	0,34	0,06
16	0,03	0,10	0,21	0,05
17	0,01	0,03	0,13	0,02
18	0,01	0,02	0,13	0,02
19	0,01	0,02	0,08	0,02
Total	100.0	100.0	100.0	100.0

Table 7. Length composition of Greenland halibut (indiv.) in catches by Russian trawlers by months. Div. 3M, 2000.

Length, cm	Month									Total
	II	III	IV	V	VII	VIII	IX	X	XI	
28	0	0	1	2	2	0	0	0	0	5
30	0	1	9	3	4	0	0	0	0	17
32	4	12	13	3	4	0	0	0	0	36
34	12	17	26	7	15	0	0	0	0	77
36	42	55	50	10	44	1	0	0	0	202
38	102	116	77	17	85	3	2	0	4	406
40	168	196	117	32	143	4	3	6	7	676
42	218	236	125	43	231	13	7	19	6	898
44	185	189	87	45	192	17	4	35	17	771
46	142	118	45	29	196	52	12	34	22	650
48	106	84	17	30	144	71	9	42	18	521
50	92	52	11	21	106	59	13	23	12	389
52	70	25	6	16	99	46	16	20	1	299
54	46	19	6	13	66	39	9	11	7	216
56	42	25	0	12	33	27	5	8	4	156
58	30	15	1	6	41	15	3	9	3	123
60	22	15	0	3	24	3	1	4	1	73
62	16	12	1	0	11	4	1	1	0	46
64	14	9	1	2	11	1	0	0	0	38
66	5	4	0	1	11	2	0	4	0	27
68	13	9	0	0	8	0	0	1	0	31
70	7	3	0	1	6	0	0	0	1	18
72	9	5	0	0	10	0	0	0	0	24
74	6	5	1	0	8	0	0	0	0	20
76	4	4	0	0	1	0	0	0	0	9
78	9	4	1	0	2	0	0	0	0	16
80	2	0	0	0	0	0	0	0	0	2
82	2	1	0	0	2	0	0	0	0	5
84	0	2	0	0	0	0	0	0	0	2
86	1	0	0	0	2	0	0	0	0	3
88	0	0	0	0	3	0	0	0	0	3
90	0	0	0	0	2	0	0	0	0	2
92	1	0	0	0	0	0	0	0	0	1
Total	1370	1233	595	296	1506	357	85	217	103	5762
Length, av., cm	47,1	45,1	41,7	45,7	47,3	50,5	49,7	49,1	47,9	46,4

Table 8. Length composition (indiv.) of Roughhead Grenadier in catches by Russian trawlers by months and Divisions in 2000.

Length, cm	3L							3M				3N	Total
	I	II	III	IV	V	VII	Total	IV	V	VII	Total	III	3LMN
18	0	0	0	0	5	0	5	0	0	0	0	0	5
21	0	0	0	1	4	0	5	0	0	0	0	0	5
24	0	3	4	5	20	2	34	0	0	0	0	0	34
27	0	12	22	58	22	0	114	0	4	2	6	1	121
30	6	46	103	201	50	1	407	3	21	0	24	14	445
33	9	86	245	316	90	4	750	11	25	0	36	34	820
36	16	183	373	416	161	2	1151	11	44	2	57	49	1257
39	23	142	354	411	129	9	1068	12	50	1	63	38	1169
42	24	156	401	347	98	10	1036	11	33	3	47	57	1140
45	12	114	338	257	131	6	858	21	33	14	68	40	966
48	6	74	256	135	85	8	564	5	34	4	43	15	622
51	2	36	171	100	52	3	364	2	20	2	24	9	397
54	0	15	102	48	44	2	211	1	23	0	24	3	238
57	1	8	62	38	29	2	140	0	10	1	11	5	156
60	1	8	46	28	33	1	117	0	7	0	7	5	129
63	0	6	41	23	36	0	106	0	3	0	3	3	112
66	0	6	34	10	33	0	83	0	4	4	8	1	92
69	0	3	30	9	26	0	68	0	2	0	2	2	72
72	0	3	35	6	11	0	55	0	0	0	0	2	57
75	0	3	25	6	14	0	48	0	0	0	0	0	48
78	0	4	20	9	8	0	41	0	0	0	0	0	41
81	0	3	17	9	3	0	32	0	0	0	0	0	32
84	0	2	16	9	4	0	31	0	0	0	0	0	31
87	0	2	4	7	3	0	16	0	0	0	0	0	16
90	0	1	4	3	0	0	8	0	0	0	0	0	8
93	0	0	4	0	0	0	4	0	0	0	0	0	4
96	0	1	0	2	0	0	3	0	0	0	0	0	3
99	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	100	917	2707	2455	1091	50	7320	77	313	33	423	278	8021
Length, av., cm	40.9	42.5	45.6	41.9	45.8	43.8	43.9	41.5	43.9	47.4	43.8	42.2	43.8

Table 9. Length composition (indiv.) of Redfish in catches by Russian trawlers by divisions in 2000.

Length, cm	Division			
	3L	**3M**	**3N**	**3O**
14	0	2	0	1
15	0	2	0	3
16	0	3	1	7
17	0	1	1	7
18	0	2	4	17
19	0	10	17	30
20	7	32	19	88
21	9	76	40	286
22	26	123	107	628
23	44	202	194	1215
24	106	250	256	1644
25	209	412	299	1934
26	331	1213	313	1801
27	551	2494	480	1392
28	801	2937	791	1041
29	943	2321	1313	930
30	970	1247	1712	831
31	676	773	1489	575
32	469	460	1240	521
33	294	321	779	409
34	275	291	707	299
35	192	278	472	256
36	131	209	207	214
37	76	149	100	178
38	49	144	37	161
39	45	99	28	126
40	27	42	21	115
41	14	36	6	103
42	14	19	6	50
43	19	6	2	34
44	10	7	1	22
45	10	4	0	17
46	3	3	0	4
47	2	0	0	0
48	1	0	0	0
Total	6304	14168	10642	14939
Length, av., cm	30.0	28.8	30.3	27.5

Table 10. Age composition of catches of Redfish by divisions in 2000, %

Age	Division		
	3 L	3 M	3 N
3	0	+	0
4	0	0.1	0
5	0	0.6	0.2
6	0.9	2.1	0.5
7	7.0	7.4	7.5
8	11.8	22.4	7.3
9	19.6	20.7	11.3
10	25.0	19.1	24.1
11	15.2	10.8	17.9
12	7.8	5.1	13.7
13	3.7	4.0	8.4
14	3.4	2.8	5.6
15	3.4	2.4	2.6
16	0.5	1.1	0.5
17	0.9	0.9	0.3
18	0.5	0.1	0.1
19	0.5	0.1	+
20	0.1	0.1	0
21	0	+	0
22	0	+	0
Total	100.0	100.0	100.0

Table 11. Length composition (indiv.) of American plaice in catches by Russian trawlers by months and Divisions in 2000.

Length,	3L						3N			3O				Total
cm	I	II	III	IV	V	Total	III	VI	Total	III	V	VI	Total	3LNO
20	0	0	0	0	0	0	0	2	2	0	0	0	0	2
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	1	4	0	3	1	9	4	1	5	2	0	0	2	16
26	3	18	8	11	3	43	7	2	9	8	0	0	8	60
28	6	36	18	30	10	100	16	2	18	13	1	0	14	132
30	8	58	33	53	27	179	37	10	47	16	8	0	24	250
32	11	91	45	50	36	233	26	25	51	44	28	14	86	370
34	14	101	59	43	50	267	38	12	50	54	41	54	149	466
36	7	116	36	17	33	209	41	6	47	39	33	80	152	408
38	3	91	55	18	41	208	41	9	50	18	39	40	97	355
40	3	57	37	21	29	147	35	17	52	3	56	33	92	291
42	5	28	24	24	18	99	33	11	44	2	48	16	66	209
44	0	22	11	21	11	65	20	9	29	5	40	6	51	145
46	0	10	9	4	9	32	6	8	14	2	28	3	33	79
48	0	3	3	5	2	13	4	6	10	13	24	4	41	64
50	0	0	0	3	2	5	2	0	2	5	9	0	14	21
52	0	0	1	0	1	2	1	0	1	6	5	2	13	16
54	0	0	0	0	0	0	0	0	0	5	8	2	15	15
56	0	0	0	0	0	0	0	0	0	2	6	2	10	10
58	0	0	0	0	0	0	0	0	0	0	7	3	10	10
60	0	0	0	0	0	0	0	0	0	0	3	1	4	4
62	0	0	0	0	0	0	0	0	0	0	0	3	3	3
64	0	0	0	0	0	0	0	0	0	0	1	1	2	2
66	0	0	0	0	0	0	0	0	0	0	0	1	1	1
68	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total	61	635	339	303	273	1611	311	120	431	237	385	266	888	2930
Length Av.,cm	33.8	35.6	36.2	35.2	36.6	35.8	36.8	37.3	37.0	36.5	41.6	39.0	39.4	37.0

Table 12. Length composition (indiv.) of Witch Flounder in catches by Russian trawlers by months and Divisions in 2000.

Length, cm	3L					3N	Total
	II	III	IV	V	Total	III	3LN
26	0	1	2	0	3	0	3
28	1	0	13	0	14	4	18
30	1	1	33	0	35	5	40
32	5	0	47	4	56	11	67
34	5	7	62	9	83	28	111
36	7	8	96	14	125	33	158
38	8	8	79	11	106	43	149
40	4	4	62	9	79	35	114
42	4	6	60	7	77	21	98
44	1	5	51	2	59	11	70
46	2	3	33	1	39	5	44
48	1	2	16	3	22	5	27
50	0	1	4	2	7	1	8
52	0	0	1	1	2	0	2
54	0	0	0	0	0	0	0
56	0	1	0	0	1	0	1
Total	39	47	559	63	708	202	910
Length, av.cm	37.7	40.0	38.5	39.3	38.7	38.5	38.6

Table 13. Length composition (indiv.) of Yellowtail Flounder in catches by Russian trawlers by months and Divisions in 2000.

Length, cm	3N	3O			Total
	VI	V	VI	Total	3NO
22	3	0	6	6	9
24	13	0	13	13	26
26	79	0	23	23	102
28	202	0	47	47	249
30	327	2	72	74	401
32	316	0	71	71	387
34	188	3	50	53	241
36	74	1	38	39	113
38	31	1	16	17	48
40	20	0	0	0	20
42	12	0	0	0	12
44	5	0	0	0	5
Total	1270	7	336	343	1613
Length, av.cm	31.8	34.0	31.7	31.7	31.8

Table 14 . Length composition of C?d (indiv.) in catches by Russian trawlers. Divisions 3LO, 2000.

Length, cm	3L		3O	
	Number	%	Number	%
33	0	0	2	0.7
36	3	1.0	14	5.2
39	11	3.6	18	6.7
42	17	5.6	71	26.6
45	20	6.6	92	34.5
48	17	5.6	26	9.7
51	22	7.2	12	4.5
54	56	18.4	5	1.9
57	36	11.8	3	1.1
60	37	12.2	1	0.4
63	31	10.2	3	1.1
66	17	5.6	3	1.1
69	12	3.9	4	1.5
72	12	3.9	2	0.7
75	4	1.3	2	0.7
78	3	1.0	1	0.4
81	2	0.7	2	0.7
84	2	0.7	0	0.0
87	1	0.3	0	0.0
90	0	0.0	1	0.4
93	1	0.3	1	0.4
96	0	0	0	0.0
99	0	0	1	0.4
102	0	0	1	0.4
105	0	0	0	0.0
108	0	0	0	0.0
111	0	0	0	0.0
114	0	0	1	0.4
138	0	0	1	0.4
Total	304	100.0	267	100.0
Length av.,cm	57.6		48.2	

Table 15. Age composition of catches (indiv.) of Cod (*Gadus morhua* L.) by divisions, 2000.

Age	Division					
	3L			3O		
	Number	%	Weight ,g	Number	%	Weight ,g
3	29	9.5	621.0	33	14.0	675.0
4	31	10.2	804.8	134	57.3	734.0
5	109	35.8	1467.4	51	21.9	778.9
6	79	25.8	1974.7	8	3.4	2275.0
7	30	10.0	3074.7	5	2.1	3050.0
8	24	7.7	3826.0	0	0.0	0.0
9	3	1.0	6223.3	2	0.9	5600.0
10	0	0.0	0.0	1	0.4	11500.0
Total	304	100.0		234	100.0	

Table 16. Length composition (indiv.) of Red hake in catches by Russian trawlers by months and Divisions in 2000.

Length,	3L						3M	Total
cm	I	II	III	IV	V	Total	VII	3LM
24	0	0	0	0	2	2	0	2
27	1	1	5	2	13	22	0	22
30	4	20	9	21	28	82	1	83
33	6	42	17	27	77	169	4	173
36	6	95	27	61	79	268	4	272
39	8	80	31	27	34	180	4	184
42	3	60	8	14	16	101	3	104
45	0	15	1	0	7	23	0	23
48	0	5	0	0	4	9	0	9
51	0	0	0	0	1	1	0	1
Total	28	318	98	152	261	857	16	873
Length av.,cm	36.9	38.7	37.1	36.7	36.1	37.3	37.3	37.3

Table 17. Length composition (indiv.) of White hake in catches by Russian trawlers by months and Divisions in 2000.

Length,	3L	3O			Total
cm	II	V	VI	Total	3LO
18	0	1	0	1	1
21	0	12	0	12	12
24	0	92	0	92	92
27	0	131	5	136	136
30	0	32	5	37	37
33	0	8	15	23	23
36	0	13	41	54	54
39	0	25	84	109	109
42	0	19	112	131	131
45	0	13	129	142	142
48	1	5	92	97	98
51	0	5	78	83	83
54	0	3	41	44	44
57	0	1	22	23	23
60	0	1	22	23	23
63	0	1	20	21	21
66	0	0	14	14	14
69	0	0	7	7	7
72	0	0	3	3	3
75	0	0	2	2	2
78	0	0	1	1	1
Total	1	362	693	1055	1056
Length av.,cm	48.0	31.1	47.7	42.0	42.0

Table 18. Length composition (indiv.) of Thorny Skate in catches by Russian trawlers by months and Divisions in 2000.

Length, cm	3L					3M	3N				3O	Total 3LMNO
	II	III	IV	V	Total	III	III	VI	VII	Total	VI	
27	0	0	0	0	0	0	0	1	0	1	0	1
30	0	0	0	1	1	0	0	2	1	3	4	8
33	2	1	1	3	7	0	0	5	2	7	10	24
36	5	5	1	14	25	0	0	13	6	19	23	67
39	10	9	7	21	47	0	0	27	11	38	31	116
42	12	21	4	35	72	0	4	44	22	70	61	203
45	10	19	8	42	79	0	7	46	7	60	67	206
48	3	12	12	30	57	0	0	43	14	57	47	161
51	4	16	5	22	47	0	6	41	11	58	61	166
54	2	19	5	26	52	0	7	34	20	61	50	163
57	1	11	3	15	30	0	4	59	15	78	37	145
60	1	10	2	12	25	0	8	42	16	66	34	125
63	2	7	2	11	22	0	2	23	9	34	31	87
66	2	9	3	9	23	1	4	18	8	30	19	73
69	2	6	1	10	19	1	3	16	4	23	13	56
72	0	1	1	5	7	0	0	16	5	21	20	48
75	0	3	1	5	9	0	0	9	2	11	23	43
78	0	0	0	1	1	0	1	12	1	14	26	41
81	0	0	0	0	0	0	0	3	0	3	20	23
84	0	0	0	0	0	0	0	1	0	1	13	14
Total	56	149	56	262	523	2	46	455	154	655	590	1770
Length, av.cm	46.5	52.6	51.1	51.2	51.1	68.5	56.4	54.6	53.5	54.5	55.7	53.9

Table 19. Length composition (indiv.) of Black Dogfish in catches by Russian trawlers by months and Divisions in 2000.

Length, cm	3L						3M			3N	Total 3LMN
	I	II	III	IV	V	Total	II	III	Total	III	
30	1	0	0	0	0	1	0	0	0	0	1
33	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0
45	2	2	0	2	0	6	0	0	0	0	6
48	0	0	1	4	0	5	0	0	0	0	5
51	0	1	1	11	0	13	0	0	0	0	13
54	0	5	5	9	1	20	0	0	0	0	20
57	3	2	3	11	4	23	0	0	0	0	23
60	6	9	4	6	10	35	0	0	0	0	35
63	5	4	6	25	17	57	1	0	1	0	58
66	1	6	7	23	12	49	3	0	3	2	54
69	0	4	7	7	1	19	0	1	1	2	22
72	0	0	2	4	1	7	0	0	0	1	8
75	0	0	3	5	0	8	0	0	0	0	8
78	0	0	1	2	0	3	0	0	0	0	3
81	0	0	0	0	1	1	0	0	0	0	1
84	0	0	0	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0
90	0	0	1	0	0	1	0	0	0	0	1
93	0	0	0	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0	0	0	0	0
111	1	0	0	0	0	1	0	0	0	0	1
Total	19	33	41	109	47	249	4	1	5	5	259
Length av.,cm	61.8	61.3	65.7	62.4	64.0	63.1	66.3	70.0	67.0	69.6	63.2