Northwest Atlantic Fisheries Organization

Serial No. N4221 **NAFO SCS Doc 00/9**

SCIENTIFIC COUNCIL MEETING – JUNE 2000

RUSSIAN RESEARCH REPORT FOR 1999

PART I. – Research Carried out by AtlantNIRO in NAFO Subarea 4

by

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1) Fishery State

In 1999 no Russian vessel carried out fishery in the Scotian Shelf area in spite of sufficiently satisfactory state of the silver hake stock as evidenced by AtlantNIRO data. In 2001, this species abundance is likely to retain at least at the average level since according to AtlantNIRO data the conditions of 1997-1999 strong year-classes formation, which will constitute the basis of the fishery, have been rather favorable.

2) Special Research

a) Environmental Research

In 1999 the monitoring of the sea-surface temperature (SST) and water masses boundaries location at the surface was continued. As before, the average monthly SST values in selected cross-points of 5-degree trapeziums were used in the areas of Labrador, Newfoundland, Scotian Shelf and adjacent open sea areas, and average monthly indices of water masses boundaries location at the surface in Labrador Current and Gulf Stream systems.

The analysis of average monthly SST deviation from the average values for 1977-99 showed that in 1999,like in 1998, the temperature in the areas adjacent to Labrador was above the long-term average. In the area of Grand Bank at the eastern and southeastern slopes SST also exceeded the long-term average level during all months in 1999. The recent trend towards SST increase in the eastern Bank area has started in 1996. It was broken only in 1997 at the Bank eastern slope when the negative SST deviations were observed for 8 months with a peak value (-1.5°C) in July.

In the Scotian Shelf area the average annual sea-surface temperature in1995-98 was close to that in 1977-96, while in 1999 it increased considerably. In the eastern shelf area a positive deviation exceeded 2° during May-September, while in June and July the maximum values were 3.5° and 2.7°, respectively. At the shelf slopes (62-63°W) the positive deviation amounted to 2.2°, 3.7° and 2.7° in May, June and July, respectively. Therefore, it may be assumed that in 1999 favorable conditions occurred in silver hake spawning grounds and prerequisites appeared for a strong year-class formation.

In 1999 an attempt was made to present SST inter-annual and seasonal variability for 1977-99 and indices of water masses boundaries location in Northwest Atlantic for 1962-99 in the form of diagram with years along Y-axes and months along X-axes where deviations of average monthly SST values and indices of

water masses boundaries were plotted against the year-month cross points. The examples of such presentation are shown in Fig. 1-3. We assume this shape of plots to be very usefully in assessment of environment conditions during any of considered years, seasons and months. It provides the possibility to assess these conditions at any stage of a fishing object's life cycle simultaneously during a period chosen. As seen in Fig. 1, 2 stable periods occurred in SST inter-annual variability when SST decrease or increase took place during several years, while these processes covered the whole year or the most part of the year. Similar diagrams were fitted for 11 cross-points of 5-degree trapeziums, covering the areas of Labrador, Newfoundland and Nova Scotia Shelf with adjacent open sea areas. Analysis of these diagrams showed that in the Labrador Current system SST fluctuations periodicity was close to 11-year cycle, while as shifting southwestwards the fluctuations with 2-4 year periodicity starts to prevail. It is probable that the recurrence with the period of about 22 years exists in localization of 3 main water masses at the surface (Cool Shelf water, Slope water and the northern edge of Gulf Stream Front) for the latest 38 years. It is evident, for example, with the change of the sign of these boundary localization indices from the long-term average values for 25-30 year period, namely during 1979-1981. This is a preliminary assumption requiring further verification. It is illustrated with Fig. 3, where the inter-annual fluctuations of the Gulf Stream Front northern edge are shown.

This report presents only some results of oceanological research in the Northwest Atlantic. They are scheduled to be submitted in more details at the September session of NAFO in the form of SCR Document.

b) **Biological Research**

An attempt was made to apply non-parametric approach by Rivard (1998) to the analysis of silver hake stock dynamics in the period 1962-1996 inclusive, as well as to get an idea of this stock state trends during earlier period starting from 1920s. For this purpose, the information on sea-surface and air temperature during respective period in the Scotian area was used (Drinkwater *et al*., 1999). The detailed description of research fulfilled and the results obtained is presented in the NAFO SCR Document submitted to the Scientific Council Meeting.

Under the program elaborated by ICES, AtlantNIRO for the first time were made calculations for the illustrative purposes, which allowed to estimate some limiting reference points of the precautionary approach to silver hake fishery management. The data required in calculations were taken from Canadian scientific document (Showell, 1998). The main results are presented in the form of a figure, which shows that the spawning biomass apparently exceeded B_{pa} limit in 1995-97, while fishing mortality rate was significantly lower than F_{pa}. This implies that during the above-mentioned years, stock of hake was within a safe zone. Therefore, from the precautionary approach point of view, no reduction of fishing mortality rate below F_{pa} level was required.

3. References

DRINKWATER, K. F., E. COLBOURNE, and D. GILBERT. 1999. Overview of environmental conditions in the Northwest Atlantic in 1997. *NAFO Sci. Coun. Studies*, **32**: 75-121.

RIVARD, D. MS 1998. Elements of a non-parametric precautionary framework. *NAFO SCR Doc.*, No. 11, Serial No. N2986, 15 p.

SHOWELL, M. A. MS 1998. Assessment of the Scotian Shelf silver hake population in 1997, with projection of yield to 1999. *DFO Can. Stock Assess. Sec. Res. Doc*., No. 141, 44 p.

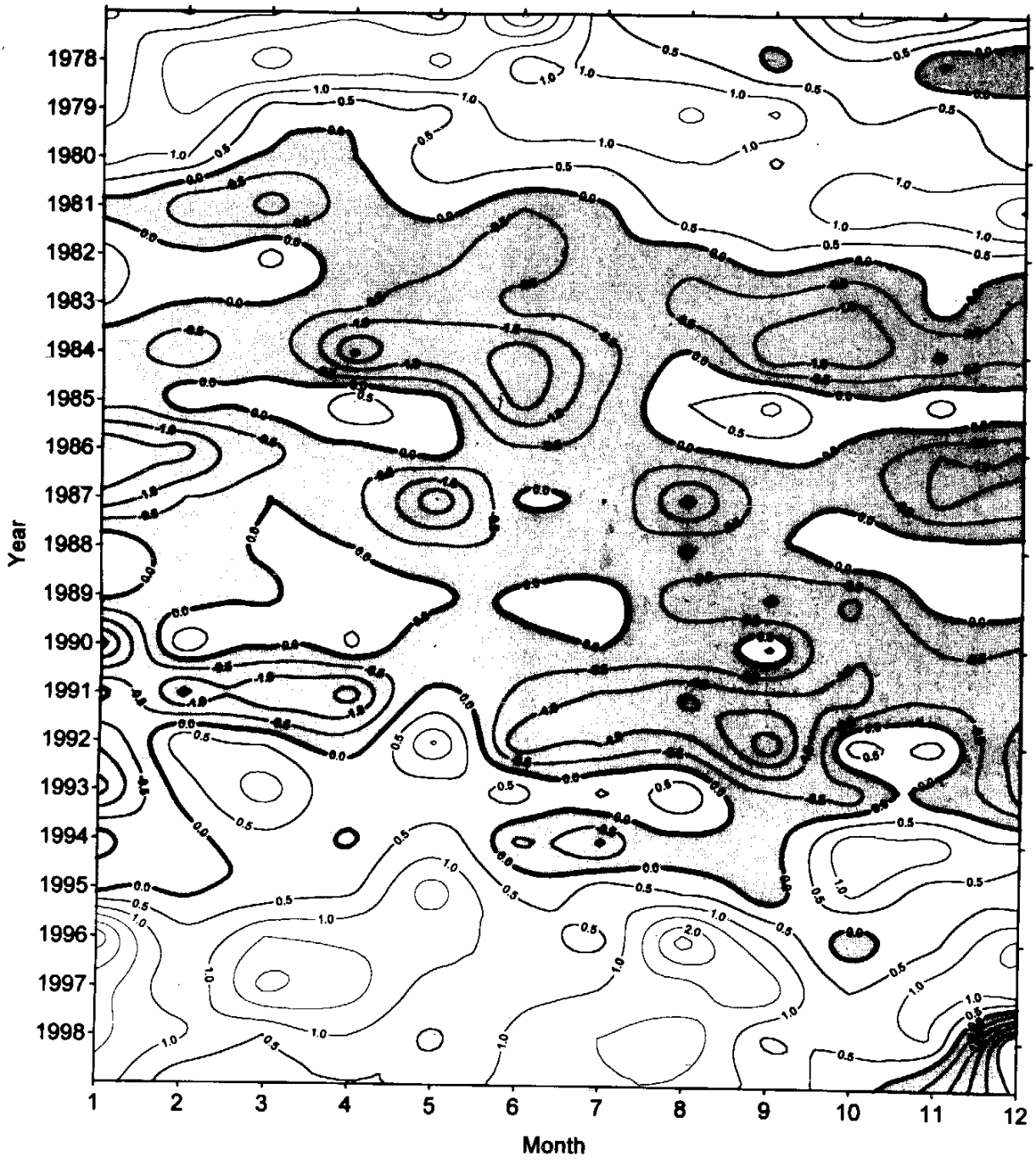

Fig. 1. Inter-annual and seasonal SST fluctuations in the western part of Labrador Sea (55°N, 50°W) in average values deviations from average long-term values for 1977-96.

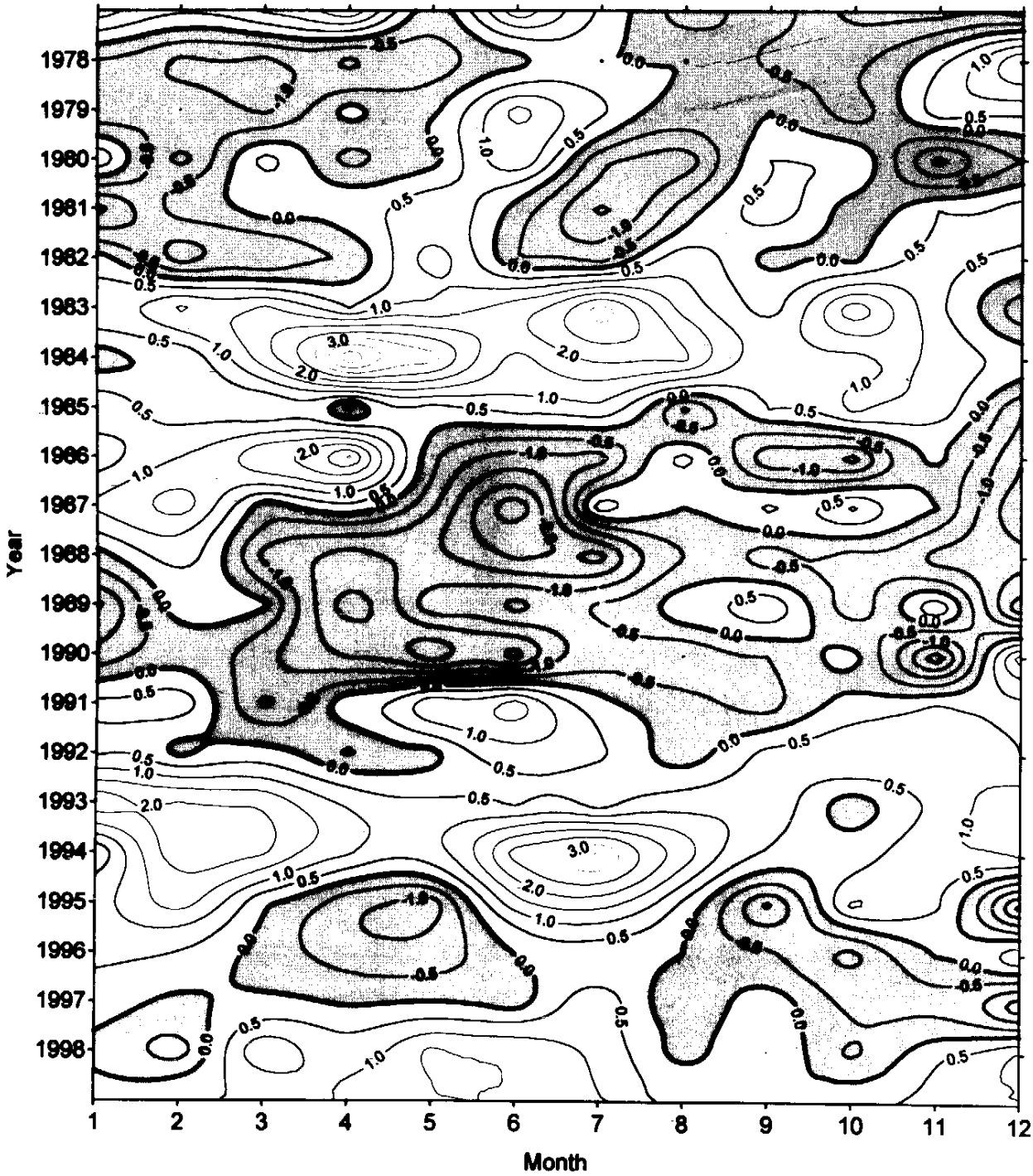

Fig. 2. Inter-annual and seasonal SST fluctuations at the Scotian Shelf Slope (42°30'N, 62°30'W).

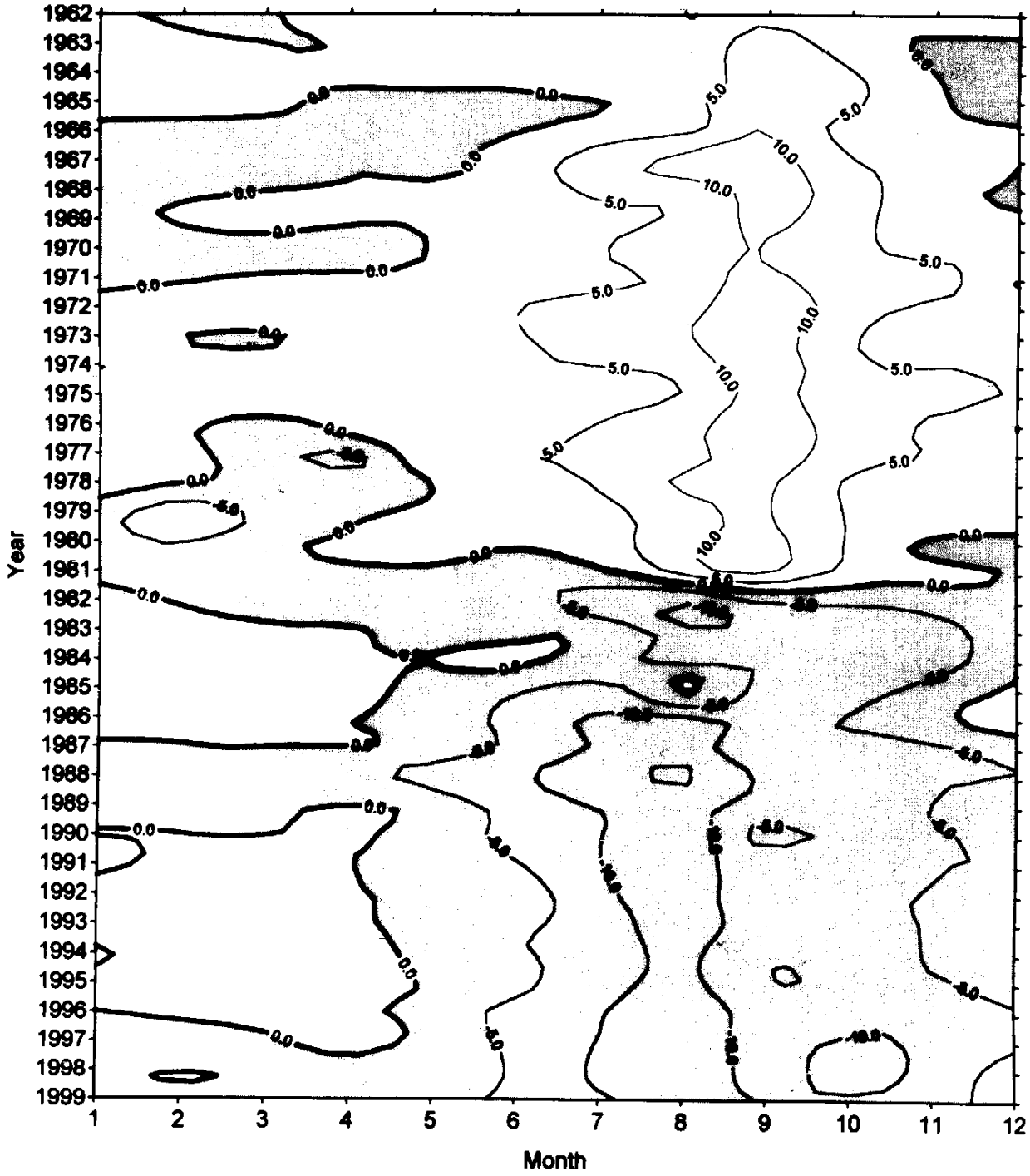

Fig. 3. Inter-annual and seasonal SST fluctuations in the northern edge of Gulf Stream Front between 50°W and 65°W in deviation of average monthly indices of front localization from their average long-term values for 1962-1992(96). (Positive values – the front shifts northwards; negative values – the front shifts southwards in tens miles.)

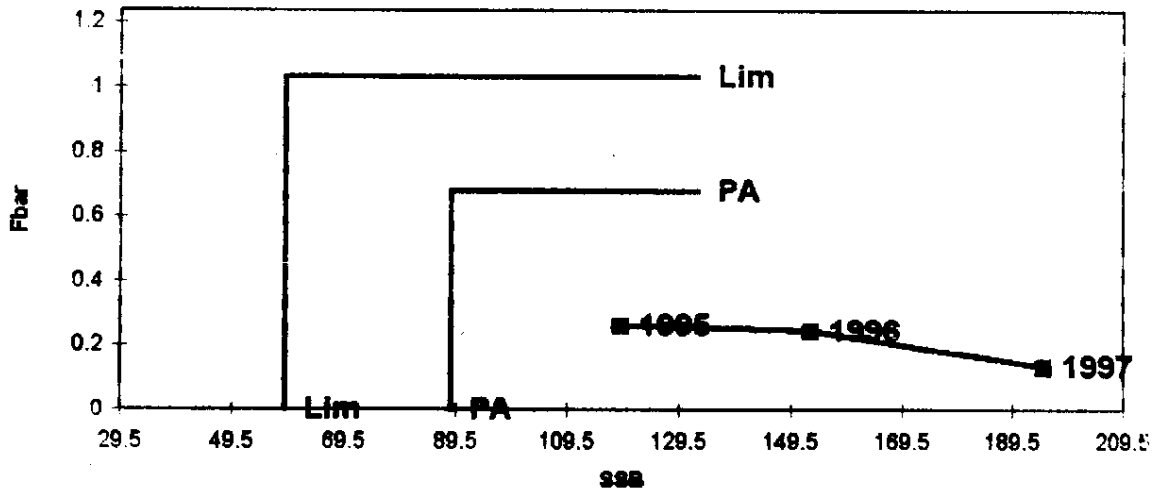

Fig. 4. Plot of limiting reference points of the precautionary approach to silver hake fishery management in the Scotian Shelf area.

PART II. – Report of PINRO Research in the NAFO Areas in 1999

by

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SUBAREA 1

A. Status of Fisheires

Greenland halibut. In 1999, Russian quota for Greenland halibut in the West Greenland area was 650 tons. 2 vessels, one of SRTMK-type and another of PST-type, fished for Greenland halibut in September and October. The vessels operated in a limited area of Div.1D. Fishing depth was 900-1500 m, average daily catch being 7.0 tons.

By provisional data, Greenland halibut catch taken by Russian vessels in the area made up 552 tons (Table 1). National trawl fishery quota was 100% utilized. In 1999 Russia did not conduct longline fishery off the West Greenland.

Other species. No directed fishery for other species was conducted. By-catch of roughhead grenadier and other species caught during the directed fishery for Greenland halibut did not exceed 2%.

B. Special Research Studies

No special environmental or hydrographic observations or research studies were performed.

No survey for assessment of Greenland halibut stock was conducted. Biological material was collected by a Russian observer - specialist from PINRO - in Div.1D during the fishing period. Greenland halibut was the main study object.

Greenland halibut. Greenland halibut were registered in all catches at 900-1500 m depth in Div. 1D. Fish length ranged from 26 to 104 cm, mean length being 48.0 cm (Table 2). Length frequencies for Greenland halibut were similar in September and October. Fish 44-48 cm long at age 6-8 made up the bulk of catches (Table 3).

SUBAREA 3

A. Status of Fisheries

Greenland halibut. In 1999, Russian quota for Greenland halibut in Div. 3LMNO was 3117 tons. 2 vessels of SRTMK-type and one vessel of TSM-type fished for Greenland halibut from January to December. The vessels operated mostly in Div. 3LMN and for a short period in Div. 3O. Fishing depth was 700-1500 m, average daily catch constituted 6.5 tons.

By provisional data, Russian quota for Greenland halibut in Div. 3LMNO was fully utilized.

Redfish. In 1999, block quota for redfish allocated to Russia, Latvia, Lithuania and Estonia in Div.3M constituted 13850 tons. There was no directed Russian fishery for redfish on the Flemish Cape bank in 1999. According to provisional data, by-catch of redfish in Div. 3M amounted to 109 tons.

Other species. No directed fishery for other species was conducted. Data on by-catch of other species caught during directed fishery for Greenland halibut are given in Table 1.

B. Special Research Studies

No special environmental or hydrographic observations or research studies were performed.

No survey for assessment of Greenland halibut stock and other groundfish stocks was conducted. Biological data were collected in Div. 3LMNO by PINRO specialists working as observers onboard vessels. The observers identified species composition of all catches. The biological material collected is shown in Table 4. Greenland halibut was the main study object.

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

Greenland halibut. In Div. 3L, length of Greenland halibut ranged from 24 to 100 cm, mean length being 44.6 cm (Table 5). The bulk of catches was made up by fish 40-42 cm long at age 6-7 (Table 6). Length of Greenland halibut caught in Div. 3M varied from 30 to 92 cm (Table 7), with mean length of 46.0 cm. The bulk of catches was made up by specimens 42-44 cm long. By comparison with Div. 3LM, fish in Div. 3N were found to be smaller. Specimens 38-40 cm long (Table 8) at age 5-6 constituted the bulk of catches (Table 6).

Roughhead grenadier. Length of roughhead grenadier in catches taken in Div. 3L ranged from 21 to 99 cm (Table 9). In Div. 3MN, length varied from 24 to 84 cm. A decrease in mean length of fish from Div. 3L to Div. 3N was registered. Females were predominant in catches over the entire fishing area. The bulk of catches was made up by fish at age 6-8 (Table 10).

S.mentella. Length of fish caught in Div. 3L ranged from 20 to 48 cm (Table 11). In Div. 3MN, specimens from 19 to 47 cm long were caught. Mean length of males and females varied insignificantly in all Divisions. The bulk of catches taken in Div. 3L was made up by fish 28-29 cm long at age 9-10 (Table 12). The bulk of catches taken in Div. 3MN was constituted by fish 29-30 cm long. Male/female ratio was close to 1 over the entire fishing area.

Cod. Length of cod caught as by-catch in Div. 3N varied from 21 to 132 cm, mean length being 56.9 cm (Table 13). The bulk of catches taken in this area was made up by 3-year-olds (Table 16). In Div. 3O, cod length ranged from 24 to 87 cm, mean length was 41.4 cm (Table 14). Fish 30-36 cm long made up the bulk of catches. In Div. 3L the portion of cod in catches was negligible (Table 15).

American plaice. Investigations on this species were carried out mostly in Div. 3LN. Fish length in Div. 3L ranged from 22 to 58 cm, mean length being 37.0 cm. The bulk of catches was made up by fish 36-38 cm long (Table 17). American plaice caught in Div. 3N were 22-66 cm long.

Witch flounder. Length of fish caught in Div. 3L ranged from 16 to 56 cm, with mean length of 38-40 cm (Table 18). The bulk of catches was made up by specimens 38-40 cm long. In Div. 3M only a small amount of fish was examined. Length of witch flounder in Div. 3N varied from 26 to 60 cm, mean length being 39.7 cm.

Yellowtail flounder. Biological material was collected in Div. 3N only. Length of fish caught varied from 22 to 54 cm, mean length being 36.0 cm (Table 19). The bulk of catches was made up by specimens 34 cm long. Catches were dominated by females, male/female ratio was 1:5.

Red hake. Red hake occurred in catches in all Divisions. Length of examined fish in Div. 3L ranged from 24 to 54 cm, mean length was 38.5 cm (Table 20). The bulk of catches was made up by fish 36 cm long. Females were predominant in catches, male/female ratio being 1:2.6. In Div. 3MN only a small amount of fish was examined.

Thorny skate. Thorny skate occurred in catches in all Divisions. In Div. 3L an insignificant amount of this species was examined. In Div. 3M fish length varied from 24 to 81 cm, mean length being 53.0 cm (Table 21). Length of thorny skate in Div. 3N ranged from 21 to 87 cm, with mean length of 58.9 cm.

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

Table 1. .Preliminary data on catch taken by Russian trawlers in the NAFO Div. 3LMNO, 1999.

Species	Division	Catch, t
Greenland halibut	1D	552
	3LMNO	3117
	3L	1697
	3M	195
	3N	1214
	3O	11
Atlantic halibut	3LMNO	6
American plaice	3LMNO	157
Yellowtail flounder	3NO	99
Witch flounder	3LNO	103
	3M	4
Roughhead grenadier	1 D	10
	3LMNO	49
Redfish spp.	3M	109
	3LN	100
	3O	339
Skate	3LMNO	163
Atlantic cod	3NO	26
White hake	3NO	3

Table 2. Length composition of Greenland halibut (indiv.) in catches by Russian trawlers in Div. 1D, 1999.

Length, Cm	Month		Total
	IX	X	
26	1	0	1
28	0	0	0
30	1	0	1
32	3	0	3
34	11	3	14
36	45	7	52
38	107	32	139
40	222	76	298
42	352	182	534
44	417	242	659
46	527	285	812
48	448	287	735
50	368	195	563
52	222	170	392
54	102	74	176
56	62	47	109
58	33	27	60
60	15	10	25
62	15	10	25
64	9	7	16
66	8	4	12
68	5	7	12
70	8	5	13
72	5	6	11
74	2	6	8
76	6	8	14
78	8	3	11
80	4	1	5
82	5	5	10
84	2	2	4
86	1	2	3
88	7	4	11
90	2	3	5
92	1	1	2
94	4	2	6
96	1	0	1
98	1	0	1
100	0	0	0
102	0	0	0
104	0	1	1
Total	**3030**	**1714**	**4744**
Length aver., cm	**47.6**	**48.9**	**48.0**

Table 3. Age composition of catches (indiv.) of Greenland halibut in Div. 1D, 1999.

Age	Total	%	Weigth, g
4	12	0.3	300.0
5	155	3.3	469.4
6	1335	28.1	669.2
7	1282	27.0	887.8
8	958	20.2	1131.9
9	482	10.2	1336.5
10	211	4.4	1839.6
11	130	2.7	1888.6
12	53	1.1	2743.1
13	33	0.7	3239.1
14	20	0.4	4733.3
15	24	0.5	5490.0
16	29	0.6	7002.5
17	12	0.3	8822.2
18	4	0.1	9376.7
19	3	0.1	11515.0
Total	**4743**	**100.0**	

Table 4. Biological material gathered by observers, 1999

Species	Division 3L			Division 3M			Division 3N			Division 3O		
	L	B	A	L	B	A	L	B	A	L	B	A
Reihardtius hippoglossoides	42573	7463	1449	8672	1723	744	22380	5581	993	0	0	0
Sebastes mentella	1641	698	434	1098	375	251	4763	1014	613	317	122	0
Hippoglossoides platessoides	1856	260	0	54	0	0	1684	303	0	366	30	0
Glyptocephalus cynoglossus	929	431	161	40	0	0	1830	470	0	0	0	0
Pleuronectes ferruginea	0	0	0	0	0	0	1962	444	444	467	149	0
Macrourus berglax	3021	837	502	549	160	86	881	366	280	0	0	0
Anarhichas denticulatus	202	0	0	33	0	0	63	0	0	0	0	0
Gadus morhua	17	15	0	0	0	0	1922	918	773	776	336	279
Urophycis chuss	2192	604	0	102	102	0	59	55	0	0	0	0
Urophycis tenuis	0	0	0	0	0	0	0	0	0	751	0	0
Antimora rostrata	275	0	0	0	0	0	0	0	0	0	0	0
Raja radiata	136	0	0	696	0	0	493	0	0	35	0	0
Raja spinicauda	153	0	0	162	0	0	27	0	0	0	0	0
Raja hyperborea	227	0	0	5	0	0	29	0	0	0	0	0
Centroscyllium fabricii	185	0	0	17	0	0	9	0	0	0	0	0
Total	**53407**	**10308**	**2546**	**11428**	**2360**	**1081**	**36102**	**9151**	**3103**	**2712**	**637**	**279**

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. Div. L, 1999.

Length, cm	Month											Total
	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
24	0	0	0	0	5	0	0	0	0	0	0	5
26	5	4	0	0	10	2	0	0	0	2	0	23
28	31	17	4	0	15	11	0	1	1	2	0	82
30	81	53	22	0	16	53	0	12	3	10	0	250
32	214	156	76	1	45	144	14	32	19	35	0	736
34	564	425	190	5	87	238	47	58	47	103	5	1769
36	969	735	343	15	170	465	187	135	120	306	17	3462
38	1169	710	409	44	252	524	396	202	258	735	42	4741
40	1303	520	366	56	197	765	612	275	380	968	46	5488
42	1021	425	279	28	161	879	770	375	445	1151	52	5586
44	866	298	184	32	129	800	665	397	416	990	39	4816
46	592	183	134	27	95	707	596	381	345	851	37	3948
48	465	149	90	29	86	506	442	279	262	581	26	2915
50	348	98	63	16	70	430	370	202	215	396	13	2221
52	249	67	49	10	54	309	320	166	156	280	7	1667
54	208	60	43	15	57	210	232	104	108	201	3	1241
56	139	54	37	13	37	149	197	87	93	166	5	977
58	106	38	22	3	27	100	147	48	68	95	1	655
60	71	23	19	9	19	75	84	31	43	108	4	486
62	51	14	9	4	15	48	52	28	38	71	5	335
64	37	11	5	0	14	25	44	18	21	42	4	221
66	19	4	4	1	12	14	34	9	16	41	4	158
68	26	4	3	1	7	14	23	7	22	31	2	140
70	21	2	1	1	4	5	20	7	12	24	4	101
72	18	1	4	0	5	2	25	3	8	21	0	87
74	16	0	3	2	1	1	23	1	10	27	1	85
76	16	1	4	2	3	4	22	1	10	20	1	84
78	9	2	4	0	5	0	13	1	12	25	0	71
80	14	0	0	1	2	0	14	2	5	14	0	52
82	12	0	2	0	6	2	8	1	6	19	3	59
84	15	0	1	1	3	0	3	1	1	10	0	35
86	5	0	1	2	2	3	9	0	3	4	0	29
88	2	1	1	1	2	2	4	4	1	2	0	20
90	4	0	1	0	2	0	3	0	2	2	0	14
92	1	0	0	0	0	0	1	0	1	1	0	4
94	2	0	1	0	0	0	1	0	0	0	0	4
96	2	0	0	0	0	0	1	0	0	0	0	3
98	0	0	1	0	0	0	0	0	0	1	0	2
100	0	0	0	0	0	0	0	0	0	1	0	1
Total	**8671**	**4055**	**2375**	**319**	**1615**	**6487**	**5379**	**2868**	**3147**	**7336**	**321**	**42573**
Length av.,cm	**43.2**	**40.8**	**41.8**	**46.3**	**44.0**	**44.6**	**47.4**	**46.0**	**46.7**	**45.9**	**45.6**	**44.6**

Table 6. Age composition of catches (indiv.) of Greenland halibut by Divisions, 1999.

	Division								
	3 L			3 M			3 N		
Age	Number	%	Weigth,g	Number	%	Weigth,g	Number	%	Weigth,g
2	5	+	145.0	0	+	145.0	8	+	145.0
3	256	0.6	176.4	10	0.1	176.4	326	1.5	176.4
4	1909	4.5	253.7	195	2.3	253.7	1665	7.4	253.7
5	8036	18.9	389.2	1244	14.3	389.2	5223	23.3	389.2
6	12592	29.6	606.5	2556	29.5	606.5	6416	28.7	606.5
7	9801	23.0	888.2	2291	26.4	888.2	4224	18.9	888.2
8	3603	8.5	1335.0	872	10.1	1335.0	1488	6.6	1335.0
9	3304	7.8	1409.2	785	9.1	1409.2	1353	6.0	1409.2
10	1295	3.0	2020.6	302	3.5	2020.6	597	2.7	2020.6
11	398	0.9	2534.8	93	1.1	2534.8	219	1.0	2534.8
12	594	1.4	2815.9	144	1.7	2815.9	349	1.6	2815.9
13	256	0.6	3482.9	64	0.7	3482.9	165	0.7	3482.9
14	250	0.6	4722.5	60	0.7	4722.5	183	0.8	4722.5
15	146	0.3	6196.5	32	0.4	6196.5	96	0.4	6196.5
16	81	0.2	7392.9	16	0.2	7392.9	48	0.2	7392.9
17	32	0.1	9089.1	6	0.1	9089.1	13	0.1	9089.1
18	15	+	11244.0	3	+	11244.0	7	+	11244.0
Total	**42573**	**100.0**		**8673**	**100.0**		**22380**	**100.0**	

Table 7. Length composition of Greenland halibut (indiv.) in catches by Russian trawlers. Div. M, 1999.

Length,	Month									Total
Cm	II	III	V	VI	VII	VIII	X	XI	XII	
30	0	2	0	0	0	1	0	1	0	4
32	5	5	3	0	4	5	1	10	3	36
34	22	26	10	2	12	24	3	48	18	165
36	53	60	25	9	26	60	12	130	57	432
38	111	72	44	16	24	120	29	273	98	787
40	166	58	49	26	43	173	42	407	119	1083
42	181	45	48	26	40	237	71	487	141	1276
44	189	29	55	26	38	203	68	401	127	1136
46	141	11	54	22	32	188	75	320	94	937
48	136	7	45	14	34	165	69	239	55	764
50	88	4	42	9	22	100	60	159	31	515
52	67	9	27	8	16	95	48	107	24	401
54	51	3	20	9	22	76	48	57	11	297
56	33	5	21	7	16	62	30	35	8	217
58	34	2	7	6	15	41	18	22	3	148
60	17	2	3	4	11	34	19	13	2	105
62	12	3	5	1	9	30	13	8	0	81
64	20	6	2	0	5	20	16	4	2	75
66	5	0	2	0	6	10	8	1	1	33
68	4	1	1	0	4	12	11	0	0	33
70	4	0	0	0	2	7	5	3	0	21
72	4	2	0	0	0	11	8	0	0	25
74	9	2	0	0	1	4	4	2	0	22
76	6	0	0	0	2	7	7	0	0	22
78	9	0	0	0	2	5	1	0	0	17
80	3	0	0	0	1	4	1	0	0	9
82	3	0	0	0	0	1	5	0	0	9
84	3	0	0	0	1	2	2	0	0	8
86	0	0	1	0	1	0	0	0	0	2
88	3	0	0	0	1	2	2	0	0	8
90	2	0	0	0	0	0	1	0	0	3
92	0	0	0	0	0	0	1	0	0	1
Total	**1381**	**354**	**464**	**185**	**390**	**1699**	**678**	**2727**	**794**	**8672**
Length av., cm	**47.0**	**41.7**	**46.0**	**45.6**	**48.0**	**47.5**	**50.6**	**44.3**	**43.4**	**46.0**

Table 8. Length composition of Greenland halibut (indiv.) in catches by Russian trawlers. Div. N, 1999.

Length, Cm	Month										Total
	II	III	IV	V	VII	VIII	IX	X	XI	XII	
22	0	0	1	0	3	0	1	0	0	0	5
24	0	0	1	1	5	0	6	1	0	0	14
26	0	1	6	8	7	4	11	1	0	1	39
28	0	5	24	40	11	9	17	4	2	1	113
30	0	7	63	149	35	27	57	23	9	3	373
32	0	17	150	315	51	58	148	61	32	5	837
34	1	52	331	638	65	127	223	73	55	13	1578
36	2	112	527	798	84	214	323	169	97	32	2358
38	17	154	638	907	80	243	408	220	144	59	2870
40	27	190	553	671	92	291	489	256	183	70	2822
42	20	152	449	552	80	304	445	248	219	69	2538
44	34	170	281	386	71	244	391	245	152	37	2011
46	24	118	198	264	75	221	316	199	172	28	1615
48	12	93	156	218	46	177	235	150	109	14	1210
50	15	90	84	135	34	150	166	109	82	7	872
52	16	76	56	95	22	115	146	62	71	8	667
54	9	47	45	77	17	103	106	58	33	2	497
56	6	19	38	77	11	92	82	44	34	1	404
58	5	23	29	35	12	100	77	30	19	0	330
60	0	13	17	24	14	57	52	33	6	1	217
62	3	16	19	21	7	44	53	19	8	0	190
64	8	7	13	14	5	35	44	16	8	0	150
66	3	11	19	12	1	34	33	12	12	0	137
68	3	8	3	7	2	25	29	14	3	1	95
70	2	3	9	3	2	21	20	7	6	1	74
72	1	4	2	2	3	31	15	12	8	1	79
74	0	4	2	5	1	18	18	7	6	0	61
76	2	2	1	5	2	10	17	6	4	0	49
78	1	4	3	3	0	17	8	4	3	0	43
80	1	6	1	2	2	19	7	2	2	0	42
82	0	5	1	1	0	6	7	7	3	0	30
84	1	1	1	1	0	11	6	5	0	0	26
86	0	1	0	1	0	7	1	3	1	0	14
88	0	0	0	1	0	6	4	0	0	0	11
90	0	0	1	0	0	1	0	0	0	0	2
92	0	0	0	0	0	3	1	1	0	0	5
94	0	0	0	0	0	0	1	0	0	0	1
96	0	0	0	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	1	0	0	1
Total	**213**	**1411**	**3722**	**5468**	**840**	**2824**	**3963**	**2102**	**1483**	**354**	**22380**
Length av.,cm	**48.5**	**45.2**	**41.2**	**40.6**	**42.3**	**47.2**	**44.8**	**45.1**	**45.0**	**41.8**	**43.4**

Table 9. Length composition of Roughhead grenadier (indiv.) in catches by Russian trawlers by Divisions, 1999.

Lenght, cm	Division								
	3 L			3 M			3 N		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
21	0	1	1	0	0	0	0	0	0
24	3	4	7	1	1	2	1	0	1
27	11	11	22	0	0	0	2	4	6
30	36	32	68	3	3	6	12	8	20
33	91	98	189	9	14	23	31	30	61
36	124	137	261	13	23	36	31	59	90
39	170	166	336	24	33	57	53	63	116
42	276	226	502	43	42	85	57	86	143
45	254	227	481	55	58	113	45	61	106
48	123	161	284	36	54	90	31	59	90
51	63	104	167	20	21	41	8	39	47
54	44	104	148	9	21	30	2	32	34
57	11	85	96	4	17	21	0	47	47
60	5	83	88	0	14	14	0	34	34
63	1	95	96	1	13	14	0	39	39
66	0	47	47	0	6	6	0	19	19
69	0	48	48	0	2	2	0	12	12
72	0	43	43	0	3	3	0	6	6
75	0	30	30	0	1	1	0	4	4
78	0	27	27	0	2	2	0	3	3
81	0	23	23	0	1	1	0	2	2
84	0	30	30	0	1	1	0	1	1
87	0	18	18	0	0	0	0	0	0
90	0	6	6	0	0	0	0	0	0
93	0	2	2	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0	0
99	0	1	1	0	0	0	0	0	0
Total	**1212**	**1809**	**3021**	**218**	**330**	**548**	**273**	**608**	**881**
Length av.,cm	**43.1**	**51.2**	**48.0**	**45.2**	**48.4**	**47.1**	**41.6**	**49.2**	**46.8**

Table 10. Age composition of catches (indiv.) of Roughhead grenadier by Divisions, 1999.

Age	Division								
	3 L			3 M			3 N		
	Number	%	Weigth,g	Number	%	Weigth,g	Number	%	Weigth,g
2	6	0.2	66.4	1	0.1	66.4	1	0.1	66.4
3	43	1.4	86.7	4	0.7	86.7	12	1.3	86.7
4	93	3.1	130.0	10	1.9	130.0	29	3.3	130.0
5	342	11.3	186.5	45	8.3	186.5	114	12.9	186.5
6	507	16.8	288.8	86	15.7	288.8	160	18.2	288.8
7	509	16.8	399.4	101	18.4	399.4	142	16.1	399.4
8	511	16.9	490.2	124	22.7	490.2	135	15.3	490.2
9	216	7.2	620.2	57	10.4	620.2	59	6.8	620.2
10	126	4.2	840.8	30	5.5	840.8	35	4.0	840.8
11	175	5.8	916.1	36	6.6	916.1	58	6.6	916.1
12	114	3.8	1062.9	21	3.8	1062.9	45	5.2	1062.9
13	84	2.8	1251.6	13	2.4	1251.6	34	3.9	1251.6
14	67	2.2	1517.5	8	1.4	1517.5	24	2.8	1517.5
15	52	1.7	1836.1	4	0.8	1836.1	14	1.6	1836.1
16	44	1.5	2361.4	3	0.5	2361.4	7	0.8	2361.4
17	23	0.8	2504.4	1	0.2	2504.4	3	0.4	2504.4
18	32	1.1	2894.6	2	0.3	2894.6	3	0.4	2894.6
19	25	0.8	3263.3	1	0.2	3263.3	2	0.2	3263.3
20	21	0.7	3665.6	1	0.1	3665.6	1	0.1	3665.6
21	14	0.5	3945.0	-	-	-	-	-	-
22	10	0.3	4417.3	-	-	-	-	-	-
23	4	0.1	4366.7	-	-	-	-	-	-
24	1	+	5110.0	-	-	-	-	-	-
Total	**3019**	**100.0**		**548**	**100.0**		**878**	**100.0**	

Table 11. Length composition (indiv.) of Redfish (*Sebastes mentella*) in catches by Russian trawlers by Divisions in 1999.

Lenght, cm	Division								
	3 L			3 M			3 N		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
19	0	0	0	1	2	3	1	0	1
20	1	0	1	4	2	6	2	1	3
21	0	0	0	1	2	3	3	2	5
22	1	1	2	2	0	2	5	4	9
23	2	3	5	1	2	3	6	6	12
24	4	3	7	3	2	5	16	14	30
25	22	23	45	12	10	22	29	27	56
26	36	30	66	19	9	28	65	46	111
27	74	79	153	22	22	44	132	129	261
28	92	89	181	47	38	85	215	198	413
29	93	93	186	61	55	116	323	299	622
30	88	72	160	69	69	138	327	315	642
31	57	74	131	46	51	97	263	276	539
32	64	56	120	38	45	83	196	228	424
33	54	57	111	58	55	113	184	204	388
34	61	63	124	48	53	101	154	209	363
35	53	61	114	47	57	104	95	189	284
36	32	50	82	28	37	65	68	113	181
37	19	21	40	16	25	41	46	74	120
38	14	12	26	9	11	20	30	41	71
39	12	6	18	2	2	4	34	29	63
40	7	6	13	1	2	3	36	29	65
41	9	4	13	1	3	4	18	26	44
42	8	2	10	1	1	2	11	14	25
43	8	3	11	2	1	3	4	11	15
44	3	8	11	0	1	1	2	6	8
45	1	1	2	1	0	1	0	6	6
46	5	2	7	0	0	0	0	0	0
47	0	0	0	0	1	1	0	2	2
48	0	2	2	0	0	0	0	0	0
Total	**820**	**821**	**1641**	**540**	**558**	**1098**	**2265**	**2498**	**4763**
Length av.,cm	**31.3**	**31.3**	**31.3**	**31.3**	**31.9**	**31.6**	**31.1**	**31.8**	**31.5**

Table 12. Age composition of catches (indiv.) of Redfish (*Sebastes mentella*) by Divisions, 1999.

Age	Division								
	3 L			3 M			3 N		
	Number	%	Weigth,g	Number	%	Weigth,g	Number	%	Weigth,g
5	-	-	-	3	0.3	100.0	2	+	100.0
6	7	0.4	142.0	3	0.3	125.0	23	0.5	139.2
7	74	4.5	198.4	9	0.8	181.0	84	1.8	195.9
8	223	13.6	238.7	56	5.2	212.7	336	7.1	228.3
9	272	16.6	294.1	197	18.3	278.1	866	18.2	286.0
10	276	16.8	365.7	205	19.1	328.4	1037	21.8	350.4
11	140	8.5	418.7	113	10.5	406.8	546	11.5	414.3
12	119	7.3	471.6	109	10.2	454.5	444	9.3	463.5
13	190	11.6	540.7	178	16.6	506.6	586	12.3	521.7
14	129	7.9	606.7	115	10.7	567.7	315	6.6	586.8
15	113	6.9	669.7	63	5.8	660.6	250	5.3	666.6
16	24	1.4	803.1	16	1.5	726.7	88	1.8	770.4
17	32	1.9	869.6	0	0.0	0.0	109	2.3	869.6
18	8	0.5	955.0	9	0.8	875.0	38	0.8	915.0
19	19	1.2	1073.0	-	-	-	24	0.5	1049.7
20	6	0.3	1160.0	-	-	-	4	0.1	1144.3
21	6	0.3	1236.3	-	-	-	-	-	-
22	1	0.1	1255.0	-	-	-	-	-	-
Total	**1639**	**100.0**		**1076**	**100.0**		**4752**	**100.0**	

Table 13. Length composition of Cod (indiv.) in catches by Russian trawlers. Div. 3N, 1999.

Length, cm	Month						Total
	IV	V	VIII	IX	X	XI	
21	-	-	-	-	1	-	1
24	-	-	-	-	2	-	2
27	-	-	-	3	10	-	13
30	-	-	10	21	34	-	71
33	-	-	7	32	177	6	227
36	1	1	4	10	276	11	313
39	0	0	0	8	208	21	223
42	3	2	0	1	81	7	89
45	5	4	0	4	21	1	35
48	7	11	0	2	7	0	27
51	6	18	0	2	9	0	35
54	9	38	0	5	7	1	60
57	13	51	0	7	12	0	83
60	7	30	0	4	35	8	84
63	4	24	2	5	37	6	78
66	4	11	0	2	38	8	63
69	2	5	3	1	46	2	59
72	0	4	4	1	34	5	48
75	0	-	0	-	32	3	35
78	0	-	0	-	27	2	29
81	0	-	1	-	20	3	24
84	-	-	3	-	18	0	22
87	-	-	0	-	27	0	27
90	-	-	0	-	19	1	20
93	-	-	0	-	24	0	24
96	-	-	1	-	28	0	29
99	-	-	0	-	39	0	39
102	-	-	0	-	37	0	37
105	-	-	1	-	32	0	33
108	-	-	0	-	26	0	26
111	-	-	1	-	18	0	19
114	-	-	0	-	15	1	16
117	-	-	1	-	10	-	11
120	-	-	1	-	6	-	7
123	-	-	0	-	4	-	4
126	-	-	2	-	4	-	6
129	-	-	-	-	1	-	1
132	-	-	-	-	2	-	2
Total	**62**	**199**	**41**	**108**	**1424**	**88**	**1922**
Length av.,cm	**55.9**	**58.2**	**60.3**	**41.4**	**58.2**	**51.6**	**56.9**

Table 14. Length composition of Cod (indiv.) in catches by Russian trawlers. Div. 3O, 1999.

Length, cm	Month V	VIII	IX	Total
24	-	-	3	3
27	9	-	10	19
30	23	1	104	128
33	32	6	206	244
36	8	3	126	137
39	2	3	42	47
42	2	2	7	11
45	2	0	5	7
48	1	1	10	12
51	0	2	5	7
54	0	1	7	8
57	1	2	12	15
60	1	4	25	30
63	0	3	34	37
66	0	2	24	26
69	0	-	21	21
72	1	-	9	10
75	-	-	4	4
78	-	-	5	5
81	-	-	4	4
84	-	-	0	0
87	-	-	1	1
Total	**82**	**30**	**664**	**776**
Length av.,cm	**34.8**	**48.4**	**41.9**	**41.4**

Table 15. Length composition of Cod (indiv.) in catches by Russian trawlers. Div. 3L, 1999.

Length, cm	Month II	IV	VII	IX	Total
48	-	-	1	1	2
51	-	2	-	0	2
54	2	0	-	0	2
57	1	2	-	0	3
60	0	1	-	1	2
63	2	0	-	-	2
66	1	0	-	-	1
69	-	2	-	-	2
72	-	0	-	-	0
75	-	0	-	-	0
78	-	1	-	-	1
Total	**6**	**8**	**1**	**2**	**17**
Length av.,cm	**60.8**	**62.2**	**49.0**	**55.5**	**60.2**

Table 16. Age composition of catches (indiv.) of Cod (*Gadus morhua* L.) by Divisions, 1999.

Age	Division					
	3N			3O		
	Number	%	Weigth,g	Number	%	Weigth,g
2	23	1.2	209.1	15	2.0	326.7
3	791	41.2	510.7	503	64.8	419.8
4	203	10.6	926.9	92	11.8	756.1
5	265	13.8	2156.5	85	10.9	2034.2
6	224	11.6	3105.0	61	7.9	2669.4
7	79	4.1	4806.6	14	1.8	3929.2
8	48	2.5	6003.7	3	0.4	5680.0
9	61	3.2	8749.8	4	0.5	5147.5
10	121	6.3	10747.3	-	-	-
11	28	1.5	12921.3	-	-	-
12	12	0.8	14958.6	-	-	-
13	6	0.3	13866.7	-	-	-
14	15	0.8	15825.0	-	-	-
15	14	0.7	17800.0	-	-	-
16	3	0.2	15700.0	-	-	-
17	10	0.5	16150.0	-	-	-
18	3	0.2	19100.0	-	-	-
19	6	0.3	20333.3	-	-	-
20	6	0.3	22262.5	-	-	-
21	1	0.1	18800.0	-	-	-
Total	**1922**	**100**		**776**	**100**	**-**

Table 17. Length composition (indiv.) of American plaice in catches by Russian trawlers by Divisions in 1999.

Lenght, cm	Division								
	3 L			3 M			3 N		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
22	0	2	2	0	0	0	3	0	3
24	10	3	13	0	0	0	12	6	18
26	23	16	39	0	0	0	11	15	26
28	40	49	89	0	0	0	34	23	57
30	46	79	125	0	0	0	37	37	74
32	48	176	224	1	0	1	50	60	110
34	41	203	244	2	0	2	67	119	186
36	33	247	280	5	0	5	56	128	184
38	23	253	276	9	1	10	45	178	223
40	12	209	221	3	0	3	11	190	201
42	2	132	134	3	1	4	8	149	157
44	1	82	83	2	5	7	3	110	113
46	0	58	58	0	6	6	0	96	96
48	0	37	37	0	9	9	1	80	81
50	0	17	17	0	5	5	0	51	51
52	0	9	9	0	2	2	0	33	33
54	0	3	3	0	0	0	0	30	30
56	0	0	0	0	0	0	0	18	18
58	0	2	2	0	0	0	0	8	8
60	0	0	0	0	0	0	0	6	6
62	0	0	0	0	0	0	0	4	4
64	0	0	0	0	0	0	0	3	3
66	0	0	0	0	0	0	0	2	2
Total	**279**	**1577**	**1856**	**25**	**29**	**54**	**338**	**1346**	**1684**
Length av.,cm	**32.6**	**37.8**	**37.0**	**38.7**	**47.4**	**43.4**	**33.9**	**41.3**	**39.8**

Table 18. Length composition (indiv.) of Witch flounder in catches by Russian trawlers by Divisions in 1999.

Lenght,	Division 3 L			3 M			3 N		
cm	Males	Females	Total	Males	Females	Total	Males	Females	Total
16	0	1	1	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
20	2	2	4	0	0	0	0	0	0
22	1	1	2	0	0	0	0	0	0
24	0	3	3	0	0	0	0	0	0
26	1	1	2	0	0	0	0	2	2
28	1	6	7	0	1	1	8	11	19
30	12	20	32	0	1	1	17	34	51
32	25	46	71	0	1	1	21	69	90
34	33	46	79	1	1	2	68	144	212
36	35	77	112	1	5	6	91	162	253
38	40	114	154	3	3	6	117	239	356
40	42	85	127	2	4	6	78	241	319
42	24	90	114	1	2	3	28	161	189
44	15	84	99	1	2	3	8	97	105
46	12	54	66	1	2	3	3	67	70
48	6	30	36	0	1	1	2	55	57
50	3	9	12	0	1	1	2	38	40
52	0	5	5	1	0	1	0	39	39
54	0	2	2	0	0	0	0	19	19
56	0	1	1	0	0	0	0	8	8
58	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	1	1
Total	**252**	**677**	**929**	**11**	**24**	**35**	**443**	**1387**	**1830**
Length av.,cm	**38.2**	**40.0**	**39.5**	**41.3**	**39.9**	**40.3**	**37.5**	**40.3**	**39.7**

Table 19. Length composition (indiv.) of Yellowtail flounder in catches by Russian trawlers in Div. 3 N, 1999.

Lenght, cm	Males	Females	Total
22	1	0	1
24	10	24	34
26	26	43	69
28	45	83	128
30	61	148	209
32	48	195	243
34	55	235	290
36	39	193	232
38	28	202	230
40	10	170	180
42	4	140	144
44	1	97	98
46	1	55	56
48	0	40	40
50	0	3	3
52	0	3	3
54	0	2	2
Total	**329**	**1633**	**1962**
Length aver.,cm	**32.6**	**36.7**	**36.0**

Table 20. Length composition (indiv.) of Red hake (*Urophycis chuss*) in catches by Russian trawlers by Divisions in 1999.

Lenght, cm	Division								
	3 L			3 M			3 N		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
24	2	2	4	2	1	3	0	0	0
27	22	13	35	9	3	12	0	0	0
30	91	64	155	12	9	21	3	1	4
33	224	204	428	13	15	28	7	3	10
36	170	343	513	9	11	20	5	10	15
39	81	377	458	4	8	12	1	7	8
42	21	323	344	0	4	4	0	11	11
45	2	193	195	0	2	2	0	5	5
48	1	53	54	0	0	0	0	6	6
51	0	4	4	0	0	0	0	0	0
54	0	2	2	0	0	0	0	0	0
Total	**614**	**1578**	**2192**	**49**	**53**	**102**	**16**	**43**	**59**
Length av.,cm	**35.3**	**39.8**	**38.5**	**32.8**	**35.7**	**34.3**	**34.9**	**41.3**	**39.6**

Table 21. Length composition (indiv.) of Thorny skate (*Raja radiata*) in catches by Russian trawlers by divisions in 1999.

Lenght, cm	Division								
	3 L			3 M			3 N		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
21	0	0	0	0	0	0	1	0	1
24	0	0	0	2	1	3	0	0	0
27	0	0	0	3	2	5	0	0	0
30	0	0	0	4	1	5	0	1	1
33	0	0	0	11	7	18	2	0	2
36	1	0	1	14	31	45	2	5	7
39	0	0	0	23	41	64	8	14	22
42	0	0	0	29	36	65	12	17	29
45	1	0	1	27	37	64	32	19	51
48	0	0	0	16	23	39	18	20	38
51	0	0	0	17	33	50	25	22	47
54	0	0	0	19	23	42	17	22	39
57	0	0	0	27	33	60	15	21	36
60	0	0	0	34	34	68	12	16	28
63	0	0	0	18	27	45	14	14	28
66	0	1	1	19	36	55	10	19	29
69	0	0	0	19	14	33	14	19	33
72	0	0	0	13	8	21	11	19	30
75	0	0	0	7	0	7	8	19	27
78	0	0	0	2	1	3	8	12	20
81	0	0	0	4	0	4	6	10	16
84	0	0	0	0	0	0	5	3	8
87	0	0	0	0	0	0	0	1	1
Total	**2**	**1**	**3**	**308**	**388**	**696**	**220**	**273**	**493**
Length av.,cm	**41.0**	**68.0**	**50.0**	**54.1**	**52.2**	**53.0**	**57.7**	**59.8**	**58.9**