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RUSSIAN RESEARCH REPORT FOR 1998

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PART I. Researches Carried out by AtlantNIRO in NAFO Subarea 4 in 1998

by

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STATE OF FISHERY

In 1998 Russian fishermen also were absent at the Scotian Shelf. As regards the prospects of silver hake fishery for 2000 it will considerably depend on 1997 year-class abundance which is still unclear. In any case the results of oceanographic researches carries out in AtlantNIRO (see below) provide no basis to assume environmental conditions unfavourable to the above said year-class formation. The researches scheduled for 1999 by Canadian scientists are likely to eliminate existing uncertainty. The results of Canadian fishery carried out this year in Emerald and La Have basins where according to the data by scientists of AtlantNIRO the bulk of 2 year old biomass is concentrated, also may be useful.

SPECIAL RESEARCHES

Environmental Researches

Materials and methods

Average monthly SST in cross-points of 5-degree trapeziax in Labrador, Newfoundland and Scotian areas and indices of three water masses location cool shelf water (CSH), warm slope water (SL) and northern edge of Gulf Stream front (ST) in the Scotian area and open ocean were used as previously to assess hydrological conditions in NWA. The data for 1997-1998 were analyzed. The table grams of SST issued by hydrometcenter of Russia with average monthly SST in cross-points of 2-degree grid and “Ocean feature analysis” map issued by Canadian Forces Metoc Center of Halifax (Canada) were used as the data source. The data processing included estimation of SST deviations in 1997 and 1998 as compared to the mean value in 1997-1996 and deviations of water masses boundaries location from average ones for 1961-1995.

Analysis Results

In Labrador area the fixed points used to monitor SST are located in Labrador current and in off-shore part of the Labrador Sea (55°N, 55°W, 52°30W, 55°N, 45°W, 50°W, 45°W). In 1997 essential positive SST deviations up to 1-2.5°C

were observed in the Labrador area, except SST in winter period in the southern area when either small negative anomaly of SST or values close to average were observed. In 1998 mostly strong positive anomalies up to 2.2°C predominated SST increase in the Labrador current system and adjacent waters of eastern Labrador Sea commenced in 1994-1995, approached maximum in 1997 and continued in 1998.

In the Grand Newfoundland Bank area the fixed points were located over the Bank itself and in the western flow of Labrador current surrounding the eastern slope of the bank (45°N, 50°W and 47°30N, 47°30W). After the period of low SST in 1992-1995 a sharp increase of temperature occurred in 1996. The negative anomaly of -0.5-2.6°C was sharply replaced by the positive anomaly of the same value. During 1997 again negative SST anomalies (up to –1.5°C) predominated, and in 1998 the latter were replaced by positive ones approaching 2.3°C. It is evident that after 1995 being the coldest one for the period from 1992 to 1998, the period of irregular SST fluctuations had been started in the area. The reason of those variations is probably related to peculiarities of interaction of major atmospheric circulation centers in the North Atlantic Ocean, i.e. to the North Atlantic Oscillation.

In the Scotian Shelf area average monthly SST were monitored by us at 4 points, one of which was located in the eastern shelf area (45°N, 60°W), the second was near the slope (42°30N, 62°30W) and two points were in the open ocean within the slope water mass (40°N, 65°W; 40°N, 60°W). At the shelf slope, noticeable decrease of SST occurred in 1996 after predominance SST positive anomalies in 1994-1995, and surface water temperature approached the long-term average value for the period 1977-1996. In 1997 weak positive anomalies were observed in winter, weak negative ones were in spring and positive anomalies predominated generally in summer, while in autumn the temperature the temperature decrease again below the normal one (from –0.4° to –1.7°C). In the eastern shelf where silver hake spawning grounds located, no definite trends were observed during the latest years. During several years both positive and negative anomalies predominated in some seasons. For example, in winter 1994 and 1995 negative anomalies predominated while in 1996-1998 SST were close to the long-term average one. In spring 1994 SST were also close to the long-term average, while in spring 1995 noticeable decrease was observed which retained till 1997. In 1998 the process of decrease was replaced by the opposite one when SST anomalies exceeded long-term values by 0.5°-0.9°C. After 1993 decrease of temperature occurred in autumn, and in 1996 that process became sustainable one. In general SST increase was observed in the eastern part in 1998 as compared to 1997. It should be mentioned than in 1997 during silver hake spawning period July-September SST exceeded the normal values by 0.4-1.2°C which was confirmed by Canadian survey data (Drinkwater, Pettipas and Petrie, 1997). During other months SST were either close to the long-term values or by 0.3-1.1°C below. Probably SST increase in summer became one of the reasons of anomalously strong silver hake year-class, appeared in 1997. In 1998 during the same summer months SST positive deviations amounted to 1.4-2.6°C, which allowed to assume that the conditions of silver hake spawning at the main spawning grounds off Sable at Misaine Bank were much more favourable as compared to 1997. In the off-shore area adjacent to the shelf from the south, the fixed points were located directly in the slope water northwards Gulf Stream front. There the trends to the slope water SST decrease was observed during the latest 5 years (1994-1998). The year of 1997 was the coldest one. Thus, since 1994 the process of gradual SST decrease from positive deviations to the values close to long-term average or below the latter is likely to occur. As regards the trends of temperature variations in the deeper layers, we are able only to refer to the above mentioned authors' analysis (Drinkwater *et al.*, 1997) which stated that the temperature of a cool intermediate layer below 50m gradually decreased in the period from middle 1980s to early 1990s. It was most evident in the coastal along-shore flow. The authors noted that the data for 1994 and 1995 evidenced the start of warming in that layer over the most part of the Scotian Shelf, which resulted in the values close to the normal ones during the latest 2 years. The authors noted also that anomalously warm slope water at the shelf and deep-water areas such as Emerald at the Scotian Shelf and George's in the Gulf of Maine formed due to the increase of advection from the south, was an important feature of hydrological conditions. They considered that the above said intrusion increased water temperature in the intermediate cool layer over the deep-water areas. That feature observed since the middle 1980s (Drinkwater *et al.*, 1997) allows to state that conditions for young silver hake survival overwintering mostly in the warm near-bottom layer of deep-water shelf area (in deeps and partially at the slope) with high food content remained most favourable since 1995.

Analysis of water boundaries dynamics showed that in winter 1997 (January-March) the boundaries of cool shelf water (CSH) and slope water (SL) were shifted northwards as compared to the average long-term position, while fluctuations of Gulf Stream front were generally close to the long-term average location. Based on the above considerations it can be assumed that increase of warm water advection into the shelf during that period increased the latter volume at the slope and in the deeps and created more favourable conditions for hake overwintering, including food

supply (mostly euphasiids). In early spring, in April, the both boundaries still located more northwards than usually while in May they shifted southwards and were close to the normal location. In June stablization of all three boundaries occurred in the western part (60-65°W), while in eastern part the boundaries CSH and SL shifted closer to each other resulting in increase of "shelf-slope" hydrological front in that area.

In summer essential shift of cool water boundary to the North was observed in August, while in July and September its location was close to the norm. The positive anomaly of slope water boundary was observed in July while in August and September it corresponded to the long-term average location. The northern boundary of Gulf Stream front in summer was either close to the norm or shifted southwards. In general summer 1997 was characterized with the boundaries fluctuations around the long-term average location.

In October-November 1997 all boundaries shifted southwards. Thus it can be assumed that due to advective processes the winter period was relatively warm, the spring and summer periods were close to the long-term average conditions, and autumn was relatively cool.

The autumn shift of boundaries southwards continued until January 1998 while in February the sign of the boundaries location changed to the opposite one. In February all three boundaries located to the north of the middle line. In March that process became stronger at CSH and SL boundaries. In April the northward shift approached maximum, and in May the process decreased. In June CSH boundary already shifted southwards of the middle line and SL boundary approached it. In 1998 the spring northward shift of water masses resulted in SST increase in the Scotian Shelf are when positive anomalies approached 0.4-1.2°C as was noted above.

Conclusion

The analysis of environmental conditions leads to the following conclusions:

1. During 1997 and 1998 significant positive anomalies of SST up to 2.2°C predominated in the Labrador area. The trend to SST increase started in 1994-1995 became stronger in 1996 and continues at present.
2. In the Grand Bank area the period of SST decrease from 1992 to 1995 was followed by the unstable period with sharp interannual fluctuations.
3. At the Scotian Shelf slope the period of positive anomalies (1991-1995) was replaced by the period of gradual SST decrease to the norm. In the eastern shelf area no definite trend was observed during the latest years. In 1997 during silver hake spawning period SST of that shelf area exceeded to norm by 0.4-1.2°C, which may become one of the reasons of anomalously strong silver hake year-class appearance. In 1998 SST during the spawning period exceeded the norm by 1.4-2.6°C which may result in one more strong year-class appearance.
4. Essential interannual and seasonal fluctuations of SST caused by atmospheric processes and warm and cool water advection. Decrease of intermediate cool layer temperature since the mid-1980s to early 1990s, temperature increase in 1994-1995 to the norm, high temperature of near bottom layer below 150m, including that of deeps after 1995 are the features of interannual water column temperature variability in the Scotian Shelf area.
5. As regards the dynamics of cool shelf water (CSH) and warm slope water (SL) during 1997-1998, their boundaries shift to the north predominated in 1997-1998, which resulted in water temperature increase in the Scotian Shelf near-bottom water mass.
6. Oceanographic conditions have remained favourable for young silver hake survival since 1995.

BIOLOGICAL RESEARCHES

The plots of stock-recruitment relationship were drawn and analyzed with a view to assess the reference points of biomass of silver hake 4VWX, cod 2J+3KL, 3NO and 3Ps, yellowtail flounder 3LNO, redfish 3M and mackerel 3-6, and to find the most acceptable approaches to the above populations management according to the points scatter. The detailed description of researches performed is the report submitted to the June Meeting of Scientific Council.

REFERENCES

Drinkwater, K. F., R. Pettipas and L. Petrie, 1998. Physical Conditions on the Scotian Shelf and in the Gulf of Maine during 1997. Canadian Stock Assessment Secretariat. Research Document 98/50. Ottawa. Canada. 29p.

Drinkwater, K. 1997. State of the Ocean: Northwest Atlantic. DFO Science Stock Status Report GO-01. November 1997. 8p.

PART II. Report of PINRO Research in the NAFO Area in 1998

by

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A. STATUS OF FISHERIES

Greenland halibut. In 1998, directed fishery for Greenland halibut was carried out by 2 vessels (TSM-type) and by 1 Spain-built trawler off the West Greenland from August to October. The fishery was mainly conducted at 1170-1240m depth. Average daily catch was 6,0 t.

According to provisional data, the Greenland halibut catch taken in this area made up 543 t in 1998. 84% of the national quota (650 t) was fished.

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

B. SPECIAL RESEARCH STUDIES

No special environmental studies, including hydrographic and biological studies, were performed.

SUBAREAS 2 AND 3

A.STATUS OF FISHERIES

The catch taken by Russian trawlers in Divs.3LMN is given in Table 1.

Greenland halibut. Fishery for Greenland halibut was conducted in Divs.3LMN by 3 Spain-built trawlers of from May to December. Prevailing depths of fishing were 700-900m. Average daily catch was 6.2 t.

By provisional data the Greenland halibut catch taken in the divisions mentioned constituted 1890 t in 1998. 74% of the national quota (250O t) was fished.

Redfish. No directed fishery for redfish was conducted by Russian vessels in 1998. By provisional data, by-catch of redfish taken during the directed fishery on halibut in Divs.3LMN constituted 12 t. The quota on redfish on the Flemish Cap Bank (18000 t) was not fished.

Cod. 4 hauls were done at 135-170m depth in Div.3M during August, December 1998. Catch of cod constituted 1.2 t.

The quota of cod on the Flemish Cap Bank (196 t) was not fished.

Other species. No directed fishery on other species was conducted. By-catch of grenadier, flatfish, wolffish, sharks and other species made up not more than 11%.

B. SPECIAL RESEARCH STUDIES

Environmental studies. Data on water temperature at trawling depth and on recordings from trawl attached sensor were collected onboard one of the vessels conducting directory fishery on Greenland halibut in Divs.3LMN from May to December 1998. At 600-1400m depth the temperature varied within 2.7°-40°C.

No special oceanographic observations were done.

Biological studies. Fisheries and biological data were collected by 2 Russian observers - specialists of PINRO from May to December 1998. The observers specified species composition of all catches. Catches taken from 334 hauls were examined. The ichthyological data collected are given in Table 2. Greenland halibut was the major object investigated.

Tables 3-6 give the length composition of ground species catches and age composition of catches is presented in Table 7.

Greenland halibut. In Divs.3LMN, Greenland halibut were registered in all catches. Fish length varied from 22 to 99cm, with the mean length being 44.6cm. Specimens at age 4-5 with 40-43cm length from 1993-1994 year-classes were preponderant in catches. Small immature fish constituted the bulk of catches. Detailed description of Greenland halibut biology is given in the paper by T.M.Igashov (NAFO SCR Doc.99/11).

No survey for Greenland halibut stock assessment was carried out.

Cod. Length of cod in catches taken on the Flemish Cap Bank (Div.3M) varied from 33 to 83cm, with mean length being 52.9cm. Fish 48-56cm long at age 4-5 from the 1993-1994 year-classes made up the bulk of catches.

No survey on cod stocks was carried out.

Roughhead grenadier. In Divs.3LMN, grenadier 19-96cm long with the mean length being 44.6cm occurred in catches. The bulk of catches consisted of specimens 39-47cm long at age 6-7.

Roundnose grenadier. In Divs.3LMN, grenadier 13-84cm long, 39.2cm mean length, occurred in catches. The bulk of catches consisted of specimens 30-36cm long.

American plaice. This species occurred in Divs.3LMN at the depth to 1200m. Fish length varied from 23 to 57cm, with the mean length being 38.2cm. Specimens 36-39cm long constituted the bulk of catches.

Witch flounder. Fish occurred in Divs.3LMN at the depth to 1200m. The length of fish caught varied from 21 to 61cm, mean length was 40.3cm. Specimens 38-41cm long were predominant in catches.

S.mentella. The species occurred in Divs.3LMN. Length of the fish caught varied from 17 to 49cm, mean length was 30.4cm. Specimens 25-27cm long dominated in catches.

No survey on S.mentella stock assessment was carried out.

S.marinus occurred in Divs.3LMN. The specimens caught were 20-48cm long and their mean length made up 29.5cm. Catches were mainly represented by specimens 27-29cm long.
No survey for S.marinus was performed.

Other species. Such species as common grenadier, wolffish, hake, tusk, skate, sharks, chimaera, rough-nosed grenadier,

yellowtail flounder, spiny eels, eels, lumpsucker, orange roughy and other fish species occurred in catches.

Minor amount of data on the species mentioned was gathered.

Table 1. Provisional data on catch taken by Rassian trawlers in NAFO Divs. 3LMN, 1998.

Species	Division	Catch, t
Greenland halibut	3L	1559,2
Greenland halibut	3M	244,4
Greenland halibut	3N	86,1
Greenland halibut	3LNM	1889,7
American plaice	3LNM	23,9
Witch flounder	3LNM	9,5
Yellowtail flounder	3N	18,3
Roughhead grenadier	3LNM	92,4
Redfish	3LNM	12,3
Skate	3LNM	16,5
Wolffish	3LNM	6,6
Cod	3M	1,2
Other species	3LNM	52,8
Total	**3LNM**	**2123,0**

Table 2. Biological data * collected by national observers on board the Russian trawlers MI-0172 and MI -0297.

Month	Division	Greenland halibut			American plaice			Witch flounder		Redfish		Cod		Roughhead grenadier			Roundnose grenadier	
		L	B	AB	L	B	AB	L	B	L	B	L	AB	L	B	AB	L	AB
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
May	**L**	1740	167	-	-	-	-	-	-	281	-	-	-	85	-	-	-	-
	M	432	63	-	-	-	-	-	-	-	-	-	-	567	-	-	-	-
	LM	**2172**	**230**	**-**	**-**	**-**	**-**	**-**	**-**	**281**	**-**	**-**	**-**	**652**	**-**	**-**	**-**	**-**
June	**L**	8124	138	499	79	79	-	-	-	1440	281	-	-	744	319	-	-	-
	M	221	32	-	-	-	-	-	-	-	-	-	-	149	36	-	-	-
	LM	**8345**	**170**	**499**	**79**	**-**	**-**	**-**	**-**	**1440**	**281**	**-**	**-**	**893**	**355**	**-**	**-**	**-**
July	**L**	10536	1226	355	-	-	-	-	-	-	-	-	-	955	319	-	-	-
	M	1116	88	79	-	-	-	-	-	-	-	-	-	140	40	-	-	-
	LM	**11652**	**1314**	**434**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1095**	**359**	**-**	**-**	**-**
August	**L**	14112	1852	106	-	-	-	176	-	-	-	-		2866	468	375	-	-
	M	907	186	-	-	-	-	-	-	-	-	600	41	272	81	-	-	-
	N	2033	205	27	-	-	-	-	-	-	-	-	-	205	75	-	-	-
	LMN	**17052**	**2243**	**133**	**-**	**-**	**-**	**176**	**-**	**-**	**-**	**600**	**41**	**3343**	**624**	**375**	**-**	**-**
September	**L**	5202	657	97	-	-	-	402	-	-	-	-	-	1584	-	390	-	-
	N	3791	215	270	233	8	-	143	-	-	-	-	-	-	-	-	-	-
	LN	**8993**	**872**	**367**	**233**	**8**	**-**	**545**	**-**	**-**	**-**	**-**	**-**	**1584**	**-**	**390**	**-**	**-**
October	**L**	8832	1671	184	6	4	-	163	17	4	4	-	-	949	-	213	461	139
	M	4314	161	509	23	11	-	12	5	511	6	-	-	-	-	-	-	-
	N	3545	-	510	9	-	-	275	27	45	1	-	-	-	-	-	-	-
	LMN	**16691**	**1832**	**1203**	**38**	**15**	**-**	**450**	**49**	**560**	**11**	**-**	**-**	**949**	**-**	**213**	**461**	**139**
November	**L**	6757	1053	50	88	23	-	259	180	171	78	-	-	53	-	49	279	86
	M	5273	618	243	155	76	40	264	143	203	41	-	-	213	40	10	130	55
	N	616	-	64	-	-	-	4	-	-	-	-	-	-	-	-	-	-
	LMN	**12646**	**1671**	**357**	**243**	**99**	**40**	**527**	**323**	**374**	**119**	**-**	**-**	**266**	**40**	**59**	**409**	**141**

Table 2. to be continued.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
December	**L**	6774	954	39	485	25	169	235	169	350	89	4	3	18	-	16	71	62
	M	-	-	-	-	-	-	-	-	-	-	92	92	-	-	-	-	-
	LM	**6774**	**954**	**39**	**-**	**25**	**169**	**235**	**169**	**350**	**89**	**96**	**95**	**18**	**-**	**16**	**71**	**62**
Total	**L**	62077	7718	1330	685	131	169	1235	366	2243	452	4	3	7254	1106	1043	811	287
	M	12263	1148	831	178	87	40	276	148	714	47	692	133	1341	197	10	130	55
	N	9985	420	871	242	8	-	422	27	245	3	-	-	205	75	-	-	-
	LMN	**84325**	**9286**	**3032**	**1078**	**226**	**209**	**1933**	**541**	**3202**	**502**	**696**	**136**	**8800**	**1378**	**1053**	**941**	**342**

* **L** - measurements, spec.
B - incomplete biological analysis (without weighing), spec.
AB - age samples, including complete biological analysis, spec..

Table 3. Length composition of Greenland halibut in catches taken by Russian trawlers, spec. Div. 3L, 1998.

Length,cm	May	June	July	Aigust	September	October	November	December	Total
22	0	188	36	0	0	0	0	0	**224**
24	134	1255	144	166	0	0	21	0	**1718**
26	446	3575	1077	558	0	186	62	133	**6037**
28	1961	15493	4128	2415	164	559	474	318	**25513**
30	3431	35879	8292	4181	263	1603	1774	1511	**56935**
32	4679	46919	13174	6837	1349	3132	3403	4932	**84425**
34	7665	50682	19851	9720	3421	4828	5734	10792	**112693**
36	9982	72950	31482	16255	7598	9284	8848	18376	**174775**
38	10027	68497	35826	18066	13289	13665	12457	23891	**195716**
40	7219	46919	36400	19696	18223	15324	15778	26065	**185624**
42	7397	40395	37728	23303	20624	18885	16561	26277	**191172**
44	4590	28478	34246	21884	19934	16517	15262	18243	**159153**
46	4813	26345	34462	21733	20131	17020	13076	13470	**151050**
48	3119	18567	27390	16240	13881	12789	11570	10235	**113791**
50	2406	14051	22113	13372	12565	10458	7652	5754	**88371**
52	1961	11228	21072	10670	9901	8855	6806	5515	**76008**
54	1604	8405	14862	8331	8092	6469	4661	2970	**55394**
56	1515	6398	9908	6188	5822	6245	4001	2519	**42596**
58	802	2509	7646	4030	3618	4250	2557	1644	**27057**
60	579	2634	4523	2747	2467	2908	1609	1326	**18793**
62	579	2258	4164	1917	1678	2591	1526	1273	**15986**
64	178	1129	2477	1404	1414	1902	1093	742	**10339**
66	223	878	1436	724	987	1398	784	557	**6987**
68	134	753	1149	634	1151	951	619	398	**5788**
70	134	1192	790	287	625	932	536	212	**4707**
72	312	376	754	347	592	746	289	212	**3628**
74	312	251	503	317	724	652	309	159	**3227**
76	312	376	826	211	362	690	247	424	**3449**
78	134	63	323	181	691	447	247	318	**2404**
80	223	251	574	181	296	391	351	186	**2453**
82	312	125	395	151	625	391	289	265	**2554**
84	89	251	108	75	197	242	206	345	**1514**
86	178	63	108	75	164	168	206	133	**1095**
88	45	63	215	30	132	93	165	212	**955**
90	0	0	0	45	132	56	82	133	**448**
92	45	125	0	15	0	19	41	27	**272**
94	0	0	0	0	0	0	21	53	**74**
96	0	63	36	0	0	0	21	0	**119**
98	0	0	0	0	0	0	21	0	**21**
Total	**77540**	**509585**	**378215**	**212986**	**171112**	**164649**	**139358**	**179619**	**1833065**
Fish measured,spec.	**1740**	**8124**	**10536**	**14112**	**5202**	**8832**	**6757**	**6774**	**62077**
Mean length,cm	**41,8**	**39,7**	**44,5**	**44,7**	**47,1**	**46,8**	**45,5**	**43,2**	**44,4**
Weight of fish measured,t	**1,4**	**5,2**	**9,5**	**12,7**	**5,5**	**9,4**	**6,6**	**5,5**	**55,8**
Catch, t	**61,6**	**325,2**	**341,2**	**191,6**	**182,0**	**175,3**	**135,7**	**146,5**	**1559,2**

Table 4. Length composition of Greenland halibut in catches taken by Russian trawlers, spec. Div. 3M, 1998.

Length,cm	June	Jule	August	October	November	Total
22	0	0	0	0	0	**0**
24	0	0	0	0	0	**0**
26	0	17	27	0	26	**70**
28	0	17	40	121	79	**257**
30	76	100	121	156	528	**980**
32	228	382	228	1108	1425	**3371**
34	152	565	415	2094	3299	**6525**
36	1141	1229	951	4171	6809	**14302**
38	1065	1827	1099	5919	10742	**20651**
40	1065	1561	1232	9242	14753	**27854**
42	1902	1761	1139	10765	18976	**34542**
44	1826	1412	831	10194	18897	**33159**
46	2587	1611	1005	9449	17208	**31860**
48	1978	1146	911	7459	15281	**26776**
50	761	1113	603	5555	10108	**18140**
52	685	714	536	3929	8314	**14177**
54	1141	747	509	2267	5384	**10049**
56	152	648	348	1229	3378	**5755**
58	533	631	402	537	1715	**3818**
60	228	382	402	260	950	**2222**
62	0	498	348	104	660	**1610**
64	76	282	161	87	185	**791**
66	228	332	147	17	132	**857**
68	76	365	134	0	106	**681**
70	152	199	107	0	53	**511**
72	76	149	80	0	53	**359**
74	76	149	67	0	53	**345**
76	76	183	94	0	26	**379**
78	0	149	40	0	0	**190**
80	76	66	40	0	0	**183**
82	228	50	54	0	0	**332**
84	76	50	0	0	26	**152**
86	76	100	13	0	0	**189**
88	0	33	13	0	0	**47**
90	0	33	0	0	0	**33**
92	76	17	27	0	0	**119**
94	0	0	0	0	0	**0**
96	0	17	13	0	0	**30**
98	0	0	13	0	0	**13**
Total	**16816**	**18537**	**12151**	**74660**	**139166**	**261331**
Fish measured,spec.	**221**	**1116**	**907**	**4314**	**5273**	**11831**
Mean length,cm	**48,0**	**48,7**	**47,7**	**44,5**	**45,3**	**45,6**
Weight of fish measured,t	**0,3**	**1,4**	**1,1**	**3,6**	**4,7**	**11,1**
Catch, t	**20,0**	**23,7**	**14,3**	**62,6**	**123,7**	**244,4**

Table 5. Length composition of Greenland halibut in catches taken by Russian trawlers, spec. Div. 3N, 1998.

Length,cm	August	September	October	November	Total
22	0	0	0	0	**0**
24	29	9	0	0	**38**
26	71	83	108	16	**279**
28	385	426	232	37	**1080**
30	656	685	681	79	**2101**
32	1554	1047	983	126	**3709**
34	2266	1287	1648	205	**5407**
36	3592	2158	2135	184	**8069**
38	3549	2528	2220	352	**8650**
40	3193	3251	2839	289	**9572**
42	3164	3519	2754	289	**9727**
44	2551	3325	2870	321	**9067**
46	2224	3538	2135	331	**8228**
48	1525	2593	1865	289	**6272**
50	998	2853	1416	131	**5398**
52	1026	2195	1184	142	**4547**
54	499	1593	758	121	**2971**
56	428	954	781	116	**2279**
58	328	908	495	95	**1825**
60	328	565	410	32	**1334**
62	114	389	364	26	**893**
64	71	259	333	11	**674**
66	114	222	186	5	**527**
68	128	120	201	11	**460**
70	14	93	124	0	**231**
72	43	130	162	5	**340**
74	14	111	116	21	**262**
76	29	56	85	0	**169**
78	43	46	101	0	**190**
80	14	46	85	0	**146**
82	14	37	77	0	**129**
84	14	56	54	0	**124**
86	0	19	8	0	**26**
88	0	9	0	0	**9**
90	0	0	15	0	**15**
92	0	0	0	5	**5**
94	0	0	0	0	**0**
96	0	0	0	0	**0**
98	0	0	0	0	**0**
Total	**28977**	**35111**	**27427**	**3237**	**94752**
Fish measured, spec.	**2033**	**3791**	**3545**	**616**	**9985**
Mean lenth, cm	**42,2**	**45,8**	**45,2**	**44,3**	**44,7**
Weight of fish measured, t	**1,5**	**3,7**	**3,5**	**0,5**	**9,3**
Catch, t	**21,8**	**34,6**	**26,9**	**2,9**	**86,1**

Table 6. Length composition of cod, roughhead grenadier, american place and witch flounder in catches taken by Russian trawlers, spec. Divs.3LMN, 1998.

Length,cm	Cod 3M	Roughhead grendier 3LMN	Length,cm	American place 3LMN	Witch flounder 3LMN
18		22	**22**	77	8
21		217	**24**	306	0
24		1195	**26**	996	17
27		4085	**28**	1379	42
30		8474	**30**	2451	161
33	4	11863	**32**	3983	355
36	5	16991	**34**	4174	727
39	12	28789	**36**	5323	1285
42	19	41782	**38**	6281	2054
45	60	26964	**40**	4481	3009
48	181	15905	**42**	3791	2553
51	237	9843	**44**	3064	1834
54	146	6127	**46**	2336	1691
57	112	4302	**48**	1723	1107
60	45	3390	**50**	498	600
63	17	2825	**52**	268	406
66	10	1716	**54**	77	279
69	7	1477	**56**	77	101
72	5	1282	**58**		68
75	1	1152	**60**		34
78	0	869	**62**		8
81	1	869			
84		630			
87		239			
90		87			
93		65			
96		43			
Total	**865**	**191204**	**Total**	**41284**	**16340**
Fish measured, spec.	**692**	**8800**	**Fish measured, spec.**	**1078**	**1933**
Mean length, cm	**52,9**	**44,6**	**Mean length, cm**	**38,2**	**40,3**
Weight of fish measured,t	**0.9**	**4.3**	**Weight of fish measured,t**	**0.6**	**1.1**
Catch,t	**1.2**	**92.4**	**Catch,t**	**23.9**	**9.5**

Table 7. Age composition of Greenland halibut, cod and roughhead grenadier in catches taken by Russian trawlers, spec. Divs.3LMN, 1998.

Age	Greenland halibut 3LMN	Cod 3M	Roughhead grenadier 3LMN
2	70245		1043
3	324815	39	7038
4	614442	379	10101
5	502751	341	23374
6	303287	93	44467
7	175807	11	36516
8	92240	3	26133
9	33058		12447
10	27241		7668
11	17321		6995
12	12309		3997
13	8829		2846
14	4181		1912
15	1246		1868
16	1246		1173
17	0		782
18	130		934
19			869
20			391
21			304
22			261
23			65
24			22
Total	**2189148**	**866**	**191206**