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USSR Research Report for 1983

Section I: A. K. Chumakov and V. A. Borovkov, PINRO
6 Knipovich Street, Murmansk, USSR

Section II: A. S. Noskov, AtlantNIRO, 5 Dmitry Donskoy Street,
Kaliningrad, USSR

SECTION I

SUBAREAS 0, 2 AND 3

A. State of fisheries

In 1983 USSR commercial ships fished mainly for redfishes, cod and witch flounder on the southern slopes of the Newfoundland (3NO) and on the Flemish Cap (3M). Besides, silver hake on the Nova Scotian shelf (4VWX), capelin in the South Labrador (2J+3K), redfish Sebastes mentella in 3K and Greenland halibut on the continental slope of the Baffin Island (0B) were also fished for. According to preliminary data for 1983, the USSR total catch in the Northwest Atlantic amounted to 85,101 tons, thus, being lower compared to 1982 (Appendix 1). The decline in the catch resulted mainly from poor catches of silver hake on the Nova Scotian shelf, roundnose grenadier in Subareas 2+3.

B. Special investigations

1. Investigation of oceanographic regime

Subarea 0

The observations of oceanographic conditions were carried out only in November and were rather scarce (Appendix 2). Water temperature in the surface layer of the surveyed area was negative and amounted to -1.8°C. The distribution of temperature and salinity in the intermediate layer up to 200 - 300 m was characterized by a complex alternation of loop-like

and circular structures which were, apparently, the effects of currents meandering and passage of synoptic scaled eddies. In the near-bottom layer a general rise of temperature and salinity with depth was observed.

As compared with the situation of 1982, a certain extension of vertical range of intermediate cold waters of Arctic origin occurred.

Subarea 2

More detailed observations were undertaken in November off the Hamilton Bank on parallel standard Sections 8-A and Seal Island. The distribution of water temperature and salinity on Section 8-A, as well as the comparison of these characteristics with corresponding long term means given in the paper by V.A.Borovkov (NAFO Sci. Coun. Studies, 5:81-86) are depicted in Fig. 1. The charts indicate the correspondence of significant anomalies to the upper 200-250 m layer. Within its limits waters with relatively low temperature and salinity dominated. The maximum of additional cooling and freshening, localized in the 50-100 m depth range in the extreme west of the Arctic front, is characterized by anomalies of temperature (-2.9°C) and salinity (-1.0‰) which are the greatest in the series of observations covering 1962, 1964-1977, 1979-1983.

Average for the 0-200 m layer water temperature amounting to -0.42° and -0.06° on Sectors A (Stations 3-5, Fig. 1) and B (Stations 6-9, Fig. 1) of Section 8-A, respectively, also turned out extremely low in the series of observations. This minimum resulted from the extreme cooling of deep shelf waters with the upper boundary at 50 m.

These peculiarities in an oceanographic situation testify to the accentuation of properties and transgression of the Arctic waters, which, in its turn, is the sign of the Labrador Current intensification.

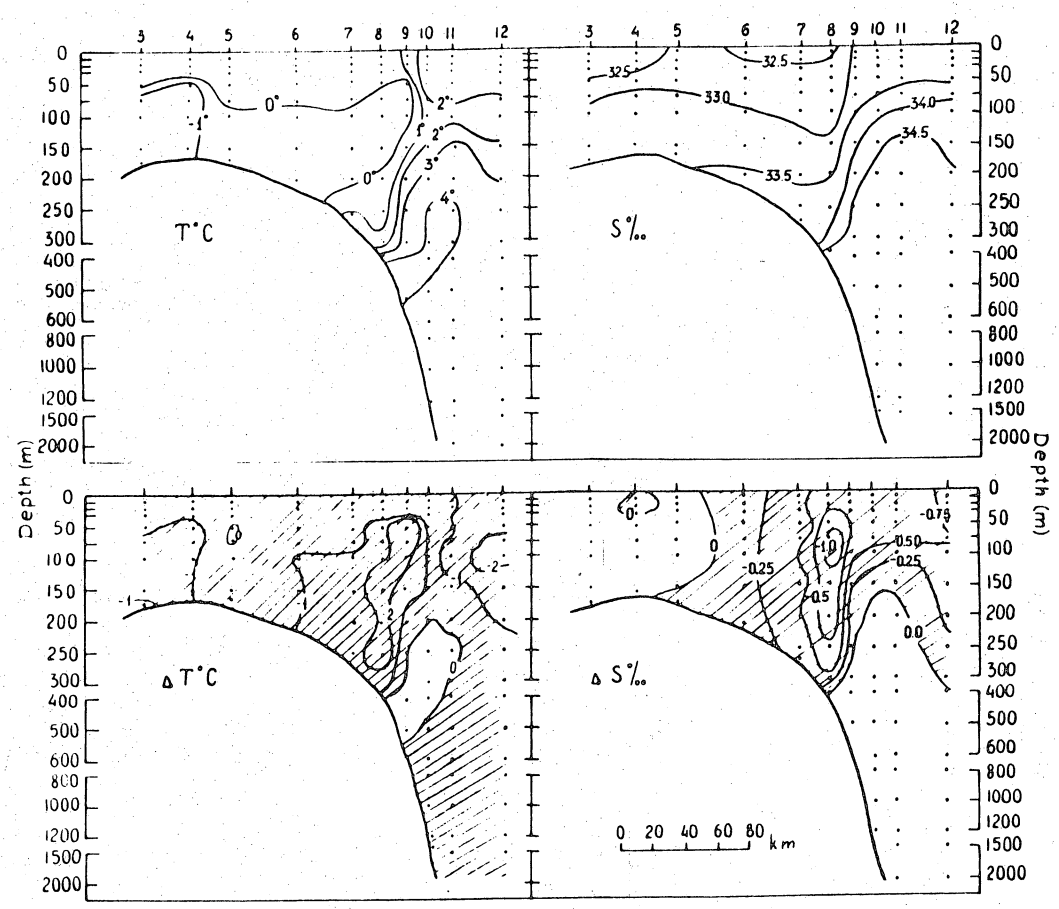

Fig.1. Distribution of temperature ($T^{o}C$), salinity (S°/..) and their anomalies (T and Δ S respectively) on Section 8-A on 1-3 November 1983 (Areas of negative anomalies are shaded).

Subarea 3

This Subarea was covered with observations most thouroughly - from January to early August and from mid-October to December (Appendix 2). Basing on the results of observations on standard sections, it follows that in spring-summer negative anomalies of water temperature dominated on the eastern slope of the Grand Bank, and in some areas they averaged -0,8°C for the 0-200 m layer and -0,5°C for the 200-500 m layer. These anomalies were brought about by the expansion of the area and

vertical range of cold intermediate waters transported by the Labrador Current. On the contrary, in the upper 200 m layer over the southern and south-western slopes of the Grand Bank notable (to 2°C) positive anomalies produced by the slope water advection were observed.

In April-July the field of geostrophic water circulation in the surface layer (Fig. 2) was characterized by the flow, being the core of the main branch of the Labrador Current, meandering over the continental slope coupled with a relatively weak motion of waters over the shelf. Judging by the portrayed dynamic relief, a number of weak eddy disturbances of spatial scale typical of synoptic formations were present in the shelf area. Most of these eddies were of the anticyclonic nature.

Fig. 3 illustrates the results of the surveys carried out in the frames of the Flemish Cap Project. The charts show the peculiarities in developing of water motion field connected with the formation of the system of anticyclonic eddies over the Bank (March-April). The destruction of the anticyclonic circulation and formation of meandering water transport in the central part of the Bank in late May might lead to the outflow of a portion of ichthyoplankton into the ocean, i.e. to consequences unfavourable for reproduction of spring spawning fish dwelling in this area.

2. Biological investigations

2.1. Greenland halibut survey (0, 2 and 3K)

In 1983 Greenland halibut stock assessment was carried on in Subareas 0, 2 + 3K by the trawl survey method. MB-2645 "Suloy", involved in the survey, employed a bottom trawl of the 1625 type with a small meshed netting in the codend. Hauls were made at random, primarily, in the areas suitable for trawling. Most hauls were made on the continental slope in Subarea 0 and Divs. 2GH. A greater part of the shelf was covered with a thick ice and happened to be out of the survey range.

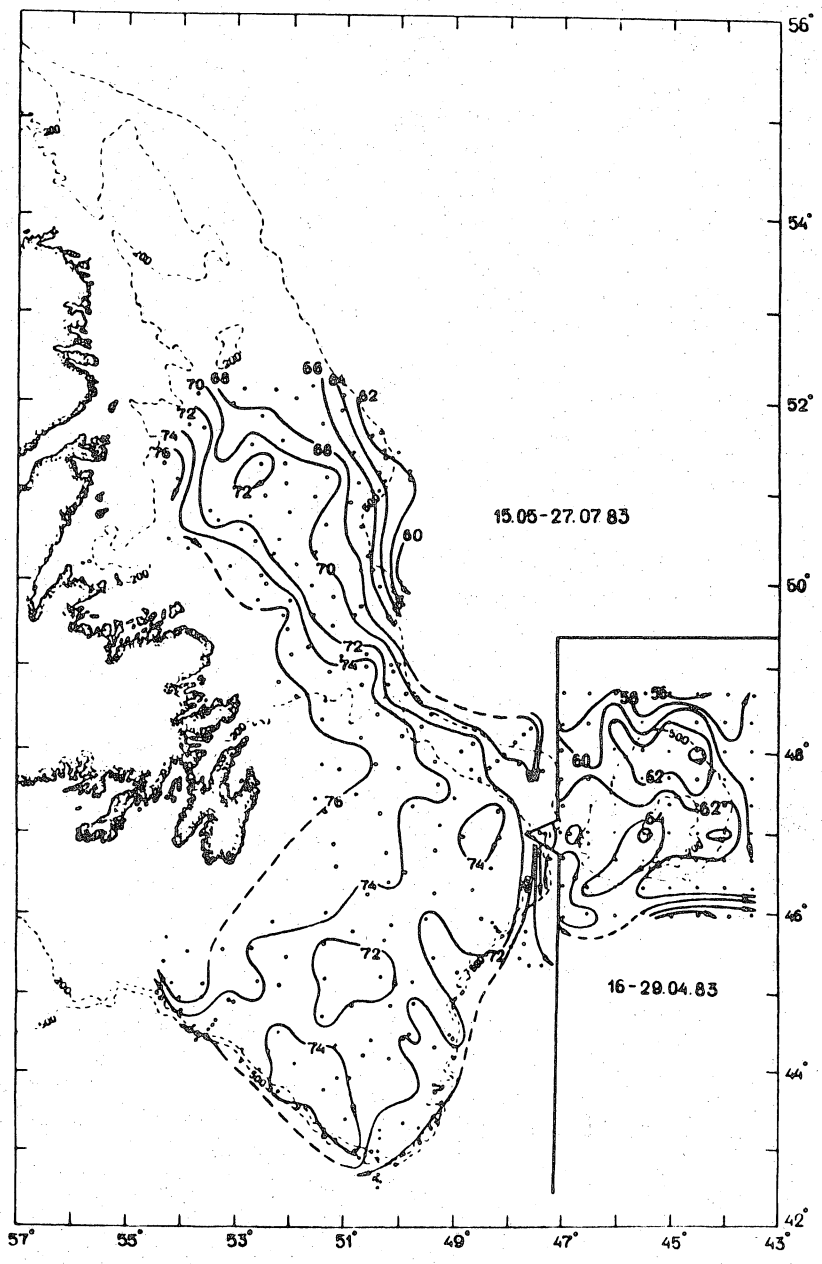

Fig. 2. Dynamic topography of sea surface relatively 200 m depth in April-July 1983 (by the survey results for Cruise 27 of RV "Suloy").

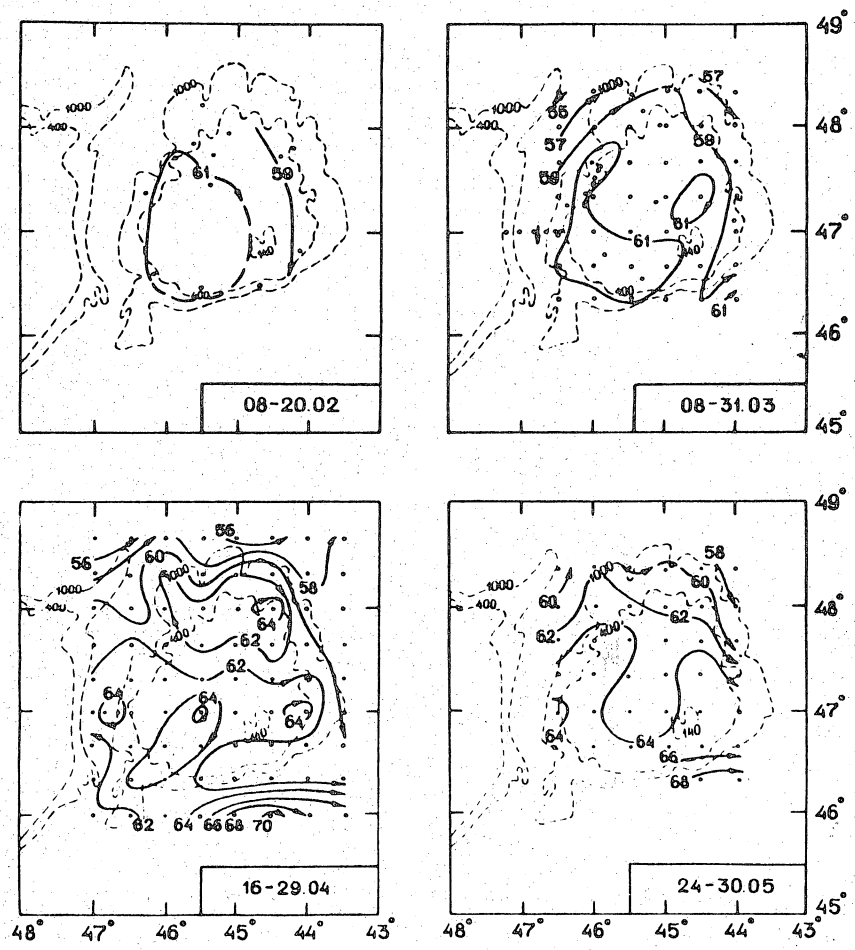

Fig.3. Dynamic topography of sea surface relatively 200 m depth on the Flemish Cap in winter-spring 1983. Schemes were plotted following the data of the surveys carried out in Cruises 26 and 27 of RV "Suloy" (8-20 February and 16-29 April), in Cruise 2 of RV "Kokshaisk" (8-31 March) and Cruise 27 of RV "Gemma" (24-30 May).

As is seen from Table 1, in 1983 average catches of Greenland halibut in Subarea 0 were lower than in 1982. The main concentrations were distributed below 1,000 m and, in fact, were not available for the bottom trawl survey.

In Divs. 2GH the densest concentrations of Greenland halibut were distributed in depths of 800-1200 m, which is approximately 100 m deeper than in 1982 (Table 2). The survey results evidence a rather high biomass of Greenland halibut in these areas. Unfortunately, the survey data do not allow so far to estimate the absolute abundance and biomass of separate age groups, because valid hauls do not cover the whole area, and the differentiated fishing efficiency in relation to different length groups is unknown either. But the results of the survey give visual representation of the distribution and relative abundance of Greenland halibut at different depths, as well as of variations in length composition.

Table 1. Greenland halibut catches from different depths over the continental slope in Subarea 0 in 1979-1983, kg per trawling hour (by trawl survey data)

Depth, m	Area, sq. miles	YEAR				
		1979	1980	1981	1982	1983
501- 600	920	455(12)	45(4)	130(1)	170(4)	907(2)
601- 700	1500	521(13)	71(4)	-	336(7)	242(7)
701- 800	1640	482(15)	130(2)	-	783(6)	247(9)
801- 900	2890	488(8)	918(4)	220(3)	986(11)	400(9)
901-1000	911	398(5)	1379(11)	618(6)	934(9)	615(12)
1001-1100	392	455(2)	1316(6)	761(3)	2130(13)	865(8)
1101-1200	400	-	-	-	1681(1)	1482(11)
1201-1300	451	-	-	-	-	1024(5)
501-1300	9104	478(55)	886(31)	522(13)	1101(51)	715(63)
Biomass index		478	580	316	821	518
% of area surveyed		90.7	90.7	56.2	95.0	100

Table 2. Greenland halibut catches from different depths over the continental slope of the North and Central Labrador in 1979–1983, kg per trawling hour (by trawl survey data).

Depth, m	Area, sq. miles	YEAR				
		1979	1980	1981	1982	1983
301– 400	543	426(16)	34(4)	33(13)	–	–
401– 500	612	295(16)	16(2)	113(3)	197(4)	22(3)
501– 600	486	288(20)	218(2)	264(5)	439(4)	291(4)
601– 700	487	344(11)	534(2)	427(4)	1379(3)	473(3)
701– 800	486	384(15)	1737(3)	506(6)	1862(6)	1446(5)
801– 900	530	697(6)	2783(4)	2865(6)	1732(7)	2914(8)
901–1000	430	440(3)	2762(10)	1753(9)	3520(5)	2686(16)
1001–1100	536	938(4)	1831(6)	1504(1)	1139(7)	1492(10)
1101–1200	549	–	1146(1)	–	623(1)	2749(5)
1201–1300	598	–	–	–	–	454(1)
301–1300	5257	397(91)	1699(34)	879(47)	1518(37)	1914(55)
Biomass index		479	1183	912	1286	1351
% of area surveyed		78.2	88.6	78.2	78.3	89.7

In 1979 fish 40–41 cm long were relatively abundant in Subarea 0; in 1980–1982 with their growth the peak of the mode gradually moved to the right (Fig. 4). In 1983 fish aged 9–10 approached the length of 54–63 cm and, in fact, formed the basis of the commercial stock. The limited fishery for Greenland halibut in this area and their low natural mortality in this period of life make a further increase of halibut biomass possible in this Subarea.

The length composition of Greenland halibut in Div. 3K, where mainly young fish dwell, is indicative of a considerable amount of growing speciemns which will recruit to the commercial stock in 1985 (Fig. 5). The decreasing length composition of Greenland halibut under the absence of fishery in Divs. 2GH also shows a good recruitment of young fish to the stock (Fig. 6).

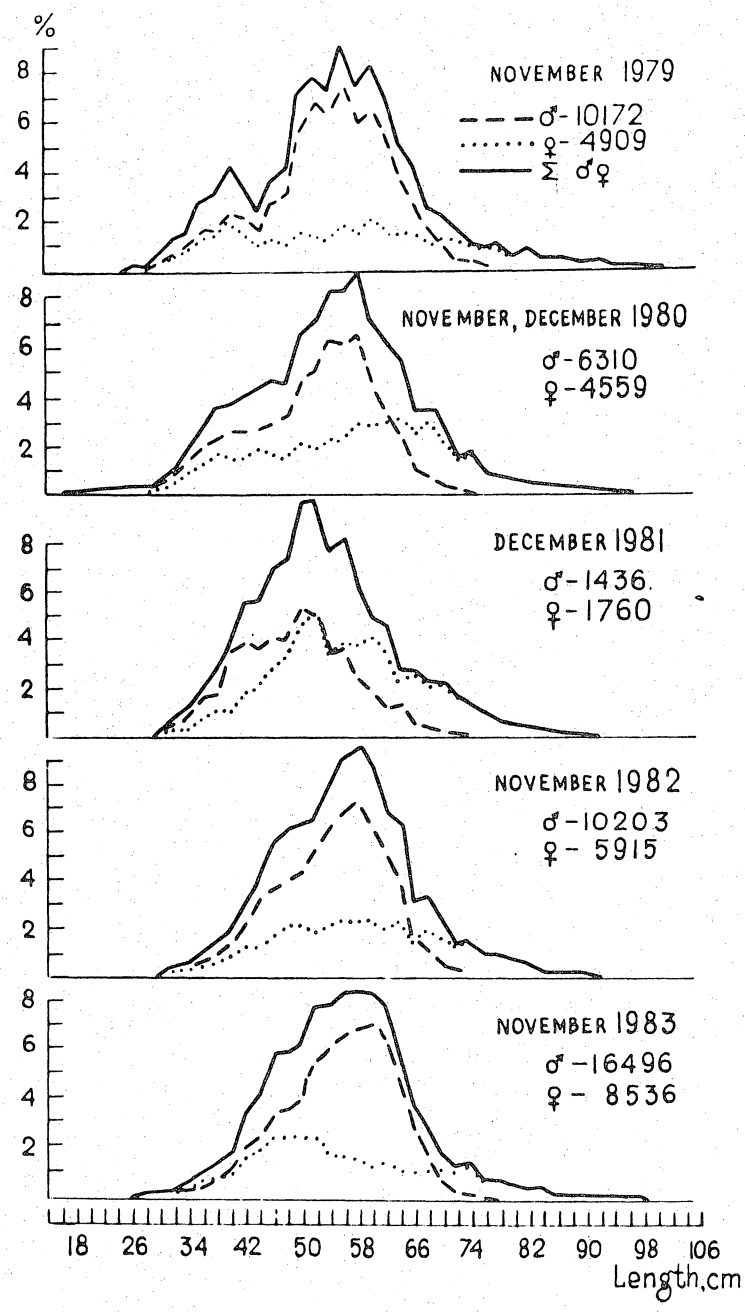

Fig.4. Length composition of Greenland halibut males and females from bottom trawl catches in Subarea 0 in 1979-1983.

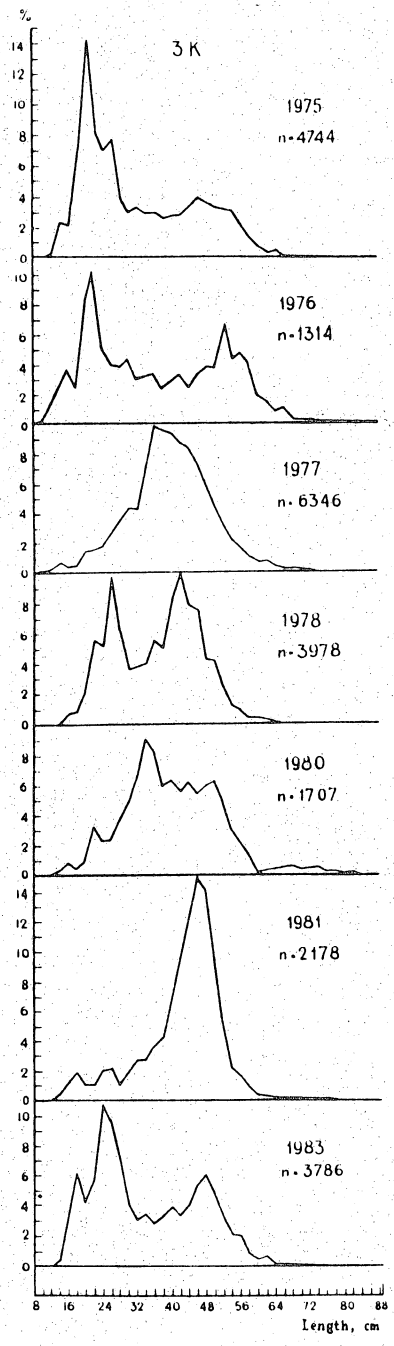

Fig.5. Length composition of Greenland halibut from bottom trawl catches on the shelf of NAFO Div.3K in 1975-1983.

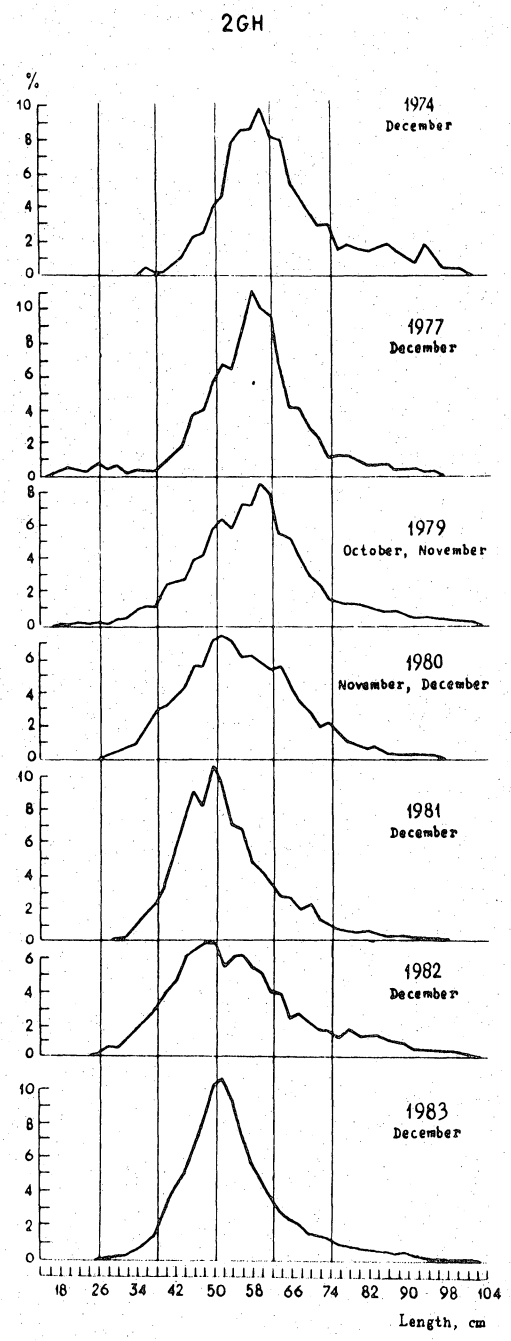

Fig.6. Length composition of Greenland halibut from bottom trawl catches in the North and Central Labrador areas (2GH) in 1974–1983.

Thus, basing on the analysis of fishing-biological indices, it may be concluded that the state of the Greenland - Canadian population of Greenland halibut is at a rather good level and, especially, in Divs. 2GH and in Subarea 0. The yield of this species may be greatly increased in these Divisions. A significant increment of halibut by-catch in the directed fishery for grenadier testifies to a growth of halibut abundance on the continental slope in recent years (Chumakov, Savvatimsky, report to the NAFO Scientific Council Meeting, 1984).

2.2. Surveys of demersal fishes in Divs. 3KLMNO

In 1983 the trawl survey of demersal fish stock in Subarea 3 was performed by MB-2645 "Suloy" from 16 April to 15 August by the method of random hauls accepted in NAFO.

As in last years, a bottom trawl of the 1625-A type was employed.

To determine the trend of stock variations for 1981-1983 the relative indices of abundance and biomass were smoothed by the formula $\hat{x}_i = \frac{x_{i-1} + 2x_i + x_{i+1}}{4}$ where x_{i-1}; x_i; x_{i+1} - preceding, medium and subsequent members of the sequence; $\hat{x}_i$ - the calculated one. Using the method of smoothing of the trawl survey relative indices the main tendencies in the variations of demersal fish stock are revealed.

Cod. The data of trawl surveys in Divs. 3KL show that after a significant decline of commercial stock in 1973-1974, low and, more rarely, mean abundant year classes recruited to the Labrador stock of cod. As a results (Fig. 7), the abundance of the stock stabilized at a low level. The cod fishery limitation introduced in 1977 promoted the steady growth of stock biomass in spite of a poor recruitment. The total increment of the Labrador cod biomass is, apparently, more significant than is shown in Fig. 7, because it is known that the bulk of large cod feed in the coastal waters of Newfoundland during the trawl survey and are beyond its range.

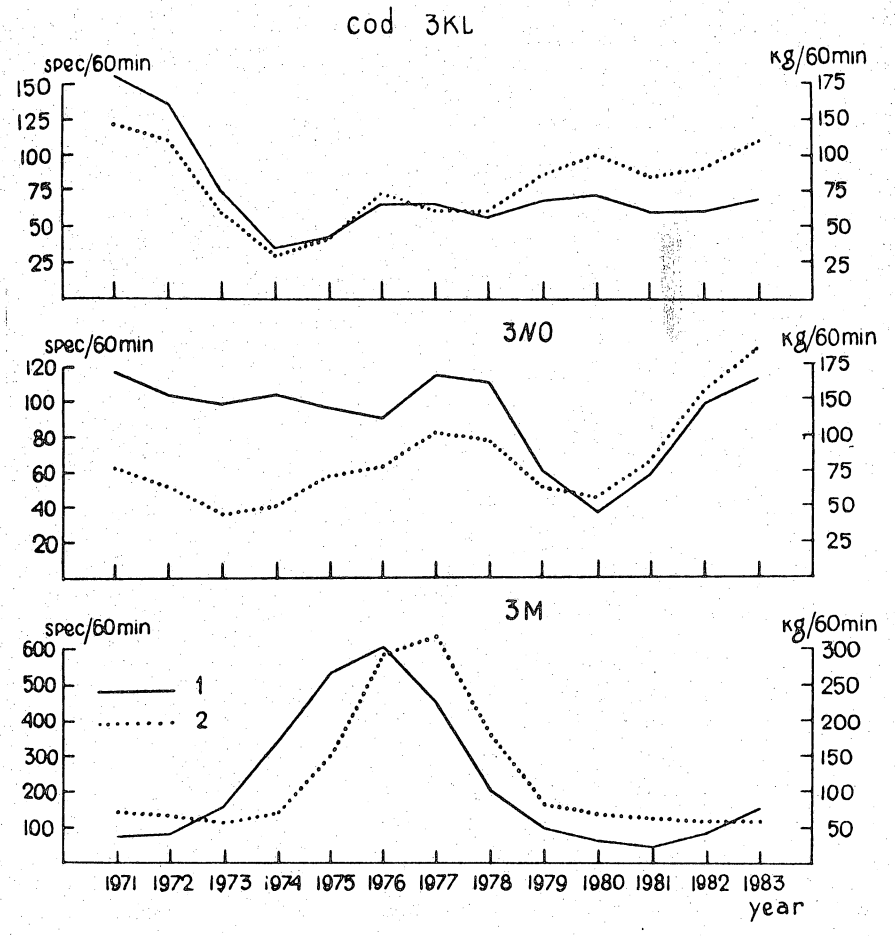

Fig.7. Dynamics of average catches of cod according to the data of trawl surveys in Divs. 3KL, 3NO, 3M in 1971-1983 (smoothed data) I - spec./60 min. of trawling; 3 - kg/60min.)

Following cod measurements and age composition studies in 1983, specimens 48-71 cm long (5- and 6-year olds of the 1978, 1977 year classes, as well as 8-year olds of the 1975 year class) dominated in the stock (Table 3).

Cod in Divs. 3NO. Using the method of smoothing of cod abundance and biomass relative indices obtained during the trawl surveys in 1971-1983, the tendency in stock variations is revealed (Fig. 7). The data obtained agree to a great extent with the dynamics of fishery and recruitment to the Newfoundland

cod stock in these years. Thus, in 1974-1977 a gradual increase in biomass at the expense of growing average weight of specimens from abundant 1973, 1974 and 1975 year classes was observed. A sharp decline of abundance and biomass indices in 1979 and 1980 resulted, apparently, from a notable catch of cod in these years.

Table 3. Age composition of cod in the catches from Newfoundland and Flemish Cap areas in 1983, °/₀₀.

Age, years	Year class	3K	3L	3N		3O	3M	
		Jul	May	Jan	Jun	Jun	Mar	May
1	1982	1	12	-	38	234	-	65
2	1981	60	42	133	115	129	376	528
3	1980	134	147	336	175	189	103	200
4	1979	50	87	204	117	137	168	32
5	1978	246	157	219	213	107	251	119
6	1977	136	248	82	182	107	42	30
7	1976	77	182	19	75	43	49	6
8	1975	133	53	6	31	37	10	12
9	1974	85	25	-	37	14	-	3
10	1973	53	37	1	15	2	1	-
11	1972	17	4	-	2	1	-	2
12	1971	8	4	-	-	-	-	2
13	1970	-	1	-	-	-	-	1
Relative amount, °/₀₀		1000	999	1000	1000	1000	1000	1000
Average age, years		5.9	5.6	3.9	4.7	3.5	2.7	2.8

In 1981-1983 a new rise in relative indices of cod stock was observed, which was caused by the entrance of abundant 1977-1980 year classes to the stock. On approaching the fishing length, fish of these year classes aged 3-6 increased greatly the biomass of the Newfoundland cod exceeding the level of preceding years.

It should be stressed that before early 80s the curves of abundance and biomass indices, given in Fig. 7, were rather separated, while beginning with 1979 their conjugation becomes prominent. We tend to explaining this by the level of fishery

established since 1980, which does not produce a negative effect on growing biomass and restoring abundance.

In 1985 the bulk of cod catches will include 5-7 year olds of abundant 1980-1978 year classes, 3- and 4-year olds of the 1982 and 1981 year classes the abundance of which was preliminarily estimated as average or below average. Cod abundance is expected to be stabilized at the 1983 level, while the biomass increment will be insignificant under a current rate of exploitation.

Cod of Div. 3M. The biomass of cod on the Flemish Cap remains low (Fig. 7). According to the trawl survey data obtained in April-May 1983 by MB-2645 "Suloy", a notable recruitment of young fish of the 1980, 1981 and 1982 year classes to cod stock was observed. Young fish aged 1-3 amounted to 79% of the total number of cod in catches. Fish 24-26 cm long - 2 - year olds of the 1981 year class prevailed (Table 3). Specimens 48-50 cm long - 5 - year olds of the 1978 year class dominated in the spawning stock. Turning up of abundant 1981-1982 year classes not only prevented cod abundance from the decline, but also the tendency to its growth emerged (Bulatova, report to the NAFO Scientific Council Meeting, 1984).

In 1985 the basis of cod commercial stock will be formed of fish 45-55 cm long - 4-year olds of an abundant 1981 and 5-year olds of an average abundant 1980 year classes. A further increment in cod abundance and biomass is expected.

Redfish. Redfishes are of great importance for the Soviet fishery in the Northwest Atlantic. The bulk of redfish catches is composed of Sebastes mentella, the most abundant species.

In 1983 the USSR commercial ships fished for Sebastes mentella mainly in Divs. 3MNO and in the economic zone of Canada - 3K. The total catch of redfish by separate stocks is given in Appendix 2.

According to the trawl survey data (Fig. 8), redfish stocks in all areas started restoring immediately after the introduction of fishery limitations in these areas, i.e. since 1977. Thus, the Figure shows that the stock of Sebastes

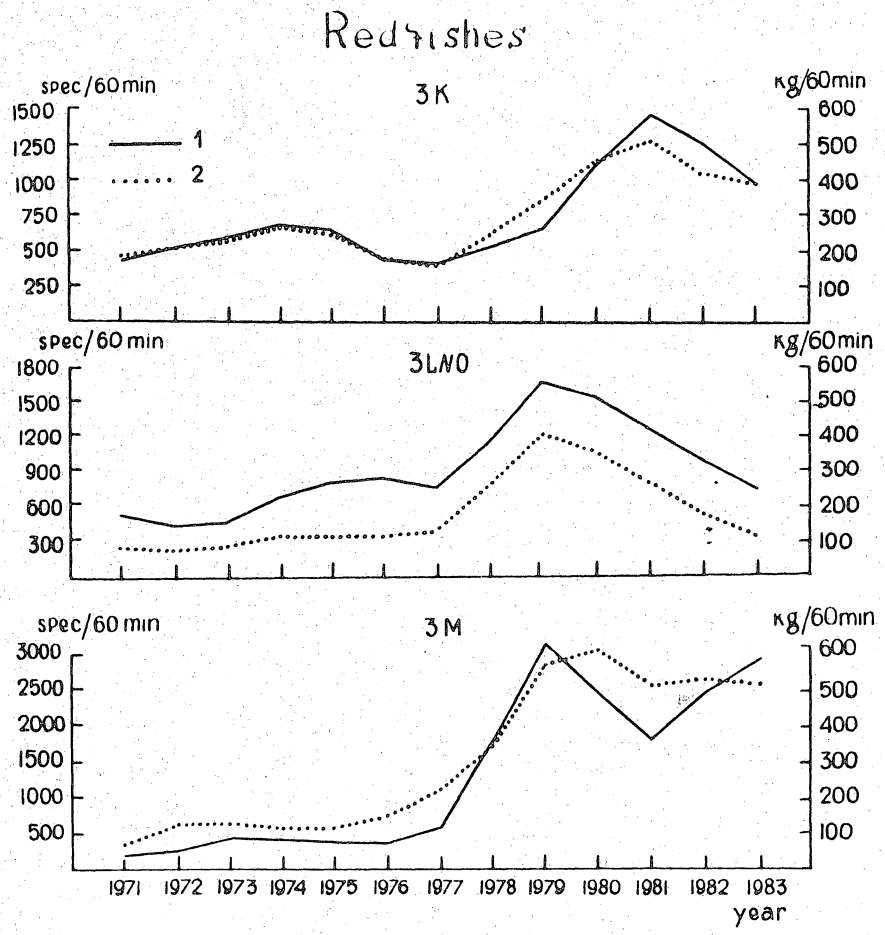

Fig.8. Dynamics of average catches of redfish Sebastes mentella according to the data of trawl surveys in Divs. 3K, 3LNO, 3M in 1971-1983, (smoothed data); I - spec./60 min. of trawling; 2 - kg/60 min.

mentella on the Flemish Cap increased greatly in 1978-1980 as compared with 1971-1976. The similar variations in relative indices of abundance and biomass occurred in other stocks. But the data of subsequent trawl surveys demonstrate the decline in redfish stocks both on the Flemish Cap and in Divs. 3K and 3LNO which, to our mind, cannot be accounted for by the intensive fishery. This problem may be solved by comparing the relative indices of the stock with the data on length composition. Thus, on the Flemish Cap the relative abundance of the stock decreased because of poor recruitment of young fish to the stock in 1980 and 1981, but the biomass index changed slightly owing to the increment of fish weight of older age groups. In 1985 redfish catches are expected to

be composed of fish 30-35 cm long aged 11-13. However, on the whole these year classes will be poor, because their abundance is greatly reduced by the fishery in preceding years and by natural mortality. Taking into account a low abundance of fish 18-25 cm long (Fig. 9) which will recruit commercial stock in 1984 and 1985, the decrease of stock biomass is expected even with cessation of fishery in 1984. Apparently, a certain reduction of TAC for 1985 will be reasonable. Besides, this is necessary for elimination of negative effect produced by fisheries on abundant 1977, 1978 year classes which will provide a good recruitment of commercial stock in 1986-1987.

In the Newfoundland area (3LNO) redfish stock is at the medium level. The data on length composition (Figs. 10, 11) are indicative of the availability of a great amount of young fish 14-18 cm long which will recruit commercial stock in 1985. As a result, the stabilization of the stock at the achieved level with a further growth of biomass is expected in 1985.

The redfish stock in Div. 3K is of above average level (Fig. 8). It should be stated that the stock assessment data refer, in fact, to the mixture of two related species - Sebastes mentella and S. fasciatus Störer considered as a single commercial stock. Nevertheless, the differentiated trawl estimates of redfish stocks in all surveyed areas will be absolutely essential in future.

Flatfishes. Currently the USSR commercial ships do not fish for flatfishes in the Northwest Atlantic. Some fish are taken as a by-catch during cod and redfish fisheries in Divs. 3M and 3LNO (Appendix 1).

Relative abundance and biomass of American plaice on the Grand Newfoundland Bank (3LNO) varied slightly without any evident dependence on the catch. In 1979 to 1982 the increase of average length and weight of fish in the catches was observed.

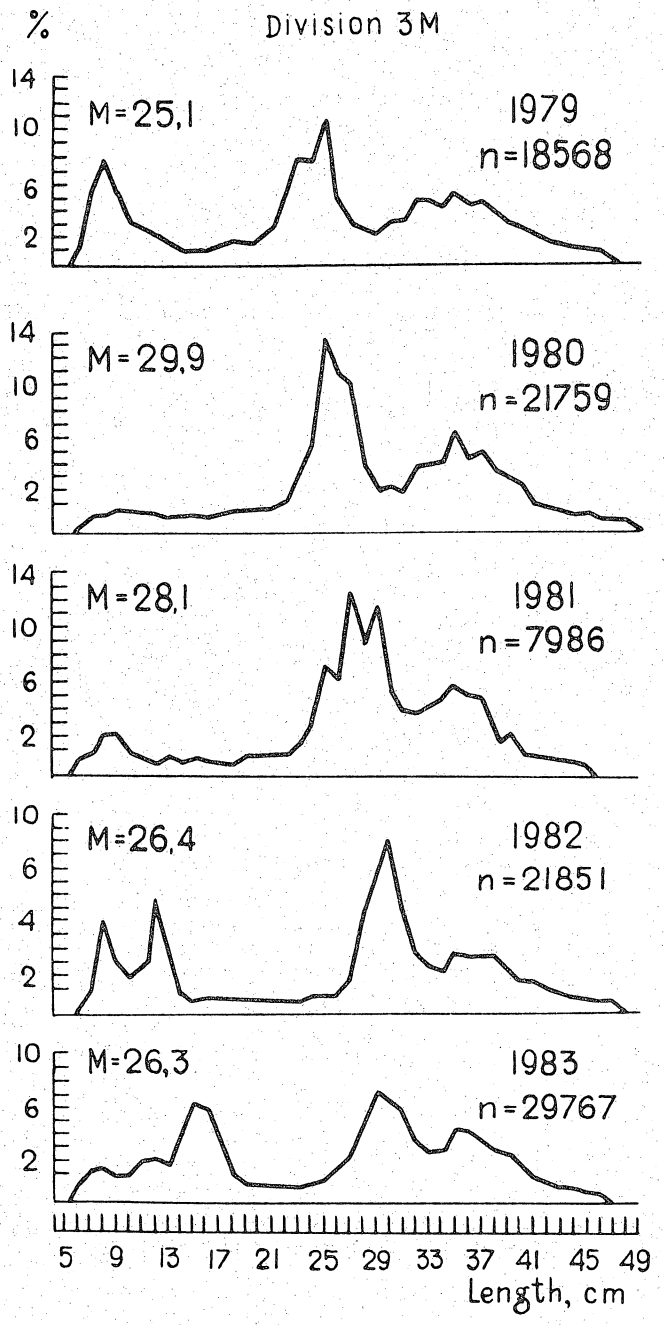

Fig.9. Length composition of redfish Sebastes mentella from bottom trawl catches on the Flemish Cap in spring - summer 1979-1983.

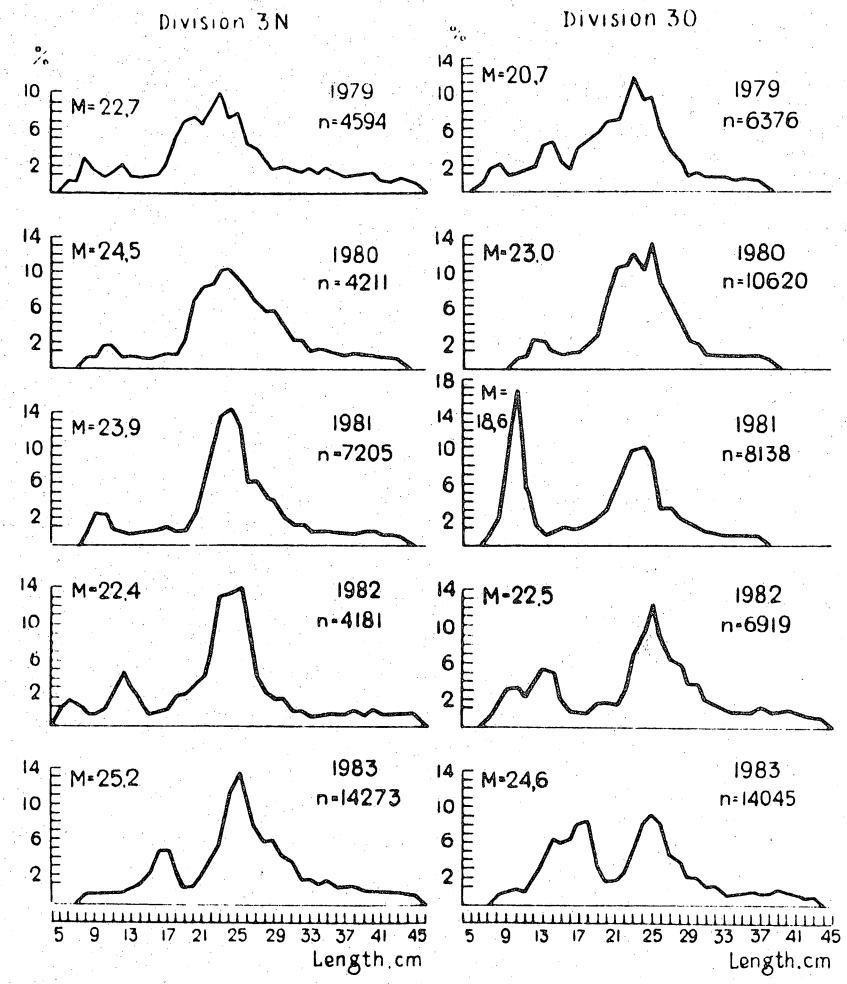

Fig.10. Length composition of redfish Sebastes mentella from bottom trawl catches in NAFO Divs. 3N, 3O in spring-summer 1979-1983.

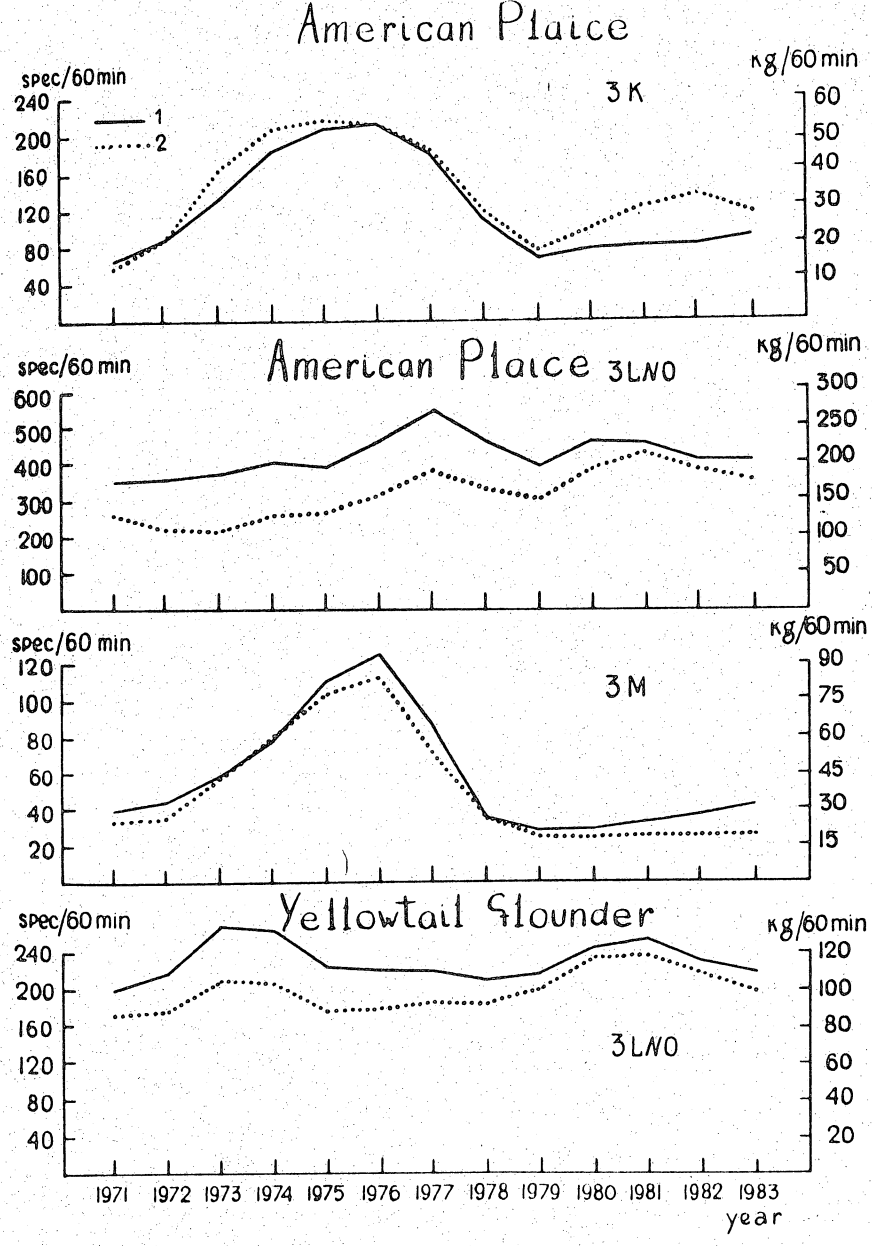

Fig.11. Dynamics of average catches of American plaice and yellowtail according to the data of trawl surveys in Divs. 3K, 3LNO, 3M in 1971-1983 (smoothed data); 1 - kg/60 min. of trawling; 2 - spec./60 min.

In the chart it is represented by the convergence of the relative abundance and biomass curves(Fig. 11). The American plaice stock in Divs. 3LNO is of average abundance. As is seen from Fig. 11, the reduction of the American plaice and cod stocks on the Flemish Cap took place simultaneously. This, no doubt, resulted from their ranges overlapping and being equally available for fishery. That is why the intensive fishery for cod on the Flemish Cap in 1976-1978 caused a substantial decrease of the American plaice stock.

According to the data of trawl surveys in Div. 3K (Fig. 11) in 1979-1981, the abundance of American plaice remained constant. In 1979 to 1982 the increase of mean length and, especially, mean weight of fish in the catches was observed. All these testified to a certain underexploitation of the stock. In 1983 the biomass of commercial stock somewhat declined which is, apparently, connected with the growth of the catch or redistribution of flatfishes in this area.

In order to determine the trends in variations of the yellowtail flounder stock on the Grand Newfoundland Bank, the relative indices of abundance and biomass were summarized by Divs. 3L, 3N, 30 (Fig. 11). As is seen from the Figure, the relative indices of yellowtail flounder abundance and biomass varied insignificantly. Two peaks in the stock growth may be singled out - 1972-1973 and 1979-1980. A certain decrease of the stock was observed in 1981 to 1983.

Haddock. In June 1983 haddock were mainly distributed on the Grand Bank at 50-380 m, water temperature at the bottom being 1.2-10°C. The highest catch - 1,268 spec. per trawling hour - was taken in Div. 3O 90 m deep at 8°C. In Div. 3N in depths of 60-230 m the catches did not exceed 164 spec. per trawling hour. Fish 28-33 cm long of the 1981 year class prevailed in the catches. The 1982 and, especially, 1980 year classes are poor but still the most numerous for the survey period except the 1981 year class which is estimated as abundant.

Roundnose grenadier. In 1983 mass measurement of roundnose grenadier was carried on by PINRO research ships in Div. 3K and Subarea 2 (Fig. 12). Besides, special investigations of grenadier - halibut ratio in bottom catches from different depths of the continental slope in Subareas 0, 2 and Div. 3K were performed (Chumakov, Savvatimsky, report to the NAFO Scientific Council Meeting, 1984).

2.3. Estimating the abundance of capelin pre-recruits.

In November 1983 the RV "Kokshaisk" carried out the trawl survey to obtain the relative estimate of abundance of capelin pre-recruits of the 1982-1983 year classes in Divs. 3LNO. The gear and survey methods were similar to those employed for 0-group surveys by Soviet and Norwegian investigators in the Barents Sea. The obtained results show that this technique may be applied to estimation of the strength of the year classes at the larval stage (0+). In order to assess the yearlings (1+) it is, apparently, more reasonable to use the trawl-acoustic method, as far as at this stage capelin form separate concentrations which are registered by hydroacoustic equipment, and can avoid a fishing gear.

The total area where capelin larvae were found embraced about 60 thou. sq. miles. The maximum catch per mile of trawling was taken in Divs. 3NO and amounted to 22.4 thou. spec. The greatest number of capelin yearlings was caught in the north of the survey area and, apparently, their main portion were distributed in Div. 3K and was not surveyed.

The length composition of larvae ranged from 29 to 65 mm. The length frequency of capelin is represented by speciemns 7.5-11.5 cm long.

2.4. Echo surveys of capelin stocks.

In 1983 the RV "Poisk" carried on the yearly investigations of abundance and assessed the Newfoundland capelin by means of Simrad EK-38A echo sounder and home-made SIORS-I digital 5-channel echo integrator. The biological material was collected by a mid-water trawl with a small-meshed netting.

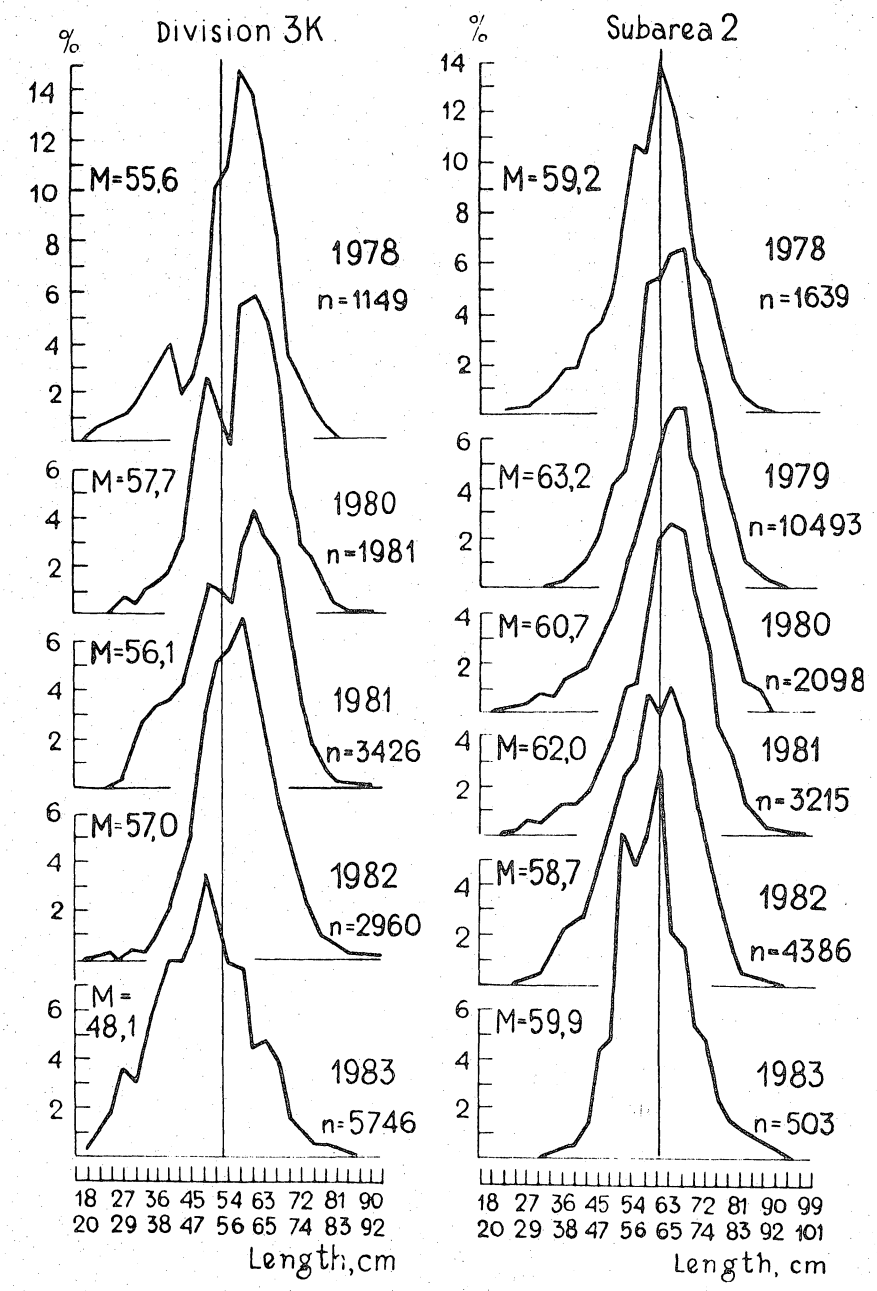

Fig.12. Length composition of roundnose grenadier from bottom trawl catches (M- mean length, vertical lines - mean long term length).

The results of the echo survey carried out in Divs. 3LNO from 7 to 20 June showed that the total abundance of capelin is 13,300 mil. spec., and biomass - 346 thou. t.

Capelin were concentrated mainly on spawning grounds of south-western slope of the Grand Newfoundland Bank (3N) and included pre-spawning specimens 13-18 cm long of the 1979 and 1980 year classes (Table 4). Immature capelin of the 1981 year class were distributed in the northern areas of Div. 3K and were not covered by the survey.

Table 4. Age composition of capelin (°/₀₀) in mid-water trawl catches.

Year class	Age	3L(June)		3N(June)		3O(June)		2J(November)	
		Males	Fem.	Males	Fem.	Males	Fem.	Males	Females
1982	1	-	-	-	-	-	-	20	50
1981	2	30	80	-	17	-	60	230	490
1980	3	90	460	53	163	70	210	250	390
1979	4	130	190	123	440	80	410	60	60
1978	5	20	-	127	77	100	70	-	-
Relative amount, °/₀₀		270	730	303	697	250	750	560	440
Number of specimens examined		27	73	91	209	25	75	56	44

The investigations performed from 12 to 19 November in Divs. 2J and 3K revealed significant concentrations of capelin on the southern slopes of the Hamilton Bank (2J). According to the obtained data, the total abundance of capelin was 41,500 mil. spec., and biomass - about 852 thou. tons. Specimens 13-16 cm long of the 1981-1980 year classes formed the basis of concentrations.

Thus, the results of both surveys show the intensive recovery of capelin commercial stock both on spawning grounds and in feeding areas at the expense of entering highly abundant 1979-1981 year classes to the stock.

SECTION II

SUBAREA 4

A. Status of Fishery

Silver hake

In 1983 the USSR was allocated by Canada 43 thous. tons, out of the 80 thous. tons of the total allowable catch of silver hake on the Scotian shelf. The USSR catch was 25.5 thous. tons which accounted for only 59% of the allocated quota. As in the recent years, the Soviet fishery was performed on the shelf slopes in the region alloted for the foreign fishing. From mid-April to the second ten-day period of June the ships of the BMRT class conducted a relatively intensive fishing for hake using bottom trawls first at 120-360 m depths and later, in June, at 120-150 m depths. In the third ten-day period of June the silver hake moved to lesser depths beyond the small mesh gear line. The ships had to leave the fishing ground, and the allocations have not been caught.

The bulk of the silver hake catches was represented by the individuals with the body length of 24 to 35 cm, at the age of 2 to 4 (tables 1 and 2). A strong 1981 year class, which accounted for 42.6% on the average, predominated in the catches. In 1984 the three year olds of the strong 1981 year class, and relatively abundant 1980 and 1982 year classes will prevail. The abundance of the recruiting year classes can be calculated from the data of trawling surveys of the young fish, which have been conducted annually in October-November since 1978. So, the minimum abundance of juvenile silver hake made up $26 \cdot 10^7$ sp. in 1978, 5×10^7 sp. in 1979, 5×10^7 sp. in 1980, 107×10^7 sp. in 1981, 1.7×10^7 sp. in 1982 and 117×10^7 sp. in 1983.

It should be noted that at present the silver hake stocks in the Nova Scotian region are underexploited. Of the total allowable catch the annual removal is 50% at the most.

Table 1 Length frequencies of commercial silver hake catches(%) from the Nova Scotian region for 1981-1983

Length, cm	1981	1982	1983
10-11	-	-	-
12-13	-	+	-
14-15	-	0.1	-
16-17	+	0.4	0.2
18-19	0.2	1.0	0.5
20-21	0.4	2.2	0.4
22-23	0.3	2.1	1.4
24-25	0.8	1.9	9.7
26-27	3.9	6.5	21.2
28-29	16.4	11.9	21.2
30-31	32.1	20.7	18.5
32-33	24.4	23.5	14.5
34-35	13.0	16.6	6.8
36-37	5.2	7.6	3.2
38-39	2.1	3.3	1.3
40-41	0.7	1.3	0.6
42-43	0.3	0.6	0.3
44-45	0.2	0.2	0.1
46-47	+	0.1	0.1
48-49	+	+	+
50-51	+	+	+
52-53	+	+	+
54-55	+	-	-
56-57	+	-	-
58-59	+	-	-
60-61	+	-	-
62-63	+	-	-
Mean length, cm	31.5	31.4	29.4
Mean weight, g	224	238	198
No. of sp.	36 482	32 603	42 506
Fishing gear	trawl Hake-815	trawl Hake-815	trawl Hake-815
Mesh size	60	60	60

Table 2 Age composition of commercial silver hake catches (%) from the Nova Scotian region for 1981-1983

Age, years	1981	1982	1983
1	0.7	4.9	1.4
2	9.9	14.9	42.6
3	42.6	24.1	27.0
4	33.0	37.6	20.6
5	10.3	12.8	5.8
6	2.6	4.1	1.9
7	0.7	1.1	0.5
8	0.1	0.4	0.1
9	0.1	0.1	0.1
10	+	+	-
Mean age, years	3.5	3.6	3.0
Fishing gear	trawl Hake-815	trawl Hake-815	Trawl Hake-815
Mesh size, mm	60	60	60

Shortfin squids

For 1983 the USSR quota for the shortfin squids was 5 thous. tons. The species occurred in the catches individually, which indicates that the commercial aggregations were absent from the Nova Scotian region. Probably the shortfin squid stocks are depressed and the possibility of fishing for this species in 1984 is rather problematic.

B. Special Studies

Distribution and abundance of the young shortfin squids in 1983

The expedition conducted on board the BMRT GIZHIGA in 1983 concluded a five-year series of studies. The scientific-research works covered the period from 10 March to 14 June and the NAFO Subareas 3 and 4 between the Gulf Stream and North-Atlantic Current and the Canada shelf.

The scientific personnel was represented by 9 scientists. The Canadian scientists did not participate in the research works.

The main tasks of the expedition involved:

1. Inventory survey of the young shortfin squids aimed at the calculation of the abundance index and assessment of the relative stock size.

2. Collection of materials for elucidation of the impact of abiotic components of the Northwest Atlantic ecosystem (Gulf Stream, its meanders, warm-core eddies, frontal zones) on the shortfin squid distribtuion.

3. Collection of materials for the shortfin squid biology studies.

During the works the vessel made 21 680 mi., 415 hydrological stations were occupied, 115 plankton and 425 trawl sets made, 3 491 specimens of shortfin squid measured and 1 961 analysed; the collection of the cephalopod samples numbered 25 646 sp. All the primary results were duplicated and forwarded to the Canadian side.

As is evident from the results the biomass of the squids in the Nova Scotia and GNB regions decreased 1.5-2.0 times compared with 1981 and 1982.

In 1982-83 the major peak of spawning shifted from February to April, therefore the migration of the squids to the shelf evidently took place in September-October.

Trawling survey for young silver hake

In 1983 a trawling inventory survey of the young silver hake (0+) of Nova Scotia was made by the Soviet and Canadian scientists from 1 to 23 November by SRTM 8086 "1500 Let Kievu". 64 sets with the IGYPT trawl were made by night - three stations each night (near the bottom, in the water column and at the surface); tows were 30 minutes in duration, and the trawl was towed at the speed

of 3.5 knots. In most cases the catch of the young silver hake exceeded 100 sp. per set. Dense silver hake aggregations (over 500 sp. per set) were recorded in the Nova Scotian trough area between the zones of upwelling and sinking waters. The surface water temperature in the area was 11-13°C; at the depth of 50 m it was 3-6°C, and at the bottom - 7-8°C with the vertical thermocline of 3-12° at the depth of 35-50 m.

The body length of the young hake in the catches ranged between 2 and 11 cm, 6.3 cm on the average. In 1983 the total minimum abundance of the young silver hake (0+) on the Scotian shelf was 117 x 10^7 sp., which is 63 times as large as in 1982.

Appendix 1.

USSR catches in Subareas 0, 2 and 3 in 1982-1983 (t)

Species	NAFO areas	1982	1983
Cod	2GH	1788	-
	2+3KL	452	159
	3NO	3985	3238
	3M	1262	1264
	4VWX	45	201
Haddock	4VWX	53	166
	3NO	3	4
Redfish (Sebastes mentella)	2+3K	3073	3722
	3LN	11021	9012
	3O	8717	5670
	3M	10916	14517
	4VWX	96	44
Roundnose grenadier	0+1	43	46
	2+3	2689	933
American plaice	2+3K	8	11
	3M	1002	1238
	3LNO	67	170
	4VWX	6	32
Witch flounder	2+3KL	552	516
	3NO	1969	1942
Greenland halibut	0+1	965	818
	2+3KL	980	176
Capelin	2J+3K	9677	10497
Silver hake	4VWX	47261	27377
	3NO	9	-
Saithe	4VWX	297	226
Yellowtail flounder	3LNO	-	-
Herring	4VW	10	3
Mackerel	3+4	3	8
Argentine	4VWX	201	351
Squid Illex	3+4	124	3
Others		1911	2717
Total		109185	85101

Appendix 2.

List of hydrological observations carried out by PINRO ships in NAFO area in 1983

Sections, grid of stations	Date of observations	Ship, Cruise	Number of stations	Elements observed
1	2	3	4	5
		SUBAREA 0		
Trawl stations	06-II.II.83r. I5-I6.II.83r. I8-29.II.83r.	MB -2645 "Suloy ", 29	36	T, S°/oo
		SUBAREA I		
Trawl stations	II-I8.II.83r.	MB -2645 "Suloy ", 29	I2	T, S°/oo
		SUBAREA II		
Section 8-A	0I-03.II.83r.	MB -2645 "Suloy ", 29	I0	T, S°/oo
Seal Island Section	03-04.II.83r.	MB -2645 "Suloy ", 29	7	T, S°/oo
Trawl stations	I3-I7.II.83r.	MI -0833 "Poisk ", 46	26	T, S°/oo
Trawl stations	30.II.-30.I2.83 r.	MB -2645 "Suloy ", 29	36	T, S°/oo
		SUBAREA 3		
Trawl stations	03.0I--20.02.83r.	MB -2645 "Suloy ", 26	66	T, S°/oo, O^2 P, Si
Flemish Cap Section	03-04.03.83r.	MG -I356 "Kokshaisk ", 2	7	T, S°/oo
Flemish Cap ground	08-3I.03.83r.	MG -I356 " Kokshaisk", 2	42	T, S°/oo
Coast Guard-4 Section	04-05.04.83r.	MG -I356 " Kokshaisk", 2	I2	T, S°/oo

Appendix 2 (continued)

1	2	3	4	5
Trawl stations	01-02.03.83 г. 01-03.04.83 г. 06-12.04.83 г.	MG -1356 "Kokshaisk ", 2	38	T, S°/₀₀
Section 4-A	16-17.04.83 г.	MG -1356 " Kokshaisk", 2	6	T, S°/₀₀
Flemish Cap ground	16-23.04.83 г. 25-29.04.83 г.	MB -2645 "Suloy ", 27	76	T, S°/₀₀
Flemish Cap Section	24.04.83 г.	MB -2645 "Suloy ", 27	6	T, S°/₀₀
Trawl stations	01-15.05.83 г.	MB -2645 " Suloy", 27	7	T, S°/₀₀
Section 4-A	26-27.05.83 г.	MB -2645 "Suloy ", 27	9	T, S°/₀₀
Section 7-A	27-28.05.83 г.	MB -2645 " Suloy", 27	8	T, S°/₀₀
Trawl stations	17-31.05.83 г.	MI -8206 "Gemma ", 27	42	T, S°/₀₀
Trawl stations	29.05-11.06.83г.	MB -2645 "Suloy ", 27	20	T, S°/₀₀
Coast Guard-4 Section	11.06.83 г.	MB -2645 "Suloy ", 27	5	T, S°/₀₀
Trawl stations	12-27.06.83 г.	MB -2645 " Suloy", 27	49	T, S°/₀₀
SW Grand Banks Section	27-28.06.83 г.	MB -2645 "Suloy ", 27	5	T, S°/₀₀
Trawl stations	28.06-04.08.83г.	MB -2645 " Suloy", 27	135	T, S°/₀₀
Trawl stations	14.10-01.11.83г.	MB -2645 "Suloy ", 29	39	T, S°/₀₀
Trawl stations	08-18.11.83 г.	MI -0833 " Poisk", 46	15	T, S°/₀₀
Trawl stations	31.10-21.11.83	MG -1356 " Kokshaisk", 4	56	T, S°/₀₀
Flemish Cap Section	22-23.11.83 г.	MG -1356 " Kokshaisk" 4	16	T, S°/₀₀
Trawl stations	26.11-09.12.83г.	MI -0833 " Poisk ", 46	49	T, S°/₀₀
Trawl stations	24.11.83- -10.01.84 г.	MG -1356 " Kokshaisk", 4	69	T, S°/₀₀
TOTAL			904	stations

Appendix 3

LIST of biological surveys carried out by Soviet ships in NAFO Subareas 0,2,3 in 1983

Subarea	Div.	Nation	Month	Type of survey	Number of hauls
0	B	USSR	Nov.	Groundfish (Greenland halibut)	71
2	GHJ	-"-	Dec	-"-	75
	J	-"-	Nov	Capelin (acoustic)	-
3	K	-"-	Jan	Groundfish (Greenland halibut)	33
		-"-	Jul	Groundfish	95
		-"-	Nov	Capelin (acoustic)	-
	LNO	-"-	Jun	Capelin (acoustic)	-
		-"-	May-Jul	Groundfish	246
				Capelin (larvae, juveniles)	-
	M	-"-	Apr-May	Groundfish	122
		-"-	Jun	Redfish (acoustic)	-
		-"-	Apr	Ichthyoplankton	93
		-"-	Mar	-"-	50
		-"-	May	-"-	42

Appendix 4

Length composition of cod (in °/₀₀) in catches in 1983

Length, cm	2J Jan	3K July	3L May-Jul	3N Jun	3O Jun	3M May
9-II	-	-	-	-	-	-
I2-I4	-	-	8	22	II5	65
I5-I7	-	I	4	29	II5	55
I8-20	2	I	6	8	24	98
2I-22	2	7	6	I8	29	I47
24-26	2	I9	I0	60	36	I67
27-29	8	22	25	79	48	I42
30-32	I5	I6	47	75	77	73
33-35	26	29	50	89	68	22
36-38	70	47	63	II3	82	I3
39-4I	I08	45	56	85	5I	I4
42-44	72	57	39	49	43	I8
45-47	46	56	47	38	34	39
48-50	37	77	8I	40	38	50
5I-53	29	82	98	37	37	38
54-56	4I	65	I24	5I	39	I8
57-59	6I	78	9I	38	40	5
60-62	I02	60	68	33	28	2
63-65	II3	72	39	2I	20	2
66-68	93	64	34	I5	I4	5
69-7I	64	64	22	9	7	6
72-74	45	48	I9	8	9	5
75-77	28	28	I8	9	5	5
78-80	I7	23	I6	I0	II	3
8I-83	6	I6	7	I0	5	I
84-86	6	6	6	II	5	I
87-89	2	5	4	I0	4	I
90-92	2	3	2	8	5	-
93-95	I	4	4	7	3	I
96-98	I	3	2	6	2	I
99-I0I	I	2	I	3	2	I
I02-I04	-	-	I	2	2	I
I05-I07	-	-	I	2	-	-
I08-II0	-	-	I	2	-	-
III-II3	-	-	-	I	I	I
II4-II6	-	-	-	I	I	-
II7-II9	-	-	-	-	-	-
I20-I22	-	-	-	I	-	-
I23-I25	-	-	-	-	-	-
I26-I28	-	-	-	-	-	-
I29-I3I	-	-	-	-	-	-
Above I3I	-	-	-	-	-	-
Relative amount, °/₀₀	I000	I000	I000	I000	I000	I000
Mean length, cm	55,45	52,39	5I,25	43,59	37,00	30,00
Amount of specimens	9I62	2769	8I33	9044	2630	I0989

Appendix 4 (continued)

Length composition of thorny skate (°/₀₀) in catches in 1983

Length, cm	3L (May- July)	3N
I2-I4	32	I0
I5-I7	II8	II3
I8-20	58	I22
2I-23	24	69
24-26	23	24
27-29	25	20
30-32	I6	29
33-35	I8	30
36-38	2I	48
39-4I	2I	46
42-44	23	38
45-47	28	38
48-50	3I	30
5I-53	27	3I
54-56	42	32
57-59	38	34
60-62	37	4I
63-65	49	40
66-68	62	28
69-7I	70	38
72-74	59	30
75-77	69	30
78-80	59	33
8I-83	25	2I
84-86	I6	I6
87-89	7	5
90-92	2	3
93-95	-	I
Relative amount, °/₀₀	I000	I000
Mean length, cm	50,5I	43,27
Amount of specimens	20I5	I883

Appendix 4 (continued)

Length composition of yellowtail flounder (°/₀₀) in catches in 1983

Length, cm	3L July		30 June		3N June		3N Jan Feb	
	males	females	males	females	males	females	males	females
I5	-	-	-	-	-	-	I	-
I6	-	-	-	-	-	-	I	2
I7	-	-	-	I	-	-	2	I
I8	-	-	-	I	I	I	6	4
I9	-	-	-	-	I	3	I5	2
20	-	-	-	I	3	4	I0	9
2I	-	-	-	I	4	5	3	3
22	-	-	2	3	3	8	9	3
23	-	-	I	I	5	6	I0	4
24	2	-	I	3	4	9	2	2
25	-	-	I	3	7	I3	I2	II
26	-	-	I	4	II	I4	5	I0
27	-	-	4	6	6	I7	I4	I0
28	-	I	8	I3	I0	I5	I9	23
29	I	I	8	7	II	2I	I9	20
30	I0	I	II	6	9	I8	39	29
3I	I5	3	I5	8	20	24	3I	39
32	I0	5	28	I2	23	22	43	37
33	24	8	25	I0	I6	I8	26	3I
34	5I	I3	37	I6	25	22	I6	27
35	I03	3I	79	28	46	44	45	52
36	I00	45	78	32	45	40	I7	3I
37	88	38	85	44	44	43	27	33
38	99	56	83	55	38	45	I5	33
39	70	56	6I	50	35	47	I7	I9
40	20	56	25	36	24	34	I7	3I
4I	I5	34	I6	25	I6	23	I	I5
42	-	I8	9	I2	9	I8	4	I7
43	I	9	6	I6	3	I3	6	I9
44	-	5	-	7	I	8	I	I0
45	-	6	2	6	2	I7	I	I4
46	-	4	-	2	I	8	-	8
47	-	-	I	I	I	6	-	6
48	-	I	-	2	-	4	-	5
49	-	-	-	I	-	2	-	2
50	-	-	-	-	-	2	-	I
5I	-	-	-	-	-	I	-	2
52	-	-	-	-	-	I	-	I
53	-	-	-	-	-	-	-	-
54	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-
Relative amount, °/₀₀	609	39I	587	4I3	424	576	434	566
Mean length, cm	36,28	38,28	36,07	36,78	34,63	35,23	3I,36	34,63
Amount of specimens measured	556	357	922	648	I697	2306	622	8II

Appendix 4 (continued)

Length composition of capelin (°/₀₀) in catches in 1983

Length, cm	3L (June)		3N (June)		3O (June)		3K (June)		2J (Nov)	
	males	females	males	females	males	females	males	females	males	females
II,0				+				I0	I0	3
II,5				I		I	3	7	I0	I9
I2,0		I2		I		5		I4	I6	26
I2,5	5	32		6		I2	-	2I	I6	I3
I3,0	I9	46	+	I5	2	27	3	76	22	32
I3,5	20	70	+	32	7	44	3	52	I9	5I
I4,0	I5	I73	2	37	2I	89	I0	59	38	74
I4,5	36	I00	5	68	27	97	I8	56	35	93
I5,0	27	I07	9	I07	33	I36	2I	66	67	54
I5,5	44	56	9	I23	24	89	I8	III	7I	45
I6,0	56	29	2I	I3I	42	80	42	66	77	29
I6,5	58	22	33	I0I	6I	34	80	73	45	I9
I7,0	36	I5	68	60	9I	2I	59	59	26	I6
I7,5	I0	5	67	24	37	4	28	24	32	I3
I8,0	5		49	6	I5		2I		26	3
I8,5		2	20	I	I	+				
I9,0			4							
I9,5			+							
Relative amount, °/₀₀	33I	669	288	7I2	36I	639	306	694	5I0	490
Amount of specimens measured	I36	275	I0I4	2508	70I	I24I	88	200	I59	I53

Appendix 4 (continued)

Length composition of witch flounder (in °/₀₀) in catches in 1983

Length, cm	3K July		3K January		3L May, July		3L February		2J January	
	males	females	males	females	males	females	males	females	males	females
I4-I5	-	-	I	-	-	-	-	-	-	-
I6-I7	-	-	I	-	-	-	-	-	-	-
I8-I9	-	-	-	-	-	-	-	-	-	-
20-2I	-	-	-	-	-	5	-	-	-	-
22-23	6	-	-	-	-	-	-	-	-	-
24-25	4	-	I	-	-	-	-	-	-	-
26-27	7	7	2	I	5	5	-	-	-	-
28-29	I3	6	I	I	-	-	-	-	-	-
30-3I	26	2I	I	3	5	5	-	-	-	-
32-33	22	23	4	7	5	-	-	-	-	-
34-35	26	I9	4	3	9	-	3	3	-	2
36-37	24	23	9	5	I9	I9	I0	3	-	-
38-39	42	27	27	7	53	24	5I	2I	2	2
40-4I	30	29	65	24	73	39	62	48	25	I2
42-43	53	49	76	23	II2	49	34	4I	57	I6
44-45	25	88	90	45	29	53	62	5I	82	35
46-47	20	82	60	67	I5	53	37	78	62	74
48-49	29	83	54	96	I9	I02	34	I26	33	II9
50-5I	I0	55	29	87	I5	73	I0	I26	I2	I64
52-53	4	34	8	47	24	63	-	68	-	64
54-55	-	20	6	47	-	39	-	5I	2	92
56-57	-	29	I	4I	5	I9	-	37	-	58
58-59	I	20	-	30	-	39	-	37	-	48
60-6I	I	25	-	I6	-	I0	-	7	-	27
62-63	-	II	I	4	-	5	-	-	-	8
64-65	-	3	-	2	-	I0	-	-	-	-
66-67	-	3	-	I	-	-	-	-	-	2
68-69	-	-	-	I	-	-	-	-	-	-
70-7I	-	-	-	I	-	-	-	-	-	2
Relative amount, °/₀₀	343	657	44I	559	388	6I2	303	697	275	725
Mean length, cm	39,29	46,23	44,03	49,46	42,35	48,20	42,97	48,93	44,93	5I,37
Amount of specimens measured	239	457	923	II68	80	I26	89	205	I4I	372

Appendix 4 (continued)

Length composition of witch flounder (in °/₀₀) in catches in 1983

Length, cm	3N May, June		30 June		30 January	
	Males	Females	Males	Females	Males	Females
20-2I	-	-	-	-	-	-
22-23	-	-	-	-	-	-
24-25	-	4	-	-	-	-
26-27	-	-	7	7	-	-
28-29	-	-	2I	I0	-	2
30-3I	-	-	24	I0	-	-
32-33	I9	8	3I	24	6	2
34-35	I9	8	48	28	I7	I3
36-37	II3	49	86	48	26	28
38-39	208	I40	I03	I03	59	44
40-4I	75	90	69	69	79	70
42-43	26	45	44	72	72	47
44-45	-	34	I4	2I	59	69
46-47	8	37	I7	4I	32	88
48-49	4	34	7	52	36	95
50-5I	-	49	3	I0	I9	66
52-53	-	22	-	I4	2	42
54-55	-	-	-	I4	-	I2
56-57	-	-	-	3	-	II
58-59	-	4	-	-	-	4
60-6I	-	-	-	-	-	-
62-63	-	4	-	-	-	-
Relative amount, °/₀₀	472	528	474	526	407	593
Mean length, cm	38,42	42,43	37,74	4I,I6	42,33	45,42
Amount of specimens measured	I25	I40	I38	I53	344	50I

Appendix 4 (continued)

Length composition of American plaice (°/₀₀) in catches in 1983

Length, cm	3K July		3K January		3M May		3M March	
	Males	Females	Males	Females	Males	Fem.	Males	Fem.
I4-I5	-	-	I4	I5	-	-	-	-
I6-I7	I	I	-	4	I	I	-	-
I8-I9	2	2	25	I2	3	2	I	-
20-2I	5	I3	25	I0	4	6	4	9
22-23	II	I8	33	23	II	II	7	II
24-25	2I	32	2I	20	I7	2I	23	22
26-27	3I	54	3I	48	47	42	70	59
28-29	54	I06	65	69	I02	86	90	67
30-3I	40	II6	33	90	85	I06	93	93
32-33	23	68	I5	59	35	80	44	78
34-35	I2	77	I7	78	I4	44	I3	25
36-37	I0	56	I0	70	I2	I8	II	I7
38-39	6	48	6	72	25	I0	I2	5
40-4I	3	45	-	37	38	I4	34	5
42-43	I	24	-	25	3I	9	I7	I5
44-45	I	23	-	I5	I7	II	I0	I5
46-47	-	28	-	I6	9	I6	7	25
48-49	-	23	-	I4	3	22	2	3I
50-5I	-	I7	-	I8	-	I8	I	35
52-53	-	I2	-	8	-	I4	4	2I
54-55	-	7	-	-	-	8	-	9
56-57	-	5	-	2	-	5	-	II
58-59	-	2	-	-	-	2	-	4
60-6I	-	I	-	-	-	-	-	-
62-63	-	I	-	-	-	-	-	-
64-65	-	-	-	-	-	-	-	-
66-67	-	-	-	-	-	-	-	-
68-69	-	-	-	-	-	-	-	-
70-7I	-	-	-	-	-	-	-	-
Relative amount, °/₀₀	22I	779	295	705	454	546	443	557
Mean length, cm	29,86	34, 64	26,37	33,68	32,56	34,I4	3I,70	35,60
Amount of specimens measured	73I	2576	I44	344	2390	2873	363	453

Appendix 4 (continued)

Length composition of American plaice (°/₀₀) in catches in 1983

Length, cm	3L May, Jun, Jul		3L October		3O June		3O January		3N May, June		3N Jan, Feb	
	Males	Fem.	Males	Fem.	Males	Fem.	Males	Fem.	Males	Fem.	Males	Fem.
14–15	2	2	-	-	2	5	5	-	1	1	6	5
16–17	5	6	1	-	13	25	1	9	4	4	13	11
18–19	10	12	3	-	18	31	6	7	9	16	18	17
20–21	15	27	9	6	17	29	15	24	13	18	19	18
22–23	26	29	7	4	19	26	15	24	16	24	28	21
24–25	28	37	9	7	23	36	28	30	21	31	32	28
26–27	39	42	13	12	33	43	41	50	27	47	35	27
28–29	44	48	18	23	39	48	44	72	36	52	45	43
30–31	42	43	16	32	35	54	44	67	33	45	39	35
32–33	37	33	34	59	32	41	34	48	23	37	36	40
34–35	32	44	31	66	28	50	32	42	21	40	31	40
36–37	33	52	10	50	27	49	33	47	25	42	33	37
38–39	25	56	13	64	22	59	32	51	25	56	39	36
40–41	11	52	15	54	10	43	13	41	18	49	29	38
42–43	8	34	5	57	4	28	3	37	9	37	14	40
44–45	3	34	1	64	3	23	3	19	8	35	9	36
46–47	2	26	-	40	1	22	-	22	7	36	4	26
48–49	1	22	1	59	1	20	-	18	6	40	4	24
50–51	-	13	-	44	-	11	-	14	2	24	2	15
52–53	-	7	-	40	-	7	-	8	1	12	1	7
54–55	-	6	-	48	-	5	-	7	4	12	-	5
56–57	-	5	-	21	-	3	-	3	-	9	-	5
58–59	-	3	-	18	-	5	-	5	-	8	-	3
60–61	-	3	-	18	-	4	-	1	-	6	-	3
62–63	-	1	-	20	-	3	-	3	-	4	-	1
64–65	-	-	-	7	-	1	-	1	-	4	-	1
66–67	-	-	-	-	-	1	-	1	-	3	-	1
68–69	-	-	-	-	-	1	-	-	-	2	-	-
70–71	-	-	-	1	-	-	-	-	-	1	-	-
Relative amount, °/₀₀	363	637	186	814	327	673	349	651	305	695	437	563
Average length, cm	30.22	35.01	31.95	43.03	29.43	33.67	30.51	34.47	31.90	37.24	30.82	35.46
Amount of spec. measured	3996	7008	127	555	1593	3280	519	968	2558	5830	2696	3440