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Report of USSR Investigations in the ICNAF Area, 1977

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The total catch taken by the Soviet fleet in the ICNAF Area was 390,400 tons in 1977 (Table 1), 409,700 tons less than in 1976. This decrease in catch was mainly caused by the change of limits and quotas in relation to the main commercial fish species, as well as due to the fact that the Soviet fishery was ceased to be conducted in Subarea 1 and in Division 3P.

S U B A R E A 0

A. Status of the fishery

In the second half of 1977, the Soviet fishing fleet performed fishery close to Baffin Island taking mainly deep water fish, especially - Greenland halibut. The biological characteristic of this fish species is given below.

Greenland halibut

The trawl catches taken off Baffin Land consisted as usual of males, they made about 2/3 of all the specimens caught there (Table 2). The average and the maximum lengths of females were greater than those ones of males, some females were longer than one meter in their length and more than 10 kg in their weight.

In November, 1966 males and 1025 females were dissected in order to determine the maturity stage on board R/V "Persey III".

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It appeared that more than half of males and almost I5 percent of females were at the pre-spawning condition and they will take part in the spawning the next winter. The maturity rate (i.e. the gonads weight in relation to that one of the whole fish body) was 7,3I percent on the average in riping males and 7.24 percent in riping females. Greenland halibut fed poorly, more than 80 percent of all the dissected individuals had empty stomachs. In some other stomachs one could find the most often squids, luminous anchovy, redfish,

The fluctuations in the maturity rates and those in the size composition registered in the Southern Baffin Land showed that immature Greenland halibut did not perform mass migrations but were keeping in the wintering concentrations. Mature Greenland halibut vice versa migrated always to the north, where their main spawning areas are lying.

S U B A R E A 2

A. Status of the fishery

In the first months I977, cod as the main fishing object formed much more dense and stable concentrations than in the previous years in the South Labrador area.

Cod

Small sized cod being mainly 36 - 47 cm in their length prevailed in the trawl catches (Table 3). To compare, let us remember that in January I976, the average length of cod was 48.2I cm, in February - 44.33 cm, i.e. it was considerably greater than in I977 (Report on the USSR investigations in the ICNAF Area, I976). Such a decrease in length of cod caught occurred due to the fact that the commercial stock was recruited by the young individuals of I972 and, especially, by those of I973 year - class . In January - February I977, the analysis of cod age (about I200 specimens) showed that 458 %o of the whole number of fish investigated could be related to I973 year - class, 368%o - to I972 year - class, their summade 826%o (Table 4).

One could find in Report on the USSR investigations in the ICNAF Area, 1976 just mentioned above (ICNAF Summ. Doc. 77/VI/15 page 5) the words as follows: "In 1978, the commercial catch should grow in its abundance as well". Thus, the results of investigations of the Soviet fleet conducted off South Labrador in 1978 confirmed the increased abundance of cod in that area.

Greenland halibut

The number of males and females is almost adequate in the trawl catches of Greenland halibut taken off the South Labrador area (Table 5), and, the both sexes of this fish species were less in their length than those taken off Baffin Land area (Table 2). This difference can be explained by the fact that the main spawning areas of the Greenland halibut are situated in the Davis Strait, apparently, on the southern slope of the Greenland - Canadian Ridge. Pelagic eggs and larvae are carried out with the Labrador Current waters south wards. The young specimens started the bottom mode of their life are concentrated in Divisions 3 K and 2 I. As soon as the young specimens of Greenland halibut are growing and developping, they migrate counter stream to the north. Thus, the northerner the areas of Greenland halibut are lying, the bigger are the specimens. The males are greater in their number in the most northern areas from time to time as they concentrate earlier than females near their main spawning areas and leave them some later.

B. Special investigations

I. Environment

The temperature along the standard section 8 - A is of great importance to perform assessment of hydrological conditions and to determine their effect on commercial fish species in the Labrador Subarea. The Soviet scientists accomplish temperature measurements and conduct hydrochemical investigations annually on I November

throughout the whole series of years. In I977, such investigations were performed from board R/V "Persey III", and, an extreme warming of water masses was registered in that area (Table 6). Comparing water temperatures in different areas of the section, one could conclude that both components of the Labrador Current, the cold and warm ones became weaker in autumn, I977 (Table 7). This resulted in the temperature anomalies in the main branch of the Labrador Current in the layers 0 - 200m, 50 - 200 m and 200 - 500 m and reached I.53°, I.92° and I.25° correspondingly. The temperature anomalies were 0.5I°, 0.48° and 0.35° correspondingly in the same layers of the warm component of the Labrador Current. Otherwise, the water temperature decreased in the layer 200 - 500 m; thus, the warm component became weaker.

Hydrochemical data testify also to some relaxation of the Labrador Current. In November I977, the amount of the dissolved oxygen was much lower at all the stations of the section 8 - A lying on the main branch of the Current versus November I97I (Table 8), Meanwhile, everybody knows that cold arctic waters flowing to the Labrador area from the North are always richer in oxygen than local and Atlantic waters. It is quite natural that the reduced intensity of the Labrador Current made lower the content of the dissolved oxygen in the shelf waters of Subarea 2.

The nearest analogs of I977 are hydrologically warm I965 and I966 years.

S U B A R E A 3

A. Status of the fishery

The increase in catch per fishing effort on FLemish Cap Bank, where the abundance and the biomass of cod increased sharply, is the most significant change in the fishery conditions in Subarea 3. In I977 fishery of bottom fish species and capelin developped almost by the same way as in I976.

Cod

Cod being 39 - 47 cm in their length prevailed in trawl catches taken off Flemish Cap Bank, their share made about 60 percent of the whole number of specimens measured (Table 9). Almost all these individuals related to the strong 1973 year - class (ICNAF Res. Doc. 77/VI/53).

Cod pertaining to the Labrador stock are dispersed in the northern part of Subarea 3 (Divs. 3 K and 3 L), data on the fluctuations in their abundance were already given above.

The counting of the young cod and the total trawl survey of bottom fish (see below) testify to the increase in the level of the commercial cod stock abundance and the cod biomass in the south of the Grand Bank (Divs. 3 N and 30).

Thus, there is a direct evidence of possible favourable cod fishery in future throughout all this area.

Redfish

The number of males and females of redfish Sebastes mentella was almost similar in trawl catches taken on Flemish Cap Bank (Table 10). Individuals being 30 - 34 cm long prevailed among males and those being 32 - 39 cm long - among females. In April, during the mass larvae spawning, large females increased considerably in their number. Almost all these individuals were 14 - 16 years old and could be mainly related to 1963, 1962 and 1961 year - classes (Table 11).

Data on size, sex and age composition of redfish Sebastes mentella inhabiting the northern part of the Grand Bank are given in Tables 12 and 13.

Other bottom fish species

Size and sex composition of Greenland halibut, roundnose grenadier and witch in Division 3 K are given in Tables 14, 15 and 16 (see below).

Capelin

In spring - summer period of I977 , capelin distribution and behaviour distinguished significantly from those observed in the preceeding years. Fish concentrations were keeping easterner Avalon (3 L) up to the end of May, they fed intensively on Calanus. In the previous years, the greatest number of the fish migrated through Div. 30 in the second half of May.

On I0 June I977, the first fish concentrations appeared in the spawning grounds of Div. 3 N, and the spawning process began just at the same time. In I977, an unusual capelin distribution was caused by anomalous high heat content in water masses on Grand Bank.

During the period from I7 June up to 6 July, the assessment of the spawning stock biomass and of the fish abundance was completed in Div. 3 N, which appeared to be I.0 mln tons and 3861I4.5 · 10^6 specimens correspondingly. The spawning stock increased by 0.3 mln tons in I976. Individuals at age 3 - 4 of I973 - I974 year - classes prevailed on the spawning grounds (Table I7). Investigations of capelin distribution were conducted off Northern Newfoundland Bank and Southern Labrador (3 K and 2 I) during the period from I9 up to 28 October. Basing on investigations of R/V "Persey III", it is safe to say that the capelin distribution distinguished greatly from that one of the previous years at the autumn - winter period as well. Due to anomalous high heat content in water masses of the ashore branch of the Labrador Current, capelin were keeping much closer to the shore and the greatest part of their concentrations was inaccessible for investigations. Age and size composition of capelin is given in Tables I7 and I8.

B. Special investigations

Counting of the young cod

The counting of the young cod (and haddock) is being accomplished by the Soviet ichthyologists in Subarea 3 already during

I5 years, since I970, this work is completed from board R/V "Persey III", some earlier - from board the vessel of some less capacity. To compare the results of investigations by different years, a series of trawlings was performed by equal time spans, by parallel tracks by the both vessels. A table summarizing the counting of the youngs for a long - term period was able to be made due to a suitable conversion factor (Table I9).

These data allow to explain and to forecast the fluctuations in the cod stocks as well as in the efficiency of their fishery. Thus, in I973 a very strong year class appeared in Div. 3 K (if three - year old specimens are taken into account) and in Div. 3 M (basing on the youngs of all the age groups). The I974 year-class is also strong, especially if one take into consideration that three - year olds from the Labrador stock are keeping in Subarea 3 as well. At last, the estimated number of youngs aged 2 and 3 full years allows to conclude that a rich year - class of cod is growing in the south of Grand Bank.

Total trawl survey of bottom fish species

The abundance and the biomass of bottom fish relating to all age and size groups are taken into account while conducting the total trawl survey. Tables 20 and 2I show that the cod abundance increased considerably on Flemish Cap, that happened, surely, due to the stock recruitment by two strong year - classes, It should be mentioned, however, that cod decreased slightly in their number during the period from I976 up to I977 (effected both by natural mortality and by the fishery), but, as the mean weight of one individual increased, the total cod biomass increased as well.

Almost the same fluctuations in the abundance and the biomass of cod were found in Divs. 3 K, 3 L. The abundance and the biomass of cod reached their maximum level during. 7 years of the total trawl survey in Divs. 3 N, O.

The results of the total trawl survey of Sebastes mentella are less representative. The fish are keeping partially within

the area of investigations, they descend to very great depths and remain there for a long time in the middle layers inaccessible for the bottom trawl activity. It can be apparently supposed according to data obtained that the biomass of the fish increased somewhat in Divs. 3 M and 3 O, it remained at the same level in Div. 3 K and decreased in Divs. 3 M and 3 L.

Redfish Sebastes marinus are keeping at less depths than Sebastes mentella, therefore, they can be registered with greater precision in time of the total trawl survey. The results of the survey (as well as data obtained during the process of the fishery) allow to conclude that the abundance and the biomass of redfish Sebastes marinus increased greatly on Flemish Cap Bank during the last year.

The flounder and white hake stocks fluctuate without a long-term tendency to their increase or their decrease. The stocks of the American plaice grew considerably especially in Divs. 3 L and 3 N during the last year.

S U B A R E A 4

A. Status of the fishery silver hake

In 1977, the USSR silver hake catches were 33,2 thousand tons in Divs. 4 VWX that is below the USSR quota (45,5 thousand tons). The main reason of catch decrease was the worsening of the fishery conditions due to the ban to the bottom trawl using in the traditional areas of the fishery on the Nova Scotia Shelf in the waters of Middle and Emerald Banks and Sable Island. Thus, the catches taken by BMRT type vessels per hour trawling reduced up to 2.0 tons in 1977 compared to 3,2 tons in 1975 and 2.8 tons in 1976, while the stocks of silver hake and the shortfin squid were at a good condition in 1977. These fish species made the bulk of the USSR catches during the last two years.

The silver hake fishery was conducted in the shallow waters of the shelf with application of the pelagic trawls and on the shelf slopes - with bottom trawls, mainly during the period

from March up to August inclusively. Individuals with body length ranged from 26 cm up to 35 cm or 82 % (see Table 22) prevailed in catches, those were at age two, three and four years. The two - year olds made on the overage 8, 9 percent, the tree - years old specimens - 44.I percent and those at age 4 - 28.I percent (Table 23). In I977,the mean body length and the mean age of fish increased as compared to those in I976. It is quite probable, that all happened due to the increase in mesh size from 40 mm up to 60mm

The preliminary assessment showed that in I979 the stock will be aboub 400 - 500 thousand tons that will allow to have the total allowable catch equal to 80 - 85 thousand tons.

Argentine. In I977, argentine were caught in a very restricted number as by - catch in time of the silver hake fishery on the shelf slopes. Thus, the USSR catch made only 0.2 thousand tons from April to September and the USSR quota was I2,7 thousand tons. The bulk of the argentine catches consisted of individuals having 23 - 32 cm in their length at age four - eight years (Tables 24 and 25). The lack of considerable fluctuations in the abundance of the year - classes, and a weak exploitation of this species during the last years ensured their stock concervation at the level of I00 thousand tons in I979, that allowed to recommend the allowable catch as high as 20 thou-sand tons.

Shortfin squid. In I977, the shortfin squid fishery was conducted mainly in the areas of Emerald Bank and Sable Island. The annual catch was I8,0 thousand tons. The special shortfin squid fishery was performed in June, July and in the first half of August, but in the last months it was taken as a by - catch. The catch of squid was represented by individual whose mantle length was within the range from II up to 3I cm, individuals being I8 cm - 23 cm in their length prevailed there (Table 26).

B. Special investigations

I. Environment

Hydrology. In I977, hydrological investigations were carried out on the Nova - Scotia Shelf throughout September - October in

time of the zoo - and inhthyoplankton survey from board SRTM 8004. The surface water layer was characterized by almost similar temperatures ranged from I2° C up to I5° C. High temperature gradients of shelf and warm marine waters (up to 2I° C) were observed over the shelf shopes. The thermocline was registered at 30 m - 50 m depths. Cold Labrador waters (I° C - 5° C) were recorded in 50 m - I00 m layer, and warmer waters (6°C - I0° C) were observed in the near bottom horizon from bottom up to 200 m layer.

Zoo - and ichthyoplankton. In time of the survey in September - October I977, zoo - and ichthyoplankton samples were collected at I62 stations along the Nova Scotian Shelf. The collection of samples was performed in the 0 - I00 m layer, and in shallower areas in I0 m layer from the ocean bottom. There were used a small model of the plankton collector "Bongo" with 0.600 mm and 0.076 mm mesh size of netting, a large "Bongo" model with 0.333 mm mesh size, a neiston net with I.070 mm mesh size and the Isaaks Kidd trawl with 5 mm mesh size. The results of the preliminary analysis allow to conclude that the greatest seston biomass was recorded in the Emerald Bank Area and in the shallow waters near Sable Island and Browns Bank.

The densest concentrations of silver hake eggs were encountered in the same areas, and their eggs were distributed throughout a larger area, but their highest amount was registered on Emerald Bank in the New Scotland Gut and off Sable Island. The length of silver hake larvae in samples fluctuated from 3.0 mm up to I3.8 mm, larvae 4 - 6 mm in length prevailed there, it testified to the spawning peak at that period.

Investigations of the trawl cod-ends selectivity relating silver hake

In autumn I977, investigations of trawl cod-ends selectivity made of synthetic (Kapron) webbing relating silver hake were conducted from board SRTM "Photon" off Nova Scotia in autumn I977. A series of trawlings was completed, the mesh size of the cod--ends was 60 mm, 70 mm and I20 mm. It was concluded as result

that the selection factor was about 3.2 on the average for this trawl type and the regime of trawling, the length of the fish body was, on the average, 20 cm; this related to the fish escaping through the cod-ends with 60 mm mesh size; if fish escaped through 70 mm mesh size - their body length was 20.5 cm and through 120 mm mesh - 40 mm correspondingly. As the bulk of silver hake catches made individuals being 25 - 38 cm in their length, the main fish mass or 80 percent passed through mesh in the trawl cod - ends with 120 mm mesh size. In July 1977, experiments performed from board BMRT "Yu. Varenkes" with application of the trawl "Hek - 2 m" having 60 mm mesh size in the cod - end showed that the selectivity factor was 4.3 relating four trawlings and the length of the fish body was 26.7 cm (relating to those 50 percent of which escaped through the mesh size).

Table 1. USSR catches in the Northwest Atlantic Ocean in 1977.

(in tons)

Item of fishery	Subareas I	II	III	IV	V	Total ICNAF	Stat. Area 6	Stat. Area 0	Total
T O T A L	5788	127756	185088	58122	68872	890416	88518	8810	482744
including:									
Capelin	-	100884	69679	-	-	170563	-	-	170563
Argentine	-	-	-	217	-	217	-	-	217
Atlantic halibut	-	-	81	-	-	81	-	-	81
Greenland halibut	1889	2648	1660	-	-	5697	-	2967	8664
American plaice	1113	185	2578	48	128	8997	18	-	4010
Winter flounder	-	-	-	-	7	7	8	-	10
Witch	-	245	2889	104	-	8288	12	-	3250
Yellowtail flounder	-	-	97	-	-	97	-	-	97
Cod	1086	17544	8504	101	86	27271	18	-	27289
Haddock	-	-	47	15	-	62	-	-	62
Pollock	-	-	-	140	104	244	24	-	268
White hake	-	-	12	-	189	201	125	-	826
Red hake	-	-	-	70	4779	4849	376	-	5225
Silver hake	-	-	10	35207	46179	79896	6966	-	86862
Grenadier	1671	2558	12019	-	-	16248	1	674	16923
Redfish	890	2412	28875	174	7	81858	-	169	81527
Wolffish	56	418	96	2	-	567	-	-	567
Sand Lance	-	199	1313	7	-	1519	-	-	1519
Angler	-	-	2729	2840	280	5799	7	-	5806
Sea robin	-	-	66	4	1264	1384	1411	-	2745
Butterfish	-	-	-	-	407	407	12	-	419
Herring	-	-	18	826	1066	1410	426	-	1886
Alewife	-	-	-	49	86	185	84	-	169
Mackerel	-	-	2	250	2867	8119	19728	-	22842
Sharks	-	-	85	817	4880	5882	1610	-	6942
Skates	-	-	1199	594	289	2082	1	-	2088
Other fish	78	718	2805	1528	847	5476	142	-	5618
Illex squid	-	-	924	18029	444	19897	7559	-	26956
Loligo quid	-	-	-	-	-	-	7	-	7
Flounders (not broken)	-	-	-	-	321	321	47	-	368
Other bottom fish	-	-	-	-	73	-	-	-	73
Other pelagic fish species	-	-	-	-	19	19	1	-	20

Table 2. Age and size composition of Greenland halibut taken off Baffin Island in August, September, October and November in 1977.

Total length, cm	August			September			October			November		
	Males	Females	Males and females together	Males	Females	Males and females together	Males	Females	Males and females together	Males	Females	Males and females together
I	2	3	4	5	6	7	8	9	IO	II	I2	I3
32-33										1	1	2
34-35										2	1	3
36-37										1	1	2
38-39	3		3	1		1				3	4	7
40-41	8	1	9	5	1	6	5	1	6	6	5	11
42-43	14	3	17	8	4	12	11	2	13	8	9	17
44-45	24	3	27	17	8	25	20	10	30	9	11	20
46-47	38	6	44	29	8	37	37	11	48	19	12	31
48-49	51	10	61	54	10	64	45	15	60	35	21	56
50-51	79	12	91	86	13	99	70	16	86	59	27	86
52-53	104	24	128	133	21	154	141	21	162	95	31	126
54-55	110	31	141	93	32	125	101	16	117	76	26	102
56-57	66	35	101	66	27	83	78	25	103	68	24	92
58-59	42	27	69	40	29	69	43	14	57	77	21	98
60-61	51	21	72	31	26	57	47	25	72	72	23	95
62-63	28	19	47	23	19	42	39	11	50	59	18	77
64-65	8	13	21	18	13	31	22	14	36	30	11	41
66-67	17	12	29	11	10	21	16	13	29	22	11	33
68-69	14	13	27	6	7	13	9	8	17	13	12	25
70-71	7	11	18	4	13	17	6	10	16	9	11	20
72-73	5	12	17	3	11	14	3	10	13	3	8	11
74-75	4	13	17	1	18	19	1	10	11	1	5	6
76-77	3	11	14		15	15		15	15		5	5
78-79	1	10	11		16	16		8	8	1	5	6
80-81		8	8		18	18		10	10		7	7
82-83		4	4		14	14		8	8		6	6
84-85		5	5		10	10		6	6		3	3
86-87		4	4		6	6		9	9		2	2
88-89		5	5		7	7		2	2		3	3
90-91		3	3		5	5		6	6		3	3
92-93		3	3		4	4		6	6		1	1
94-95		2	2		2	2		1	1		1	1
96-97		1	1		1	1		2	2			
98-99					2	2					1	1
100 -101		1	1		1	1						
Relative number, %o	677	323	1000	629	371	1000	694	305	999	669	330	999
Mean Length, cm	54,44	63,42	57,34	51,99	67,72	58,35	54,67	64,18	57,17	56,19	59,28	57,21
Number of specimens measured	4225	2020	6245	1405	830	2235	835	367	1202	4937	2435	7372

Table 3. Size composition of cod (‰) off South Labrador, January and February 1977.

Total length (cm)	January	February
30-32	2	
33-35	40	19
36-38	182	183
39-41	300	270
42-44	252	344
45-47	109	119
48-50	28	46
51-53	11	11
54-56	12	1
57-59	11	2
60-62	13	1
63-65	13	2
66-68	10	1
69-71	7	1
72-74	5	-
75-77	3	-
78-80	1	-
81-83	1	-
Relative number (‰)	1000	1000
Mean length (cm)	42,8	41,8
Number of specimens measured	13186	850

Table 4. Age composition, mean weight and mean Length of cod by different age groups off South Labrador, January-February 1977.

Year - class	Age (years)	Number of specimens (‰)	Mean weight, g	Mean length, cm
1974	3	39	217	34,0
1973	4	458	401	39,2
1972	5	368	716	43,0
1971	6	57	958	48,1
1970	7	17	1208	54,0
1969	8	27	1395	60,2
1968	9	18	1654	65,8
1967	10	9	1876	70,1
1966	11	6	2029	74,7
1965	12	1	2285	74,3

Table 5. Age and sex composition (‰) of Greenland halibut near South Labrador, February 1977.

Total length, cm	Males	Females	Total for males and females
34-35	1	-	1
36-37	1	1	2
38-39	1	2	3
40-41	2	4	6
42-43	9	11	20
44-45	9	8	17
46-47	25	32	57
48-49	32	46	78
50-51	42	39	81
52-53	98	100	198
54-55	47	58	105
56-57	71	82	153
58-59	41	72	113
60-61	18	29	47
62-63	14	35	49
64-65	1	14	15
66-67	1	11	12
68-69	1	11	12
70-71	1	6	7
72-73	1	7	8
74-75	-	2	2
76-77	-	4	4
78-79	-	1	1
80-81	-	1	1
82-83	-	4	4
84-85	-	1	1
86-87	-	1	1
88-89	-	1	1
90-91	-	1	1
Relative number (‰)	416	584	1000
Mean length	53,4	55,8	54,8
Number of individuals measured	823	1158	1981

Table 6. Water temperature (°C) along the hydrological section 8A (between 53°40'N, 55°44'W and 54°50'N, 53°32'W for 1 November.

Year	Depth, m		
	0 - 50	50 - 200	0 - 200
1964	1,04	0,04	0,32
1965	1,49	1,76	1,66
1966	2,41	1,44	1,72
1967	2,00	0,89	1,19
1968	2,29	-0,18	0,50
1969	0,82	0,36	0,50
1970	1,29	0,32	0,60
1971	0,88	0,43	0,57
1972	0,35	-0,39	-0,17
1973	1,00	0,59	0,72
1974	0,96	-0,02	0,27
1975	1,14	0,51	0,70
1976	0,74	0,20	0,36
1977	1,78	2,52	2,34
Mean for 1964-1974	1,30	0,60	0,81

Note: In line with new coordinates of stations made along the section 8-A (Seal Island - Cape Farewell) adopted by ICNAF, an area of the section used for calculation of average values in 1977 (analogous to that one selected for the period 1964-1977) is situated between the stations at the coordinates 53°37' N, 55°00' W and 54°37' N, 55°14' W.

Table 7. Water temperature in different layers of cold water (53°37'N, 55°00'W - 54°37'N, 53°14'W) and that of warm water (54°47'N, 53°00'W - 55°04'N, 52°30'W), components of the Labrador Current at the section Seal Island - Cape Farewell for 1 November 1977 and the longterm average, 1964-1977.

Layer , m	Cold component		Warm component	
	°C - I977	longterm average	°C - I977	longterm average
0-50	1,78	1,30	4,45	3,67
50-200	2,52	0,60	4,13	3,65
0-200	2,34	0,81	4,21	3,70
200 -500	3,21	1,96	3,68	4,03

Table 8. The content of the dissolved oxygen (ml/l) at different stations of the section 8-A, November 1971 and 1977.

Depth, m	54°02'N	55°04'W	54°II'N	54°47'W	54°26'N	54°I9'W	54°38'N	53°55' W	54°44' 5 N	53°42'5 W
	I97I	I977	I97I	I977	I97I	I977	I97I	I977	I97I	I977
0	8,66	7,80	8,43	7,87	8,36	7,82	8,19	7,74	7,93	7,76
20	8,33	7,76	8,37	7,80	8,15	7,70	8,11	7,74	7,82	7,74
50	8,36	7,64	8,22	7,31	7,92	7,14	7,98	7,39	7,86	7,30
100	8,16	7,32	7,85	7,27	7,90	7,27	7,78	7,13	7,23	6,84
200	-	-	-	-	7,17	6,83	6,85	6,77	7,50	6,73
300	-	-	-	-	-	-	6,77	-	6,91	6,54
400	-	-	-	-	-	-	-	-	6,89	6,55
Bottom	7,45	6,90	7,42	6,86	6,81	6,93	6,80	6,59	6,98	6,55

Table 9. Size composition (‰) of cod off the Flemish Cap Bank, January, March and April, 1977.

Total length, cm	January	March	April
30-32	-	29	10
33-35	-	41	36
36-38	16	112	111
39-41	58	232	158
42-44	100	267	140
45-47	325	145	83
48-50	184	70	103
51-53	172	39	109
54-56	74	26	81
57-59	35	16	51
60-62	26	6	51
63-65	7	5	32
66-68	3	1	10
69-71	-	1	6
72-74	-	1	6
75-77	-	1	2
78-80	-	1	2
81-83	-	1	-
84-86	-	1	2
87-89	-	1	2
90-92	-	1	4
93-95	-	1	2
96-98	-	1	-
Relative number (‰)	1000	999	1001
Mean length (cm)	48,45	43,31	47,77
Number of specimens measured	608	3899	506

Table 10. Age and size composition of redfish *Sebastes mentella* off Flemish Cap Bank, January and April, 1977.

Total length (cm)	January			April		
	Males	Females	Tptal fo males and females	Males	Females	Total of males and females
I	2	3	4	5	6	7
20	-	-	-	1	-	1
21	2	-	2	1	1	2
22	1	-	1	-	-	-
23	1	-	1	1	-	1
24	2	1	3	-	1	1
25	4	1	5	-	1	1
26	6	3	9	2	1	3
27	12	5	17	1	1	2
28	23	8	31	5	1	6
29	33	8	41	7	4	11
30	45	15	60	12	21	33
31	63	30	93	9	24	33
32	78	46	124	12	33	45
33	53	51	104	25	32	57
34	42	48	90	22	36	58
35	28	39	67	22	56	78
36	33	39	72	34	59	93
37	44	57	101	31	67	98
38	17	39	56	37	60	97
39	12	44	56	33	58	91
40	4	29	33	32	72	104
41	2	14	16	12	37	49
42	-	8	8	6	47	53
43	-	5	5	2	36	38
44	-	2	2	3	18	21
45	-	2	2	-	13	13
46	-	1	1	1	6	7
47	-	-	-	-	1	1
48	-	-	-	-	3	3
Relative number (‰)	505	495	1000	311	689	1000
Mean length (cm)	32,6	35,3	33,9	36,0	37,5	37,1
Number of fish measured, specimens	2143	2101	4244	456	1011	1467

Table 11. Age and sex composition, mean weight and mean length of redfish *Sebastes mentella* by different age groups, Div. 3M, April 1977.

Year-class	Age (years)	Number of specimens, ‰			Mean weight , g			Mean Length, cm		
		Males	Females	Males and females together	Males	Females	Males and females together	Males	Females	Males and females together
1968	9	2		2	250		250	28,0		28,0
1967	10	4	27	31	275	422	401	27,0	31,3	30,7
1966	11	11	51	62	382	438	428	31,2	32,6	32,3
1965	12	34	63	97	487	563	536	34,1	34,4	34,3
1964	13	39	56	95	513	595	562	34,3	35,2	34,8
1963	14	20	74	94	615	656	647	35,9	36,9	36,7
1962	15	29	74	103	648	688	677	36,8	37,4	37,3
1961	16	50	90	140	705	784	756	37,7	38,6	38,3
1960	17	37	38	75	787	849	819	38,7	39,5	39,1
1959	18	31	34	65	826	872	850	39,7	40,1	39,9
1958	19	27	49	76	890	952	930	40,1	41,2	40,8
1957	20	16	40	56	921	1018	991	40,6	42,2	41,7
1956	21	11	43	54	906	1113	1069	41,0	43,4	42,9
1955	22	2	29	31	1120	1185	1189	44,0	44,4	44,3
1954	23	2	13	15	1260	1202	1210	46,0	45,2	45,3
1953	24	-	2	2	-	1620	1620	-	48,0	48,0
1952	25	-	2	2	-	1590	1590	-	48,0	48,0
By all age groups		315	685	1000	689	769	744	37,1	38,1	37,8

Table 12. Sex and size compositions (‰) of redfish *Sebastes mentella*, Div. 3L, February 1977.

Total length, cm	Males	Females	Total for males and females
23	-	1	1
24	1	1	2
25	1	3	4
26	4	4	8
27	9	8	17
28	15	13	28
29	18	12	30
30	28	19	47
31	58	24	82
32	61	44	105
33	46	61	107
34	32	63	95
35	23	40	63
36	27	32	59
37	42	31	73
38	24	44	68
39	31	38	69
40	18	20	38
41	8	20	28
42	3	20	23
43	1	16	17
44	-	12	12
45	-	12	12
46	-	7	7
47	-	3	3
48	-	1	1
49	-	1	1
Relative number (‰)	450	550	1000
Mean Length, cm	33,8	35,8	34,9
Number of specimens measured	2875	3522	6397

Table 13. Age and sex composition, mean weight and mean Length of redfish *Sebastes mentella* by different age groups in Div. 3L, February 1977.

Year-class	Age (years)	Number of specimens (‰)			Mean weight, g			Mean Length, cm		
		Males	Females	Males and females together	Males	Females	Males and females together	Males	Females	Males and females together
1968	9	14	14	28	325	362	343	27,5	28,5	28,0
1967	10	28	28	56	406	362	384	29,9	28,7	29,3
1966	11	54	75	129	453	483	470	31,4	31,9	31,7
1965	12	71	121	192	510	576	551	32,3	33,4	33,0
1964	13	57	64	121	612	633	623	34,0	34,7	34,3
1963	14	54	53	107	663	693	678	36,1	36,3	36,2
1962	15	39	14	53	681	725	693	36,4	37,5	36,7
1961	16	32	18	50	733	910	796	37,3	39,4	38,1
1960	17	14	11	25	787	883	828	38,7	39,3	39,1
1959	18	18	25	43	960	985	975	40,2	40,4	40,3
1958	19	7	39	46	925	1127	1096	40,0	42,4	42,0
1957	20	18	18	36	1010	1250	1115	41,0	43,2	42,1
1956	21	11	21	32	1067	1350	1255	42,0	44,2	43,4
1955	22	11	18	29	1167	1250	1218	43,0	43,6	43,4
1954	23	-	18	18	-	1470	1470	-	45,8	45,4
1953	24	3	25	28	1450	1586	1568	46,0	47,4	47,2
1952	25		7	7		1650	1650		48,5	48,5
By all age groups		431	569	1000	648	797	733	34,9	36,8	36,0

Table 14. Sex and size composition (‰) of the Greenlandh halibut in Div. 3k, January 1977.

Total length, cm	Males	Females	Males and females
42-43	-	2	2
44-45	2	-	2
46-47	3	2	5
48-49	16	3	19
50-51	8	15	23
52-53	35	26	61
54-55	26	31	57
56-57	49	53	102
58-59	36	59	95
60-61	48	81	129
62-63	48	78	126
64-65	30	66	96
66-67	18	43	61
68-69	23	41	64
70-71	3	28	31
72-73	-	38	38
74-75	2	16	18
76-77	-	10	10
78-79	-	13	13
80-81	3	13	16
82-83	2	11	13
84-85	2	5	7
86-87	-	3	3
88-89	-	5	5
90-91	-	2	2
92-93	-	2	2
Relative number (‰)	354	646	1000
Mean length, cm	59,5	64,1	62,5
Number of fish measured	215	392	607

Table 15. Sex and size composition (‰) of roundnose grenadier, Div. 3K, January 1977.

Total length, cm	Males	Females	Males and females
33-35	1	2	3
36-38	5	6	11
39-41	4	3	7
42-44	12	12	24
45-47	24	13	37
48-50	41	29	70
51-53	58	36	94
54-56	58	38	96
57-59	85	55	140
60-62	71	68	139
63-65	62	60	122
66-68	52	49	101
69-71	34	37	71
72-74	22	29	51
75-77	10	14	24
78-80	2	5	7
81-83	1	1	2
84-86	-	1	1
Relative number (‰)	542	458	1000
Mean Length (cm)	58,9	60,5	59,6
Number of specimens measured	2162	1828	3990

Table 16. Sex and size composition (‰) of flounder Glyptocephaus, Div. 3K, October 1977.

Total length, cm	Males	Females	Males and females
24-25	2	1	3
26-27	9	4	13
28-29	31	10	41
30-31	52	33	85
32-33	38	25	63
34-35	23	11	34
36-37	62	21	83
38-39	80	69	149
40-41	73	55	128
42-43	46	28	74
44-45	28	31	59
46-47	29	20	49
48-49	40	39	79
50-51	16	35	51
52-53	5	27	32
54-55	1	21	22
56-57	1	10	11
58-59	-	9	9
60-61	1	12	13
62-63	-	3	3
Relative number (‰)	537	464	1001
Mean length (cm)	38,75	43,06	40,82
Number of specimens measured	563	486	1049

Table 17. Age composition (‰) of capelin, Divs. 2J, 3K, 3L, 3N in 1977.

Year-class	Age (years)	2 I		3 K		3 L		3 N	
		VIII, IX, X, XI		X, XI		V, VI		VI	
		males	females	males	females	males	females	males	females
1975	2	30	6	80	42	17	28		7
1974	3	270	228	451	371	258	367	96	297
1973	4	629	650	443	555	658	578	827	662
1972	5	68	100	23	27	67	22	77	27
1971	6	3	12	3	5		5		7
1970	7		4						
n		296	491	348	565	120	180	52	148

Table 18. Size composition (‰) of capelin, Divs. 2J, 3K in 1977.

Total length, cm	2 I		3 K	
	October, males	November, females	October, males	November, females
10,0			+	+
10,5			-	1
11,0			1	2
11,5		1	+	2
12,0		5	3	4
12,5	9	7	7	10
13,0	8	13	15	30
13,5	19	27	34	68
14,0	56	88	74	130
14,5	51	103	107	170
15,0	71	125	143	187
15,5	115	132	155	151
16,0	126	135	166	111
16,5	156	127	139	71
17,0	169	110	87	41
17,5	134	83	49	16
18,0	47	30	15	4
18,5	31	8	4	1
19,0	8	5	1	1
19,5		1	+	+
20,0			-	
20,5			+	
21,0			+	
21,5				
Number of specimens measured	745	1500	5122	9268

Table 19. Mean catch (number of specimens) of juvenile cod aged 1, 2 and 3 full years per hour of trawling taken by a fish - counting trawl in Subarea 3.

Year-class	One - year olds					Two-year olds					Three-year olds				
	3 K	3 L	3 M	3 N	3 O	3 K	3 L	3 M	3 N	3 O	3 K	3 L	3 M	3 N	3 O
I	1 2	3	4	5	6	7	8	9	I0	II	I2	I3	I4	I5	I6
1959											33	18	0	12	1
1960						9	3	0	5	0	16	11	0	3	2
1961	2	2	0	2	2	5	6	0	9	4	29	42	6	17	2
1962	0	1	0	2	10	2	8	7	23	3	22	56	29	26	3
1963	1	3	0	1	1	1	11	6	8	2	51	44	14	42	2
1964	0	2	0	57	37	4	22	1	192	18	11	68	14	103	60
1965	0	1	3	0	0	1	2	2	19	17	27	17	9	32	27
1966	0	0	0	2	21	4	10	0	39	24	38	61	13	53	47
1967	0	0	0	0	2	11	15	13	4	6	48	36	20	44	20
1968	1	1	10	8	24	10	68	106	153	40	46	118	58	127	32
1969	1	4	0	4	6	3	31	2	15	8	19	60	2	37	17
1970	0	1	0	9	2	1	7	1	35	4	8	8	1	29	14
1971	0	0	22	6	2	1	1	87	51	21	4	12	3	81	12
1972	0	0	3	6	3	0	3	20	12	11	8	8	22	34	9
1973	0	1	303	1	3	7	9	350	42	10	41	24	568	92	9
1974	0	2	138	2	4	3	4	50	89	7	10	58	57	201	21
1975	0	0	5	10	1	1	8	17	92	5					
1976	0	0	0	1	1	-									
Average for the whole period or counting	0,3	1,2	32,2	6,9	7,4	3,9	12,9	47,9	49,2	11,1	25,7	39,9	38,2	58,2	17,5

Table 20. Mean number of specimens per hour of trawling taken by a fish - counting trawl in time of a total trawl survey in Subarea 3, 1971-1977.

Fish species	Year of survey	3 K	3 L	3 M	3 N	3 O
I	2	3	4	5	6	7
Cod	1971	97	184	77	208	44
	1972	158	205	66	139	56
	1973	41	29	108	134	53
	1974	32	40	346	185	30
	1975	27	24	550	186	28
	1976	98	57	693	243	32
	1977	42	135	489	452	70
redfish Sebastes Mentella	1971	337	82	66	911	957
	1972	612	37	449	366	498
	1973	475	118	484	645	884
	1974	796	314	314	733	560
	1975	692	73	516	1278	1864
	1976	227	4	103	128	1085
	1977	600	73	660	282	3033
redfish Sebastes marinus	1971	30	-	93	-	-
	1972	15	11	409	-	-
	1973	45	-	214	-	-
	1974	65	-	264	-	-
	1975	9	7	137	-	103
	1976	14	2	164	-	-
	1977	59	5	621	-	-
American plaice	1971	57	703	38	194	145
	1972	74	516	41	387	167
	1973	142	569	65	277	278
	1974	177	671	83	357	158
	1975	238	663	93	356	301
	1976	175	394	169	223	209
	1977	227	1086	59	567	203
Yellowtail flounder (Limanda ferruginea)	1971	-	71	-	282	16
	1972	-	126	-	326	128
	1973	-	31	-	206	122
	1974	-	84	-	395	98
	1975	-	16	-	227	100
	1976	-	23	-	439	121
	1977	-	24	-	108	212
White hake	1971	-	-	-	-	14
	1972	-	-	-	1	20
	1973	-	-	-	-	5
	1974	-	-	-	-	7
	1975	-	-	-	-	14
	1976	-	-	-	-	4
	1977	-	-	-	-	8

Table 21. Mean catch (kg) per hour of trawling taken by the fish counting trawl in time of the total trawl survey in Subarea 3, 1971-1977.

Fish species	Year of survey	3 K	3 L	3 M	3 N	3 O
1	2	3	4	5	6	7
Cod	1971	77	138	69	135	34
	1972	134	163	75	72	67
	1973	33	19	46	47	18
	1974	36	33	51	72	10
	1975	19	20	121	155	16
	1976	123	48	296	121	25
	1977	36	98	448	254	70
Redfish Sebastes mentella	1971	144	33	13	221	80
	1972	266	16	194	43	62
	1973	150	38	117	161	114
	1974	308	110	89	145	66
	1975	282	29	163	241	166
	1976	109	1	48	21	107
	1977	205	23	327	56	509
Redfish Sebastes marinus	1971	27	-	85	-	-
	1972	21	11	334	-	-
	1973	24	-	141	-	-
	1974	69	-	104	-	-
	1975	5	2	37	-	81
	1976	12	-	84	-	-
	1977	77	-	347	-	-
American plaice	1971	16	250	26	142	57
	1972	9	132	22	117	42
	1973	56	111	37	107	77
	1974	43	166	74	186	53
	1975	66	202	53	171	90
	1976	39	112	127	84	86
	1977	64	345	30	127	69
Yellow tail flounder (Limanda ferruginea)	1971	-	31	-	110	8
	1972	-	57	-	140	46
	1973	-	12	-	76	50
	1974	-	40	-	137	46
	1975	-	7	-	88	41
	1976	-	10	-	171	52
	1977	-	-	-	44	100
White hake	1971	-	-	-	-	34
	1972	-	-	-	-	33
	1973	-	-	-	-	7
	1974	-	-	-	-	9
	1975	-	-	-	-	14
	1976	-	-	-	-	6
	1977	-	-	-	-	10

Table 22. Size composition of silver hake taken off Nova Scotia (Div. 4W), %

Length, cm	I976	I977
10-11	-	+
12-13	0,1	+
14-15	0,2	0,1
16-17	0,5	0,6
18-19	2,0	1,4
20-21	2,3	1,4
22-23	2,6	0,8
24-25	6,0	1,5
26-29	29,7	17,4
30-31	16,9	25,8
32-33	9,5	27,0
34-35	5,5	11,3
36-37	2,7	3,7
38-39	1,0	0,9
40-41	0,4	0,3
42-43	0,2	0,2
44-45	0,1	+
46-47	0,1	+
48-49	+	+
50-51	+	+
52-53	+	+
54-55	+	+
56-57	+	+
Total, %	100,0	100,0
Mean Length	28,6	30,6
Number of fish measured	148703	73731

Table 23. Age composition of silver hake off Nova Scotia (Div. 4W), %

Age (years)	I976	I977
1	8,3	2,7
2	45,2	8,9
3	30,0	44,1
4	11,0	35,9
5	4,4	7,1
6	0,7	1,0
7	0,3	0,3
8	0,1	+
9	+	+
Total, %	100,0	100,0
Mean age	2,62	3,40

Table 24. Size composition of argentine taken off Nova Scotia.

Length, cm	Browns Bank			Emerald Bank		
	1975	I976	I977	1975	I976	I977
I	2	3	4	5	6	7
16	-	-	-	-	-	+
17	-	-	-	-	-	-
18	-	-	-	0,1	-	-
19	+	-	-	0,1	-	-
20	0,5	-	-	0,1	0,1	0,1
21	2,0	-	-	0,4	0,5	1,9
22	2,5	-	-	1,1	1,7	5,4
23	1,7	0,2	-	3,9	1,5	17,3
24	2,4	1,7	-	8,6	0,8	11,6
25	3,3	4,3	-	13,2	3,9	2,1
26	6,6	8,6	-	10,2	19,3	1,4
27	8,6	7,8	-	9,0	18,9	2,1
28	10,2	12,1	-	13,1	14,2	3,9
29	12,3	12,3	-	12,0	9,6	7,2
30	9,3	12,0	-	10,1	9,5	10,8
31	7,4	15,5	-	5,5	6,4	9,3
32	5,9	10,5	-	3,4	6,4	10,2
33	4,0	4,6	-	2,4	5,1	6,9
34	2,5	3,7	-	2,0	1,0	4,6
35	3,5	2,0	-	1,8	0,8	1,5
36	5,1	1,9	-	1,4	0,1	1,3
37	5,1	1,6	-	0,9	0,1	1,2
38	4,1	0,6	-	0,5	-	1,0
39	1,3	0,4	-	0,2	-	0,2
40	0,7	0,1	-	0,1	0,1	+
41	0,5	0,1	-	+	-	-
42	0,3	-	-	+	-	-
43	0,1	-	-	-	-	-
44	0,1	-	-	-	-	-
45	-	-	-	-	-	-
46	-	-	-	-	-	-
47	-	-	-	-	-	-
48	-	-	-	-	-	-
49	-	-	-	-	-	-
Percentage	100,0	100,0		100,0	100,0	100,0
Mean length	30,2	29,8	-	27,9	28,2	28,1
Number of fish measured	3510	2400		17769	1020	3451

Table 25. Age composition of argentine taken off Nova Scotia, %

Age, years	I976	I977
1	-	+
2	-	-
3	-	2,6
4	2,2	34,6
5	11,5	7,5
6	14,2	13,5
7	36,2	14,5
8	21,4	13,8
9	5,0	7,6
10	2,2	2,7
11	2,0	1,1
12	2,5	1,1
13	1,4	0,6
14	0,8	0,3
15	0,4	0,1
16	0,2	+
17	-	-
18	-	-
19	-	-
Mean age	7,30	6,11

Table 26. Size composition of the Atlantic shortfin squid catches in 1977 (%).

Length, cm	Number, %
11	+
12	+
13	0.1
14	0.5
15	1.7
16	3.4
17	5.2
18	10.1
19	13.2
20	17.3
21	18.2
22	14.6
23	7.6
24	4.5
25	2.4
26	1.2
27	0.7
28	0.2
29	0.1
30	+
31	+
Total	100.0