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Northwest Atlantic



Fisheries Organization

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SCIENTIFIC COUNCIL MEETING - JUNE 1983

by

PART 2. Report on USSR Investigations in Subarea 4 in 1982

A. S. Noskov Atlantic Research Institute of Marine Fisheries and Oceanography (AtlantNIRO) 5 Dmitry Donskov Street, Kaliningrad 236000, USSR

A. Status of the fisheries

<u>Silver hake</u>. The Soviet catch of the silver hake in 1982 was 47,3 thous.tons against the alloted quota of **48,4**thous.tons. In 1981 the silver hake eatch was 40,2 thous.tons against the alloted 48.4 thous.tons. In 1882 the silver hake was caught from April to June inclusive on the southern slopes of the Nova Scotia shelf. The conditions for fishing were very favourable. The influx of cold waters to the shelf resulted in massive movement of the hake to the shelf slopes, where dense and stable aggregations were formed. In April 1982 the catches with BMRT class vessels per fishing day amounted to 49.7 tons compared with 13.5 tons in 1981, in May the catches were 37.9 and 28.0 tons, and in June 37.4 and 22.9 tons respectively. The total value of fishing effort reduced in 1982 due to large eatches per effort.

As in the previous years, the bulk of the silver hake catches in 1982 was made of the specimens 28-35 cm in length, at the age of 3 and 4 (tables 1, 2). Both the mean body length and mean weight of the hake in the catches has remained almost unchanged in the recent three years (table 1). In 1984, as in the previous years, the catches will be mostly represented by 3 and 4 year olds of the 1980 and 981 year classes. The data of the surveys of fry abundance show that the 1981 year-class is relatively strong, and the 1980 year-class is a poor one. So it can be expected that in 1984 the fishing stock of the silver hake will remain at the 1982 and 1983 level, i.e. about 800 thous.tons. <u>Short-finned squid.</u> In 1982, in the areas fished by the Soviet fleet the species was found in small numbers and its catch amounted to I24 tons in all, the quota being 5 thous.tons.

Very small catches of the squid can be attributed to the fact that the species did not move to the shelf occupied in 1982 with extremely cold waters. In July the squids were represented in the catches by the specimens ranging from 12 to 23 cm in length with the mean length of 17.4 cm and mean weight of 97 g.

B. Special Studies

<u>Hydrology</u>. In 1982 the environmental studies in the Nova Scotia shelf area were limited to observations of the water temperatures in the O-200 m depth layer made during the ichthyoplankton survey from 23 September to 13 October, and during the survey of silver hake fry abundance from 31 October to 14 November.

The surveys were made by the Soviet vessel SRTMK-8080 "EKLIP-TIKA" under the bilateral agreement between the USSR and Canada.

The observations covered a greater part of the shelf area adjacent to the Nova Scotia Peninsula on the south. The obtained temperatures were processed by square (each square 20'x30' in size), and then the averaged water temperature values for each square were calculated based on two surveys and charts of autumn temperature distribution built for the 0, 50, 75 m depths and for the near-bottom layer. For illustration, in figs.1 and 2 the temperature distribution in the near-bottom layer is shown for autumn 1981 and 1982. As is evident from comparison of the two figures, a marked decrease of the water temperature took place on the shelf, being especially significant in the eastern part of the area and in traditional spawning grounds of the silver hake, which, probably, affected the survival of the larvae of this species. The analysis of changes of the water temperatures, which took place in the area in the recent 5-6 years, will be presented in a special report.

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<u>Zooplankton</u>. The zooplankton samples collected during the surveys in August and September 1980 were processed in 1982. The zooplankton was mainly represented by <u>Oithona spp.</u>, <u>Centropages</u> <u>spp.</u>, <u>Calanus finmarchicus</u> and copepod eggs and nauplii, the proportion of which constituted 80%. Unlike the previous years, beginning with 1977, the zooplankton abundance in 1980 was the lowest and averaged to 910 thous.sp./m³ compared with 1500 thous.sp/m³ in 1977 and 1020 thous.sp./m³ in 1979. The zooplankton biomass in 1980 was on the average 10 g/m², and more dense aggregations of 40 g/m² were found westward of Sable Island in the Emerald and Browns Banks area.

Ichthyoplankton. The results of the analysis of the materials of ichthyoplankton surveys carried out in August and September 1980 showed that, as in the previous years, the massive spawning of the silver hake took place on the western slopes of the Sable shoal.

In August, the number of eggs under m^2 was on the average 25, and in September - 12, fluctuating from 1 to 260 eggs. The total abundance of silver hake eggs in August 1980 was 4 times below that of 1978, and 1.5 times below that of 1979. The number of larvae in August 1980 averaged to 46 sp./m², and in September to 32 sp./m². The total abundance of larval hake in 1980 was two times below that of 1978, and 4 times below that of 1979.

<u>Trawling survey of the hake fry</u> carried out in the first half of November on the Nova Scotia shelf showed that the total abundance of the hake fry appeared to be 60 times below that of 1981 and constituted $17^{\circ}10^{\circ}$ sp.

Young short-finned squids. The R/V "Evrika" conducted the investigations of the distribution and abundance of the young short-finned squids in the Hova Scotia area from the continental slope to the Gulf Stream during the period from February to May. Preliminary results were submitted to the MAFO Session held in June 1982 (Res.Doc./82/VI/28). Additional analysis of the materials of the expedition made it possible to suggest that a low abundance of the short-finned squids on the shelf in the NAFO Div. 4W in summer 1982 was caused by a redistribution of the youngs in the open sea prior to their movement to the shelf. So, in the area to the west of 60°W the abundance of the young short-finned squids averaged to 500 thous.sp./km³, and in the area between 50° and 60°W it amounted only to 60 thous.sp./km³. The redistribution of the young squids can be attributed to weakening of the main Gulf Stream jet.

Length, cm	1980	1581	1982
10-11	+	<u></u>	
12-13	+	-	1
14-15	• • • • • • • • • • • • • • • • • • •		0.1
10–17	0.2	+ · · · · · · · · · · · · · · · · · · ·	0.4
18–19	0.4	0.2	1.0
20-21	0.7	0.4	2.2
22-23	1.8	0.3	2.1
24-25	3.5	0.8	1.9
26-27	7.8	3.9	6.5
28-29	14.0	16.4	11.9
30-51	24.5	32.1	20.7
32-33	24.2	24.4	23.5
34-35	14.1	13.0	16.6
36-37	5.0	5.2	7.6
38-39	2.2	2.1	3.3
40-41	0.7	0.7	1.3
42-43	0.3	0.3	0.6
44-45	0.4	0.2	0.2
40-47	0.1	+	0.1
48-49	• • • • • •	+	• • •
50-51	0.1	+	+ 1
52-53	+		• • • •
54-55	+	+	
56-57	+	+	· · · · · · · · · · · · · · · · · · ·
58-59	+	+	-
60-61	-	+	
62-63	- 1	+	
Mean length, cm	31.1	31.5	31.4
Mean weight, g	202	224	238
No. of sp.	56701	36482	32603
Fishing gear	traw1,815-1	lake trawl,815-Hak	e trawl,815- Hake
Mesh size. mm	60	60	60

Table 1 Size composition (%) of commercial silver hake catches taken off Nova Scotia in 1980-1982

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Age years	1980	1981	1982
1	1.4	0.7	4.9
2	16.8	9.9	14.9
3	36.2	42.6	24.1
4	32.4	33.0	37.6
5	9.6	10.3	12.8
6	2.2	2.6	4.1
7	0.6	0.7	1.1
8	0.5	0.1	0.4
9	0.2	0.1	0.1
10	0.1		+
Mean age, years	3.1	3.5	3.6
Fishing gear tr	awl,815-Hake	trawl,815-Hake	trawl,815-Hak
Mesh size, mm	60	60	60

Table 2 Age composition (%) of silver hake commercial catches taken off Nova Scotia in 1980-1982

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autumn 1981.



Fig.2 Water temperatures in the near-bottom layer, autumn 1982.

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Fisheries Organization

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SCIENTIFIC COUNCIL MEETING - JUNE 1983

PART 1. Report of USSE Investigations in Subareas off Newfoundland, Labrador and Baffin Island in 1982

by

K.G. Konstantinov

Polar Research Institute of Marine Fisheries & Oceanography, (PINRO), 6 Knipovich Street, Murmansk, USSR

The total yield taken by the Soviet fleet in Subareas 0, 2 and 3 in 1982 was equal to 60676 tons (Table 1) or 44I2 tons Less than in 1981.

The stocks of the main commercial fishes in all the Subareas and Divisions investigated are characterized below. Our stocks assessments are mainly based on the results of the total trawl survey of demersal fishes that had been already regularly undertaken over a period of 12 years during spring-summer in the Newfoundland Subarea. The methods of the total trawl survey had been earlier described in a special report (NAFO SCR Doc. 81/VI/73).

This fairly laborious but valuable operation allows to obtain the indices of the abundance and biomass of demersal fishes in each division (Tables 3 and 4), and to register the increase, reduction or stabilization of the stocks.

During the trips intended at the conduction of the total trawl survey a great attention was paid to the assessment of the young cod (and haddock) in the first three years of their life (Table 5).

All the data on size-age compositions of the fishes (Tables 6-21) given below were obtained by means of the analysis of the catches that had been taken by the trawls with

small-meshed insertion in the codend. Thus, not only the part of the stocks that can be fished with the conventional trawls nowdays, but also the fishes of smaller length which will recruit to the commercial stock in the nearest future have been characterized. While measuring all the fishes including the skates the greatest (total) length - from the tip of the snout to the end of the rays of the tail fin was registered. Only the capelin specimens were measured up to the end of the middle rays of the tail fin (fork length).

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Cod

The results of the total trawl survey indicated that the abundance and biomass of cod in Div.3K in 1982 were somewhat higher than those in 1981 but remained to be far less than the level of almost all the previous years and below the long-term mean norm (Tables 3 and 4). The low abundance in Div.3K is considered to be the reason of the poor recruitment to the Labrador stock with the young specimens. Judging by the data on the assessment of the young cod in Div.3K, the latest comparatively strong year classes appeared there in 1973 and 1974 (Table 5).

In January 1982, in Divs.2H and 2J the specimens 57-68 cm long at age of 7-9 belonged to the 1975, 1974 and 1973 year classes dominated by their abundance and biomass (Tables 6 and 7). Small cod were comparatively numerous only in July when larger specimens migrated to the coast.

The predominance of the 1975, 1974 and 1973 year classes cod was also registered during the total trawl survey undertaken as early as 1981 (NAFO SCS Doc. 82/VI/12).

In summer 1982, on the southern slopes of the Grand Bank (Divs. 3NO) and in the adjacent part of its northeastern slope (Div. 3L) the cod 42-50 cm long, mainly belonged to the 1978 year class and, to a lesser degree, to the 1977

year class (Tables 6 and 7) prevailed. As the assessment of the young cod undertaken earlier showed that the

1978 year class in Divs. 3NO was fairly abundant (Table 5). In 1982, 4-year-olds reached the commercial size considerably increased the abundance and biomass of cod, as it was conclusively shown by the total trawl survey (Tables 3 and 4). In 1982 the southern Newfoundland cod stocks exceeded the level of almost all the previous years.

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The abundance and biomass of the Flemish Cap Bank cod continue to reduce (Tables 3 and 4). On the basis of the data on the young cod assessment in 1977, the year class of average strength appeared on the Flemish Cap Bank, but all the subsequent year classes were poor (Table 5). At present, the 1977 year class cod were chiefly reached the maturity. Thus, on April 18, 1982 on the western Flemish Cap Bank the catch with bottom trawl taken at 340-390 m completely consisted of the spawning and post-spawning cod, mainly, belonged to the 1977 and 1976 year classes (Table 7). The size composition of the cod caught on the Flemish Cap Bank in July 1982 was indicative of the predominance of the young specimens 33-41 cm long (Table 6), however their absolute number was not great.

Forecast for 1983-84 It had been already expected earlier (NAFO SCS Doc. 82/VI/12), that in 1983 the abundance and biomass of the Labrador stock cod would reduce because of poor recruitment to that stock with the young specimens. It is apparently that the expected reduction will continue and in 1984 when the commercial stock'll be mainly consist of very large specimens at age of 9-11. During the spawning period (February/March) these fishes will concentrate in the northernmost part of the Labrador, where the ice edge will not allow to carry out the trawl fishery. However, in summer and autumn the large cod migrated to the coast provided for rather successful long-line, pound net and trap fishing.

On the southern slopes of the Grand Bank (Divs. 3NO), as it had been earlier projected (NAFO SCS Doc. 82/VI/12), in 1983 the 1978 year class cod reached 45-55 cm would be predominant. The cod of this stock at age of 5-6 are usually most effectively exploited by the trawl fleet, therefore in 1983 and 1984, comparatively favourable commercial situation can be expected. Due to the number of 2-year-olds assessed (Table 5) the most abundant year class appeared in 1980. There are reasons for the increase in cod yield limit in Divs. 3NO for 1984.

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The cod stocks status on the Elemish Cap Bank in 1983 and 1984 will deplete. A regular relationship between the temperature on the hydrographic section 4-A in May and the abundance of the successive Flemish Cap Bank cod year class in the same calendar year had been revealed (NAFO SCS Doc. 81/VI/77; NAFO SCS Doc. 82/VI/12, Fig.2), and the decreased temperature favoured for the appearance of the abundant year class. In May 1982 the hydrographic section 4-A was worked from board the PINRO RV "Suloy"; the water temperature in the 0-50 m layer was 3°14°C, i.e. considerably higher than the long-term mean. Thus, in 1982 only a very poor cod year class could appear (as, by the way, and in some of the previous years).

The cod year class which will appear in 1983 can be also assessed but with caution. Noticeable cooling of water masses was observed in the Labrador and Newfoundland Subareas (as this is more detailed described in one of the final sections of the report). It is quite probably that in spring 1983 the cooling will also cover the section 4-A including the 0-50 m layer. In this case an average or abundant year class of cod had to appear on the Flemish Cap Bank. True, the abundance of mature specimens on the Flemish Cap Bank was low; but the strength of the year classes was determined not by a number of spawners, but survival of the developing eggs and larvae under the influence of the oceanographic conditions.

Haddock

During about 20 previous years the haddock in the Newfound-

land Subarea were not of significant commercial value. Since 1966 to 1980 the haddock yield reduced from 10 to 0°7 thou. tons (NAFO Statistical Bulletin, vol. 30, 1982). The total trawl survey was carried out in the recent 12 years aboard the PINRO vessels. The haddock stock was recruited only with very poor year classes and had low abundance and biomass (Tables 3 and 4).

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In May 1980 the author of this report was the leader of specialists conducted the total trawl survey and investigated the southern Grand Bank. The spawning period for haddock did not come yet, however it was possible to notice some preconditions for the strong year class appearance. Just in Div.30 the large pre-spawning females, mainly, of the 1975 year class with matured eggs were observed over wide area, although to be despersed under the favourable water temperature. The large predators dangerous for spawning haddock were absent. All this allowed to expect for the strang year class appearance in future (NAFO SCS Doc. 81/VI/13).

Next calendar year (1981) the total trawl survey and assessment of the young haddock showed that the 1980 year class actually exceeded all the previous ones (NAFO SCS Doc. 82/VI/12).

In 1981 on the southern Grand Bank one more abundant year class appeared; a year later the yearlings of that year class reached 15-25 cm constituted over 90% of all the haddock specimens estimated in Div. 3N. High abundance of yearlings and 2-year-olds was also observed in Div. 30; the 2-year-olds of the 1980 year class reached 25-35 cm (Tables 8 and 9). During the last 12 years the abundance and biomass of haddock on the southern slopes of the Grand Bank increased up to the highest level (Tables 3 and 4).

It is interesting to notice that in 1982 the yearlings of hadddck were also numerous on the Flemish Cap Bank (Table 8).

Forecast for 1983-84 On the southern slopes of the Grand Bank the haddock will form the concentrations, the density and length composition of which, will allow to carry out the productive trawl fishery. The predominant length of the two abundant year classes will vary from 30 to 40 cm in 1983 and from 40 to 50 cm in 1984. It is evident that a regular fishery is reasonable to start in 1984, having by that time the scientific substantiations for determining the rational limit and yield quotas.

Redfish

The total trawl survey does not allow to estimate the abundance and biomass of the redfish with such accuracy as those of cod, haddock, flounders, wolffishes and other demersal fishes inhabited at comparatively small depths of the continental shelf. The redfish concentrations were often observed at the depths deeper than 500 m, i.e. in the layers not covered with regular fish-counting hauls. Besides, the redfish can lift for a long period into intermediate layers, being not unattainable for bottom trawl.

Nevertheless, the total trawl survey allows to reveal the common tendencies in variations of the redfish abundance and biomass. So, from Tables 3 and 4 it is sufficiently seen that on the Flemish Cap Bank the beaked redfish stocks essentially increased in 1977-1982 compared to those of 1971-1976 - undoubtedly as consequence of the yield limit. Nearly the same can be said about the redfish from the southern slopes of the Grand Bank. It should be only noticed that while analysing the results of the total trawl survey it is necessary to combine the indices concerning the Divs. 3N and 30 and to use the summarized indices of the abundance (biomass), because in both divisions the common stock of the redfish distributed.

The assessment of the redfish stocks was complicated because of the fact that in the catches three species occurred not easily different particularly at the young stage. But the adult specimens of the redfish <u>Sebastes marinus</u> L.

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and <u>Sebastes mentella</u> Travin are distinctly differed, but <u>Sebastes fasciatus</u> Störer looks absolutely similar to <u>Sebastes</u> <u>mentella</u>. The data on <u>Sebastes mentella</u> in Tables 3 and 4 are actually referred to the mixture of the two close species. During the total trawl survey the redfish <u>Sebastes marinus</u> is separately assessed but is of commercial value only on the Flemish Cap; these indices of abundance and biomass are not included in Tables 3 and 4 at all.

While considering the data on length-age composition of the redfish <u>Sebastes mentella</u> (Tables 10 and 11) it is important to notice that on the Flemish Cap Bank in 1982 a comparatively small number of the young specimens was observed. The same situation was registered in 1981 also (NAFO SCS Doc. 82/VI/12, Fig. 1). In all the rest divisions the length-age composition of the redfish <u>Sebastes mentella</u> did not differ from the typical, long-term mean; thus, the predominance of the specimens 22-27 cm long at age of 6-9 years was typical for the stock from the southern slopes of the Grand Bank; on the northeastern slope of that bank (Div.3L) the redfish were considerably larger and older - a separate stock of its own abundance dynamics inhabited there.

In all the divisions the females were somewhat larger than the males; the sex ratio did not greatly differ from the ratio: 1:1.

Forecast for 1983-84 The abundance and biomass of the redfish <u>Sebastes mentella</u> (or rather two close species of the redfish) in Divs. 5NO will remain at a high level, lengthage composition will not change. Trawl fishery capacity on the both southern slopes of the Grand Bank will not reduce compared to that of 1982. The best season for the trawl fleet operation - February-April, when the redfish will concentrate in a comparatively narrow belt along the continental slope, mainly between the 350 and 450 m isobaths.

The abundance of the redfish <u>Sebastes mentella</u> on the Flemish Cap Bank in 1983 and 1984 will gradually decline because of the poor recruitment to the stock with the young specimens.

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However the mean length and weight of the redfish will increase; thus, the total stock biomass possibly will remain approximately at the level of 1982.

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Flounders

The abundance and biomass of two main commercial species of flounders - American plaice and yellowtail flounder - on the Newfoundland shelf sharply decreased (Tables 3 and 4). That decrease was particularly vividly observed in Div.3L, where the main American plaice fishery took place. For instance, in 1980, 54°5% of the total yield in the Newfoundland Subarea were taken in that division (NAFO Statistical Bulletin, vol. 30, 1982).

It can hardly be doubted that general and very essential reduction in the stocks of two species of the flounders is caused by excessively intensive fishery. In 1980 summarized yield of these flounders in the Newfoundland Subarea exceeded 76 thou. tons, i.e. it was only less than that of cod; the yield of redfish was 67 thou. tons, that of squid - 35 thou. tons, Greenland halibut - 31 thou. tons, capelin and herring -19 and 16 thou, tons respectively. In 1981 the total yield of the American plaice and yellowtail flounder remained to be as much high - 76°5 thou, tons (NAFO SCS Doc. 82/VI/7). An intensive fishery particularly effected the yellowtail flounder, that considerably gave in the American plaice by their area of distribution, vertical distribution range, abundance and biomass of stock. Therefore, in spite of seeming fairly satisfactory stock status of the yellowtail flounder in some previous years (NAFO SCR Doc. 82/VI/62) an excessive fishery led to undesirable consequences. Apparently, the annual yield of 15-20 thou. tons exceeds nowdays the yellowtail flounder stock regeneration capacity.

It should be noted that the American plaice yield on the Flemish Cap Bank was rationally limited and in 1981 it constituted only 632 tons. In some recent years the abundance level of the American plaice on that bank was approximately constant (Table 3). As mentioned earlier (NAFO SCS Doc. 82/VI/12), in 1981 the young specimens on the Flemish Cap Bank were very abundant; they dominated also in 1982 (Table 12). Owing to such abundant recruitment to the stock with the young fish the mean weight of one specimen in some recent years reduced: in 1980 - 700 g, in 1981 - 618 g, in 1982 - 452 g (the mean weight can be easily estimated on the basis of data from Tables 3 and 4).

It is interesting to note that on the Newfoundland and Labrador shelf the American plaice males were, as in all previous years, much less abundant than females; however the sex ratio on the Flemish Cap Bank was close to 1:1 (Table 12).

All over the areas the females of the American plaice, yellowtail flounder and witch flounder were longer than the males (Tables 12, 13 and 14).

<u>Forecast for 1983-84</u> If the yield of the American plaice and yellowtail flounder on the Newfoundland shelf will not be significantly reduced, then their abundance and biomass continue to decrease.

It is reasonable to remain the former quota for American plaice on the Flemish Cap Bank. During next two years their mean length and weight will gradually increase as well as their total abundance and biomass probably.

Greenland halibut

The main data on length-age composition of the Greenland halibut in the northern part of their area were collected in November/December 1982 and could not be used in the present paper, because the RV "Suloy" was still at sea by the time of the report preparation. The total trawl survey allowed to characterize the size composition of the Greenland halibut in May-July (Table 15). As usual, larger specimens than those in Divs. 3KLN were observed off the South Labrador and everywhere the females exceeded the males by their mean length. The age of the Greenland halibut was determined only by the materials collected aboard the RV "Persey III" in mid-December 1981 in the northern part of the area (Table 16). While comparing these data with those obtained two years earlier, in November 1979 (NAFO SCS Doc. 80/VI/18, Table 13) it is easily to be convinced that neither the age composition of the catches, nor the mean length of the specimens in the main age groups changed in the Baffin Island Subarea. Both in late 1979 and in late 1981 among the males the 7, 8 and 9-year-olds prevailed, among the females the specimens at age of 7-11 dominated. In 1979 the mean length of the males at age of 8 was equal to 54°7 cm, in 1981 - 54°55 cm; the lengths of the females at age of 8 were 56°9 and 55°55 cm respectively.

Thus, there were no any grounds to suppose noticeable influence of the fishery upon the Greenland halibut stock because there was no a tendency either to reduction in average age and average length or increased growth rate. Meanwhile, in 1980 and 1981 in Subareas 0, 1, 2 and 3 (where the common population distributed, see NAFO SCR Doc. 82/IX/96) the total yield taken by all the countries was equal to about 80 thou. tons of the Greenland halibut.

Forecast for 1983-84 From the above mentioned it follows that the modern yield of the Greenland halibut is not excessive and can be increased. An increase in the yield is particularly reasonable in the northern parts of the area (Baffin Island, North and Central Labrador), where the largest specimens inhabited.

Grenadier

The main biological data on the rock grenadier <u>Coryphaenoides</u> <u>rupestris</u> were collected aboard the RV "Sulcy" in the Baffin Island and Labrador Subareas in November/December 1982. These data are not included in the report because of the vessel being yet at sea.

Mass measurements of the grenadier were carried out in July 1982 in Div. 3K (Table 17). An age sample was also taken there (Table 18).

Thorny skate

In 1982, as in the previous years during the total trawl survey the abundance and biomass of the skates were assessed. The most numerous skates on the Grand Bank are the thorny skates <u>Raja radiata</u>. The specimens from 12 cm almost up to 1 m long were registered in their catches taken with fishcounting trawl (Table 19). As a rule, the young skates of 15-20 cm long were mostly predominant. There were no vividly expressed peaks in the length frequencies of skates; by other words there were no generations in the stock that would be markedly separated out by their abundance. Approximately equal abundance of all the year classes is considered to be the direct consequence of the skates reproductive features (the laying of few eggs, well protected with rigid capsule and with a great stock of nutrients).

When the relationship between the length and weight of the thorny skates is known we can obtain the data on their biomass in the divisions of the Newfoundland Subarea investigated. The highest density of population was registered in Div. 3N: 31 specimens by the total weight of 41 kg per hour trawling carried out with fish-counting haul. The thorny skates were evenly distributed over the shelf and in the adjacent waters of the continental slope up to a 300 m depth; but they were rarely observed in deeper waters. The square of Div. 3N limited by the 300 m isobath was equal to about 56 thou. km². Assuming that 50% of thorny skates occurred in the area fished were taken by the bottom fish-counting trawl and taking into account the trawls dimensions it was easily to estimate that the total abundance in Div. 3N exceeded approximately 38 millions of specimens, and biomass - 50 thou.

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tons. Further assessment shows that on all the three slopes of the Grand Bank the summarized abundance of the thorny skates reaches about 100 millions of specimens, and total biomass - 150 thou. tons.

Thus, the thorny skate <u>Raja radiata</u> by their abundance and biomass takes one of the first places among the demersal fishes on the Grand Bank and undoubtedly deserves a greater practical use than it was previously.

Capelin

From 14 to 25 October 1982 the hydroacoustic capelin survey was carried out aboard the RV "Suloy" in Divs.2J and 3K. The underwater photography and control trawlings by midwater trawl with small-meshed insertion were conducted in the survey.

The capelin abundance in the investigated area was assessed to be equal to 36°4 billions of specimens, and their total biomass - to about 611 thou. tons.

The data on the survey allow to conclude that the capelin stock is regenerated fast and nowdays is at the 1976-1977 level approximately.

The survey showed that the specimens at age of 2 and 3, 12-17 cm long dominated in the stock (Tables 20 and 21).

B. Special investigations

Oceanographic observations

In 1982 oceanographic observations were carried out on standard sections I-A, 3-A, 4-A, 7-A in May/June and on section 8-A - in November during the trips of the RV "Suloy".

In spring, positive water temperature anomalies were registered on the Grand Bank and the slightly negative ones on the Flemish Cap Bank and off the South Labrador.

According to the forecast given in the former report of the USSR investigations (NAFO SCS Doc. 82/VI/12) the cooling of the water masses below the long-term mean norm had to be registered in 1982 and 1983. That forecast was soon borne out by the temperature observations on section 8-A. This section which is of great importance for assessment of future fishery conditions is annually carried out by PINRO scientists by 1 November. In 1982, a significant water temperature decrease compared to the level of many previous years and long-term mean norm was registered on that section (Table 22). The water temperature in the 0-50, 50-200 and O-200 m layers was measured on the Labrador shelf, between 53°40'N 50°44'W and 50°40'N 53°32'W. This part of the section crossed the cold component of the Labrador Current. The water temperature in the 200-500 m layer was measured on the continental slope in the distance between 54°55'N 53°23'W and 55°13'N 52°52'W. That part of the section was the warm component, which was the continuation of the West Greenland Current. As it is seen from Table, in autumn 1982 the negative temperature anomalies were observed over the whole section; the O-50 m layer on the shelf was particularly strongly cooled. In winter 1982-1983, the abnormal cooling of the water masses was one of the reasons of extremely hard ice conditions in the Labrador Subarea and in the adjacent waters of the Newfoundland Subarea.

On the basis of a 4 year periodicity of water temperature fluctuations it should be expected that in the second half of 1983 the warming of water masses will start, and in 1984 the water temperature on the standard sections up to the level of the long-term mean will come.

Relative weight of cod liver

The liver weight expressed in % of the ungutted fish weight is a very valuable phisiological index varied in relation to the season, feeding intensity of fish, their maturity and lengths. This index is also valuable from the practical point

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of view because the liver is the most valuable production of the <u>Gadidae</u>, <u>Macrouridae</u>, sharks and skates.

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In May-July 1982, the relative weight of liver was estimated in some divisions of the Newfoundland and Labrador Subareas (Table 23). The results obtained while investigating ten or more specimens of a given length, and in total - 630 specimens, have been represented in the Table.

In the papers by the Soviet ichthyologists the relative weight of liver is named "fatness".

Spring and early summer are the period of comparatively low fatness of cod (after wintering, and after maturing the gonads and recent spawning - for larger specimens). It is seen from the Table that the lowest fatness was registered in April (on the Flemish Cap Bank) and it gradually increased by July (off the South Labrador).

Among the specimens less than 50-60 cm long, i.e. the immature ones, the fatness, as usual grew with an increase in fish lengths. As for the larger (mature) specimens the fatness in spring and early summer was not high in relation to the recently finished spawning. This concerns, for instance, the cod over 70 cm long, caught in Div.3N. Tables 1 and 2. The USSR catches taken in the Northwest Atlantic in 1982 (tons).

and all all the set of the							un (1211 1000 - 0110 - 0220	
Object of	8 0 0	Subareas			Total	Stat.	Subareas	Total
fishery	П	:Ш:	IA :	у	і П-У	6	: 0	
Total including:	I3804	45863	48483			66	I009	I09I85
Capelin	9677	· _	-			dana .	6 27	9677
Argentine	-	_	201				-	20I
Atlantic halibu	b - d							-
Greenland halib	ut 8 1 6	I64					965	I945
American plaice	8	I069	6			-	-	I083
Witch	57	2468	2			-	-	2527
Cod	2140	5347	45				-	7532
Haddock	-	3	53					56
Pollack	-		297			-		297
White hake		I					and the second se	I
Red hake	-		65			·	-	65
Silver hake	·	9	47261	 		-		47270
Grenadier	98I	I7 08	6 55 0			· _	43	2732
Redfish	56	3367I	96			· · •	I	33824
Wolffishes	35	-				6523A		35
Angler	-	57	IO			· _	-	67
Beryx	.	-	-			43	-	43
Mackerel	 .	- 	3			-		3
Sharks	-	-	27			-	-	27
Skates	-	983	-			-	-	983
Other fish	34	383	253-			3	20	693
Squid		4	I24			-		I24
		1						

Table 3. Average number of demersal fishes of all sizes per trawling hour taken with fish-counting trawl in the total trawl survey (spec.).

				1000 atter and and	
Year :	ЗК :	3 L :	3M :	3 _N :	30
දුන නො නො දුන නො නො නො	CO	D	907 4009 607 6007 409	• 629-629-629-629-629-	999° 990° 999° 997° 997° 997°
1971	97	184	77	208	44
1972	I58	205	66	I39	56
1973	4I	29	I08	I34	53
1974	32	40	346	185	.30
1975	27	24	550	186	28
1976	98	57	693	243	32
1977	42	I35	489	452	70
1978	15	3I	96	ISI	43
1979	55	I3I	122	103	22
1980	69	63	34	I24	34
1981	23	92	53	103	II
1982	31	80	29	270	92
	HAD	DOCK			
1971		9			9
1972		-		IO	IO
1973		6 000	Quera .	n in	4
1974		6002		• • • • • • • • • • • • • • • • • • •	3
1975		-		I	3
1976	4000	670 0.		6	5
1977		1235	6327	gang.	25
1978	gang		e 2	67%)	2
1979		60100	-	6 49 3	8
1980		exe	2000 2000		5
1981	Mane			7	52
1982 D	*** ਬ ਨ ਸ ਕ ਸ	Cohestos	8	70	752
T97T	337 337	82	66	9TT	957
1972	612	37	449	366	498
1973	47.5	TI3	484	645	884
1974	796	314	314	733	560
1975	692	73	516	1278	I864
1976	227	4	103	128	I085
1977	600	73	660	282	3033
1978	405	224	816	2556	508

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Table 3.

(Continued).

		~ ~ ~			-		en en en		·	
Year	r	ЗК	• •	3 _L	•	3M		3 _N	•	30
1979		910		42		4813		4247		668
1980		622		178		2077		70I		3139
1981		I925		668		950		466I		2144
1982		594	÷	42I		3030		478		3435
		A	ME	RICA	N	PLAI	СЕ			
1971		57		703		38		194		145
1972		74		516		4I	· · · · · · · · · · · · · · · · · · ·	387		167
1973		I42		569		55		277		278
1974		177		671		83		357		I58
1975		238		683		93		356		301
1976		I75	:	394		169		223		209
1977	an a	227		I086		69		567		203
1978		69		573		46		167		121
1979		52	н.,	487		16		53I		1 51
1980		.78		710		30		266		155
1981		79		661		34		291		I50
1982		53		420		31		234		II6
	YEI	L L O	wr	AIL	FL	OUNDE	R			
1971		6000		71		entroy .		282		16
1972		-		126				326	•	128
1973				31		-		206		I22
1974		· <u>·</u>		84		Maria 🦛		395		98
1975		-	1. j. 1.	16				227		I00
1976				23				439		12I
1977				24		timp.		I08		II2
1978		***		8				I05		I24
1979		-		57		·		327		68
1980		6 00		20				230		76
1981		-		125				317		129
1982		Cump .		25		Emg.		163		51

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total	trawl surv	ken with in ey (kg).	.sn-counting	trawl in the	9
Year	: ЗК	: 3	L: 3M	: 3 N	: 30
1971	77	COD I38	69	135	34
1972	134	163	3 75	72	67
1973	33	IS	46	47	18
1974	36	33	3 5I	72	IO
1975	19	20) 121	155	16
1976	123	48	296	121	25
1977	36	98	3 448	254	70
1978	17	36	5 79	122	23
1979	77	160) I08	83	33
I980	97	104	1 35	100	58
198I	36	123	3 9I	99	15
1982	61	122	3 6	205	107
TOPT	H	A D D O C K,	2		ŋ
1972			,	т	3
1973		· · · · · · · · · · · · · · · · · · ·		in andar Santa Santa	Т
1973 1974				-	T T
1975	atte	· . •••	.		T
1976	-	- 	-	т	T ·
1977		-			TO
T978	· · · ·		- -		Ţ
1979		<u>.</u>			8
1980		. .	-		6
T98 T	-	· •	. · ·	T State State	IO
1982			- I	5	122
	RE	DFISH	Sebastes me	ntella	
1971	I44	3	3 I3	221	80
1972	266	5 I6	5 194	43	62
I973	160	38	3 II7	161	II4
1974	308	IIC) 89	I45	66
1975	282	2 2	9 163	241	166
I976	IOS		I 48	21	107
1977	205	5 23	3 327	56	509

Table 4. Average catch of demersal fishes of all sizes per trawling hour taken with fish-counting trawl in the total trawl survey (kg). Table 4.

(Continued).

		and the second second	1. A				
Year	جی حقق حقق جی 6 جق بی حق حق	ЗК :	3 L	: 31	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	3 N	: 30
1978		151	79	IE	56	535	99
I979		553	15	71	0	971	106
1980		250	82	70)2	213	664
1981		540	295	33	39	966	403
I982		203	I54	66	57	133	490
		America	n plaice	,			1. 1. 1. 1.
I 971		I6	250	2	26	I42	57
1972		9	I32	2	22	117	42
I973		56	III	3	37	107	77
I974		43	166	7	4	I8 6	53
I975		66	202	5	53	171	90
I976		39	II2	IZ	27	84	86
1977		64	345	S	30	197	89
I978		16	208	2	29	75	54
I979		16	I53	I	0	I66	54
1980		22	264	2	2I	I06	78
1981		35	259	2	PI	I46	68
1982		24	173	I	4	II8	79
TOPT		Yellowta	ail flou	nder		**	0
19/1		-	32			110	8
1912		<u>e</u>	57			140	46
TODY			12		•	- 76 T07	50
1974			40 m			137	46
1975					-	00 TTT	41
1970					••••••••••••••••••••••••••••••••••••••	171	20
TOTO			2			44	TOO
1070		-	<u></u>		•••• · 	40 T/0	07
TORU		-	20 TO			140	<u>ح</u> ک
TORT			10			104	4±⊥ CO
1901			04 TO			130	60
TION			12		(C)	QT	20

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-

rable 6.

 Size composition of cod (%0) in catches taken by fish-counting trawl with small- meshed net insertion, 1982.

		an an an an	en en en e	یه حقی حق حق		w 957 car e			400 400
Length, cm	2H Jan	2 J Jan	2J	ЗК	3 L	3M	3M	3N May I	30 May
$\begin{array}{c} 9-11\\ 12-14\\ 15-17\\ 18-20\\ 21-23\\ 24-26\\ 27-29\\ 30-32\\ 33-35\\ 36-38\\ 39-41\\ 42-44\\ 45-47\\ 48-50\\ 51-53\\ 54-56\\ 57-59\\ 60-62\\ 63-65\\ 66-68\\ 69-71\\ 72-74\\ 75-79\\ 78-80\\ 81-83\\ 84-86\\ 87-89\\ 90-92\\ 93-95\\ 96-98\\ 99-101\\ 102-104\\ 105-107\\ 108-110\\ 114-116\\ 117-119\\ 120-122\\ 123-125\\ 126-128\\ 129-131\\ 132-134\\ \end{array}$	I I I I I I I I I I I I I I I I I I I	Line	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	- 2 3 14 37 328 227 388 998 998 998 998 998 998 998 998 998	11, 9496923882519968667664780425953566980521111-221 18588654780425953566980521111-221	19892362259942H2222HH	- 3286954392302060873192286453221111 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	664426195634453222088444751130908442131 111 1 125222634688863222088444751130908442131 111 1
Relative number,%	01000	1000	1000	1000	1000	1000	1000	1000	1000
Mean length, cm	59,65	54,35	42,97	60,3I	57,99	47,59	35,86	4I,65	46,51
No of spec. mea- sured	2833	4274	2533	1651	4450	2569	9462	7556	2582

Table 7. Age composition and mean length of cod in catches taken by fish-counting trawl with small-meshed net insertion, 1982.

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	~ ~ ~ ~			J (Jan.		2J(Ju]	;) 3	L(Jun.)	SM (Apr) 3	Q _{May})
C	lass	years	s No o spec (%o)	of Mean length cm	No of Spec	Mean lengt (cm)	No of Spes	Mean length .(cm)	No of spec (%o	Mean length)(cm-	No os spe (%o	Mean leng (cm)
	1981	T		-	-	-			n. Rain		31	I2.57
	1980	2	-	· · · · · · · · · · · · · · · · · · ·	7	20,50	25	24,40			154	19,77
	1979	3	7	34,00	I5I	33,33	60	34,50	, canata		7I	30,44
	1978	4	27	40,37	373	38,32	405	40,26		_	533	4 I,76
	1977	5	23	46,43	295	46,IO	275	46,98	330	54,66	I50	46, 6I
	1976	6	I27	53,26	80	51,25	35	57,14	347	60,9I	9	59,50
	I975	7	324	57,26	64	58,3I	80	62,3I	77	69,74	I3	64,00
	I974	8	278	61,04	27	6I , 37	80	69,8I	67	76,15	9	71,50
	I973	9	I4I	66,50	3	68,00	20	78,25	73	79,00	9	82,00
	I972	IO	60	70,16			20	96,25	73	9I,I3	13	92,00
	I97I	II	IO	73,00	-	-	Dow	,	20	97,00	4	112,00
	1970	12	· · · ·						7	107,50		
	I969	I3	3	86,00			~	<u> </u>	-	-	4	133,00
	I968	14	8734A	4993	Gette	-			3	132,00	-	-
	I967	15	C1000		1000	abris.	· - ·	-	.3	131,00		-
Mean	age,	years	7,52	9039	4,61		5,0I	- (6,59	60mm	3,96	6 -
Mean	lengt	th, cm	-	59,26	-	42,78	-	48,77	1829	65,56	·	39,44
No of sed	2 spec	c. analy-	- 2	99	2	98	20	0	3	00	2	27

TISH-COMPTING PLANT WIG	II OHGTT-HOD	100 100 III	01010119	
Can 630 Can 630 kan 640 657 657 657 657 657	: 3M	: : 3M	; 3N	30
Length, cm	April	July	May	May
$\begin{array}{c} \mathbf{14-15}\\ \mathbf{16-17}\\ \mathbf{18-19}\\ \mathbf{20-21}\\ \mathbf{22-23}\\ \mathbf{24-25}\\ \mathbf{26-27}\\ \mathbf{28-29}\\ \mathbf{30-31}\\ \mathbf{32-33}\\ \mathbf{34-35}\\ \mathbf{36-37}\\ \mathbf{38-39}\\ \mathbf{40-41}\\ \mathbf{42-43}\\ \mathbf{44-45}\\ \mathbf{46-47}\\ \mathbf{48-49}\\ \mathbf{50-51}\\ \mathbf{52-53}\\ \mathbf{54-55}\\ \mathbf{56-51}\\ \mathbf{58-59}\\ \mathbf{56-61}\\ \mathbf{62-63}\\ \mathbf{64-65}\\ \mathbf{66-67}\\ \mathbf{68-69}\\ \mathbf{70-71}\\ \mathbf{72-75}\\ \mathbf{76-77}\\ \mathbf{76-77}\\ \end{array}$	- 128 477 125 2 6 13 69 118 50 2 - - - - - - - - - - - - -	- 6 51 253 407 149 10 - 3 32 51 32 6 - - - - - - - - - - - - - - - - - -	2 55 401 462 48 6 9 5 2 1 - - - - - - - - - - - - - - - - - -	3 31 214 44 167 120 176 432 1 1 1 1 233 1 12 12 22 13 12 12 12 12 12 12 12 12 12 12 12 12 12
Relative number, %o Mean length, cm	1000 26,34	1000 25,65	1000 19,90	1000 25,66
No of spec. measured	476	77 I	1242	2044

Table 8. Size composition of haddock ($^{\circ}/_{\circ\circ}$) in catches taken by

fish-counting trawl with small-meshed net insertion, 1982.

Table 9. Age composition and mean length of haddock in catches taken by fish-counting trawl with small-meshed net insertion, 1982.

هی حصه حصه حصه حصه حصه ۱ ۱		3N (M	ay) :	30 (May)		
Year class	Age, years	No of spec. (%o)	Mean length(cm)	No of spec. (%o)	Mean length (cm)	
1981	I	980	20,0	396	20,3	
1980	2	20	27,6	48I	29,9	
1979	3		-	<u> </u>	-	
1978	4		-	5	46,0	
1977	5		-	I4	50,3	
1976	6	1400	-	19	53,0	
1975	7	· · · · · · · · · · · · · · · · · · ·		66	66,I	
1974	8		-	14	65,0	
1973	9	e 🐂	- -	5	6I,O	
Mean age,ye	ars	I,02		2,18	-	
Mean length	, CM	-	20,I	-	29,3	
			·		070	

No of spec. analysed

I00

2I2

Table 10. Size composition of the redfish Sebastes mentella ($^{\circ}/_{\circ \circ}$) in

nsertion,	1982.		-		-						· · · ·		
Length.cm	2J(J	uly)	3K(J	June)	; 3L(June)	3M(July)	. 3N((May)	30(May)	
,,	° M	, f	• m	, f	• n	, f	i n	· f	• m	, f	• m	, f	07874 615
15 16 17 18 90 21 22 34 56 78 90 12 33 45 67 89 01 22 34 56 78 90 44 23 44 56 78 90 12 33 45 56 78 90 44 23 44 56 51 22 34 55 52		- I I 53755162324326558898576808997775553221 - I I I I I I I I I I I I I I I I I I	1 1 2 4 7 18 2 5 2 3 3 5 5 3 3 3 4 1 9 9 9 7 4 5 2 HH 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	I 2754633I 463205277279483653353433H I 127546331463205277279483653353433H I	- I I 435599978888413466220331031762231111	II24475912235226976979694566154111	I I I I I I I I I I I I I I I I I I I			- 331600684215517943 - H2224H4H2H23HHH	1324103647069696926212425523111111111111	13325984335480990204116555744421211111111111	
Relative number,°/	, 5 11	489	497	503	477	523	557	443	559	44I	527	473	
Mean	30,I	30, 8	28,I	29,5	29,0	30,2	30,3	30,9	24,3	25,0	25,5	27,I	
No of spec. me	3I03 asured	2966	5617	5676	2 7 32	299 I	3063	2433	1954	1543	2689	2410	

catches taken by fish-counting trawl with small-meshed net insertion, 1982.

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Table 11. Age composition of the redfish Sebastes mentella (%o) in catches taken by fish-counting trawl with small-meshed net insertion, 1982.

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									and the second
Year	Age	<u> JL (J</u>	une)	<u>: 3M (</u>	April)	: <u>3N(</u>	March)	: 30 (May)
class	years	്റ്	*: <u></u>	៓៰៓៰	: 22	0*0*	: ♀ ♀	0 0	: 2 2
1978	4	-						3	3
1977	5			-	-	I4		IO	7
I976	6	7	IO	-	-	53	25	94	43
I975	7	7	28	-	-	77	88	247	214
I974	8	72	86	27	7	120	56	I34	I34
1973	9	I00	176	206	47	56	99	27	57
I972	10	66	96	I59	I05	I4	42	-	20
197I	II	35	76	34	84	·	46	· •	7
1970	12	3	I24	I7	24	7	127	-	
I969	13	7	35	71	IO	4	70	-	-
I968	I4	-	24	44	IO		53	<u> </u>	
I96 7	I5		I4	30	24	-	I8	-	· · · ·
I966	I 6	(7648)	17	7	27	-	14	-	·
I965	17	-	7	IO	3	-	IO	-	
I964	18	~	IO		30	B ara - 1	7		-
1963	19		-	· · · · ·	14	-	(Jan)D		÷ +
1962	20			-	7		-	-	-
I96I	2I	, 		-	-	-			-
1960	22		-	-	3	 '		•••	
Relativ	7e , %0	297	703	605	395	345	655	515	485
Mean ag years	ge,	9,22	12,50	10,76	12,32	7,72	9,69	7,12	7,55
No of s analyse	spec.	86	204	179	117	98	I 86	154	I45

2 J(July)3K(June) 3L (June) 3M(April) 3N(May) 30(May) Length, cm • f m f f m f m ID f m : m f ••• • • • • 9 0 • • 12-13 - 2242035692344 13566452645334721 - 3053649453347318814551 - I 14-15 16-17 - 87217922937437946555879965553511 exca exca 9000 4040 stuces - 162234043055494294610832 - I -8005 () Const I 57746455340H7 42000 I I I 34044486888113822285265311 123789764323322852265311 - 3363016708177222042519772211 271936645550991333791397431111 2233311832111111111111111111111 227 21837 637 614387 614387 97231 I 9211448841824333141831---I I8-**I**9 29 ĨΪ 33 35 37 39 **4**I 43 45 47 48 - 49·5T 4000 6000 6000 6000 6000 57 56 2015 1011 80000 60000 58-. 59 6000 6T 10002 (1947) (1947) 90007 61407 .63 685 887 680 -4000 6000 64 65 -I 4467) 5467 5567 66 ·67 6000 **Salage** •••• (1940) (1940) 4000 4000 0000 68-69 **** 70-71 72-73 80%. 1996 -----Ī ----Relative number, °/ 202 798 727 433 567 533 467 428 572 438 562 273 Mean 35,4 27,8 34, I 30, 6 34, 3 3I, 5 34, I 34, 5 37, I 36, 6 43, 8 29,3 length, cm No of spec. 245 measured 2330 4467 5859 953 965 836 837 2697 3602 1617 2075

Table 12. Size composition of American plaice (°/...) in catches taken by fishcounting bottom trawl with small-meshed net insertion, 1982.

net insertion , 19	82.	J				
نعه می بعد <mark>مع مع می می</mark> می می می می می ا	: <u>31 (</u> ;	June)	<u>: 3n (</u>	May)	<u>30 (</u>	Max)
Length, cm	of of	: 2 2 _	00	· 4 2	00	: 22
I7 I8 I9 20 21 22 23 24 25 26 27 28 29 30 31 32 33 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 Relative number, %0			- IIIIII35867889751809369375854111 	I 2 - 22458427042846441506447022915221 498		- HH26H34235586008209305907725HH H 94
Mean length.cm	36,04	38,17	35,65	36,00	36,26	37,48
No of spec. measu-	- 295	291	I685	1674	1189	772

Table 13. Size composition of yellowtail flounder (%o) in catches taken with fish-counting trawl with small-meshed net insertion, 1982. Table 14. Size composition of witch (%o) in catches taken by fish-counting trawl with small-meshed net insertion, 1982.

میں حان هو _{الل} میں میں می می م	: <u>3K</u> (J	une)	: 3L (June)	: <u>3</u> N(May):	<u> </u>	May)
Length, cm		_ <u>\$_</u> {_	. 6 6	: & &	0 07:		_o [#] _o [#] _:	\$\$
20-2I	I		in generalise An and	<i>6</i> 74	10%	2	2	2
22-23	2	5	2000		2	4	2	6
24-25	7	3	-		2	-	2	2
26-27	II	6	3	3	2		2	2
28-29	II	12			-	-	3	8
30-3I	12	12	912		8	6	8	I4
32-33	8	II	3	5	I2	I4	30	20
34-35	13	7	9		37	33	64	44
36-37	13	I5	24	13	65	53	87	53
38-39	20	9	4I	30	5I	72	72	67
40-4I	62	2I	54	-33	67	92	88	53
42-43	107	4I	73	78	69	59	43	57
44-45	82	42	49	95	23	43	41	3I
46-47	44	7D	5I	84	45	35	3I	44
48-49	33	68	43	60	16	4 I	17	20
50 - 5I	I9	74	22	49	8	51	9	37
52-53	7	33	13	68	8	4I	~~	18
54-55	4	.24	5 ·	38		21	(846)	17
56-57	3	. 33	,	30		IO	-	4
58-59	I	I8	<u> </u>	II		4	, enc.	8849
60-6I		20		8	-	2	****	6200.
62-63		12	Øxila	prop.	.	2	-	
64-65		2		5		-		
66-67		2	.	-	-	-	-	2404
Relative number, %o	460	540	390	610	415	585	50I	499
Mean length, cm	41,93	47,I8	43,42	47,26	40,38	43,24	3 9,I0	4I,I4
No of spec. meas red	su-562	660	I44	225	212	.299	327	326

- 29 -

take:	n by fish-co	unting	trawl 1982.	with sma	all-mesl	ned net	inser	tion,	
	900 9509 9607 670 680 980 990	: 25 (.	July)	: <u>3</u> K (June)	: 3ī (June :	NE	(May)
Len	gth, cm	88	: \$ \$	8 8	: \$ \$	ਰ ਹੈ	· • •	88.	22
	I6-I7 I8-I9 20-2I 22-23 24-25 26-27 28-29 30-3I 32-33 34-35 36-37 38-39 40-4I 42-43 34-45 53-55 56-57 58-59 60-6I 62-63 64-65 56-57 58-59 60-6I 62-63 64-65 66-67 668-69 70-7I 72-73 74-75 76-77 78-79 80-8I 82-83 84-85 86-87 88-89 90-9I 92-93 94-95 96-97 98-99 90-IOI 02-IO3 004-IO5 elative	- 2235437 10116919246667555224532 11-111	- I 3 I 2 4 5 4 6 0 0 7 2 8 4 6 1 5 9 4 4 2 8 2 3 3 5 4 9 4 4 2 8 2 3 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	-728399237416292644257829997991521-11-1-1-1-1-1	- 2 23 17 18 30 4 26 21 22 42 24 22 42 24 22 42 24 22 42 24 22 42 24 22 24 22 24 22 24 22 24 22 24 22 24 22 22	23 10 11 47 102 10 14 7 102 10 14 17 32 338566 3369 23 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	34 18247 1065113911165 1922348772353262473522111 11111111111111111111111111111111	I 4 22 12 13 22 7 7 2 5 5 5 18 8 3 4 9 2 7 5 10 3 I	- 12777122222126669355391892630475 - 3
M	ean length, cr	48,12	56,32	36,04	3 9,6I	45,22	46,86	38,16	3 9,9I
N	o of spec.	959	1294	3098	3077	954	I257	33I	436
m	easured								

Table 15. Size composition of Greenland halibut (%o) in catches

Table 16. Age composition (°/...) and mean length of Greenland halibut in catches taken by fish-counting trawl with small-meshed net insertion, December, 1981.

						-			
Year	Age,	Baffin	Isl	and (s	ubarea 0).	: Nor : (rth Labr Divisi	ador on 2 G)	
class	years	Number spec. (of %0)	Mean	length	Nun spec	ber of	Mean le	ngth _{cm}
	。 。 	8 4 :	8 8	. o o	:22	. 8 6	· • • •	88	00
1977	4	_	-		3 ania	. 7	3	42,55	48,55
1976	5	14	7	37,55	38,55	17	7	44,55	47,55
1975	6	68	25	46,55	49,I2	3I	45	47,66	51,93
1974	7	I04	86	50,34	52,72	91	IOI	52,47	53,03
1973	8	I56 1	15	54,55	55,55	94	94	56,25	.59,07
1972	9	I04	97	56,62	6I,66	24	I28	59,4I	63,90
I 97 I	IO	3 6	76	6I , 35	65,98	3	I95	64,55	67,09
1970	II		50	-	72,12	7	49	69,55	69,55
I969	12	4	40	66,55	73,28	6,000	66	-	72,97
I968	13	-	7	_	80,55		2I	-	73,22
1967	I4	-	II	-	75,88		I4		8I, 55
1966	15	ans.		_	10700)		3	-	80,55
Relative number,%	20 20	4 86 5	14	486	514	274	726	27.4	726
Mean age years	9	7,8I 8,	97	-		7,34	9,26	-	-
Mean ler	ngth, c	m —		53,05	60,97	-		53,66	63,54
No of sp analysed	pec.	I35 I	43	135	I43	79	209	79	209

مرین بیش بالای میں الائی الائی ا					
Length, cm	Immature	Males	Females	Total	, س
12-14	2		-	2	
15-17	I	-	-	I	
18-20	2	I		3	
2I-23	2	2	-	4	
24-26	Í	2	I	4	
27-29			I	I	
30-32	Ι	3	I	5	
33-35		3	1	4	
36-38		5	4	9	
39-4I	-	I3	8	2I	
42-44	-	16	20	36	
45-47	-	27	27	54	
48-50		54	44	98	
5 I-53		68	51	II9	
54-56	-	74	52	I26	
57-59	-	75	64	139	
60-62	-	59	55	II4	
63-65		52	37	89	
66-68		33	30	63	
69-7I	-	29	20	49	
72-74	ang i 🚣 💷 a	I9	IO	29	
75-77	—	9	6	15	
78-80	an an an ' - arainn an a	5	3	• • • 8 •	
81-83	-	2	3	5	
84-86		I	I	2	
Relative number, %o	9	552	439	1000	
Mean length, cm	20,73	57,04	56,97	56,74	
No of spec. mea-	. 26	1649	I3II	2986	

Table 17. Size composition of roundnose grenadier (%o) in catches taken by fish-counting trawl with small-meshed net insertion in division 3K, July 1982.

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Table 18. Age composition of roundnose grenadier (%o) in catch taken by fish-counting trawl with small-meshed net insertion in division 3K, July 1982.

		and the second			· · · · · · · · · · · · · · · · · · ·			
Year	: Age.	Number	of	spec.(%) Mear	length (cm)	
class	years	: 88:	ç ç .	: ď g _	88	<u>:pp</u>	:_ <u>6</u>	-
19 78	4		2	2	· · _ ·	37,00	37,00	
I977	5	8	I3	2I	39,00	42,40	4 I ,IO	
19 76	6	5	23	28	4 I, 50	45,00	44 ,3 6	
19 75	7	30	63	93	46,50	50,20	49,00	
I9 74	8	83	91°	I 74	50,64	5 3, I7	5 1,9 6	
1973	9	II9	63	I82	53,28	57,40	54,7I	
1972	IO	I 09	55	I64	57,44	6I,68	58,88	
I97I	II	76	38	II4	60,80	66,00	62,53	
I970	I2	6I	25	86	64,50	67,90	65,50	
I969	13	48	.I0	58	66,68	70,75	67,39	
I968	14 /	38	-	38	70,80	- <u>-</u>	70,80	
I967	I5	25	8	33	72,10	76,00	73,23	
19 66	I 6	2	-	2	73,00	-	73,00	
19 65	17	5	-	5	79,00	_	79,00	
Relat numbe	ive r, %0	609	391	10001	609	391	1000	
Mean years	age,	I0 , 38	8,86	9,79	_	- -	-	
Mean	length,	cm	-	. –	58,34	56,74	57,7I	
No of analy	spec.	24I	I55	396	24I	155	39 6	

.

Table 19. Size composition of thorny skate (%o) in catches taken by fish-counting trawl with small-meshed net insertion, 1982.

Length, cm	3 L (June)	3 _{N (May)}	30 (May)
$\begin{array}{c} 12-14\\ 15-17\\ 18-20\\ 21-23\\ 24-26\\ 27-29\\ 30-32\\ 33-35\\ 36-38\\ 39-41\\ 42-44\\ 45-47\\ 48-50\\ 51-53\\ 54-56\\ 57-59\\ 60-62\\ 63-65\\ 66-68\\ 69-71\\ 72-74\\ 75-77\\ 78-80\\ 81-83\\ 84-86\\ 87-89\\ 90-92\\ 93-95\\ 96-98\\ \end{array}$	2I 83 7I 72 68 7I 5I 44 45 34 17 36 26 23 21 28 24 27 42 39 42 52 26 15 15 15 15 15 15 15 15 15 15	30 119 66 43 46 37 50 52 54 56 43 59 40 36 39 25 33 31 20 23 18 24 22 20 8 3 - -	8 33 68 26 29 4I 78 59 70 54 37 67 55 33 34 44 4I 26 24 I5 33 36 2I I6 2I I3 II 55 2
number, %o	1000	1000	1000
Mean length, cm	42,82	40,78	46,58
No of spec. mea-	1007	1562	614

Table 20. Size composition of capelin (%o) in catches taken by midwater trawl with small-meshed net insertion, 1982.

			بر ۱۰ ۱۰ مدر مدر مدر مد			
	:2G (De	cember)	2 J (Oct	ober)	ЗК (о	ctober)
Length, cm	Males	Females:	Males	Females_	Males	Females_
9,5	-	n an the second s	Gilm.	an a		2
10,0	_	-		I	-	5
10,5			I	3	2	7
II,0	-	-	3	4	12	19
II,5	-	-	9	IO	12	21
12 , 0	-	-	13	23	14	26
I2,5	-		26	47	12	46
I3 , 0	· .	2	59	102	21	59
I3, 5	-	2	71	97	. 26	42
I4 , 0	5	-	59	80	I4	46
I4,5	18	26	42	52	19	54
I5,0	83	86	36	46	17	13
I5,5	II9	83	27	36	17	104
16,0	146	100	27	30	9	132
I6 , 5	II8	47	25	17	2	106
17,0	78	34	22	10		52
17,5	2I	8	9	5		2I
18,0	21	3	4	2	-	_
18,5	-	-	I	I	-	-
Relative number, %o	609	391	434	566	177	823
No of spec. measured	234	150	3333	4345	75	348

Table 21. Age composition of capelin (%o) in catch taken by midwater trawl with small-meshed net insertion at South Labrador (2J) in October 1982.

Year Age, :	Molec	Fomolog	æ
class years			99
I98I I	4 • • • •	2	
I980 2	204	281	
1979 3	202	283	
1978 4	6	18	
Relative number,%o	416	584	
No of spec. analysed	206	289	

Table 22. Water temperature on hydrological section 8-A by 1 November 1964-1982, °C.

	: Layer, m								
Year	0-50	: 50-200	: 0-200	: 200-500					
1964	I,04	0,04	0,32	4,08					
I965	I,49	I,76	I,66	4,37					
1966	2,4I	I,44	I,72	4,60					
I967	2,00	0,89	I,I9	4,04					
I968	2,29	-0,I8	0,50	3,95					
I969	0,89	0,36	0,50	4,38					
1970	I,29	0,32	0,60	4,49					
I97I	0,88	0,43	0,57	4,08					
1972	0,35	-0,39	-0,17	4,07					
1973	Ι,00	0,59	0,72	3,9I					
1974	0,96	-0,02	0,27	3,54					
1975	I,I4	0,5I	0,70	3,72					
1976	0,74	0,20	0,36	3,46					
1977	I,76	2,52	2,32	3,68					
1978	0,94	0,78	0,82	3,92					
I979	I,42	0,79	0,99	3,82					
I980	I,32	0,62	0,82	3,65					
1981	2,76	0,70	I,28	3,68					
Mean for	I,37	0,63	0,84	3,97					
1982	0,45	0,38	0,41	3,58					
Anomaly	-0,92	-0,25	-0,43	-0,39					

round weight), 1982. Table 23. Relative weight of cod liver (in % of -

1

				- 3	7 -	
	06-90		ţ		3, 52	8
sth of cod, cm 36-40:41-45:46-50:51-55:56-60:61-65:66-70:71-75:76-80:81-85:8	1	I	1	2,84	1	
		ı	1	2,6I	1	
	1	4,35		2,72		
				1		
		ſ				
	•	8 	۱ م	•		
	1	4,24	3,97		1	
	5,24	4,56	I	3, I5	1	
	5,64	4,59	J	4,39	1	
	4,3I	4,80	1	4,34	1	
	1	4,92	3, 33	I	4,63	
Ten	31-35:	1	4,64	2,74	· 1	1
	l	3,93	2,4T	2,05	1	
	1	1	1	2,42	3,05	
	. 1	3,97	1,	1	3,86	
	Month	July	June	April	May	May
•••	sion -	2 J	ц С	WE	N C	30

