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Report on the USSR Investigations in the ICNAF Area, 1976

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In 1976, the total catch taken by the Soviet fleet in the Convention Area was 800079 tons (Table 1), i.e. 320445 tons less than in 1975. This decrease in catch was mainly caused by the change of limits and quotas in relation to the main commercial fish species.

S u b a r e a 0

A. Status of the fishery

In 1976, as in previous years the Soviet fishing fleet performed fishery along the continental slope of Baffin Island mainly in August-October taking deep water fish species, namely, Greenland halibut and roundnose grenadier. The first of the species just mentioned prevailed in trawl catches that did not occur every year, The Soviet scientists revealed a regular connection between the hydrologic conditions of the calendar year and the relationship of Greenland halibut and roundnose grenadier in catches taken by bottom trawl off Baffin Island. Throughout the years, when the water temperature was lower compared the long-term rate, Greenland halibut prevailed in catches, but, when water temperature was higher than the long-term rate, the major part in catches made roundnose Grenadier.

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Prognostic equation allows to make preliminary calculations allowing to determine the relationship between these two species in their future catches, namely, three months before these fish species will be taken. Using this prognostic equation, the scientists made forecasts that in September 1976, 64 percent of trawl catches taken off Baffin Island will consist of Greenland halibut; as it appeared to be in reality, the share of Greenland halibut reached 70.3 percent. A brief biological characteristic of Greenland halibut and roundnose grenadier is given below.

Greenland halibut

Table 2 shows that individuals 50-70 cm in length prevailed in Greenland halibut catches. Females were larger (and older) than males on the average, and males were somewhat greater in their abundance, the approximate correlation between males and females can be represented as 55:45.

Mature individuals with still slightly developped gonads prevailed in number both among males and females; the next spawning was awaited in 3-4 months. Roundnose grenadier was mainly found in their stomachs; other feeding objects were mainly represented by luminous anchovy, Cephalopoda, redfish, Paralepis and very seldom by shrimps. Thus, Greenland halibut fed mainly on bathypelagic fish and invertebrates that is quite characteristic to this fish species.

Roundnose grenadier

Males of roundnose grenadier were much more abundant than females off Baffin Island, like in other areas of the Northwest Atlantic (Table 3); the reason of this phenomenon is not clear yet. Individuals 55-65 cm in length prevailed in number among males, apparently, they were 9-12-year olds; individuals 60-70 cm in length aged 8-12 years prevailed among females.

Every individual studied, both male and female, appeared to be immature. Areas and terms of the roundnose grenadier spawning are not known up to the present. That concerns the roundnose grenadier inhabiting near Baffin Island and throughout all the neighbouring areas. Their stomachs were most of all filled with shrimps and bathypelagic small crustacean Themisto.

S u b a r e a I

A. Status of the fishery

The Soviet fishery fleet performed operations mainly in the area of the Greenland-Canadian Ridge joining two gigantic islands under water, namely, Greenland and Baffin Island. The bulk of catches taken on the southern slopes of the Ridge consisted usually of roundnose grenadier, that - on the northern slopes and in Div. 1B - of Greenland halibut.

The fishery operations lasted from September up to December.

Roundnose grenadier

This fish was one of the leading species in fisheries in Subarea I, and the mean length of this fish was less compared the same fish inhabiting Subarea 0 (compare Tables 3 and 4). As everywhere throughout the Northwest Atlantic Area, the commercial catches of the roundnose grenadier consisted exclusively of immature fish, where males prevailed significantly in their number. The fish stomachs were mainly filled with bathypelagic invertebrates, mainly, with shrimps, Themisto, Calanus, fish were found more rarely (luminous anchovy).

Shrimps

Instrumental and trawl surveys in the areas of Pandalus borealis concentrations performed in 1975-1976 allowed to

clear up the regularities of their distribution, to assess their stocks and their allowable commercial catch in Div.1B. The method of survey was given in a specieal document (ICNAF Res.Doc. 76/XII 156).

B. Special investigations

I. Environment

In December 1976, the average water temperature of the Arctic component of the West Greenland Current (Layer 0-200 m) was one degree centigrade higher than it was in December 1965, 1970, 1974 and 1975, but, 0.3°-0.5°C lower than it was observed in 1961 and 1964 hydrologically warm years.

Water temperature of the Irminger component of the West Greenland Current in the layer 200-500 m was about 0.1° lower in comparison to the level of previous years and 1° lower versus the level of hydrologically warm 1961 and 1965 years.

Periodical fluctuations of water temperature revealed with help of the harmonic analysis were used for determining the long-period hydrological forecasting along the standard sections 32-A and 11-A. The temperature fluctuations were determined with help of using the contribution of harmonies of three-four-six-eight and ten year periodicities. By using the equations found, expected in July 1978 temperature was estimated (Table 5).

Real and forecasted data obtained for other subareas allow to come to conclusion that in 1977-1978, the next warming of water masses will be observed in the Northwest Atlantic. As usual, counterphase fluctuations begin simulataneously in water temperature of the Barents Sea.

S u b a r e a 2

A. Status of the fishery

In 1976, the fish yield taken by the Soviet fleet in Subarea 2 was less than in the previous years like in the

most other ICNAF subareas and divisions, that happened mainly due to the quatas decrease relating the main commercial fish species.

Cod

In 1976, cod of the Labrador stock was very low in their abundance and their biomass. The main reason of the stock decrease was a low strength of some fish year-classes running. 1969, 1970 and 1971 year-classes were poor (the matter of interest is that year-classes of these years were very strong in the Barents Sea; this phenomena confirms once more the availability of the counterphase in the fluctuations of all the oceanological and biological processes for different parts of the Atlantic Ocean).

Cod of the Labrador stock of 1972 and 1973 year classes were more abundant and the number of their small individuals was much greater in trawl catches (Table 6). The second peak of the size series ranged between 54 cm and 65 cm became apparent due to a great number of strong 1966-1968 year-classes. The analysis of the age sample confirmed once more the predominance of 1967 year-class among other elder age groups (Table 7).

No doubt, in 1977 the stock of the Labrador cod (and their maximum allowable catch) increased considerably in their number versus 1976 due to the entering into the fishery of young cod of strong new year classes. In 1978, the commercial catch should grow in its abundance as well.

Redfish Sebastes mentella

In 1975 and 1976, the efficiency of Sebastes mentella trawl fishery near the South Labrador increased significantly, as well as in the adjacent area of Div.3K. Some year-classes rich enough in their abundance, those of 1963, 1964, 1975 and

1966 entered the commercial stock (Table 8). Redfish Sebastes mentella of these year-classes reached 28-33 cm in length and together with elder specimens they made the bulk of trawl catches, their size compositior is given in Table 9.

In 1978, individuals of 1963-1966 year-classes would be as previously predominant in the commercial stock, but, they would become larger, therefore, mean sizes of redfish in trawl catches would increase as well. Apparently mean weight of one specimen caught would be about 650 g and the mean length-about 35 cm. The efficiency of the trawl fishery would be kept at a high level.

Roundnose grenadier

The most stable and productive fishery of the roundnose grenadier takes usually place near the North Labrador, Div.2G, in the second half-year. Soviet big tonnage trawlers use both bottom and mid-water trawls. Size composition of catches.show (Table 10) that the fishery of the last years had no considerable effect on the structure of the roundnose grenadier population.

Greenland halibut

Greenland halibut are usually fished simultaneously with roundnose grenadier. Their size composition remained at a stable level throughout all the previous years of the fishery as well (Table 11). It is of some interest that Greenland halibut is not almost taken by the midwater trawl. Greenland halibut contrary to the majority of flounders are keeping in water masses for a long period, where they feed on and persecute the mobile prey. Greenland halibut are speedy swimmers and avoid easily the midwater trawl.

B. Special investigations

I. Environment

Standard hydrological section 8-A has the greatest meaning for assessment of temperature conditions and their effect on commercial fish species. Observations are conducted by Soviet oceanographers along this section every year approximately on 1 November. Table 12 shows that the temperature of 50-200 m water layer fluctuates almost every four year period. Water temperature lowered up to its minimum in 1964, 1969, 1972. The last period covering years 1973-1976 was apparently terminated and the next years would be hydrologically warm ones.

Water temperature along the Labrador part of the standard section 8-A effects greatly the trawl fishery. Low temperature favours the cod shoals to become denser in water of the Labrador condinental slope, that was shown even in 1970 (see USSR Research Report, 1969 published in ICNAF Redbook 1970, part 2). In November 1976, water temperature was lower than the average long-term rate, as Table 12 shows, and this phenomenon (as well as the increase of cod stocks) favoured to make the trawl fishery more efficient near the South Labrador in January-February 1977.

S u b a r e a 3

A. Status of the fishery

In 1976, the Soviet catches of all the commercial fish species decreased like in other subareas. That was caused by the decrease in catch quotas and not by that one in fish stocks. Vice versa, some commercial fish stocks (for example, those of cod off the Flemish Cap Bank, yellowtail flounder off the Grand Bank) increased considerably in their abundance and their biomass during the last year.

Cod

The truly assessment of cod stock is based on data of total trawl survey and the youngs counting (see below section "special investigations"). These combined data confirm once more that the fluctuations in fish stocks are effected mainly by the natural fluctuations of year-classes.

The reason explaining the increase of the Labrador cod stocks discussed now was already investigated in the section related to Subarea 2.

Similar fluctuations in fish stocks are observed also in the northern part of Subarea 3 (Divs, 3K and 3L). More sharp, uneven increase in the fish abundance and their biomass is observed now in the commercial cod stock of the Flemish Cap Bank. In 1977, there could be taken the peak cod yield, namely, about 130 thousand tons, if quotas would increased correspondingly

The abundance and the biomass of the commercial cod stock inhabiting the southern part of Grand Bank (Divs 3NO) are now at a level approximate to the long-term average, and, apparently, would not change significantly in the next years. The allowable catch of this cod stock is 90 thousand tons in 1978.

The size composition of trawl cod catches taken along two slopes of the Grand Bank is given in Table 13.

Capelin

In March-May, capelin at the pre-spawning condition migrated through Divs.3LO. The spawning took place as usual in the shallow waters of Div. 3N, the beginning of the spawning was registered on 18-22 June.

The Soviet fleet conducted the capelin fishery mainly with help of the mid-water trawls. The size composition of capelin catches is given in Table 14, the age composition - in Table 15.

The predominance of females is, as usual, the natural phenomenon, though the mechanism of this phenonemon can not yet be explained.

On 16-17 June, the assessment of capelin stocks was made with help of some instruments from board the research vessel "Odissey" in Div. 3N, and on 7-24 November - from board the vessel "Persey III" in Divs. 3K and 2J. In both cases, the whole population could not be covered by the surveys, as capelin approach for their spawning by some parts, "waves", and in November fish are partially keeping in a narrow ashore zone, just that part could not be covered by surveys. The biomass of the capelin commercial stock was determined in Div.3N as high as 0.687 mln tons and their abundance - as high as 35561,8 10^6 specimens. Analogous data for the northern divisions are given in Table 16.

B. Special investigations

1. Environment

Table 17 shows some results of Soviet observations made along the standard hydrological section 6-A. The section cuts both the Northeastern slope of the Grand Bank or "the bergs way" and Flemish Cap along 47°00'. The Table testifies that in May 1976, water temperature was lower within Flemish Cap (area H_2) in layers 0-200 m and 200 m - 500 m compared that one in May of the previous years.

Such a falling in the temperature had to effect the species composition and the terms of the zooplankton development, as well as the reproduction of commercial fish species (thus, the Soviet ichthyologists found that cod of Flemish Cap produce the strongest year-classes within hydrologically cold years).

Hydrochemical investigations were completed along the standard sections in Subarea 3 from board the Soviet research vessels "Persey III" and "Odissey" in addition to the measurement of water temperature. 3029 samples were taken for determination of the dissolved oxygen in water and those samples have been already treated up to the present. Besides, 2729 samples

for determining the phosphorus content and 18 ones for finding the silicon content were taken in time of investigations conducted.

2. Zooplankton

Throughout the period from 17 March up to 20 June 1976, the plankton haulings were performed from board the research vessel "Persey III" along the standard hydrological sections 6-A, 7-A and inside the "triangle" at the horizons 0-50 m, 50-100 m and 100-200 m. The total number of collected plankton samples was 143, of them 40 samples were taken at Flemish Cap, those xamples were treated with application of the counting method (under binocular). The other samples were treated by visual counting of the zooplankton number (much, rather much, scarce number, singular individuals).

Copepods prevailed in number among zooplankton like in the previous years, of them Calanus finmarchicus dominated. In May coldwater crustaceans Calanus hyperboreus, Calanus glacialis, Metridia longa, Oikopleura labrodoriensis were more abundant than usually at Flemish Cap. In 1976, the biological spring began later than in the period 1970-1974, C.finmarchicus spawning took place on Flemish Cap in the midst of May, that one on the Northeastern slope of the Grand Bank-late in May - early in June.

Thus, the zooplankton species composition and the terms of their spawning on Flemish Cap testify to the rising in temperature of water masses in spring 1976. Thus, data obtained as result of investigations conducted and given above were confirmed once more.

3. Benthos

In April-June 1976, the benthos survey was conducted in Subarea 2 (as well as in the adjacent part of Subarea 3). 53 quantitative and 49 qualitative samples were taken at 53 stations. Materials collected are at the stage of treatment in the laboratory conditions. Preliminary results showed that during the last ten-year period some changements were registered

both in the distribution of certain species and the biocenosises of bottom animals. These changements night be effected by the fluctuations in the hydrological conditions.

Counting of juvenile cod and haddock

This work is conducting by Soviet ichthyologists in Subarea 3 already throughout fifteen years. In 1970, this work began to be realized from board the vessel of greater capacity "Persey III". To compare the results obtained in the previous years to those planned for future, a conversion factor was worked out as result of a series of parallel trawlings made by two vessels. Data for the whole period of counting of the young cod are shown in Table 18, and, for the period from 1970 up to 1976 there are given the actual data obtained on board the R/V "Persey III", those for the previous years were got by multiplying the mean catches taken by an old, not so powerful trawler by the conversion factor.

The attention would be paid to the figures given in Table 18. The mean catch of cod at age 3 characterizes the strength of the Labrador cod year-classes in Division 3K. It was already metioned above in the section on the cod fishery that in 1975-76 their catches declined due to the fact that in 1975-76 the cod stocks decreased as result of the entering of the poor juvenile recruitment of 1970-71 year-classes.

But, in 1973 an extremely strong year-class recruited the stock and partially this year-class recruits the commercial stock even at the present. The recruitment of the Labrador stock by quickly growing individuals of this year-class (as well as the hydrological conditions favouring the fish stocks to become denser) allowed to increase sharply the efficiency of the trawl fishery near the South Labrador in January-February, 1977.

The increment of cod stocks appeared to be much greater on Flemish Cap, where an extremely strong year-class was re-

gistered in 1973. This year-class may be fished the most intensively in 1977 and 1988.

The 1974 year-class, rich enough, inhabit the southern part of Subarea 3.

Perhaps, the recruitment of this year-class will increase somewhat in its abundance, and surely, it will favour the stabilization of the possible optimum catches in Divisions 3P.

Total trawl survey of bottom fish species

The fluctuations inthe total cod catch per hour trawling correspond entirely with the results of the young cod counting (including the individuals of any size and age). Tables 19 and 20 shown that the highest factors characterizing the abundance and the biomass of cod were observed in 1972 in Divisions 3K and 3L throughout the whole period of the total trawl survey (when the efficiency of the trawl fishery of the Labrador cod was high enough). From 1972 up to 1975, the factors characterizing the abundance and the biomass were always decreasing, as just after 1968, some year-classes running were poor. In 1976, the Labrador cod began to increase both in their abundance and in their biomass (that effected greatly the efficiency of the trawl fishery early in 1977).

Tables 19 and 20 show also distinctly a quick growth of the cod biomass, and especially of their abundance on Flemish Cap, the reasons caused this phenomena were already mentioned in the previous section on counting the young cod.

The results obtained in time of the total trawl survey showed also the stabilization of the American plaice stocks, some increase in the abundance and the biomass of the yellowtail flounder, and the restoration of the abundance and the biomass of the white hake in Division 3P.

The area of redfish habitation, this deepwater fish is often streched far beyons the limits of the area covered by the total trawl survey, and, therefore, the assessment of the redfish abundance and the biomass is not quite representative.

Fishing gears

Investigations on the selectivity of the bottom trawl cod-end relating cod were conduoted in Divisions 3N, 3L, and 2J. The cylindrical part of the codend was covered with small sized mesh chafing gear. As soon as the hauling process had been over, all the cod specimens retained in the codend as well as those avoided through its mesh into the chafer were counted and measured.

It was found that in case of the catch invreasing, the significance of the selection factor becomes less. The duration of the trawling has any effect on the selection factor.

In addition, the investigations were also conducted on the escaping cod and redfish through the mesh in the fore parts of the standard bottom trawl.

S u b a r e a 4

A. Status of the fishery

Silver hake. In 1976, the USSR catches of silver hake in Divisions 4VWX made 81,2 thousand tons that was somewhat less than the quota established for the USSR. The silver hake was mainly caught throughout the period from February to March. The bulk of catches made fish being 26-31 cm long at age-2-4 years. The 1964 rich year-class dominated in the catches, the mean number of specimens of this year-class made 50 percent of the silver hake catches. The stock of this fish species was determined to be as high as 227 thousand tons in 1978 with application of the virtual population method, then, it was taken into account the fact that the possible 1977 catch may be 70 thousand tons, besides, it was admitted that the abundance of 1975 and 1976 year-classes of fish at age 2 would be 10^9 specimens. The maximum catch allowable for 1978 may be 76 thousand tons at $F_{1,0}$ (age 3 and older fish) and at $F_{0,126}$ (age 2 fish).

Herring. In 1976, the herring catch bore the incidental character. Thus, the catch of this fish species made some 3,1 thousand tons near the Nova Scotia. 3-4-year-old fish of 22-27 cm in length prevailed in catches (Table 21).

Argentine. This fish species was caught mainly while harvesting silver hake and other fish species. The bulk of catches made individuals age 5-8 having 26-32 cm in length (Table 22).

As the argentine fishery is not intensive and the fluctuations in their abundance are insignificant, one can assume that in 1978 the stock of this fish species will be about 100 thousand tons, i.e. the stock will remain at the level of previous years. The 1978 TAC may be set as high as 20-25 thousand tons.

Shortfin squid. In summer 1976, enormous concentrations of shortfin squid were observed off Nova Scotia, thus they were exploited successfully. Individuals of 14 cm - 19 cm long dominated in the catches. One can spuppose that shortfin squid represent a unique population in the Northwest Atlantic. This can be confirmed by the fact that their concentrations are observed throughout the area from Nova Scotia up to Newfoundland, and their spawning areas are beyond the shelf. Data obtained as result of trawl survey by "Argus" in summer 1971 showed that their minimum biomass on Georges Bank was 100 thousand tons, those obtained by "Belogorsk" in 1972 allowed to estimate it to be as high as 58 thousand tons, in 1975 - 197 thousand tons and in 1976 - 258 thousand tons. It should be taken into account that in 1972 and 1976 the surveys completed covered the less area. Knowing that the life cycle of shortfin squid is short (abount 23 months) and taking into consideration their stock condition during the last years, it is possible to increase considerably their catches.

S u b a r e a 5

A. Status of the fishery

Silver hake. The stocks of this fish species are rich enough in the area of Georges Bank. In 1976, the bulk of catches made individuals at age 3-4 years, 28-33 cm in length (Table 23).

Data obtained as result of trawl survey by "Albatross IV" showed that the 1974-75 year classes appeared to be the rich ones, Thus, the 1973 mean fingerling catch appeared to as high as 10,2 individuals per 30 minutes of trawling, the 1974 catch - 110,3, and the 1975 catch - 33,6 individuals. The stock condition of silver hake allows to recommend to remain in 1978 the catch quota at the 1977 level, i.e. 70 thousand tons.

Silver hake stocks were recruited by rich 1974 and 1975 year-classes in the southern part of New England (5Ze+6a). In 1973, the fingerling catch was 15.3 individuals per 30 minutes of trawling by "Albatross IV", in 1974- 87,7 individuals and in 1975 - 47,8 ones. The 1978 TAC may be kept at the 1977 level, i.e. 50 thousand tons.

Herring. The herring catch was performed by purse seines and by mid-water trawls in summer and at the beginning of autumn. The herring catches made 12.6 thousand tons. The individuals at age 4-5 and 6,27 cm - 39 cm in length dominated in their catches.

Mackerel. Mackerel was fished in January and February. Their annual total catch was 58.9 thousand tons. Individuals at age 2 through 5 within the range from 25 cm to 37 cm in length dominated in their catches (Table 24).

Takinginto account the value of the mackerel catch taken in 1976, their age composition in catches, as well as the possible catch determined for 1977 to be as high as 105 thousand tons, it became possible to estimate the mackerel stock for 1978 as

high as 631 thousand tons. The above calculations allowed to recommend the 1978 TAC of 165 thousand tons at Fopt. of 0.35.

Hake. In 1976, the hake catch was performed by bottom trawls at the southeastern slopes of Georges Bank and, sometimes, they were fished by pelagic trawls in the shallow waters of the Shelf. Individuals at age 2 through 5 years of 26 cm - 37 cm long made the bulk in the catches on Georges Bank (Table 25).

In 1978, the bulk of catches will make the 1973-75 year-classes. Data of trawl surveys showed that the 1973 and 1974 year-classes are the rich ones, and the 1975 year-class is an average one. Thus, the 1971 fingerling catch was 5,4 individuals per 30 minutes of trawling by "Albatross IV" in 5Ze, in 1972 it was 1,9, in 1973 - 8,5, in 1974 - 20,6 and in 1975 - 3,0 individuals. The value of the catch allowed to be taken in 1978 was determined as high as 20 thousand tons.

Shortfin squid. In 1976, shortfin squid were successfully fished, as their stocks were dense. Individuals of 13 cm through 19 cm in length dominated in their catches. The quota for shortfin squid may be increased significantly, it may be as high as 150 thousand tons and more for the Northwest Atlantic.

B. Special investigations

I. Environment

a) Hydrology. In 1976, studies of intraannual fluctuations of the geostrophic circulation were continued in the areas of the New England Shelf and of Nova Scotia. Basing on the analysis of the dynamic topography maps plotted with use of hydrologic surveys data, 1962 through 1975, it appeared possible to distinguish the types of fields for geostraphic currents (11 types for the New England area and 4 ones - for the Nova Scotia area). It was noted that the circulation types were developped by an exclusive circle. Quasistationary cycles or the upwelling water

zones were distinguished within the shelf zone, the development of zoo- and ichthyoplankton, as well as of adult fish are timed to those cycles in different periods of their life circle. Complete results of this work are given as a special report to the ICNAF Annual Meeting.

b) Hydrochemistry. The studies of the hydrochemical regime of Georges Bank waters were continued by AtlantNIRO with the purpose to understand the dynamics of the biogenic elements and their effect on the phytoplankton development.

The materials collected in August 1974 and in April, August and September 1975 were treated and analysed. The nitrates content was at the lowest level. They reached often the analytical zero on the surface, and in August 1975 such a content was registered in the layer 0-30 m. The maximum nitrate values were registered in the layer 150-200 m (18-22 mkg-at/l).

The phosphate content fluctuated within the ranges from 0,1-0,3 mkg-at/l in the surface layer up to 1,4 - 1,9 mkg-at/l at depth 200 m - 300 m; the silicium content was in the range from 0,5 - 1,2 mkg - at / l up to 5,5 - 14,0 mkg-at/l correspondingly.

In April, the values of the ratio N/P fluctuated from 2 in the surface layer up to 16 in the near-bottom layer, in August - from 0 up to 12 and in September - from 2-4 up to 12. The values of the ratio Si/p fluctuated from 6-8 in the surface layer up to 14 at 300 m depth in August and from 4 up to 10 - in Septempber.

c) Zooplankton. In 1976, the treatment of the zooplankton samples was completed, the samples had been collected on Georges Bank in time of the ichthyoplankton survey in October. The zooplankton samples were collected with the purpose to study the providing of the herring larvae with food. Their catch was conducted with help of a small model "Bongo" covered with net made of gas N 53 (0,106 mm).

The seston biomass was in the range from 50 g up to 100 g under 1 m^2 throughout the largest part of the investigated area, and it was 162 g under 1 m^2 in the northern part of Georges Bank.

The zooplankton consisted mainly of Calanus finmarchicus, P.parvus, Ova u Nauplii, Copepoda, Oithona similis, of them Ova u Nauplii Copepoda dominated in number. The areas of concentration of Copepoda larvae and eggs including more than 500 thousand individuals under 1 m^2 coincided with those of herring concentrations.

Thus, in October 1975 the distribution of seston and of the main feeding objects (Ova u Nauplii Copepoda) coincided with the maximum concentrations of the herring larvae.

One can conclude that the herring larvae were ensured enough with feeding objects within the investigated period.

d) Ichthyoplankton. The results of the ichthyoplankton samples collected in August and September 1975 for the counting of eggs and larvae of silver and red hakes on Georges Bank showed that the abundance of silver hake larvae was approximately 2,4 times more than that one in August 1974. In 1975,the total abundance of red hake larvae made 0,4 x 10^{12} individuals, that was 13 times more compared 1974, when their abundance made 5,1x10^{12} individuals.

In September-October 1975, 2 ichthyoplankton surveys were performed in time of the mass herring spawning in the area of Georges Bank with the purpose of studying the distribution of herring larvae and the estimation of their abundance.

The 200 m layer of water was swept with help of a large model of the plankton collector "Bongo" (the diameter of the opening was 61 cm), the mesh size was 333 mm and 505 mm.

The results obtained after the treatment of survey materials showed that the distribution of herring larvae coincided mainly with this one in the previous years. The total abundance of herring larvae was 1,84·10^{12} individuals in the second half

of October 1975, that was about 3,5 times less than in the corresponding period, 1974, when the total larvae abundance was $6,42 \cdot 10^{12}$ individuals. Contrary to the previous years, in Obtober 1975 the 1,5 increment in the total abundance of herring larvae in the spawning area on the Nantucket Shoals was observed versus the spawning area on the northern slopes of Georges Bank.

The survey in the Gulfstream area southerner Nova Scotia

In November and December 1974, a complex survey was completed by "Belogorsk" in the high sea adjacent to the Nova Scotia Shelf lying between 57°W and 63°W and limited by 40° from the southern part. The complex observations at every station consisted of water temperature measurements, salinity determination by standard horizons and the collection of zooplankton and ichthyoplankton samples.

The results of the analysis of material collected showed that this area has a complex structure of currents caused by the interaction between the Gulfstream frontal zone and the slope waters. Meanders are formed as result of complex interactions, and the hydrolic cycles with the cyloric and anticyclonic gyrations are observed between the meander curves. A great variety of zooplankton is caused by different origin of water of the Gulfstream system and the Labrador currents. Boreal Arctic species and warmwater ones are found in the samples collected. The densest seston concentrations were found along the meanders curves at the limits of gyrations with the counterside rotation.

Studies of fish and squid feeding

The analysis of materials on fish feeding on Georges Bank collected and treated throughout the period from 1971 up to 1976 showed that fish-planktoneaters feed on the organisms found often in water. But, as the concentrations of different species of planktoneaters are located separately, the similarity of their food composition is insignificant. Their feeding is the most in-

tensive in the areas of the feeding objects concentrations. The comparison of the feeding intensity showed that mackerel feed more intensively than the Atlantic herring and this one genus Alosa.

The analysis of 425 samples of Illex and Loligo stomachs collected in 1974 and 1975 showed that the composition of squid food is similar to that one of the planktoneaters, besides, it includes fish, squids and crustaceans. The dominating component of the Loligo food are fish-Myctophidae, that of the Illex food - crustaceans. The results of the analysis of the treated samples on the feeding of silver and red hakes showed that the number of euphausids eaten by hakes increases depending on the depth they inhabit. The intensity of feeding and the volume of food eaten by silver and red hakes are growing with the increase of fish bodies lengths throughout all the areas of Georges Bank.

This fact testifies that older individuals are better ensured with their food. The main feeding and spawning periods of silver and red hakes are registered at the end of summer and in autumn on the southern slopes of Georges Bank.

УЛОВЫ СССР В СЕВЕРО-ЗАПАДНОЙ АТЛАНТИКЕ ЗА 1976 ГОД

TABLE 1. USSR CATCHES IN THE NORTHWEST ATLANTIC OCEAN IN 1976

(в тоннах) TONS

	Подрайоны SUBAREAS					ВСЕГО ИКНАФ Total ICNAF	6 ст. район Stat area 6	0 ст. район Stat area 0	ВСЕГО TOTAL
	I	II	III	IV	V				
ВСЕГО TOTAL	27277	123274	329110	160637	159781	800079	45876	6726	852681
в том числе:									
мойва capelin	15	85199	211928	-	-	297142	-	-	297142
аргентина argentine	-	-	-	6631	264	6895	-	-	6895
палтус атлантический Atlantic halibut	140	-	187	-	-	327	-	-	327
палтус черный Greenland halibut	6944	4201	2598	-	-	13743	-	3990	17733
камбала-ерш American plaice	1753	576	6895	4102	3	13329	-	-	13329
камбала зимняя winterflounder	-	-	-	376	1	377	-	-	377
камбала длинная witch	-	134	5882	3237	2	9255	-	-	9255
камбала желтохвостая yellowtail flounder	-	-	57	281	4	342	-	-	342
треска cod	137	16084	46823	10018	925	64987	8	-	64995
пикша haddock	-	-	100	24	4	128	-	-	128
сайда pollock	-	-	-	1402	64	1466	-	-	1466
белый морской налим white hake	-	-	917	-	-	917	-	-	917
красный морской налим: red hake	-	-	-	1080	17559	18639	6301	-	24940
серебристый хек silver hake	-	-	-	81216	47562	128778	6210	-	134988
макрурус grenadier	5564	6137	13841	-	-	25542	-	2610	28152
морские окуни redfish	5825	10359	36739	1021	379	54323	78	126	54527
зубатки wolffishes	322	437	62	-	-	820	-	-	820
бычки sculpins	-	-	-	-	472	472	-	-	472
морской черт американский angler	-	-	-	3394	332	3726	-	-	3726
морской петух sea robin	-	-	-	367	37	404	-	-	404
батерфиш butterfish	-	-	-	73	260	333	87	-	420
сельдь herring	-	-	-	3117	12612	15729	384	-	16113
помолобус alewife	-	-	-	2468	181	2649	63	-	2712
скумбрия mackerel	-	-	-	16576	58892	75468	29833	-	105301
акулы sharks	-	-	-	2856	12359	15215	1466	-	16681
скаты skates	-	-	443	8095	412	8950	-	-	8950
прочие рыбы other fish	110	147	2309	6732	1221	10519	38	-	10557
кальмар-иллекс Illex squid	-	-	329	16571	5689	22589	1123	-	23712
кальмар-лолиго Loligo squid	-	-	-	-	547	547	285	-	832
креветки shrimps	6468	-	-	-	-	6468	-	-	6468

TABLE 1.

УЛОВЫ СССР В СЕВЕРО-ЗАПАДНОЙ АТЛАНТИКЕ ЗА 1976 ГОД

USSR CATCHES IN THE NORTHWEST ATLANTIC OCEAN IN 1976

(в тоннах) TONS

	Подрайоны SUBAREAS					ВСЕГО ИКНАФ Total ICNAF	6 ст. район Stat area 6	0 ст. район Stat area 0	ВСЕГО TOTAL
	I	II	III	IV	V				
ВСЕГО TOTAL	27277	123274	329110	160637	159781	800079	45876	6726	852681
в том числе:									
мойва capelin	15	85199	211928	-	-	297142	-	-	297142
аргентина argentine	-	-	-	6631	264	6895	-	-	6895
палтус атлантический Atlantic halibut	140	-	187	-	-	327	-	-	327
палтус черный Greenland halibut	6944	4201	2598	-	-	13743	-	3990	17733
камбала-ерш American plaice	1753	576	6895	4102	3	13329	-	-	13329
камбала зимняя winterflounder	-	-	-	376	1	377	-	-	377
камбала длинная witch	-	134	5882	3237	2	9255	-	-	9255
камбала желтохвостая yellowtail flounder	-	-	57	281	4	342	-	-	342
треска cod	137	16084	46823	1018	925	64987	8	-	64995
пикша haddock	-	-	100	24	4	128	-	-	128
сайда pollock	-	-	-	1402	64	1466	-	-	1466
белый морской налим white hake	-	-	917	-	-	917	-	-	917
красный морской налим: red hake	-	-	-	1080	17559	18639	6301	-	24940
серебристый хек silver hake	-	-	-	81216	47562	128778	6210	-	134988
макрурус grenadier	5564	6137	13841	-	-	25542	-	2610	28152
морские окуни redfish	5825	10359	36739	1021	379	54323	78	126	54527
зубатки wolffishes	328	437	62	-	-	820	-	-	820
бычки sculpins	-	-	-	-	472	472	-	-	472
морской черт monkfish angler	-	-	-	3394	332	3726	-	-	3726
морской петух sea robin	-	-	-	367	37	404	-	-	404
батерфиш butterfish	-	-	-	73	260	333	87	-	420
сельдь herring	-	-	-	3117	12612	15729	384	-	16113
помохобус alewife	-	-	-	2468	181	2649	63	-	2712
скумбрия mackerel	-	-	-	16576	58892	75468	29833	-	105301
акулы sharks	-	-	-	2856	12359	15215	1466	-	16681
скаты skates	-	-	443	8095	412	8950	-	-	8950
прочие рыбы other fish	110	147	2309	6732	1221	10519	38	-	10557
кальмар-иллекс Illex squid	-	-	329	16571	5689	22589	1123	-	23712
кальмар-лолиго Loligo squid	-	-	-	-	547	547	285	-	832
креветки shrimps	6468	-	-	-	-	6468	-	-	6468

Table 2. Age and size composition (%o) of Greenland halibut near Baffin Island, August and September 1976

Total length cm	August			September		
	Males	Females	Total for males and females	Males	Females	Total for males and females
1	2	3	4	5	6	7
36-37	1	1	2	1	1	2
38-39	3	1	4	2	1	3
40-41	4	2	6	4	2	6
42-43	8	4	12	7	2	9
44-45	10	5	15	8	5	13
46-47	23	10	33	19	8	27
48-49	35	15	50	34	15	47
50-51	59	26	85	61	21	82
52-53	69	32	101	77	34	111
54-55	53	31	84	50	25	75
56 -57	45	28	73	41	26	67
58-59	31	21	52	36	24	60
60-61	43	24	67	42	24	66
62-63	45	23	68	44	20	64
64-65	38	21	59	42	19	61
66-67	27	21	48	29	16	45
68-69	22	22	44	22	18	40
70-71	14	20	34	17	16	33
72-73	9	17	26	12	20	32
74-75	6	17	23	7	19	26
76-77	2	14	16	3	15	18
78-79	1	15	16	2	13	15
80-81	-	16	16	-	20	20
82-83	-	12	12	-	14	14
84-85	-	12	12	-	12	12
86-87	-	10	10	-	9	9
88-89	-	8	8	-	8	8
90-91	-	8	8	-	9	9
92-93	-	4	4	-	5	5
94-95	-	4	4	-	5	5
96-97	-	2	2	-	3	3
98-99	-	2	2	-	3	3
100-101	-	2	2	-	2	2
102-103	-	1	1	-	3	3
104-105	-	1	1	-	2	2
106-107	-	-	-	-	-	-
108-109	-	-	-	-	1	1
110-111	-	-	-	-	2	2
Relative number %o	548	452	1000	560	440	1000
Mean length, cm	56.95	67.71	60.95	57.38	67.16	61.68
Number of individuals measured	7534	6223	13757	2939	2309	5248

Table 3. Age and sex composition (‰) of roundnose grenadier near Baffin Island, August and September, 1976

Total length, cm	August			September		
	Males	Females	Total for males and females	Males	Females	Total for males and females
1	2	3	4	5	6	7
27-29	2	1	3	1	-	1
30-32	5	4	9	3	-	3
33-35	7	3	10	4	2	6
36-38	10	3	13	6	2	8
39-41	12	4	16	11	4	15
42-44	21	7	28	29	9	38
45-47	29	9	38	35	13	48
48-50	50	19	69	66	18	84
51-53	66	26	92	79	24	103
54-56	57	29	96	66	28	94
57-59	69	36	105	74	26	100
60-62	73	35	108	75	33	108
63-65	74	42	116	79	35	114
66-68	60	38	98	65	28	93
69-71	48	28	76	44	23	67
72-74	38	24	62	38	20	58
75-77	7	21	28	12	19	31
78-80	11	9	20	9	11	20
81-83	3	5	8	2	3	5
84-86	1	3	4	1	2	3
87-89	-	1	1	1	-	1
Relative number (‰)	653	347	1000	700	300	1000
Mean length, cm	58.63	61.23	59.53	58.43	61.29	59.28
Number of individuals measured	8824	4688	13512	2896	1218	4114

Table 4. Size and sex composition (%o) of the roundnose grenadier near the West Greenland, Div.1C, September and October 1976

Total length, cm	September			October		
	Males	Females	Total for males and females	Males	Females	Total for males and females
27-29	1	1	2	13	1	14
30-32	12	4	16	18	7	25
33-35	8	4	12	23	6	29
36-38	14	4	18	20	5	25
39-41	21	10	31	28	5	33
42-44	38	14	52	47	13	60
45-47	65	23	88	52	16	68
48-50	90	28	118	79	26	105
51-53	100	36	136	99	29	128
54-56	69	24	93	82	28	110
57-59	76	26	102	67	29	96
60-62	74	20	94	78	28	106
63-65	66	25	91	61	23	84
66-68	33	21	54	33	14	47
69-71	25	17	42	21	12	33
72-74	18	13	31	13	10	23
75-77	7	4	11	4	3	7
78-80	2	5	7	4	2	6
81-83	1	1	2	1	-	1
Relative number, %o	720	280	1000	743	257	1000
Mean length, cm	54.47	56.00	54.91	52.90	55.33	53.57
Number of measured individuals	4961	1911	6872	4611	1591	6202

Table 5. Water temperature (°C) along two standard hydrological sections expected in July 1978

Section	Layer, m	Expected temperature and allowable error	Average long-term temperature	Expected temperature anomaly
32 - A	0-200	1.94 ± 0.51	1.88	+ 0.06
11 - A	0-200	2.49 ± 0.75	2.12	+ 0.37
11 - A	200-500	4.10 ± 0.70	3.83	+ 0.27

Table 6. Size composition of cod (‰) off South Labrador, January and February 1976

Total length (cm)	January	February
24-26	5	1
27-29	38	37
30-32	119	141
33-35	141	188
36-38	73	122
39-41	28	49
42-44	23	43
45-47	33	47
48-50	44	40
51-53	49	48
54-56	89	51
57-59	95	66
60-62	108	63
63-65	78	42
66-68	42	24
69-71	18	13
72-74	10	11
75-77	3	8
78-80	2	4
81-83	1	1
84-86	-	1
87-89	1	1
Relative number (‰)	1000	1000
Mean length (cm)	48.21	44.33
Number of specimens measured	9320	2226

Table 7. Age composition, mean weight and mean length of cod by different age groups near South Labrador, January 1976

Year-class	Age (years)	Number of specimens (%o)	Mean weight, g	Mean length, cm
1973	3	187	314	32.1
1972	4	367	404	35.5
1971	5	63	779	42.4
1970	6	80	1198	49.6
1969	7	70	1429	52.3
1968	8	67	2042	57.8
1967	9	130	2344	60.8
1966	10	27	2525	63.6
1965	11	7	3000	65.5
1964	12	3	2110	69.0

Table 8. Age and sex composition, mean weight and mean length of redfish Sebastes mentella by different age groups near the South Labrador, May 1976.

Year-class	Age (years)	Number of specimens, %			Mean weight, g			Mean length, cm		
		males	females	Males & females together	males	females	Males females together	males	females	Males and females together
1971	5	5	-	-	125	-	125	20.0	-	20.0
1970	6	-	3	3	-	135	135	-	22.0	22.0
1969	7	14	-	14	185	-	185	23.2	-	23.2
1968	8	17	7	24	249	262	253	26.2	25.5	26.0
1967	9	48	31	79	272	253	265	26.6	26.3	26.5
1966	10	66	34	100	307	291	302	28.0	27.4	27.8
1965	11	66	41	107	362	370	365	29.8	29.4	29.7
1964	12	73	52	125	410	440	422	30.8	32.1	31.3
1963	13	34	55	89	493	495	494	32.4	32.9	32.8
1962	14	17	14	31	572	546	561	34.4	34.2	34.3
1961	15	10	10	20	577	592	584	35.0	35.3	35.2
1960	16	28	28	56	625	792	709	36.2	38.0	37.1
1959	17	21	24	45	702	881	798	37.3	38.1	37.8
1958	19	24	97	121	854	908	894	39.0	40.0	39.5
1957	19	-	34	34	-	938	938	-	40.6	40.6
1956	20	-	66	66	-	1082	1082	-	41.2	41.2
1955	21	7	17	24	1182	1029	1073	44.0	42.6	43.0
1954	22	-	28	28	-	1241	1241	-	44.5	44.5
1953	23	-	17	17	-	1251	1251	-	46.0	46.0
1952	24	-	14	14	-	1392	1392	-	47.0	47.0
By all the age groups	428	428	572	1000	438	744	613	31.0	36.4	34.1

Table 9. Size and sex composition (‰) of redfish Sebastes mentella, May 1976

Total length, cm	Males	Females	Males and females together
21	1	1	2
22	2	1	3
23	3	3	6
24	6	6	12
25	7	11	18
26	15	20	35
27	20	19	39
28	24	32	56
29	23	34	57
30	39	51	90
31	43	49	92
32	61	56	117
33	64	49	113
34	48	37	85
35	51	26	77
36	39	17	56
37	33	17	50
38	24	8	32
39	14	8	22
40	10	7	17
41	6	6	12
42	1	4	5
43	2	1	3
44	1	-	1
Relative number, ‰	537	463	1000
Mean length (cm)	32.80	31.71	32.30
Number of specimens measured	1717	1479	3196

Table 10. Size and sex composition (%o) of roundnose grenadier near the North Labrador, July 1976

Total length (cm)	Bottom trawl			Mid-water trawl		
	males	females	males and females together	males	females	males and females together
24 - 26	1	-	1	-	-	-
27 - 29	2	-	2	-	-	-
30 - 32	8	2	10	1	1	2
33 - 35	14	1	15	4	1	5
36 - 38	10	1	11	2	4	6
39 - 41	9	5	14	6	7	13
42 - 44	30	15	45	23	12	35
45 - 47	21	15	36	36	14	50
48 - 50	38	23	61	48	33	81
51 - 53	79	39	118	57	36	93
54- 56	114	59	173	61	31	92
57 - 59	78	52	130	62	41	103
60 - 62	58	66	124	62	44	106
63 - 65	68	48	116	84	45	129
66 - 68	31	22	53	61	40	101
69 - 71	28	18	46	43	37	80
72 - 74	21	9	30	30	20	50
75 - 77	5	1	6	12	11	23
78 - 80	5	1	6	11	7	18
81 - 83	-	1	1	5	3	8
84 - 86	-	2	2	3	1	4
87 - 89	-	4	-	-	1	1
Relative number (%o)	620	380	1000	611	389	1000
Mean length, cm	55.97	58.12	56.84	59.34	59.83	59.54
Number of specimens measured	949	573	1522	2097	1334	3431

Table 11. Size and sex composition (%o) of the Greenland halibut near North Labrador, August and September 1976

Total length	August			September		
	Males	Females	Males and females together	Males	Females	Males and females together
40 - 41	-	-	-	1	-	1
42-43	2	1	3	2	1	3
44 - 45	8	2	10	-	-	-
46 - 47	9	3	12	6	2	8
48 - 49	16	6	22	11	6	17
50 - 51	38	18	56	28	7	35
52 - 53	52	20	72	55	30	85
54 - 55	42	17	59	37	25	62
56 - 57	32	22	54	38	32	70
58 - 59	36	27	63	38	39	77
60 - 61	33	22	55	61	39	100
62 - 63	44	23	67	60	36	96
64 - 65	41	24	65	37	30	67
66 - 67	21	25	46	28	24	52
68 - 69	23	20	43	18	22	40
70 - 71	14	22	36	17	24	41
72 - 73	7	25	32	8	18	26
74 - 75	3	26	29	3	20	23
76 - 77	2	18	20	2	14	16
78 - 79	2	33	35	-	22	22
80 - 81	1	39	40	-	29	29
82 - 83	-	33	33	-	20	20
84 - 85	-	44	44	-	23	23
86 - 87	-	29	29	-	21	21
88 - 89	-	26	26	-	14	14
90 - 91	-	21	21	-	19	19
92 - 93	-	13	13	-	9	9
94 - 95	-	9	9	-	11	11
96 - 97	-	3	3	-	8	8
98 - 99	-	1	1	-	3	3
100 -101	-	1	1	-	2	2
102-103	-	1	1	-	-	-
Relative number (%o)	426	574	1000	450	550	1000
Mean length (cm)	58.51	72.99	66.82	59.40	70.16	65.32
Number of specimens measured	1041	1403	2444	1107	1351	2458

Table 12. Water temperature (°C) along the hydrological section (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
Average for 1964-1976	1.26	0.46	0.69

Table 13. Size composition (‰) of cod on the slopes of the Grand Bank in spring 1976

Total length, cm	Northeastern slope (3L), March	Southeastern slope (3N), April
21 - 23	1	1
24 - 26	1	11
27 - 29	6	20
30 - 32	17	35
33 - 35	37	56
36 - 38	68	65
39 - 41	91	66
42 - 44	148	88
45 - 47	144	102
48 - 50	120	126
51 - 53	94	133
54 - 56	75	103
57 - 59	48	75
60 - 62	29	39
63 - 65	23	24
66 - 68	18	18
69 - 71	15	12
72 - 74	17	11
75 - 77	13	7
78 - 80	8	4
81 - 83	7	1
84 - 86	5	2
87 - 89	4	-
90 - 92	2	-
93 - 95	4	-
96 - 98	2	-
99 -101	2	1
102 -104	1	-
Relative number (‰)	1000	1000
Mean length (cm)	49.69	48.47
Number of specimens measured	4648	4327

Table 14. Size composition (%o) of capelin in Subarea 3, 1976

Total length (cm)	3K August, November, December		3L April-June		3N March-June		3O April-June	
	Males	Females	Males	Females	Males	Females	Males	Females
8	-	-	-	4	-	-	-	6
9	-	-	-	10	-	-	-	17
10	-	-	1	23	6	2	-	8
11	-	10	4	43	9	4	-	15
12	-	61	9	100	14	25	1	41
13	25	136	9	238	18	155	4	153
14	72	217	29	296	26	342	11	287
15	113	248	125	175	129	253	81	253
16	217	193	333	72	378	121	287	130
17	307	94	340	28	290	61	369	61
18	249	37	129	10	109	31	206	23
19	16	4	20	1	19	6	37	5
20	1	-	1	-	2	-	3	1
21	-	-	-	-	-	-	1	-
Number of specimens measured	2054	3419	4132	11172	4946	9429	3755	8543

Table 15. Age composition (%o) of capelin in Subarea 3, 1976

Year class	Age (years)	3K August, November		3L May		3N March, April, June		3O May, June	
		Males	Females	Males	Females	Males	Females	Males	Females
1975	1	7	10	-	-	-	-	-	-
1974	2	269	237	-	-	34	43	-	4
1973	3	683	710	716	612	676	696	550	697
1972	4	41	43	264	276	274	202	414	199
1971	5	-	-	20	92	16	43	36	74
1970	6	-	-	-	20	-	14	-	26
1969	7	-	-	-	-	-	-	-	-
1968	8	-	-	-	-	-	2	-	-
Number of specimens investigated		145	304	148	152	321	420	169	231

Table 16. Biomass and number of capelin in Divs. 3K and 2J, 1974-1976

Year	Biomass, mln tons	Abundance, mln specimens
1974	1,33	43681,8
1975	0,98	45665,7
1976	1,05	45240,8

Table 17. Water temperature (°C) in different water layers at the section 6-A along 47°00'N : H_1 - between 49°07'W and 48°07'W, G - between 47°30'W and 46°50'W, H_2 - between 46°40'W and 46°29'W

Date	H_1			G				H_2			
	0-50	50-200	0-200	0-50	50-200	0-200	200-500	0-50	50-200	0-200	200-500
20 May 1970	1.74	0.26	1.59	1.77	1.92	1.88	3.60	4.48	3.63	3.84	4.52
1 May 1971	0.89	-0.38	0.32	0.25	0.74	0.65	3.29	1.35	3.34	2.84	4.48
1 May 1972	-0.48	-1.02	-0.76	-0.19	0.40	0.25	2.43	1.91	2.97	2.71	4.18
24 May 1973	0.60	-1.45	-0.37	2.21	1.45	1.63	3.13	2.08	1.60	1.72	3.84
2 May 1974	-0.22	-1.04	-0.64	-0.90	0.53	0.04	2.32	1.68	3.24	2.84	3.98
18 May 1976	0.60	-0.51	0.06	0.56	0.27	0.35	2.37	1.46	1.74	1.67	3.74

Table 18. Mean catch (number of individuals) of young cod at age 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					
	3K	3L	3M	3N	3O	3P	3K	3L	3M	3N	3O	3P	3K	3L	3M	3N	3O	3P
1959													33	18		12	1	6
1960							9	3		5	0	4	16	18		3	2	8
1961	2	2		2	2	10	5	6		9	4	10	29	42	6	17	2	9
1962	0	1		2	10	69	2	8	7	23	3	11	22	56	29	26	3	19
1963	1	3	0	1	1	5	1	11	6	8	2	20	51	44	14	42	2	24
1964	0	2	0	37	37	47	4	22	1	192	18	31	11	68	14	103	60	81
1965	0	1	3	0	0	7	1	2	2	19	17	30	27	17	9	32	27	35
1966	0	0	0	2	21	10	4	10	0	39	24	45	38	61	13	53	47	39
1967	0	0	0	0	2	1	11	15	13	4	6	28	48	36	20	44	20	17
1968	1	1	10	8	24	56	10	68	106	153	40	112	46	118	58	127	32	89
1969	1	4	0	4	6	25	3	31	2	15	8	70	19	60	2	37	17	35
1970	0	1	0	9	2	8	1	7	1	35	4	12	8	8	1	29	14	4
1971	0	0	22	6	2	7	1	1	87	51	21	9	4	12	3	81	12	10
1972	0	0	3	6	3	6	0	3	20	12	11	65	8	7	22	34	9	6
1973	0	1	303	1	3	15	7	9	350	42	10	4	41	24	568	92	9	22
1974	0	2	133	2	4	1	3	4	50	89	7	97						
1975	0	0	5	10	1	6												
Average for the whole period of counting	0.3	1.2	36.9	7.6	7.9	18.2	4.1	13.2	50.3	46.3	11.5	36.4	26.7	38.7	58.3	48.7	17.1	26.9

Table 19. Mean number of specimens per hour of the trawling taken by the fish counting trawl in time of the total trawl survey in Subarea 3, 1971-1976

Fish species	Year of survey	3K	3L	3M	3N	3O	3P
Cod	1971	97	184	77	208	44	183
	1972	158	205	66	139	56	145
	1973	41	29	108	134	53	34
	1974	32	40	346	185	30	93
	1975	27	24	550	186	28	16
	1976	98	57	693	243	32	157
American plaice	1971	57	703	38	194	145	317
	1972	74	516	41	387	167	213
	1973	142	569	55	277	278	316
	1974	177	671	83	357	158	284
	1975	238	663	93	356	301	327
	1976	175	394	169	223	209	588
Yellowtail flounder	1971	-	71	-	282	16	53
	1972	-	126	-	326	128	44
	1973	-	31	-	206	122	52
	1974	-	84	-	395	98	93
	1975	-	16	-	227	100	33
	1976	-	23	-	439	121	161
White hake	1971	-	-	-	-	14	16
	1972	-	-	-	1	20	6
	1973	-	-	-	-	5	4
	1974	-	-	-	-	7	16
	1975	-	-	-	-	14	12
	1976	-	-	-	-	4	17

Table 20. Mean catch (kg) per hour of the trawling taken by the fish counting trawl in time of the total trawl survey in Subarea 3, 1971-1976

Fish species	Year of survey	3K	3L	3M	3N	3O	3P
Cod	1971	77	138	69	135	34	65
	1972	134	163	75	72	67	76
	1973	33	19	46	47	18	10
	1974	36	33	51	72	10	18
	1975	19	20	121	155	16	9
	1976	123	48	296	121	25	64
American plaice	1971	16	250	26	142	57	109
	1972	9	132	22	117	42	29
	1973	56	111	37	107	77	60
	1974	43	166	74	186	53	101
	1975	66	202	53	171	90	72
	1976	39	112	127	84	86	146
Yellowtail flounder (Limanda ferruginea)	1971	-	31	-	110	8	26
	1972	-	57	-	140	46	19
	1973	-	12	-	76	50	19
	1974	-	40	-	137	46	43
	1975	-	7	-	88	41	14
	1976	-	10	-	171	52	68
White hake	1971	-	-	-	-	34	34
	1972	-	-	-	4	33	11
	1973	-	-	-	-	7	4
	1974	-	-	-	-	9	18
	1975	-	-	-	-	14	15
	1976	-	-	-	-	6	21

Table 21. Age composition of herring (%,%) taken off Nova Scotia in 1974 and 1976

Years	Age						Total
	2	3	4	5	6	7+	
1974	-	10.6	22.8	41.1	15.5	10.0	100.0
1976	3.0	78.6	15.9	1.5	0.6	0.4	100.0

Table 22. Argentine catches (%,%) taken off Nova Scotia in 1975 and 1976

Years	Age									Total
	2	3	4	5	6	7	8	9	10+	
1975	1.8	5.2	8.6	17.6	18.2	13.6	8.7	4.3	22.0	100.0
1976	-	-	2.2	11.5	14.2	26.2	21.4	5.0	9.5	100.0

Table 23. Age composition of silver hake catches (%,%) off Georges Bank in 1974-1976

Years	Age								Total
	1	2	3	4	5	6	7	8+	
1974	3.8	7.5	30.4	35.7	16.4	3.7	1.6	0.9	100.0
1975	2.2	13.3	44.0	26.4	8.5	3.8	1.4	0.4	100.0
1976	-	18.1	53.9	18.0	7.3	1.7	0.3	0.1	100.0

Table 24. Age composition of the mackerel catches in Subareas 5+6 (%,%), 1975 and 1976

Years	Age								Total
	1	2	3	4	5	6	7	8+	
1975	30.6	46.4	7.9	4.7	2.1	1.7	2.2	4.4	100.0
1976	0.5	34.2	47.8	7.0	4.7	1.5	2.5	1.8	100.0

Table 25. Age composition of the hake catches (%,%) on Georges Bank in 1974 and 1975

Years	Age							Total
	1	2	3	4	5	6	7+	
1974	-	11.0	23.9	37.0	15.7	6.3	6.1	100.0
1975	1.5	23.2	21.9	25.2	22.7	4.2	1.3	100.0