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Total Polish catches in the ICNAF Area have shown a very small increase, from 170,973 tons in 1970 to 171,539 tons in 1971. This was due in the first place to a relatively substantial decrease in cod catches, and on the other hand to an increase in herring catches. The increase in mackerel, flatfish and redfish was rather small. Therefore the weight difference in Polish catches between the years 1970 and 1971 were insignificant.

In subareas 2, 3 and 4 26 factory trawlers operated mainly during winter and spring seasons. These vessels made 55 trips to the ICNAF Area while in 1970 the same amount of factory trawlers had made 41 trips. A large number of factory trawlers have operated beyond the ICNAF Area when the winter and spring season was over.

In Subarea 5, besides factory trawlers, 11 smaller freezer trawlers of 1,900 gross tons and 12 larger of 3,100 gross tons operated in herring and mackerel catches. Moreover, 14 side motor trawlers and 37 side steam trawlers took part in fishing operations. These units made approximately 209 trips compared with 126 trips made by freezer trawlers and side trawlers in 1970.

In order to reduce the loss of time for voyages between fishing grounds and home ports, side trawlers operated together with mother ships. The comparative data for the years 1970 and 1971, with respect to major species and their percent relation in the catches are given in table 1.

Table 1.

Species	1 9 7 1		1 9 7 0	
	metric tons	%	metric tons	%
Redfish	8,444	4.9	5,846	3.4
Cod	29,365	17.1	49,587	29.0
Flatfish	6,740	3.9	4,502	2.7
Greenland halibut	5,238	3.1	8,270	4.8
Mackerel	43,684	25.4	41,036	24.0
Herring	69,086	40.3	56,050	32.8
Other species	8,982	5.3	5,682	3.3
Total	171,539	100.0	170,972	100.0

The above data show that Polish fisheries were still interested mainly in herring, cod and mackerel catches. An increase in landings of mackerel and herring was noted in 1971 in comparison with 1970 whereas the decrease in landings of Cod was very substantial.

S U B A R E A 2

A. Status of the Fisheries

In total 15 factory trawlers operated in Subarea 2 in Div.2H and Div. 2 mainly in January and February. In March most ships shifted toward more southern fishing grounds. During the other months of the year Polish catches in Subarea 2 were irregular. The catch and fishing effort in Subarea 2 are given in table 2.

Table 2.

ICNAP Div.	CATCH in metric tons					Hours fishing	Days fished
	Redfish	Cod	Greenland Halibut	Flatfish	Other species		
2 G	-	-	3	-	-	34	4
2 H	67	1,660	1,511	10	100	1,997	168
2 J	683	15,344	894	1,194	5	9,179	704
Total	750	17,004	2,408	1,204	105	11,210	876

In January the yields from the fishing grounds in Div. 2 H reached 25.2 tons per day. In Div. 2 J the daily yields in successive months were as follows: January - 27.9 tons, February - 24.9 tons, March - 23.7 tons, April - 31.1 tons, May - 21.0 tons and June - 17.0 tons per day fished. As early as in March, however, the ice drifting so much hampered fishing operations that, in spite of good yields, fishing vessels had to withdraw from these fishing grounds.

During summer months the fishing yields were sensibly lower than in the same period of the previous year.

In general, the decrease in fishing yield led to a smaller fishing effort /number of hours fished/ of 23 % in comparison to that in 1970.

B. Research studies

I. Cod

The observations on cod were carried out on commercial vessels. In January and February 16,049 cod specimens were measured. The length of cod in the catches ranged from 21 to 87 cm. The average length fluctuated between 41.2 cm to 49.1 cm. The fish caught were 3 to 15 years old. The most numerous, however, were determined to be in five to seven age group. The age composition was determined according to catches per hour. In February, in Div. 2 J 1,445 cod specimens were caught in an hour. In this sample the most important was the 1964 year class /7 years of age/ which was represented by 352 specimens. Next came the 1966 year class /5 years of age/ represented by 350 specimens. The 1965 year class /6 years of age/ was third with 304 specimens. The remaining 439 specimens appertained to all the other year classes.

According to Stanek, in the previous years the number of cod caught in an hour, during the peak period of fishing season was as follows: 1963 - 3,734, 1969 - 2,299, 1970 - 1,626 and 1971 - 1,445.

II. Redfish

In Div. 2 J, in commercial catches, 1,295 redfish /type mentella/ were measured and 300 otoliths read for age. The length of these fish ranged from 20 to 47 cm. Fish with a length of about 30 cm were prevailing. The otoliths of redfish which had been examined showed a range of age from 6 to 16 years. The most numerous were fish with an age of 8, 9 and 10 years.

S U B A R E A 3

A. Status of the Fisheries

In this area only factory trawlers fished mainly during the period from January to October. The best fishing results were obtained from February to May. The catch and fishing effort are presented in table 3.

Table 3.

ICNAP Div.	Catch in metric tons					Hours fishing	Days fished
	Redfish	Cod	Greenland Halibut	Flatfish	Other species		
3 K	5,438	10,302	2,778	4,998	22	13,702	1,019
3 L	599	1,868	48	505	35	2,386	182
3 M	22	19	-	-	-	50	7
3 N	8	-	-	2	-	11	1
3 O	225	1	4	16	-	197	17
3 Ps	58	1	-	-	-	89	8
Total	6,350	12,191	2,830	5,521	57	16,435	1,234

The data in this table show that Polish trawlers mainly operated in Div.3 K. In consecutive months of fishing the daily yields were as follows: January - 6.7 tons, February - 28.4 tons, March - 22.3 tons, April - 23.7 tons, May - 19.6 tons, June - 13.7 tons, July - 24.5 tons, August - 1.3 tons, September - 11.0 tons, October - 7.2 tons, November - 14.1 tons, December - 9.3 tons.

It is worth while comparing the mean fishing yields for trawlers operating in Subarea 3. In the last four years the mean yield

per hour fishing was as follows: 1968 - 1.33 ton ; 1969 - 1.58 ton ; 1970 - 1.35 ton and in 1971 - 1.61 ton. It is to be noted than in 1971 the fish yield was higher than in the previous 3 years.

B. Research studies

I. Cod

3,182 fish were measured in Div. 3 K. Their length ranged from 21 to 86 cm and their age from 2 to 13 years. The main component were fish with a length from 39 to 59 cm /62,9%/ and age from 5 to 7 years /year classes 1966, 1965 and 1964 all together 69,7%/. Cod born in 1965 made 26,8 % of catches. In Div. 3 K the mean number of fish caught in an hour hardly reached 226 fish. The most numerous were Cod of the year class 1965 /6 years of age/ - 60 fish per hour. On the second place - 52 fish/hour - was the 1965 year class /5 years of age/, on the third one - 45 fish/hour - was the year class of 1964 /7 years of age/. Fish constituting all the other year classes amounted to 69 fish per hour.

According to Stanek the number of cod caught in one hour in the particular years was as follows: 1963 - 1,548; 1970 - 1,264 and 1971 - 226. This shows a very sensible decrease in the number of cod during this year.

II. Redfish

In May in the northern part of Div. 3 K it was noted that in the fishing operations carried out by commercial vessels there occurred redfish of the length range 20 to 45 cm.

The mean length of these fish was 30,6 cm and their mean age 9,2 years.

In September in Div. 3 O /Green Banks/ an appreciable quantity of small redfish was found. 393 fish were measured; their length ranged from 6 to 23 cm. Their mean length was 12,2 cm and their mean age 2,4 years. Green Banks is supposed to be a good feeding ground for the young redfish.

III. American Plaice

In June, in Div. 3 K 653 fish were measured and their otoliths read for age. In the catches fish of the length range 21 to 62 cm occurred. Their mean length was 44,9 cm. The age groups represented were the groups from VII to XXV +. Groups XII to XVII were the most numerous.

In September, in Div. 3 L 816 fish were measured and read for age. Their length ranged from 6 to 52 cm and their mean length was 22.1 cm. In catches there occurred fish from 1 to 11 years of age, the prevailing ones, however, were 2 to 6 years old.

C. H y d r o g r a p h y

Hydrographic observations which were carried out, were rather fragmentary and were performed only in the period from 12 to 20 September 1971 on the south-western slopes of the Great Newfoundland Bank. In this part, by the end of summer, the temperature of surface waters was 17 - 18°C. The temperature markedly dropped with the depth and there were even water spots with a temperature of 0.50°C. At greater depths there occurred Atlantic water with a temperature of 6°C.

S u b a r e a 4

A. Status of the Fisheries

In Subarea 4 only a few factory trawlers operated. On the fishing ground of Banquero Bank these ships mainly caught redfish. The catch results and fishing effort are given in table 4.

Table 4

ICNAF Div.	Catch in metric tons				Hours fishing	Days fished
	Redfish	Cod	Halibut	Other species		
4 Vs	1,257	15	13	-	894	68
4 W	3	-	-	7	11	3
Total	1,260	15	13	7	905	71

The redfish yields in the period August - October reached 1180 - 1520 kg per hour. The mean daily yield of all species in 1971 was 18.tons whereas in 1970 factory trawlers, on the same fishing grounds caught 12.3 tons per day. In 1971, however, the redfish caught were slightly smaller than in the year 1970.

B. Research Studies

No research work was carried out in 1971 in subarea 4. Only 228 redfish were measured. They had a length of 21 - 39 cm - a mean length of 30.2 cm.

C. Hydrography

In subarea 4 hydrographic observations were carried out in the period from 20 to 24 October only, on Browns Bank, Lahave Bank and Emerald Bank.

On Browns Bank the surface temperatures increased from 11 to 13^oC, advancing from the coastal region to the open ocean. At a depth of 50 m the mean temperature showed about 10^oC and at a depth of 150 m it ranged from 7 to 8^oC.

On Lahave Bank from the surface down to 30 m the water temperature was 13^oC. Then deeper to 60 m there occurred a marked drop of temperature to 5^oC /thermocline/. Only at a depth of about 130 m down to 200 m an increase of temperature was again observed.

On Emerald Bank too, at depth 30 - 50 m a drop of temperature from 13 to 5^oC was observed. The temperature raised again at greater depths. On the Atlantic slope, at a depth of 150 m the bottom temperature was 10^oC.

S u b a r e a 5

A. Status of the Fisheries

In subarea 5, during the season of herring and mackerel fishing there operated 26 factory trawlers, 12 large freezer trawlers /3,100 gross tons/, 11 smaller freezer trawlers /1,900 gross tons/, 14 motor side trawlers /800 gross tons/ and 37 steam side trawlers. The side trawlers and smaller freezer trawlers operated with mother ship^s. Data concerning catch and fishing efforts of these ships are given in table 5 .

Table 5

ICNAF Div.	Cod	Catch in metric tons			Hours fishing	Days fished
		Herring	Mackerel	Other species		
<u>Factory trawlers</u>						
5 Ze	4	19,117	2,699	216	7,827	718
5 Zw	16	164	10,081	33	1,545	184
<u>Freezer trawlers /3100 G.T./</u>						
5 Ze	29	17,661	10,076	3,374	6,972	888
5 Zw	-	44	2,375	29	362	60
<u>Freezer trawlers /1900 G.T./</u>						
5 Ze	-	13,221	11,174	3,532	6,432	799
5 Zw	-	2,228	3,048	769	1,681	242
<u>Motor side trawlers</u>						
5 Ze	92	3,412	2,269	879	4,044	628
5 Zw	-	802	601	138	715	112
<u>Steam side trawlers</u>						
5 Ze	12	11,071	793	1,337	16,941	2,107
5 Zw	2	1,363	566	462	3,027	415
Total	155	69,083	43,682	10,769	49,546	6,153

Fishing operations took place in the period from April to December, mainly on the fishing grounds of Georges Bank.

The largest fishing activities occurred from July to November. It may be of interest to compare the yield per unit of fishing effort of particular types of ships in the consecutive months of the year. Data are given in table 6.

Table 6

Months	Yield per hour /in kg/				
	Type B-15-22 factory trawlers	Type B-18-418 Freezer trawlers 3,100 tons	Type B-29-29s Freezer trawlers 1,900 tons	Type B-20 Motor Side trawlers	Type B-10-14 Steam Side trawlers
April	3,398	-	2,986	-	964
May	2,095	6,762	3,002	1,215	621
June	-	4,708	2,440	2,246	717
July	2,512	4,274	2,492	1,980	850
August	1,738	3,226	1,846	896	391
September	3,101	4,910	11,106	1,513	1,071
October	3,844	4,814	4,344	1,077	668
November	3,520	4,977	4,929	1,557	763
December	8,067	-	4,830	-	849
Mean	3,450	4,580	4,187	1,721	781

Stern trawlers, factory trawlers and freezer trawlers had relatively high yields. These ships, however, often utilized mid-water trawlnets. Side trawlers had rather low yields but they used bottom trawlnets.

B. Research Studies

I. Herring

In subarea 5 9,499 fish caught in commercial fishing were measured and 1,487 otoliths were read for age.

In subarea 6 4,924 fish were measured and 1,134 otoliths read for age.

The mean length of herring on feeding grounds was 28.4 cm and on spawning grounds 29.86 cm.

The age composition of herring varied depending on the position of the fishing ground and on the fishing season.

This is shown by the figures in table 7 /in %/.

Table 7

Year classes Fishing grounds and seasons	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960
Subarea 6 January - May	-	4.6	13.6	25.8	17.8	10.9	12.9	3.2	6.6	4.6
Georges Bank June-August	0.3	31.8	21.0	27.0	12.5	3.5	2.1	0.8	0.6	0.4
Georges Bank September - December	-	15.7	18.0	26.6	18.8	9.3	6.4	2.4	1.6	1.2
Mean	0.1	17.8	17.9	26.5	16.7	8.0	6.6	2.1	2.5	1.8

Taking into account the fishing effort, the index of total mortality of fish of four years of age and older has been determined. According to the observations of B. Draganik the index of mortality /Z/ during the last years was as follows: 1967/1968 - 0.69, 1968/1969 - 0.78, 1969/1970 - 1.08, 1970/1971 - 1.11.

This shows a very significant increase of fishing intensity .

As the abundance of larvae may be a sign of intensity of spawning of herring, therefore observations on the quantity of larvae were carried out. From among 127 stations, only on 23 stations scattered mainly in Georges Bank, herring larvae were found with a Hensen net.

Most of the larvae were found in the western and central part of Georges Bank. On these stations the number of larvae under 1 square meter of surface attained 500.

Observations on the feeding of herring were also carried out. They showed that herring most intensely fed during the period from May to August. As component of the food Copepods occupy the first place then come Euphausiacea, Decapods and Amphipods.

II. Mackerel

Observations on the fishing yields show that with bottom trawl-nets the mean daily yield of motor side trawlers was 8.6 tons, whereas freezer trawlers using mid-water trawlnets caught 41.6 tons per day.

17,150 mackerel were measured and 2,880 otoliths read for age.

In order to compare the part taken by mackerel year classes in Polish catches, during the last two years the data obtained

from the reading of otoliths are given in table 8 /in 5/

Table 8

Year classes Year of Fishing	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960
1970	-	125	17	501	214	86	19	13	14	13	4
1971	8	86	32	544	224	52	14	14	17	9	-

The cited figures show that in the catch there occurred fish from 1 year to 10 years of age. In two consecutive years an important part in the catches was played by year class 1967. The length of mackerel fished was 20 to 48 cm. The mean length was 35 cm.

Comparing the abundance of age classes during the last two years, the size of the fish caught and the daily yield in the 1971 catches, it may be supposed that previous catches have not caused apparent changes in the exploited stock.

Observations were also carried out on the feeding of mackerel. In the region of Georges Bank, in May and June the basic food of mackerel consisted of Copepods and then of Thaliacea. In the stomachs of the examined fish there were also Amphipods, Euphausiacea, Sagitta and Decapods larvae. The mean degree of stomach repletion - according to the 5 -degree scale, depending on the depth of the fishing ground, oscillated between 0.49 /at a depth of 140 m/ and 2.88 /at a depth of 90 m/

III. Yellow tail Flounder

Polish fisheries did not carry out intended catch of yellow tail flounder in subarea 5. The fish occasionally caught, however, were measured and read for age. In total, 212 fish were measured and 165 otoliths were read for age. The length of fish ranged from 22 to 44 cm - their mean length was 34.5 cm. The age composition consisted of 6 age groups: II - VII. The most numerous was group IV - about 40 % of the number of examined fish.

C. Hydrography

Hydrographic observations were carried out in the region of Georges Bank during the period from 4 to 24 October 1971.

Mr. A. Furtak carried out observations on the temperature and the salinity according to a designed graticule of hydrographic sections. On the basis of these investigations he distinguished 5 types of masses of water which were shown in Figure 1.

The names of the masses of water show their origin. It should be said, however, that bottom water constitutes a compound of Labrador and Gulf Stream waters. Atlantic water which reaches the southern slope of Georges Bank is in fact Gulf Stream water.

Observations on the oxygen content were also carried out. On Georges Bank, in the surface layers the content of oxygen as a rule, amounted to more than 5.5 ml/l.

In the bottom layers, at a depth of 100 m and even 150 m a dropping of oxygen content down to 4 ml/l was noted.

Observations on plankton, besides definition of the quantity of herring larvae, aimed at determining its species and biomass composition. During the period from 24 September to 4 November 1971, the most frequent component of plankton in the region of Georges Bank and partly of the Bay of Maine were Copepods /*Calanus finmarchicus*, *Pseudocalanus elongatus*, *Oithona similis*/.

The next important component were Euphausiacea /*Meganicthiphanes norvegica*, *Thysanoessa inermis*/ . In plankton *Sagitta* occurred very often.

According to data from 116 stations, the biomass of plankton oscillated between 0.1 to 83.0 cm³ and amounted to a mean value of 17.2 cm³.

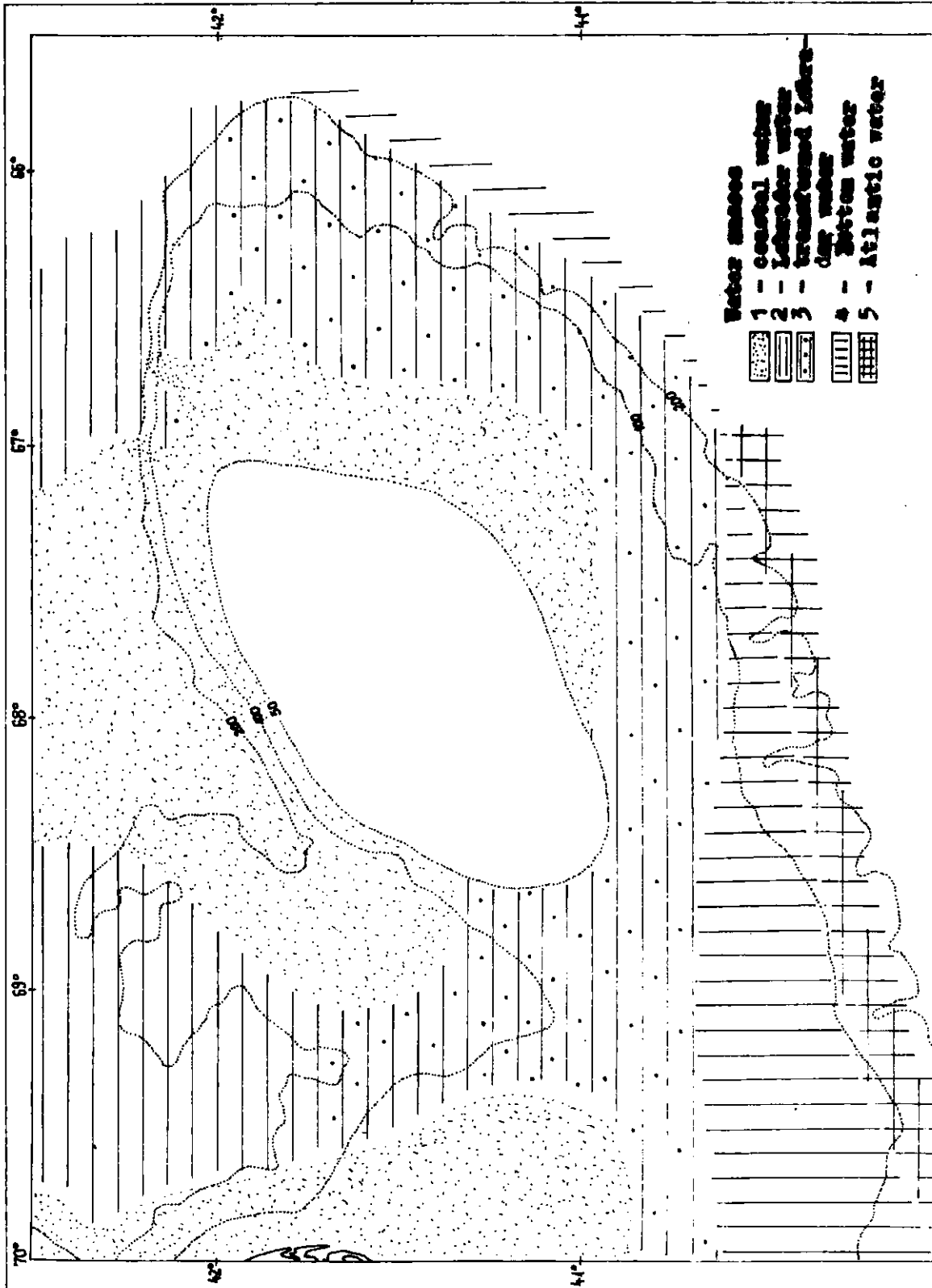


Figure 1. Distribution of water masses at 50 m depth on the Georges Bank in autumn 1971.

