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Report of USSR Investigations in the ICNAF Area, 1978

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The total catch taken by the Soviet fleet in the ICNAF Area in 1978 was 207,700 tons (Table 1), which is 225,000 tons less than in 1977. This decrease in catch was caused by the fact that fishery was ceased in Subareas 0 and 1. Capelin catches in Subarea 2 reduced considerably. Catches of the main bottom fishes in Subareas 2 and 3 changed comparatively little the last three years.

S U B A R E A S 2 A N D 3

A. Status of the fishery

The capacity of trawling was higher in 1978 than in 1977 for certain bottom fishes, which is due to the increase of number and biomass of these fishes.

Cod

In January 1978 the Soviet fleet was conducting successful cod fishery in the South Labrador Area. Specimens 42-53 cm long were prevailing in catches, with mean cod length being 47,3 cm (Table 2), while in January 1977 it was 42,8 cm (ICNAF Sum.Doc. 78/VI/9). Five-year olds pertaining to 1973 year-class were the most numerous among different age groups of fishes (Table 3).

Individuals of this year-class prevailed in catches in 1977 too (ICNAF Sum.Doc. 78/VI/9). Owing to individual growth of fish last year, the mean length of cod pertaining to the Labrador stock also increased.

Big number of cods of 1973 year-class was registered while three-year olds were counted (Table 4), i.e. long before cod of this year-class has reached its commercial size.

The data regarding age of cod in Subdivisions 2J and 3N were obtained by recounting age samples into age rows which included several thousand measured specimens.

On the southeast slope of Grand Bank cods of 1974 year-class were prevailing, while on Flemish Cap Bank 1973 year-class was more numerous (Tables 3 and 5). These data are well coordinated with the results of juvenile cod counting (Table 4). Because of the rich year-class 1974, cod resources in the south of Grand Bank increased (which became the basis of expanded yield limits - from 15,000 tons in 1978 to 25,000 tons in 1979).

On Flemish Cap Bank cod of 1973 year-class has reached maturity. Its number and biomass are likely to have reached their peak in the second half of 1977 and the first half of 1978, further on giving way to decrease caused by natural mortality and fishery.

Redfish

In 1978 redfish Sebastes mentella, as usual, formed commercial concentrations on Flemish Cap Bank, the slopes of Newfoundland Bank, in the area of Notre Dame Gulf and near South Labrador. Size composition of catches taken by conventional bottom trawl is shown in Table 6 and by bottom trawl with small-mesh insertion in Table 7.

On Flemish Cap Bank males 35 cm long and females 36-37 cm long were prevailing. However, the second peak of size row was quite distinct. It was made by individuals 20-23 cm long. This peak is an indication of big number of growing fish,

mainly four- , five- and six-year olds of rather rich 1970, 1971 and 1972 year-classes. Mature individuals making the main peak of size row were 11-15 years old and belonged to 1963, 1964, 1965, 1966 and 1967 year-classes (Table 8).

Considerable replenishment of resources with young fish may be traced in Table 9 based on the results of total trawl survey. In 1978 the number of redfish Sebastes mentella on Flemish Cap Bank reached the maximum level of the last eight years. However, biomass of redfish Sebastes mentella has not increased, but even diminished compared to 1977. The comparison of Tables 9 and 10 makes evident that mean weight of one specimen in 1977 was 495 g and in 1978 only 203 g.

Calculations made earlier (ICNAF Res.Doc. 77/VI/2) showed that while starting the fishery of redfish Sebastes mentella when it reaches the length of 21-23 cm, we ensure maximum yield per recruit ($\frac{Y}{R}$).

In the southern part of Grand Bank (3 NO) redfish Sebastes mentella still has high number and biomass. Table 9 shows that considerable redistribution of fish has taken place: in 1977 redfish Sebastes mentella was keeping mostly on the Southwest slope of Grand Bank (3O) and in 1978 on the Southeast slope (3N). The drifting of the stock to the east is partly attributed to the growth of mean size of redfish Sebastes mentella, which gradually migrates to the east while growing. In 1977 the mean weight of one specimen in Subdivision 3NO was 170 g, in 1978 - 207 g (Table 9).

Age composition of redfish Sebastes mentella on the eastern slope of Grand Bank is given in Tables 10 and 11.

Redfish Sebastes marinus keeps at smaller depth than Sebastes mentella. In 1977 and 1978 on Flemish Cap Bank an intensive cod fishery was developed with constant by-catches of redfish Sebastes marinus. Resources of the latter have somewhat diminished.

Size and age composition of redfish Sebastes marinus of Flemish Cap Bank in 1978 is shown in Tables 12 and 13.

American plaice

Measurements and weighing of American plaice were carried out in 1978 during the total survey in Subdivisions of Newfoundland and South Labrador Subareas. Size and sex composition of catches are shown in Table 14.

As usual, females were more numerous than males and had bigger mean length. A lot of juveniles were keeping in Subdivision 3L which resulted in the fact that mean length of both males and females was smaller here compared to other subdivisions.

Data regarding tagged specimens of American plaice are quoted in Table 20.

Grenadier

Evaluation of resources of this particular species is complicated since in this case total trawl survey, juvenile counting and mass tagging are impossible. Age determining is also very difficult.

Nevertheless, data of many years (including 1978, Table 15) testify to practically constant size and sex composition of grenadier in all parts of the Northwest Atlantic Ocean. Therefore it may be assumed that grenadier resources were not subject to considerable fluctuations, either for natural reasons, or because of fishery.

Capelin

In spring and summer 1978 commercial concentrations of capelin were found only in Subdivision 3L. Only insignificant number of fish migrate to spawning area of Southeast slope of Grand Bank (Subdivision 3N), which is connected with reduction of mature part of the stock as well as with abnormally high water temperature.

In Subdivision 3L in May there was carried out hydroacoustic evaluation of prespawning capelin number and biomass from board R/V "POISK". In prespawning concentrations

individuals of 1973/1975 year-class 14-17 cm long were prevailing (Tables 16 and 17).

In Subdivisions 2J and 3K capelin study was carried out in summer and autumn by R/V "PERSEY III". It was marked there that the number of capelin diminished compared to 1977, which is credited to poor year-classes 1974-1975. Prevailing length of individuals was 15-17 cm.

B. Special investigations

Hydrology

Hydrologic survey of standard sections was made in January and May-August from board R/V "PERSEJ III".

In winter, spring and summer 1978, the same as in 1977, positive anomalies of water temperatures remained in the main branch of the Labrador Current: from 0,30 to 1,14°C in Subdivision 3N and from 1,00 to 1,80°C in Subdivision 2J. Maximum positive anomalies were registered in the layers 50-100 and 50-200 m, i.e. in the nucleus of the cold Labrador Current. This warming in 1978 corresponded to extreme warming which happened in 1966 and was, to a great extent, the result of southern winds. Owing to the same reason, thanks to affluent warm Atlantic waters from the south there happened slowing down and divergency of the Labrador Current on the northeast slope of Grand Bank, the north of Flemish Cap Bank and in Flemish Pass. Temperature anomalies here in the layer 0-200 m were close to average norm of many years.

The coastal branch of the Labrador Current was developed according to its norm and could be traced down to 180-230 m. Particularly low temperatures of this branch were marked very close to the shore. Yet, distribution of cold waters of the Coastal branch in southern direction was observed 60 miles to the north compared to average norm of many years (up to 46°N and not to 45°N).

In the layers 200-500 m temperature anomalies of mixed Atlantic waters were 0,37 - 0,91°C in Subdivision 3N

and from 0,20 to 0,27°C in Subdivisions 3L and 2J.

In autumn 1978 cold snap occurred in all the layers of the Labrador Current, with water temperatures reaching their average of many years (Table 18).

Thus, as it had been predicted on the basis of 4-6 years periodicity, extreme warming in the end of 1977 and in 1978 was followed by fall of temperature of the Labrador Current on the eve of 1979.

It should be expected that in 1980 water temperature will be below its norm.

Tagging of bottom fishes

In 1978 from board the Soviet R/V "PERSEY III" there were tagged about 12,000 bottom fish (Table 19). Information of some recovered specimens is already available in Murmansk, for example of American plaice taken by Canadian fishermen on Grand Bank (Table 20). Unfortunately, the exact point of taking usually remains unknown.

S U B A R E A 4

A. Status of the fishery

Silver hake

The catches of silver hake taken by the Soviet Union in 1978 were 43,800 tons which is 8,200 tons below the quota. Fishery was carried out mainly in May - August on shelf slopes of Subarea 4W. The share of silver hake in total catches in the USSR was 75,5%. Individuals 26-37 cm long, 2-5 years old prevailed (Table 21).

As a result of an increase of mesh size in cod ends of trawls in 1978 up to 60 mm(compared to 40 mm in previous years) fishing mortality of two- and three-year olds reduced considerably while in respect of four-year olds it became 0,5 compared to 1,0 in 1976 and 1,8 in 1977. Judging by Abundance Indexes, silver hake resources were still on a high level in autumn 1978 (Table 22).

Therefore there may be recommended the TAC of 70,000 specimens for 1980, i.e. of the same level as in 1979.

Argentine

Argentine constituted an insignificant part of catches as by-catch in silver hake fishery. Only 300 tons were taken by trawlers in the USSR compared to the quota of 11,000 tons. Individuals 24-27 cm long prevailed in catches. Weak exploitation of argentine resources and lack of drastic fluctuations of abundance in different year-classes allows to recommend the TAC of 20,000 tons on the basis of earlier assesments. However, definite quota may be established only in case the directed fishery is allowed on the slopes of Browns Bank in April-May or in August-October.

Shortfin squid

Shortfin squid fishery was carried out by trawlers mainly in July and August. The USSR catch was 9,400 tons - below the quota of 10,000 tons. Trawling was made at the depth of 110-250 m. Individuals 17-20 cm long weighing 90-150 g prevailed in catches.

B. Special investigations

1. Environment

Hydrology. Temperature distribution in water horizons was controlled with thermobathigraph throughout August and September in course of ichthyoplankton and trawl surveys from board RSTM-8004 "VYHMA". In the surface layer the temperature of water varied from 11 to 20°C, in the bottom layer from 5 to 10°C and in the interstitial layer of cold Labrador water from 0 to - 0,3°C.

Zooplankton. In August on the Nova Scotia Shelf the most concentrated seston biomass (up to 260 g/m^2) was observed in the area of Roseway, Sambro and Emerald Banks and the least concentrated one in the north-eastern part of the shelf. In

summer the average biomass was 51,3 g/m^2 (August) and in September it was twice as low (26,2 g/m^2). In areas of mass concentration of silver hake larvae in August there prevailed specimens of Oithona sp., Centropages sp. genera and Copepoda nauplia.

Ichthyoplankton. In order to study the effectiveness of spawning of silver hake there were undertaken two surveys on the Nova Scotia Shelf in August and September. Ichthyoplankton was taken from a minor plankton collector "BONGO" equipped with a mill gauze net with 0,57 mm mesh. The total of 296 samples was taken. The biggest number of eggs in August was observed to the south-west of Sable Island. Smaller concentrations of eggs were registered on Browns and Bankero Banks. In August masses of eggs were also encountered to the south-west of Sable Island and in small number on Bankero Bank. In September eggs and larvae were taken from mass concentrations to the west of Sable Island. In August there were in average 29 eggs under the surface of 1 m^2 and in September 13 eggs. The respective number of larvae in August was 20 per 1m^2 and in September 14 per 1m^2 (Special Report).

Feeding of silver hake larvae. In August and September the basis of food bolus of silver hake larvae consisted of copepodae Paracalanus sp., Pseudocalanus sp., Clausocalanus sp., Oithona sp. and nauplia of these species. The average Food Consumption Index ($\%_0$) of the larvae 2,0-5,9 mm long was 638 in August, 554 in September and of the larvae 6,0-8,9 mm long it was 262 and 533$\%_0$ respectively.

Fingerlings counting. In October there was undertaken a fingerling trawl survey from board "VYHMA" on the Nova Scotia Shelf in order to investigate distribution and abundance of silver hake fingerlings. The main concentrations of silver hake fingerlings were observed in the Nova Scotia Channel, where they kept at the depth of 100-200 m with water temperature 6-8°C. The length of fingerlings in Subarea 4W ranged from 2 to 7 cm, making 2,8 in average.

Fecundity of silver hake. To determine fecundity of silver hake of the Nova Scotia there were counted eggs of prespawning females. It was found out that average fecundity varies from 180,000 eggs for females 30 cm long to 1,600,000 eggs for females 55 cm long. The dependence of fecundity from body length may be expressed in the following formula:

$$N = 7L^{3.087}$$

N - fecundity

L - length, cm

Table 1. USSR catches in the Northwest Atlantic Ocean in 1978

(in tons)

Items of fishery	SUBAREAS I	II	III	IV	V	Total ICNAF	Stat. area 6	Stat. area 0	Total
1	2	3	4	5	6	7	8	9	10
Total	-	24471	106896	58025	14508	203900	3781		207681
including:									
Capelin	-	10283	53405	-	-	63688	-	-	63688
Argentine	-	-	-	330	-	330	-	-	330
Atlantic halibut	-	-	26	-	-	26	-	-	26
Greenland halibut	-	2202	3430	-	-	5632	-	-	5632
American plaice	-	97	1655	32	4	1788	-	-	1788
Winter flounder	-	-	-	-	-	-	-	-	-
Witch	-	341	3279	134	-	3754	2	-	3756
Yellowtail flounder	-	-	-	-	-	-	-	-	-
Flounders (not broken)	-	-	-	-	3	3	-	-	3
Cod	-	7191	6579	223	-	13993	-	-	13993
Haddock	-	-	41	135	-	176	-	-	176
Pollock	-	-	-	494	-	494	-	-	494
White hake	-	-	39	-	-	39	-	-	39
Red hake	-	-	-	447	1651	2098	428	-	2526
Silver hake	-	-	-	43775	10607	54382	2863	-	57245
Grenadier	-	2677	15083	-	-	17760	-	-	17760
Redfish	-	1429	21081	151	-	22661	-	-	22661
Wolffish	-	251	100	-	-	351	-	-	351
Angler	-	-	348	186	9	543	8	-	551
Sea-robin	-	-	-	-	36	36	9	-	45
Sand lance	-	-	34	-	-	34	-	-	34
Other bottom fish	-	-	-	-	-	-	-	-	-
Butterfish	-	-	-	-	14	14	-	-	14
Herring	-	-	-	2	-	2	-	-	2
Alewife	-	-	-	-	18	18	3	-	21
Mackerel	-	-	-	424	231	655	-	-	655
Other pelagic fish species	-	-	-	-	-	-	-	-	-
Berix	-	-	-	-	-	-	147	-	147
Sharks	-	-	40	11	438	489	84	-	573
Skates	-	-	1139	755	189	2083	27	-	2110
Other fish	-	-	576	1496	1274	3346	210	-	3556
Illex squid	-	-	41	9430	27	9498	-	-	9498
Loligo squid	-	-	-	-	7	7	-	-	7

Table 2. Size composition of cod (‰) taken by conventional bottom trawl off South Labrador and on Flemish Cap Bank in January 1978.

Length, cm	South Labrador	Flemish Cap Bank
27-29	-	1
30-32	1	4
33-35	4	9
36-38	49	13
39-41	106	35
42-44	167	142
45-47	216	255
48-50	191	212
51-53	148	137
54-56	68	77
57-59	26	46
60-62	8	25
63-65	3	15
66-68	3	10
69-71	4	6
72-74	2	3
75-77	2	2
78-80	1	1
81-83	-	1
84-86	1	1
87-89	-	2
90-92	-	1
93-95	-	1
96-98	-	1
Relative number, ‰	1000	1000
Mean length, cm	47.3	49.3
Number of specimens measured	6738	10068

Table 3. Age composition and mean length of cod taken by conventional bottom trawl off South Labrador and on the southeast slope of Grand Bank in 1978.

Year-class	Age (years)	Divs. 2J. January, 441 spec.		Divs. 3N, February, March, 242 specimens	
		Number of specimens %	Mean length, cm	Number of specimens, %	Mean length, cm
1975	3	1	34,0	99	36,0
1974	4	182	40,2	303	42,7
1973	5	404	45,1	199	50,4
1972	6	273	50,3	265	59,4
1971	7	99	54,6	109	68,6
1970	8	28	58,9	21	74,2
1969	9	6	69,0	4	79,0
1968	10	3	72,7	-	-
1967	11	2	76,0	-	-
1966	12	1	83,7	-	-
1965	13	1	80,8	-	-
Total		1000	47,3	1000	51,6

Table 4. Number of juvenile cod (aged 1-3 years) of 1959-1977 year-class in mean catch per hour of hauling taken by a fish-counting trawl in Newfoundland subarea.

Year-class	One-year olds					Two-year olds					Three-year olds				
	3K	3L	3N	30	3M	3K	3L	3N	30	3M	3K	3L	3N	30	3M
1959	-	-	-	-	-	-	-	-	-	-	33	18	12	1	-
1960	-	-	-	-	-	9	3	5	0	-	16	11	3	2	-
1961	2	2	2	2	-	5	6	9	4	-	29	42	17	2	6
1962	0	1	2	10	-	2	8	23	3	7	22	56	26	3	29
2963	1	3	1	1	0	1	11	8	2	6	51	44	42	2	14
1964	0	2	57	37	0	4	22	192	18	1	11	68	103	60	14
1965	0	1	0	0	3	1	2	19	17	2	27	17	32	27	9
1966	0	0	2	21	0	4	10	39	24	0	38	61	53	47	13
1967	0	0	0	2	0	11	15	4	6	13	48	36	44	20	20
1968	1	1	8	24	10	10	68	153	40	106	46	118	127	32	58
1969	1	4	4	6	0	3	31	15	8	2	19	60	37	17	2
1970	0	1	9	2	0	1	7	35	4	1	8	8	29	14	1
1971	0	0	6	2	22	1	1	51	21	87	4	12	81	12	3
1972	0	0	6	3	3	0	3	12	11	29	8	7	34	9	22
1973	0	1	1	3	303	7	9	42	10	350	41	24	92	9	568
1974	0	2	2	4	133	3	4	89	7	50	10	58	201	21	57
1975	0	0	10	1	5	1	8	92	5	17	2	6	62	5	17
1976	0	0	0	0	0	0	0	4	3	2	-	-	-	-	-
1977	0	0	0	1	8	-	-	-	-	-	-	-	-	-	-
Average for 17 years	0	1	6	7	33	4	12	47	11	45	24	38	59	17	56

Table 5. Age composition, mean length and weight of cod in catches by conventional bottom trawl on Flemish Cap Bank in January 1978 (698 specimens in samples).

Year-class	Age (years)	Number of specimens (%o)	Mean length cm	Mean weight, g
1974	4	84	41,3	666
1973	5	732	47,6	999
1972	6	160	55,2	1476
1971	7	13	60,7	1991
1970	8	4	70,0	3340
1969	9	3	88,7	6845
1968	10	-	-	-
1967	11	-	-	-
1966	12	4	95,0	9397
Total		1000	48,9	1122

Table 6. Size composition of redfish Sebastes mentella (‰) taken by conventional bottom trawl.

Length, cm	Divs. 3K February		Divs. 3K March		Divs. 3K April		Divs. 3M January		Divs. 3N February	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
17	-	-	-	-	-	-	1	-	3	-
18	-	-	-	-	-	-	2	3	10	9
19	-	-	-	-	-	-	6	6	18	13
20	-	-	-	-	-	-	12	11	19	21
21	-	-	-	-	-	-	13	13	34	28
22	-	-	-	-	-	-	11	10	42	40
23	1	1	-	-	2	-	4	4	58	60
24	3	1	-	-	5	3	1	2	77	75
25	3	3	2	1	12	10	2	2	72	81
26	6	4	4	3	20	14	3	4	42	83
27	24	11	15	10	21	17	4	3	21	52
28	21	21	34	30	34	36	4	2	14	38
29	33	25	33	32	36	34	18	11	8	26
30	55	53	56	56	47	49	33	12	7	11
31	48	38	62	43	36	42	38	19	4	7
32	53	40	58	42	31	43	62	33	2	3
33	57	45	49	43	27	36	52	30	2	2
34	48	36	33	30	24	43	73	41	1	4
35	43	39	27	29	29	45	76	39	-	4
36	33	51	25	33	29	34	57	57	1	2
37	43	40	26	34	36	25	37	48	-	2
38	38	28	21	27	27	21	20	35	-	2
39	10	14	11	22	17	15	12	34	-	2
40	4	10	5	15	12	13	4	17	-	-
41	2	8	4	11	5	11	1	9	-	-
42	-	3	2	8	3	12	1	4	-	-
43	-	1	2	7	3	9	-	1	-	-
44	-	1	-	13	2	9	-	1	-	-
45	-	-	1	8	-	9	1	-	-	-
46	-	1	-	11	-	9	-	1	-	-
47	-	-	-	5	-	6	-	-	-	-
48	-	1	-	11	-	3	-	-	-	-
49	-	-	-	4	-	-	-	-	-	-
50	-	-	-	1	-	1	-	-	-	-
51	-	-	-	1	-	-	-	-	-	-
Relative number ‰	525	475	470	530	451	549	548	452	435	565
Mean length, cm	32,8	33,6	32,5	34,8	32,5	33,8	32,6	33,6	23,9	25,1
Number of specimens measured	831	754	837	940	1184	1443	2070	1711	865	1124

Table 7. Size composition of redfish Sebastes mentella (‰) taken by bottom trawl with small-mesh insertion in total trawl survey made by R/V "Persey III".

Length cm	Divs. 2J July		Divs. 3K July		Divs. 3L June		Divs. 3M July		Divs. 3N July	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
11	1	2	-	-	-	-	-	-	-	-
12	1	1	2	1	-	-	-	-	-	-
13	1	2	2	2	-	-	-	-	1	1
14	1	2	2	3	1	-	1	1	2	2
15	2	2	4	4	1	1	1	1	6	2
16	1	4	12	15	2	1	5	4	10	10
17	4	5	21	19	3	2	11	7	23	13
18	5	5	20	15	2	2	10	8	29	21
19	2	2	7	5	2	2	10	14	13	11
20	5	6	6	5	5	5	26	22	26	16
21	19	19	9	7	5	5	45	38	31	26
22	37	38	14	16	13	12	49	43	59	41
23	31	36	15	17	13	10	29	24	48	43
24	29	35	16	18	16	15	8	8	45	38
25	47	48	25	32	32	23	10	6	55	37
26	29	35	27	30	34	25	5	5	42	49
27	38	36	26	28	37	30	9	7	31	34
28	12	13	16	17	35	38	8	4	11	19
29	29	22	30	25	35	36	11	4	16	26
30	32	27	40	25	51	56	27	10	10	23
31	28	23	36	30	33	34	30	20	9	16
32	43	22	31	27	32	39	44	26	9	13
33	17	9	14	14	16	22	23	15	4	7
34	14	8	20	14	14	14	36	18	4	8
35	29	17	26	23	20	29	59	31	5	10
36	15	10	20	12	14	16	34	27	3	7
37	18	15	24	14	18	19	35	32	2	4
38	11	6	11	7	18	20	13	20	3	3
39	10	10	1	8	12	17	9	12	3	3
40	6	7	6	8	11	18	7	18	3	3
41	2	6	2	9	3	3	3	7	2	2
42	1	2	2	10	3	9	1	6	1	2
43	-	1	1	8	1	4	-	1	1	1
44	-	1	6	6	2	2	-	1	-	1
45	-	2	1	12	1	3	-	1	-	1
46	-	1	-	7	-	2	-	-	-	-
47	-	1	1	9	-	1	-	-	-	-
48	-	-	-	3	-	1	-	-	-	-
49	-	-	-	3	-	1	-	-	-	-
50	-	-	-	2	-	-	-	-	-	-
Relative number ‰	520	480	490	510	483	517	559	441	507	493
Mean length, cm	28,4	27,6	28,3	30,0	29,8	31,2	29,0	29,4	24,1	25,6
Number of specimens measured	4497	4152	5041	5294	2575	2751	4612	3618	3544	3452

Table 8. Age composition, mean length and weight of redfish Sebastes mentella in catches taken by conventional bottom trawl on Flemish Cap Bank in January 1978 (296 sepcimens in sample).

Year-class	Age (years)	Number of specimens, %			Mean lenght, cm			Mean weight, g		
		Males	Females	Males and females	Males	Females	Males and females	Males	Females	Males and females
1970	8	3	3	6	27,0	29,0	28,0	240	300	270
1969	9	10	7	17	29,0	30,0	29,4	377	410	390
1968	10	30	40	70	30,4	30,2	30,3	410	441	428
1967	11	58	64	122	31,5	32,3	31,9	448	497	474
1966	12	128	96	223	33,0	33,7	33,3	500	600	542
1965	13	95	95	190	33,8	35,0	34,4	533	638	586
1964	14	44	64	108	35,1	36,0	35,6	624	709	674
1963	15	34	88	122	36,6	37,7	37,4	670	778	748
1962	16	17	71	88	37,0	38,4	38,1	702	832	807
1961	17	-	10	10	-	39,3	39,3	-	1003	1003
1960	18	-	24	24	-	40,3	40,3	-	1014	1014
1959	19	-	14	14	-	41,8	41,8	-	1122	1122
1958	20	-	3	3	-	43,0	43,0	-	1370	1370
1957	21	-	-	-	-	-	-	-	-	-
1956	22	-	3	3	3	44,0	44,0	-	1170	1170
Total		419	581	1000	33,0	35,5	34,6	524	691	621

Table 9. Mean number of redfish specimens (Sebastes mentella) and mean weight of catches per hour of trawling, taken by a fish-counting trawl during total trawl survey in Subdivisions of Newfoundland Subarea.

Year of survey	Number of specimens					Weight, kg				
	3K	3L	3M	3N	30	3K	3L	3M	3N	30
1971	337	82	66	911	957	144	33	13	221	80
1972	612	37	449	366	498	266	16	194	43	62
1973	475	113	484	645	884	150	38	117	161	114
1974	796	314	314	733	560	308	110	89	145	66
1975	692	73	516	1278	1864	282	29	163	241	166
1976	227	4	103	128	1085	109	1	48	21	107
1977	600	73	660	282	3033	205	23	327	56	509
1978	405	224	816	2556	508	151	79	166	535	99

Table 10. Composition and mean length of redfish Sebastes mentella taken by bottom conventional trawl on Southeast slope of Grand Bank (Subdivision 3N) in August 1978 (192 specimens in sample).

Year-class	Age (years)	Number of specimens, %			Mean length, cm		
		Males	Females	Males and females	Males	Females	Males and females
1974	4	-	5	5	-	18,0	18,0
1973	5	52	42	94	22,9	22,8	22,8
1972	6	125	104	229	24,0	24,7	24,3
1971	7	125	89	214	25,2	26,3	25,7
1970	8	73	156	229	26,1	26,7	26,5
1969	9	21	89	110	26,8	28,6	28,2
1968	10	5	83	88	29,0	30,3	30,2
1967	11	-	16	16	-	32,0	32,0
1966	12	5	5	10	33,0	33,0	33,0
1965	13	-	-	-	-	-	-
1964	14	-	-	-	-	-	-
1963	15	-	5	5	-	38,0	38,0
Total		406	594	1000	24,9	26,0	26,2

Table 11. Age composition and mean length of redfish Sebastes mentella taken by conventional bottom trawl on the northeast slope of Grand Bank (Subdivision 3L) in August 1978 (193 specimens in sample).

Year-class	Age (years)	Number of specimens, %			Mean length, cm		
		Males	Females	Males and females	Males	Females	Males and females
1973	5	21	21	42	22,8	24,0	23,4
1972	6	41	16	57	24,2	24,7	24,4
1971	7	36	41	77	25,1	24,9	25,0
1970	8	51	68	120	26,5	26,6	26,6
1969	9	47	31	78	27,8	28,0	27,9
1968	10	119	52	171	29,5	29,6	29,5
1967	11	77	41	118	31,5	31,4	31,4
1966	12	72	21	93	33,0	34,0	33,2
1965	13	41	5	46	34,9	34,0	34,8
1964	14	31	5	36	35,7	36,0	35,7
1963	15	31	-	31	36,8	-	36,8
1962	16	21	-	21	37,5	-	37,5
1961	17	11	-	11	38,5	-	38,5
1960	18	11	5	16	38,5	39,0	38,7
1959	19	11	21	32	39,5	41,0	40,5
1958	20	-	41	41	-	42,6	42,6
1957	21	-	10	10	-	41,5	41,5
Total		622	378	1000	30,7	31,0	30,8

Table 12. Size composition of redfish Sebastes marinus (‰) taken by conventional bottom trawl on Flemish Cap Bank in January 1978.

Length, cm	Males	Females	Males and females together
26	1	1	2
27	1	1	2
28	1	1	2
29	2	1	3
30	3	1	4
31	7	3	10
32	16	5	21
33	18	7	25
34	24	8	32
35	45	17	62
36	53	15	68
37	68	22	90
38	56	36	92
39	47	37	84
40	40	44	84
41	34	36	70
42	36	28	64
43	28	24	52
44	20	32	52
45	18	29	47
46	11	20	31
47	7	28	35
48	1	16	17
49	1	16	17
50	-	16	16
51	-	6	6
52	1	3	4
53	-	5	5
54	-	2	2
55	-	1	1
Relative number ‰	539	461	1000
Mean length, cm	38,4	41,7	39,9
Number of measured specimens	938	801	1739

Table 13. Age composition, mean length and weight of redfish Sebastes marinus taken by conventional bottom trawl on Flemish Cap Bank in January 1978 (283 specimens in sample).

Year-class	Age (years)	Number of specimens %			Mean length, cm			Mean weight, g		
		Males	Females	Males and females	Males	Females	Males and females	Males	Females	Males and females
1973	5	18	11	29	18,4	18,3	18,3	114	113	114
1972	6	11	7	18	18,7	19,5	19,0	130	145	136
1971	7	11	4	15	23,7	24,0	23,8	230	250	235
1970	8	7	4	11	23,0	23,0	23,0	210	180	200
1969	9	11	11	22	25,0	28,7	26,8	240	405	322
1968	10	46	18	64	28,0	29,4	28,4	350	409	366
1967	11	25	21	46	31,6	31,8	31,7	482	517	498
1966	12	61	21	82	33,1	33,8	33,3	587	655	601
1965	13	54	21	75	34,5	34,5	34,5	637	669	646
1964	14	43	29	72	35,5	36,6	36,0	725	801	755
1963	15	86	21	107	37,4	37,7	37,5	787	863	802
1962	16	75	29	104	38,0	38,8	38,2	853	971	885
1961	17	36	4	40	38,8	40,0	38,9	904	1020	914
1960	18	39	29	68	40,2	40,5	40,3	963	1110	1025
1959	19	46	35	81	40,7	41,9	41,2	1012	1180	1085
1958	20	36	29	65	41,5	43,1	42,2	1084	1309	1184
1957	21	14	7	21	43,2	45,0	43,8	1154	1459	1253
1956	22	4	7	11	44,0	45,0	44,7	1300	1500	1433
1955	23	18	18	36	46,0	47,0	46,5	1427	1632	1529
1954	24	4	18	22	47,0	48,8	48,5	1330	1812	1732
1953	25	-	7	7	-	50,0	50,0	-	1805	1805
1952	26	-	-	-	-	-	-	-	-	-
1951	27	-	4	4	-	55,0	55,0	-	2050	2050
Total		645	355	1000	35,0	37,8	36,1	743	965	822

Table 14. Size composition of American plaice (%o) taken by bottom trawl with small-mesh insertion during total trawl survey from board R/V "Persey III".

Length, cm	Subdivision 2J July		Subdivision 3L July		Subdivision 3N June		Subdivision 3N August	
	Males	Females	Males	Females	Males	Females	Males	Females
12-13	-	-	1	-	-	-	-	-
14-15	-	-	5	4	1	-	-	-
16-17	1	1	21	21	3	2	1	1
18-19	2	3	32	32	13	13	2	1
20-21	8	9	47	46	35	39	6	4
22-23	16	17	49	52	39	53	20	15
24-25	36	35	55	64	39	52	46	40
26-27	56	64	60	71	49	59	66	52
28-29	43	53	41	54	31	38	47	39
30-31	68	87	42	58	42	58	74	63
32-33	43	67	20	42	27	45	46	45
34-35	43	73	16	42	27	31	47	53
36-37	36	66	9	31	22	40	33	55
38-39	14	37	4	22	16	21	12	30
40-41	6	46	4	21	21	27	18	45
42-43	2	26	1	12	15	19	9	32
44-45	1	16	1	6	15	12	5	24
46-47	-	13	1	4	10	16	5	19
48-49	-	5	-	3	9	12	2	8
50-51	-	4	-	3	3	11	3	11
52-53	-	2	-	1	1	7	-	5
54-55	-	1	-	1	1	5	-	5
56-57	-	-	-	-	1	6	-	5
58-59	-	-	-	1	-	4	-	2
60-61	-	-	-	-	-	5	-	2
62-63	-	-	-	-	-	1	-	1
64-65	-	-	-	-	-	1	-	1
66-67	-	-	-	-	-	1	-	-
68-69	-	-	-	-	-	-	-	-
70-71	-	-	-	-	-	1	-	-
72-73	-	-	-	-	-	1	-	-
Relative number %o	375	625	409	591	420	580	442	558
Mean length, cm	30,3	33,3	25,6	28,7	30,8	32,5	31,0	35,0
Number of specimens measured	4145	6904	3343	4838	1573	2168	3329	4201

Table 15. Size composition of grenadier (‰) taken by conventional bottom and pelagic trawls.

Length, cm	Subdivision 3K July Pelagic trawl		Subdivision 2G July Pelagic trawl		Subdivision 2G September Pelagic trawl		Subdivision2G September Bottom trawl	
	Males	Females	Males	Females	Males	Females	Males	Females
30-32	-	-	-	-	1	-	-	-
33-35	1	1	-	-	4	-	-	-
36-38	9	8	2	-	5	2	-	-
39-41	15	6	4	2	6	9	-	-
42-44	32	8	5	6	31	15	1	1
45-47	38	17	16	13	42	28	7	-
48-50	47	31	17	13	36	27	13	4
51-53	84	43	28	20	31	27	15	5
54-56	88	50	54	29	36	28	37	16
57-59	90	50	80	44	80	47	57	29
60-62	83	40	80	63	89	49	51	38
63-65	52	28	95	71	88	68	48	33
66-68	40	30	64	45	71	55	65	59
69-71	29	17	53	37	34	24	78	49
72-74	21	11	39	24	18	11	81	47
75-77	9	5	28	23	13	9	54	35
78-80	3	3	12	13	9	4	47	31
81-83	3	3	4	3	1	-	22	21
84-86	-	3	1	2	2	-	13	9
87-89	1	1	1	1	-	-	7	10
90-92	-	-	-	1	-	-	2	8
93-95	-	-	1	-	-	-	4	2
96-98	-	-	-	-	-	-	-	1
Relative number, ‰	645	355	584	416	597	403	602	398
Mean length, cm	56,9	57,8	62,8	62,6	59,2	59,1	68,0	69,8
Number of specimens measured	701	386	1278	911	462	312	600	396

Table 16. Size composition of capelin taken by mid-water trawl in 1978.

Length, cm	Subdivision 2J August-September		Subdivision 3K August-December		Subdivision 3L April-June		Subdivision 3O June	
	Males	Females	Males	Females	Males	Females	Males	Females
9,5	-	-	1	1	-	-	-	-
10,0	-	-	4	3	-	-	-	42
10,5	-	-	10	9	-	1	-	27
11,0	-	-	32	22	3	6	11	85
11,5	-	-	44	29	1	12	14	96
12,0	-	1	61	35	10	23	11	112
12,5	6	1	49	24	8	27	26	96
13,0	31	5	49	40	15	51	91	181
13,5	39	6	47	56	14	55	153	112
14,0	63	16	76	82	23	76	332	106
14,5	50	37	89	75	41	124	146	48
15,0	112	85	144	97	80	159	128	37
15,5	109	99	113	91	72	115	22	5
16,0	175	129	110	95	91	106	29	16
16,5	168	133	69	94	108	75	15	16
17,0	128	166	52	103	115	53	7	21
17,5	54	141	26	67	134	46	-	-
18,0	44	103	15	48	93	27	11	-
18,5	10	57	6	21	81	18	-	-
19,0	6	16	2	7	49	13	-	-
19,5	4	3	1	1	37	8	4	-
20,0	-	2	-	-	14	3	-	-
20,5	-	-	-	-	8	1	-	-
21,0	1	-	-	-	3	1	-	-
Number of measured specimens	685	3926	8275	10488	3220	6183	274	188

Table 17. Age composition (‰) of capelin in Newfoundland Area in 1978.

Year-class	Age (years)	Subdivision 2J August		Subdivision 3K September-		Subdivision April-June		3L Sibdiv.30 June	
		Males	Females	Males	Fe-males	Males	Females	Males	Females
1977	1	-	-	78	36	-	-	-	-
1976	2	-	-	261	230	8	13	-	161
1975	3	143	140	400	330	67	104	150	468
1974	4	714	839	208	350	500	483	227	274
1973	5	143	21	53	52	403	385	23	97
1972	6	-	-	-	1	22	11	-	-
1971	7	-	-	-	-	-	4	-	-
Number of measured specimens		7	93	472	466	360	470	88	62

Table 18. Water temperature (°C) along the hydrologic section 8A (between 53°40'N, 55°44'W and 54°50'N, 53°32'W) for November 1.

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	0.60
1969	0.82	0.36	0.50
1970	1.29	0.39	0.60
1971	0.88	0.43	0.57
1972	0.35	0.39	0.17
1973	1.00	0.59	0.72
1974	0.96	0.02	0.27
1975	1.14	0.51	0.70
1976	0.74	0.20	0.36
1977	1.78	2.52	2.34
1978	0.95	0.79	0.83
Mean for 1964-1977	1.30	0.60	0.81

Table 19. Tagged bottom fishes released in 1978.

Subdivision	Cod	Greenland halibut	American plaice	Witch	Other fish	Total
2J	3202	1334	55	8	10	4609
3K	62	2542	33	185	4	2826
3L	384	128	2474	-	1	2987
3M	43	-	445	-	-	488
3N	93	-	871	-	-	964
30	-	-	-	-	1	1
Total	3784	4004	3878	193	16	11875

Table 20. Released and recovered tagged specimens of American plaice on Grand Newfoundland Bank in 1978.

No.	Released				No. of tag	Recovered		
	Date	Latitude (N)	Longitude (W)	Length of fish, cm		Date	Latitude (N)	Longitude (W)
1.	31 May	46°40'0"	50°24'9"	40	338724	28 July	?	?
2.	31 May	47°30'0"	50°46'0"	56	249717	19 June	?	?
3.	3 June	48° 1'7"	49°58'3"	41	355741	28 July	?	?
4.	3 June	48° 3'9"	50°28'9"	42	275097	19-21 July	47°30'	50°00'
5.	3 June	48° 1'7"	49°58'3"	40	355532	12 July	?	?
6.	3 June	48° 1'7"	49°58'3"	42	355630	3July	?	?
7.	3 June	48° 1'7"	49°59'3"	33	355599	28 July	?	?
8.	5 June	48°29'7"	50°37'0"	33	249661	15 July	48°15'	51°30'
9.	12 June	43°47'4"	49°15'7"	38	261517	24 July-3 August	?	?
10.	16 June	44°39'4"	49°48'7"	60	261961	19 July	?	?
11.	16 June	44°39'4"	49°48'7"	41	322225	19 July	?	?
12.	16 June	44°39'4"	49°48'7"	48	261999	16 July	45°3'	49°46'
13.	16 June	44°28'7"	49°44-5"	39	261938	21 July	?	?
14.	16 June	44°28'7"	49°44'5"	61	261893	25-27 July	?	?

Table 21. Age composition of silver hake catches in Div. 4W (%).

Age (years)	1976	1977	1978
1	8,3	2,7	0,5
2	45,2	8,9	18,5
3	30,0	44,1	37,5
4	11,0	35,9	32,8
5	4,4	7,1	8,9
6	0,7	1,0	1,2
7	0,4	0,3	0,6
Total	100,0	100,0	100,0

Table 22. Catches of silver hake per half an hour of trawling in the Emerald (number of specimens).

Years	1972	1973	1974	1975	1976	1977	1978
Number of specimens taken	963	873	1342	2629	1508	-	1232