Northwest Atlantic Fisheries Organization

Serial No. N294

NAFO SCR Doc. 81/VI/18

SCIENTIFIC COUNCIL MEETING - JUNE 1981

Preliminary Assessment of Some Demersal Fish Stocks in the Newfoundland and Labrador Areas

by

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Abstract

Preliminary assessment of the abundance and biomass of commercial demersal fishes in Subareas of Newfoundland and Labrador is given on the basis of the total trawl survey and young estimation. The conclusions concerning the rationality of some changes in the annual yield limits in 1981 (compared to the 1980 level) have been made.

Material and methods

The ichthyologists of PINRO carried out the total trawl survey of demersal fishes and the cod and haddock fry assessment, simultaneously, in the period from 23 April to 1 August 1980 in the Subareas of Newfoundland and South Labrador. These investigations were conducted aboard the RV "Nikolay Kononov". Due to her dimensions, displacement and engine power RV "Nikolay Kononov" differs a little from FRV "Persey III", on board of which the most of the previous total trawl surveys were carried out.

300 fish-counting trawlings were made during the total trawl survey in 1980.

As in previous years, the fish-counting trawlings with small-meshed bottom trawl were undertaken at constant stati-

ons. The duration of each trawling was one hour. All the bottom fishes caught were measured (the representative samples for measurements were taken only from very great catches). The mass of the whole catch by each species separately was determined by means of size-weight keys. The average abundance and biomass of each species by areas and depths were estimated after the end of the cruise. The comparison between the results of the trawl surveys carried out in different years of the last decade allows to reveal the main tendencies to fluctuations in demersal fishes stocks, to forecast the stocks level next year and recommend the rational changes of the yield limits.

The assessment on cod and haddock fry was also carried out in the cruise. Age, sex, stomach fullness degree, food content and liver weight (it was later expressed in % to the whole fish weight) were determined for the majority of the specimens caught. The fry assessment in Subarea of Newfoundland was annually conducted by ichthyologists of PINRO since 1962. The data obtained allow to evaluate the strength of each year class; this strength is expressed by mean number of specimens per one fish-counting trawling.

Only preliminary assessments of bottom fishes stocks are given in the present paper; more precise estimates will be presented in subsequent documents, where the results of the total trawl survey will be distributed by separate squares with equal densities of fish concentrations. However, the main conclusions on stocks status, probably, will remain in force.

Results of investigations

As it is seen from Tables 1 and 2, the mean abundance and biomass of cod in Division 3K in 1980 were above the long-term mean level and above those in 1977, 1978 and 1979. Thus, the view on Canadian scientists (Wells & Bishop, 1980)

about good stocks status and favourable possibilities for the Labrador cod fishery is confirmed.

From Tables 1 and 2 it is quite easy to estimate mean weight of one specimen of cod in Division 3K from the data on the total trawl survey. Both in 1979 and 1980 this weight (1°4 kg) was rather high, because the total trawl survey was carried out with small-meshed trawl over a fairly extensive area, including shallow waters, where the young cod was mainly observed. Undoubtedly, the Labrador cod population is now presented predominantly by the species of elder ages. The young cod assessment shows, that only poor year classes were observed for last some years in Division 3K (Table 3, mean catch of 3 year-olds per hour trawling). In 1981, large mature specimens will probably prevail in the commercial stock of Labrador cod.

The cod stocks status on the southern slopes of Grand Bank (Divisions 3N + 3O) can be evaluated as rather satisfactory: compared to 1979, the indices of abundance and biomass increased. Judging by fry assessment the cod year class, appeared in these areas in 1977 was less than the long-term mean by its abundance, but the year class, appeared in 1978, was close to the long-term mean.

The most unfavourable changes in the cod stock were registered on the Flemish Cap Bank, where the indices of abundance and biomass sharply reduced since 1979 to 1980. Fairly abundant 1977 year class showed itself well while fry assessment in 1979 and in January 1980 (Wells, 1980), but in summer 1980 it practically disappeared from the fish-counting catches. The subsequent cod year classes were very poor (Table 3).

The abundance and biomass of Sebastes mentella almost in all the areas were higher than the long-term level; the indices for Divisions 3N and 3O should be considered in total, because there were no any physical barriers between these areas and the redfish easily migrate from

one area to another (Nikolskaya, 1969). The abundance of Sebastes mentella on the Flemish Cap Bank in 1979 was the highest due to a mass recruitment of stock with the young species; as it is easy seen from Tables 1 and 2, the average weight of one specimen was equal to only 148 g. In 1980 the redfish Sebastes mentella became markedly larger (average weight reached 333 g), the biomass of population remained at a former, very high level, although the abundance decreased. It should be noticed, that in Tables 1 and 2 the data on the Flemish Cap Bank investigations were obtained as average of two surveys - the spring and summer ones.

In 1980 the biomass of American plaice in almost all the areas was higher than that of 1979 (the data on the investigations in Divs.3N and 3O should be considered in total). The abundance and biomass of American plaice in Div.3L essentially increased.

The abundance and biomass of yellowtail flounder noticeably increased from 1978 to 1979 and remained at a fairly high level in 1980. Apparently, the yield of yellowtail flounder would be remained without changes next year.

The young haddock assessment showed that only very poor year classes appeared for recent years. It is difficult to expect for the abundance of year class, appeared in 1980. However, the specialists in the cruise registered an extensive distribution of large mature spawners in May 1980 on the southwestern slopes of the Grand Bank (Div.3O), predominantly, at the 100-200 m depths. It is possible that the availability of large mature fishes will influence upon the progeny abundance favourably.

The demersal fishes distribution by depths will be presented in subsequent papers concerning the results of the total trawl survey. Only the data on the Flemish Cap investigations, where the total trawl survey in 1980 was carried out twice, have been given here. It's easy to see that in

spring (Table4) Sebastes mentella and Sebastes marinus were observed rather deeper, than in summer (Table 5). Thus, the total trawl survey can give a general idea of fluctuations in the redfish abundance only during the observations at the same time of the year, best of all, probably, in summer months. The time of the trawl survey conduction for assessment of the commercial fishes inhabited in the shallow waters - cod, wolffishes, American plaice - is of no particular importance.

Conclusions

On the basis of the results of the total trawl survey and fry assessment in the Newfoundland area it can be recommended in 1981 to increase (compared to the 1980 level) the following yield limits of demersal fishes:

cod in Div. 3N + 3O
redfish in Div. 3M
redfish in Divs. 3N + 3O
American plaice in Div. 3L

More precise value of the recommended yield limits can be stated after the final analysis of data on the total trawl survey.

References

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Table 1 Average number of demersal fishes (spec. per hour trawling) due to the data of total trawl surveys in the Newfoundland area

Species	Year	Div.3K	Div.3L	Div.3M	Div.3N	Div.3O
C o d	I971	97	I84	77	208	44
	I972	I58	265	66	I39	56
	I973	39	29	I08	I44	53
	I974	32	40	346	I85	30
	I975	27	24	550	I86	28
	I976	98	57	693	243	32
	I977	42	I35	489	452	70
	I978	I5	3I	95	I8I	43
	I979	55	I3I	I22	I03	22
	I980	69	63	34	I24	34
Redfish Sebastes mentella	I97I	337	82	66	9II	957
	I972	6I2	37	449	366	493
	I973	475	II3	484	645	884
	I974	796	3I4	3I4	733	560
	I975	692	73	5I6	I278	I834
	I976	227	4	I03	I28	I085
	I977	600	73	660	282	3038
	I978	405	224	8I6	2555	508
	I979	9I0	42	48I3	4247	668
	I980	622	I78	2077	70I	3I39
Redfish Sebastes marinus	I97I	30	-	93	-	-
	I972	I5	II	409	-	-
	I973	45	-	2I4	-	-
	I974	65	-	264	-	-
	I975	9	7	I37	-	I03
	I976	I4	2	I64	-	-
	I977	59	5	62I	-	-
	I978	I	I	I25	-	-
	I979	I	20	22	3	-
	I980	7	7	I70	59	-
American plaice	I97I	57	703	38	I94	I45
	I972	74	5I6	4I	387	I67
	I973	I42	569	53	267	258
	I974	I77	67I	83	357	I58
	I975	238	663	93	356	30I
	I976	I75	394	I69	223	209
	I977	227	I086	60	567	203
	I978	69	578	46	I67	I2I
	I979	52	487	I6	53I	I5I
	I980	78	7I0	30	266	I55
Yellowtail flounder	I97I	-	7I	-	282	I6
	I972	-	I26	-	326	I28
	I973	-	3I	-	206	I22
	I974	-	84	-	395	98
	I975	-	I6	-	227	I00
	I976	-	23	-	439	I2I
	I977	-	24	-	I08	II2
	I978	-	8	-	I05	I24
	I979	-	57	-	327	68
	I980	-	20	-	230	76

Table 2 Average catch (kg) of demersal fishes per hour trawling due to the data of total trawl surveys in the areas of Newfoundland

Species	Year	Div.3K	Div.3L	Div.3M	Div.3N	Div.3O
Cod	1971	77	138	69	135	34
	1972	134	163	75	72	67
	1973	33	32	57	74	25
	1974	36	33	51	72	10
	1975	19	20	121	155	16
	1976	123	48	296	121	25
	1977	36	98	448	254	70
	1978	17	36	79	122	23
	1979	77	160	108	83	33
	1980	97	104	35	100	58
Redfish Sebastes mentella	1971	144	33	13	221	80
	1972	266	16	194	43	62
	1973	150	38	117	161	114
	1974	308	110	89	145	66
	1975	282	29	163	241	166
	1976	109	1	48	21	107
	1977	205	23	327	56	509
	1978	151	79	166	535	99
	1979	553	15	710	971	106
	1980	250	82	702	213	664
Redfish Sebastes marinus	1971	27	-	85	-	-
	1972	21	11	334	-	-
	1973	24	-	141	-	-
	1974	69	-	104	-	-
	1975	5	2	37	-	21
	1976	12	-	84	-	-
	1977	77	-	347	-	-
	1978	1	1	66	-	-
	1979	-	6	6	-	-
	1980	6	1,5	99	12	-
American plaice	1971	16	250	26	142	57
	1972	6	132	22	117	42
	1973	56	111	37	107	77
	1974	43	166	74	186	53
	1975	66	202	53	171	90
	1976	39	112	127	84	86
	1977	64	345	30	197	69
	1978	16	208	29	75	54
	1979	16	153	10	166	54
	1980	22	264	21	106	78
Yellowtail flounder	1971	-	32	-	110	8
	1972	-	57	-	140	46
	1973	-	12	-	76	50
	1974	-	40	-	137	46
	1975	-	7	-	88	41
	1976	-	10	-	171	52
	1977	-		-	44	100
	1978	-	3	-	45	57
	1979	-	28	-	148	32
	1980	-	10	-	104	41

Table 3 Number of young cod of the 1959-1979 year classes in the average catch per hour trawling on the Newfoundland shelf, spec.

Year class, year	Age, years														
	1					2					3				
	3K	3L	3N	3O	3M	3K	3L	3N	3O	3M	3K	3L	3N	3O	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
1963	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	0	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	2	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	43	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	2	3	24	2	13
1977	0	0	0	1	8	0	0	8	0	51	1	2	22	3	8
1978	0	0	2	5	3	0	2	39	5	2	-	-	-	-	-
1979	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-
Mean for 19 years	0	1	6	7	29	3	11	44	10	43	22	34	55	75	50

Table 4. Average number of demersal fishes (Spec. per hour trawling) caught in Div. 3M during the periods: 23 Apr-27 Apr abd 30 Apr-03 May 1980.

Species	Depth, m									
	101-200		201-300		301-400		401-500		501-600	
	No. of spec.	Mean length, cm	No. of spec.	Mean length, cm	No. of spec.	Mean length, cm	No. of spec.	Mean length, cm	No. of spec.	Mean length, cm
Gadus morhua	121	32,8	26	40,4	13	51,6	12	66,0	-	-
Urophycis chesteri	-	-	-	-	3	-	6	-	36	-
Anarhichas lupus	1	-	1	-	2	-	-	-	-	-
Anarhichas minor	46	41,8	16	39,6	16	37,9	3	-	-	-
Anarhichas denticulatus	-	-	-	-	-	-	4	-	11	-
Sebastes mentella	1	-	58	20,6	24	24,7	403	28,0	1344	32,7
Sebastes marinus	13	16,6	43	19,1	76	36,0	-	-	-	-
Hippoglossoides platessoides	116	40,7	10	34,4	30	38,7	2	-	2	-
Glyptocephalus cynoglossus	1	-	1	-	1	-	-	-	1	-
Macrourus berglax	-	-	-	-	-	-	6	-	21	-
Nezumia bairdi	-	-	-	-	3	-	10	-	87	-
Number of trawlings	4		11		5		4		1	

Table 5. Average number of demersal fishes (spec. per hour trawling) caught in Div. 3M in the period from 24 July to 01 August 1980.

Species	Depth, m									
	100-200		200-300		300-400		400-500		500-600	
	No. of spec.	Mean length, cm	No. of spec.	Mean length, cm	No. of spec.	Mean length, cm	No. of spec.	Mean leng.	No. of spec.	Mean length
Gadus morhua	42	39,3	43	51,1	6	59,9	-	-	-	-
Urophycis chesteri	-	-	-	-	3	-	2	-	-	-
Anarhichas lupus	1	-	2	-	2	-	4	-	-	-
Anarhichas minor	35	29,6	13	46,0	17	39,9	05	-	-	-
Anarhichas denticulatus	1	-	-	-	1	-	2	-	-	-
Sebastes mentella	10	34,5	6393	28,9	4190	26,2	902	31,0	250	35,4
Sebastes marinus	108	21,3	580	32,4	2	38,5	1	-	-	-
Hippoglossoides platessoides	32	40,2	42	38,9	8	41,5	1	-	-	-
Glyptocephalus cynoglossus	1	-	-	-	1	-	1	-	-	-
Macrourus berglax	-	-	-	-	1	-	5	-	1	-
Nezumia bairdi	-	-	-	-	-	-	6	-	-	-
Number of trawlings	5		11		5		2		3	