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The Scotian Shelf redfish fishery in 1975

by

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Introduction

The allowable catch for Div. 4VWX redfish has been adjusted downwards from the initial level of 40,000 mt set for 1974, to 30,000 mt set for 1975, and to 20,000 mt for 1976, the latter adjustment being based on a preliminary assessment of the stock complex by Mayo and Miller (1976). Commercial catches, after doubling in 1971 to 62,000 mt, have declined by approximately 10,000 mt per year, and by 1974, catches had declined to about the 1970 level (1974 catch = 33,000 mt). Preliminary 1975 catches are 28,000 mt, close to the TAC of 30,000 mt. The present paper gives 1975 data for the commercial fishery and for Canadian research vessel surveys.

Research vessel abundance estimates

Stratified random groundfish surveys have been conducted in Div. 4VWX from 1970. Redfish abundance estimates derived from these showed considerable stability from 1970 to 1973. Suggesting moderate increases in abundance until 1972 and a slight drop in 1973 (Table 1). However, in 1974 apparent abundance dropped very substantially but increased even more substantially to the highest recorded values in 1975.

Examination of survey length-frequencies indicates that fluctuations in the estimated abundance of fish in the 25-30 cm range are largely responsible for the variations in population estimates (Table 2). Examination of the basic data from the 1975 survey reveals that a single very large catch of 3,000 kg in one half-hour tow is entirely responsible for the increased abundance estimates for that year. This single catch contributed 163,000 mt to the biomass estimate and 554×10^6 fish to the population number estimate and these fish were distributed over the length range 23-33 cm. From the growth data of Parsons (in Mayo and Miller, 1976) fish of this size are in the age range 8-14 years. Thus, they do not represent recruitment of the small fish which appeared in the 1974 survey. These fish, with a modal length of 17 cm in 1974 were most likely about age 4, and could be expected to be in the order of 19-20 cm in 1975. It is likely that they are represented by the small mode at 20 cm in the 1975 survey, and thus, from these data, do not appear to be particularly abundant. Following length-frequency modes from 1970, the fish with modal length of 22 cm in that year probably represents age 6 or age 7 fish, which, by 1975, are age 11 or age 12 with modal lengths of 26-28 cm. Parson's age data suggest that fish of this size should, in fact, be age 10 or 11. Thus, the length frequency and ageing data are fairly consistent with each other.

Commercial catch composition

The Canadian commercial catch in 1975 was composed largely of fish 25-35 cm, with a mean length of 31 cm (Table 3). The largest modes in the length-frequency were at 26 cm and 28 cm as in the research vessel surveys,

but larger fish also contributed significantly to the commercial catch. In the USA catch, the fish were predominantly 23-29 cm, with a mean length of 26.7 cm and a mode at 25 cm. The USSR catch (based on 17 samples taken in April and May) was composed of considerably smaller fish than those of Canada and the USA. The mean length was 19.2 cm, the largest mode occurring at 18 cm and a clear, but smaller, mode at 26 cm. In comparison to earlier years (Table 4), total removals show a substantial shift to smaller fish similar to that seen in 1970.

Canadian commercial catch rates

Catch rates of Canadian vessels of 150-499.9 gt fishing for red-fish on the Scotian Shelf increased to 0.63 mt/hr in 1971, and have declined each year since to 0.38 mt/hr in 1975 (Table 5). Catch rates for each Division were calculated by averaging the monthly catch rates, and the overall value for Div. 4VWX was obtained by taking a weighted average of the Division catch rates. The weighting factors used were the calculated areas of each Division.

Discussion

The year class (or classes) which supported expansion of the fishery in 1971 continue to support the Canadian fishery but at decreasing catch rates. The USSR fishery appears to be based on a younger year class (or classes) which will probably have a modal length of 21-22 cm in 1977. The size of this year class remains subject to conjecture. Research vessel surveys suggest that it is not particularly large and, as indicated by Mayo and Miller (1976), there are benefits to be accrued in terms of yield-per-recruit in allowing further growth before subjecting this year class to heavy exploitation. In summary, the 1975 data do not substantially change the interpretation of events by Mayo and Miller, and support similar management advice for 1977 as given for 1976.

References

- Mayo, R. K., and D. S. Miller. 1976. A preliminary assessment of the red-fish, *Sebastes marinus* (L.), in ICNAF Divisions 4VWX. ICNAF Selected Papers No. 1: 31-39.

Table 1 . Div. 4VWX Redfish - Canadian survey results.

A. Biomass estimates (mt)

<u>Div.</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
4V	53,540	71,750	27,710	29,100	37,370	25,540
4W	99,620	45,680	33,530	27,060	11,950	178,250
4X	19,180	68,830	168,010	140,360	40,270	41,630
4VWX	172,340	186,260	229,250	196,520	89,590	245,420

B. Population number estimates ($\times 10^{-6}$)

4V	131.5	152.0	115.2	95.4	95 .2	101.4
4W	481.4	152.3	122.1	94.6	48.6	609.8
4X	58.9	369.7	494.5	527.7	209.8	62.9
4VWX	671.8	674.0	731.8	717.7	353.6	774.1

C. Catch rates (Kg/tow)

4V	37.98	50.92	19.66	20.64	26.52	18.12
4W	58.10	26.64	19.55	15.78	6.97	103.95
4X	10.42	37.36	91.21	76.20	21.86	22.60
4VWX	34.70	37.51	46.16	39.57	18.04	49.42

Table 2 . Div. 4VWX Redfish - estimated population length frequencies from Canadian research vessel surveys ($\times 10^{-6}$).

<u>Length Cm.</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
<10	1.2	1.4	1.5	0.2	0.3	1.0
11	2.6	0.7	0.3	1.1	1.0	-
12	2.5	1.6	0.7	1.3	1.5	0.4
13	1.8	3.0	1.2	1.6	4.0	0.9
14	1.5	3.2	1.9	1.8	11.1	1.3
15	3.4	3.5	5.8	3.4	28.8	4.5
16	7.5	3.6	6.2	3.5	41.8	4.2
17	18.5	15.8	14.1	3.2	46.9	8.9
18	33.8	38.3	20.0	7.4	26.9	7.1
19	42.3	36.4	26.5	12.1	12.4	10.9
20	60.7	53.6	27.5	14.0	7.2	11.8
21	67.7	50.9	48.3	24.5	6.4	10.0
22	71.7	52.8	53.0	53.4	11.8	17.5
23	61.4	52.2	70.7	95.0	10.5	28.6
24	47.1	48.1	81.2	93.7	10.1	54.6
25	36.2	53.5	64.7	99.3	11.1	72.4
26	28.6	42.6	49.0	87.4	10.3	98.0
27	24.2	35.3	33.6	65.2	11.7	87.3
28	21.9	21.7	29.1	39.2	10.8	98.8
29	18.9	19.8	26.4	26.2	11.5	78.6
30	19.6	23.6	33.0	19.6	7.4	54.0
31	17.1	18.0	27.3	13.0	9.6	43.6
32	14.7	16.8	21.4	12.5	9.4	18.0
33	12.4	12.3	21.5	9.8	10.5	20.0
34	13.0	13.1	14.0	6.4	10.0	4.8
35	10.7	14.3	12.2	5.1	7.7	6.1
36	6.7	12.6	16.0	6.0	7.1	3.6
37	7.3	9.7	13.0	3.8	4.5	5.3
38	3.9	4.2	6.0	3.1	4.3	6.1
39	2.8	2.9	3.8	1.8	2.9	4.6
40	2.1	2.4	1.0	1.6	1.4	3.7
41	1.6	1.3	0.3	0.5	0.8	1.5
42	2.1	1.5	0.4	0.4	1.2	1.1
43	1.6	1.2	0.1	0.5	0.5	0.6
44	1.6	0.5	-	-	0.2	1.0
≥45	1.4	0.6	-	0.1	0.1	3.1
Totals	672.1	673.0	731.7	717.7	353.6	774.1
<20	115.1	107.5	78.2	35.6	174.7	39.2
≥20	557.0	565.5	653.5	682.1	178.9	734.9

Table 3 . Div. 4VWX Redfish - 1975 Removals at length by country.

<u>Length (cm)</u>	<u>Canada</u>	<u>USA</u>	<u>USSR</u>	<u>Total</u>
10	-	-	43	43
1	-	-	129	129
2	-	-	429	429
3	-	-	1268	1268
4	-	-	2343	2343
15	-	-	2858	2858
6	-	-	3396	3396
7	-	-	5029	5029
8	-	18	6770	6788
9	-	43	6211	6254
20	193	128	3890	4211
1	178	274	2171	2623
2	389	928	903	2220
3	969	1565	580	3114
4	1645	2332	516	4493
25	2371	2850	1010	6231
6	2532	2299	1719	6550
7	2274	1936	1053	5263
8	2834	1452	924	5210
9	2166	1131	752	4049
30	2252	896	580	3728
1	2322	657	236	3215
2	2301	558	172	3031
3	1824	364	-	2188
4	2004	241	-	2245
35	1854	296	-	2150
6	2057	208	-	2265
7	1755	63	-	1818
8	1429	57	-	1486
9	1051	4	-	1055
40	779	18	-	797
1	367	18	-	385
2	315	11	-	326
3	171	14	-	185
4	57	18	-	75
45	73	11	-	84
6	49	-	-	49
7	61	-	-	61
8	51	-	-	51
9	-	-	-	-
50	16	-	-	16
Total	36,339	18,390	42,982	97,711
Mean Length	31.1	26.7	19.2	25.0

Table 4 . Estimated numbers ($\times 10^{-3}$) of Div. 4VWX redfish landed by length for all countries combined.

Length (cm)	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
10	-	-	-	-	-	67	-	-	-	-	43
11	-	-	-	-	-	143	-	-	28	18	129
12	-	-	-	-	-	150	-	24	61	39	429
13	-	-	-	-	-	544	259	8	188	114	1,268
14	31	21	-	-	-	1,309	786	0	388	245	2,343
15	68	66	90	-	-	2,211	918	0	238	150	2,858
16	233	161	0	-	-	3,210	2,787	76	475	239	3,396
17	354	568	162	7	-	4,956	8,007	61	1,028	545	5,029
18	377	1,296	374	27	-	8,913	11,916	262	2,032	896	6,788
19	726	1,445	350	40	8	9,286	12,948	439	3,697	1,577	6,254
20	975	2,936	1,235	81	19	11,106	10,707	1,037	6,736	3,307	4,211
21	2,212	4,018	2,106	79	17	9,368	9,259	2,967	10,489	5,248	2,623
22	3,342	6,729	2,198	108	91	8,513	9,664	6,682	13,412	6,500	2,220
23	5,273	8,583	2,489	131	231	6,565	13,194	10,354	13,870	7,860	3,114
24	7,494	12,238	3,369	157	316	5,423	14,978	14,707	12,716	8,231	4,493
25	7,050	13,660	3,300	219	496	3,979	15,753	17,502	13,244	8,773	6,231
26	5,976	12,625	2,556	307	563	3,007	14,941	17,195	10,852	7,688	6,550
27	5,904	10,484	3,060	507	627	2,919	12,215	14,652	9,580	7,453	5,263
28	5,240	9,518	2,785	662	1,688	2,681	10,473	12,894	7,399	6,175	5,210
29	4,662	7,951	2,780	1,065	2,556	2,792	9,352	10,218	5,556	5,059	4,049
30	3,365	8,002	3,271	1,515	3,776	2,892	8,376	8,416	5,290	4,960	3,729
31	2,414	5,468	3,419	1,868	3,570	2,881	6,677	5,890	3,618	3,936	3,215
32	1,436	3,595	3,238	2,164	3,937	3,098	6,182	5,141	3,444	3,271	3,031
33	1,474	3,065	3,063	1,922	3,566	2,683	5,852	4,150	3,388	2,614	2,188
34	1,072	1,908	1,856	1,972	3,437	3,004	6,016	3,677	2,790	2,230	2,245
35	991	2,381	1,154	1,514	2,615	2,739	5,281	2,640	2,113	1,910	2,150
36	996	1,480	1,007	1,478	2,213	2,465	4,324	2,694	1,940	1,887	2,265
37	639	1,612	1,114	1,200	2,385	1,857	3,486	2,036	1,694	1,652	1,818
38	459	1,015	1,048	1,061	1,982	1,990	2,263	1,736	1,356	1,356	1,486
39	340	1,359	469	793	1,103	1,271	1,358	1,024	735	775	1,055
40	292	1,210	503	577	1,419	1,077	997	701	587	417	797
41	240	1,021	145	482	682	729	632	491	273	264	385
42	183	587	323	389	568	500	297	345	175	144	326
43	140	518	108	207	316	206	216	172	153	69	185
44	37	232	108	131	136	142	129	92	82	29	75
45	28	77	107	64	133	66	37	117	37	32	84
46	0	24	36	31	51	44	68	-	97	0	49
47	9	9	-	22	51	26	0	-	60	7	61
48	-	16	-	0	25	13	7	-	0	8	51
49	-	0	-	19	0	-	3	-	56	-	-
50	-	3	-	-	49	-	-	-	-	-	16
Total	64,039	125,885	47,867	21,100	38,626	114,825	210,358	148,402	139,878	95,682	97,711
Mean Length	26.80	27.23	28.57	33.41	33.29	24.34	25.62	27.53	25.71	26.75	25.03

Table 5. Div. 4VWX Redfish - commercial catches and Canada (M)
150 - 499.9 gt side otter trawler catch rates.

A. Commercial catches (metric tons)

<u>Div.</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>
4Vn	4,246	6,954	4,525	7,125	6,985	-	-
4Vs	6,694	23,698	14,580	11,213	8,112	-	-
4W	16,215	19,953	22,223	14,709	11,587	-	-
4X	4,424	11,776	8,972	7,126	6,153	-	-
4VWX	31,579	62,381	50,300	40,173	32,837	27,966	-
TAC	-	-	-	-	40,000	30,000	20,000

B. Catch rates (mt/hr fished)

4Vn	0.52	0.70	0.46	0.54	0.35	0.33
4Vs	0.49	0.72	0.68	0.51	0.51	0.44
4W	0.75	0.73	0.87	0.63	0.60	0.57
4X	0.41	0.47	0.34	0.29	0.24	0.19
4VWX	0.55	0.63	0.60	0.47	0.43	0.38

