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Some Aspects of the Witch Flounder Fishery on the Southern Newfoundland Grand Bank (NAFO Divisions 3NO)

by

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The commercial fishery

Reported catches of witch flounder in the last 15 years and prior to 1985 ranged from about 2400 t in 1980 and 1981 to 9200 t in 1972 (Table 1, and Fig. 3). With increased effort mainly by EEC countries in 1985 and 1986, more particularly Spain and Portugal, catches rose sharply to 8800 and 8500 t for 1985 to 1986 respectively. This increased effort was concentrated outside the Canadian 200-mile limit mostly in Div. 3N. Other non-member countries such as the USA, Korea, the Cayman Islands, and Panama also attributed to increased catches. The catches in both years are nearly double the TAC of 5000 t. In 1987, the catch fell to 5300 t (Table 2) largely due to reduced USSR catches since the USSR usually has a catch similar to that of Canada (Table 3). Also, with reduced catch rates for flatfish generally outside the Canadian 200-mile limit some countries have diverted effort towards other species such as redfish and this may explain some of the reduction in catch in 1987 compared to 1985 and 1986. Again in 1987, the catch is well in excess of the TAC.

This stock came under quota management for the first time in 1974 at a TAC level of 10,000 t. This was reduced to 7000 t in 1979 and 1980, was further reduced to 5000 t in 1981 and has remained at that level ever since. A major factor in being unable to provide an adequate analytical assessment for this resource has been the lack of appropriate data for Div. 3N. This problem has become even more pronounced in recent years when even the catch levels are uncertain.

Catch and effort

Catch and effort statistics for Canada (N) from 1972-87 are presented in Table 1 and Fig. 1 where the fishery is mainly conducted in Div. 3Ø. Canadian catch rates declined from a high of 0.72 t/hr in 1972 to a low of 0.19 t/hr in 1979; although, for some years the proportion of main species catch on which the figures are based is very low and the value of such data are questionable. The catch rates have declined somewhat over the period 1985 to 1987; however, they are still considerably above those levels experienced during the late 1970s. It is unlikely that these catch rates are fully reflective of the whole resource but more likely to be a representation of the component of the resource which occupies the southwest slope of the Grand Bank in Div. 3Ø. Had catch rates in Div. 3N maintained themselves at similar levels as in Div. 3Ø, it would not be expected that effort be diverted away from such a high-priced product.

Commercial catch at age

It has been reported in previous assessments that as recent as 1974, the Canadian commercial fishery in Div. 3Ø was comprised of fish up to 19 years old with more than half the catch being 14-19 years old. Since 1983, none were caught older than 14 years old with nearly the entire catch in the 9-12 year old range. This stability in age composition for the Canadian fishery in Div. 3Ø was evident again in 1987 (Fig. 2). The ages ranged from 6-14 years old with more than 85% of the catch in the 9-12 year old range. As with catch rates, it must be pointed out that this apparent stability in the population age structure is largely a reflection of the stock component in Div. 3Ø.

Research vessel data

Results of Canadian stratified-random groundfish surveys in Div. 3N and 3Ø are presented in Tables 4 and 5 respectively. The results are presented as mean weight (kg) of witch per 30-minute sets for each stratum. The numbers in parentheses signify the numbers of successful sets upon which each mean is based. It is important to realize that these surveys do not cover important depths for witch and are, therefore, presented to examine for trends only. This is particularly evident for Div. 3N where the catches apparently far outweigh the actual estimates of biomass. It is notable, nonetheless, that the trend in biomass has gone in exactly the opposite direction than that of the commercial catch rates. The 1987 estimates were, in fact, the second highest in the time series for both divisions. Given the magnitude of recent catch levels and the magnitude of the increased biomass estimates, it is unlikely that such an apparent trend in biomass is a true reflection of increased stock size. This is particularly true when the stability in the age structure is considered. It is more likely that this apparent increasing trend in stock biomass is a representation of a distributional change to shallow waters covered by the surveys.

Prognoses

Given the data available it is not possible to arrive at a precise estimate of fishing mortality or stock size. However, it would appear that (1) the resource component in Div. 3Ø may be declining slowly in the last three years although catch rates are still reasonably high; (2) the reduced catch and effort in Div. 3N may be indicative of a substantial decline in this component of the resource; and (3) the magnitude of change in the biomass estimates would suggest a change in distribution.

Table 1. Witch catches in Div. 3NO during 1987.

Country	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total	3N	30
CAN (SF) (ins)	-	-	-	2	1	4	-	-	-	-	-	-	7	1	6
(off)	2	4	16	49	38	3	-	-	-	-	-	5	117	1	115
CAN (N) (ins)	-	-	-	-	-	-	-	-	-	-	-	-		-	-
(off)	36	153	1224	1114	34	78	24	10	9	12	8	-	2702	40	2662
CAN (Q)															
CAN (G)															
JAPAN			10										10		
USA	1		3	17	141	53	61	45	16	7	1	1	346		
EEC[a]			312[b]		615[c]	842[d]		1105[e]	1361[f]	1485[g]	1632[h]	1756[i]	1756		
USSR								279	73	2	30	7	391		
TOTAL	39	157	1253	1182	214	138	85	334	98	21	39	13	5329		
3N CAN (ins)	-	-	-	-	1	-	-	-	-	-	-	-	1		
(off)	-	-	1	-	1	2	10	8	5	7	7	-	41		
30 CAN (ins)	-	-	-	2	-	5	-	-	-	-	-	-	7		
(off)	38	157	1239	1163	70	79	14	2	4	5	1	5	2777		

[a] Not included in vertical totals

[b] (Jan-Mar)

[c] (Jan-May)

[d] (Jan-Jun)

[e] (Jan-Aug)

[f] (Jan-Sept)

[g] (Jan-Oct)

[h] (Jan-Nov)

[i] (Jan-Dec)

Table 2. Landings of witch flounder in NAFO Divisions 3N and 3Ø by Canada and USSR from 1974-87.

Year	Country	3N	3Ø
1974	Canada	454	2353
	USSR	1765	3470
	Total	2219	5823
1975	Canada	407	730
	USSR	2135	2884
	Total	2542	3614
1976	Canada	1325	1719
	USSR	1103	1888
	Total	2428	3607
1977	Canada	337	2676
	USSR	1768	974
	Total	2105	3650
1978	Canada	378	787
	USSR	2108	167
	Total	2486	954
1979	Canada	559	634
	USSR	1477	391
	Total	2036	1025
1980	Canada	219	206
	USSR	1069	925
	Total	1288	1131
1981	Canada	313	68
	USSR	2034	10
	Total	2347	78
1982	Canada	383	1377
	USSR	1551	418
	Total	1934	1795
1983	Canada	526	1148
	USSR	1853	89
	Total	2379	1237
1984	Canada	108	726
	USSR	1677	303
	Total	1763	1029
1985	Canada	121	2625
	USSR	1840	68
	Total	1961	2693
1986	Canada	45[a]	2875[a]
	USSR	1675[a]	49[a]
	Total	1720[a]	2924[a]
1987	Canada	42[a]	2662[a]
	USSR	399[a]	1026[a]
	Total	441[a]	3688[a]

[a]Provisional.

Table 3. Catch effort statistics for witch flounder in Divisions 3Ø, 1972-87 from Canada (N) based trawlers (TC5).

Year	CPUE (t/hr)	Main species catch (t)	Total catch in 3NØ	% Main species
1972	0.716	2751	9177	30
1973	0.502	4080	6691	61
1974	0.337	1015	8045	13
1975	0.252	595	6156	10
1976	0.271	1291	6035	21
1977	0.365	2436	5806	42
1978	0.249	452	3454	13
1979	0.186	25	3051	1
1980	0.267	25	2419	1
1981	0.352	177	2425	7
1982	0.667	601	3729	16
1983	0.379	816	3616	23
1984	0.327	160	2809	6
1985	0.543	1756	8771	20
1986	0.511	1946	8479[a]	23
1987	0.474	2054	7568[a]	27

[a]Provisional.

Table 4. Average weight per set of witch flounder in NAFO Division 3N from research vessel surveys from 1971–88.

Stratum	ATC 187 1971	ATC 199 1972	ATC 208–9 1973	ATC 222 1974	ATC 233 1975	ATC 245 1976	ATC 263 1977	ATC 277 1978	ATC 289 1979	ATC 304 1980	ATC 327–329 1982	A.N. 27 1984	W.T. 29 1985	W.T. 47 1986	W.T. 59 1987	WT 70 1988
357	–	–	1.20(2)	–	–	–	7.26(2)	–	6.50(3)	2.05(3)	8.50(2)	1.00(2)	4.25(2)	5.40(2)	7.00(1)	0.25(2)
358	–	2.95(4)	2.42(3)	–	–	–	6.02(2)	–	1.13(2)	0.27(3)	2.50(2)	2.00(2)	11.0(2)	1.20(2)	4.50(2)	0.75(2)
359	–	8.47(3)	20.88(3)	–	–	43.28(3)	1.82(2)	–	2.72(4)	1.38(4)	6.00(2)	6.00(2)	1.1(2)	1.90(2)	0.88(2)	4.00(2)
360	–	0.11(4)	–	–	0.0(4)	1.36(4)	0.17(4)	2.61(4)	3.23(9)	1.18(11)	5.86(7)	5.57(7)	0.27(16)	1.80(13)	1.63(15)	4.00(12)
361	0.0(2)	0.0(3)	0.0(4)	0.0(4)	1.46(4)	0.0(5)	0.45(3)	0.0(4)	0.14(8)	0.50(7)	0.17(6)	0.60(5)	0.0(7)	0.00(10)	0.13(9)	0.26(7)
362	1.82(2)	0.0(4)	0.0(5)	0.0(4)	0.0(3)	0.0(5)	0.0(5)	0.0(3)	0.08(12)	0.14(11)	0.00(8)	0.00(7)	0.23(11)	0.20(14)	0.05(12)	0.51(10)
373	0.0(4)	0.0(4)	0.0(4)	0.0(4)	–	0.0(5)	0.0(4)	0.31(4)	0.08(11)	0.00(8)	0.00(5)	0.00(7)	0.0(9)	0.00(14)	0.00(13)	0.00(10)
374	0.0(2)	0.0(2)	0.0(4)	0.0(2)	0.0(2)	–	0.0(3)	0.0(4)	0.0(4)	0.00(3)	0.00(4)	0.00(3)	0.0(4)	0.00(6)	0.00(5)	0.00(5)
375	0.30(3)	0.0(3)	0.0(3)	0.0(3)	0.0(3)	–	0.0(4)	0.09(5)	0.0(5)	0.00(4)	0.00(5)	0.00(5)	0.0(8)	0.00(8)	0.00(8)	0.00(6)
376	1.13(2)	0.0(2)	0.0(3)	0.0(3)	0.0(2)	0.0(3)	0.0(3)	0.0(2)	0.0(4)	0.00(3)	0.00(7)	0.00(4)	0.0(7)	0.00(9)	0.06(8)	0.00(6)
377	0.45(2)	0.0(2)	0.0(2)	1.13(3)	0.0(2)	–	13.17(2)	0.0(2)	1.29(3)	2.51(4)	0.00(2)	1.00(2)	0.0(2)	0.00(2)	5.00(2)	0.20(2)
378	0.0(3)	0.45(2)	1.36(2)	2.88(3)	–	–	4.81(2)	11.81(2)	7.57(3)	2.50(2)	2.00(2)	2.00(2)	1.13(2)	1.70(2)	8.75(2)	1.35(2)
379	0.68(2)	–	0.68(2)	1.82(2)	–	–	14.30(2)	4.77(2)	5.60(3)	2.80(3)	1.50(2)	4.00(2)	0.9(2)	1.80(2)	1.00(2)	2.70(2)
380	–	5.56(2)	2.12(3)	1.99(4)	–	–	6.81(2)	–	4.20(2)	1.33(3)	–	0.50(2)	3.25(2)	0.00(3)	9.50(2)	2.00(2)
381	–	0.91(4)	0.0(3)	0.0(3)	1.08(2)	–	5.45(2)	11.35(3)	2.57(3)	1.25(4)	1.00(2)	1.50(2)	0.3(2)	1.50(3)	4.00(2)	2.75(2)
382	–	0.0(4)	0.0(3)	0.0(2)	–	0.0(2)	0.61(3)	0.0(3)	0.0(3)	0.81(4)	0.00(2)	0.00(3)	0.0(4)	0.00(4)	0.13(3)	0.00(2)
383	–	0.0(2)	0.0(2)	–	–	0.0(3)	0.0(3)	0.0(3)	0.0(3)	0.00(4)	0.00(2)	0.00(3)	0.67(3)	0.00(4)	0.42(3)	0.00(3)
723	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
724	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
725	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
726	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
727	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
728	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total wt (tons)	432	409	754	776	218	1674	768	973	165	569	1722	1655	462	638	974	1265

Table 5. Average weight per set of witch flounder in NAFO Division 3Ø from research vessels surveys from 1973–88.

Stratum	1973 ATC 207 208 209	1975 ATC 233	1976 ATC 245	1977 ATC 263	1978 ATC 277	1979 ATC 291	1980 ATC 303	1981 ATC 318–319	1982 ATC 327–329	1984 A.N.27	1985 A.N. 43	1986 W.T. 47	1987 W.T. 58–59	1988 W.T. 70
329	0.0(2)	–	29.96(2)	1.36(3)	0.96(5)	0.04 (6)	0.0 (2)	0.0(2)	0.0(6)	0.0(5)	0.0(8)	0.00(8)	0.00(9)	3.29(7)
330	0.15(6)	0.15(3)	0.0 (3)	0.0 (3)	0.42(6)	1.62 (7)	0.0 (2)	1.13(4)	0.0(7)	0.0(4)	0.0(10)	0.00(9)	0.00(11)	0.08(9)
331	0.0 (2)	0.0 (2)	0.0 (2)	–	6.14(2)	0.76 (3)	6.25 (2)	–	0.07(4)	28.83(3)	5.5(3)	0.50(4)	0.03(2)	6.50(2)
332	–	3.40(2)	12.41(3)	9.69(3)	10.76(3)	0.40 (4)	15.50 (2)	–	72.75(4)	19.0(2)	61.5(5)	15.50(6)	22.96(5)	40.48(4)
333	–	0.68(2)	1.59(2)	0.23(2)	1.51(3)	0.34 (2)	3.25 (2)	–	19.38(4)	0.40(2)	2.38(2)	0.30(3)	0.00(2)	2.95(2)
334	–	–	1.36(2)	0.11(2)	1.36(3)	0.38 (3)	1.75 (2)	–	9.07(4)	0.0(2)	3.25(2)	2.50(2)	0.07(2)	0.81(2)
335	0.0 (2)	–	4.62(3)	–	0.79(2)	0.0 (2)	7.17 (3)	–	2.25(2)	0.0(2)	12.15(2)	1.90(2)	0.01(2)	6.25(2)
336	0.61(3)	1.25(2)	15.89(2)	6.81(2)	1.59(2)	0.28 (4)	12.50 (2)	–	15.00(2)	0.50(2)	0.5(2)	2.00(2)	1.30(2)	2.50(2)
337	2.80(3)	0.68(3)	6.54(2)	3.63(2)	1.25(2)	0.0 (4)	2.17 (3)	–	1.67(3)	0.45(2)	29.7(5)	11.60(5)	4.88(5)	7.58(4)
338	13.26(5)	5.90(2)	10.74(3)	3.63(4)	0.14(5)	0.32 (7)	4.40 (5)	–	0.28(5)	0.70(5)	32.22(9)	5.30(9)	9.79(10)	12.13(8)
339	2.95(2)	0.0 (2)	–	–	2.95(2)	2.42 (3)	–	6.75(2)	0.45(4)	4.00(2)	0.0(3)	0.10(3)	3.40(3)	1.83(3)
340	–	0.0 (3)	2.19(6)	0.0 (3)	0.57(2)	3.15 (7)	0.0 (2)	0.40(3)	0.07(6)	0.13(4)	0.64(9)	0.00(8)	0.11(9)	0.00(7)
341	0.0 (2)	–	–	–	–	–	–	–	–	–	–	–	–	–
351	0.14(5)	0.67(4)	0.0 (4)	0.32(5)	0.0 (5)	0.91(11)	0.65(10)	19.50(4)	0.39(9)	2.23(6)	0.87(9)	1.60(14)	0.86(13)	3.24(10)
352	0.09(5)	2.83(4)	0.17(4)	0.23(5)	0.34(4)	0.87 (6)	3.14(11)	–	0.61(7)	0.29(7)	3.32(11)	0.70(14)	4.34(13)	4.20(11)
353	18.77(3)	7.42(3)	11.80(2)	8.78(3)	11.36(3)	1.59 (5)	7.50 (4)	–	23.83(3)	25.00(2)	8.33(6)	7.70(7)	12.08(6)	43.70(5)
354	22.40(3)	–	14.07(3)	2.27(2)	–	1.19 (4)	8.50 (3)	0.25(2)	7.50(2)	8.00(2)	2.0(3)	17.00(3)	4.25(2)	6.50(2)
355	0.23(2)	2.72(2)	4.99(2)	–	–	0.45 (4)	2.75 (2)	1.90(2)	12.75(2)	4.00(2)	13.0(2)	2.60(2)	4.75(2)	0.15(2)
356	0.91(2)	–	–	–	–	0.68 (2)	27.50 (2)	0.85(2)	–	0.50(2)	8.75(2)	2.10(2)	2.15(2)	0.75(2)
717	–	–	–	–	–	–	–	–	–	–	–	–	–	–
718	–	–	–	–	–	–	–	–	–	–	–	–	–	–
719	–	–	–	–	–	–	–	–	–	–	–	–	–	–
720	–	–	–	–	–	–	–	–	–	–	–	–	–	–
721	–	–	–	–	–	–	–	–	–	–	–	–	–	–
722	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total wt. (tons)	4899	2609	9025	2808	2760	1425	4309	4240	9187	6014	13,735	4,675	6,100	12,175

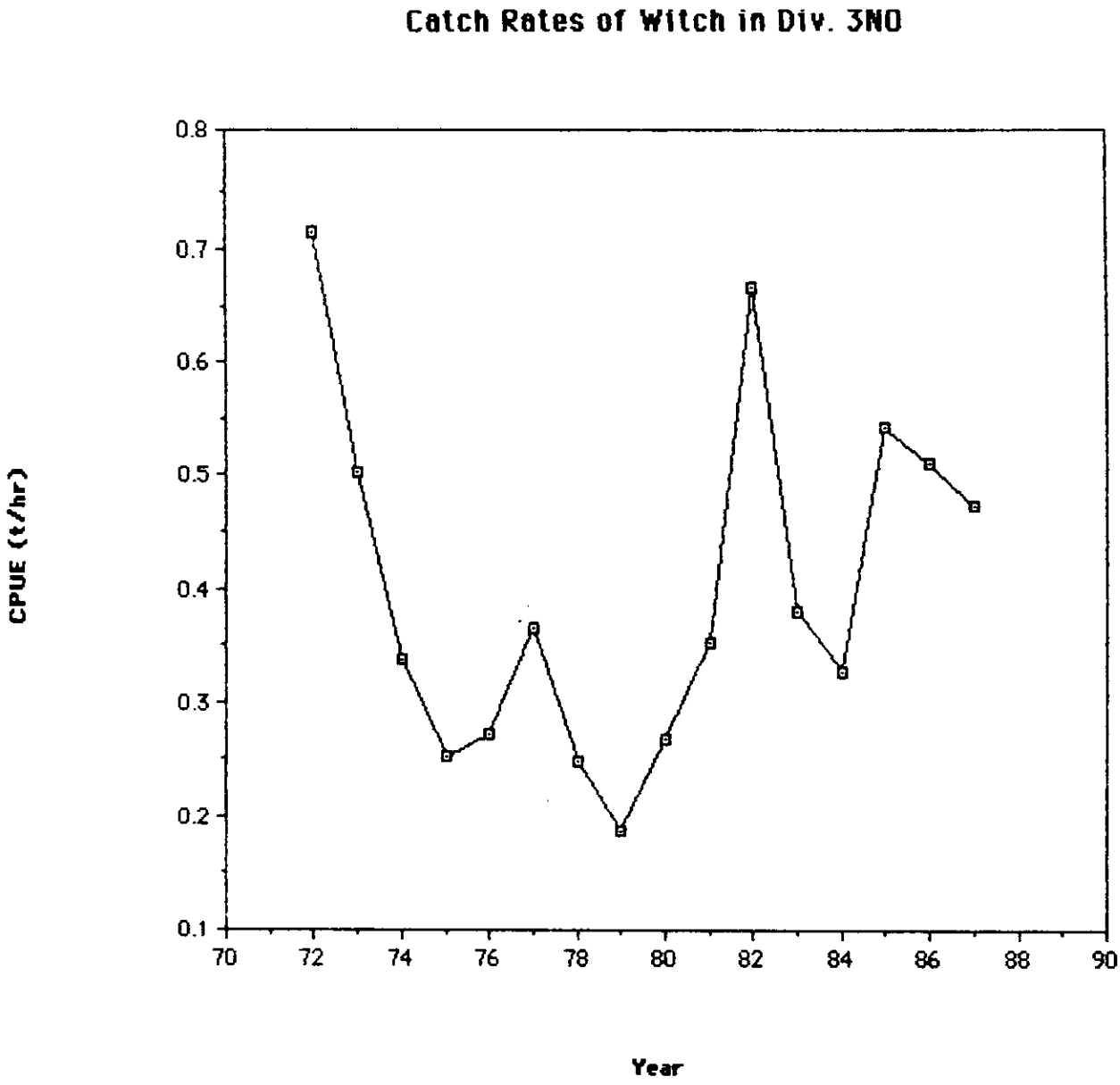

Fig. 1 Commercial catch rate of witch by Canadian trawlers in Div 3O.

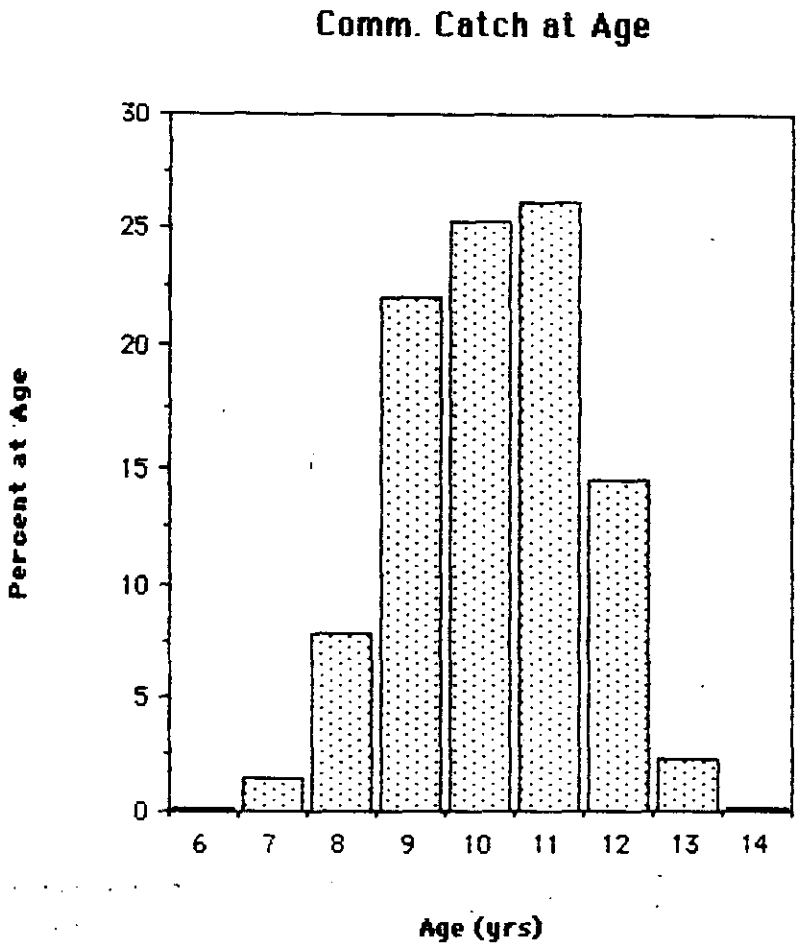

Fig. 2 Age composition of witch from Canadian commercial trawlers in Div. 3O during 1987.

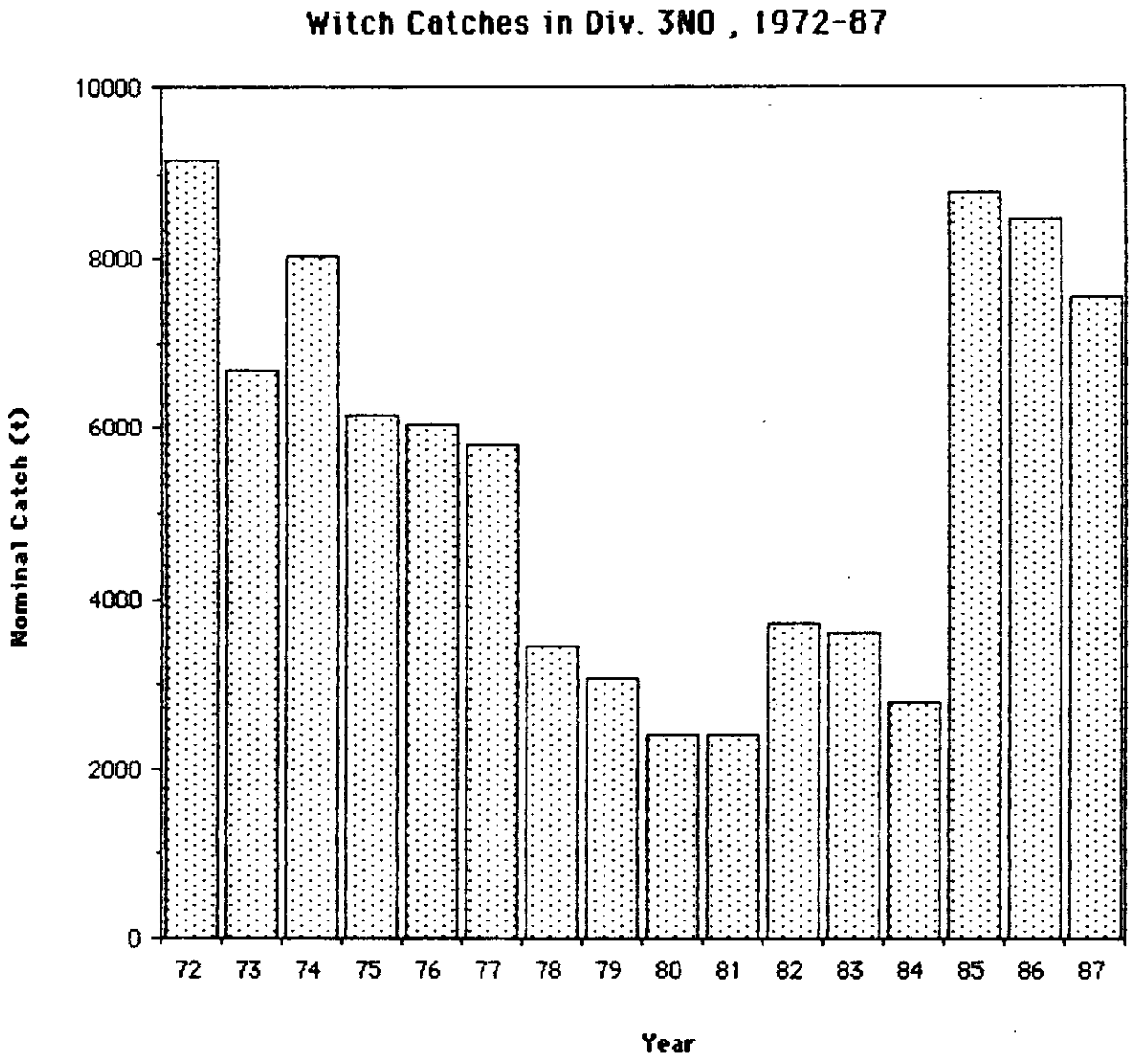

Fig. 3 Nominal catches of witch in Divisions 3NO from 1972-87.