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An Evaluation of the Witch Flounder Resource in NAFO Div. 3NØ

by

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The commercial fishery

During the period 1974-84 the highest level of recorded catch occurred in 1974 at about 8,000 t (Table 1, Fig. 1). From 1975-77 catches remained steady at about 6,000 t annually however from 1978 to the present catches have averaged about 3,200 t with 1980 and 1981 catches of 2,400 t being the lowest in the period. Preliminary estimates for 1984 indicate a catch of 2,700 t followed by a marked increase in 1985 to nearly 4,800 t (Table 1) just 200t short of the 1985 TAC.

The witch fishery in Div. 3NØ is primarily prosecuted by the Soviet Union and Canada although during 1985 there was some increased activity by the USA in fishing outside Canada's 200-mile economic zone at the tail of the Grand Bank (Table 2). The Canadian fishery is most generally conducted in Div. 3Ø during winter-spring at the southwest slope of the Grand Bank where prespawning concentrations occur at this time of year. The catches by the Soviet Union are more often than not taken in Div. 3N in deeper water mostly as a by-catch of the redfish fishery.

The first TAC of 10,000 t placed upon this stock during 1974-78 inclusive was based upon catch levels at that time although catches prior to 1974 were adjusted by assumed proportions of witch flounder in unspecified flounder catches. As more information became available for evaluation of the stock the TAC was reduced to 7,000 t for 1979 and 1980. Using the results of equilibrium general production analysis the TAC was further reduced to 5,000 t in 1981 and has remained in effect since that time.

Catch and effort

Catch and effort statistics were available from the Canada(N) OTB5 otter trawl fishery and are presented for the period 1972-85 in Table 3 and Fig. 2. As in previous analyses a directed fishery was assumed to be one in which the main species in the catch was witch flounder. When comparing the percentage directed catch against total catch it is obvious that the main portion of the fishery is a bycatch. However, when comparing the proportion of directed catch in Table 3 against the total Canadian catch in Table 1 it is clear that the Canadian catch is almost entirely directed.

The highest catch rate was recorded in 1972 at 0.716 t/hr based upon 30% directed. Catch rates declined to 0.252 t/hr in 1975 based upon 10% directed. From 1975 to 1979 catch rates remained reasonably stable at low levels. They began to increase again in 1981 and in 1982 the catch rate of 0.667 t/hr was the highest since 1972. In the 1983 and 1984 catch rates dropped to near the 1981 level still higher than those of the 1974-80 period. However, it should be noted that for many of those years the levels of directed catch were extremely low and little significance can be placed upon the calculations. In the 1985 directed fishery the catch rate was 0.573 t/hr based upon 37% directed against the total catch and 67% directed against the total Canadian catch. This is the third highest catch rate in the past 14 years. Considering the 1982, 1983, and 1985 catch rates based upon a reasonable proportion of directed catch, it would appear that the stock may be rather stable at some level higher than in the previous 10 years.

Commercial catch at age

Due to the variable nature of this fishery it has not always been possible to obtain reliable catch at age data and in fact no data are available from the Soviet fishery which in most years is the most significant. Good sampling data are available from the Canadian component from 1982-85 from the Div. 30 area. The 1982-84 catch at age data are similar to those presented in the previous assessment with the 1985 sampling data shown in Table 4. Histograms of the age distributions are presented in Fig. 3. A comparison of the age distributions for 1982-84 suggests that the fishery is essentially dependent upon the ages 9-12 with very few fish beyond 13 years showing up in the catches. Bowering and Pitt (MS 1975) indicated that as late as 1974 the commercial catch was comprised of ages up to 19 years old with more than half the catch coming from the 14-19 year old age groups. Ages 14+ in 1985 were less than 1% of the catch (Fig. 3). It was pointed out by Bowering (MS 1983) that while there is a reduced number of ages there has also been an increase in growth rate explaining a shift to a predominance of younger ages being fished.

Research vessel data

Stratified-random research vessel surveys have been conducted in Div. 3N and 30 since 1971 and 1973 respectively. However, for many years survey coverage was poor. Even when survey coverage was relatively good it did not cover depths beyond 200 fms. Therefore they can not be considered as useful abundance indices for witch flounder which are particularly abundant in depths beyond this. The results of the surveys are shown in Tables 5 and 6 for Div. 3N and 30 respectively and are presented for information purposes only. It is clearly obvious for Div. 3N in particular that the important depths are not covered since the biomass estimates are always much less than the catch. It may be extrapolated from this that given the comparatively high estimates in Div. 30 compared to 3N the overall biomass of witch flounder may be relatively high. However, this can only be regarded as pure speculation.

Prognoses

Given the recent catch rates from the Canadian fishery, the stability of the age distributions in the commercial fishery (at least in Div. 30) it would seem that the stock is in reasonably stable condition or in fact slightly increasing at recent catch levels. It should be noted, however, that the data available from which such conclusions are drawn are essentially from the Div. 30 component of the fishery and can only be extrapolated to include Div. 3N.

REFERENCES

- Bowering, W.R. MS 1983. Some biological considerations of witch flounder on the southern Grand Bank (NAFO Divisions 3N0). NAFO SCR Doc. 83/56, Ser. No. N714. 7 p.
- Bowering, W.R., and T.K. Pitt. MS 1975. Yield per recruit assessment of witch (Glyptocephalus cynoglossus) for ICNAF Divisions 3N and 30. ICNAF Res. Doc. 75/23, Ser. No. 3478. 5 p.

Table 1. Landings of witch flounder in Divisions 3N and 3Ø by Canada and USSR from 1974-85.

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	104 ^a	707 ^a
	USSR	1934 ^a	-
	Total	2038 ^a	707 ^a
1985	Canada	112 ^a	2510 ^a
	USSR	1758 ^a	-
	Total	1870 ^a	2510 ^a

^aProvisional.

Table 2. Catches of witch flounder in NAFO Divisions 3NØ by country during 1985.

Country	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Can(M)	3N) 3Ø)	1	5	12	4	1	1	13	23	14	31	4	6 109
EEC													
USSR	18	339	481	435	52		1	301		132			1758
Japan											1		1
Portugal													
Spain													
USA					57		36	64	48	27	12	15	259
Can(N)													
3N		73	4	5	3	2	1	13	4	5	2		112
3Ø		314	630	1311	207	3		1	26	14	4		2510
													4755

Table 3. Catch effort statistics for witch flounder in Divisions 3NØ, 1972-85 from Canada (N) based trawlers (TC5).

Year	CPUE (t/hr)	Main species catch (t)	Total catch	% 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	2758 ^a	6
1985	0.573	1756	4755 ^a	37

^aProvisional.

Table 4. List of commercial samples for 1985 for witch flounder from the Canadian fishery in Division 30 and the derived catch at age with the appropriate statistics.

AGE/LENGTH KEYS

NAME	NO. AGED
ALK501CN30	589
ALK502CN30	593

LENGTH FREQUENCIES

NAME	NO. MEASURED	AV. WEIGHT
LFOTAPRCN30	4393	0.500
LFOTFBCN30	1840	0.610
LFOTMARC30	6069	0.640

SMALLEST LENGTH: 25
LARGEST LENGTH : 61

AGE	AVERAGE		CATCH		
	WEIGHT	LENGTH	MEAN	STD. ERR.	C. V.
* 5	0.096	26.966		0.18	0.53
* 6	0.157	30.922	4	1.21	0.30
7	0.221	34.031	22	3.69	0.17
8	0.311	37.398	144	15.65	0.11
9	0.435	40.928	586	50.90	0.09
10	0.539	43.414	998	75.15	0.08
11	0.656	45.897	1178	61.88	0.07
*12	0.796	48.416	1022	75.64	0.07
13	1.023	51.996	293	36.94	0.13
*14	1.190	54.146	34	11.04	0.33

Table 5 . Average weight per set of witch flounder in NAFO Division 3N from research vessel surveys from 1971-86.

Stratum	ATC 1971	ATC 1992	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	M.T. 29 1985	M.T. 47 1986
357	-	-	1.20(2)	-	-	-	7.25(2)	-	6.50(3)	0.5(3)	0.8(2)	0.0(2)	4.25(2)	5.40(2)
358	-	2.95(4)	2.42(3)	-	-	-	6.02(2)	-	1.13(2)	1.8(3)	3.5(2)	3.5(2)	1.10(2)	1.20(2)
359	-	8.47(3)	20.88(3)	-	-	-	1.82(2)	-	2.72(4)	36.0(4)	28.5(2)	51.8(2)	1.1(2)	1.90(2)
360	-	0.11(4)	-	-	0.0(4)	43.28(3)	0.17(4)	2.61(4)	3.23(9)	39.9(11)	37.8(7)	47.3(7)	0.27(16)	1.80(13)
361	0.0(2)	0.0(3)	0.0(4)	0.0(4)	1.46(4)	1.36(4)	0.45(3)	0.0(4)	0.14(8)	33.7(7)	45.5(6)	39.0(5)	0.0(10)	0.00(10)
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)	46.5(11)	46.8(8)	89.9(7)	0.23(11)	0.20(14)
373	0.0(4)	0.0(4)	0.0(4)	0.0(4)	0.0(3)	0.0(5)	0.0(4)	0.31(4)	0.08(11)	33.6(8)	31.8(5)	66.1(7)	0.0(9)	0.00(14)
374	0.0(2)	0.0(2)	0.0(4)	0.0(2)	0.0(2)	0.0(5)	0.0(3)	0.0(4)	0.0(4)	54.7(3)	12.4(4)	112.1(3)	0.0(4)	0.00(6)
375	0.30(3)	0.0(3)	0.0(3)	0.0(3)	0.0(2)	-	0.0(4)	0.09(5)	0.0(5)	16.8(4)	18.5(5)	46.2(5)	0.0(8)	0.00(8)
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)	71.3(3)	22.9(7)	10.6(4)	0.0(7)	0.00(9)
377	0.45(2)	0.0(2)	0.0(2)	1.13(3)	0.0(2)	0.0(3)	13.17(2)	0.0(2)	1.29(3)	36.1(4)	62.0(2)	319.5(2)	0.0(2)	0.00(2)
378	0.0(3)	0.45(2)	1.36(2)	2.88(3)	-	-	4.81(2)	11.81(2)	7.57(3)	10.0(2)	6.5(2)	21.5(2)	1.13(2)	1.70(2)
379	0.68(2)	-	0.68(2)	1.82(2)	-	-	14.30(2)	4.77(2)	5.60(3)	9.7(3)	2.0(2)	4.5(2)	0.9(2)	1.80(2)
380	-	5.56(2)	2.12(3)	1.99(4)	-	-	6.81(2)	-	4.20(2)	2.7(3)	-	1.3(2)	3.25(2)	0.00(3)
381	-	0.91(4)	0.0(3)	0.0(3)	1.08(2)	-	5.45(2)	11.35(3)	2.57(3)	13.1(4)	5.6(2)	53.8(2)	0.3(2)	1.50(3)
382	-	0.0(4)	0.0(3)	0.0(2)	-	0.0(2)	0.61(3)	0.0(3)	0.0(3)	25.5(4)	56.8(2)	2.8(3)	0.0(4)	0.00(4)
383	-	0.0(2)	0.0(2)	-	-	0.0(3)	0.0(3)	0.0(3)	0.0(3)	33.0(4)	19.8(2)	61.5(3)	0.67(3)	0.00(4)
723	-	-	-	-	-	-	-	-	-	-	-	-	-	-
724	-	-	-	-	-	-	-	-	-	-	-	-	-	-
725	-	-	-	-	-	-	-	-	-	-	-	-	-	-
726	-	-	-	-	-	-	-	-	-	-	-	-	-	-
727	-	-	-	-	-	-	-	-	-	-	-	-	-	-
728	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total wt (tons)	432	409	754	776	218	1674	768	973	1165	556	1166	1439	462	638

Table 6. Average weight per set of witch flounder in NAFO Division 30 from research vessels surveys from 1973-86.

Stratum	1973		1975	1976	1977	1978	1979	1980	1981	1982	1984	1985	1986
	ATC 207	209											
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
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)	
356	0.91(2)	-	-	-	-	0.68 (2)	27.50 (2)	0.85(2)	-	0.50(2)	8.75(2)	2.10(2)	
717	-	-	-	-	-	-	-	-	-	-	-	-	
718	-	-	-	-	-	-	-	-	-	-	-	-	
719	-	-	-	-	-	-	-	-	-	-	-	-	
720	-	-	-	-	-	-	-	-	-	-	-	-	
721	-	-	-	-	-	-	-	-	-	-	-	-	
722	-	-	-	-	-	-	-	-	-	-	-	-	
Total wt. (tons)	4899	2609	9025	2808	2760	1425	4309	4240	9187	6014	13,735	4,675	

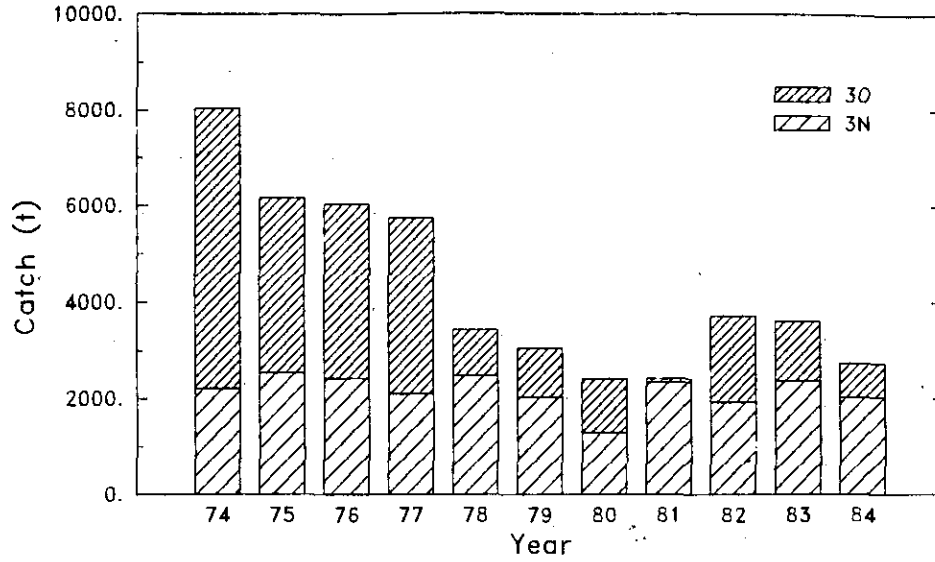


Fig.1: Nominal catches of witch in Div. 3NO, 1974-1984 (1983 and 1984 provisional).

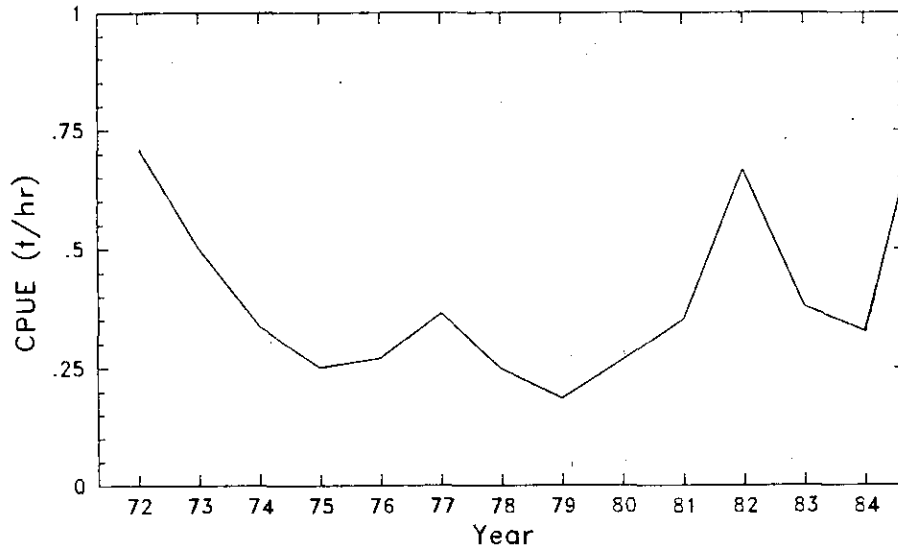


Fig.2: CPUE for witch in Div. 3NO, 1972-1984 for Canadian (Nfld) based otter trawlers (TC5).

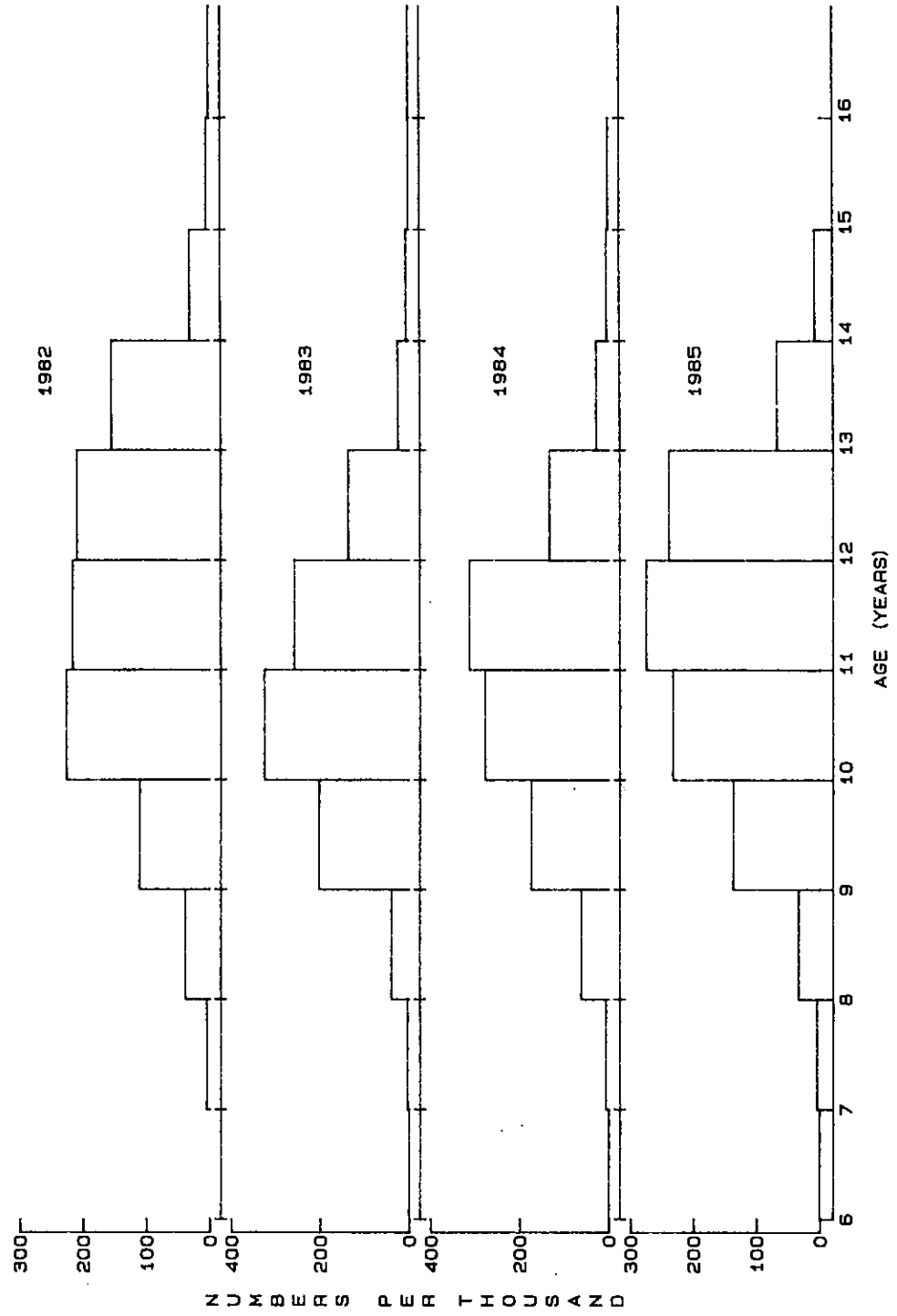


FIG. 3 CATCH AT AGE FOR COMMERCIAL (CANADA NFLD) WITCH IN NAFO DIV. 30.

