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A Review of Catch and Catch Rate Data for Haddock Stocks in NAFO Divisions 3NØ
and Subdivision 3Ps Along with Biomass and
Abundance Estimates from Stratified-random Surveys

by

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Abstract

Haddock landings from NAFO Subarea 3 have been increasing in recent years, particularly in Subdivision 3Ps. A comparison of current catch rates with those from the period when stock levels were high (early 1960's) was difficult as the main tonnage class category had changed from 4 to 5. Biomass and abundance estimates from research vessel surveys have shown an increase in recent years over low levels from 1973 to 1981. The increase was produced mainly by the incoming and relatively abundant 1980-81 year-classes. Both Canadian and French surveys in Subdiv. 3Ps indicated relatively high abundance only for the 1981 year-class.

Résumé

Les débarquements d'aiglefin dans la sous-zone 3 de l'OPANO ont augmenté au cours des dernières années, particulièrement dans la subdivision 3Ps. Il a été difficile d'établir des comparaisons entre les taux de prises actuels et ceux qui ont été relevés durant la période où les stocks étaient abondants (début des années 1960), la catégorie de classe de tonnage principale étant passée de 4 à 5. Les estimations de biomasse et d'abondance établies par des relevés de recherche révèlent une augmentation au cours des dernières années par rapport aux faibles résultats obtenus de 1973 à 1981. Cette hausse est due en grande partie à l'apparition des classes d'âge relativement abondantes de 1980-1981. Les relevés par navire de recherche effectués par le Canada et par la France dans la subdivision 3Ps ne révèlent un taux d'abondance relativement élevé que pour la classe d'âge de 1981.

Introduction

Haddock occurring in Newfoundland waters belong to two major stocks, those from the Grand Bank (NAFO Div. 3N and 3Ø) and from St. Pierre Bank (NAFO Subdiv. 3Ps). The basis for this separation includes: differences in growth rate, sizes at sexual maturity, otolith length vs. fish length, year-class strength and winter and summer distribution patterns (Templeman et al. 1978).

Haddock were reported to be abundant on the southern part of the Grand Bank in the 1930's but were not exploited on a large scale till the mid 1940's. The largest reported catches from Div. 3NØ were 58,000, 62,000 and 75,000 t in 1957, 1960 and 1961 respectively. Over 50% of the catches in 1960 and 1961 were accounted for by the USSR fleet. Until 1953 haddock were landed mainly from the Grand Bank (Div. 3NØ) but the recruitment of the very successful 1949 year-class in both Div. 3NØ and Subdiv. 3Ps resulted in a large fishery in the latter area. The largest recorded catch from both stocks was 105,000 t in 1955.

As a result of poor year-class survival, catches since the early 1960's declined to the point where the commercial fishery for haddock virtually disappeared. In recent years (Bishop 1984) there has been some indication that haddock were beginning to reappear in commercial and research catches in increasing numbers. The present paper presents data currently available for each stock from research vessel surveys and the commercial fishery.

DIVISION 3NØ

A. The commercial fishery

1. Landings

Landings by division and country are shown in Tables 1 and 2 and Fig. 1 and 2. The fishery has been conducted mainly by Canada and Spain. In the early years when a directed fishery occurred, catches were mainly from quarter 3 and 4 in Div. 3N and from quarters 1 and 2 in Div. 3Ø (Tables 3 and 4). This fishing pattern is coincident with the migration of haddock within this stock (Hodder 1966). Landings by division have been generally less than 1,000 t since 1970 but have increased somewhat in recent years to a level exceeding 3,000 t for the stock in 1985.

2. Catch rates

Tables 5 and 6 show catch rate data for Canadian vessels of T.C. 4 and 5 respectively from Div. 3N and 3Ø. Tonnage class 4 vessels were the predominant vessel category in the Canadian fishery in the early to mid 1960's (Table 5). Catch rates were highest in the early 1960's and declined thereafter. Tonnage class 5 vessels did not take part in the fishery until the stock had drastically declined and have obtained

a significant directed catch only in 1985. As such, comparisons with the early period are difficult.

Analysis of sampling data from catches in 1984 and 1985 in terms of total removals at length are shown in Table 7 and Fig. 6. Catches were predominantly from lengths ranging from 38 to 47 cm in 1984 (63%) and 40 to 51 cm in 1985 (82%).

B. Research surveys

Table 8 shows estimates of biomass and abundance for the stock area and Tables 9 and 10 indicate biomass estimates by strata and division from stratified random research cruises. These indicate that abundance and biomass were very low from 1973 to 1981 but increased dramatically in 1982. This increase was again apparent in 1984 but declined abruptly in 1985. The 1982 and 1985 estimates show considerable variation.

Age data were available only from the 1981 and 1982 surveys (Table 11). These would indicate that the large increase in abundance was caused by the appearance of the 1980 and 1981 year-classes as had been previously estimated (Bishop 1984).

Table 12 and Fig. 4 shows estimates of mean number per tow at length for surveys from 1981-85 (excluding 1983). It would appear that the population consists mainly of individuals from these same two year-classes.

Soviet surveys in 1983 (NAFO, SCS Doc. 84/VI/17) and 1984 (NAFO SCS Doc. 85/14) suggested biomass levels as follows:

Division	Abundance ($\times 10^{-6}$)		Biomass ($t \times 10^{-3}$)	
	1983	1984	1983	1984
3N	12.1	190.0	3.4	95.4
3Ø	65.8	250.8	15.9	134.4

Results from a similar survey in 1985 indicated that biomass and abundance were lower by a factor of 3 and most fish were from the 32-45 cm length range.

SUBDIVISION 3Ps

A. The commercial fishery

Landings by country are shown in Table 13 and Fig. 3. Catches were predominantly by Canada and Spain with the highest proportion generally being taken in the first quarter (Table 14). Landings from 1953 to 1958 were reported by NAFO from Div. 3P. Since that time statistics have been available from Subdiv. 3Ps. The largest catch from this stock was 58,000 t in 1955. Landings subsequently decreased to 3,000 t by 1959

and were generally less than 1000 t in recent years with the exception of 1984 when 3,000 t were reported. The high catches in the mid 1950's are attributed to the very large 1949 year-class.

2. Catch rates

Tables 5 and 6 indicate catch rate data for Canadian vessels of T.C. 4 and 5 for Subdiv. 3Ps. Catch rate data are available only for the period 1959-85, when relatively low catches were reported. As with Div. 3N and 3Ø, directed catches were obtained by T.C. 4 in the early years and by both T.C. 4 and 5 more recently. The amount of directed catch has been very low with the exception of that for Can(M) (T.C. 5) for 1985 which reported a CPUE of 0.69 t/hr.

The results of sampling data from catches in 1984 and 1985 in terms of total removals at length are shown in Table 7 and Fig. 6. Sampling in 1984 was restricted to one length frequency from November and may not be representative. The 1985 sampling was more adequate and indicated that the majority of landings (63%) were from the length range 42-49 cm.

B. Research surveys

Estimates of biomass and abundance for the stock area are shown in Table 15 while Table 16 shows biomass estimates by strata from stratified-random research cruises. It can be seen that estimates were low, particularly in the late 1970's and early 80's and have since increased although there is considerable variation in certain years. Over 60% of the biomass level produced in 1985 was estimated from one large stratum.

Age data were available from the 1982-84 research surveys (Table 11). These indicate that the 1981 year-class was relatively strong.

Table 17 and Fig. 5A and B show mean number per tow at length for the years 1981-86. The 1981 year-class is evident through the series and there is an indication of more recent year-classes from the 1986 survey.

Research surveys conducted by France in Subdiv. 3Ps during the winter and fall of 1984 (NAFO SCS Doc. 84/VI/21) obtained very high catch rates in numbers of young haddock. Length compositions from these cruises were unimodal at 30 cm in winter and 37 cm in the fall. Both were said to correspond to the 1981 year-class.

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Table 1. Historical catches of haddock (t) from NAFO Division 3N for the years 1953-85.

Year	Can(M)	Can(N)	Fra.		Spain	Port.	UK	USSR	USA	POL.	Other	Total
			(M)	(SP)								
1953	58	42										100
1954		(695)			11614	203						12512
1955	50	270			25797	630						26747
1956	179	1484			23858		368		3			25892
1957	286	1435			24447							26168
1958	1765	4752			15129					2		21648
1959	311	2383			5043					1		7738
1960	285	961		204	3514		20	35959				40943
1961	152	651		135	1826			19610				22374
1962	149	776		18	569			1				1513
1963	19	270		16	554							859
1964	215	500	2	119	422		9	25	1			1293
1965	23	489	3	30	759		7					1311
1966	67	493		58	675			33				1326
1967	16	44			1341			75				1476
1968		19			382			377				778
1969		37			390							427
1970	15	22			434			19			4	494
1971	2	3			814			157				976
1972	25	3			535		1	269				833
1973					336			49		3		388
1974		1			47		30	883				961
1975		1						944				945
1976		2			1			48				51
1977		2			1			22				25
1978		9						41			50	100
1979	1	5		1	181			15				203
1980		44		2							1	47
1981	3	9		3								15
1982		9			74	1						84
1983	1	5		3	266			24			1	300
1984	1	25			1105			21			7	1159
1985	4	75			693			2			5	780

Table 3. Historical catches of haddock (t) by quarter from NAFO Division 3N for the years 1954-83.

Year	Quarter				Total
	1	2	3	4	
1954	336	2971	7356	1849	12512
1955	427	1256	18882	6188	26753
1956	830	1271	14397	9394	25892
1957	261	1629	10335	13943	26168
1958	484	1475	7761	11928	21648
1959	2392	1703	2272	1371	7738
1960	619	724	2925	716	4984
1961	333	1446	8665	11930	22374
1962	765	198	394	156	1513
1963	78	148	516	117	859
1964	403	109	426	355	1293
1965	240	602	300	169	1311
1966	560	58	675	33	1326
1967	79	564	784	49	1476
1968	14	299	407	58	778
1969	43	133	246	5	427
1970	25	212	226	31	494
1971	81	625	94	176	976
1972	156	349	117	211	833
1973	10	130	248		388
1974	12	803	122	24	961
1975		560	357	28	945
1976	1	44	6		51
1977		22		3	25
1978	31	60	6	3	100
1979	15	186		2	203
1980		29	9	11	49
1981		6	5	4	15
1982		15	66	2	83
1983	31	128	58	83	300

Table 4. Historical catches of haddock (t) by quarter from NAFO Division 3Ø for the years 1954-83.

Year	Quarter				NK	Total
	1	2	3	4		
1954	3038	2495	697	5787		12017
1955	5617	4551	951	6200		17319
1956	9813	6002	104	8435		24354
1957	15140	11986	1386	3308		31820
1958	10534	5853	289	954		17630
1959	9023	8690	783	1094		19590
1960	10211	7830	538	1931		20510
1961	25165	22096	475	4593		52329
1962	21833	7624	193	1596		31246
1963	6041	2657	366	1353		10417
1964	2030	1289	1767	959	10	6055
1965	1563	1446	825	138		3972
1966	489	49	418	4238		5194
1967	1950	3984	379	153	48	6514
1968	191	1068	455	154		1868
1969	195	184	132	190		701
1970	393	484	208	79		1164
1971	120	1224	102	96		1542
1972	274	536	140	87		1037
1973	43	189	101	7		340
1974	4	290	143	11		448
1975		154	70	124		348
1976	1	75	6			82
1977	7	31	15	57		110
1978	15	237	48	71		371
1979	41	391	17	93		542
1980	4	15	52	36		107
1981	21	15	4	41		81
1982	148	647	39	20		854
1983	32	126	2	53		213

Table 5. Catch and catch/effort data (t) for haddock from directed fisheries in NAFO Division 3N and 3Ø and Subdivision 3Ps by Canadian tonnage class 4 vessels.

Year	Country	3N		3Ø		3Ps	
		Catch	C/E (hrs)	Catch	C/E	Catch	C/E
1959	Can N	2309	1.12	11516	2.09	383	0.58
1960		656	0.71	11599	0.93	208	0.48
1961		314	0.66	20264	1.96	287	0.58
1962		703	1.13	19406	1.11	175	0.35
1963		117	0.39	5275	0.52	164	0.22
1964		324	0.49	3365	0.62	172	0.29
1965		202	0.36	1637	0.65	26	0.30
1966		115	0.44	33	0.39	3	0.17
1967		3	0.25	17	0.53	133	0.30
1968		-	-	-	-	18	0.43
1969		-	-	-	-	243	0.50
1970		-	-	-	-	18	0.23
1971		-	-	-	-	-	-
1972		-	-	-	-	10	0.19
1977		-	-	6	0.22	127	0.28
1978		-	-	-	-	37	0.27
1979		-	-	47	0.19	-	-
1980		-	-	-	-	-	-
1981		-	-	-	-	3	0.13
1982		-	-	15	0.58	-	-
1983		-	-	-	-	-	-
1984		1	0.20	-	-	-	-
1985		7	0.24	13	0.20	11	0.32

Table 6. Catch and catch/effort data (t) for haddock from directed fisheries in NAFO Division 3N and 3Ø and Subdivision 3Ps by Canadian tonnage class 5 vessels.

Year	A. <u>Can(N)</u>						
	3N		3Ø		3Ps		
	Catch	Catch/effort	C	C/E	C	C/E	
1965	172	0.50	-	-	3	0.50	
1966	-	-	-	-	-	-	
1967	-	-	1	0.08	153	0.44	
1968	-	-	58	0.71	69	0.48	
1969	35	0.32	42	0.38	770	0.72	
1970	-	-	-	-	387	0.40	
1971	-	-	-	-	20	0.37	
1972	-	-	-	-	14	0.47	
1976	-	-	19	0.18	9	0.28	
1977	-	-	-	-	81	0.21	
1978	-	-	112	0.48	36	0.49	
1979	-	-	80	0.27	-	-	
1980	-	-	10	0.83	19	0.21	
1981	-	-	13	0.46	13	0.16	
1982	-	-	79	0.56	7	0.33	
1983	-	-	-	-	-	-	
1984	-	-	280	0.69	47	0.30	
1985	-	-	758	0.87	67	0.43	
			B. <u>Can(M)</u>				
1967					5	0.25	
1970					139	0.58	
1971			-	-	-	-	
1972					-	-	
1977					54	0.20	
1978			5	0.25	60	0.33	
1979			-	-	-	-	
1980			13	3.25	16	0.43	
1981					4	0.13	
1985			1381	1.19	1466	0.69	

Table 7. Removals of haddock by 2 cm length groups by the commercial fisheries in NAFO Divisions 3NO and Subdivision 3Ps in 1984 and 1985. (1985 landings by Canada only.)

Length (cm)	3NO		3Ps	
	1984	1985	1984	1985
30-31				
32-33				
34-35	21	4		
36-37	134	37		
38-39	284	144		55
40-41	346	374	7	172
42-43	331	437	23	329
44-45	300	511	37	334
46-47	253	499	91	357
48-49	182	444	128	309
50-51	163	286	196	213
52-53	124	160	294	174
54-55	99	102	210	58
56-57	62	50	196	49
58-59	32	29	114	20
60-61	16	22	68	10
62-63	11	6	7	9
64-65	9	4	7	
66-67	5	1	30	
68-69	9	3	30	
70-71	7	2	52	1
72-73	7	2	16	1
74-75	7	2	30	9
76-77	5	3	16	1
78-79	2	2	16	
80-81	2	2	16	1
82-83		2	7	
84-85		1	7	
86-87			7	
#	2411	3129	1605	2102
Av. wt. (kg.)	0.94	1.01	1.71	1.05
Catch wt. (t)	2266	3120	2745	2199

Table 8. Haddock biomass and abundance estimates from stratified random research vessel surveys. (Divisions 3N and 30 combined).

Year	Biomass (tons)			Numbers (000's)			Mean no. per tow	Mean wt. per tow (kg.)
	Mean	Upper	Lower	Mean	Upper	Lower		
1973	459	985	-67	306	794	-182	0.14	0.21
1975	631	5853	-4590	379	1406	-649	0.19	0.31
1976	438	4568	-3691	1387	2583	191	0.61	0.19
1977	215	569	-139	325	545	107	0.13	0.09
1978	4079	12242	-4085	4587	12087	-2913	1.85	1.65
1979	913	1519	308	1533	3867	-801	0.59	0.35
1980	1401	2117	684	745	1108	382	0.29	0.55
1981	64	598	-470	430	1640	-780	0.24	0.04
1982	11882	34813	-11049	79888	256767	-96991	30.93	4.60
1984	54873	80465	29281	104284	158194	50376	40.17	21.14
1985	12244	66382	-41893	18512	100594	-63570	7.13	4.72

Table 9. Haddock biomass estimates (t) by stratum from stratified random research vessel surveys in NAFO Division 3N.

Depth Range (fm)	Strata	Area (sq mi)	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985
30	375	1593	0	0	0	0	-	0	0	0	0	0	0	2679	22
	376	1499	0	0	-	0	0	0	0	0	0	0	0	0	0
31-50	360	2992	25	-	-	0	0	0	0	0	0	0	0	160	0
	361	1853	52	0	0	0	0	0	0	0	89	-	7	7514	755
	362	2520	0	0	0	0	0	0	0	0	0	8	5	7783	0
	373	2520	0	0	0	-	0	0	0	0	0	0	0	2337	0
	374	931	0	0	0	0	-	0	0	0	0	0	0	3294	0
	383	674	0	0	0	-	0	0	0	0	0	0	0	0	0
51-100	359	421	38	0	-	-	7	0	-	0	0	21	48	8	0
	377	100	0	0	0	0	-	0	0	0	0	0	0	0	0
	382	647	0	0	0	-	0	0	0	0	0	0	0	0	0
101-150	358	225	0	38	-	-	-	29	-	8	0	0	20	182	25
	378	139	0	0	0	-	-	1	0	0	0	0	0	0	0
	381	182	3	0	0	0	-	0	0	0	0	0	0	0	0
151-200	357	164	-	0	-	-	-	0	-	0	0	0	3	0	0
	379	106	-	0	0	-	-	0	0	0	0	0	0	0	0
	380	116	0	0	0	-	-	0	-	0	0	0	-	0	0

Table 10. Haddock biomass estimates (t) by stratum from stratified random research vessel surveys in NAFO Division 3Ø.

Depth Range (fm)	Strata	Area (sq mi)	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1984	1985
31-50	330	2089		0		0	0	0	0	325	0	0	0	0	0
	331	456		0		0	0	-	0	18	0	-	0	0	0
	338	1898		0		323	0	64	0	42	85	-	74	8491	1053
	340	1716		-		0	0	0	0	0	0	0	13	10	7
	351	2520		0		0	0	0	0	51	0	0	99	161	0
	352	2580		0		0	0	17	0	0	0	-	14	11371	713
	353	1282		266		0	0	0	0	18	0	-	1219	698	72
51-100	329	1721		0		-	304	0	2710	1	0	0	0	0	0
	332	1047		0		250	36	0	619	53	153	-	99	9647	165
	337	948		22		43	16	0	582	359	119	-	9678	498	1480
	339	585		0		0	-	-	0	0	-	0	23	0	0
	354	474		67		-	51	0	0	8	0	36	0	36	0
101-150	333	151		-		8	0	63	0	12	326	-	237	0	2358
	336	121		44		0	6	40	0	19	288	-	204	0	4823
	355	103		0		8	0	-	-	0	123	0	112	6	479
151-200	334	92		-		-	0	0	0	0	190	-	26	0	283
	335	58		16		-	0	-	0	0	7	-	0	0	2
	356	61		0		-	-	-	-	0	21	0	-	0	6

Table 11. Mean number at age of haddock per standard tow from research surveys in NAFO Divisions 3NO and Subdivision 3Ps.

Age	3Ps			3NO	
	1982	1983	1984	1981 (Fall)	1982 (Spring)
0				21.69	
1	10.38	0.51	0.17	0.50	12.21
2	.45	3.86	0.25	0.00	18.16
3	.29	.37	4.78	0.00	0.00
4	.07	.11	1.41	0.02	0.00
5	.16	.11	0.34	0.04	.01
6	.05	.08	0.08	0.08	.02
7	.01	.01	.03		.04
8		.01			.02
9					.06
10					
11					
12					
13					
14					
Total	11.41	5.07	7.06	22.32	30.57
Upper limit	22.00	10.36	15.32	85.69	97.72
Lower limit	0.82	-0.22	-1.21	-41.05	-36.58
No. sets	92	171	95	73	136

Table 12. Mean numbers per tow of haddock at length from research vessel surveys in NAFO Divisions 3NO for the period 1981-85 (excluding 1983).

	ATC 319 1981	ATC 327-8 1982	AN 27 1984	WT 29/AN 43 1985
14.5		0.30		0.01
16.5	0.01	3.36		
18.5	0.01	5.30	0.02	0.04
20.5	0.17	2.49	0.10	0.02
22.5	0.11	0.91	0.01	
24.5	0.04	3.41	0.08	
26.5		6.76	0.77	0.02
28.5		5.36	3.10	0.03
30.5		2.09	3.04	0.21
32.5		0.39	3.10	0.46
34.5		0.05	6.16	0.59
36.5			7.08	0.77
38.5			5.32	1.00
40.5			4.00	1.18
42.5			3.17	0.82
44.5			2.19	0.63
46.5			1.19	0.43
48.5			0.45	0.34
50.5			0.10	0.22
52.5			0.05	0.15
54.5			0.01	0.11
56.5		0.01	0.02	0.04
58.5			0.03	0.02
60.5			0.02	0.01
62.5				0.01
64.5				0.01
66.5		0.02		
68.5		0.02		
70.5		0.02	0.01	0.01
72.5		0.01	0.05	0.02
74.5		0.02		0.02
76.5		0.02	0.01	
78.5			0.01	
80.5			0.02	0.01
82.5			0.03	
84.5		0.01	0.02	
Total	0.34	30.57	40.17	7.16
Upper	1.28	97.72	60.94	39.05
Lower	-0.61	-36.58	19.41	-24.74

Table 14. Historical catches of haddock (t) by quarter from NAFO Subdivision 3Ps for the years 1959-83.

Year	Quarter				NK	Total
	1	2	3	4		
1959	919	877	122	804	28	2750
1960	1848	423	785	1028	-	4084
1961	798	704	417	838	-	2757
1962	522	403	320	236	-	1481
1963	671	199	386	600	-	1856
1964	575	564	151	806	-	2096
1965	352	213	336	527	-	1428
1966	491	433	310	765	-	1999
1967	674	663	160	492	373	2362
1968	657	498	177	1434	-	2766
1969	1887	926	145	539	-	3497
1970	2386	965	372	610	-	4333
1971	841	269	185	182	-	1477
1972	342	101	232	226	-	901
1973	340	64	148	98	-	650
1974	144	194	18	32	-	388
1975	18	77	25	27	-	147
1976	12	60	133	40	-	245
1977	66	205	95	614	-	980
1978	9	7	10	3	-	29
1979	73	80	26	72	-	251
1980	40	53	58	297	-	448
1981	146	68	36	195	-	445
1982	51	114	13	131	-	309
1983	50	202	172	49	-	473

Table 15. Haddock biomass and abundance estimates from stratified random research vessel surveys in Subdivision 3Ps.

Year	Biomass (tons)			Numbers (000's)			Mean No. per tow	Mean wt. (kg) per tow
	Mean	Upper	Lower	Mean	Upper	Lower		
1972	2886	5315	457	2442	4144	740	3.97	4.70
1973	683	1037	328	1759	3789	-271	3.05	1.18
1974	866	1224	509	659	950	367	1.42	1.86
1975	666	1023	308	478	826	129	1.24	1.73
1976	937	1625	250	691	1164	219	0.77	1.05
1977	1996	4723	-731	1551	3255	-152	2.69	3.46
1978	118	217	18	214	537	-109	.33	0.18
1979	770	3935	-2395	554	2052	-945	.73	1.01
1980	829	1488	169	359	613	105	.28	0.64
1981	472	997	-53	342	741	-56	.28	0.38
1982	1570	2445	694	14602	28150	1053	11.48	1.23
1983	2345	5275	-584	6684	13661	-293	5.10	1.79
1984	6442	12490	-607	7659	16626	-131	7.06	5.94
1985	32349	59214	5484	30328	55299	5356	25.81	27.53
1986	18309	105498	-68879	18471	142618	-105675	14.08	13.95

Table 16. Haddock biomass estimates (wt.'s in tons) by stratum from stratified random research vessel surveys in NAFO Subdivision 3Ps.

Depth Range (fm)	Area Strata (sq mi)	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	
0-30	314	974	0	-	0	-	7	0	0	-	0	0	7	63	0	0	0
	320	1320	-	0	-	-	0	-	-	-	0	0	105	94	111	0	0
31-50	308	112	-	0	0	0	0	0	0	0	0	19	0	0	32	0	0
	312	272	72	-	0	0	0	0	0	0	-	0	0	5	1327	0	0
	315	827	0	0	0	-	0	0	-	0	0	0	0	31	1	0	0
	321	1189	0	0	-	-	0	-	0	-	8	0	0	0	0	0	0
	325	944	-	-	-	-	0	-	0	0	0	0	0	0	0	0	0
	326	166	-	-	-	-	-	-	0	0	0	0	0	0	0	-	0
	327	395	323	0	152	111	0	30	0	19	74	0	342	22	185	12	390
51-100	311	317	117	0	85	22	393	221	0	1	0	1	0	20	1178	9	4
	317	193	155	3	89	13	92	204	-	20	0	87	333	192	56	0	0
	319	984	17	12	34	141	84	1358	-	0	0	0	293	633	3509	1108	129
	322	1567	-	-	-	-	3	-	0	0	0	0	0	0	0	5	0
	323	696	5	-	-	-	0	0	0	-	0	0	0	0	0	3	0
	324	494	-	-	-	-	0	-	-	0	0	-	0	0	0	0	0
101-150	306	419	-	-	21	0	86	0	0	136	0	142	28	67	0	1195	105
	309	296	292	195	16	10	0	0	54	10	0	7	0	15	0	354	239
	310	170	804	79	195	215	-	2	42	14	0	0	213	7	0	4105	762
	313	165	742	64	160	79	202	103	22	40	133	149	152	929	0	917	511
	316	189	140	340	169	45	35	74	-	80	106	31	-	156	28	493	401
	318	123	371	10	0	9	0	3	-	14	105	-	69	51	9	-	7878

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Table 16 (Cont'd.)

Depth Range (fm)	Area Strata (sq mi)	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
151-200	705	195	-	-	15	0	37	0	0	6	0	0	0	0	3026	2357
	706	476	-	-	36	-	-	0	-	87	373	0	0	0	670	1237
	707	93	-	-	7	0	0	0	-	307	0	-	-	0	-	1817
	715	132	-	-	-	20	0	0	0	37	29	12	26	60	5	37
	716	539	-	-	-	-	-	0	0	0	0	25	0	0	20392	1912
201-300	708	117	-	-	-	0	-	0	-	0	0	-	-	0	-	37
	711	961	-	-	-	-	-	-	-	0	0	0	0	0	0	393
	712	973	-	-	-	-	-	-	-	0	0	0	0	-	61	32
	713	950	-	-	-	0	-	-	-	0	0	0	0	-	0	14
	714	1195	-	-	-	-	-	-	-	0	0	0	0	-	-	54

Table 17. Mean numbers per tow of haddock at length from research vessel surveys in NAFO Subdivision 3Ps for the period 1981-86.

	ATC 316 1981	ATC 330 1982	AN-9 1983	AN-26 1984	WT-26 1985	WT-45 1986
14.5		0.15				0.02
16.5	0.01	2.14	0.01	0.01	0.01	0.04
18.5	0.02	5.02	0.15	0.02		
20.5	0.02	2.78	0.16	0.06		0.01
22.5		0.41	0.18	0.07		
24.5		0.05	0.52	0.01		
26.5	0.01	0.02	0.81	0.02	0.01	
28.5	0.02	0.08	0.77	0.01	0.01	
30.5	0.01	0.11	1.00	0.04	0.07	0.01
32.5		0.12	0.60	0.10	0.12	0.09
34.5	0.01	0.05	0.23	0.28	0.11	0.77
36.5		0.03	0.08	0.52	0.27	1.02
38.5	0.02	0.04	0.09	1.08	0.46	1.56
40.5	0.02	0.05	0.06	1.33	0.93	1.90
42.5	0.01	0.08	0.03	1.21	1.95	1.41
44.5	0.01	0.04	0.08	0.65	3.55	0.98
46.5		0.03	0.03	0.48	5.06	1.05
48.5	0.01	0.04	0.02	0.38	5.19	1.10
50.5	0.01	0.02	0.03	0.23	4.06	0.97
52.5	0.02	0.03	0.03	0.25	2.38	0.90
54.5	0.02	0.04	0.05	0.11	0.93	0.83
56.5		0.03	0.02	0.03	0.28	0.55
58.5	0.01	0.02	0.01	0.04	0.18	0.42
60.5	0.01	0.03	0.01	0.02	0.05	0.19
62.5	0.01	0.01	0.02	0.02	0.07	0.13
64.5		0.02	0.02	0.01	0.04	0.04
66.5			0.02	0.02	0.03	0.04
68.5			0.01			0.03
70.5				0.01		
72.5			0.01	0.02	0.01	
74.5						0.01
76.5	0.01				0.01	0.01
78.5				0.02		0.02
80.5					0.01	
82.5					0.01	
84.5						
86.5						0.01
88.5						0.01
Total	0.27	11.41	5.07	7.06	25.81	14.08
Upper	0.59	22.00	10.36	15.32	47.06	108.71
Lower	-0.05	0.82	-0.22	-1.21	4.55	-80.55

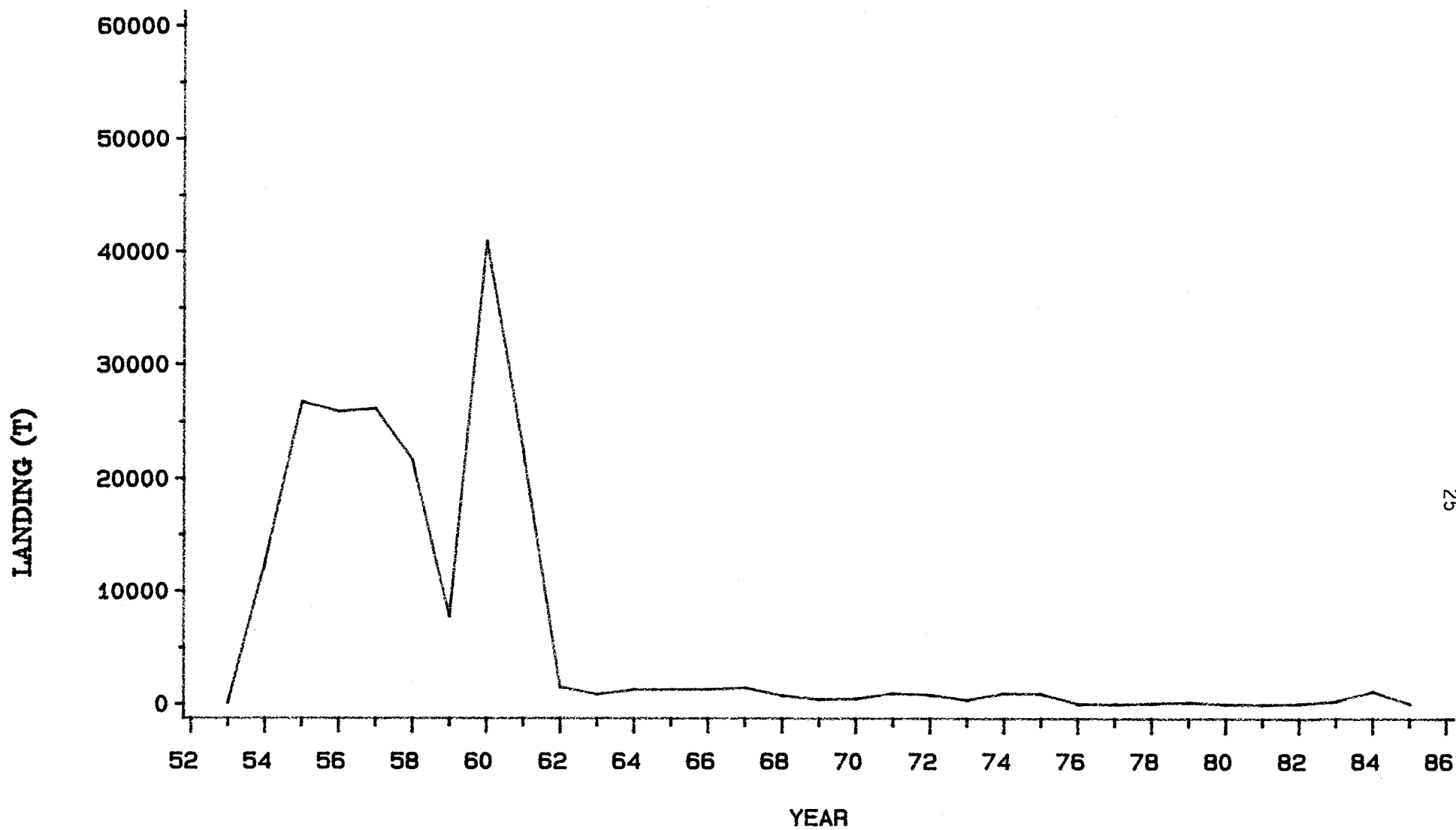


FIG.1 HISTORICAL CATCHES OF HADDOCK FROM NAFO DIV 3N FOR THE YEARS 1953-85

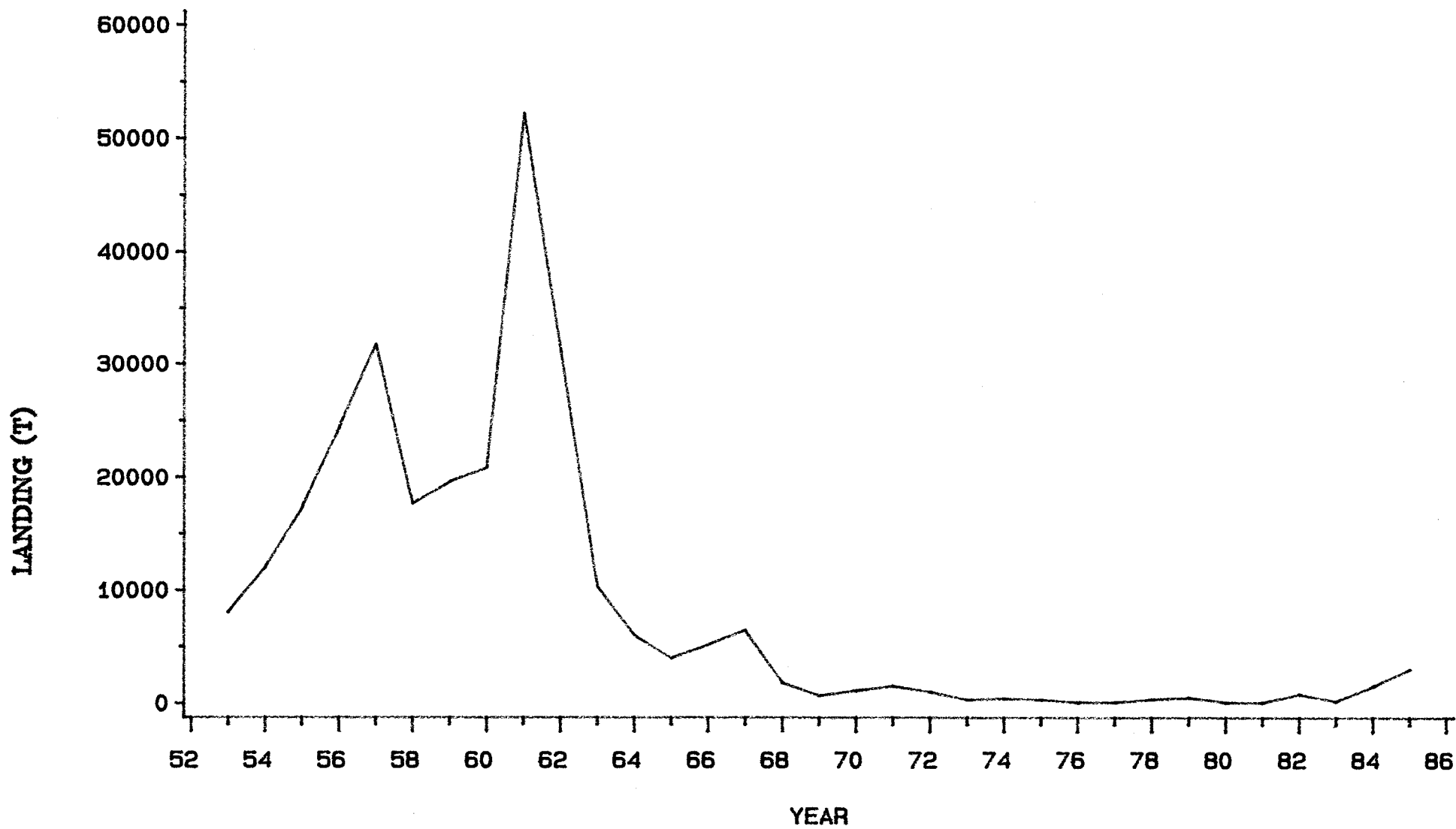


FIG.2 HISTORICAL CATCHES OF HADDOCK FROM NAFO DIV 30 FOR THE YEARS 1953-85

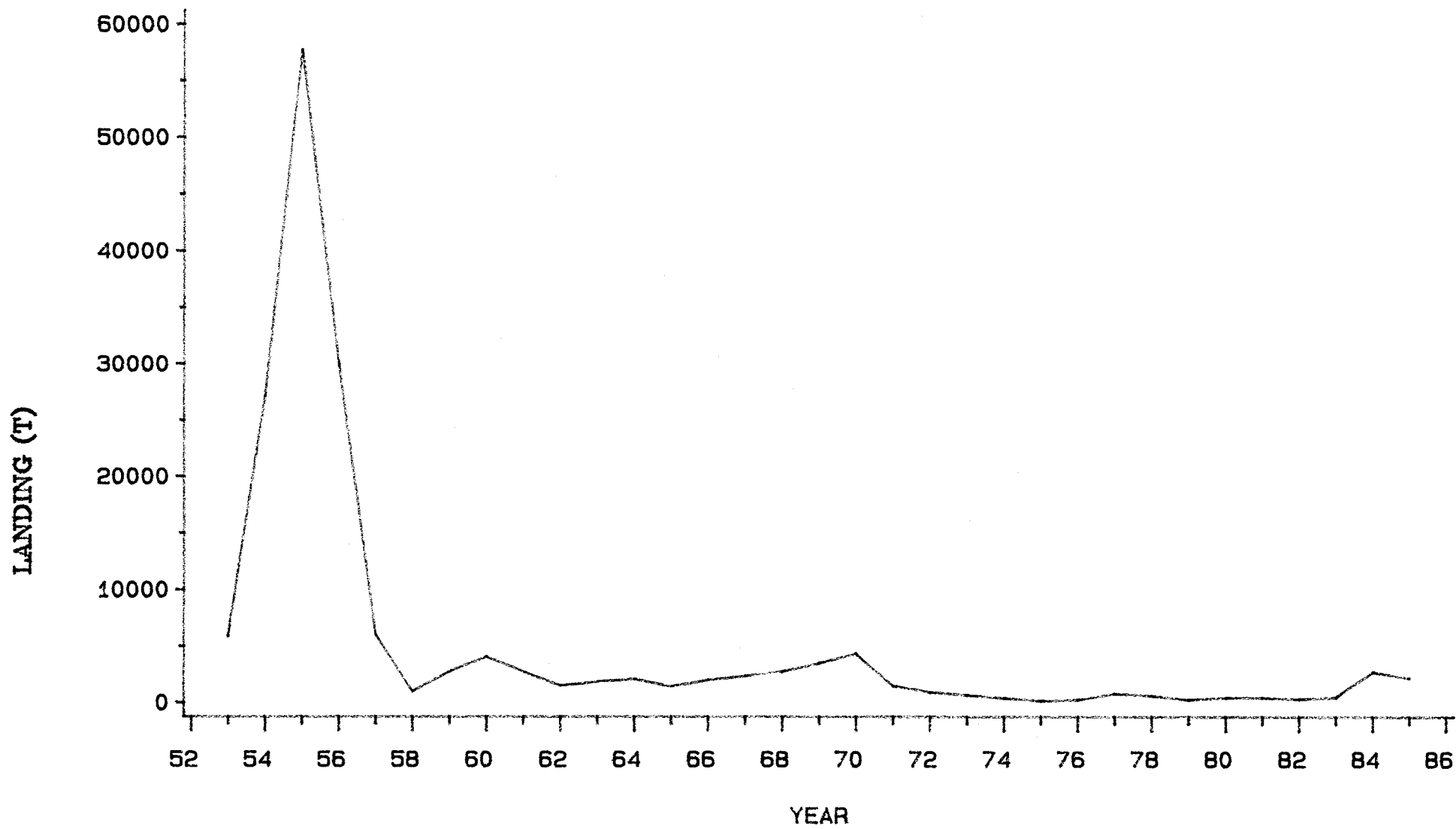


FIG.3 HISTORICAL CATCHES OF HADDOCK FROM NAFO DIV 3PS FOR THE YEARS 1953-85

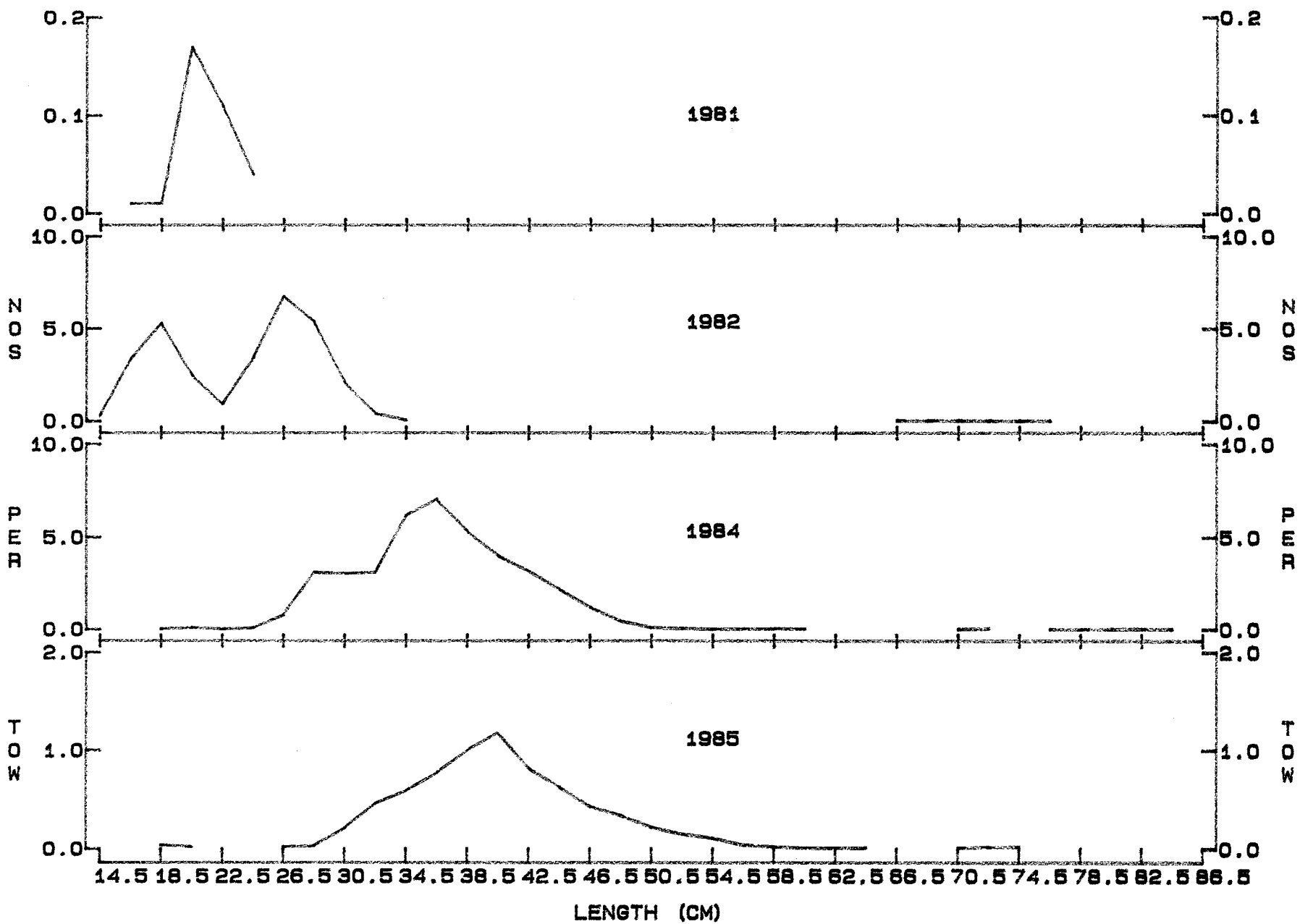


FIG 4. MEAN NUMBERS PER TOW OF HADDOCK AT LENGTH FROM RESEARCH VESSEL SURVEYS IN NAFO DIVS. 3NO FOR THE PERIOD 1981-1985 (EXCLUDING 1983).

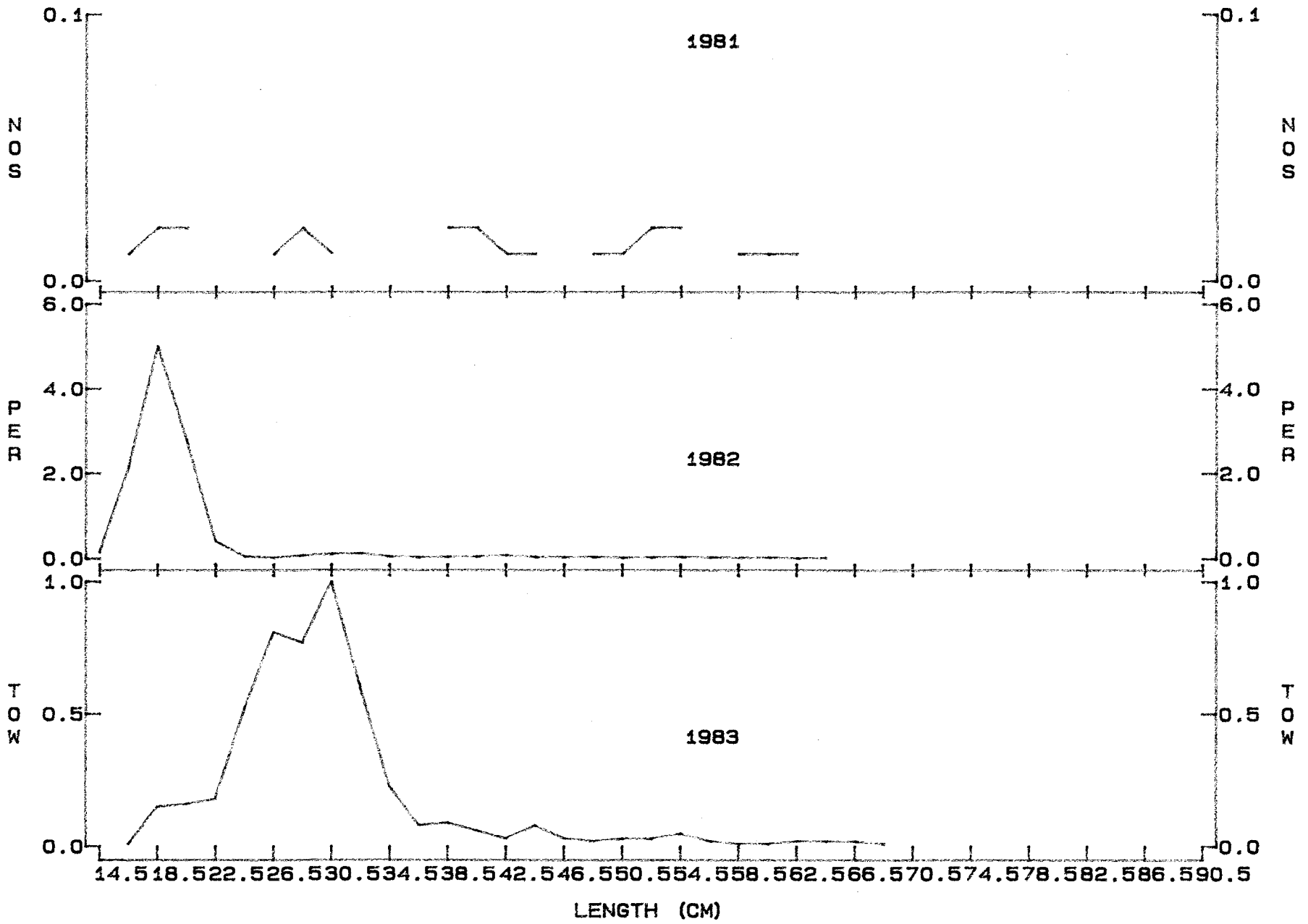


FIG 5A. MEAN NUMBERS PER TOW OF HADDOCK AT LENGTH FROM RESEARCH VESSEL SURVEYS IN NAFO DIV. 3PS FOR THE PERIOD 1981-1983.

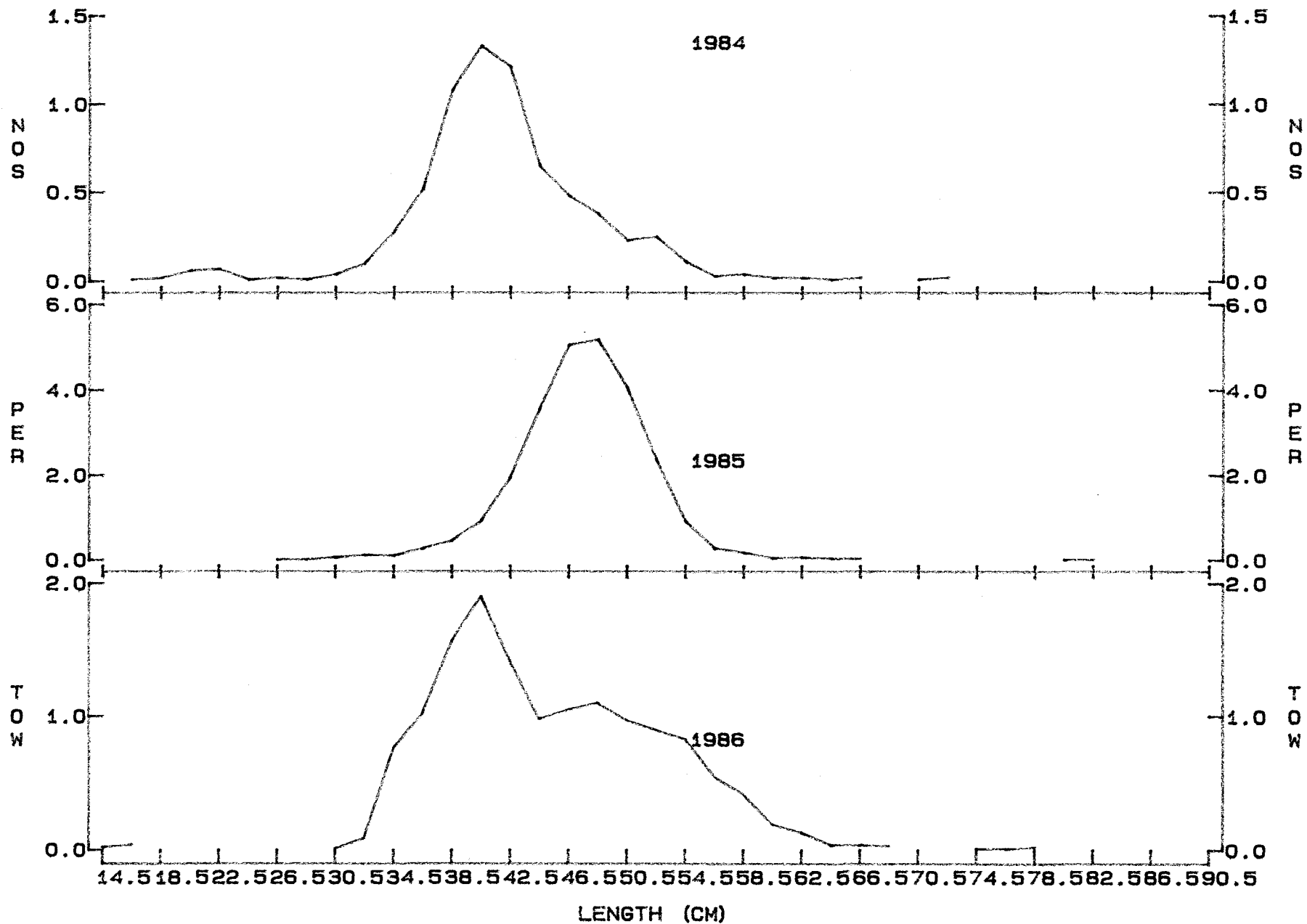


FIG 5B. MEAN NUMBERS PER TOW OF HADDOCK AT LENGTH FROM RESEARCH VESSEL SURVEYS IN NAFO DIV. 3PS FOR THE PERIOD 1984-1986.

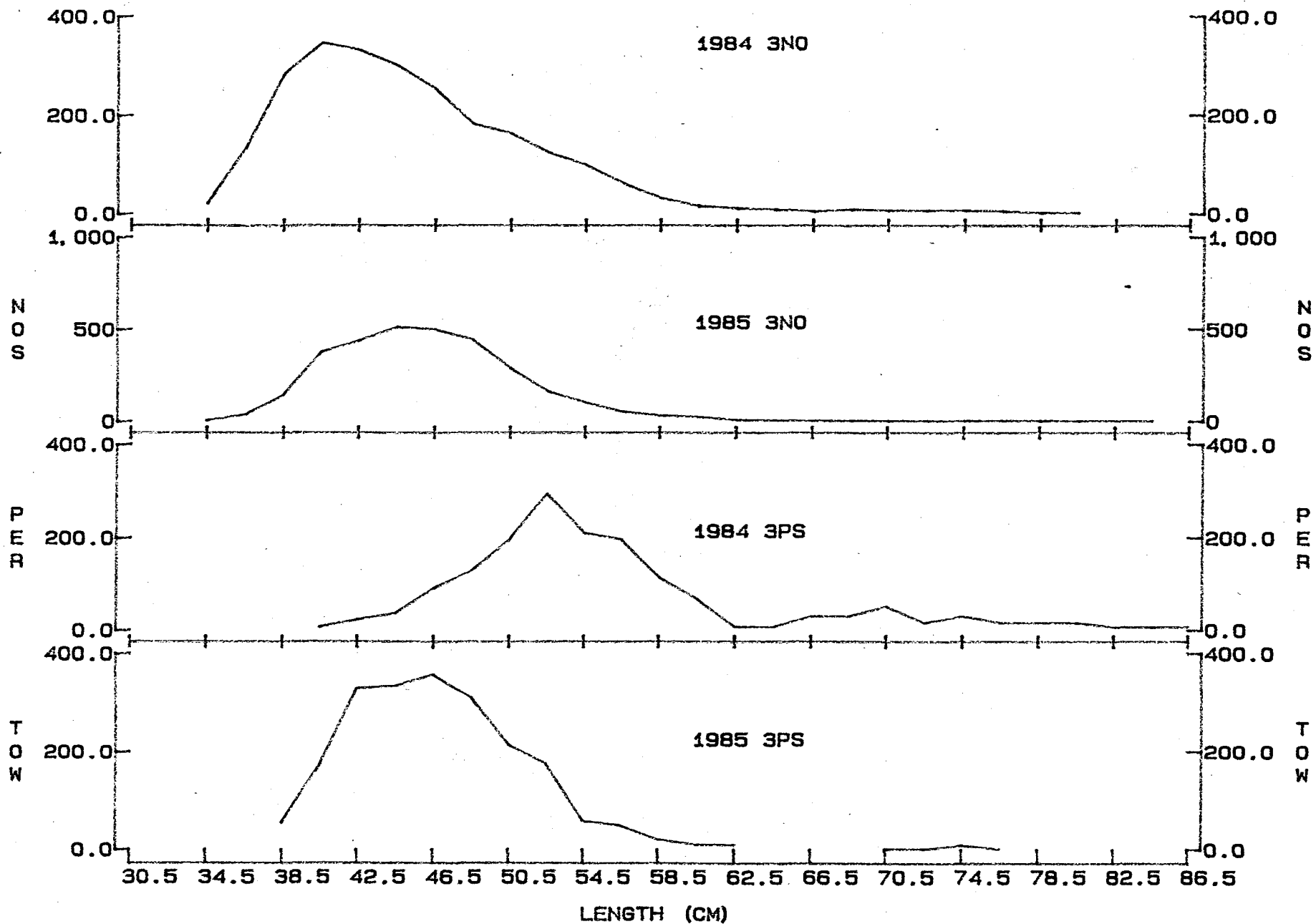


FIG 6. REMOVALS OF HADDOCK BY LENGTH GROUP BY THE COMMERCIAL FISHERIES IN NAFO DIVS. 3NO AND 3PS IN 1984 AND 1985. (1985 LANDINGS BY CANADA ONLY)