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Biomass and Abundance of Haddock in NAFO Divisions 3NO and Subdivision 3Ps from Research Vessel Surveys along with Estimates of Commercial Catch and Effort

by

C. A. Bishop, J. W. Baird and H. F. Hicks
Science Branch
Department of Fisheries and Oceans
P.O. Box 5667
St. John's, Newfoundland A1C 5X1

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ABSTRACT

Landings from both stock areas were substantial in the mid 1950's and early 1960's mainly as a result of the very successful 1949 year-class. Since the early 1960's recruitment has been poor and subsequently landings have been low (less than 1000 t during the 1970's) The moderately successful 1980 and 1981 year-classes have resulted in slightly higher catches in recent years.

RESUME

Les débarquements provenant des deux zones du stock ont été substantiels vers le milieu des années 1950 et le début des années 1960, principalement en raison de la très abondante classe d'âge de 1949. Depuis le début des années 1960 le recrutement a été mauvais et subséquemment les débarquements ont été faibles (moins de 1 000 t pendant les années 1970). Les classes d'âge modérément abondantes de 1980 et 1981 ont entraîné des captures légèrement plus élevées au cours des dernières années.

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). Landings from both stocks were substantial in the mid 1950's and early 60's mainly as a result of the very successful 1949 year-class in both stocks as well as the 1955 year - class in Div. 3NO. Poor year-class survival since the early 1960's has resulted in low catches since that time. In the early 1980's there were some moderately successful year-classes as evidenced by their appearance in commercial and research catches. This paper provides an update of information presented previously (Bishop et al. 1986) along with additional information on survey abundance and biomass at age.

Division 3NO

A. The commercial fishery

1. Landings and catch rates

Landings by division and country are shown in Tables 1 and 2. Landings showed an increase in 1986 although statistics are available for Canada only. Directed effort by the Canadian fleet (TC 5) increased considerably over the period 1985-86 (2031 and 3862 hrs respectively) with catch rates showing a slight decrease (1.05 t/hr and 1.02 t/hr respectively -Table 4).

Catch rate comparisons with earlier periods are difficult as TC 5 vessels have only obtained significant catches in recent years.

2. Catch at length

Sampling coverage of the commercial Can(N) fishery in Div. 3Ø during 1986 was substantial with 17 samples taken over 7 months and including approximately 7000 measurements. As in 1985, over 80% of the Div. 3NO landings were from length groups approximating 42 to 51 cm (Table 5). The average fish weight was slightly higher in 1986 than 1985.

B. Research surveys

Research vessel surveys have been conducted in Div. 3NO since 1972 using the random-stratified survey design (Fig. 1). Research survey biomass and abundance estimates (Table 6) were highest in 1984, declined substantially in 1985, and increased slightly in 1986. Confidence limits about the estimates were wide for both 1985 and 1986. Biomass estimates by stratum (Table 7 and 8) indicate that the estimate for Div. 3Ø was strongly influenced by that for one stratum (334). Mean no. per standard tow estimates at length and age (Tables 9 and 10) indicate that the 1980 and 1981 year-classes were most abundant up to 1984 with some indication of strength for the 1982 year-class. The 1981 and 1982 year-classes were most abundant in the 1986 survey with the 1980 year-class being poorly represented.

Subdivision 3Ps

A. The commercial fishery

Catches have increased since 1983 over the relatively low levels of previous years (Table 11). The amount of directed effort by the Canadian fishery decreased from 1985 to 1986 as did catch rates (Tables 3, 4). No sampling data were avaliable for the Canadian commercial fishery in 1986.

B. Research surveys

Research vessel surveys have been conducted in Div. 3NO since 1972 using the random stratified survey design (Fig. 2).

Biomass and abundance estimates from surveys were highest in 1985 but have since decreased (Tables 12 and 13).

Mean no. per standard tow estimates at length and age (Tables 14 and 15) indicate that the 1981 year-class was most abundant for years up to 1985 and again in 1987. The relatively strong appearance of 1982 and 83 year-classes in the 1986 survey was not evident in the 1987 survey.

Reference

Bishop, C. A., J. W. Baird, and H. F. Hicks. 1986. A review of catch and catch rate data for haddock stocks in NAFO Div. 3NO and Subdiv. 3Ps along with biomass and abundance estimates from stratified-random surveys. CAFSAC Res. Doc. 86/60, 31 p.

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

Year	Can(M)	Can(N)	Fra. (M)	Fra. (SP)	Spain	Port.	UK	USSR	USA	POL.	Other	Total
1953	58	42										100
1954	(695)				11614	203						12512
1955	50	270			25797	630						26753
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
1986*	64	162			41				5			272

*provisional

Table 2. Historical catches of haddock (t) from NAFO Division 3Ø for the years 1953-85.

Year	Can(M)	Can(N)	Fra. (M)	Fra. (SP)	Spain	Port.	UK	USSR	USA	Other	Total
1953	2920	5058				83					8061
1954	4773				6932	312					12017
1955	943	1816			14233	28	291		8		17319
1956	5866	15597			2818				73		24354
1957	6706	21840			3028		236		10		31820
1958	4386	11949			1151				4	140	17630
1959	5265	11930			2313		62		20		19590
1960	3246	12438		2449	2074		302	347	1		20857
1961	7518	21009		4177	707			18703	1	114	52229
1962	6648	20059		2325	522		79	1613			31246
1963	2037	6232		937	904		138	140	1	28	10417
1964	1369	3594		637	326		14	115			6055
1965		1723		302	893		229	784		41	3972
1966	140	349		49	418		104	4134			5194
1967	40	330		48	832		42	5210		12	6514
1968	1	187		12	1217			451			1868
1969	119	287		27	268						701
1970	191	18		1	864			90			1164
1971	11	15			1196			320			1542
1972	48	19			891		6	73			1037
1973	8	16			277			39			340
1974	2	7			6		116	317			448
1975	5	4						339			348
1976	3	42			3			34			82
1977	55	14			7			25		9	110
1978	89	267		14						1	371
1979	166	362		1				12		1	542
1980	54	53									107
1981	13	62		6							81
1982	138	701		4		8		3			854
1983	20	150		19				20		4	213
1984	858	427		193				27		29	1534
1985*	1812	1230								19	3063
1986*	3846	2197						5	1	479	6523

*provisional

Table 3. 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
1986		224	1.24	35	0.30	50	0.52
	Can M						
1986				760	1.49	28	0.25

Table 4. 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. Can(N) 3N Catch	3N Catch/effort	3Ø C	3Ø C/E	3Ps C	3Ps 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
1986	18	0.40	1561	0.90	71	0.33
		B. Can(M)				
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
1986			2363	1.11	338	0.60

Table 5. Removals of haddock at length by the commercial fisheries in NAFO Divisions 3NO (1984-86) and Subdivision 3Ps (1984, 1985). (1985 and 1986 landings by Canada only.)

Length (cm)	3NO			3Ps	
	1984	1985	1986	1984	1985
30-31					
32-33					
34-35	21	4			
36-37	134	37	1		
38-39	284	144	27		55
40-41	346	374	168	7	172
42-43	331	437	697	23	329
44-45	300	511	1195	37	334
46-47	253	499	1171	91	357
48-49	182	444	965	128	309
50-51	163	286	634	196	213
52-53	124	160	387	294	174
54-55	99	102	243	210	58
56-57	62	50	120	196	49
58-59	32	29	78	114	20
60-61	16	22	44	68	10
62-63	11	6	25	7	9
64-65	9	4	11	7	
66-67	5	1	7	30	
68-69	9	3	6	30	
70-71	7	2	1	52	1
72-73	7	2	1	16	1
74-75	7	2	1	30	9
76-77	5	3	1	16	1
78-79	2	2		16	
80-81	2	2	6	16	1
82-83		2		7	
84-85		1		7	
86-87				7	
88-89			1		
#	2411	3129	5790	1605	2102
Av. wt. (kg.)	0.94	1.01	1.08	1.71	1.05
Catch wt. (t)	2266	3120	6251	2745	2199

Table 6. Haddock biomass and abundance estimates from stratified random research vessel surveys. (Divisions 3N and 3O 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
1986	15901	118786	-86984	24017	190593	-142558	9.25	6.13

Table 7. 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	1986
	375	1593	0	0	0	0	-	0	0	0	0	0	0	2679	22	0
30	376	1499	0	0	-	0	0	0	0	0	0	0	0	0	0	0
	360	2992	25	-	-	0	0	0	0	0	0	0	0	160	0	112
	361	1853	52	0	0	0	0	0	0	0	89	-	7	7514	755	14
31-50	362	2520	0	0	0	0	0	0	0	0	0	8	5	7783	0	0
	373	2520	0	0	0	-	0	0	0	0	0	0	0	2337	0	0
	374	931	0	0	0	0	-	0	0	0	0	0	0	3294	0	0
	383	674	0	0	0	-	0	0	0	0	0	0	0	0	0	0
	359	421	38	0	-	-	7	0	-	0	0	21	48	8	0	3
51-100	377	100	0	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	0
	358	225	0	38	-	-	-	29	-	8	0	0	20	182	25	0
101-150	378	139	0	0	0	-	-	1	0	0	0	0	0	0	0	0
	381	182	3	0	0	0	-	0	0	0	0	0	0	0	0	0
	357	164	-	0	-	-	-	0	-	0	0	0	3	0	0	0
151-200	379	106	-	0	0	-	-	0	0	0	0	0	0	0	0	0
	380	116	0	0	0	-	-	0	-	0	0	0	-	0	0	0

Table 8. 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	1986
	330	2089		0		0	0	0	0	325	0	0	0	0	0	0
	331	456		0		0	0	-	0	18	0	-	0	0	0	0
31-50	338	1898		0		323	0	64	0	42	85	-	74	8491	1053	326
	340	1716		-		0	0	0	0	0	0	0	13	10	7	0
	351	2520		0		0	0	0	0	51	0	0	99	161	0	604
	352	2580		0		0	0	17	0	0	0	-	14	11371	713	25
	353	1282		266		0	0	0	0	18	0	-	1219	698	72	0
	329	1721		0		-	304	0	2710	1	0	0	0	0	0	2
	332	1047		0		250	36	0	619	53	153	-	99	9647	165	447
51-100	337	948		22		43	16	0	582	359	119	-	9678	498	1480	256
	339	585		0		0	-	-	0	0	-	0	23	0	0	0
	354	474		67		-	51	0	0	8	0	36	0	36	0	59
	333	151		-		8	0	63	0	12	326	-	237	0	2358	1065
101-150	336	121		44		0	6	40	0	19	288	-	204	0	4823	1010
	355	103		0		8	0	-	-	0	123	0	112	6	479	380
	334	92		-		-	0	0	0	0	190	-	26	0	283	11277
151-200	335	58		16		-	0	-	0	0	7	-	0	0	2	295
	356	61		0		-	-	-	-	0	21	0	-	0	6	25

Table 9. 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	WT 47 1986
14.5		0.30		0.01	0.01
16.5	0.01	3.36			0.02
18.5	0.01	5.30	0.02	0.04	0.01
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	0.13
34.5		0.05	6.16	0.59	0.50
36.5			7.08	0.77	1.09
38.5			5.32	1.00	1.48
40.5			4.00	1.18	1.57
42.5			3.17	0.82	1.77
44.5			2.19	0.63	1.14
46.5			1.19	0.43	0.81
48.5			0.45	0.34	0.35
50.5			0.10	0.22	0.15
52.5			0.05	0.15	0.07
54.5			0.01	0.11	0.06
56.5		0.01	0.02	0.04	0.03
58.5			0.03	0.02	0.01
60.5			0.02	0.01	0.01
62.5				0.01	
64.5				0.01	
66.5		0.02			0.01
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	9.25
Upper	1.28	97.72	60.94	39.05	73.42
Lower	-0.61	-36.58	19.41	-24.74	-54.91

Table 10. Mean numbers of haddock per tow at age from research vessel surveys in NAFO Divisions 3NO.

Age	1981	1982	1984	1985	1986
0	21.69		0.02		
1	0.50	12.21	0.12	0.06	0.04
2	0.00	18.16	6.35	0.08	0.00
3	0.00	0.00	18.40	1.36	0.16
4	0.02	0.00	14.97	3.63	4.31
5	0.04	0.01	0.16	1.77	4.61
6	0.08	0.02	0.00	0.20	0.10
7		0.04	0.01	0.01	0.01
8		0.02	0.02	0.02	0.00
9		0.06	0.05	0.02	0.00
10			0.02	0.00	0.00
11			0.00	0.00	0.00
12			0.02	0.01	0.00
13			0.01		
14			0.00		
15			0.01		
Total	22.32	30.57	40.17	7.16	9.25
Upper limit	85.69	97.72	60.94	39.05	73.42
Lower limit	-41.05	-36.58	19.41	-24.74	-54.91
No. sets	73	136	117	178	203
Trip #	ATC 323 & 324	ATC 327 & 328	AN 27	WT 29/ AN 43	WT 47
# Aged	29	292	313	236	199

Table 11. Historical catches of haddock (t) from NAFO Subdivision 3Ps.

Year	Can(M)	Can(N)	Fr. (M)	Fr. (SP)	Spain	Port.	UK	USSR	USA	JAP.	Other	Total
1953		5849										5849
1954		26490			685	4						27179
1955		39948			15637	117	2095					57797
1956		25177			3531	291	827		114			29940
1957		4271			1474	36	239				59	6079
1958		368			496	9	67				19	956
1959	925	774		28	956		62		5			2750
1960	1154	794		144	1908		84					4084
1961	373	658	8	230	1446		42					2757
1962	291	411	2	33	605		137		2			1481
1963	141	437		158	978		127				15	1856
1964	69	835		221	646		325					2096
1965	75	295	12	178	619		259					1428
1966	54	493	2	449	548		241	212				1999
1967	174	1083		373	560		172					2362
1968	222	844		159	1198			343				2766
1969	146	1840		939	571		2					3498
1970	491	1684		1158	946			48		6		4333
1971	21	901	13	45	497							1477
1972	49	379		52	421							901
1973	14	352		16	234		6	26		2		650
1974	37	166	28		157							388
1975	18	128		1								147
1976	118	101	26									245
1977	252	516	16	9								793
1978	305	295		3								603
1979	98	176	8	19								251
1980	69	176	168	34								447
1981	12	223	135	75								445
1982	36	164	36	73								309
1983	58	88	10	318								474
1984	685	221		1839								2745
1985*	1799	431		5272								7501
1986*	809	750	1675	1974								5208

*provisional

Table 12. 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
1987	10092	23021	-2836	5724	12263	-816	4.37	7.71

Table 13. Haddock biomass estimates (wt.'s in tons) by stratum from stratified random research vessel surveys in NAFO Subdivision 3Ps.

Depth Range (fm)	Strata	Area (sq mi)	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	314	974	0	-	0	-	7	0	0	-	0	0	7	63	0	0	0	0
0-30	320	1320	-	0	-	-	0	-	-	-	0	0	105	94	111	0	0	0
	308	112	-	0	0	0	0	0	0	0	0	19	0	0	32	0	0	0
	312	272	72	-	0	0	0	0	0	0	-	0	0	5	1327	0	0	0
	315	827	0	0	0	-	0	0	-	0	0	0	0	31	1	0	0	0
31-50	321	1189	0	0	-	-	0	-	0	-	8	0	0	0	0	0	0	0
	325	944	-	-	-	-	0	-	0	0	0	0	0	0	0	0	0	0
	326	166	-	-	-	-	-	-	0	0	0	0	0	0	0	-	0	0
	307	395	323	0	152	111	0	30	0	19	74	0	342	22	185	12	390	1408
	311	317	117	0	85	22	393	221	0	1	0	1	0	20	1178	9	4	0
	317	193	155	3	89	13	92	204	-	20	0	87	333	192	56	0	0	0
51-100	319	984	17	12	34	141	84	1358	-	0	0	0	293	633	3509	1108	129	164
	322	1567	-	-	-	-	3	-	0	0	0	0	0	0	0	5	0	0
	323	696	5	-	-	-	0	0	0	-	0	0	0	0	0	3	0	1
	324	494	-	-	-	-	0	-	-	0	0	-	0	0	0	0	0	0
	306	419	-	-	21	0	86	0	0	136	0	142	28	67	0	1195	105	841
	309	296	292	195	16	10	0	0	54	10	0	7	0	15	0	354	239	286
101-150	310	170	804	79	195	215	-	2	42	14	0	0	213	7	0	4105	762	1180
	313	165	742	64	160	79	202	103	22	40	133	149	152	929	0	917	511	2598
	316	189	140	340	169	45	35	74	-	80	106	31	-	156	28	493	401	362
	318	123	371	10	0	9	0	3	-	14	105	-	69	51	9	-	7878	307

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Table 13 (Cont'd.)

Depth Range (fm)	Strata	Area (sq mi)	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	705	195	-	-	15	0	37	0	0	6	0	0	0	0	0	3026	2357	139
	706	476	-	-	36	-	-	0	-	87	373	0	0	0	0	670	1237	907
151-200	707	93	-	-	7	0	0	0	-	307	0	-	-	0	0	-	1817	234
	715	132	-	-	-	20	0	0	0	37	29	12	26	60	5	-	37	25
	716	539	-	-	-	-	-	0	0	0	0	25	0	0	0	20392	1912	1243
	708	117	-	-	-	0	-	0	-	0	0	-	-	0	0	-	37	211
	711	961	-	-	-	-	-	-	-	-	0	0	0	0	0	0	393	113
201-300	712	973	-	-	-	-	-	-	-	0	0	0	0	0	-	61	32	37
	713	950	-	-	-	0	-	-	-	-	0	0	0	0	-	0	14	36
	714	1195	-	-	-	-	-	-	-		0	0	0	0	-	-	54	0

Table 14. 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	WT 55,56 1987
14.5		0.15				0.02	0.02
16.5	0.01	2.14	0.01	0.01	0.01	0.04	0.06
18.5	0.02	5.02	0.15	0.02			0.05
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		0.01
28.5	0.02	0.08	0.77	0.01	0.01		0.03
30.5	0.01	0.11	1.00	0.04	0.07	0.01	0.02
32.5		0.12	0.60	0.10	0.12	0.09	0.02
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	0.01
38.5	0.02	0.04	0.09	1.08	0.46	1.56	0.02
40.5	0.02	0.05	0.06	1.33	0.93	1.90	0.09
42.5	0.01	0.08	0.03	1.21	1.95	1.41	0.07
44.5	0.01	0.04	0.08	0.65	3.55	0.98	0.11
46.5		0.03	0.03	0.48	5.06	1.05	0.17
48.5	0.01	0.04	0.02	0.38	5.19	1.10	0.24
50.5	0.01	0.02	0.03	0.23	4.06	0.97	0.38
52.5	0.02	0.03	0.03	0.25	2.38	0.90	0.45
54.5	0.02	0.04	0.05	0.11	0.93	0.83	0.43
56.5		0.03	0.02	0.03	0.28	0.55	0.58
58.5	0.01	0.02	0.01	0.04	0.18	0.42	0.51
60.5	0.01	0.03	0.01	0.02	0.05	0.19	0.39
62.5	0.01	0.01	0.02	0.02	0.07	0.13	0.38
64.5		0.02	0.02	0.01	0.04	0.04	0.17
66.5			0.02	0.02	0.03	0.04	0.08
68.5			0.01			0.03	0.05
70.5				0.01			0.03
72.5			0.01	0.02	0.01		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	4.37
Upper	0.59	22.00	10.36	15.32	47.06	108.71	9.37
Lower	-0.05	0.82	-0.22	-1.21	4.55	-80.55	-0.62

Table 15. Mean numbers of haddock per tow at age from research vessel surveys in NAFO Subdivisions 3Ps.

Age	1982	1983	1984	1985	1986	1987
0						
1	10.38	0.51	0.17	0.01	0.06	0.13
2	0.45	3.86	0.25	0.16	0.01	0.06
3	0.29	0.37	4.78	0.61	3.77	0.05
4	0.07	0.11	1.41	21.56	5.32	0.18
5	0.16	0.11	0.34	2.94	4.09	0.99
6	0.05	0.08	0.08	0.38	0.69	2.71
7	0.01	0.01	0.03	0.06	0.04	0.17
8		0.01		0.03	0.01	0.04
9				0.04	0.05	0.01
10				0.00	0.01	0.02
11				0.00	0.01	0.00
12				0.00	0.01	0.00
13				0.00	0.01	0.00
14				0.00		
15						
Total	11.41	5.07	7.06	25.81	14.08	4.37
Upper limit	22.00	10.36	15.32	47.06	108.71	9.37
Lower limit	0.82	-0.22	-1.21	4.55	-80.55	-0.62
No. sets	92	171	95	112	145	135
Trip #	ATC 330	AN 9	AN 26	WT 26	WT 45	WT 55& 56
# Aged	233	322	184	291	312	299

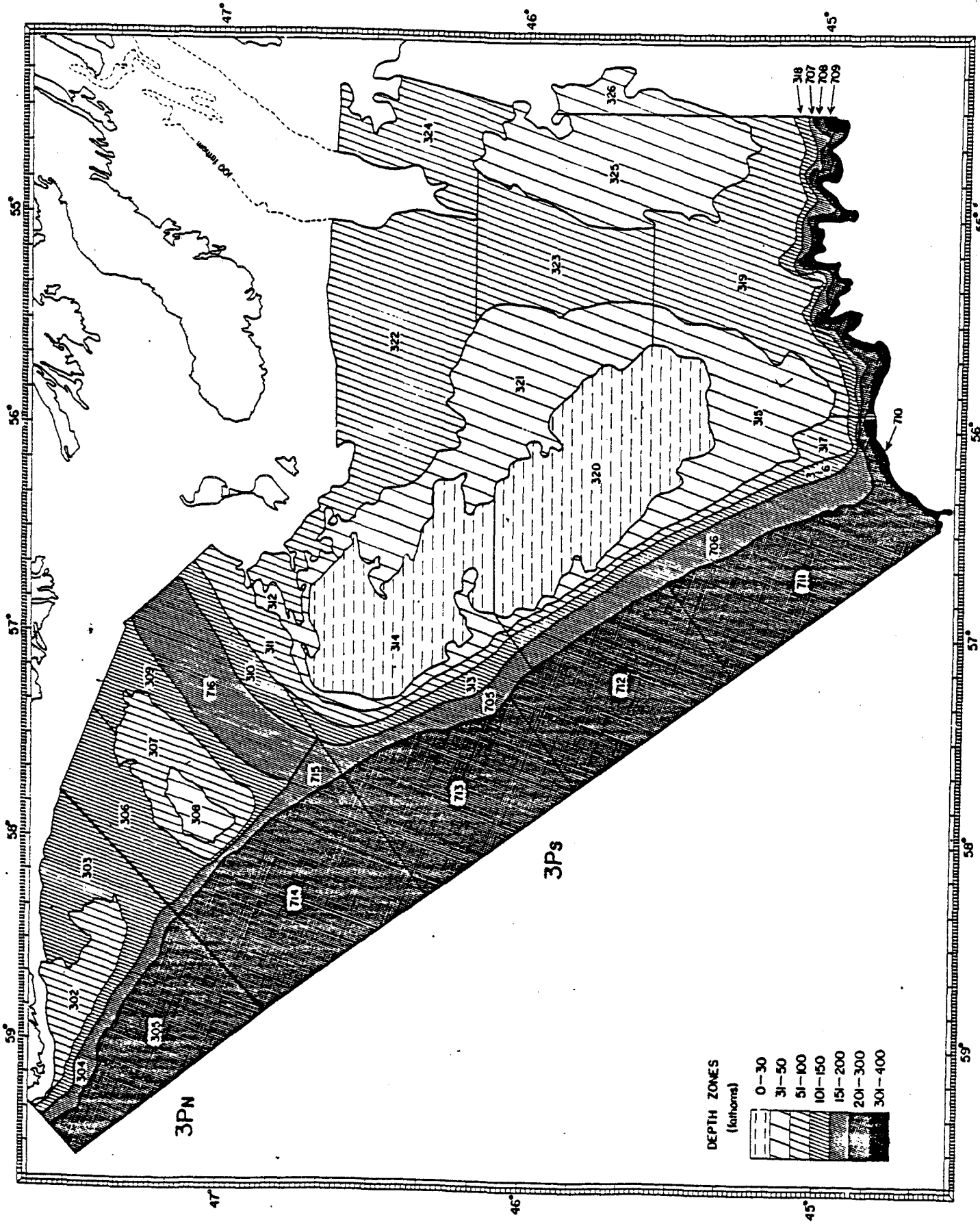

Fig. 1. Stratification scheme used for random-stratified research vessel surveys in Subdivision 3Ps.

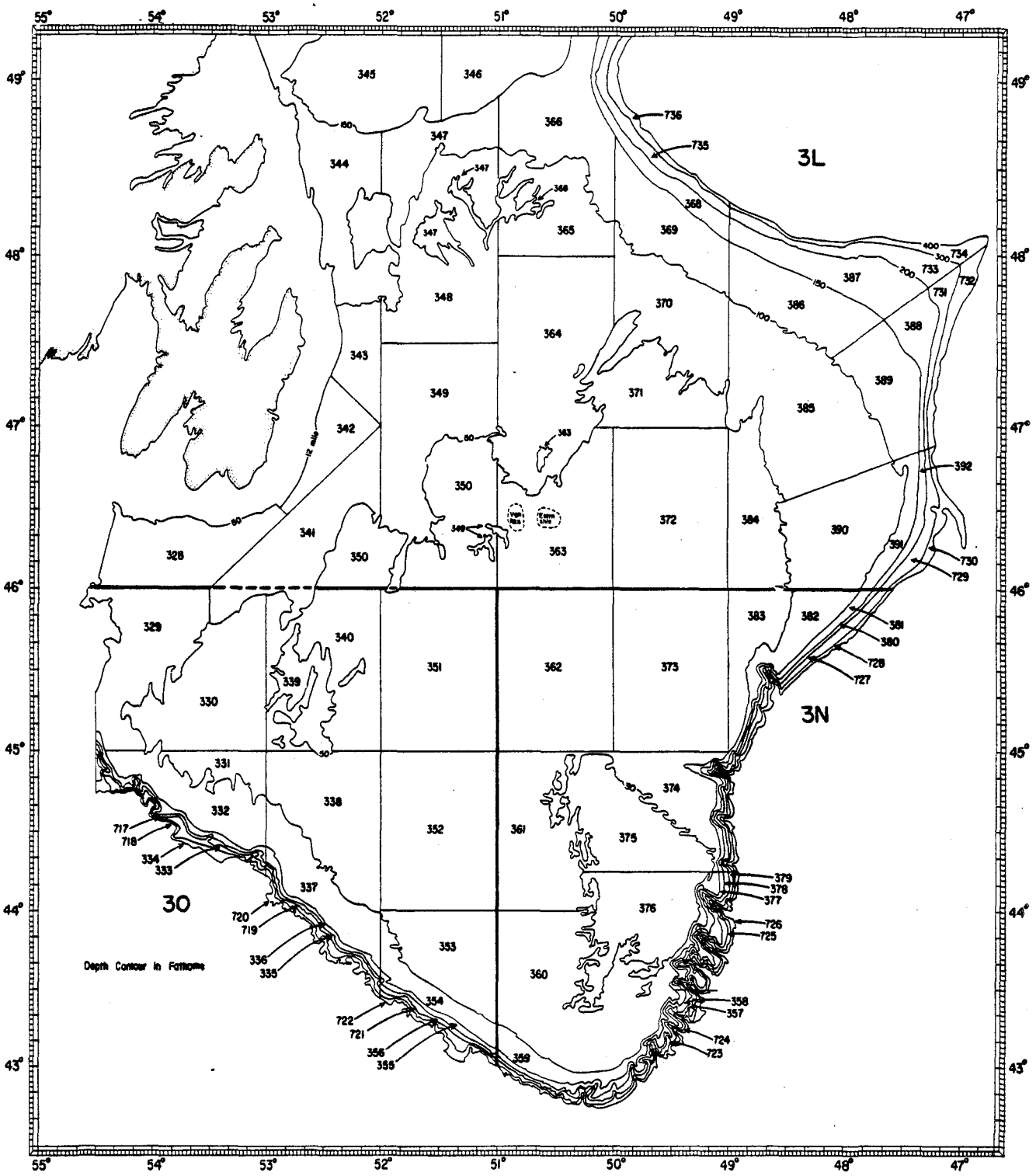

Fig. 2. Stratification scheme for NAFO Divisions 3L, 3N and 30.