Not to be cited without
permission of the authors[1]

Ne pas citer sans
autorisation des auteurs[1]

Canadian Atlantic Fisheries
Scientific Advisory Committee

Comité scientifique consultatif des
pêches canadiennes dans l'Atlantique

CAFSAC Research Document 92/112

CSCPCA Document de recherche 92/112

A REVIEW OF STOCK STATUS - 2GH COD

by

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

[1] This series documents the scientific basis for fisheries management advice in Atlantic Canada. As such, it addresses the issues of the day in the time frames required and the Research Documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

Research Documents are produced in the official language in which they are provided to the Secretariat by the author.

[1] Cette série documente les bases scientifiques des conseils de gestion des pêches sur la côte atlantique du Canada. Comme telle, elle couvre les problèmes actuels selon les échéanciers voulus et les Documents de recherche qu'elle contient ne doivent pas être considérés comme des énoncés finals sur les sujets traités mais plutôt comme des rapports d'étape sur les études en cours.

Les Documents de recherche sont publiés dans la langue officielle utilisée par les auteurs dans le manuscrit envoyé au secrétariat.

Abstract

Catches from the stock have ranged from a high of 94,000t in 1966 to a low of no reported catch in 1991. Assessments have not been possible because indices of abundance were lacking. A 1991 fall survey indicated that very few cod were present in the area in spite of reduced fishing effort in recent years. The low catches of recent years may be an indication of low stock levels.

Résumé

Les prises dans le stock considéré se sont échelonnées entre un sommet de 94 000 t en 1966 et un seuil nul en 1991, année ou aucune prise n'a été déclarée. Il n'a pas été possible de procéder à des estimations, faute d'indices d'abondance. Une campagne d'évaluation réalisée en automne 1991 a révélé qu'il y avait peu de morue dans la région, en dépit de la réduction de l'effort de pêche ces dernières années. Les faibles prises récentes sont peut-être une indication du bas niveau du stock.

INTRODUCTION

The annual catches from this stock range from 94,000 (t) in 1966 to 134 (t) in 1987. (Table 1;Fig. 1) Since 1985 catches have been less than 500 (t) and there was no reported catch in 1991.

A TAC of 20,000 (t) was first introduced in 1974 by STACRES of ICNAF and has remained unchanged since that time. The basis for the advice was first provided in 1973 (ICNAF Res. Doc. 73/106) when a yield per recruit analysis gave an estimate of F max (0.7) which along with recruitment estimates suggested yields (F max) ranging from 20,000 to 40,000 (t) (ICNAF Redbook 1973, p.68). With the prospect of poorer recruitment it was decided to set the TAC at the lower end of the range. At a 1980 meeting of CAFSAC (CAFSAC Subcommittee Report 80/18) additional data were provided to suggest an F0.1 catch consistent with earlier analysis by STACRES (20,000 t.) Catches relative to the TAC'S since 1982 are as follows.

YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
TAC	20	20	20	20	20	20	20	20	20	20
Nominal catch	13.5	2.4	1.5	0.5	0.5	0.1	0.5	0.4a	0.2a	0.0a

a Provisional

Research vessel surveys

Line transect surveys,for groundfish, were conducted in 2G and 2H in 1978, 1979 and 1981. Random stratified groundfish surveys (Fig. 2-3) were started in 1986, with limited coverage in 2H, and conducted in 2G and 2H in 1987, 1988 and 1991. Abundance and biomass estimates are presented in tables 2-5. The 1978, 1979 and 1981 surveys have been post-stratified. A shrimp survey,in the Hopedale Channel (Fig. 4.) has been conducted since 1979 and cod abundance and biomass estimates from this series are shown in Table 6. (no survey 1989 or 1991)

The results of the groundfish surveys are undoubtedly affected by timing. The influence of the onshore - offshore migration may result in large portions of the stock being outside the survey area, in 1979, 1987 and 1988 as all were conducted during August. The limited 1986 survey in 2H was conducted in late september and had a higher biomass than surveys with much greater coverage conducted in August of 1987 and 1988.

The mean numbers per standard tow for the 1986-1991 random stratified surveys (Table 7.) show substantial year to year variation but the 1981 yearclass is the most abundant in all but 1991.

The shrimp survey series has been conducted during the early July to mid August period. Cod biomass and abundance estimates from these surveys may be influenced by variation in the onshore-offshore migration pattern. However the results indicated a decline in abundance and biomass since 1986.

Discussion

An analytical assessment of this stock has not been possible in recent years because the required data have been insufficient or entirely lacking. Catch levels have been low and representative sampling data have not always been available. Catch rate data are also limited and no consistent series is available. The survey data are of recent origin and limited value because of problems with spatial coverage and timing.

The low catch rates of recent years may be an indication of low stock level. Reduction of TAC's in other areas and allocations to foreign fleets should have meant an increase in effort. However there has been no reported catch or effort in 1991 and no foreign catch since 1988. The fall 1991 survey indicated that the stock may be at a very low level.

Table 1. Cod landings (t) from Divisions 2G, 2H, and stock area 2GH for the period 1953-91.

Year	2G	2H	2GH	Year	2G	2H	2GH
1953	3296	50421	53717	1973	15	282	297
1954	27	1672	1699	1974	-	4070	4070
1955	12	753	765	1975	1134	5825	6959
1956	7	171	178	1976	219	5710	5929
1957	-	963	963	1977	16	3642	3658
1958	-	2528	2528	1978	4	4854	4858
1959	-	2994	2994	1979	7	2173	2180
1960	278	8099	8377	1980	1	2617	2618
1961	8	4287	4295	1981	6	3644	3650
1962			5451[b]	1982	3	13508	13511
1963	1341	2673	4014	1983	-	2381	2381
1964			9147	1984	41	1490	1531
1965			64245	1985	2	545	547
1966	15039	79150	94189	1986	-	494	494
1967			56113	1987	15	119	134
1968			84087	1988	-	496	496
1969			60557	1989	-	449	449[a]
1970			17787	1990	19	214	233[a]
1971			12639	1991	-	-	-[a]
1972	88	13602	13690				

[a]Provisional.

[b]Estimates available by stock area only. Total includes estimates from some countries not separated by division.

Table 2. Cod abundance estimates (No. x 10^{-3}) from research vessel surveys in NAFO Division 2G.

Depth range meter	Stratum #	GADUS 13 Sep 13-Oct 3 1978	GADUS 24 Aug 1-21 1979	GADUS 57 Oct 23-Nov 10 1981	GADUS 143 Aug 26-Sep 1 1987	GADUS 156 Aug 29-Sep 5 1988	AN 161 Nov 17-Dec 1 1991
< 200	909	865	156	2264			0
	910	132	132	2458			0
	925	4496	305	2302			
201-300	901	768	273	1912	23	36	26
	908	790	337	3125	26	44	0
	911	2266	208	1333	0	0	0
	924	2128	927	1078	0	23	
	926						
301-400	902				3	0	
	912				0	5	
	923	14		0	7	35	
	927				0	125	
401-500	903		3	5	0	0	3
	913				0	0	
	922	0		0			
	928				0	0	
501-750	904		0	0	0	4	
	914				0	0	
	921		0		0	0	
	929		0	0	0	0	
751-1000	905					0	
	915					0	
	920				0	6	
1001-1250	906				0	0	
	916					0	
	919					0	
Total		11460	2340	14477	59	279	29
Upper		19677	6508	20951	132	701	71
Lower		3242	-1828	8003	-14	-143	-12
# sets		53	59	52	51	59	27

Table 3. Cod biomass estimates in (t) from research vessel surveys in NAFO Division 2G.

Depth range meter	Stratum #	GADUS 13 Sep 13-Oct 3 1978	GADUS 24 Aug 1-21 1979	GADUS 57 Oct 23-Nov 10 1981	GADUS 143 Aug 26-Sep 1 1987	GADUS 156 Aug 29-Sep 5 1988	AN 161 Nov 17-Dec 1 1991	
< 200	909	1527	358	8703				0
	910	229	319	9152				0
	925	8791	684	9524				
201-300	901	1240	579	7231		32	38	13
	908	897	571	11286		16	81	0
	911	3658	348	4381		0	0	0
	924	3684	2173	3547		0	9	
	926						0	
301-400	902					4	0	
	912					0	4	
	923	22		0		3	39	
	927					0	125	
401-500	903		1	14		0	0	2
	913					0	0	
	922	0		0				
	928					0	0	
501-750	904		0	0		0	3	
	914					0	0	
	921		0			0	0	
	929		0	0		0	0	
751-1000	905						0	
	915						0	
	920					0	8	
1001-1250	906					0	0	
	916						0	
	919						0	
Total		20050	5033	53837		55	308	15
Upper		36790	14705	75660		162	698	4
Lower		3310	-4640	32014		-52	-82	-6
# sets		53	59	52		51	59	27

Table 4. Cod abundance estimates (No. x 10^{-3}) from research vessel survey in NAFO Division 2H.

Depth range meter	Stratum #	GADUS 13 Sep 13-Oct 3 1978[a]	GADUS 24 Aug 1-21 1979[a]	GADUS 57 Oct 23-Nov 10 1981[a]	WT 52 Sep 18-24 1986	GADUS 143 Aug 15-26 1987	GADUS 156 Aug 18-Sep 6 1988	AN 161 Nov 17-Dec 1 1991
< 200	930	675	836	5474	6312	86	93	87
	954	0	15	49		33	44	0
	956	26	39	178		0	32	0
	957	41	806	703		84	185	0
201-300	931	546	974	4544	2538	47	166	166
	943	412	27	2777	1262	13	684	80
	950					-	-	
	953	44	335	240		102	15	0
	955	117	311	196		7	0	15
	958		143	519		7	29	11
301-400	932					0	6	62
	944	4573	4074	1298	1153	13	32	48
	949					-	-	
	952		452	146		22	58	13
	959		463	241		13	20	7
401-500	933					-	4	2
	942		2	6	4	1	0	4
	945		2445	138		62	48	35
	948					-	-	
	951	624	509	19		0	9	44
	960		0	0		0	0	12
501-750	934		0		0	0	0	
	941				0	0	0	
	946	95	97	39		60	27	
	947		51	30		6	9	
	961		0	0		0	0	
751-1200	935					0	0	
	940					0	0	
	962					0	0	
1001-1250	936					0	0	
	939					0	0	
	963					0	0	
Total		7152	11581	16596	11269	557	1460	585
Upper		13136	19325	24102	19351	758	3596	947
Lower		1167	3836	9090	3188	356	-676	224
# sets		51	75	83	20	120	118	48

[a]Surveys are post-stratified.

Table 5. Cod biomass estimates in (t) from research vessel surveys in NAFO Division 2H.

Depth range meter	Stratum #	GADUS 13 Sep 13-Oct 3 1978[a]	GADUS 24 Aug 1-21 1979[a]	GADUS 57 Oct 23-Nov 10 1981[a]	WT 52 Sep 18-24 1986	GADUS 143 Aug 15-26 1987	GADUS 156 Aug 18-Sep 6 1988	AN 161 Nov 17-Dec 1 1991
< 200	930	708	940	14404	5476	95	132	120
	954	0	33	109		42	50	0
	956	60	113	513		0	47	0
	957	65	1425	2581		167	400	0
201-300	931	740	1035	12417	4030	54	131	74
	943	682	42	6975	1541	18	858	37
	950					-	-	
	953	64	536	950		128	25	0
	955	106	477	597		5	0	6
	958		296	1821		14	46	8
301-400	932					0	1	34
	944	8157	6923	4214	1612	17	33	19
	949					-	-	
	952		754	492		33	79	10
	959		708	808		8	30	3
401-500	933					-	2	2
	942		5	25	5	1	0	4
	945		4457	444		121	74	19
	948					-	-	
	951	945	1021	62		0	19	25
	960		0	0		0	0	9
501-750	934		0		0	0	0	
	941				0	0	0	
	946	104	166	124		74	41	
	947		66	124		6	10	
	961		0	0		0	0	
751-1200	935					0	0	
	940					0	0	
	962					0	0	
1001-1250	936					0	0	
	939					0	0	
	963					0	0	
Total		11632	18995	46659	12663	783	1978	369
Upper		23123	32511	67994	24109	1104	4633	690
Lower		141	5480	25324	1217	462	-676	48
# sets		51	75	83	20	120	118	48

[a]Surveys are post-stratified.

Table 6. Abundance and biomass estimates for Hopedale Channel from shrimp research surveys 1979-90.

	Area		No.	Cod abundance			Cod biomass	
Year	sq. n.mi.		sets	Mean	Upper		Lower	
Mean	Upper		Lower					
1979	2582	56	386	627	145	831	1846	-184
1980	2991	84	1084	1418	751	2411	3073	1749
1981	3050	57	614	4767	-3539	1460	11200	-8279
1982	3050	77	932	1372	491	3149	4780	1519
1983	3359	89	891	1369	412	1844	2608	1080
1984	2829	61	1286	2084	489	1864	3060	668
1985	3636	65	846	1243	449	1158	2095	222
1986	3494	76	620	935	304	779	1111	447
1987	3494	74	28	52	3	20	41	-10
1988	3363	71	172	406	-62	116	256	-25
1989						-		
1990	3639	77	93	298	-11	39	82	-4

Table 7. Mean number of cod per tow at age from research vessel surveys in NAFO Div. 2GH.

Age	1986	1987	1988	1991
2	0.55	.01	0.11	.04
3	3.49	.04	.09	0.07
4	12.17	.00	.22	0.33
5	19.74	.06	.08	0.04
6	7.19	.17	.19	0.02
7	7.71	.05	.25	0.03
8	3.04	.09	.06	
9	.20	.04	.15	
10	.09		.05	
11	.37		.01	
12	.10		.01	
13	.00			
14	.10			
15	.00			
16	.05			
UK		0.01		
Total	54.79	0.46	1.22	0.52
Upper	94.08	0.61	2.74	0.82
Lower	15.50	0.31	-0.31	0.21
No.sets(Total)	18	171	177	75
No. sets 2G	0	51	59	27
No. sets 2H	18	120	118	48

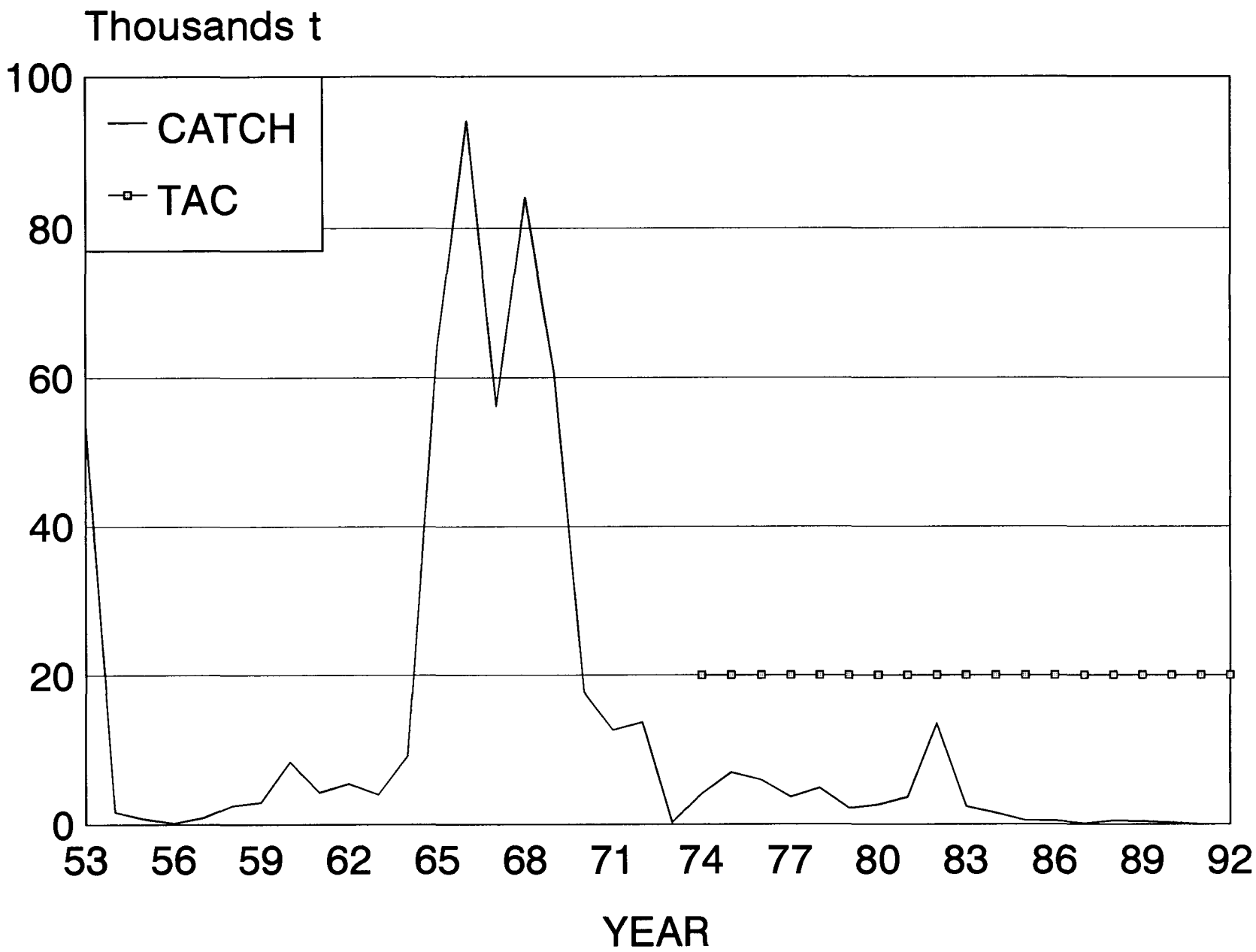

Fig.1. Catches of Cod in Divs. 2GH

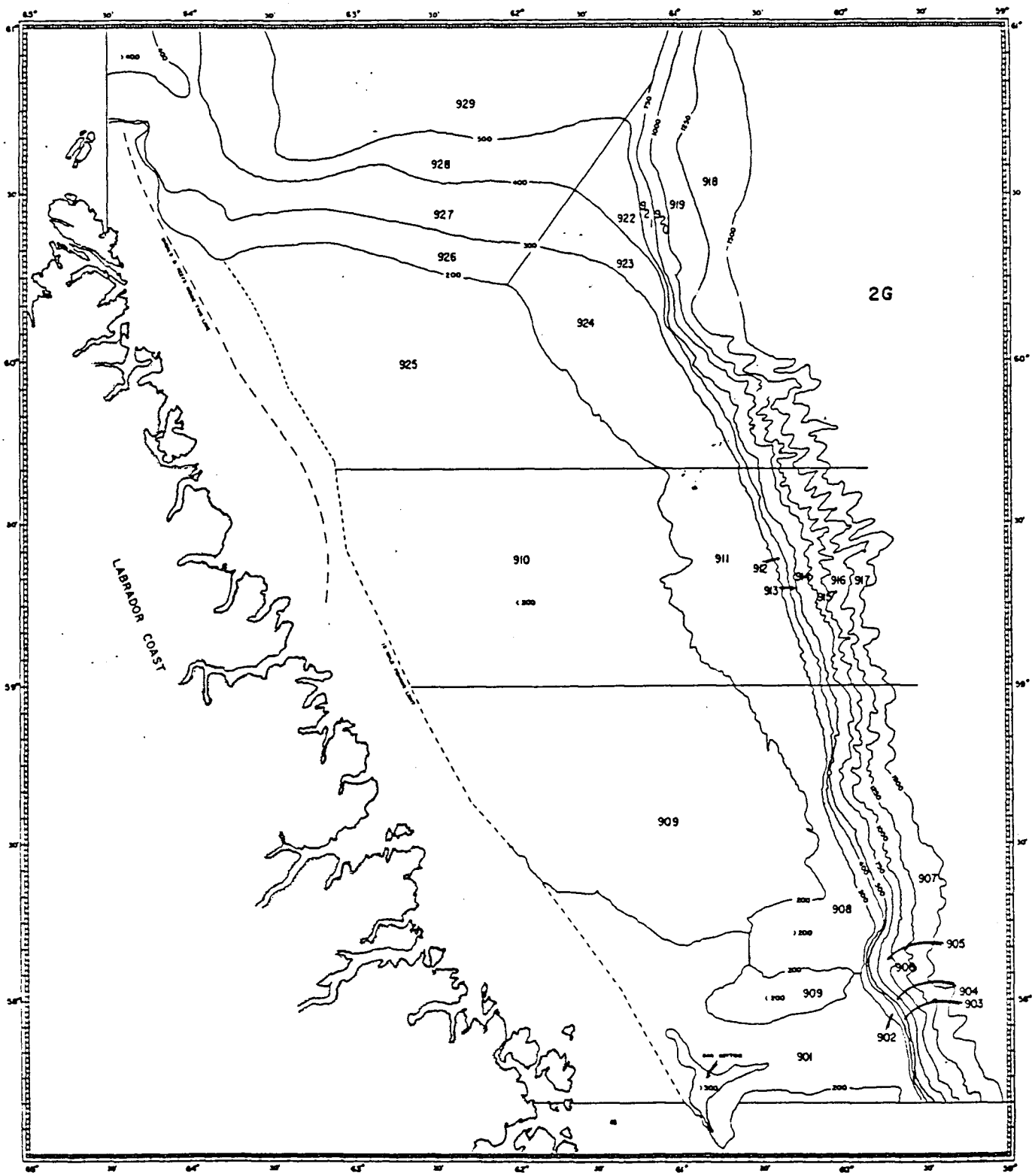

Fig. 2 Stratification scheme used in random stratified groundfish surveys in 2G

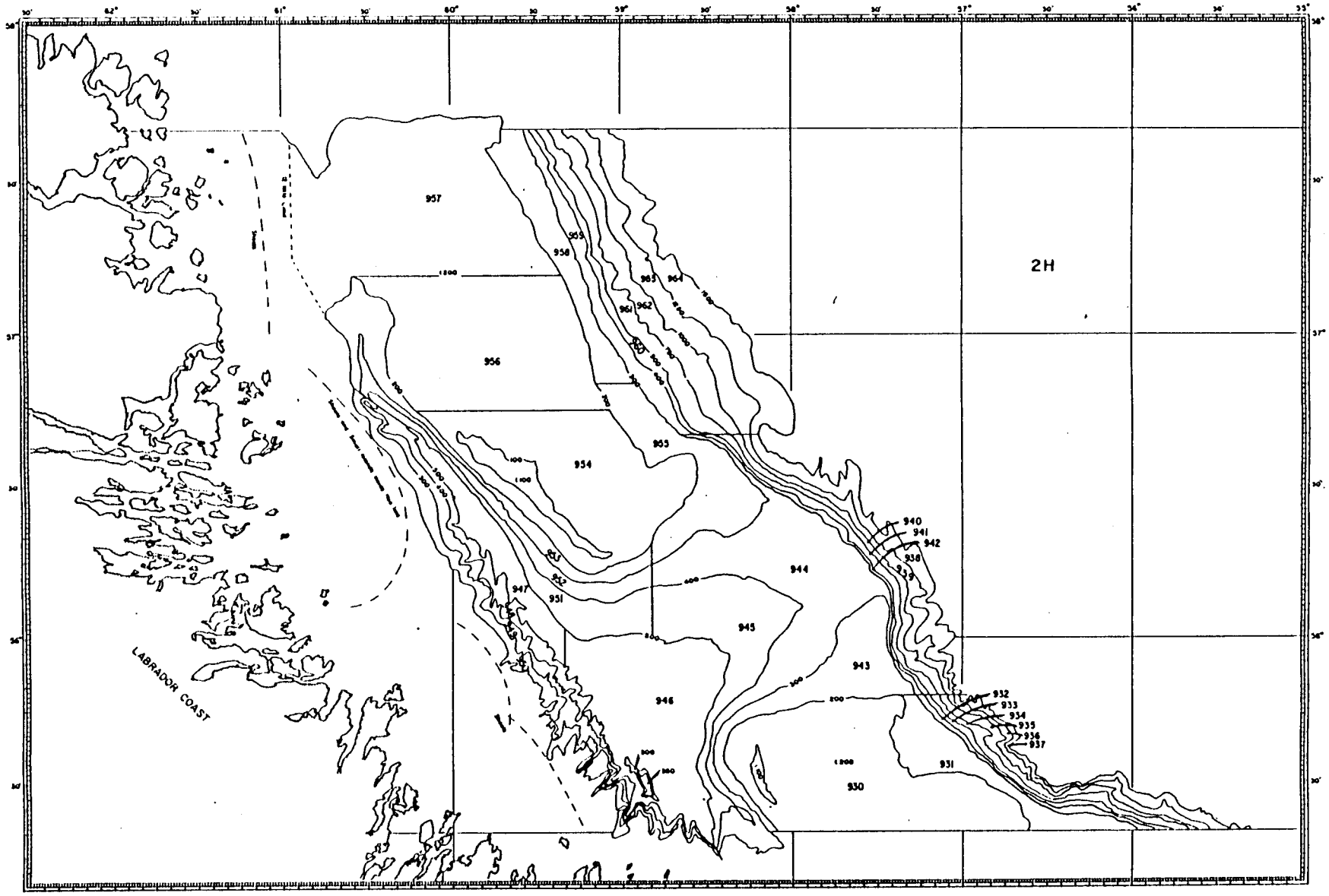

Fig. 3 Stratification scheme used in random stratified groundfish surveys in 2H

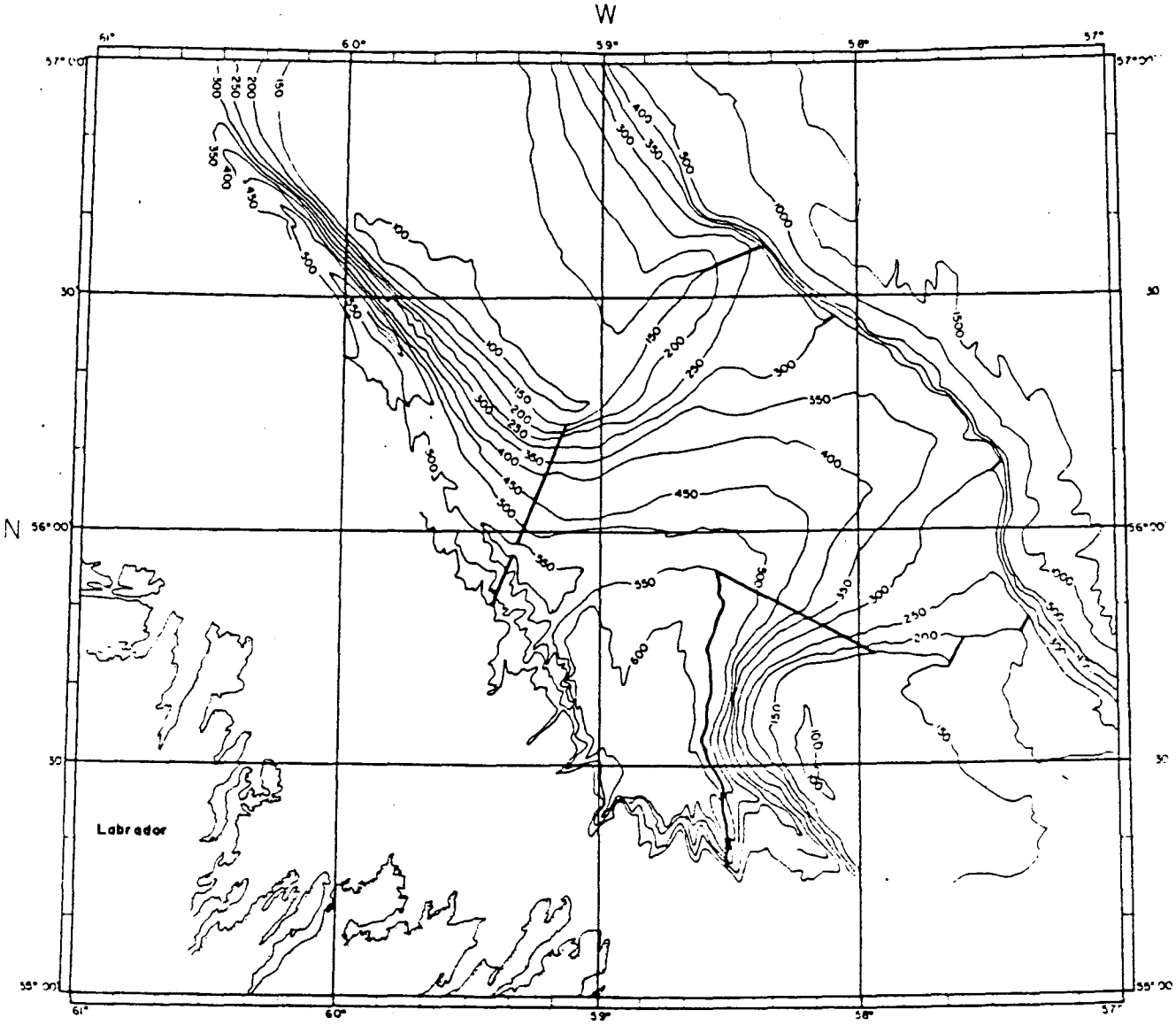

Fig. 4 Stratification scheme used in 2H portion of the shrimp random stratified survey