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An Evaluation of the Status of the Greenland Halibut Resource in NAFO Subarea 2 and Divisions 3KLM

by

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Catch History and TACs

A directed fishery for Greenland halibut began in the early-1960s in the deepwater bays of eastern Newfoundland. Catches increased from fairly low levels in the early-1960s to over 36,000 tons by 1969 and ranged from 24,000 tons to 39,000 tons over the next 15 years (Fig. 1). From 1985 to 1989, catches exceeded 20,000 tons only in 1987 (Table 1; Fig. 1). In 1990, an extensive fishery for Greenland halibut developed in the deepwater area of the NAFO Regulatory area near the boundary of Div. 3L and 3M in areas known as the Sackville Spur and the Flemish Pass. The development of this fishery quickly resulted in increased catches to about 47,000 tons in 1990. It was estimated that the catch in 1991 was at least as high as 65,000 tons (Table 1; Fig. 1 and 2) although some estimates put the catch at nearer 75,000 tons. Catches during 1992 remained high and are believed to be in the order of about 63,000 tons of which more than 10,000 tons were estimated as non-reported. The major participants in this fishery have been EC/Spain and EC/Portugal, as well as some non-member countries such as Panama. Catches listed as "Subarea 3 Outside" in Table 1 include all non-Canadian catches during recent years and are illustrated in Fig. 2 and 3 for comparison with traditional fishing areas.

Up until 1990, Canada, USSR, GDR, and Poland were usually the main participants in the fishery, although Portugal and Japan have become increasingly involved in the fishery since 1984. USSR/Russia catches were about 1100 tons in 1988-90 but increased to 8,200 tons in 1991, the highest level since 1975. Most of this catch in 1991 was taken in Div. 2H. Canadian catches peaked in 1980 at just over 31,000 tons while the largest non-Canadian catches before 1990 occurred in 1969-70. In most years, the most of the catch has come from Div. 3K and 3L, with catches from Div. 2G and 2H usually being relatively low (detailed breakdown in Brodie and Baird (1992)).

Canadian catches are taken mainly by gillnet and have been around 7,000-10,000 tons in recent years, down from a peak of about 28,000 tons in 1980. The 1991 gillnet catch of 3,500 tons was the lowest in the time series. The traditional gillnet fishery has been conducted by relatively small vessels fishing in the deepwater channels near the Newfoundland and Labrador coast as well as the Newfoundland east coast deepwater bays. However, this component of the fishery has been declining rapidly in recent years due to the lack of raw material in the area (see Bowering and Power 1993 (this meeting)). The Canadian gillnet catches in the last couple of years represent mainly those of a newly developed fishery along the deep edge of the continental slope especially in Div. 3K. Canadian otter trawl catches peaked at about 8,000 tons in 1982, declined to less than 1,000 tons in 1988, then increased to about 7,400 tons in 1991 which is the highest level since 1982. In 1992 , otter trawl catches were less than half that of 1991 due to low catch rates.

The TAC for this resource increased from 35,000 tons in 1980 to 55,000 tons in 1981-84, 75,000 tons in 1985, and 100,000 tons in 1986-89 (Fig. 1). These increases in TACs were the result of research vessel information on estimates of stock biomass which indicated both high levels of fishable biomass as well as prospects of several better than average recruiting year-classes. After observing a major reduction in stock biomass from the late-1970s to the late-1980s of about 50% the TAC was reduced to 50,000 tons in 1990 and this level been maintained since that time despite the substantive declines in stock size throughout the normal range of observed historical stock distribution.

Commercial Catch and Effort

Catch and effort data from the directed fishery for the period 1975 to 1989 were obtained from ICNAF/NAFO Statistical Bulletins and were combined with provisional 1990-1991 NAFO data and preliminary Canadian data for 1991-1992.

The catch/effort data were analyzed with a multiplicative model (Gavaris 1980) to derive a standardized catch rate series for hours fished. Effects

included in the model were a combination country-gear-tonnage class category type (CGT), month, NAFO division and year. Except for the year category type, individual observations of catch or effort data less than 10 units were eliminated prior to analysis as were categories where there were less than five samples in the database .

The regression was significant ($p < .05$), explaining 48% of the variation in catch rates (Table 2). The standardized catch rate series (Table 2, Fig. 4) shows high within year variability, especially in the late-1970s to mid-1980s. There was an increasing trend from the mid-1970s to about 1981 then declined to the lowest observed by 1986. The standardized catch rate showed stability for the next several years but declined further to very low levels during 1991-92. According to the diagnostics presented in Table 2 there appears to be little in the way of significant seasonal trends, however, it would seem that catch rates improved as the fishery moved progressively northward.

Catch-at-age and mean weights-at age

Length sampling data from the catches of Canada, Portugal, and Spain were available at this meeting, however, only Canadian aging data were provided. Table 3 contains a summary of the sampling data available from the Canadian catch in 1992 (Table 4); the calculated catch numbers-at-age, mean weights (kg)-at-age and associated statistics for the Canadian fisheries in 1992 are presented in Table 5. For many of the previous years' assessments, Canadian age sampling data often have been used to calculate estimates of total removals-at-age for catches where sampling was not available. Due to the serious uncertainties connected with catch information in new fast developing fisheries this is no longer considered acceptable. Consequently, catch-at-age for Canadian sampling and Canadian catch only are being re-calculated. At the time of this meeting only re-calculations for 1988-92 were available. Catch numbers-at-age, percent-at-age, catch biomass-at-age and catch weights (kg)-at-age are shown in Tables 6, 7, 8 and 9, respectively for the years 1988-92. Ages 6-8 dominated the catch in all years from 1988-91 (Table 6), which is typical of the Canadian catch in virtually all years. In 1992, as in most years, 7 is the peak age in the catch, followed by age 8, however, the proportion of age 6 fish is offset by increases in the proportions of ages 9-13 (Table 7). Catch biomass at ages 9-11 are higher individually than age 6 in 1992 and age 12 catch biomass is about the same as age 6 (Table 8). The mean weights (kg)-at-age in 1992 did not indicate any significant variation among years (Table 9) . It must be noted again that there are substantial sampling data for some non-Canadian fisheries for 1989-92 that have not been analyzed. These data are gradually being prepared and more information should be available for the next assessment of this stock, allowing continuation of the catch at age series beyond 1988.

Research vessel surveys

1) **Stratified-random groundfish surveys**

Results of Canadian stratified-random groundfish surveys in autumn in Div. 2J, 3K, and 3L are shown in Tables 10-15 respectively, first as mean weight (kg) per tow per stratum and secondly as biomass per stratum with associated confidence intervals both by division. Annual biomass estimates are also illustrated by division in Fig. 5 and cumulatively for Div. 2J, 3K and 3L in Fig. 6. Prior to 1992 (in which survey coverage was complete), the biomass indices were calculated using a multiplicative model to estimate strata not surveyed. It should be noted that in Div. 2J and 3K, the strata from 1001-1500 m were rarely surveyed and thus were not included in the indices. In Div. 3L, the deepest strata are only 732 m, and these areas were not surveyed in all years. No survey data are available in Div. 2GH since those presented in Brodie and Baird (1992).

Cumulative abundance indices at age from Div. 2J, 3K and 3L are provided in Table 16 and illustrated by year in Fig. 7. A summary of annual abundance by various age groups i.e. Ages 1+; Ages 4-6; Ages 7-9; Ages 10+ are shown in Fig. 8. In order to examine strengths of recruiting year-classes the abundance indices for ages 4, 5, and 6 are presented in Fig. 9 with the 1984-1986 year-classes highlighted. A rank of the year-class strengths of the 1982-86 year-classes are provided in Table 17 to illustrate the degeneration of strength over time.

Although there were no surveys in the fall of 1978-80 in Div. 3L estimates of biomass and abundance were obtained for these years by averaging estimates from spring surveys of adjacent years.

Biomass indices of Greenland halibut have been declining in Div. 2J since 1982 from a level of over 100,000 tons to less than 9,000 tons by 1992 (Tables 10 and 11; Fig. 5). The biomass index in Div. 3K peaked at 112,000 tons in 1984 but by 1987 biomass in this division also began a steep systematic decline similar to Div. 2J and reached a low of just over 20,000 tons in 1992 (Tables 12 and 13; Fig. 5). Estimates for Div. 3L to a depth of 366 meters were relatively stable from 1981 to 1990 at about 15,000 tons (Tables 14 and 15; Fig. 5). Between 1990 and 1991, the biomass index fell from nearly 17,000 tons to 7,300 tons and further to 6,700 tons in 1992 despite the fact that survey coverage in 1991-92 was complete to depths of more than 720 meters. The cumulative biomass index for all three divisions (Fig.6) has steadily declined from a high of about 225,000 tons to 37,000 tons in 1992 by far the lowest in the time series.

Longer term declines in abundance are less apparent than indicated by the biomass indices due to the fact that the declines are not consistent across all age classes (Fig. 7). An examination of the age structure in Table 16 and Fig. 8 shows that the ages 7+ abundance has been declining since about 1982 whereas

ages 4-6 were slowly increasing from the early-1980s to about 1989. From 1989 to 1992, on the other hand, these age groups declined very sharply and as with the biomass index fell to the lowest levels observed by 1992.

Abundance indices obtained during small mesh gear shrimp surveys in Div. 2H, 2J and 3K indicated that at very young ages, the 1984, 1985 and 1986 year-classes were all considered to be stronger than average (see Brodie 1991). An examination of the annual abundance indices at ages 4, 5, and 6 from the groundfish surveys in Div. 2J, 3K, and 3L show that at age 4 all three year-classes were indeed estimated to be higher than average (Fig. 9). By 1992, however, only the 1984 year-class appeared to be somewhat higher than average whereas the 1985 year-class was below average at age 6 and the 1986 year-class was well below average at age 6.

A ranking of the 1982-86 year-classes by strength as they appeared during the 1978-92 surveys showed that the 1982 year-class was a weak one (Table 17) at most ages, therefore, it was not surprising that at ages 8, 9, and 10 it was the weakest in the survey time series. The 1983-86 year-classes were usually from average to better than average in most years, however, in both the 1991 and 1992 surveys they were represented as the weakest observed.

2. Calculation of trawlable biomass from RV surveys in 1991

In 1991, Canada conducted a series of research vessel surveys in the deepwater slope areas from Davis Strait in Div. 0B to the Flemish Pass in Div. 3LM. These were directed primarily at Greenland halibut and a description of the survey methodologies and results can be found in Brodie et al 1992. In order to obtain a measure of trawlable biomass of Greenland halibut from Div. 0B to Div. 3LM, the results of these line transect surveys were converted into estimates of swept-area biomass and added to the results of the other surveys throughout this area.

The surveys of deepwater areas in Subarea 2 were carried out on the **Northern Kingfisher** and consisted of 6-11 sets between 1000 and 1500 meters, in line transects, in each Division. These were post-stratified, using the usual stratification schemes. The areas of all strata from 1000-1500 meters were added together and the number of trawlable units calculated in the normal way, accounting for tow distance and wing-spread of the trawl. The number of units in each division was then multiplied by the mean catch weight per tow for that division resulting in a biomass estimate. The results are shown in Table 18.

In Div. 3K, which was surveyed by the **Cape Adair**, virtually the same method was used, except the various depths were not grouped. The improved coverage in Div. 3K allowed the sets from 1000-1500 m to be post-stratified into one of strata 643, 644, 648, or 649. The total biomass estimate was about 22,000 tons (Table 18).

In Div. 3LM, the same technique was used, except that the strata had to be defined, as no stratification scheme of this area exists for depths greater than 732 meters (400 fm). A rudimentary stratification was devised by grouping sets from adjacent line transects (usually 2 transects and 2-4 sets per transect) and enclosing the area covered by the sets in a regular polygon. The area of the polygon was calculated, followed by the number of trawlable units, which were then multiplied by the mean catch weight per tow of the sets in that 'stratum', giving a biomass estimate. The size of these 'strata' ranged from 168 to 880 sq. n. mi. (mean 558), with between 2 and 11 (mean 5.6) sets in each. This density of approximately 1 set per 100 square miles is greater than that usually achieved in most Canadian stratified random surveys as a whole, but is probably close to the ratio found in the smaller strata surveyed. Fourteen such 'strata' were calculated for the entire deepwater area surveyed in Div. 3LM, and the biomass estimates summed to give 18,251 tons for Div. 3L and 22,870 tons for Div. 3M (Table 18).

Table 19 shows the compiled biomass estimates from Table 18, to give as complete an estimate as possible of the biomass of G.halibut during the last half of 1991. The total, including Div. 0B is about 208,000 tons, and about 163,000 tons excluding Div. 0B. These estimates must be treated with caution, given the methods used to calculate some of the individual estimates which were used to derive this total, as well as the differences in vessel, gear, survey design, survey coverage, and timing. No estimates of variance are available for many of the results, and most of the deepwater areas have not been surveyed since 1991. As well, it should be noted that there are some areas for which biomass estimates do not exist in 1991, such as the eastern and southern slopes of Flemish Cap deeper than 732 meters, the slopes of Div. 3NO deeper than 732 meters, all the inshore bays in the Newfoundland and Labrador area, and virtually all slope areas deeper than 1500 meters. It is likely that some of these areas have never been surveyed.

Maturity Data From Deepwater Gillnet Fishery

A sample of Greenland halibut from the deepwater gillnet fishery in Div. 3K in August 1992 was examined for sexual maturity stage. The sample consisted of 153 fish, 145 of which were female. Of the 145 females examined, 20 were determined to be sexually mature and of these, only 5 were identified as having spawned in 1992. The length frequency is shown in Fig.10 and the mean length of the mature females is 81.5 cm. compared to 69.5 cm. for the immature fish. These fish were sampled from a catch in a depth of over 1,000 meters.

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Table 1. Catches of Greenland halibut in Subarea 2 and 3KL with some estimates of catch in Div. 3MN of the NAFO Regulatory area.

Year	Div. 2G	Div. 2H	Div. 2J	Div. 3K	Div. 3L	Subarea 3	Total
					Inside	Outside	All areas
1977	1778	1524	8237	13446	6956	-	31941
1978	1899	1207	3723	24107	7596	-	38532
1979	577	1623	3415	19843	8610	-	34068
1980	36	444	1466	17923	12773	-	32642
1981	1799	2141	1358	16472	8912	-	30682
1982	369	8985	5931	6794	4135	-	26214
1983	111	5671	6028	11374	4655	-	27839
1984	214	4663	6368	8432	5120	1900	26697
1985	193	2358	6724	5775	3061	2200	20311
1986	455	1564	6823	4237	2794	2100	17973
1987	2700	2631	12464	6860	4786	3000	32441
1988	2068	2463	1971	6389	2019	3500	18410
1989	837	1821	2952	7840	2860	2600	18910
1990	905	1158	2911	4952	2020	35500	47446
1991	1556	2591	3034	2019	1590	54200	64990
1992	1264	107	381	3489	1694	56225	63160

Note: Catches in Subarea 2, 3K and 3L inside for 1992 are Canadian only. Catches in Subarea 3 outside include an estimate of 10,737 tons of non-reported catches.

TABLE 2. ANOVA RESULTS AND REGRESSION COEFFICIENTS FROM A MULTIPLICATIVE MODEL UTILIZED TO DERIVE A STANDARDIZED CATCH RATE SERIES FOR GREENLAND HALIBUT IN SA2 + DIV. 3KL. (1990-1992 BASED ON PROVISIONAL DATA)

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R..... 0.692
MULTIPLE R SQUARED..... 0.479

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	1.442E2	1.442E2	
REGRESSION	46	6.302E1	1.370E0	6.228
Country¦Gear¦TC (1)	14	1.672E1	1.194E0	5.429
Month (2)	11	8.018E0	7.289E-1	3.314
Division (3)	4	5.114E0	1.278E0	5.812
Year (4)	17	2.154E1	1.267E0	5.761
RESIDUALS	311	6.841E1	2.200E-1	
TOTAL	358	2.756E2		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
CGT	3125	INTERCEPT	-0.752	0.238	358
Month	9				
Division	22				
Year	75				
(1)	3124	1	0.111	0.225	5
	3126	2	0.473	0.173	13
	3127	3	0.242	0.209	7
	10127	4	0.975	0.209	8
	11125	5	0.069	0.154	16
	11126	6	-0.252	0.228	6
	11127	7	0.247	0.142	17
	14124	8	0.378	0.161	12
	14126	9	0.669	0.137	21
	14127	10	0.460	0.191	9
	16127	11	0.207	0.102	51
	20126	12	0.161	0.217	6
	20127	13	-0.174	0.127	28
	27125	14	0.153	0.116	24
(2)	1	15	0.331	0.190	9
	2	16	0.145	0.199	8
	3	17	-0.002	0.169	13
	4	18	-0.048	0.147	21
	5	19	0.250	0.152	18
	6	20	0.365	0.139	19
	7	21	0.063	0.106	39
	8	22	0.121	0.097	48
	10	23	-0.309	0.111	39
	11	24	0.020	0.103	47
	12	25	0.188	0.110	44
(3)	21	26	0.158	0.099	42
	23	27	-0.026	0.074	98
(3)	31	28	-0.398	0.102	81
	32	29	-0.297	0.137	26
(4)	76	30	-0.108	0.247	11
	77	31	0.108	0.239	19
	78	32	0.378	0.258	18
	79	33	0.167	0.253	10
	80	34	0.393	0.261	13
	81	35	0.193	0.246	17
	82	36	0.411	0.240	19
	83	37	0.360	0.234	24
	84	38	0.292	0.236	23
	85	39	0.115	0.238	21
	86	40	-0.203	0.237	25
	87	41	0.098	0.229	33
	88	42	-0.264	0.238	22
	89	43	-0.074	0.243	22
	90	44	-0.104	0.242	27
	91	45	-0.539	0.249	24
	92	46	-0.554	0.246	24

PREDICTED CATCH RATE

YEAR	LN TRANSFORM MEAN	LN TRANSFORM S.E.	RETRANSFORMED MEAN	RETRANSFORMED S.E.	CATCH	EFFORT
1975	-0.7524	0.0569	0.511	0.120	28681	56080
1976	-0.8602	0.0309	0.465	0.081	24598	52881
1977	-0.6439	0.0263	0.579	0.093	31941	55182
1978	-0.3744	0.0293	0.757	0.129	38532	50920
1979	-0.5849	0.0386	0.610	0.119	34068	55828
1980	-0.3597	0.0293	0.768	0.131	32642	42509
1981	-0.5593	0.0261	0.630	0.101	30682	48701
1982	-0.3410	0.0196	0.786	0.110	26206	33331
1983	-0.3920	0.0181	0.748	0.100	27839	37232
1984	-0.4602	0.0166	0.699	0.090	24809	35496
1985	-0.6370	0.0194	0.585	0.081	18610	31822
1986	-0.9558	0.0188	0.425	0.058	15878	37331
1987	-0.6541	0.0186	0.575	0.078	30938	53791
1988	-1.0165	0.0205	0.400	0.057	19043	47615
1989	-0.8260	0.0197	0.484	0.068	19465	40214
1990	-0.8562	0.0174	0.470	0.062	46796	99520
1991	-1.2913	0.0234	0.303	0.046	74989	247148
1992	-1.3067	0.0206	0.299	0.043	66000	220598

AVERAGE C.V. FOR THE RETRANSFORMED MEAN: 0.155

LEGEND FOR ANOVA RESULTS:

CODE CGT:
3124 = Can(NFLD) TC 4 ¦ 14124 = Japan TC 4
3125 = TC 5 ¦ 14126 = TC 6
3126 = TC 6 ¦ 14127 = TC 7
3127 = TC 7 ¦ 16127 = Poland TC 7
10127 = Former FRG TC 7 ¦ 20126 = Former USSR TC 6
11125 = Former DDR TC 5 ¦ 20127 = TC 7
11126 = TC 6 ¦ 27125 = Can(SP) TC 5
11127 = TC 7 ¦
All of the above CGT are Stern Trawlers

CODE DIVISION : 21 = 2G, 22 = 2H, 23 = 2J, 31 = 3K, 32 = 3L

Table 3. 1992 Greenland halibut sampling data for SA2+3KL - Canadian only - no observer data included.

Age-length key	Length frequency	Catch (tons)	Description
Offshore Q3 3K(365)	GN June 3K(1174)	390	GN, May-June, 3K
3L(198)	GN June 3L (595)	275	GN, May-June, 3L; other, June-Sept.
	GN Aug. 3K (153)	1578	GN, July-Aug., 2HJ, 3KL
Offshore Q4 3K (70)	GN Sept. 3K (144)	909	GN, Sept.-Oct., 2HJ, 3K
3L(161)	GN Sept. 3L (478)	553	GN, Sept.-Nov., 3L
Offshore Q1 3K(298)	OT Jan. 3K (561)	251	OT, Jan., 3KL
	OT Feb. 3K (470)	349	OT, Feb.-Mar., 3KL
Offshore Q2 3K(203)	OT April 3K (651)	559	OT, Apr.-May, 2J, 3KL
Q2 3L (96)	OT June 3L (339)	229	OT, June-July, 3KL
Offshore Q3 2G(128)	OT Aug. 2G (348)	1264	OT, Aug.-Nov., 2G
2H(128)	OT Aug. 2H (266)	26	OT, Aug.-Dec., 2H
Offshore Q4 3K(380)	OT Oct. 3K(1501)	525	OT, Aug.-Nov., 2J, 3K
3L (55)	OT Nov. 3L (303)	27	OT, Sept.-Nov., 3L

Table 4. Greenland halibut 1992 - Canadian catches.

	Gillnet						Otter Trawl							Other gears	
	2G	2H	2J	3K	3L	Total	2G	2H	2J	3K	3L	3MN	Total	all areas	Total
Jan.										200	51		251		251
Feb.										207	53		260		260
Mar.										83	6		89		89
Apr.										107	108		215		215
May				78	35	113			1	162	181		344		457
June				312	193	505				49	117		166	8	679
July		7		308	70	385			43	20			63	9	457
Aug.		24	162	754	253	1193	138	13	36	1			188	26	1407
Sept.		50	118	576	321	1065	237		6	155	1		399	4	1468
Oct.			7	158	227	392	168	12	8	318			506		898
Nov.					5	5	721			1	26		748		753
Dec.								1					1		1
Total		81	287	2186(1)	1104(2)		1264	26	94	1303	543			47	6935

(1) 2012 tons caught in offshore slope area.
(2) 878 tons caught in offshore slope area.

	2G	2H	2J	3K	3L	3MN	Total
Division Totals	1264	107	381	3489	1647	47	6935

TABLE.5.

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
★5	0.386	36.941	18	3.19	0.17
★6	0.560	41.342	255	19.90	0.08
★7	0.797	45.851	1319	35.38	0.03
★8	1.252	52.447	840	29.47	0.04
★9	1.937	59.760	359	19.61	0.05
★10	2.544	64.844	316	19.11	0.06
★11	3.169	69.232	268	19.04	0.07
★12	3.942	73.841	234	15.89	0.07
★13	5.111	79.779	119	9.46	0.08
★14	6.220	84.560	70	6.64	0.09
★15	7.194	88.257	36	4.50	0.12
16	8.290	92.186	8	1.61	0.20
★17	10.623	99.210	4	0.64	0.16

TABLE 6. CATCH AT AGE (000) OF G.HALIBUT FROM THE CANADIAN FISHERY IN SA 2+3 FROM 1988-1992.

AGE	1988	1989	1990	1991	1992
5	41	166	148	159	18
6	2124	1878	2979	1684	255
7	5429	7076	6706	4348	1319
8	1659	3568	1813	2121	840
9	404	597	300	900	359
10	130	90	78	295	316
11	25	19	34	89	268
12	10	4	21	80	234
13	2	2	11	21	119
14	2	1	13	21	70
15	1	1	9	4	36
16	1	1	2	1	8
17	0	1	1	1	4
5+	9828	13404	12115	9724	3846

TABLE 7. CATCH AT AGE (PERCENT) OF G.HALIBUT FROM THE CANADIAN FISHERY IN SA 2+3 FROM 1988-1992.

AGE	1988	1989	1990	1991	1992
5	0.4	1.2	1.2	1.6	0.5
6	21.6	14.0	24.6	17.3	6.6
7	55.2	52.8	55.4	44.7	34.3
8	16.9	26.6	15.0	21.8	21.8
9	4.1	4.5	2.5	9.3	9.3
10	1.3	0.7	0.6	3.0	8.2
11	0.3	0.1	0.3	0.9	7.0
12	0.1	0.0	0.2	0.8	6.1
13	0.0	0.0	0.1	0.2	3.1
14	0.0	0.0	0.1	0.2	1.8
15	0.0	0.0	0.1	0.0	0.9
16	0.0	0.0	0.0	0.0	0.2
17	0.0	0.0	0.0	0.0	0.1

TABLE 8. CATCH BIOMASS AT AGE (t) OF G. HALIBUT FROM THE CANADIAN FISHERY IN SA 2+3 FROM 1988-1992.

AGE	1988	1989	1990	1991	1992
5	16	67	62	65	7
6	1238	1054	1749	1004	143
7	4349	5413	5056	3513	1051
8	1919	3800	1907	2501	1052
9	663	967	463	1562	695
10	291	198	165	709	804
11	71	57	97	274	849
12	36	16	76	306	922
13	9	9	50	111	608
14	11	6	72	125	435
15	7	7	62	27	259
16	8	8	17	9	66
17	0	10	10	10	42
5+	8618	11609	9786	10215	6935

TABLE 9. WEIGHT AT AGE (KG) OF G. HALIBUT FROM THE CANADIAN FISHERY IN SA 2+3 FROM 1988-1992.

AGE	1988	1989	1990	1991	1992
5	0.397	0.403	0.416	0.410	0.386
6	0.583	0.561	0.587	0.596	0.560
7	0.801	0.765	0.754	0.808	0.797
8	1.157	1.065	1.052	1.179	1.252
9	1.640	1.619	1.542	1.736	1.937
10	2.240	2.201	2.116	2.404	2.544
11	2.837	2.980	2.850	3.078	3.169
12	3.593	3.981	3.632	3.821	3.942
13	4.456	4.455	4.524	5.294	5.111
14	5.512	5.623	5.567	5.940	6.220
15	6.821	6.962	6.906	6.674	7.194
16	7.782	7.547	8.546	9.001	8.290
17	0.000	9.659	9.601	9.659	10.623

Table 10. Average weight (kg) of Greenland halibut caught per set from fall research vessel surveys by the GADUS ATLANTICA in Division 2J. Numbers in parenthesis indicate the number of sets per stratum.

Stratum	Depth (m)	Gadus 3 1977	Gadus 12, 15 1978	Gadus 27, 29 1979	Gadus 42, 44 1980	Gadus 58 1981	Gadus 71, 72 1982	Gadus 86, 87, 88 1983	Gadus 101, 102, 103 1984	Gadus 116, 117, 118 1985	Gadus 131, 132, 133 1986	Gadus 145, 146, 147 1987
201	101-200	7.26(2)	1.36(3)	0.45(2)	2.83(3)	2.70(5)	9.67(6)	3.72(6)	4.83(3)	0.41(6)	0.98(5)	0.19(6)
202	201-300	21.34(2)	16.39(4)	22.00(4)	29.00(4)	34.50(2)	45.50(2)	30.75(2)	92.75(2)	10.05(2)	0.85(2)	17.76(2)
203	301-400	31.55(2)	40.08(3)	65.32(3)	21.13(4)	52.00(2)	64.33(3)	226.83(3)	179.25(2)	25.00(3)	107.94(2)	27.83(3)
204	401-500	175.70(2)	484.67(2)	260.36(2)	-	170.50(2)	284.00(3)	250.83(3)	260.00(2)	16.50(2)	267.35(2)	146.50(2)
205	101-200	20.97(4)	6.58(4)	10.21(2)	3.75(4)	14.94(8)	24.09(12)	14.25(8)	6.97(8)	1.44(8)	1.11(7)	0.35(10)
206	101-200	20.80(11)	7.78(7)	8.11(8)	10.11(7)	37.18(11)	18.72(18)	8.70(14)	10.86(11)	4.44(14)	4.03(11)	0.41(14)
207	101-200	77.77(5)	25.54(4)	10.39(5)	6.90(5)	18.22(9)	10.33(15)	7.65(10)	6.26(7)	2.18(13)	1.21(7)	0.26(11)
208	301-400	186.14(4)	145.98(5)	90.72(4)	149.62(4)	240.75(2)	348.67(3)	110.00(2)	496.17(3)	406.14(3)	189.64(2)	102.94(2)
209	201-300	65.25(7)	22.01(6)	88.44(7)	104.75(6)	55.67(6)	129.64(11)	52.77(7)	37.42(7)	34.47(9)	13.67(7)	8.55(8)
210	201-300	19.41(6)	8.81(7)	9.53(4)	10.80(5)	5.00(3)	20.88(6)	41.50(2)	26.88(4)	5.19(4)	3.67(3)	4.00(4)
211	301-400	34.96(2)	85.30(4)	46.97(4)	72.82(5)	35.75(2)	55.75(2)	134.75(2)	55.75(2)	164.00(3)	102.94(2)	44.48(2)
212	501-750	189.61(4)	150.82(2)	232.24(2)	103.50(2)	147.75(2)	144.10(5)	44.75(3)	70.83(3)	109.75(4)	382.79(3)	374.48(4)
213	201-300	16.46(8)	13.16(7)	9.59(7)	22.94(8)	29.33(6)	34.19(10)	23.25(10)	20.50(5)	35.83(9)	19.66(9)	8.82(9)
214	201-300	38.97(6)	48.18(7)	22.01(6)	15.40(5)	60.10(5)	84.31(8)	44.63(8)	59.75(4)	66.83(6)	8.86(6)	13.74(6)
215	201-300	37.68(4)	22.03(8)	7.11(6)	18.50(4)	12.30(5)	38.28(9)	14.46(8)	42.00(3)	16.21(6)	14.84(5)	11.87(7)
216	301-400	102.83(2)	145.78(3)	181.36(4)	186.25(4)	63.25(2)	215.25(2)	102.67(3)	173.00(2)	81.75(2)	34.64(2)	51.12(2)
217	401-500	141.95(3)	168.28(2)	87.15(2)	156.00(2)	41.00(2)	58.25(2)	64.50(2)	-	145.00(2)	108.69(2)	41.48(2)
218	501-750	217.92(2)	238.14(2)	-	129.50(2)	156.50(2)	40.00(2)	39.00(2)	-	30.25(2)	82.20(2)	48.97(2)
219	751-1000	-	-	-	-	48.00(2)	-	103.00(2)	-	83.75(2)	286.09(2)	83.95(2)
-220	1001-1250	-	56.92(2)	-	-	-	-	-	-	-	-	-
-221	1251-1500	-	-	-	-	-	-	-	-	-	-	-
222	301-400	115.32(4)	64.52(5)	76.69(4)	90.38(4)	55.75(2)	188.00(3)	131.50(3)	27.67(3)	34.00(2)	2.25(2)	32.98(2)
223	401-500	251.52(2)	84.82(2)	63.98(2)	136.00(2)	94.75(2)	88.00(2)	61.75(2)	113.75(2)	80.25(2)	126.93(2)	20.99(2)
224	501-750	173.65(2)	78.70(2)	122.47(2)	32.75(2)	115.00(2)	36.50(2)	50.50(2)	37.50(2)	28.00(2)	244.05(2)	63.46(2)
-225	1001-1250	39.95(2)	-	-	-	-	-	-	-	-	-	-
-226	1251-1500	-	3.17(2)	-	-	-	-	-	-	-	-	-
227	401-500	115.32(4)	86.86(2)	27.47(2)	73.75(2)	43.50(2)	54.90(5)	38.50(4)	36.67(3)	37.13(4)	20.66(3)	36.73(4)
228	201-300	6.53(8)	2.19(3)	8.39(6)	18.40(5)	8.00(6)	9.25(10)	10.33(6)	16.50(7)	6.36(7)	10.40(6)	5.28(7)
229	301-400	39.03(4)	14.40(4)	23.82(4)	25.63(4)	30.50(2)	21.50(4)	36.50(4)	11.00(3)	13.00(3)	14.66(3)	5.93(3)
230	501-750	243.28(3)	80.74(2)	-	169.44(2)	60.25(2)	30.80(2)	93.00(2)	21.50(2)	26.25(2)	102.19(2)	67.96(2)
231	751-1000	64.24(2)	138.57(2)	-	186.50(2)	-	93.75(2)	51.25(2)	98.75(2)	119.75(2)	28.23(2)	38.48(2)
-232	1001-1250	49.03(2)	27.21(2)	-	-	-	-	-	-	-	-	-
-233	1251-1500	-	-	-	-	-	-	-	-	-	-	-
234	201-300	49.03(2)	98.53(5)	65.21(4)	79.00(4)	52.00(2)	98.00(3)	46.71(3)	90.70(2)	18.33(3)	12.74(2)	5.16(3)
235	401-500	117.59(4)	107.05(2)	83.99(2)	128.00(2)	39.00(2)	89.67(3)	252.50(2)	82.00(3)	85.00(2)	182.65(2)	118.68(2)
236	751-1000	98.06(2)	-	-	-	44.75(2)	66.75(2)	101.00(2)	53.00(2)	85.25(2)	223.78(2)	93.95(2)
Estimated biomass (t) (surveyed area)		106,834	85,136	66,969	74,564	76,661	104,233	78,546	81,234	62,603	77,555	50,771
lower limit		90,708	62,722	53,867	54,260	49,579	82,993	63,918	55,160	47,364	47,571	25,957
upper limit		122,960	107,550	80,071	94,867	103,742	125,473	93,175	107,308	77,842	107,539	75,586
Estimated biomass (t) multiplicative model (excl. strata 220, 221, 225, 226, 232, 233)		109,184	86,732	75,280	84,311	79,715	107,864	78,546	89,273	62,603	77,555	50,771

Table 10. (Cont'd.)

Stratum	Depth (m)	Gadus 159, 160, 161 1988	Gadus 174, 175, 176 1989	Gadus 190, 191, 192 1990	Gadus 208 209, 210 1991	Gadus 224 225, 226 1992
201	101-200	0.08(8)	0.80(8)	0.53(6)	0.06(3)	0.00(3)
202	201-300	-	0.47(2)	3.37(2)	2.13(3)	1.30(3)
203	301-400	34.00(2)	89.98(3)	24.33(2)	30.78(3)	5.59(3)
204	401-500	166.00(2)	567.23(2)	125.15(2)	56.08(3)	37.17(3)
205	101-200	1.05(6)	0.39(10)	0.30(8)	0.35(2)	0.06(4)
206	101-200	1.78(14)	0.65(13)	0.94(11)	0.12(6)	0.19(10)
207	101-200	0.05(7)	0.04(10)	0.00(7)	0.00(2)	0.00(3)
208	301-400	84.00(2)	201.75(2)	170.96(2)	36.88(3)	20.72(3)
209	201-300	11.22(5)	10.28(8)	8.20(6)	2.52(7)	1.85(5)
210	201-300	7.83(3)	6.76(4)	11.83(3)	2.37(7)	2.35(7)
211	301-400	81.50(2)	23.33(2)	151.35(2)	17.75(5)	5.85(6)
212	501-750	75.25(2)	42.75(4)	80.02(3)	21.30(2)	26.80(2)
213	201-300	5.85(8)	2.35(9)	2.26(8)	0.25(14)	0.61(19)
214	201-300	22.08(6)	5.97(6)	5.09(5)	0.77(15)	1.20(14)
215	201-300	9.01(7)	5.39(6)	7.04(6)	3.40(15)	2.63(10)
216	301-400	3.50(2)	12.55(2)	7.90(2)	3.09(3)	3.12(3)
217	401-500	43.75(2)	6.03(2)	32.08(2)	4.33(3)	3.44(3)
218	501-750	58.50(2)	17.98(2)	42.15(2)	21.20(2)	2.99(2)
219	751-1000	45.25(2)	35.00(2)	93.92(2)	12.50(2)	8.10(2)
-220	1001-1250	-	-	-	-	-
-221	1251-1500	-	-	-	-	-
222	301-400	41.50(2)	8.00(2)	14.22(2)	0.97(3)	2.15(3)
223	401-500	63.50(2)	15.76(2)	23.43(2)	3.05(3)	3.36(3)
224	501-750	63.00(2)	2.60(2)	12.35(2)	6.60(2)	5.27(2)
-225	1001-1250	-	-	-	-	-
-226	1251-1500	-	-	-	-	-
227	401-500	32.00(3)	52.37(4)	40.83(3)	12.77(6)	19.70(6)
228	201-300	2.60(5)	5.27(8)	8.53(6)	2.13(3)	1.48(5)
229	301-400	3.23(3)	3.08(3)	2.25(2)	7.07(3)	9.13(3)
230	501-750	44.25(2)	43.28(2)	46.48(2)	30.95(2)	58.00(2)
231	751-1000	170.50(2)	-	124.75(2)	27.40(2)	34.03(2)
-232	1001-1250	-	-	-	-	-
-233	1251-1500	-	-	-	-	-
234	201-300	20.25(2)	10.18(2)	4.90(2)	2.92(3)	1.84(3)
235	401-500	70.25(2)	145.25(2)	185.95(2)	12.83(3)	9.05(3)
236	751-1000	13.00(2)	-	110.69(2)	110.75(2)	39.28(2)
Estimated biomass (t) (surveyed area)		35,447	42,339	38,616	11,249	8,630
lower limit		26,531	-74,245	29,215	8,574	5,267
upper limit		44,364	158,923	48,018	13,925	11,993
Estimated biomass (t) multiplicative model (excl. strata 220, 221, 225, 226, 232, 233)		35,450	46,920	38,616	11,249	-

Table 1. Biomass (tons) of Greenland halibut per stratum from fall surveys in Division 2J.

Stratum	Depth (m)	Area	Units	Year 1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
206	101-200	2582	194	4031	1508	1572	1959	7206	3628	1686	2105	861	781	79	345	126	182	23	37
207		2246	169	13112	4306	1752	1183	3072	1742	1290	1055	368	204	44	8	7	0	0	0
201		1427	107	778	146	48	303	289	1036	398	517	44	105	20	9	86	57	6	0
205		1823	137	2870	900	1397	513	2044	3297	1950	954	197	152	48	144	53	41	48	8
215	201-300	1270	95	3592	2100	678	1764	1173	3649	1378	4004	1545	1415	1132	859	514	671	324	251
234		508	38	1870	3757	2487	3012	1983	3737	1781	3459	699	486	197	772	388	187	111	70
228		1428	107	700	235	899	1972	858	992	1107	1769	682	1116	566	279	565	914	228	159
214		1171	88	3425	4235	1935	1354	5283	7411	3923	5252	5874	779	1208	1941	525	447	68	105
202		440	33	705	541	727	958	1139	1503	1016	3063	332	281	587	0	16	111	70	43
210		774	58	1128	512	554	627	290	1213	2411	1562	302	213	232	458	393	687	138	137
213		1725	129	2131	1704	1242	2970	3798	4427	3011	2654	4639	2546	1142	757	304	293	32	79
209		1608	121	7876	2657	10675	12644	6720	15648	6370	4517	4161	1650	1032	1354	1241	990	304	223
208	301-400	448	34	6260	4909	3051	5032	8096	11725	3699	16686	13658	6377	3462	2825	6785	5749	1240	697
229		567	43	1661	613	1014	1091	1298	915	1553	468	553	624	252	137	131	96	301	389
203		480	36	1137	1444	2354	761	1874	2318	8173	6459	901	3889	1003	1225	3242	877	1109	201
222		441	33	3817	2136	2539	2992	1846	6223	4353	916	1126	74	1092	1374	265	471	32	71
211		330	25	866	2113	1164	1804	886	1381	3338	1381	4062	2550	1102	2019	578	3749	440	145
216		384	29	2964	4202	5228	5369	1823	6205	2959	4987	2356	998	1474	101	362	228	89	90
227	401-500	686	51	5938	4473	1415	3798	2240	2827	1983	1888	1912	1064	1891	1648	2697	2103	658	1014
217		268	20	2856	3385	1753	3138	825	1172	1298	0	2917	2187	834	880	121	645	87	69
223		180	14	3398	1146	864	1838	1280	1189	834	1537	1084	1715	284	858	213	317	41	45
204		354	27	4669	12879	6918	0	4531	7547	6665	6909	438	7104	3893	4411	15073	3326	1490	988
235		420	32	3707	3375	2648	4035	1230	2827	7961	2585	2680	5762	3742	2215	4579	5862	404	285
230	501-750	237	18	4328	1436	0	3014	1072	548	1654	382	467	1819	1209	787	770	827	551	1032
212		664	50	9451	7517	11575	5159	7364	7182	2230	3530	5470	19079	18665	3751	2131	3988	1062	1336
218		420	32	6870	7508	0	4083	4934	1261	1230	0	954	2592	1544	1844	587	1329	668	94
224		270	20	3519	1595	2482	664	2331	740	1024	760	567	4949	1288	1277	53	250	134	107
236	751-1000	122	9	898	0	0	0	410	611	925	485	781	2050	860	119	0	1014	1014	360
231		182	14	878	1893	0	2548	0	1281	700	1349	1636	388	526	2329	0	1704	374	465
219		213	16	0	0	0	0	767	0	1647	0	1339	4574	1342	723	560	1502	200	130
-225	1001-1250	177	13	531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-232		236	18	869	482	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-220		324	24	0	1384	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-233	1251-1500	180	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-221		268	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-226		180	14	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Biomass (t)			106834	85135	66969	74565	76660	104234	78547	81234	62605	77522	50747	35450	42342	38617	11248	8630

Table 12. Average weight (kg) of Greenland halibut caught per set from fall research vessel surveys by the GADUS ATLANTICA in Division 3K. Numbers in parenthesis indicate the number of sets per stratum.

Stratum	Depth (m)	Gadus 12, 15 1978	Gadus 27, 29 1979	Gadus 42, 44 1980	Gadus 58, 59 1981	Gadus 71, 72 1982	Gadus 86, 87, 88 1983	Gadus 101, 102, 103 1984	Gadus 116, 117, 118 1985	Gadus 131, 132, 133 1986	Gadus 145, 146, 147 1987	Gadus 159, 160, 161 1988	Gadus 174, 175, 176 1989
-618	101-200							1.50(5)	4.43(6)	0.20(5)	0.07(7)	0.03(6)	0.33(8)
-619	101-200							1.90(7)	0.57(7)	0.22(5)	0.06(8)	0.01(7)	0.27(8)
620	201-300	66.73(12)	29.39(10)	28.31(12)	25.72(10)	22.33(9)	19.25(10)	13.08(13)	14.68(14)	12.74(9)	5.96(14)	9.52(12)	1.59(15)
621	201-300	126.48(12)	114.39(11)	48.40(13)	32.77(11)	14.68(14)	31.87(12)	18.32(14)	30.53(15)	5.01(14)	8.16(12)	6.77(10)	8.35(17)
622	401-500	143.11(2)	119.44(3)	43.75(2)	132.50(2)	120.83(3)	224.00(2)	143.75(4)	60.38(4)	563.76(2)	207.12(3)	221.33(3)	148.27(3)
623	301-400	159.51(6)	33.53(4)	83.17(6)	83.33(4)	146.20(5)	217.17(6)	270.00(5)	67.50(6)	179.62(4)	136.80(5)	135.70(5)	82.06(6)
624	201-300	9.36(7)	10.60(4)	5.13(4)	3.75(2)	5.25(4)	2.38(4)	5.00(4)	4.97(4)	3.60(2)	5.80(3)	2.30(3)	3.30(3)
625	301-400	17.56(6)	14.24(5)	14.50(6)	31.50(4)	8.75(2)	66.33(3)	42.95(5)	55.60(5)	39.00(3)	52.63(4)	30.58(4)	7.04(4)
626	301-400	60.74(7)	42.18(5)	139.90(5)	58.20(5)	120.40(5)	101.75(4)	217.75(6)	124.69(5)	155.00(4)	66.30(5)	95.10(5)	98.92(5)
627	401-500	71.67(2)	41.73(3)	68.50(2)	189.75(6)	124.43(7)	220.83(6)	300.56(8)	140.36(7)	263.60(5)	136.85(6)	145.15(5)	243.56(6)
628	301-400	43.18(7)	35.75(5)	68.21(6)	16.33(6)	12.92(6)	36.08(6)	27.21(7)	81.96(6)	60.38(4)	42.46(5)	40.30(5)	29.90(4)
629	301-400	20.57(6)	13.38(2)	26.10(5)	31.33(3)	68.50(2)	65.67(3)	31.13(4)	22.00(4)	54.00(3)	79.67(3)	100.50(2)	66.27(3)
630	301-400	27.23(2)	10.78(4)	21.37(4)	117.25(2)	-	67.75(2)	7.73(3)	33.16(4)	30.75(2)	56.50(3)	56.33(3)	39.35(3)
631	401-500	45.42(2)	23.30(3)	34.50(3)	68.60(5)	38.00(2)	66.70(5)	105.30(5)	70.86(7)	67.58(4)	108.75(6)	76.52(6)	111.82(7)
632	201-300	3.20(7)	2.83(4)	11.69(4)	6.25(2)	7.50(3)	3.43(3)	-	8.57(3)	2.25(2)	2.00(2)	0.80(2)	1.58(2)
633	301-400	8.10(9)	9.05(10)	16.10(10)	9.98(8)	7.93(7)	12.38(12)	12.05(10)	14.46(12)	19.70(8)	19.61(11)	13.24(8)	22.34(10)
634	201-300	6.31(9)	9.44(8)	5.29(7)	5.41(7)	14.09(11)	6.60(5)	5.93(7)	4.68(9)	3.72(5)	9.05(11)	3.45(6)	2.69(7)
635	201-300	6.69(9)	6.12(8)	19.25(6)	12.00(5)	17.10(5)	7.83(6)	10.19(8)	4.21(7)	11.02(6)	11.08(6)	4.54(5)	6.99(7)
636	201-300	5.58(7)	4.67(7)	11.79(7)	12.75(6)	21.85(10)	4.05(6)	7.40(8)	4.34(8)	3.40(4)	1.70(7)	3.97(6)	3.52(5)
637	201-300	3.93(9)	4.15(7)	6.00(6)	8.25(6)	9.71(7)	14.80(5)	4.97(6)	13.50(7)	10.95(4)	9.08(6)	3.96(8)	3.37(5)
638	301-400	15.15(8)	13.24(9)	11.11(9)	21.31(8)	20.39(15)	18.05(11)	12.55(10)	34.52(11)	25.45(4)	18.68(10)	11.00(8)	11.49(11)
639	301-400	5.13(9)	7.83(4)	6.58(6)	7.38(6)	19.05(10)	11.71(7)	2.41(8)	4.69(8)	7.33(6)	3.60(7)	3.23(6)	2.76(8)
640	401-500	32.91(2)	-	59.25(2)	36.00(2)	21.50(2)	-	13.75(2)	18.50(3)	10.25(2)	20.25(2)	6.25(2)	9.01(2)
641	501-750	5.45(2)	26.77(2)	31.75(2)	21.80(2)	24.50(4)	61.33(3)	62.50(3)	22.69(4)	-	25.90(3)	-	-
642	751-1000	18.63(2)	-	33.25(2)	9.33(3)	33.33(6)	-	81.35(6)	33.50(5)	-	27.70(5)	-	-
-643	1001-1250	7.49(2)	12.94(2)	-	-	-	-	-	-	-	-	-	-
-644	1251-1500	15.22(2)	4.99(2)	-	-	-	-	-	-	-	-	-	-
645	401-500	18.61(2)	-	12.00(2)	21.75(2)	17.67(3)	3.25(2)	54.25(2)	41.83(3)	-	25.50(2)	11.40(2)	3.23(2)
646	501-750	59.24(2)	88.96(2)	51.50(2)	63.25(2)	15.50(2)	91.25(2)	100.50(2)	66.50(3)	-	30.00(2)	-	-
647	751-1000	160.23(2)	48.13(2)	89.25(2)	82.50(2)	39.50(2)	-	-	114.72(3)	-	-	-	-
-648	1001-1250	15.45(2)	-	-	-	-	-	-	-	-	-	-	-
-649	1251-1500	10.91(2)	-	-	-	-	-	-	-	-	-	-	-
Estimated biomass (t) (surveyed area)		99,134	66,330	70,623	77,966	70,870	97,790	111,612	78,804	106,387	76,482	68,270	68,878
lower limit		68,648	49,413	55,888	64,299	55,559	76,916	86,170	63,917	76,206	57,939	51,398	53,665
upper limit		129,622	83,247	85,358	91,633	86,182	118,664	137,055	93,691	136,567	95,025	85,143	84,090
Estimated biomass (t) multiplicative model (excl. strata 618, 619, 643, 644, 648, 649)		96,896	65,670	70,668	78,098	72,567	105,647	115,399	78,355	113,507	79,475	73,265	73,154

Table 12 (Cont'd.)

Stratum	Depth (m)	Gadus 190, 191, 192 1990	Gadus 208, 209, 210 1991	Gadus 224 225, 226 1992
-618	101-200	0.00(4)	0.0(5)	0.00(3)
-619	101-200	0.00(5)	0.0(4)	0.00(3)
620	201-300	1.13(9)	2.04(14)	0.25(3)
621	201-300	0.98(11)	2.44(5)	3.19(3)
622	401-500	385.48(2)	61.47(3)	29.45(3)
623	301-400	35.77(5)	31.56(6)	10.95(3)
624	201-300	3.60(4)	3.18(2)	2.70(3)
625	301-400	34.64(4)	15.63(3)	2.90(3)
626	301-400	23.49(4)	25.35(3)	23.12(3)
627	401-500	115.92(5)	63.20(3)	15.30(3)
628	301-400	17.46(5)	6.33(3)	3.23(3)
629	301-400	15.55(2)	6.20(4)	13.58(3)
630	301-400	28.04(2)	28.55(3)	10.63(3)
631	401-500	34.94(6)	112.37(6)	19.80(3)
632	201-300	7.20(2)	1.63(10)	3.10(13)
633	301-400	11.99(11)	12.02(25)	9.14(25)
634	201-300	3.18(7)	2.37(25)	0.90(25)
635	201-300	1.71(6)	0.26(4)	0.46(3)
636	201-300	2.03(7)	1.24(3)	0.92(3)
637	201-300	5.42(5)	1.99(6)	1.01(3)
638	301-400	27.57(9)	8.49(25)	8.19(25)
639	301-400	4.57(7)	4.19(3)	4.71(25)
640	401-500	16.48(2)	12.00(3)	4.95(3)
641	501-750	39.92(2)	8.30(2)	6.53(2)
642	751-1000	45.20(3)	38.05(2)	94.16(2)
-643	1001-1250	-	-	-
-644	1251-1500	-	-	-
645	401-500	20.40(2)	3.87(3)	8.02(3)
646	501-750	10.40(2)	27.70(3)	9.27(3)
647	751-1000	95.70(2)	24.85(3)	14.08(3)
-648	1001-1250	-	-	-
-649	1251-1500	-	-	-
Estimated biomass(t) (surveyed area)		60,272	35,987	20,714
lower limit		40,175	28,656	16,511
upper limit		80,368	43,318	24,917
Estimated biomass(t) multiplicative model (excl. strata 618, 619, 643, 644, 648, 649)		60,354	36,035	-

Table 13. Biomass (tons) per stratum of Greenland halibut from fall surveys in Division 3K.

Stratum	Depth (m)	Area	Units	Year														
				1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
-618	101-200	1455	109	0	0	0	0	0	0	164	484	22	8	3	36	0	0	0
-619		1588	119	0	0	0	0	0	0	226	68	26	7	1	32	0	0	0
637	201-300	1132	85	334	353	510	701	825	1258	422	1147	930	772	336	286	461	169	86
632		447	34	107	95	392	210	252	115	0	288	75	67	27	53	242	55	104
635		1274	96	640	585	1841	1148	1635	749	974	403	1054	1060	434	868	164	25	44
636		1455	109	609	510	1288	1393	2386	442	808	474	371	186	434	384	222	135	100
621		2859	215	27144	24549	10387	7033	3150	6840	3932	6552	1075	1751	1453	1792	210	524	685
624		668	50	469	532	257	188	263	119	251	249	181	291	115	165	181	159	135
634		1618	121	766	1147	642	657	1711	802	720	568	452	1099	419	327	386	288	109
620		2709	203	13570	5976	5757	5230	4541	3914	2660	2985	2591	1212	1936	323	230	415	51
639	301-400	1463	110	583	860	723	810	2092	1286	265	515	805	395	355	303	502	460	517
638		2059	155	2342	2046	1717	3294	3151	2790	1940	5335	3933	2887	1700	1776	4261	1312	1266
625		850	64	1120	909	925	2010	558	4232	2740	3548	2488	3358	1951	449	2210	997	185
628		1085	81	3517	2912	5555	1330	1052	2939	2216	6675	4918	3458	3282	2435	1422	516	263
623		1027	77	12297	2585	6412	6424	11271	16742	20815	5204	13847	10546	10461	6326	2758	2433	844
626		919	69	4190	2910	9651	4015	8306	7019	15021	8602	10693	4574	6560	6824	1620	1749	1595
633		2179	164	1325	1480	2633	1632	1297	2025	1971	2365	3222	3208	2166	3654	1961	1966	1495
630		544	41	1112	440	873	4788	0	2767	316	1354	1256	2307	2300	1607	1145	1166	434
629		495	37	764	497	970	1164	2545	2440	1157	817	2006	2960	3734	2462	578	230	505
645	401-500	204	15	285	0	184	333	271	50	831	641	0	390	175	49	312	59	123
627		1194	90	6424	3740	6139	17007	11152	19792	26938	12580	23626	12265	13009	21830	10390	5664	1371
631		1202	90	4098	2102	3113	6190	3429	6018	9501	6394	6098	9812	6904	10089	3153	10139	1787
622		632	47	6789	5666	2076	6286	5732	10627	6820	2864	26745	9826	10500	7034	18287	2916	1397
640		198	15	489	0	881	535	320	0	204	275	152	301	93	134	245	178	74
646	501-750	333	25	1481	2224	1287	1581	387	2281	2512	1662	0	750	0	0	260	692	232
641		584	44	239	1174	1392	956	1074	2689	2740	995	0	1135	0	0	1750	364	286
642	751-1000	931	70	1302	0	2324	652	2329	0	5685	2341	0	1936	0	0	3159	2659	6580
647		409	31	4919	1478	2740	2533	1213	0	0	3522	0	0	0	0	2938	763	432
-643	1001-1250	1266	95	712	1230	0	0	0	0	0	0	0	0	0	0	0	0	0
-648		232	17	269	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-644	1251-1500	954	72	1090	357	0	0	0	0	0	0	0	0	0	0	0	0	0
-649		263	20	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Biomass (t)				99182	66356	70668	78098	70944	97934	111829	78907	106567	76561	68350	69041	59045	36034	20700

Table 14. Average weight (kg) of Greenland halibut per set from fall research vessel surveys in Division 3L. Numbers in parentheses indicate number of sets per stratum.

Stratum	Depth (m)	ATC 323, 324, 325 1981	ATC 333, 334 1982	W.T. 7, 8, 9 1983	W.T. 16, 17, 18 1984	W.T. 37, 38, 39 1985	A.N. 72 1986	W.T. 65 1987	W.T. 78 1988	W.T. 87 1989	W.T. 101 1990	W.T. 113-115 1991	W.T. 129,130 1992
328	51-100	-	-	-	0.20(4)	0.09(8)	0.52(6)	0.25(4)	0.06(7)	0.10(7)	0.01(5)	0.00(3)	0.00(3)
341	51-100	0.50(3)	0.19(4)	0.80(4)	0.50(5)	0.26(7)	0.04(7)	0.62(9)	0.31(8)	0.26(8)	0.18(6)	0.00(3)	0.30(3)
342	51-100	1.33(3)	2.83(3)	0.87(4)	0.00(2)	0.73(3)	0.20(3)	0.00(3)	0.23(3)	0.17(3)	0.56(2)	0.01(2)	0.00(3)
343	51-100	0.88(4)	-	0.53(3)	0.00(4)	0.08(3)	0.02(3)	0.00(3)	0.00(3)	0.27(3)	0.09(3)	0.00(3)	0.00(2)
344	101-150	6.94(4)	1.00(3)	4.34(6)	0.18(6)	2.46(9)	4.63(7)	2.88(4)	3.20(7)	6.89(7)	1.13(6)	0.34(2)	0.00(2)
345	151-200	20.75(4)	8.67(6)	9.25(8)	39.60(7)	36.61(9)	6.26(4)	18.00(2)	23.07(7)	12.43(7)	24.62(5)	2.07(4)	2.55(4)
346	151-200	9.00(3)	11.63(4)	17.50(5)	27.33(6)	35.80(5)	26.06(3)	22.50(4)	16.00(5)	25.75(4)	32.63(3)	12.73(15)	5.82(14)
347	101-150	1.83(3)	3.02(4)	2.58(6)	0.17(6)	0.76(4)	2.94(4)	0.13(2)	20.30(5)	15.10(5)	3.94(2)	0.01(4)	0.00(2)
348	51-100	0.42(6)	2.08(5)	0.30(11)	0.11(11)	0.61(14)	0.88(5)	0.43(9)	0.44(10)	0.29(9)	0.26(11)	0.00(4)	0.00(4)
349	51-100	0.09(7)	0.03(5)	0.43(9)	0.10(14)	0.07(10)	0.09(9)	0.24(10)	0.00(9)	0.04(10)	0.06(7)	0.00(5)	0.00(5)
350	31-50	0.00(6)	0.00(2)	0.00(8)	0.00(12)	0.00(9)	0.00(11)	0.00(9)	0.00(10)	0.00(10)	0.00(8)	0.00(16)	0.00(4)
363	31-50	0.00(4)	0.00(3)	0.00(3)	0.00(8)	0.00(10)	0.00(7)	0.00(9)	0.00(10)	0.00(9)	0.00(8)	0.00(17)	0.00(25)
364	51-100	0.49(9)	0.25(11)	0.87(11)	0.00(10)	0.05(18)	0.14(5)	0.53(14)	0.27(14)	0.35(11)	0.21(12)	0.01(4)	0.03(5)
365	51-100	2.88(4)	2.75(4)	1.30(5)	0.30(4)	0.12(8)	1.08(5)	3.18(6)	0.30(5)	0.90(5)	0.31(4)	0.01(3)	0.07(3)
366	101-150	5.00(3)	9.58(6)	6.00(4)	6.23(11)	18.09(9)	10.90(4)	8.11(7)	20.64(7)	11.50(7)	6.81(6)	0.28(21)	1.23(24)
368	151-200	21.50(2)	28.75(2)	-	17.75(2)	29.00(2)	6.66(2)	9.00(2)	21.75(2)	27.25(2)	184.63(2)	9.81(6)	7.37(10)
369	101-150	13.25(2)	13.00(4)	14.00(6)	5.19(7)	13.33(6)	6.36(3)	9.25(4)	3.64(5)	4.08(5)	12.40(4)	4.76(9)	1.15(8)
370	51-100	0.00(4)	0.50(6)	0.44(6)	0.39(7)	1.52(9)	2.30(2)	0.25(6)	0.01(7)	0.04(6)	0.73(5)	0.00(3)	0.00(3)
371	31-50	0.01(4)	0.00(5)	0.00(5)	0.00(7)	0.00(7)	0.04(3)	0.00(5)	0.00(6)	0.00(4)	0.00(5)	0.01(3)	0.00(3)
372	31-50	0.00(5)	0.00(7)	0.00(4)	0.00(13)	0.00(17)	0.01(9)	0.00(13)	0.00(13)	0.00(12)	0.00(10)	0.00(26)	0.00(24)
384	31-50	-	0.00(4)	0.00(3)	0.00(6)	0.00(8)	0.08(5)	0.00(6)	0.00(6)	0.00(5)	0.00(4)	0.00(18)	0.00(19)
385	51-100	0.26(8)	2.19(8)	3.20(5)	0.50(12)	1.24(12)	4.67(8)	2.44(9)	0.00(13)	0.17(11)	0.72(7)	0.00(5)	0.61(5)
386	101-150	37.00(3)	21.75(4)	-	12.69(8)	37.50(5)	8.34(4)	6.13(4)	4.86(5)	10.90(5)	11.57(4)	5.70(3)	9.62(3)
387	151-200	67.50(2)	43.67(3)	-	49.00(3)	42.25(4)	8.00(2)	26.33(3)	12.75(4)	15.33(3)	12.00(3)	24.53(5)	13.87(3)
388	151-200	-	2.33(3)	-	24.00(2)	24.75(2)	-	17.25(2)	19.00(2)	15.50(2)	4.18(2)	12.73(3)	30.03(3)
389	101-150	-	7.88(4)	-	19.25(6)	26.80(5)	9.80(4)	11.25(4)	8.88(4)	10.25(2)	6.28(3)	4.60(3)	8.52(3)
390	51-100	0.00(3)	3.50(4)	0.07(3)	0.00(3)	2.72(7)	3.62(6)	1.06(8)	0.00(8)	0.57(7)	0.52(6)	2.17(3)	0.32(3)
391	101-150	-	2.75(2)	21.50(2)	18.75(2)	29.75(7)	8.25(2)	4.10(2)	2.40(2)	13.00(2)	6.03(2)	17.25(3)	4.10(3)
392	151-200	-	14.00(2)	15.25(2)	26.50(2)	25.00(2)	18.00(2)	8.25(2)	13.25(2)	12.00(2)	10.73(2)	22.10(3)	6.72(3)
729	201-300	-	-	-	70.75(2)	30.50(2)	17.92(2)	-	-	-	22.60(2)	25.55(3)	19.30(2)
730	301-400	-	-	-	12.25(2)	6.75(2)	-	-	-	-	-	15.27(2)	11.07(2)
731	201-300	-	-	-	41.75(2)	15.00(2)	-	-	-	-	18.20(2)	7.18(3)	14.33(3)
732	301-400	-	-	-	12.63(2)	21.00(2)	-	-	-	-	16.25(2)	4.10(2)	15.52(2)
733	201-300	-	-	-	12.75(4)	35.83(3)	-	-	-	-	14.33(2)	26.42(3)	27.58(3)
734	301-400	-	-	-	17.67(3)	37.00(2)	-	-	-	-	18.40(2)	13.18(2)	7.78(2)
735	201-300	-	33.00(2)	-	42.00(3)	29.25(2)	47.50(2)	-	-	-	-	14.38(3)	18.62(3)
736	301-400	-	30.00(2)	-	-	70.00(2)	52.53(2)	-	-	-	19.20(2)	15.83(2)	11.20(2)
Estimated biomass (t) (surveyed area)		12,722	11,649	6,634	17,548	23,848	10,610	9,821	10,851	10,518	16,055	7,326	6,735
lower limit		5,692	9,130	5,010	12,286	19,726	6,743	6,996	8,443	8,133	44,558	4,584	4,875
upper limit		19,752	14,168	8,258	22,810	27,970	14,477	12,646	13,259	12,903	76,667	10,067	8,596
Estimated biomass (t) multiplicative model (all strata included)		17,310	14,528	14,368	17,923	23,924	13,669	13,064	13,526	13,351	16,589	7,324	-

Table 15. Biomass (tons) per stratum of Greenland halibut from fall surveys in Division 3L.

Stratum	Depth (f)	Area	Units	Year 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
371	31-50	1121	84	1	0	0	0	0	3	0	0	0	0	1	0
363		1780	134	0	0	0	0	0	0	0	0	0	0	0	0
372		2460	185	0	0	0	0	0	2	0	0	0	0	0	0
350		2071	155	0	0	0	0	0	0	0	0	0	0	0	0
384		1120	84	0	0	0	0	0	7	0	0	0	0	0	0
348	51-100	2120	159	67	331	48	18	97	140	68	70	46	41	0	0
343		525	39	35	0	21	0	3	1	0	0	11	4	0	0
328		1519	114	0	0	0	23	10	59	29	7	11	1	0	0
341		1574	118	59	22	95	59	31	5	73	37	31	21	0	35
342		585	44	58	124	38	0	32	9	0	10	7	25	0	0
349		2114	159	14	5	68	16	11	14	38	0	6	10	0	0
370		1320	99	0	50	44	39	151	228	25	1	4	72	0	0
385		2356	177	46	387	566	88	219	826	432	0	30	127	0	108
390		1481	111	0	389	8	0	302	402	118	0	63	58	241	36
364		2817	211	104	53	184	0	11	30	112	57	74	44	2	6
365		1041	78	225	215	102	23	9	84	248	23	70	24	1	5
391	101-150	282	21	0	58	455	397	630	175	87	51	275	128	365	87
344		1494	112	778	112	487	20	276	519	323	359	773	127	38	0
389		821	62	0	486	0	1186	1652	604	693	547	632	387	283	525
347		983	74	135	223	190	13	56	217	10	1498	1114	291	1	0
369		961	72	956	938	1010	374	962	459	667	263	294	894	343	83
386		983	74	2730	1605	0	936	2767	615	452	359	804	854	421	710
366		1394	105	523	1002	628	652	1893	1141	849	2160	1203	713	29	129
368	151-200	334	25	539	721	0	445	727	167	226	545	683	4629	246	185
392		145	11	0	152	166	288	272	196	90	144	131	117	241	73
346		865	65	584	755	1136	1775	2325	1692	1461	1039	1672	2119	827	378
345		1432	107	2230	932	994	4257	3935	673	1935	2480	1336	2646	223	274
387		718	54	3638	2354	0	2641	2277	431	1419	687	826	647	1322	748
388		361	27	0	63	0	650	671	0	467	515	420	113	345	814
731	201-300	216	16	0	0	0	677	243	0	0	0	0	295	116	232
735		272	20	0	674	0	858	597	970	0	0	0	0	294	380
729		186	14	0	0	0	988	426	250	0	0	0	316	357	269
733		468	35	0	0	0	448	1259	0	0	0	0	503	928	969
734	301-400	228	17	0	0	0	302	633	0	0	0	0	315	226	133
736		175	13	0	394	0	0	920	690	0	0	0	252	208	147
730		170	13	0	0	0	156	86	0	0	0	0	0	195	141
732		231	17	0	0	0	219	364	0	0	0	0	282	71	269
Biomass (tons)				12723	12045	6239	17548	23846	10609	9822	10851	10518	16054	7323	6737

Table 16. Abundance (000s) of Greenland halibut at age from Canadian research vessel surveys in Div. 2J3KL from 1978-92.

	Year														
Age (yrs)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
1	2538	2805	2994	7563	2137	1004	1452	7460	13005	1491	4025	3407	547	5814	1684
2	25686	22523	8911	22486	5991	5905	7148	18147	22185	8685	12436	10414	5347	6726	14858
3	54708	28846	15315	30875	23971	19036	21435	20024	32997	47694	28404	35816	14506	11369	26664
4	55914	25799	22680	21226	31204	31465	36094	36224	55685	35752	50345	69334	68019	37832	34313
5	57650	35886	35995	34277	31061	40182	72180	44886	45213	35854	58938	77935	65410	38273	23316
6	45141	38805	42154	38654	29062	34742	38931	37715	57888	33486	39603	56524	48199	27416	17109
7	28923	18843	27942	26647	32070	38908	30683	22359	45327	33956	29733	32108	28837	9020	8406
8	13379	7378	9511	11458	32617	31538	21712	12761	12676	20722	9257	9627	6828	2155	962
9	6983	3316	4207	5281	13535	11559	10222	6293	3308	7621	2525	2884	1839	475	95
10	5112	3179	3229	2824	5375	3040	4132	3498	1430	2156	809	675	718	231	48
11	4237	2102	3601	2255	2801	2049	1869	1592	960	1065	542	558	488	104	13
12	2541	1843	2393	1030	1790	1497	1216	1218	961	642	309	161	267	61	0
13	1611	1520	1551	579	1276	1089	964	517	441	504	267	56	160	14	0
14	476	762	858	276	1306	713	804	636	411	200	210	73	115	5	0
15	335	493	326	155	835	306	427	330	213	151	151	77	49	0	0
16	243	426	182	19	325	81	294	210	62	100	81	23	27	2	0
17	130	153	53	0	51	0	140	161	0	10	38	0	0	0	0
Ages 1+	305607	194679	181902	205605	215407	223114	249703	214031	292758	230089	237673	299672	241356	139497	127468
Ages 4-6	158705	100490	100829	94157	91327	106389	147205	118825	158784	105092	148886	203793	181628	103521	74738
Ages 7-9	49285	29537	41660	43386	78222	82005	62617	41413	61309	62299	41515	44619	37504	11650	9463
Ages 10+	14685	10478	12193	7138	13759	8775	9846	8162	4478	4828	2407	1623	1824	417	61

Table 17. Rank of year class strengths (1=strongest, 15=weakest) for year-classes 1982-1986 during 1978-1992.

	Age (yrs)								
Year-class	2	3	4	5	6	7	8	9	10
1982	10	10	4	12	6	4	13	14	15
1983	5	4	9	4	2	9	14	15	
1984	3	2	5	1	3	14	15		
1985	9	7	1	3	14	15			
1986	6	3	2	9	15				

Table 18. Biomass estimates of G.halibut from surveys conducted during 1991.

DIV.	VESSEL	DEPTH RANGE	DATES	BIOMASS(t)
2G	A.Needler	< 500 m	Nov.	420
2G	N.Kingfisher	1000-1500 m	Aug.	13,463
2GH	(USSR ?)	300-1500 m	???	15,550
2H	A.Needler	< 500 m	Nov.	2,293
2H	N.Kingfisher	1000-1500 m	Aug.	15,980
2J	N.Kingfisher	1000-1500 m	Aug.	13,179
2J	G.Atlantica	< 1000 m	Nov.	11,249
3K	G.Atlantica	< 1000 m	Nov.	36,035
3K	C.Adair	1000-1500 m	Sep.	22,072
3L	C.Adair	750-1500 m	Sep.	18,251
3L	W.Templeman	< 732 m	Nov.	7,324
3M	C.Adair	750-1500 m	Sep.	22,870
3M	(EEC ?)	< 732 m	Jul.	8,038

Table 19. Summary of biomass estimates of G. halibut from surveys conducted in 1991.

AREA	BIOMASS ESTIMATE (t)
0B	45,000
2GH	23,853
2J	24,428
3K	58,107
3L	25,575
3M	30,908
Total	207,871
Total (excl. 0B)	162,871

- 0B is an average of Russian and German surveys.

- 2GH is the mean of Canadian and Russian/German surveys. The Canadian survey consists of the estimate from the A.Needler plus the estimate from the N.Kingfisher.

- 2J Canadian survey consists of the estimate from the G.Atlantica plus the estimate from the N.Kingfisher.

- 3K Canadian survey consists of the estimate from the G.Atlantica plus the estimate from the C.Adair.

- 3L Canadian survey consists of the estimate from the W.Templeman plus the estimate from the C.Adair.

- 3M consists of the estimate from the Canadian survey (C.Adair) plus the estimate from the EEC survey.

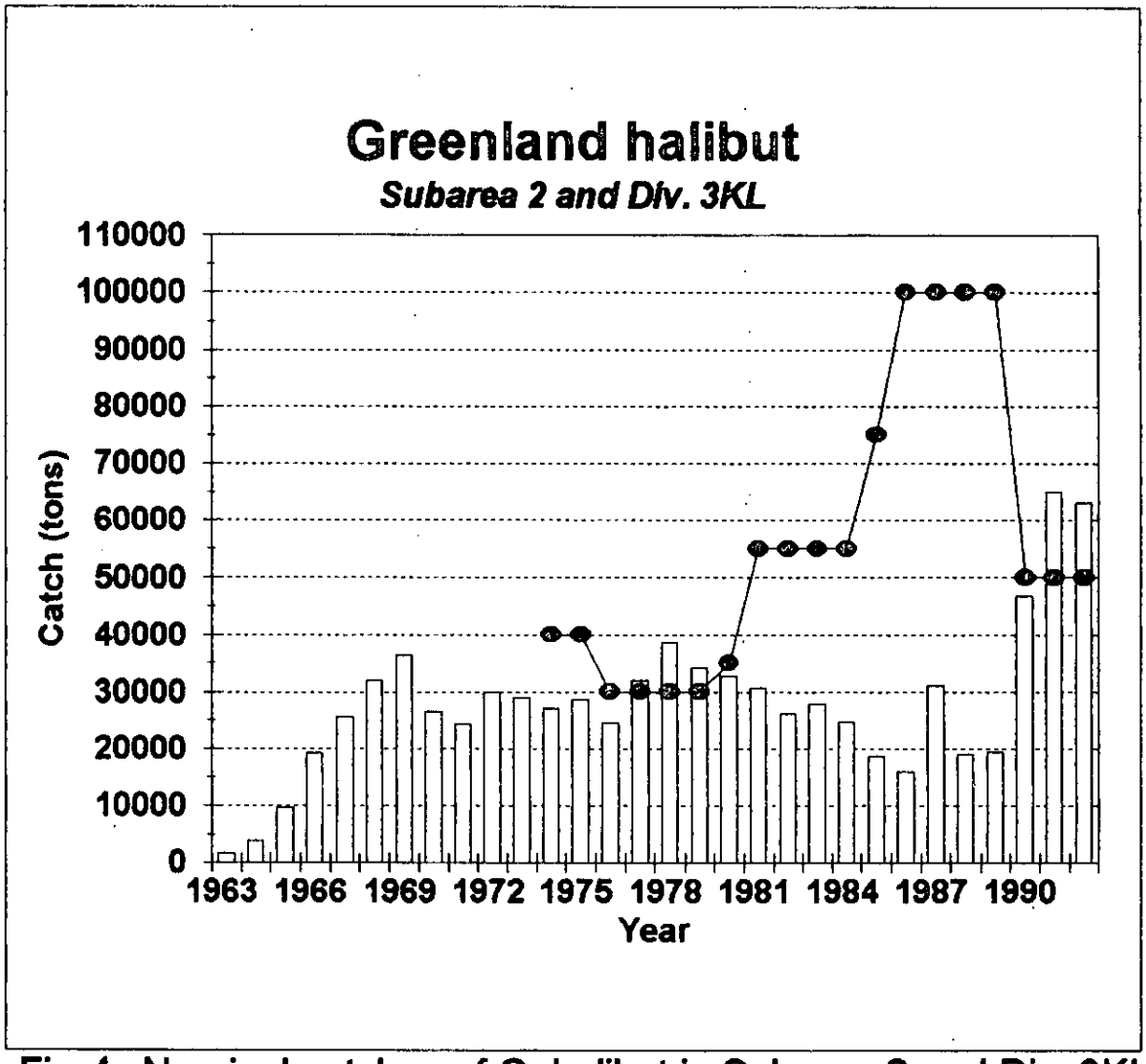

Fig. 1 Nominal catches of G. halibut in Subarea 2 and Div. 3KL. Recent years include Div. 3MN.

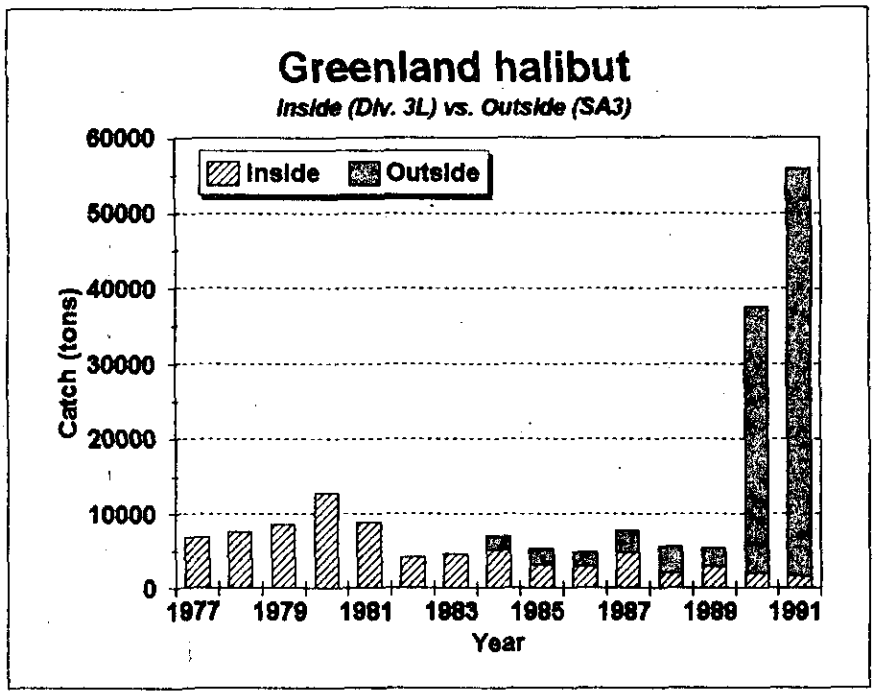

Fig. 2 Catch of G. halibut inside 200 miles (Div. 3L) compared to the catch outside 200 miles (Subarea 3) from 1977-91.

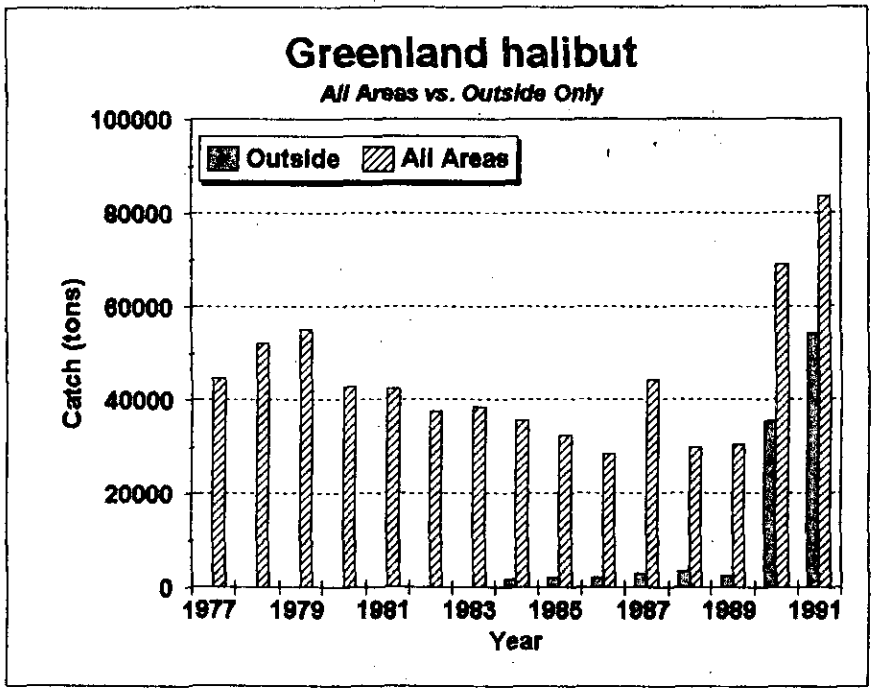

Fig. 3 Total catch of G. halibut inside 200 miles (all areas) compared to the catch outside 200 miles (Subarea 3) from 1977-91.

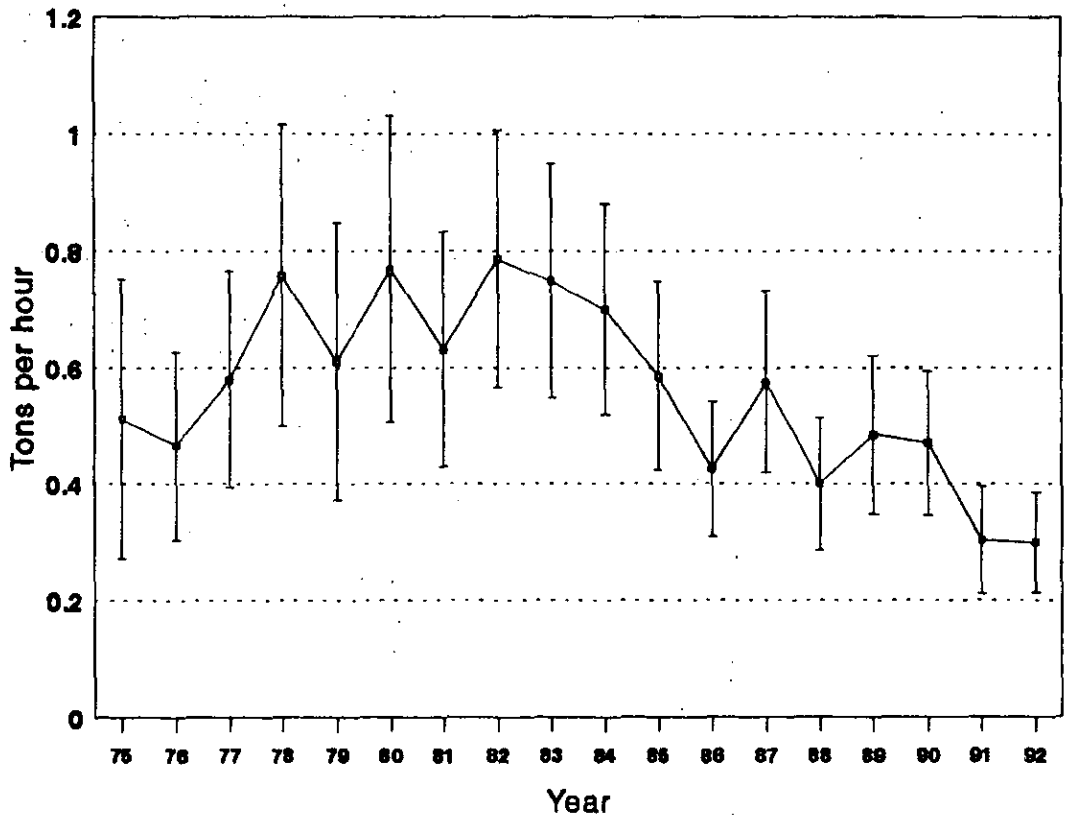

Fig. 4 Standardized CPUE with approximate 95% confidence intervals for Greenland Halibut in SA2 + Div. 3KL from 1975-1992.

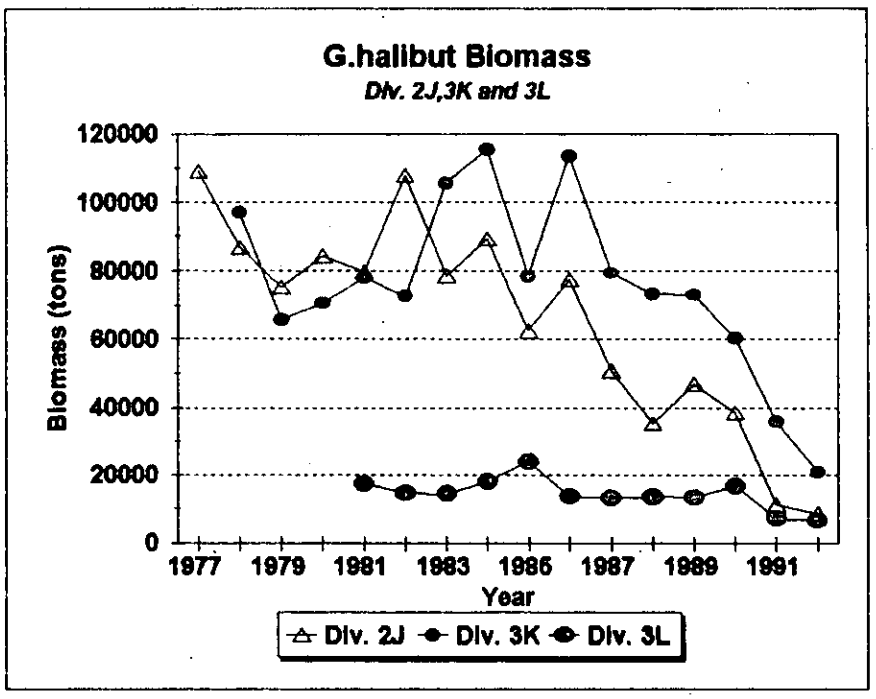

Fig.5 G. halibut biomass estimates separately by division from research surveys in Div. 2J,3KL during 1977-92.

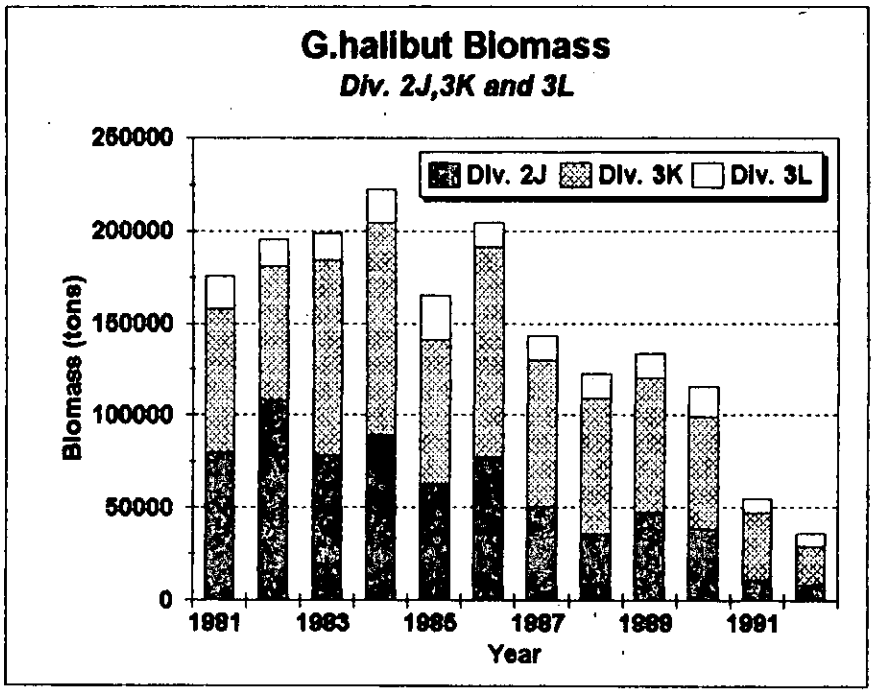

Fig. 6 G. halibut cumulative biomass estimates by division from research surveys in Div. 2J,3KL during 1981-92.

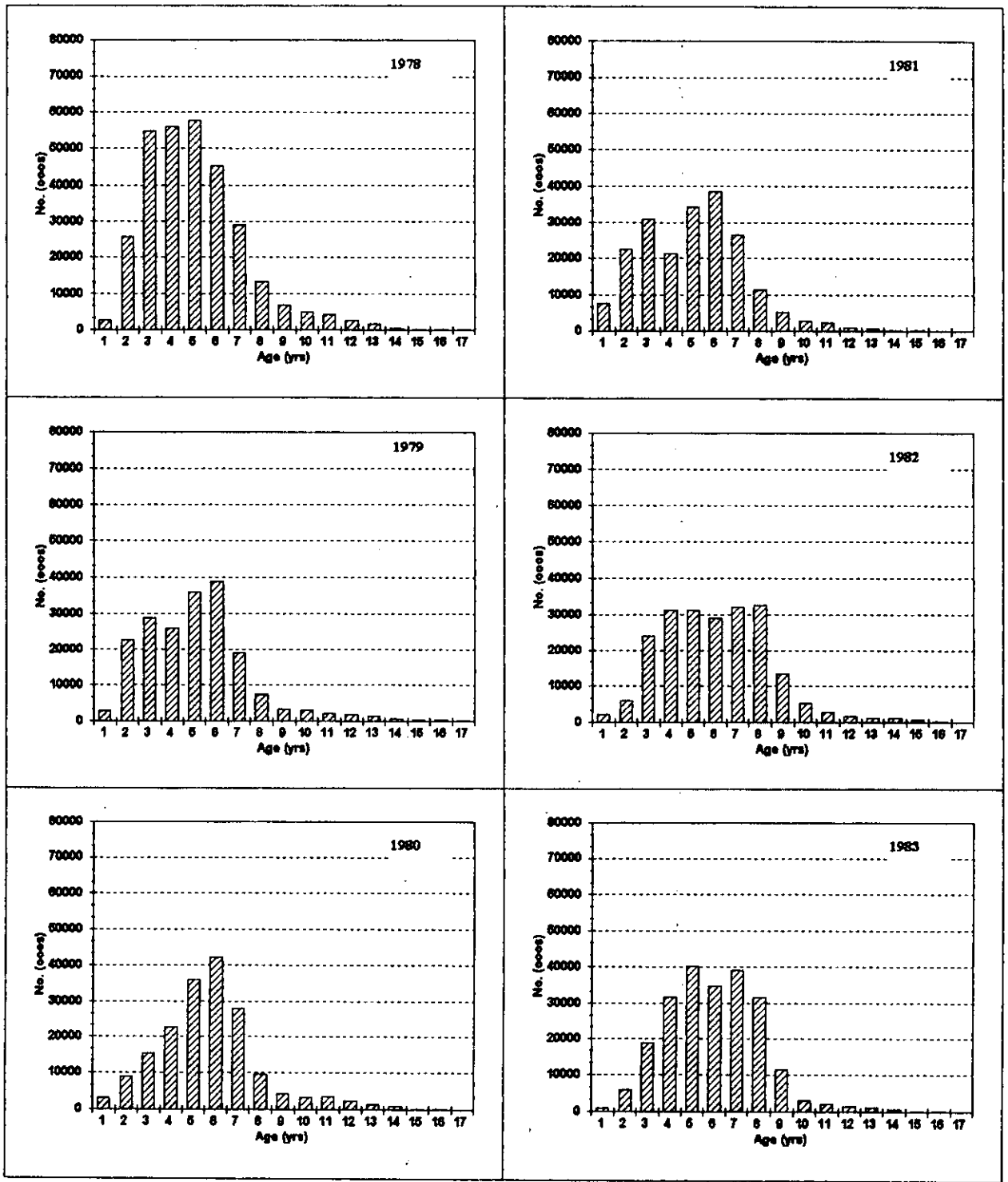

Fig. 7 Abundance estimates at age of G. halibut from research vessel surveys in Div. 2J,3KL from 1978-92.

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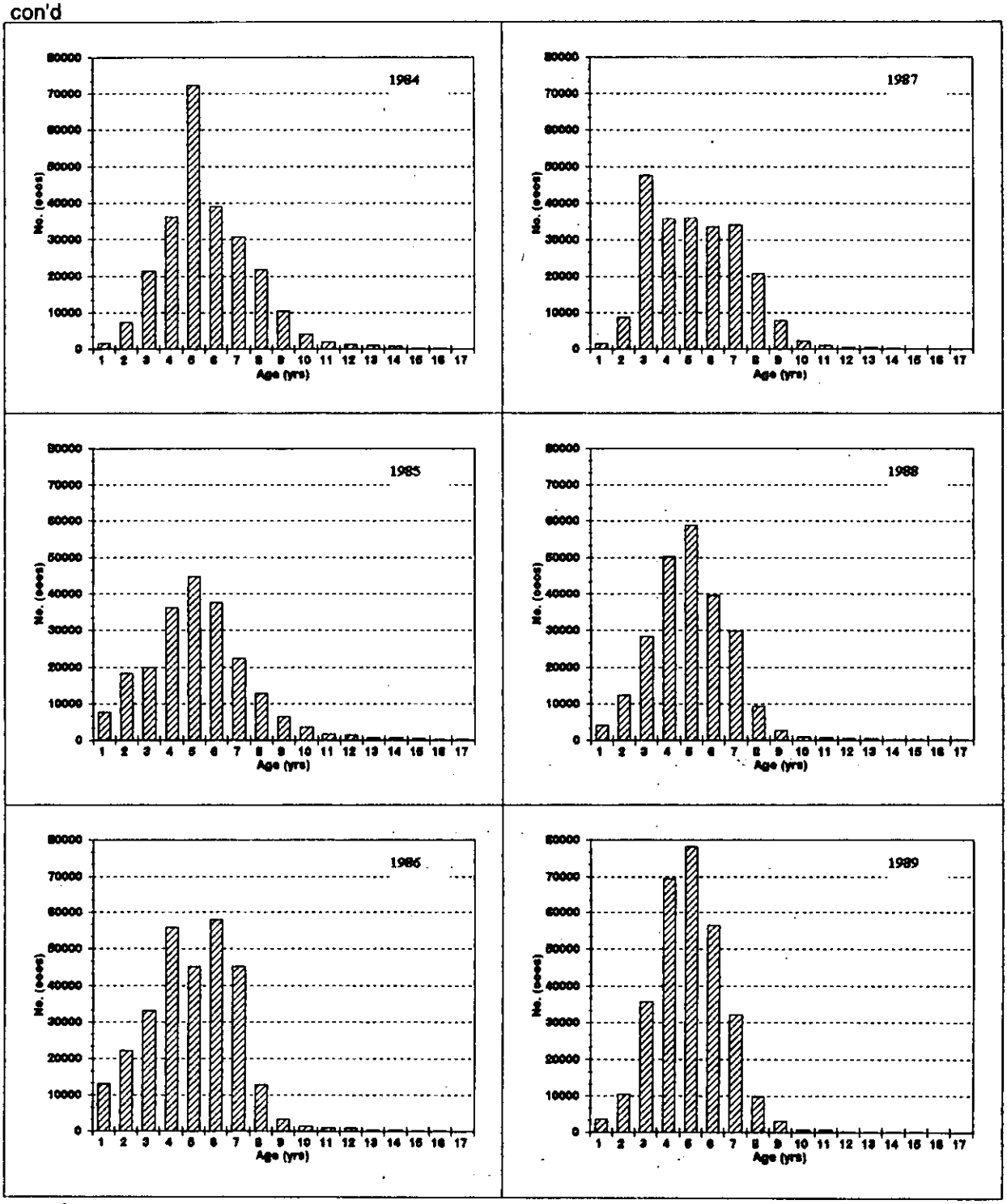

Fig. 7 Abundance estimates at age of G. halibut from research vessel surveys in Div. 2J,3KL from 1978-92

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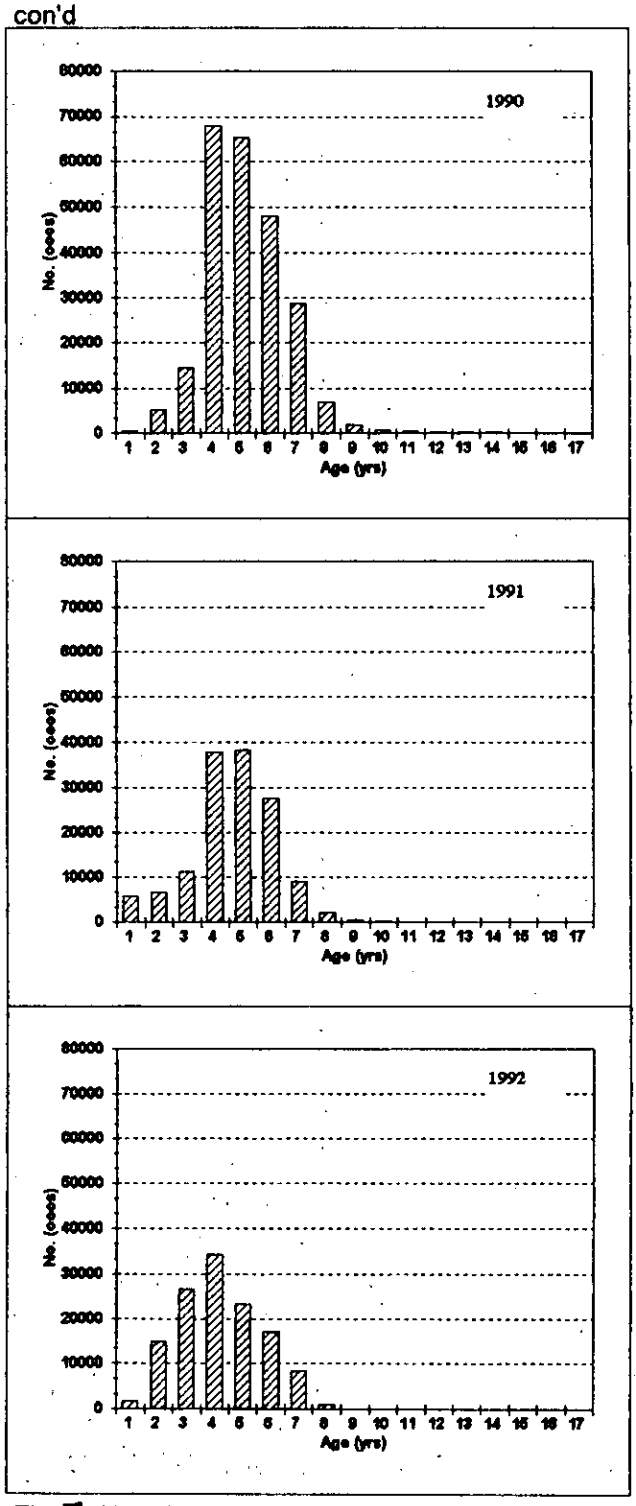

Fig. 7 Abundance estimates at age of G. halibut from research vessel surveys in Div. 2J,3KL from 1978-92.

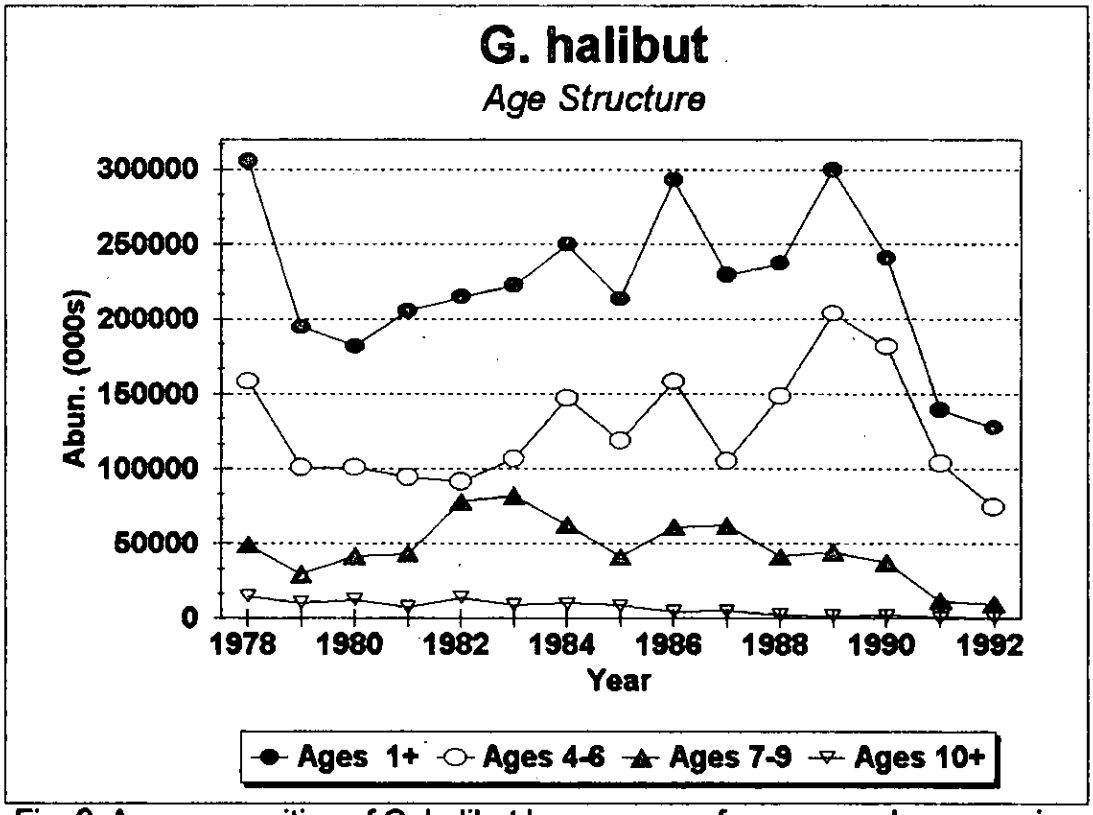

Fig. 8 Age composition of G. halibut by age range from research surveys in Div. 2J,3KL during the fall of 1978-92.

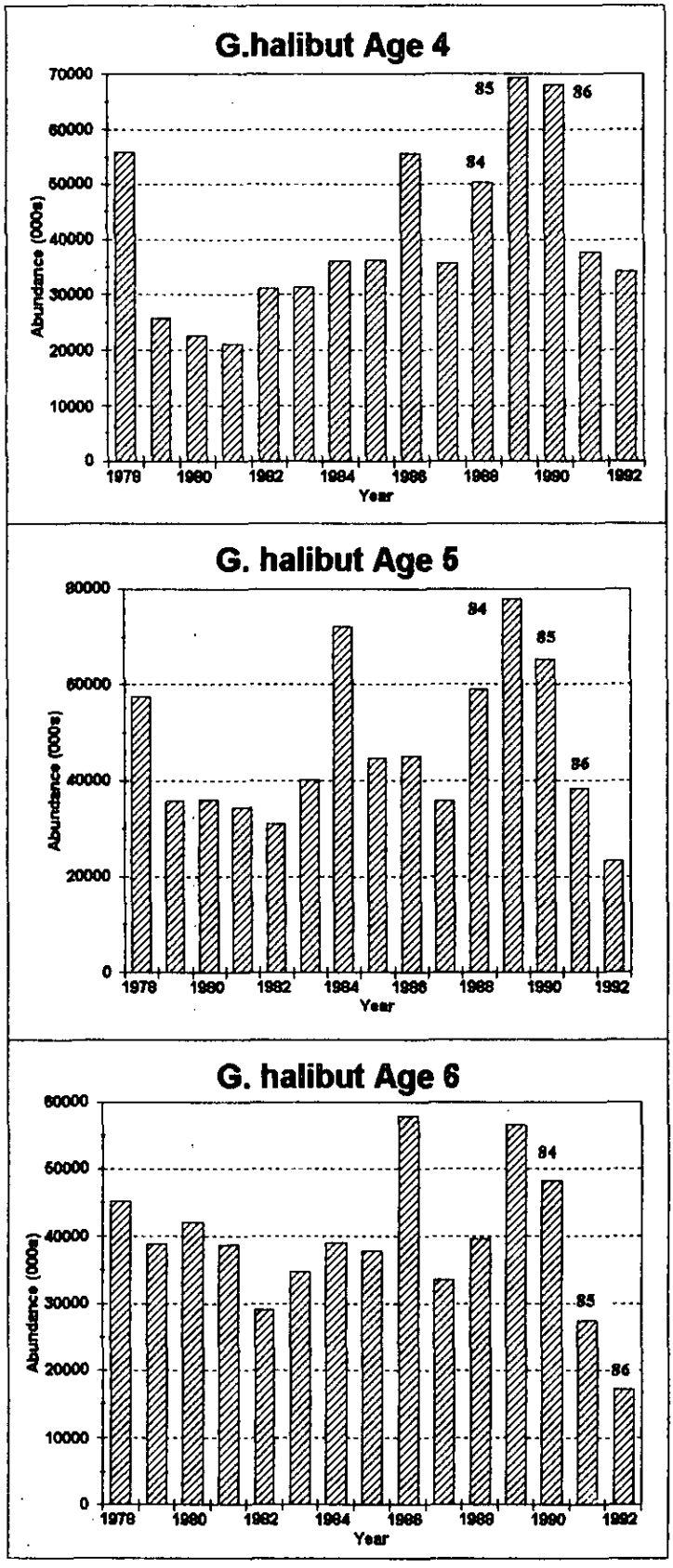

Fig. 9 Abundances of G. halibut from surveys in Div. 2J3KL at ages 4-6 from 1978-92. Highlighted numbers on graphs indicate particular year-classes.

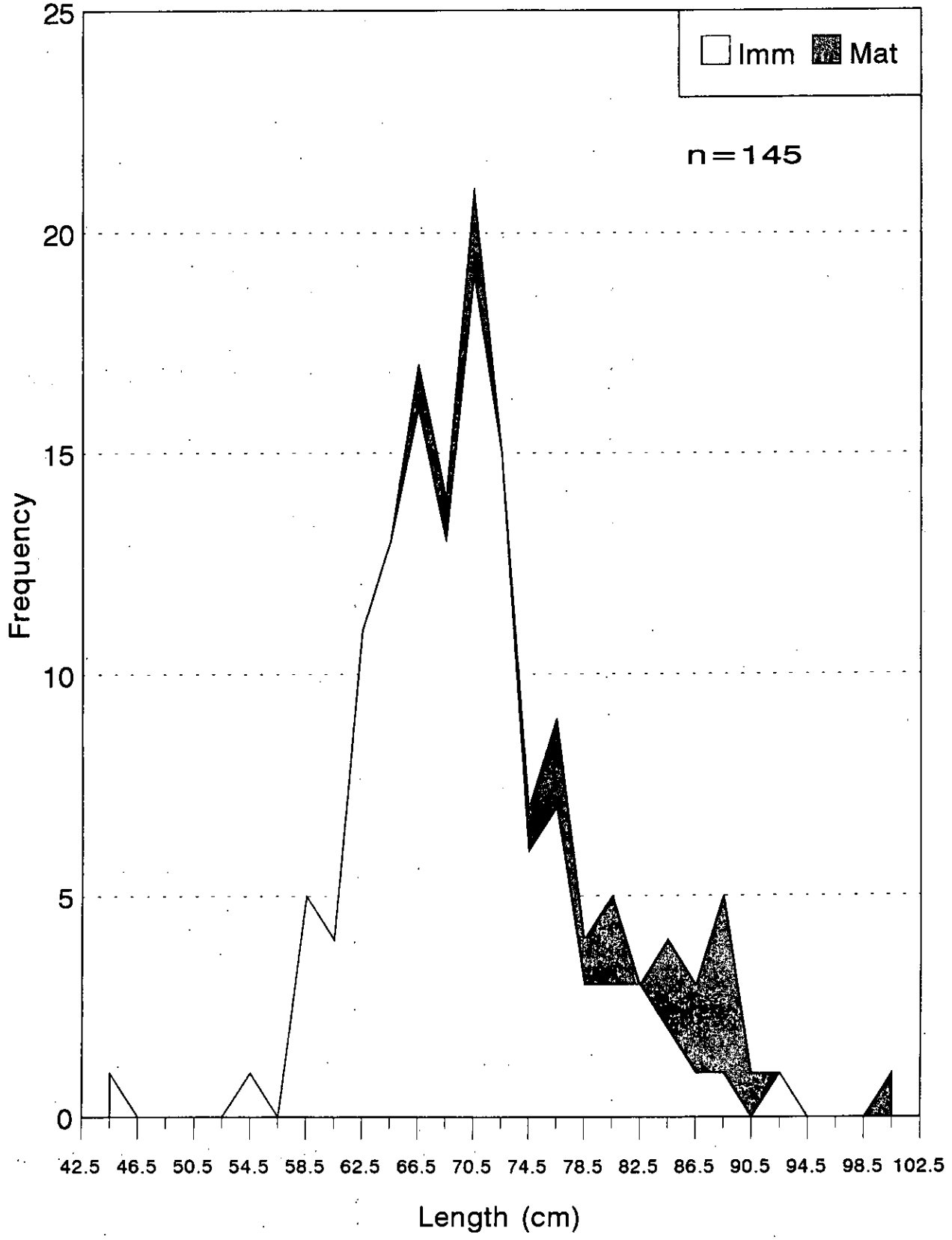

Fig.10. Length frequency of sexually immature vs. mature female G.halibut from the deepwater gillnet fishery in Div. 3K in Aug. 1992.