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An Evaluation of the Status of the Greenland Halibut Resource

in NAFO Subarea 2 and Divisions 3K and 3L

by

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Introduction

Greenland halibut catches in the Labrador-eastern Newfoundland area have averaged between 25,000-30,000 t annually from 1970 to 1976 with the 1978 catch being the highest since the beginning of the fishery in the early 1960s (Table 1, Fig. 1). Catches declined rather steadily since 1978 to reach an all time low of about 16,000 t in 1986 (Table 1). In 1987, the fishery improved to the extent that the 1987 preliminary catch of 27,000 t (Table 1) was approaching double the 1986 catch and slightly above the average over the last 18 years. The 1988 catch (Tables 1 and 2), however, was again one of the lowest in the time series at 18,000 t. Most of the catch was accounted for by Canada with 8,300 t; followed by EEC with 4,118 t; the GDR with 2,200 t; and Poland, Japan, and Faroes Islands accounting for most of the remainder. The Canadian trawler catches were less than 600 t, compared to 4,800 t in 1987, and was taken mainly in Div. 2J during August and December (Table 2). The inshore gillnet catches mainly in the southern divisions of 3K (4,300 t) and 3L (1,800 t) with 1,600 t taken in Div. 2J. The gillnet fishery occurs primarily during the months between July and October. Catches by other countries occurred generally later in the year, quite often in conjunction with catching other species and varied with division fished. However, while Div. 3L is rarely directly fished for Greenland halibut by countries other than the coastal state, nearly 3,300 t was reported by the EEC in 1988.

The TAC has increased from 30,000 t in 1976 to 35,000 t in 1980; 55,000 t in 1981, for Div. 2J3KL only, with an additional 20,000 t in Div. 2GH; and to 100,000 t in 1986 where it has remained through 1988. These increases were attributable to indications of good recruitment, estimated high levels of biomass, and what was considered to be low overall levels of fishing mortality.

It is worth re-emphasizing that this resource undertakes extensive migrations throughout its life history, with the main spawning component migrating to Davis Strait while the younger immature portion of the stock (particularly, ages 6-10 years old) supports the fishery in the southern areas. It was cautioned, at that time, that a TAC of 100,000 t would not likely harm the resource, provided it were spread over all commercial age groups and all areas of the distribution. If, on the other hand, a highly-concentrated effort were directed in localized areas on a few age groups, a significant component of the stock could be detrimentally affected.

Research vessel surveys

1) Biomass estimates and abundance indices in Divisions 2J3KL and 2GH

Results of stratified-random groundfish fall surveys for Greenland halibut in Div. 2J (1977-88), Div. 3K (1978-88), and Div. 3L (1981-87) are presented as mean weight (kg) per set per stratum in Tables 3, 4, and 5 respectively. Biomass was estimated for most missing strata using a multiplicative analysis model. For the area surveyed in Div. 2J in 1988 (Table 3), the biomass estimate was 35,450 t, which was the lowest in the time series. The previous low was in 1987 at 50,771 t. The 1986 estimate of 77,555 t was near the average over the period. The 1985 estimate was possibly attributed to the

effect on availability due to adverse environmental conditions. This would unlikely explain the drop in 1987 and again in 1988.

In Div. 3K, the 1988 biomass estimate was 73,582 t (Table 4) which is near the lowest in the time series and considerably below the 1986 estimate of 114,000 t. The average biomass over the time period is 85,000 t.

In Div. 3L, the 1988 biomass estimate was 13,795 t (Table 5) and is virtually the same as the 1986 and 1987 estimates. These estimates are within 20% of the average of 16,000 t since 1981.

Groundfish surveys were conducted in Div. 2G and 2H in 1978, 1979, and 1981 using fixed station design and biomass estimates were post-stratified; however, in 1987 and 1988, surveys were conducted using stratified random design. For Div. 2G, the 1987 and 1988 estimates of 16,076 t and 15,307 t (Table 6) respectively, were less than half the post-stratified estimates for the earlier period despite the fact that coverage was much more intensive in the 1987-88 surveys. It is clearly obvious, however, from examination of strata commonly fished, that there has been a considerable decline in biomass between the two periods examined. It should be noted, however, that strata < 200 m, which were of considerable area, were not fished in 1987-88 but accounted for significant catches in earlier years. On the other hand, there was a considerable decline in catch per set even in the earlier period for these strata.

For Div. 2H, the 1987 and 1988 estimates were also virtually the same at 23,300 t and 22,003 t respectively. As with Div. 2G, the more recent estimates are well below the earlier estimates despite better coverage. Again, it is clear for most strata commonly fished between the periods that there has been an obvious decline in catch per set.

For all divisions combined, the estimated biomass for 1988 was 160,137 t.

ii) Catch numbers at age from groundfish surveys

Stratified mean numbers per set (from fall surveys) at age are shown in Table 8 for Div. 2J and 3K from 1978 to 1988, Table 9 for Div. 3L from 1981 to 1988, and Table 10 for Div. 2J, 3K, and 3L combined (Div. 3L summer survey used in 1984). It is apparent from the data presented that Greenland halibut do not fully recruit to the survey gear until age 5 as evidenced by the 1979 year-class which has been predicted to be a strong year-class, a prediction which has been borne out in fisheries to be true. The 1980 year-class was also predicted to be a strong year-class from data in earlier shrimp surveys. It was more difficult to reach this conclusion here except that it was probably better than average. The dominant age-class in the 1987 survey is age 3 which represents the 1984 year-class and is more abundant than any other year-classes at age 3 in the Div. 2J3KL series. In 1988, this year-class was also more abundant than any other year-class at age 4 than any other in the series.

In this survey series, generally only 10-15% of the survey catches are older than 8 years.

Age compositions for Div. 2G and 2H are shown in Figures 2 and 3 respectively for the 1987 and 1988 stratified random surveys and Tables 11 and 12 for all surveys 1978-88. Unlike the southern regions, more than 70% of the catches in Div. 2G (Fig. 2) were older than 6 years although this may be largely due to fishing only in deeper water. In 1987, the catch was dominated by the strong 1979 year-class although there was an indication of possible good recruitment at ages 1 and 2 (1986 and 1985 year-classes). In 1988, the catch was dominated by the 1980 year-class with little evidence of the good recruitment shown in 1987. For Div. 2H (Fig. 3), the 1985 year-class clearly dominated the catch at both age 2 in 1987 and age 3 in 1988. The 1986 year-class at age 2 in 1988 also appeared, although it did not appear in large numbers at age 1 in 1987. Age 1 in 1987 in Div. 2G was relatively abundant, however, indicating a possible southward migration as observed in the past. Given that the fish are not fully recruited to the fishing gear until age 5, it may be interpreted that certainly the 1985 year-class has been shown to be consistently strong at younger age groups in all areas and also the 1984 and 1986 year-classes may also be much better than average.

A comparison of year-classes at age 5 in Div. 2J3KL is presented in Figure 4 scaled to the strong 1979 year-class. It would suggest that the 1976, 1977, 1981, and 1982 year-classes are average, with the 1978 and 1980 year-classes possibly just above average. The 1983 year-class, on the other hand, is measured at about 90% of the 1979 year-class at age 5, although this is not fully consistent at younger ages (Table 10).

iii) Catch numbers at age from shrimp surveys

Shrimp surveys have been conducted in the deep water channels of Labrador since 1979 in Div. 2H (Hopedale Channel) and Div. 2J (Cartwright Channel). During these surveys, the

most significant by-catch has been Greenland halibut. From 1979 to 1983, the catches of Greenland halibut have been sampled for length but not age; however, since 1984, age samples have also been collected. The age composition for Div. 2H and Div. 2J are shown in Figures 5 and 6 respectively. In Div. 2H (Fig. 5), the 1979 year-class dominated the 1985 catch at age 5. In 1985, the 1984 year-class was most abundant at age 1 and still reasonably abundant at age 2 in 1986. The 1985 year-class was the most predominant at age 1 in the series and dominated the catch again in 1987 at age 2 and the most abundant at age 3 in the series in 1988. While the 1986 year-class did not appear dominant at age 1, it was the most abundant catch per set at age 2 in 1988 over the period.

In Div. 2J (Fig. 6), the most striking feature is that the 1985 year-class dominated the catches at ages 1, 2, and 3 in 1986, 1987, and 1988 respectively. Other year-classes also appeared strong at certain ages (e.g., the 1983 and 1984 year-classes); however, it was more difficult to interpret the consistency.

Estimates of year-class strengths at age 1 are shown in Figure 7 from the 1978 to 1987 year-classes. For the years 1979-83, the indices at age 1 were taken from the previous assessment as derived from modal analysis of the length frequencies and scaled to the strength of the 1985 year-class in Div. 2J. Both Div. 2H and 2J, as stated earlier, indicate that the 1985 year-class showed up as being the strongest in both areas with the 1984 year-class also being relatively strong in comparison. The 1986 year-class was similar to the 1982 in both divisions, which is suggested here to be lower than average. For both divisions as well, the 1987 year-class is by far the weakest year-class observed.

Commercial data

i) Catch and effort

Considering the nature of this fishery and the migratory behaviour of this species as well as the low levels of directed catch, it is difficult to obtain catch and effort statistics which are accurately representative of total stock abundance. Those that are available (mainly, Canada (N)), however, can be helpful as indicators of distribution and abundance in localized areas. The only directed catch-effort data available during the last couple of years was from Div. 2J in the summer (Table 13). It appears that the catch rate declined in Div. 2J from 1984 to 1986, increased in 1987 to a level higher than 1982 but still below the 1984-85 levels. It subsequently declined in 1988 to the lowest observed during the period examined.

ii) Catch numbers and weights at age

Catch numbers and weights at age were calculated in the usual manner for the 1988 Canadian fishery only. The data for foreign fisheries were unavailable at the time of the meeting. The results are shown in Table 14. More than 55% of the Canadian catch was comprised of fish at age 7 with 94% of the catch being comprised of ages 6-8. Hardly any were caught beyond 12 years old. Matrices of catch at age, percent at age, average weights at age, and catch biomass at age up to 1987 are shown in Tables 15-18 respectively.

Prognosis

The TAC of 100,000 t, set in 1985, was put in place for 1986 largely based upon high biomass estimates, potentially good recruitment, and what was considered to be low fishing mortality. The biomass was estimated in excess of 400,000 t of which 200,000 t was estimated for Div. 2GH alone. The present data, based upon more refined survey data, would suggest that 2GH may now contain only about 25% of that level. In Div. 2J3KL, the estimated biomass has declined from about 225,000 t in 1984 to nearly half that in 1988. Such declining trends in biomass were also reported in the 1988 assessment (SCR Doc. 88/41) from USSR surveys. It is also clear that the fishery is unlikely to have contributed solely to such declines. In 1988, STACFIS was unable to explain the declines, particularly in areas where there was little or no fishing. Nevertheless, the declining trends continue; and it is becoming difficult to continue supporting a TAC level which is no longer supported by the data, although there is some potentially good recruitment for the future. Since the existing fishery prosecutes such few and young age groups, the success of the fishery will remain contingent upon the strength of 1-3 recruiting year-classes.

Given the present levels of biomass, compared to those of the past when the TAC was put in place, a more realistic TAC level may be proportionately lower.

Table 1. Greenland halibut landings (metric tons) by year and country for Subarea 2 and Division 3KL from 1970-87.

Country	Year																		
	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86 ^a	87 ^a	88 ^a
Canada	10706	9408	8952	6840	5745	7807	9306	17967	24692	29940	31774	24125	19248	19031	17283	12277	8220	16930	8283
FRG	13	-	86	707	515	622	927	755	1022	15	55	-	57	2	9	482	15	-	-
Poland	8266	5234	6986	9060	7105	8447	5942	5998	5215	1813	203	1806	1111	5258	943	460	177	1378	904
Iceland	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	-	-	1389	501	117	-	6	15	3	8	1	-	-	15	18	1	-	-	-
USSR	7384	9094	10183	8652	9650	9439	6799	4308	5632	1961	238	3325	1471	937	440	149	770	342	1053
Romania	225	7	120	80	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
GDR	-	647	402	1681	2701	2025	1512	1953	1636	178	316	1350	2487	2587	2498	1850	1868	3264	2246
Den-F	-	-	970	950	4	-	-	350	268	-	-	-	-	-	-	193	451	2174	921
Den-G	-	-	3	-	-	-	1	-	-	4	-	-	-	-	-	-	-	-	-
Spain	-	-	731	201	1112	62	-	476	53	110	22	-	1	-	3	-	-	-	-
UK	-	-	-	65	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	207	161	231	73	119	-	38	21	16	1818	-	2612	2940	3107	-	-
Fra-M	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fra-Sp	-	-	-	-	6	48	32	-	5	1	-	-	7	-	-	-	-	-	-
Japan	-	-	-	-	-	-	-	-	3	-	12	60	14	-	1003	258	1277	1911	1203
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-
EEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1407	-	4118
Total	26594	24392	29822	28944	27123	28681	24598	31941	38532	34068	32642	30682	26206	27839	24809	18610	15885	27406	18878

^aProvisional

Table 2. Commercial catch of Greenland halibut in NAFO Subarea 2 and Div. 3KL for 1988.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Can (G)										99			99
Can (SF) 2H													
2J													
3K													
3L													
Total				14 ^a				30 ^a	6 ^a	1 ^a			51
EEC	292 ^a	146 ^a	132 ^a	6 ^a	119 ^a	720 ^a	1273 ^a	132 ^a	172 ^a	290 ^a			4118
GDR	15 ^a						1 ^a	137 ^a	235	332 ^a	555 ^a	971 ^a	2246
Poland		27 ^a	64 ^a		4 ^a	395 ^a	167 ^a	22 ^a			129 ^a	96 ^a	904
USSR							75 ^a	65 ^a	62 ^a	48 ^a	187 ^a	616 ^a	1053
Japan	1 ^a				86 ^a				390 ^a	726 ^a			1203
Portugal													
Norway													
Spain									839 ^a	82			921
Faroes													
Total	308	173	196	6	209	1115	1516	356	1698 ^b	1478	871	1683	9609
Can (N)													
2G (GN)								45					45
2H (OT)									5				5
2H (GN)													
2J (OT)				1				195	11				207
2J (GN)							2	79	930	546			1557
3K (OT)	1	1	31	190	12			21	2				258
3K (GN)					30	96	2096	1497	382	233	3		4337
3L (OT)		6	78	1				1		2	1	4	93
3L (GN)	1	9	1		42	46	678	571	154	175	104		1781
Total (Can(N))	2	16	110	192	84	142	2776	2409	1484	956	108	4	8283
Total (All Countries)													18878

^aTotal to this date.

^bTotal for Faroes Jan-Sep included.

Table 3. 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	Gadus 1977	Gadus 1978	Gadus 1979	Gadus 1980	Gadus 1981	Gadus 1982	Gadus 1983	Gadus 1984	Gadus 1985	Gadus 1986	Gadus 1987	Gadus 1988
201	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)	0.08(8)
202	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)	8.50(2)	17.76(2)	-
203	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)	108.00(2)	27.83(3)	34.00(2)
204	175.70(2)	484.67(2)	260.36(2)	-	170.50(2)	284.00(3)	250.83(3)	260.00(2)	16.50(2)	267.50(2)	146.50(2)	166.00(2)
205	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)	1.05(6)
206	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)	1.78(14)
207	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)	0.05(7)
208	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)	189.75(2)	103.00(2)	84.00(2)
209	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)	11.22(5)
210	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)	7.88(3)
211	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)	103.00(2)	44.50(2)	81.50(2)
212	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)	383.00(3)	374.69(4)	75.25(2)
213	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)	19.67(9)	8.82(9)	5.85(8)
214	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)	8.87(6)	13.75(6)	22.08(6)
215	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)	14.85(5)	11.87(7)	9.01(7)
216	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)	34.66(2)	51.15(2)	3.50(2)
217	141.95(3)	168.28(2)	87.15(2)	156.00(2)	41.00(2)	58.25(2)	64.50(2)	-	145.00(2)	108.75(2)	41.50(2)	43.75(2)
218	217.92(2)	238.14(2)	-	129.50(2)	156.50(2)	40.00(2)	39.00(2)	-	30.25(2)	82.25(2)	49.00(2)	58.50(2)
219	-	-	-	-	48.00(2)	-	103.00(2)	-	83.75(2)	286.25(2)	84.00(2)	45.25(2)
220	-	56.92(2)	-	-	-	-	-	-	-	-	-	-
221	-	-	-	-	-	-	-	-	-	-	-	-
222	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)	33.00(2)	41.50(2)
223	251.52(2)	84.82(2)	63.98(2)	136.00	94.75(2)	88.00(2)	61.75(2)	113.75(2)	80.25(2)	127.00(2)	21.00(2)	63.50(2)
224	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)	244.18(2)	63.50(2)	-
225	39.95(2)	-	-	-	-	-	-	-	-	-	-	-
226	-	3.17(2)	-	-	-	-	-	-	-	-	-	-
227	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)	20.67(3)	36.75(4)	32.00(3)
228	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)	10.41(6)	5.29(7)	2.60(5)
229	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)	14.67(3)	5.93(3)	3.23(3)
230	243.28(3)	80.74(2)	-	169.44(2)	60.25(2)	30.80(2)	93.00(2)	21.50(2)	26.25(2)	102.25(2)	68.00(2)	44.25(2)
231	64.24(2)	138.57(2)	-	186.50(2)	-	93.75(2)	51.25(2)	98.75(2)	119.75(2)	28.25(2)	38.50(2)	170.50(2)
232	49.03(2)	27.21(2)	-	-	-	-	-	-	-	-	-	-
233	-	-	-	-	-	-	-	-	-	-	-	-
234	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)	12.75(2)	5.17(3)	20.25(2)
235	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)	182.75(2)	118.75(2)	70.25(2)
236	98.06(2)	-	-	-	44.75(2)	66.75(2)	101.00(2)	53.00(2)	85.25(2)	223.90(2)	94.00(2)	13.00(2)
Estimated biomass (t) (surveyed area)	106,834	85,136	66,970	74,564	76,661	104,233	78,546	81,234	62,603	77,555	50,771	35,447
Estimated biomass (t) (multiplicative model (excl. strata 220, 221, 225, 226, 232, 233))	110,098	86,607	76,380	84,719	79,715	108,728	78,547	91,684	62,605	77,554	50,772	35,450

Table 4. 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	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
- 618							1.50(5)	4.43(6)	0.20(5)	0.07(7)	0.03(6)
- 619							1.90(7)	0.57(7)	0.22(5)	0.06(8)	0.01(7)
620	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)
621	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)
622	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)
623	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)
624	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)
625	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)
626	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)
627	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)
628	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)
629	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)
630	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)
631	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)
632	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)
633	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)
634	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)
635	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)
636	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)
637	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)
638	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)
639	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)
640	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)
641	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	18.63(2)	-	33.25(2)	9.33(3)	33.33(6)	-	81.35(6)	33.50(5)	-	27.70(5)	-
- 643	7.49(2)	12.94(2)	-	-	-	-	-	-	-	-	-
- 644	15.22(2)	4.99(2)	-	-	-	-	-	-	-	-	-
645	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)
646	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	160.23(2)	48.13(2)	89.25(2)	82.50(2)	39.50(2)	-	-	114.72(3)	-	-	-
- 648	15.45(2)	-	-	-	-	-	-	-	-	-	-
- 649	10.91(2)	-	-	-	-	-	-	-	-	-	-
Estimated biomass (t) (surveyed area)	99,134	66,330	70,623	77,966	70,870	97,790	111,612	78,804	106,386	76,482	68,270
Estimated biomass (t) multiplicative model (excl. strata 618, 619, 643, 644, 648, 649)	96,896	65,758	70,668	78,098	72,600	105,410	115,399	78,355	114,000	79,475	73,582

Table 5. Average wt. (kg) of Greenland halibut per set from fall research vessel surveys in Division 3L. Numbers in parentheses indicate number of sets per stratum.

Stratum	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
328	-	-	-	0.20(4)	0.09(8)	0.52(6)	0.25(4)	0.06(7)
341	0.50(3)	0.19(4)	0.80(4)	0.50(5)	0.26(7)	0.04(7)	0.62(9)	0.31(8)
342	1.33(3)	2.83(3)	0.87(4)	0.00(2)	0.73(3)	0.20(3)	0.00(3)	0.23(3)
343	0.88(4)	-	0.53(3)	0.00(4)	0.08(3)	0.02(3)	0.00(3)	0.00(3)
344	6.94(4)	1.00(3)	4.34(6)	0.18(6)	2.46(9)	4.63(7)	2.88(4)	3.20(7)
345	20.75(4)	8.67(6)	9.25(8)	39.60(7)	36.61(9)	6.26(4)	18.00(2)	23.07(7)
346	9.00(3)	11.63(4)	17.50(5)	27.33(6)	35.80(5)	26.06(3)	22.50(4)	16.00(5)
347	1.83(3)	3.02(4)	2.58(6)	0.17(6)	0.76(4)	2.94(4)	0.13(2)	20.30(5)
348	0.42(6)	2.08(5)	0.30(11)	0.11(11)	0.61(14)	0.88(5)	0.43(9)	0.44(10)
349	0.09(7)	0.03(5)	0.43(9)	0.10(14)	0.07(10)	0.09(9)	0.24(10)	0.00(9)
350	0.00(6)	0.00(2)	0.00(8)	0.00(12)	0.00(9)	0.00(11)	0.00(9)	0.00(10)
363	0.00(4)	0.00(3)	0.00(3)	0.00(8)	0.00(10)	0.0(7)	0.00(9)	0.00(10)
364	0.49(9)	0.25(11)	0.87(11)	0.00(10)	0.05(18)	0.14(5)	0.53(14)	0.27(14)
365	2.88(4)	2.75(4)	1.30(5)	0.30(4)	0.12(8)	1.08(5)	3.18(6)	0.30(5)
366	5.00(3)	9.58(6)	6.00(4)	6.23(11)	18.09(9)	10.90(4)	8.11(7)	20.64(7)
368	21.50(2)	28.75(2)	-	17.75(2)	29.00(2)	6.66(2)	9.00(2)	21.75(2)
369	13.25(2)	13.00(4)	14.00(6)	5.19(7)	13.33(6)	6.36(3)	9.25(4)	3.64(5)
370	0.00(4)	0.50(6)	0.44(6)	0.39(7)	1.52(9)	2.30(2)	0.25(6)	0.01(7)
371	0.01(4)	0.00(5)	0.00(5)	0.00(7)	0.00(7)	0.04(3)	0.00(5)	0.00(6)
372	0.00(5)	0.00(7)	0.00(4)	0.00(13)	0.00(17)	0.01(9)	0.00(13)	0.00(13)
384	-	0.00(4)	0.00(3)	0.00(6)	0.00(8)	0.08(5)	0.00(6)	0.00(6)
385	0.26(8)	2.19(8)	3.20(5)	0.50(12)	1.24(12)	4.67(8)	2.44(9)	0.00(13)
386	37.00(3)	21.75(4)	-	12.69(8)	37.50(5)	8.34(4)	6.13(4)	4.86(5)
387	67.50(2)	43.67(3)	-	49.00(3)	42.25(4)	8.00(2)	26.33(3)	12.75(4)
388	-	2.33(3)	-	24.00(2)	24.75(2)	-	17.25(2)	19.00(2)
389	-	7.88(4)	-	19.25(6)	26.80(5)	9.80(4)	11.25(4)	8.88(4)
390	0.00(3)	3.50(4)	0.07(3)	0.00(3)	2.72(7)	3.62(6)	1.06(8)	0.00(8)
391	-	2.75(2)	21.50(2)	18.75(2)	29.75(7)	8.25(2)	4.10(2)	2.40(2)
392	-	14.00(2)	15.25(2)	26.50(2)	25.00(2)	18.00(2)	8.25(2)	13.25(2)
729	-	-	-	70.75(2)	30.50(2)	17.92(2)	-	-
730	-	-	-	12.25(2)	6.75(2)	-	-	-
731	-	-	-	41.75(2)	15.00(2)	-	-	-
732	-	-	-	12.63(2)	21.00(2)	-	-	-
733	-	-	-	12.75(4)	35.83(3)	-	-	-
734	-	-	-	17.67(3)	37.00(2)	-	-	-
735	-	33.00(2)	-	42.00(3)	29.25(2)	47.50(2)	-	-
736	-	30.00(2)	-	-	70.00(2)	52.53(2)	-	-
Estimated biomass (t) (surveyed area)	12,722	11,649	6,634	17,548	23,848	10,610	9,821	10,851
Estimated biomass (t) multiplicative model (all strata included)	17,917	14,735	15,311	17,923	23,924	13,671	13,388	13,795

Table 6. Stratified mean weight (kg) per set of Greenland halibut in NAFO Division 2G (nos. in parentheses are nos. of successful sets).

Depth Range (m)	Stratum	Gadus 13 1978	Gadus 24 1979	Gadus 57 1981	Gadus 143 1987	Gadus 156 1988
≤ 200	909	23.12(13)	3.87(12)	5.94(8)	-	-
	910	52.69(8)	6.54(8)	8.06(8)	-	-
	925	66.74(5)	15.66(4)	13.83(3)	-	-
201-300	901	48.33(9)	52.86(7)	51.58(6)	10.50(4)	17.97(5)
	911	7.25(4)	10.89(4)	6.67(3)	2.81(3)	0.15(2)
	924	8.17(2)	11.96(3)	19.50(2)	4.50(2)	1.50(5)
	926	-	-	-	-	10.87(3)
	908	7.72(2)	20.28(3)	6.38(3)	2.34(5)	3.80(4)
301-400	902	-	-	-	23.10(3)	2.35(2)
	912	-	-	-	11.50(2)	0.10(2)
	923	306.18(2)	-	77.50(2)	3.75(2)	12.00(2)
	927	-	-	-	29.86(5)	6.28(4)
401-500	903	-	93.29(2)	73.25(2)	18.79(2)	12.35(2)
	913	-	-	-	27.00(2)	21.75(2)
	922	303.04(2)	-	84.50(2)	-	-
	928	-	-	-	48.17(3)	11.50(3)
501-750	904	-	265.44(3)	114.00(4)	47.25(3)	25.21(3)
	914	-	-	-	33.88(2)	75.00(2)
	921	-	660.11(2)	-	12.75(2)	17.50(2)
	929	-	145.96(4)	240.67(3)	52.60(5)	35.50(4)
751-1000	905	-	-	-	-	179.50(2)
	915	-	-	-	-	193.50(2)
	920	-	-	-	261.17(4)	187.75(2)
1001-1250	906	-	-	-	2.42(2)	25.50(2)
	916	-	-	-	-	10.19(2)
	919	-	-	-	-	24.20(2)
1251-1500	907	-	-	-	-	-
	917	-	-	-	-	-
	918	-	-	-	-	-
Biomass (t)		37,187	35,484	37,746	16,076	15,307

Table 7. Stratified mean weight (kg) per set of Greenland halibut in NAFO Division 2H (Nos. in parentheses are nos. of successful sets).

Depth Range (m)	Stratum	Gadus 13 1978	Gadus 24 1979	Gadus 57 1981	Gadus 143 1987	Gadus 156 1988
≤ 200	930	1.12(4)	1.75(6)	5.00(8)	0.06(9)	0.26(10)
	954	3.13(5)	4.04(5)	1.92(6)	0.21(11)	0.23(10)
	956	4.84(3)	1.01(6)	3.63(4)	0.38(10)	1.68(10)
	957	16.07(5)	2.05(6)	7.25(6)	1.25(11)	1.35(14)
201-300	931	15.44(3)	1.18(3)	35.83(3)	1.33(4)	0.83(3)
	943	19.29(2)	0.16(2)	28.75(2)	1.85(4)	8.30(4)
	950	-	-	-	-	-
	953	267.33(2)	22.09(3)	72.38(4)	10.53(3)	4.97(3)
	955	11.35(2)	11.20(3)	7.83(3)	1.92(4)	4.53(4)
	958	-	10.21(2)	4.25(2)	0.10(3)	2.30(3)
301-400	932	-	-	-	3.60(2)	3.75(2)
	944	46.00(6)	45.75(9)	102.11(9)	4.59(10)	5.94(8)
	949	-	-	-	-	-
	952	-	197.76(2)	92.50(2)	34.33(3)	65.00(3)
	959	-	87.47(3)	54.33(3)	13.17(3)	36.50(2)
401-500	933	-	-	-	-	3.70(2)
	942	-	270.81(2)	148.50(2)	8.67(3)	6.40(2)
	945	-	259.08(3)	134.92(6)	37.04(5)	63.32(5)
	948	-	-	-	-	-
	951	77.41(2)	316.66(2)	102.27(3)	78.75(2)	57.50(2)
	960	-	436.29(2)	48.00(2)	44.17(3)	8.17(3)
501-750	934	-	636.31(2)	-	58.50(2)	10.00(3)
	941	-	-	-	38.00(2)	75.27(2)
	946	460.47(4)	721.41(5)	187.71(7)	193.10(8)	110.25(6)
	947	-	660.80(2)	109.25(4)	255.17(3)	223.25(2)
	961	-	285.26(3)	63.53(3)	27.50(2)	36.00(3)
751-1000	935	-	-	-	46.86(2)	42.00(2)
	940	-	-	-	40.13(2)	30.00(2)
	962	-	-	-	49.85(3)	72.50(2)
1001-1250	936	-	-	-	10.18(2)	237.75(2)
	939	-	-	-	21.81(2)	42.50(2)
	963	-	-	-	57.81(2)	78.75(2)
1251-1500	937	-	-	-	-	-
	939	-	-	-	-	-
	964	-	-	-	-	-
Biomass (t)		38,605	86,231	34,005	23,330	22,008

Table 8. Age composition - numbers/standard tow from groundfish surveys in Div. 2J, 3K (all strata fished).

Div. Age	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	
3K	1	0.62	0.54	0.34	1.37	0.22	0.14	0.38	1.23	2.37	0.27	1.36
	2	7.64	3.20	2.53	4.89	1.35	1.09	1.55	2.99	6.24	2.31	4.74
	3	15.54	6.18	4.33	9.20	6.75	6.20	4.46	4.92	11.39	16.54	10.41
	4	13.45	5.39	6.03	5.33	6.63	10.75	11.67	6.32	18.75	13.14	19.09
	5	13.98	7.83	9.06	7.85	7.58	12.35	23.24	12.44	11.07	13.23	22.63
	6	11.41	9.57	10.91	11.38	7.46	9.94	9.92	12.69	15.70	10.36	13.29
	7	7.51	4.83	6.45	7.22	7.31	11.33	6.76	8.10	13.70	7.85	7.34
	8	2.88	1.72	1.68	2.32	7.29	9.39	3.58	2.49	3.37	4.27	1.09
	9	1.12	0.61	0.58	0.93	2.22	3.18	2.08	0.90	0.75	1.24	0.31
	10	0.79	0.49	0.46	0.42	0.56	0.73	0.68	0.66	0.16	0.24	0.14
	11	0.74	0.32	0.50	0.23	0.34	0.41	0.33	0.30	0.12	0.11	0.08
	12	0.42	0.30	0.28	0.09	0.24	0.21	0.22	0.21	0.19	0.12	0.04
	13	0.22	0.26	0.16	0.07	0.15	0.12	0.15	0.09	0.03	0.07	0.02
	14	0.05	0.11	0.07	0.01	0.15	0.06	0.11	0.08		0.01	0.01
	15	0.04	0.08	0.02	0.00	0.03	0.01	0.03	0.04		0.02	
	16	0.03	0.04	0.01	0.01	0.01	0.00	0.01	0.02		0.02	
	17	0.01	0.01			0.01			0.02		0.02	
	18		0.01						0.01			
	19		0.00									
	20											
unknown		0.01						0.03	0.03	0.00	0.01	
Total	76.46	41.50	43.41	51.51	48.33	65.90	65.16	53.54	83.88	69.81	80.56	
2J	1	0.45	0.91	0.63	1.88	0.52	0.09	0.12	1.31	0.67	0.40	0.46
	2	3.36	7.92	0.79	5.68	0.92	0.37	1.62	1.53	0.76	1.31	0.81
	3	7.79	7.35	2.15	4.15	3.87	1.43	5.79	1.14	0.98	3.45	2.24
	4	10.66	5.64	3.32	4.04	8.07	3.55	4.24	2.06	2.49	1.61	3.48
	5	9.80	7.81	5.53	5.82	6.64	6.92	8.26	4.93	4.99	1.63	2.19
	6	7.07	7.23	6.56	5.68	5.27	6.73	6.93	7.06	8.33	3.35	3.05
	7	4.87	3.82	5.44	5.52	7.44	7.14	6.45	6.55	8.66	6.40	5.97
	8	3.00	1.87	2.49	3.53	9.05	5.52	5.99	3.81	3.85	5.07	3.23
	9	2.24	1.10	1.27	1.68	4.87	2.42	2.44	1.85	1.59	2.80	0.78
	10	1.73	1.20	0.98	1.03	2.32	0.86	1.18	1.25	0.58	0.62	0.22
	11	1.31	0.79	1.11	0.97	1.16	0.68	0.59	0.46	0.45	0.50	0.15
	12	0.83	0.68	0.78	0.46	0.71	0.58	0.39	0.44	0.29	0.38	0.09
	13	0.59	0.54	0.53	0.23	0.54	0.46	0.33	0.21	0.24	0.14	0.12
	14	0.19	0.29	0.31	0.14	0.55	0.33	0.31	0.25	0.17	0.18	0.10
	15	0.13	0.18	0.12	0.09	0.44	0.16	0.21	0.16	0.18	0.12	0.08
	16	0.10	0.19	0.07		0.17	0.04	0.16	0.09	0.10	0.00	0.05
	17	0.05	0.07	0.02		0.02	0.00	0.08	0.08	0.03	0.02	0.02
	18	0.00	0.03			0.01	0.02		0.02	-		0.01
	19	0.00	0.02						0.01	-		0.00
	20	0.01										0.01
unknown	0.04		0.03	0.25	0.02			0.01	0.01	0.10		
Total	54.21	47.64	32.13	41.15	52.61	37.31	45.08	33.23	34.37	28.08	23.06	
2J+3K	130.67	89.14	75.54	92.46	100.94	103.21	110.24	86.77	104.27	97.89	103.62	

Table 9. Age composition of Greenland halibut - numbers/standard tow for Division 3L.

AGE	ATC 323, 324, 325 1981	ATC 333, 334 1982	WT 7, 8, 9 1983	WT 16, 17, 18 1984	WT 37, 38, 39 1985	A.N. 72 1986	WT 65 1987	WT 78 1988
1	0.29	0.22	0.12	0.13	0.69	1.55	0.01	0.08
2	0.37	0.42	0.69	0.26	0.80	1.43	0.15	0.19
3	0.80	0.74	0.86	0.36	0.46	0.50	0.85	0.52
4	0.56	0.53	0.69	0.66	0.76	0.32	0.65	0.73
5	1.51	0.74	0.55	1.53	1.39	0.58	0.49	1.72
6	1.61	0.84	0.52	1.38	2.56	1.00	0.68	1.64
7	0.86	1.05	0.65	1.32	1.68	1.15	0.77	1.03
8	0.21	0.89	0.54	1.02	0.91	0.36	0.79	0.40
9	0.00	0.23	0.16	0.40	0.50	0.09	0.28	0.16
10	0.05	0.07	0.00	0.17	0.18	0.02	0.09	0.04
11	0.01	0.02	0.00	0.03	0.09	0.01	0.06	0.03
12	0.00	0.01	0.01	0.01	0.06	0.00	0.02	0.02
13	0.00		0.01	0.02	0.00	0.00	0.01	0.01
14	0.00			0.00	0.01	0.01	0.00	0.01
15	0.00			0.00	0.01		0.01	
16	0.01				0.00			
17					0.00			
Unknown	0.03	0.00	0.03	0.00	0.00	0.03	0.01	0.00
Total	6.30	5.77	4.80	7.28	10.08	7.05	4.88	6.56

Table 10. Age composition of Greenland halibut from surveys for Divisions 2J3KL.

Age	1981	1982	1983	1984	1985	1986	1987	1988
1	3.54	0.96	0.35	0.50	3.23	4.17	0.68	1.89
2	10.94	2.69	2.15	3.17	5.32	7.00	3.77	6.00
3	14.15	11.36	8.49	10.25	6.52	11.12	20.84	13.83
4	9.93	15.23	14.99	15.91	9.14	17.71	15.40	24.53
5	15.18	14.96	19.82	31.50	18.76	15.89	15.35	27.46
6	18.67	13.57	17.19	16.85	22.31	22.05	14.39	19.34
7	13.60	15.80	19.12	13.21	16.33	20.89	15.02	14.86
8	6.06	17.23	15.45	9.57	7.21	7.57	10.13	4.82
9	2.61	7.32	5.76	4.52	3.25	2.33	4.32	1.22
10	1.50	2.95	1.59	1.86	2.09	0.74	0.95	0.40
11	1.21	1.52	1.09	0.92	0.85	0.57	0.67	0.24
12	0.55	0.96	0.80	0.61	0.71	0.45	0.52	0.13
13	0.30	0.69	0.59	0.48	0.30	0.27	0.22	0.14
14	0.15	0.70	0.39	0.42	0.34	0.18	0.19	0.11
15	0.09	0.47	0.17	0.24	0.21	0.18	0.15	0.08
16	0.02	0.18	0.04	0.17	0.11	0.10	0.02	0.05
17		0.03	0.00	0.08	0.10	0.03	0.04	0.02
18		0.01	0.02		0.03			0.01
19					0.01			0.00
20								0.01
Unknown	0.28	0.02	0.03		0.04	0.07	0.11	0.01
Total	98.78	106.65	108.04	110.26	96.86	111.32	102.77	115.15

Table 11. Stratified mean number per set at age of Greenland halibut in NAFO Division 2G from post-stratified surveys in 1978, 1979, and 1981 and a stratified-random survey in 1987.

Age (Years)	Gadus 13 1978	Gadus 24 1979	Gadus 57 1981	Gadus 143 1987	Gadus 156 1988
1	0.0	1.19	0.45	2.03	0.15
2	3.76	1.14	1.17	2.20	0.42
3	2.64	2.40	1.52	1.10	0.52
4	3.28	3.35	2.30	0.90	0.57
5	4.24	3.89	3.12	0.85	0.38
6	4.53	3.36	3.82	1.82	0.57
7	5.05	3.62	4.74	4.14	1.21
8	4.92	4.38	2.89	5.28	2.23
9	4.07	3.20	1.93	3.13	1.55
10	2.35	1.36	1.02	2.03	0.53
11	1.22	0.53	0.55	0.91	0.30
12	0.41	0.32	0.20	0.30	0.13
13	0.22	0.11	0.03	0.35	0.19
14	0.09	0.12	0.02	0.10	0.09
15	0.05	0.09	0.00	0.09	0.03
16	0.04	0.06	0.00	0.01	0.02
17	0.00	0.00	0.00	0.00	0.00
18	0.00	0.01	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00
Unknown	0.01	0.00	0.07	0.00	0.00
Total	36.87	29.13	23.83	25.27	8.89

Table 12. Stratified mean number per set at age of Greenland halibut in NAFO Division 2H from post-stratified surveys in 1978, 1979, and 1981 and a stratified-random survey in 1987.

Age (Years)	Gadus 13 1978	Gadus 24 1979	Gadus 57 1981	Gadus 143 1987	Gadus 156 1988
1	0.0	2.40	0.76	2.36	2.41
2	5.33	14.72	3.99	12.63	14.08
3	9.52	23.90	3.92	5.89	16.21
4	15.64	25.46	2.52	2.07	8.04
5	12.94	18.35	3.44	3.98	3.14
6	8.97	10.64	3.78	11.77	2.47
7	6.09	8.88	4.55	8.49	5.51
8	4.50	8.75	3.50	2.42	7.71
9	4.42	7.46	2.28	1.01	2.02
10	3.12	3.99	1.21	0.30	0.55
11	2.22	2.20	0.72	0.16	0.26
12	1.09	1.39	0.29	0.08	0.16
13	0.69	0.63	0.09	0.06	0.13
14	0.36	0.63	0.05	0.06	0.12
15	0.24	0.28	0.01	0.02	0.08
16	0.09	0.15	0.00	0.01	0.02
17	0.02	0.03	0.00	0.01	0.00
18	0.00	0.02	0.00	0.00	0.00
19	0.00	0.02	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00
Unknown	0.00	0.00	0.01	0.00	0.00
Total	75.24	129.90	31.11	51.34	62.91

Table 13. Catch and effort statistics of Greenland halibut in NAFO Div. 2HJ3K from Canada(N) where effort was considered directed in 1978-88.

Year	NAFO Div.	Months	Mean CPUE (t/hr.)	Directed catch (t)
<u>Canada(N) (TC 5)</u>				
1980	3K	Mar-May	0.559	1148
1981	3K	Mar-May	0.485	3118
1982	3K	May	0.416	304
	2J	Aug-Sep	0.610	1132
	2H	Aug-Sep	0.924	3406
1983	3K	May-Jul	0.587	1471
	2J	Aug	1.153	1465
	2H	Aug-Sep	1.423	2168
1984	3K	May-Sep	0.607	1759
	2J	Jul-Sep	1.115	1603
	2H	Jul-Sep	1.072	1451
1985	3K	May-Sep	0.269	151
	2J	Jul-Oct	0.600	2398
	2H	Aug-Sep	0.892	1265
1986	2J	Jun-Oct	0.424	1098
1987	2J	Aug	0.694	1936
1988	2J	Aug-Sep	0.365	559

Table 14.

AGE	AVERAGE		CATCH		
	WEIGHT	LENGTH	MEAN	STD. ERR.	C. V.
* 5	0.337	37.300	41	7.54	0.18
* 6	0.588	41.833	2124	71.30	0.03
7	0.891	45.974	5429	82.79	0.02
8	1.157	51.285	1659	46.36	0.03
* 9	1.649	56.914	404	16.14	0.04
*10	2.240	62.484	180	8.08	0.06
*11	2.837	67.031	25	4.05	0.16
*12	3.533	71.892	10	1.46	0.14
*13	4.456	76.565	2	0.60	0.27
*14	5.512	81.648	2	0.41	0.17
*15	6.821	86.968	1	0.25	0.21
*16	7.782	90.500		0.00	0.02

Table 15. CATCH NUMBERS (x10³) AT AGE,

- 15 -

AGE	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
5	322	19	464	3016	2182	204	810	236	766	958	1662	245	113
6	2719	680	4351	9511	7980	2032	4242	2020	3669	2211	4449	1958	1576
7	5547	3600	9374	9072	11726	8913	9209	5552	10714	5560	4955	5604	9117
8	4781	6030	6377	7662	5611	9429	10753	5064	8215	7309	2933	4450	7403
9	3821	4199	2546	2898	1069	5258	4045	3112	2509	3888	1156	1284	2349
10	1628	2457	879	1454	440	3729	836	1480	756	1198	429	412	707
11	677	923	191	731	262	987	240	524	229	387	133	213	318
12	130	290	113	371	136	125	133	225	83	136	83	122	233
13	269	113	101	225	131	52	40	143	116	101	73	61	186
14	131	36	26	110	84	14	27	70	93	55	40	49	139
15	63	21	16	58	76	9	20	55	74	73	18	32	88
16	41	1	22	54	56	2	13	29	10	28	12	20	47
17	43	1	7	39	44	1	5	14	14	18	2	1	15
5+	20172	18370	24469	34201	29797	30755	30373	18524	27468	21819	15945	14450	22291

Table 16. CATCH AT AGE AS PERCENTAGES

AGE	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
5	1.6	0.1	1.9	8.8	7.3	0.7	2.7	1.3	2.8	3.9	10.4	1.7	0.5
6	13.5	3.7	17.8	24.9	26.8	6.6	14.0	10.9	14.2	10.1	27.9	13.5	7.1
7	27.5	19.6	38.3	26.5	39.4	29.0	30.3	30.0	39.0	25.5	31.1	38.8	40.9
8	23.7	32.8	26.1	22.4	18.8	30.7	35.4	27.3	29.9	33.5	18.4	30.8	33.2
9	18.9	22.9	10.4	8.5	3.6	17.1	13.3	16.8	9.1	17.8	7.2	8.9	10.5
10	8.1	13.4	3.6	4.3	1.5	12.1	2.8	8.0	2.8	5.5	2.7	2.9	3.2
11	3.4	5.0	0.8	2.1	0.9	3.2	0.8	2.8	0.8	1.8	0.8	1.5	1.4
12	0.6	1.6	0.5	1.1	0.5	0.4	0.4	1.2	0.3	0.6	0.5	0.8	1.0
13	1.3	0.6	0.4	0.7	0.4	0.2	0.1	0.8	0.4	0.5	0.5	0.4	0.8
14	0.6	0.2	0.1	0.3	0.3	0.0	0.1	0.4	0.3	0.3	0.3	0.3	0.6
15	0.3	0.1	0.1	0.2	0.3	0.0	0.1	0.3	0.3	0.3	0.1	0.2	0.4
16	0.2	0.0	0.1	0.2	0.2	0.0	0.0	0.2	0.0	0.1	0.1	0.1	0.2
17	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1

Table 17. AVERAGE WEIGHTS AT AGE (KG);

AGE	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
5	0.609	0.609	0.609	0.609	0.609	0.514	0.392	0.525	0.412	0.377	0.568	0.350	0.364
6	0.760	0.760	0.760	0.760	0.760	0.659	0.598	0.684	0.629	0.583	0.749	0.584	0.589
7	0.955	0.955	0.955	0.955	0.955	0.869	0.789	0.891	0.861	0.826	0.941	0.811	0.836
8	1.192	1.192	1.192	1.192	1.192	1.049	0.985	1.130	1.176	1.097	1.244	1.096	1.161
9	1.580	1.580	1.580	1.580	1.580	1.145	1.235	1.400	1.648	1.462	1.685	1.580	1.589
10	2.209	2.209	2.209	2.209	2.209	1.256	1.700	1.787	2.231	1.943	2.242	2.124	2.129
11	2.699	2.699	2.699	2.699	2.699	1.573	2.460	2.381	3.006	2.632	2.953	2.885	2.818
12	3.371	3.371	3.371	3.371	3.371	2.709	3.507	3.471	3.964	3.485	3.711	3.897	3.603
13	3.884	3.884	3.884	3.884	3.884	3.115	4.794	4.506	5.061	4.486	4.851	4.954	4.635
14	4.563	4.563	4.563	4.563	4.563	4.418	5.944	5.847	6.058	5.730	6.134	6.089	5.477
15	5.918	5.918	5.918	5.918	5.918	5.037	8.055	7.527	7.315	6.849	7.163	7.637	6.671
16	7.144	7.144	7.144	7.144	7.144	7.022	8.710	8.684	8.599	8.329	8.921	9.807	7.848
17	7.887	7.887	7.887	7.887	7.887	10.147	9.576	11.527	11.318	9.572	11.833	10.103	9.841

Table 18. CATCH BIOMASS AT AGE,

AGE	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
5	196	12	283	1837	1329	105	318	124	316	323	944	86	41
6	2066	517	3307	4468	6965	1339	2537	1383	2446	1290	3331	1144	928
7	5297	3438	8952	8664	11198	7745	7266	4947	9223	4591	4662	4545	7626
8	5699	7188	7601	9133	6688	9891	10592	5724	9662	8017	3648	4878	8592
9	6037	6634	4023	4579	1689	6020	4996	4357	4135	5694	1949	2029	3733
10	3596	5428	1942	3212	972	4684	1421	2645	1686	2327	962	875	1505
11	1827	2491	516	1873	707	1553	590	1248	689	1018	393	615	896
12	438	978	381	1251	458	338	466	781	330	473	308	476	840
13	1045	439	392	874	509	162	192	644	589	452	354	300	862
14	598	164	119	502	383	62	160	409	564	316	245	297	761
15	373	124	107	343	450	45	161	414	542	501	129	241	587
16	293	7	157	386	400	14	113	252	88	230	107	194	369
17	339	8	55	308	347	10	48	161	155	172	24	13	148
5+	27805	27427	27834	39529	31196	31969	28860	23089	30426	25393	17054	15693	26888

6. Halibut Commercial Catch (t) in SA2+Div. 3KL

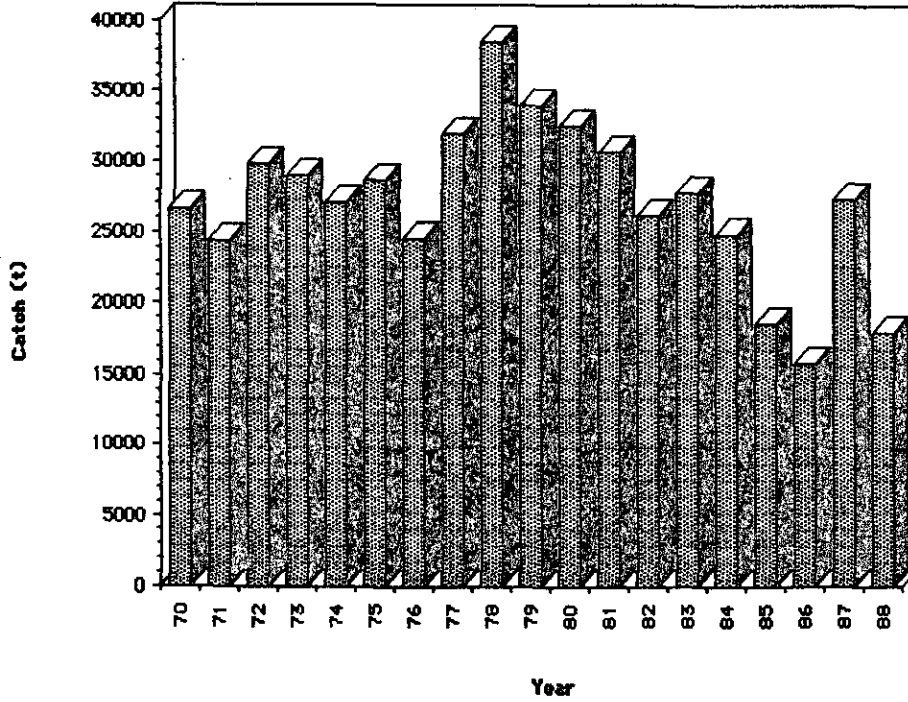


Fig. 1 Commercial catch of G. Halibut in SA2+Div. 3KL from 1970-88.

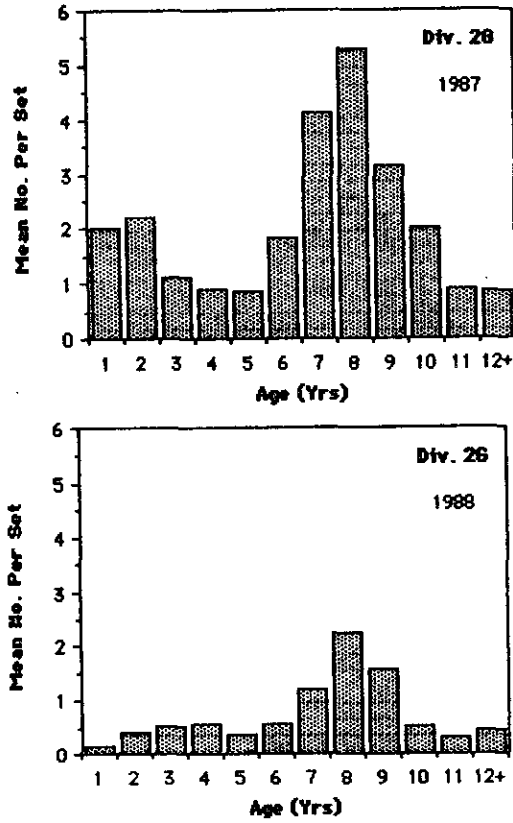


Fig. 2 Age composition of G. halibut from Groundfish surveys in Div. 2G 1987-88.

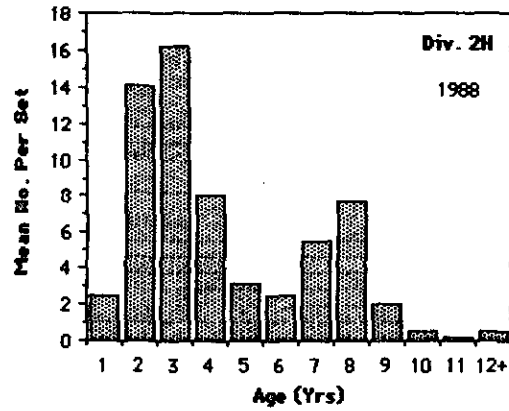
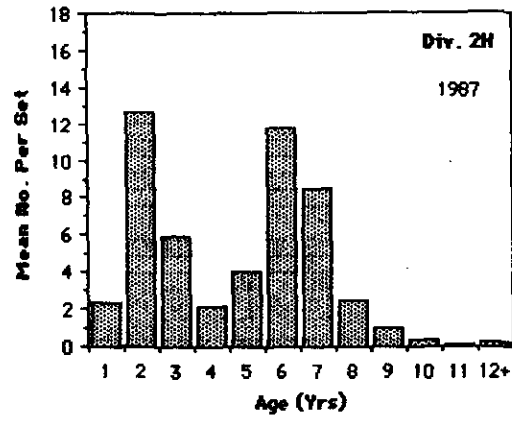


Fig. 3 Age composition of *G. halibut* from Groundfish surveys in Div. 2H 1987-88.

Age 5 From Div. 2J3KL Groundfish Surveys

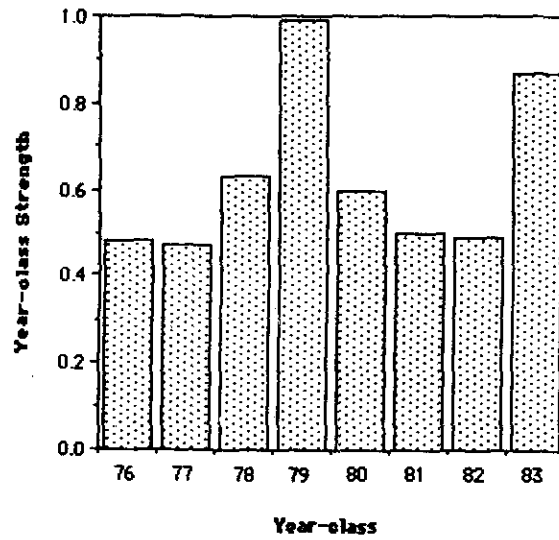


Fig. 4 Year-class strength at age 5 from Groundfish surveys in Div. 2J3KL. Values are scaled to the 1979 year-class.

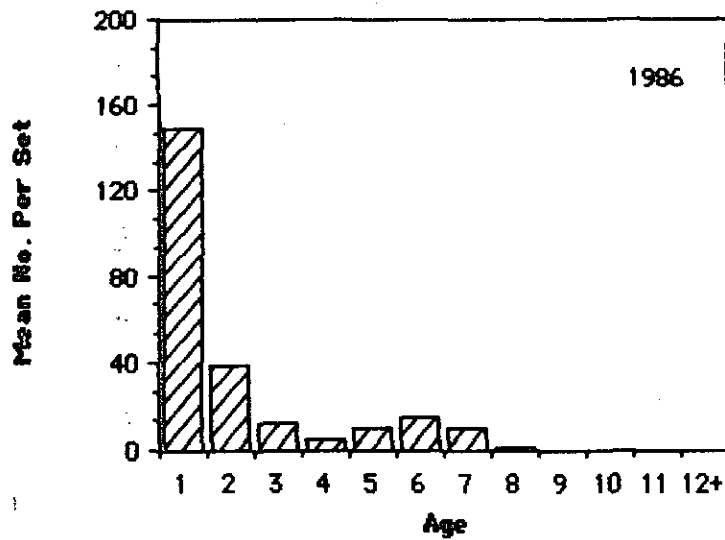
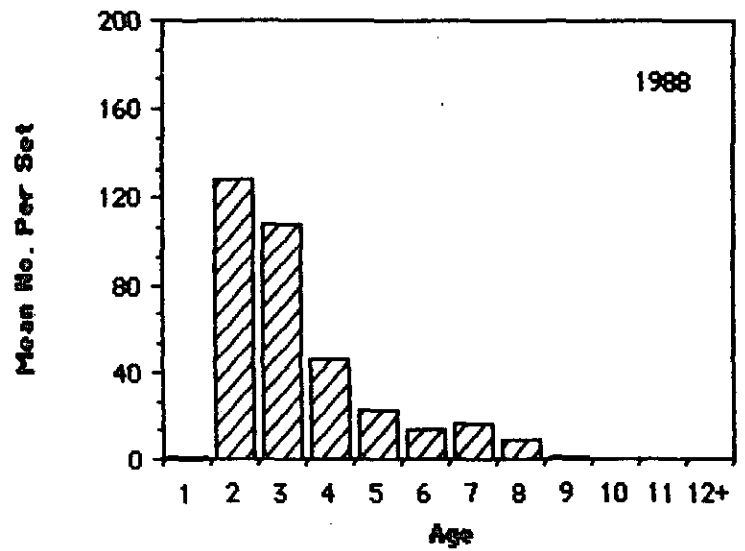
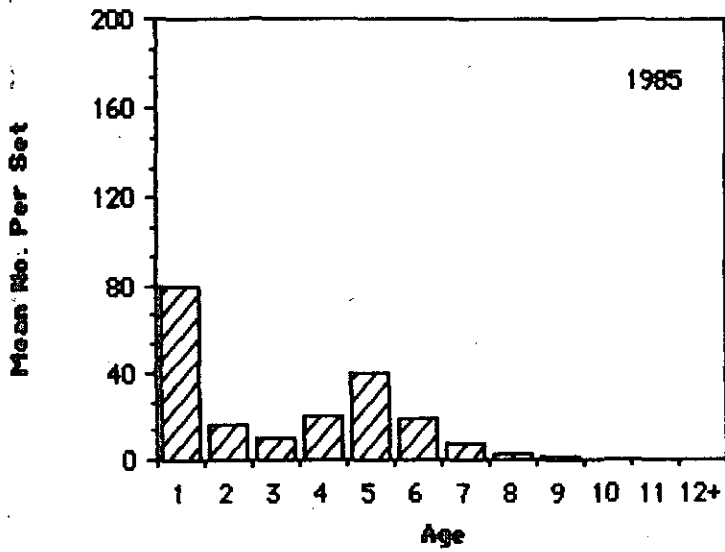
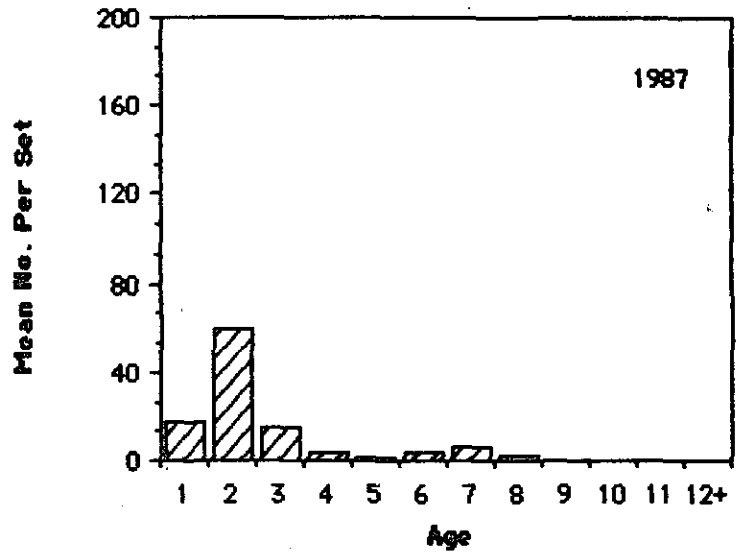
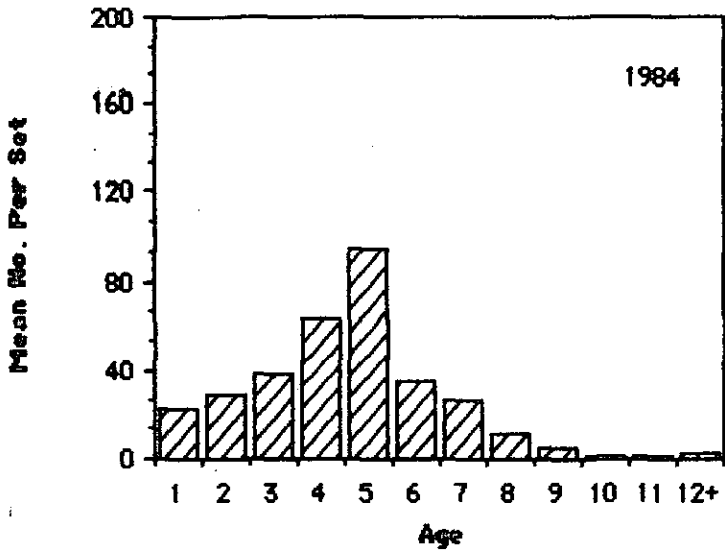


Fig. 5 Mean no. per set of *G. halibut* from shrimp surveys in Div. 2H.

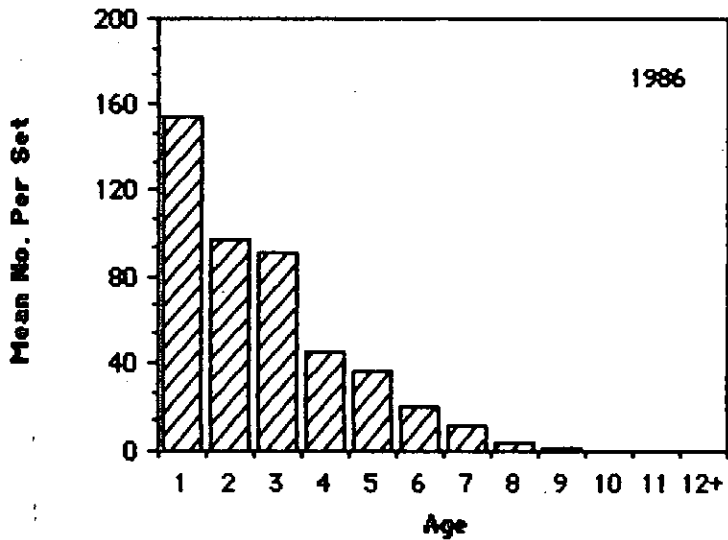
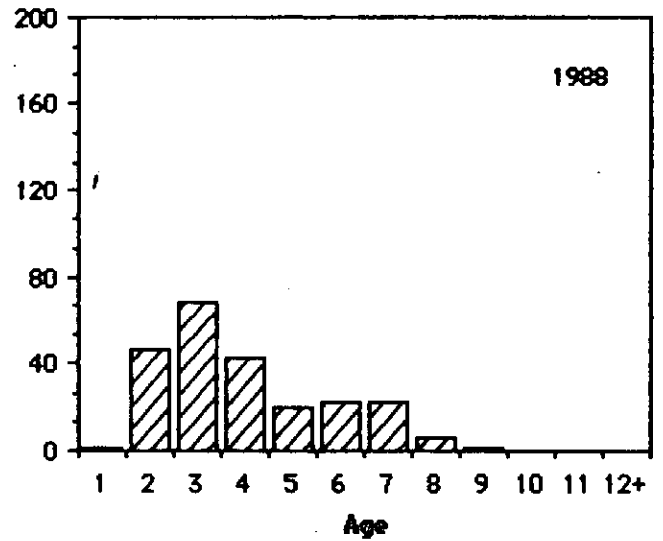
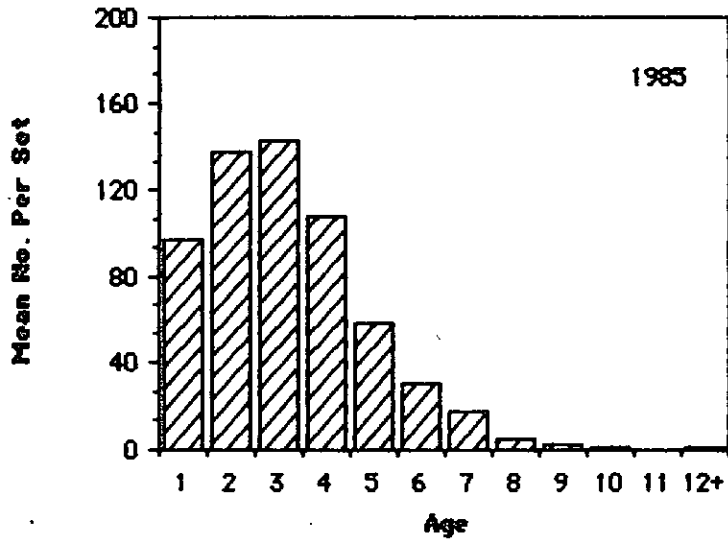
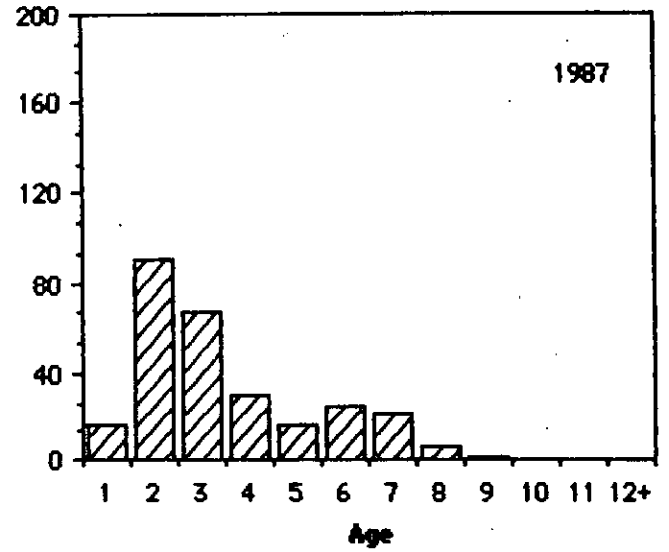
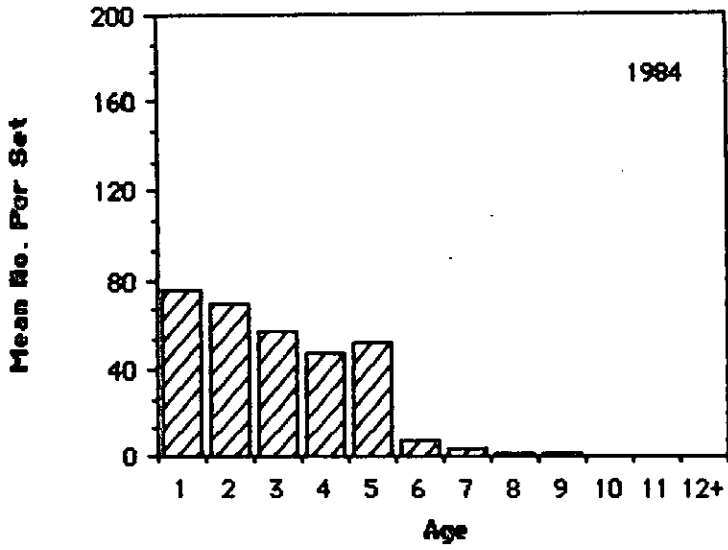


Fig. 6 Mean no. per set of *G. halibut* from shrimp surveys in Div. 2J.

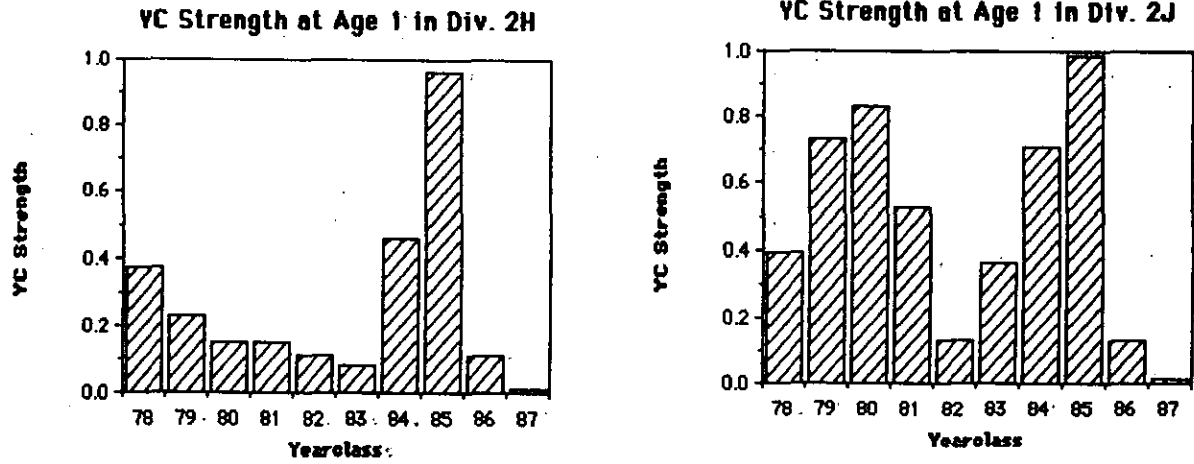


Fig. 7 Yearclass strength at age 1 of *G. halibut* in Div. 2J and 2H relative to the 1985 yearclass in Div. 2J.

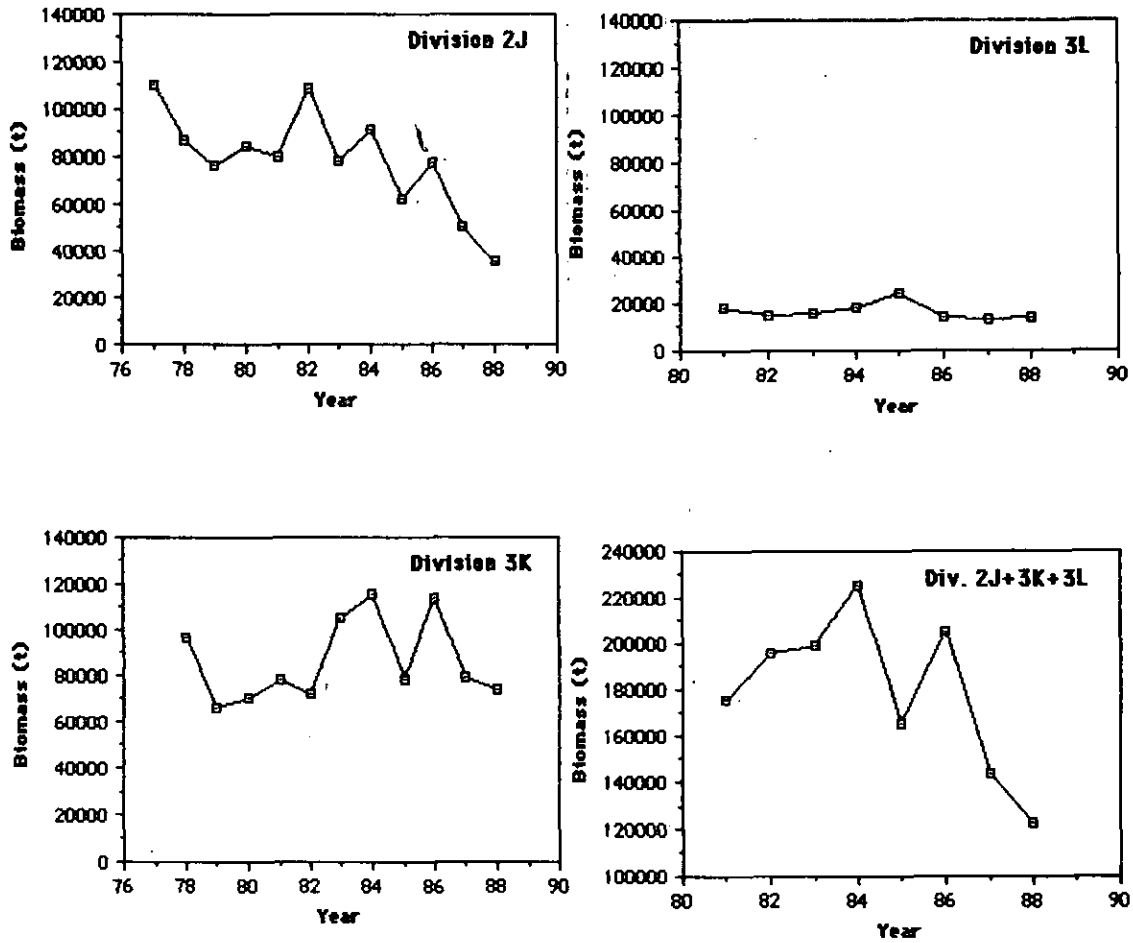


Fig. 8 Biomass estimates of *G. halibut* in Div. 2J, 3K and 3L.