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Canadian Fishery for Greenland Halibut in SA2 + Div. 3KLMNO, with Emphasis on 2000.

by

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Abstract

The Canadian catch of Greenland halibut in 2000 in NAFO Subarea 2 and Divisions 3KLMNO was reported to be almost 10,600 tons, more than two and one half times the catches in 1998 and 1999. Effort was higher for the three major gear types in the fishery. Gillnet was the predominant gear type, although otter trawl catches of about 1300 tons were the highest by this gear type since 1992. Much of the catch came from Divisions 3KL, in depths less than 550 metres. Over half of the catch was taken in July and August. The catch at age in all areas and gear sectors in 2000 was dominated by the 1993 year-class.

Review of the Canadian fishery prior to 2000

The Canadian fishery for Greenland halibut in Subareas 2 and 3 began in the early 1960s, using gillnets in the deepwater bays of eastern Newfoundland, particularly Trinity Bay. As catches declined here, the effort moved progressively northward in the other bays along the east and northeast coast of Newfoundland. In later years, vessels moved further offshore to the deep channels, such as the area in the central part of Div 3K known as Funk Island Deep, and eventually to the continental slope. Canadian catches increased from fairly low levels in the early 1960s to almost 32,000 tons in 1980 then declined steadily to between 2900 and 6300 tons in each year from 1993-99 (Table 1). This declining trend was mainly a result of low catch rates and reduced effort, as fishers pursued other species such as snow crab which were more profitable.

Canadian catches have been taken mostly by gillnet (Table 1). This fishery has been conducted mainly by small vessels (<20 m) fishing in the deepwater channels near the NF and Lab. coast as well as in the deepwater bays, using an average mesh size of 150 mm. However, Canadian gillnet catches taken during recent years are mainly from a fishery along the deep edge of the continental slope in Divisions 2J and 3KLO. In an attempt to reduce the catch of young Greenland halibut in this new deepwater gillnet fishery, gillnet mesh size for Greenland halibut in the Canadian zone in depths > 732 m (400 fathoms) is regulated to be no less than 190 mm. 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. After 1992, catches by this fleet have been less than 1600 tons annually, and there has been very little effort in some years, particularly 1998 and 1999.

Catches from Subarea 2 were very low prior to the mid 1970's, then increased to a peak around 9000 tons in 1982. Since 1991, catches from Subarea 2 have been in the range of 1000 to 2500 tons per year. Most of the catch from Subarea 2 has come from Div. 2J, although catches in 1993-96 were higher in Div. 2GH compared to Div. 2J. In most years, Div. 3K has produced the largest Canadian catches, peaking around 18,000 tons in 1979-80. Peak catches of around 13,000 tons in Div 3L occurred in 1966-67 and 1980. Catches in Div. 3M and 3N have been negligible, and

catches in Div. 3O increased from similar low levels to a few hundred tons per year from 1993-1999. The catch in Divs. 2GH declined from values around 1400 tons in 1994-95 to 168 t in 1999.

In 1999, the Canadian fishery was very similar to that in 1998. Catches were around 4100 t in each year, and the fishery in both years was dominated by gillnet catches, mainly from Div. 2J and 3K. In both years, the otter trawl fisheries took less than 100 tons.

The Canadian fishery in 2000

The Canadian fishery for *G.halibut* in 2000 was more extensive than in recent years. Total reported catch was 10,593 tons, compared to about 4100 tons in 1998 and 1999. Reasons for the increased catch and effort on this stock include a switch of some effort by fishers in Divs. 3KL from snow crab to *G.halibut* due to declining quotas for crab, combined with improved catch rates for Greenland halibut in most of the traditional fishing areas. Breakdowns of this catch by gear, Division, depth range and month are shown in Tables 3-5. The dominant gear by far was gillnet, with catches in the shallow zone (<732 m) being about double the catch in the deeper zone. These catches are referred to in Tables 3 and 5 as GN<400 and GN>400. Longline catches were minimal and otter trawl catches of 1285 tons were the highest by this fleet sector since 1992. Most of the increased catch in 2000 came from Div. 3KL, although the catch in Div. 3O in 2000 of 567 tons was the highest on record for that area (Table 2). The catch of 126 tons in Div 2GH in 2000 was the lowest from this area since 1991.

Figure 1 shows the location of most of the Canadian catch of Greenland halibut in 2000. These data were aggregated by 10-minute squares, from logbook records, and account for almost 9100 tons of the total catch of 10,600 tons. Most of the fishery occurred between 48 30°N and 51° N latitude. Catches were spread over a number of depth zones, although 30% of the total was caught in depths less than 366 metres (Table 4). Fig. 2 shows the location of the catch by the 3 major gear types (2 gillnet categories and otter trawl). Most of the otter trawl fishery was located in a relatively small area around the slope edge at the border between Divs. 3K and 3L. There was some seasonal variation in the location of the GN<400 catches, as shown in Fig. 3; less variation was observed in the GN>400 and otter trawl fisheries (Fig 4 and 5). Over half of the catch was taken in July and August (Table 5), due mainly to improved weather and completion of other fisheries (notably snow crab) during this period.

It should be noted that there are data on Greenland halibut from Science-based logbooks collected in the small boat (< 35 feet) cod fishery in Divisions 2J3KL. These have not been analysed for inclusion in this paper. By-catches in the gillnet fishery include cod and snow crab, particularly in the GN<400 sector, while American plaice and witch flounder were important by-catches in the otter trawl fishery

Catch at age

Details on the catch at age for previous years can be found in Bowering and Brodie (2000).

Ages 6-8 dominated the Canadian catch in most years, both in the otter trawl and shallow water gillnet fisheries. The deep water gillnet fishery was comprised mainly of larger, older individuals. For the catch in 2000, sampling data, as collected by observers at sea and by port samplers, were available from Divs. 2J3KLO. The following table shows the number of length measurements by Division and gear type, and the number of otoliths (in italics). The otolith samples from the two gillnet sectors have been combined. As well, otoliths collected in the French otter trawl fishery in Div 2J were included with those collected from the Canadian fishery.

	2J		3K		3L		3O	
Gill net < 400		<i>110</i>	10498	<i>1008</i>	3125	<i>545</i>		<i>501</i>
Gill net > 400	2288		4065		2514		7528	
Otter trawl	3771	<i>175</i>	3130	<i>206</i>	9577	<i>816</i>		
Totals	6059	<i>285</i>	17693	<i>1214</i>	15216	<i>1361</i>	7528	<i>501</i>

Age compositions are presented for both gillnet components (GN<400 and GN>400) as well as otter trawl (Table 6). The peak age in all 3 gear sectors was 7 (1993 year class), although the large presence of this age in the deepwater gillnets may be due in part to incorrect categorization of a few gillnet length frequencies. Most of the age length frequencies from the GN>400 sector contained larger fish, as evidenced by the wider spread of ages in seen in Table 6, and a secondary peak in the age distribution at age 11. Overall, age 7 accounted for over two-thirds of the catch in numbers and over half of the catch in weight. Age 8 was second highest in the catch numbers, followed by age 6. Mean weights at age were calculated using the same length weight relationship used in 1998 and 1999 for Greenland halibut catches, which was the Divisions-combined, year = 1997 (from Gundersen and Brodie 1999), and were similar to those in the Canadian fishery in 1998-99 (Bowering and Brodie 2000).

References

- Bowering, W. R., and W. B. Brodie. 2000. Calculation of catch-at-age for commercially caught Greenland halibut in NAFO Subarea 2 and Divisions 3KLMNO during 1975-99 with particular emphasis on construction of the catch-at-age matrix since 1989. NAFO SCR Doc. 00/24.
- Gundersen, A.C. and W.B.Brodie. 1999. Length-weight relationships of Greenland halibut in NAFO Divisions 2GHJ and 3KLMNO, 1990-97. NAFO SCR Doc. 99/31, Ser. No. N4087.

Table 1. Canadian catch of G.halibut, by gear type, from 1960-2000.

YEAR	GEAR					TOTAL
	GILLNET	LONGLINE	MISC	UNSPEC.	OT TRAWL	
1960				660		660
1961				741		741
1962				586		586
1963		5		771		776
1964				1757		1757
1965				8082		8082
1966	257	194	15	15640	120	16226
1967	93	144	95	15478	798	16608
1968		94		12766	493	13353
1969	9980	850	69	412	245	11556
1970	9818	371	119	318	85	10711
1971	8947	153	55	180	75	9410
1972	8775	34	22	50	71	8952
1973	6546	35	70	102	95	6848
1974	5500	49	16	8	184	5757
1975	7510	3	53	1	247	7814
1976	8500	6	41		767	9314
1977	15038	33	36		2866	17973
1978	20622	46	83		3951	24702
1979	24550	116	116		5183	29965
1980	27703	128	57		3946	31834
1981	17927	55	43		6155	24180
1982	11038	69	59		8143	19309
1983	9911	58	73		7085	17127
1984	11100	27	100		6070	17297
1985	7422	2	42		4847	12313
1986	6293	7	20		1896	8216
1987	10849	22	115		2465	13451
1988	7715	70	53		629	8467

Table 2. Canadian catch of G.halibut, by Division, from 1960-2000.

YEAR	DIVISION								TOTAL	
	2G	2H	2J	3K	3L	3M	3N	3O		
1960				610	50					660
1961				613	128					741
1962				479	107					586
1963				592	184					776
1964				870	887					1757
1965				2129	5953					8082
1966				3691	12518		17			16226
1967			7	2892	13705		1	3		16608
1968			53	3672	9597		31			13353
1969				7140	4413		1	2		11556
1970				5937	4769		5			10711
1971				4160	5248		2			9410
1972				4736	4216					8952
1973			5	3602	3233		1	7		6848
1974			19	2817	2909		9	3		5757
1975			22	3245	4540		7			7814
1976	62	168	153	4779	4144	1	7			9314
1977		72	419	10751	6725	1	2	3		17973
1978		14	1255	15875	7548	1	5	4		24702
1979		34	3163	18165	8578	2	17	6		29965
1980		217	1157	17658	12742	14	43	3		31834
1981	10	41	862	14379	8833		49	6		24180
1982	15	5155	3942	6031	4105		55	6		19309
1983		2578	2238	7679	4618		12	2		17127
1984		1913	2796	7496	5078		12	2		17297
1985		1758	3101	4395	3023		35	1		12313
1986		82	2476	2886	2769		2	1		8216
1987		6	4143	4740	4561		1			13451
1988	45	27	1867	4591	1921	2	12	2		8467

Table 1. continued.

1989	10956	16	35	988	11995	
1990	6732	18	15	2402	9167	
1991	3440	36	9	3254	6739	
1992	4470	30	1	2502	7003	
1993	3863	4	5	1034	4906	
1994	2378			575	2953	
1995	2602	1		632	3235	
1996	5134	1	1	1043	6179	
1997	5202	61		1017	6280	
1998	3963	108	4	46	4121	
1999	3870	65		81	4016	
2000	9271	18	5	14	1285	10593

Table 2. continued

1989		190	2635	6342	2809	6	10	3	11995
1990	57	171	2798	4075	2020	38	4	4	9167
1991		50	3008	2215	1291	157	11	7	6739
1992	428	230	476	3882	1951	4	10	22	7003
1993	557	403	214	2398	880		19	435	4906
1994	1045	210	203	1032	258		1	204	2953
1995	1006	453	709	754	197			116	3235
1996	688	639	1058	2567	888			339	6179
1997	370	619	1513	2659	935			184	6280
1998	358	418	1234	1374	633		1	103	4121
1999	65	103	1094	1940	683			131	4016
2000	45	81	1152	5845	2901	1	1	567	10593

Table 3. Canadian catches of G.halibut in 2000 by area and gear.

	GN <400	GN >400	Longline	Otter trawl	Misc	Can (N)	Can (SF)	Can Total
2GH	90	31	5			126		126
2J	428	596		114	3	1141	11	1152
3K	4090	1427		324	2	5843	2	5845
3L	1532	515	8	846		2901		2901
3MNO	92	470	5	1		568	1	569
Total	6232	3039	18	1285	5	10579	14	10593

Table 4. Canada (NF) catches of G.halibut in 2000 by Division, and depth zone (fm).

	<200	201-300	301-400	401-500	501-600	601-700	>700	Total
2G	13					21	11	45
2H	2	15	62				2	81
2J	236	58	136	175	335	196	5	1141
3K	1537	1417	1242	528	605	402	112	5843
3L	1359	104	626	262	129	253	168	2901
3M						1		1
3N								1
3O	93		1	2	78	338	54	566
Total	3240	1594	2067	967	1147	1211	352	10579

Table 5. Breakdown of Canada (NF) catches of G.halibut in 2000 by area, gear, and month.

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2GH	GN<400 fm							67	2	21				90
	GN>400 fm							16	15					31
	Longline										5			5
	Total							83	17	21	5			126
2J	GN<400 fm						67	144	175	42				428
	GN>400 fm					56	156	216	135	33				596
	Otter Trawl					1	11				19	83		114
	Misc/unk							3						3
	Total					57	234	363	310	75	19	83		1141
3K	GN<400 fm					8	314	918	1540	1305	4	1		4090
	GN>400 fm					84	335	496	396	98	15	3		1427
	Otter Trawl				52	77	151	36			4	4		324
	Misc/unk								2					2
	Total				52	169	800	1450	1938	1403	23	8		5843
3L	GN<400 fm						12	150	1036	329	5			1532
	GN>400 fm				60	126	34	71	148	70	1	5		515
	Longline				7					1				8
	Otter Trawl				1	122	299	368			1	55		846
	Total				68	248	345	589	1184	400	7	60		2901
3MNO	GN<400 fm							20	30	42				92
	GN>400 fm	33	55	15		35	88	88	91	49	16			470
	Longline		4										1	5
	Otter Trawl										1			1
	Total	33	59	15		35	88	108	121	91	17		1	568
TOTAL	33	59	15	120	509	1467	2593	3570	1990	71	151	1	10579	

Table 6. Catch at age for the Canadian (N) catch of G.halibut in SA 2 + Div. 3KLMNO in 2000. Catch at age in thousands of fish. See text for definition of GN gear types.

Age	Gear			Total	Mean		
	Otter trawl	GN<400	GN>400		Len (cm)	Wgt (kg)	S.O.P(t)
4	2	1		3	33.3	0.294	0.9
5	17	11		29	36.4	0.390	11.3
6	422	357	9	788	41.8	0.600	472.8
7	975	5211	214	6404	46.5	0.842	5392.2
8	140	918	168	1228	51.5	1.171	1438.0
9	28	139	175	342	58.8	1.763	602.9
10	11	73	168	251	63.6	2.263	568.0
11	2	33	190	225	68.4	2.834	637.7
12	*	13	114	128	73.4	3.549	454.3
13	*	9	74	84	78.2	4.354	365.7
14	*	5	43	48	81.9	5.029	241.4
15	*	1	26	27	85.9	5.826	157.3
16	*	*	4	4	90	6.767	27.1
17			*	*	94.5	7.858	0.8
18	*			*	102.5	10.157	1.0
				9561			10371
* indicates catch of less than 500 fish						Catch=10579	

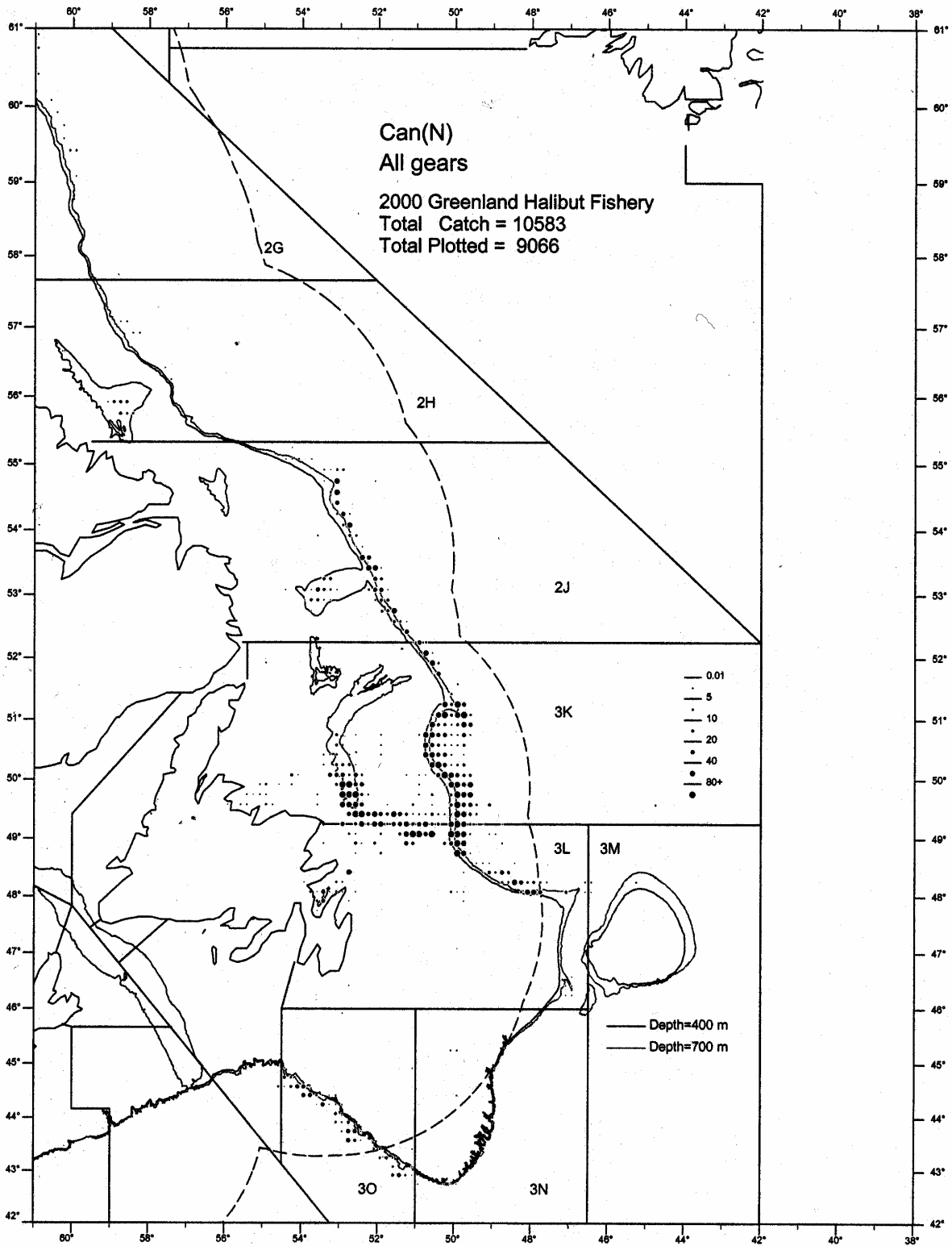


Fig. 1. Distribution of Can(N) Greenland halibut catch (tons) from the 2000 commercial fishery. Represented is catch from directed fisheries and by-catch from other fisheries aggregated by 10minute square for all gears from Div. 2G to Div. 3O where position was recorded on the logbook.

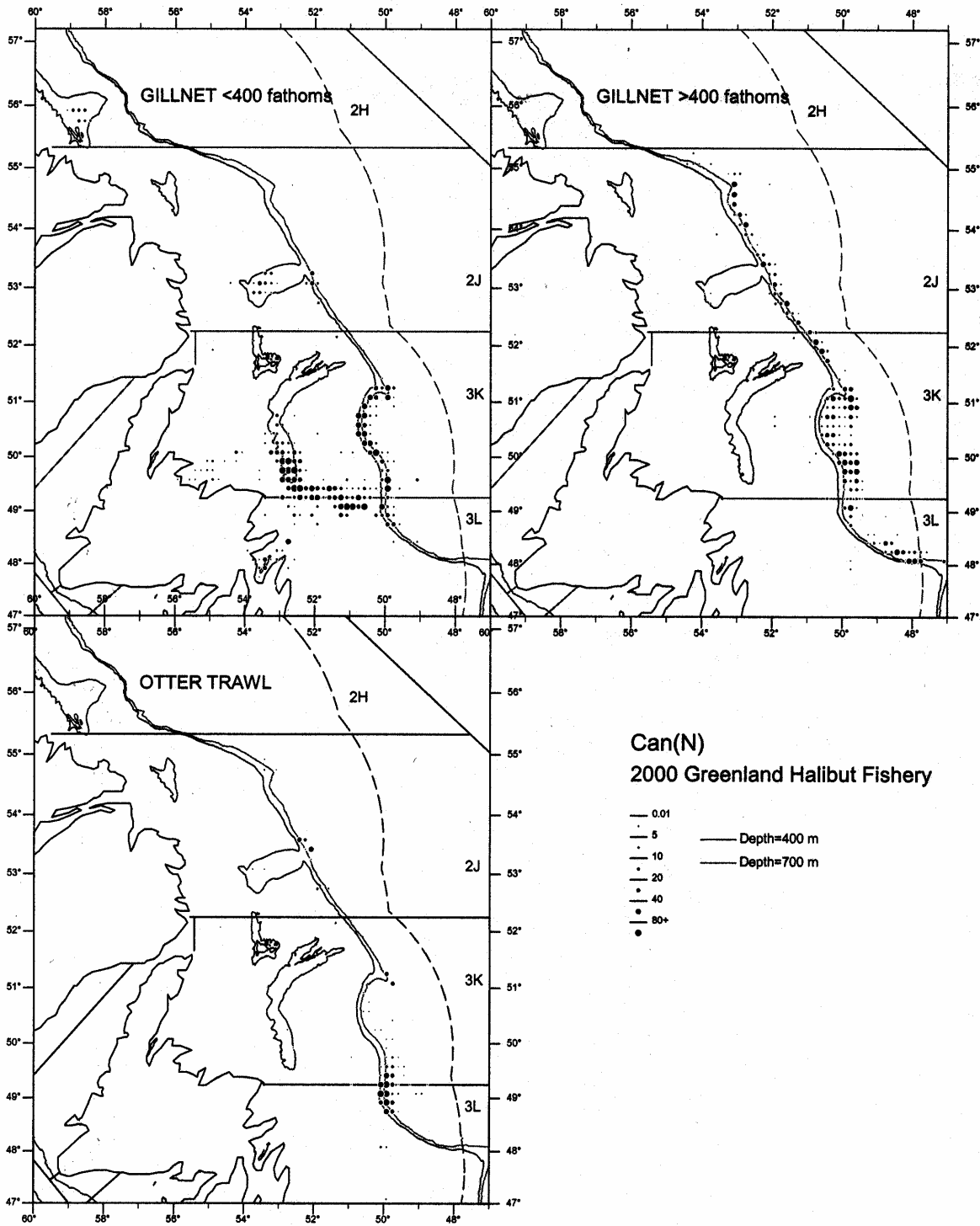


Fig. 2. Distribution of Can(N) Greenland halibut catch (tons) from the 2000 commercial fishery. Represented is GILLNET (<400 fathoms), GILLNET (>400 fathoms) and OTTER TRAWL from directed fisheries and by-catch from other fisheries. The data are aggregated by 10-minute square for Div. 2J3KL where position was recorded on the logbook.

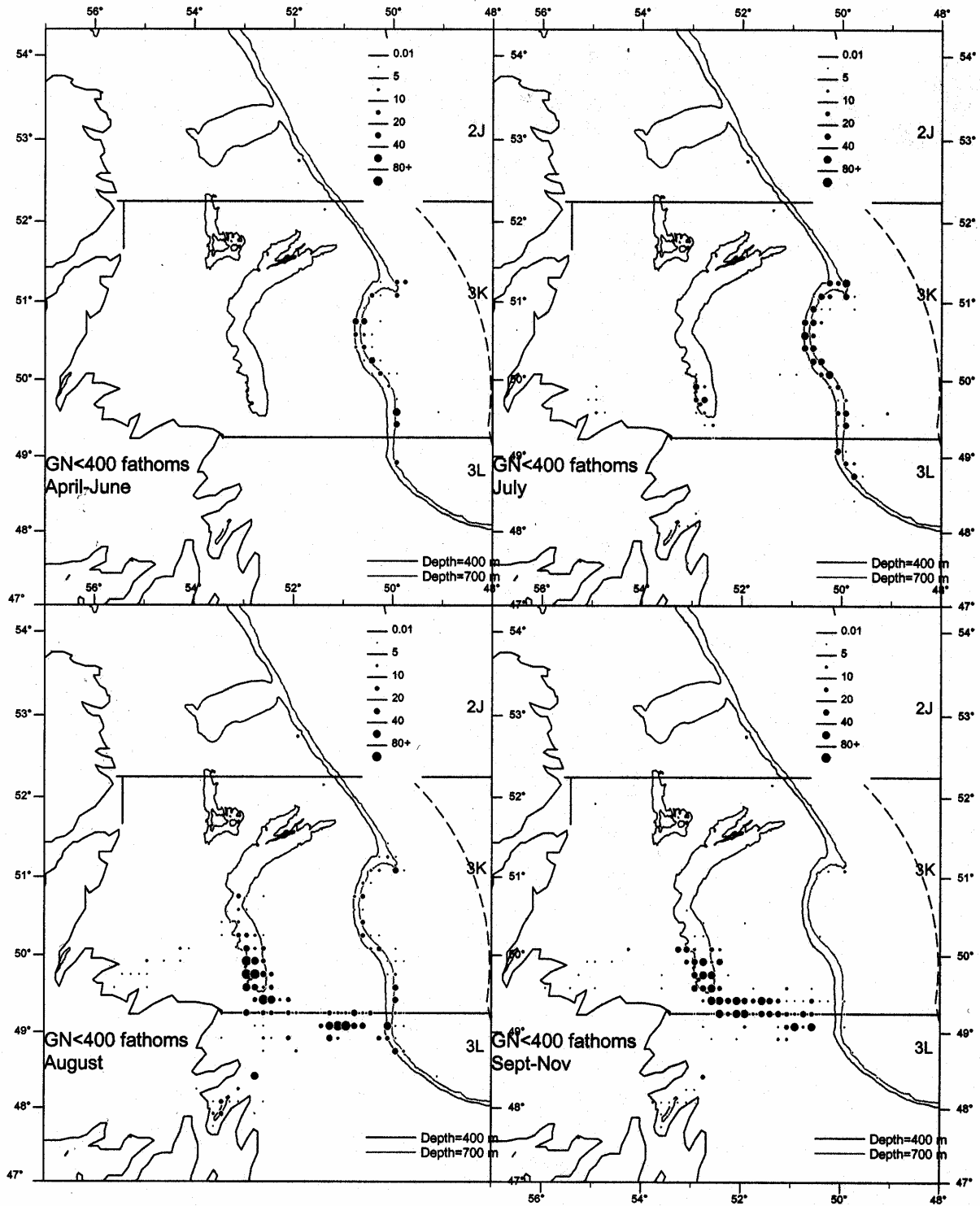


Fig. 3. Distribution of Can(N) Greenland halibut catch (tons) from the 2000 commercial fishery. Represented is GILLNET (<400 fathoms) for various months from directed fisheries and by-catch from other fisheries. The data are aggregated by 10-minute square for Div. 2J3KL where position was recorded on the logbook.

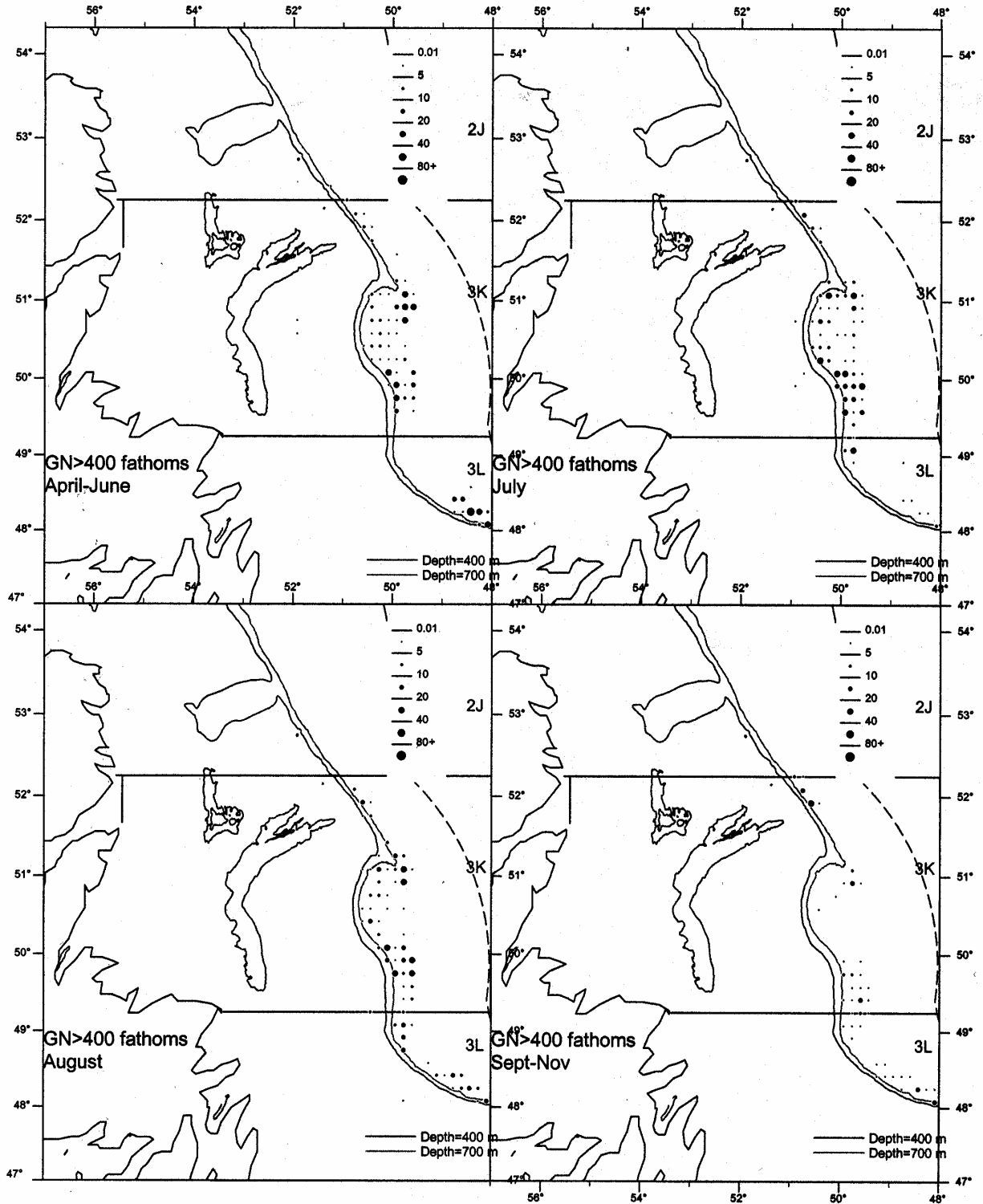


Fig. 4. Distribution of Can(N) Greenland halbut catch (tons) from the 2000 commercial fishery. Represented is GILLNET (>400 fathoms) for various months from directed fisheries and by-catch from other fisheries. The data are aggregated by 10-minute square for Div. 2J3KL where position was recorded on the logbook.

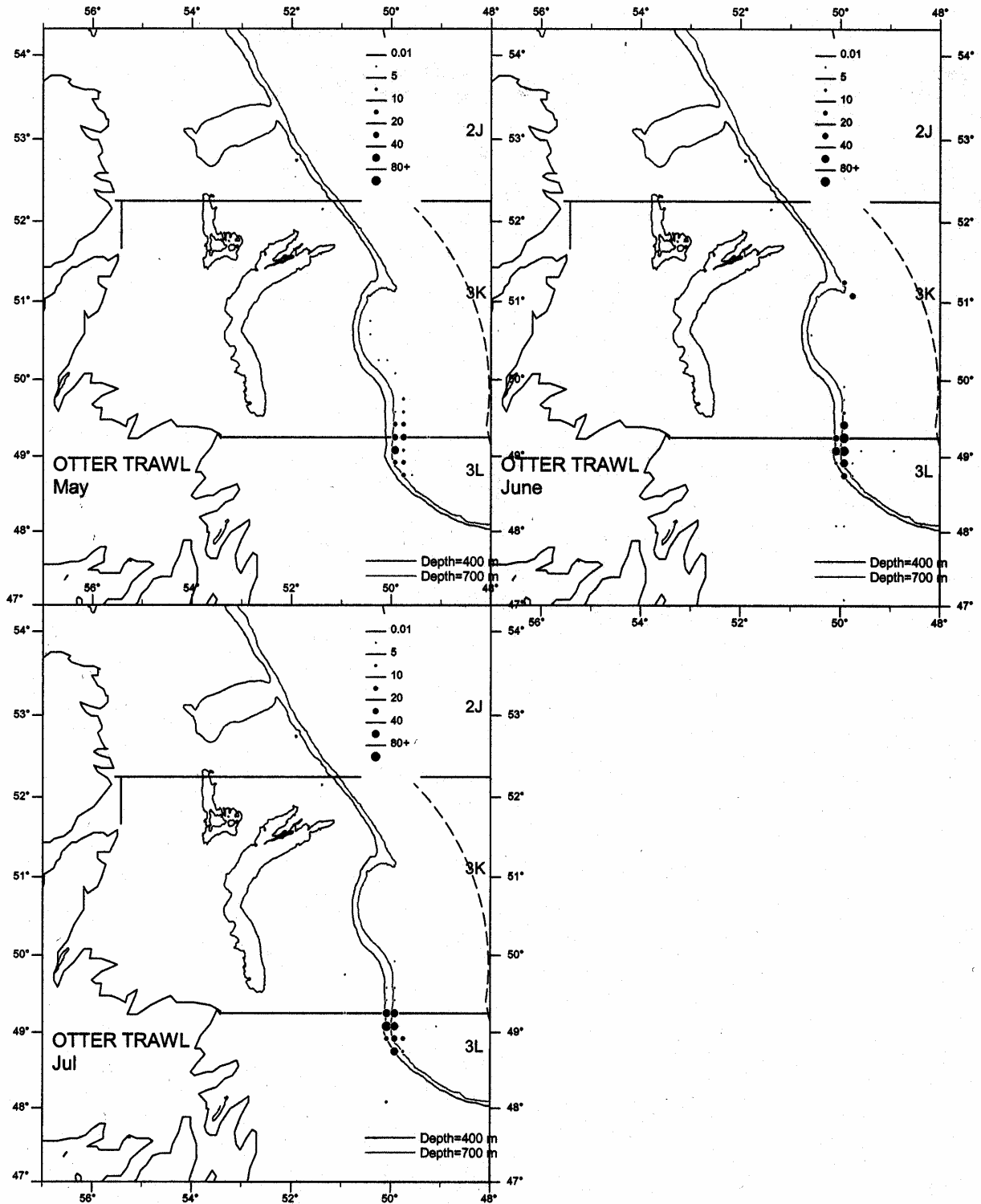


Fig. 5. Distribution of Can(N) Greenland halibut catch (tons) from the 2000 commercial fishery. Represented is OTTER TRAWL catch for various months from directed fisheries and by-catch from other fisheries. The data are aggregated by 10-minute square for Div. 2J3KL where position was recorded on the logbook.