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The Canadian Fishery for Greenland Halibut in Subarea 2 + Divisions 3KLMNO, with Emphasis on 2001

by

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Abstract

The Canadian catch of Greenland halibut in 2001 in NAFO Subarea 2 and Divisions 3KLMNO was reported to be almost 8,400 tons. This was down by 2,200 tons from the catch in 2000, but was still more than double the catches taken. in each of 1998 and 1999. Lower catches in the gillnet sector, primarily in Div. 3K, were responsible for the decline. Although gillnet was still the predominant gear type, otter trawl catches of about 1800 tons were 500 tons higher than in 2000, and the highest by this fleet sector in ten years. As in 2000, much of the catch came from Divisions 3KL, and about half of the catch was taken in July and August. The catch at age in 2001 was dominated by the 1994 year-class, which accounted for 55% of the catch numbers and 40% of the catch weight.

Review of the Canadian fishery prior to 2001

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. However, in 2000, the Canadian catch in NAFO Subarea 2 and Divisions 3KLMNO was about 10,600 tons, more than two and a half times greater than catches 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 (Brodie and Power, 2000).

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 Newfoundland and Labrador coast as well as in the deepwater bays, using an average mesh size of 150 mm. However, Canadian gillnet catches taken during recent years also include those from a substantial 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. From 1993 to 2000, catches by this fleet were less than 1300 tons annually, and although there was very little effort in some years, notably 1998 and 1999, otter trawl catches in 2000 did increase to the highest level since 1992 (Table 1).

Catches from Subarea 2 were very low prior to the mid-1970s, 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, peaking at 567 tons in 2000. The catch in Div. 2GH declined from values around 1400 tons in 1994-95 to less than 170 tons in each of 1999 and 2000.

Prior to the increase in 2000, the Canadian fisheries in 1998 and 1999 were very similar. Catches were around 4100 tons 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 2001

The spatial and temporal patterns in the Canadian fishery for Greenland halibut in 2001 were similar to those observed in 2000, the year with the most extensive fishery since 1989-90. However, total reported catch was 8365 tons, compared to about 10,600 tons in 2000. Most of the decline occurred in the gillnet sector, in both the deep and shallow-water fisheries. Breakdowns of this catch by gear, Division, depth range and month are shown in Tables 3 and 4. As was the case in 2000, the dominant gear by far was gillnet, with catches in the shallow zone (<732 m, or 400 fathoms) being about 70% higher than the catch in the deeper zone. These catches are referred to in Tables 3 and 4 as GN<400 and GN>400. Longline catches were minimal, but otter trawl catches of 1833 tons were the highest by this fleet sector since 1992. Catches in Subarea 2 in 2001 remained at the level of 1999-2000, about 1300 tons. Most of the drop in catch in 2001 occurred in Div 3K (Table 1), although catches were lower in most areas in 2001.

Figure 1 shows the location of most of the Canadian catch of Greenland halibut in 2001. These data were aggregated by 10-minute squares, from logbook records, and account for almost 7500 tons of the total catch of 8365 tons. Most of the fishery occurred between 48° N and 51°N latitude, and was very similar to the spatial distribution of the 2000 fishery (Fig. 2). Fig. 3 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 Div. 3K and 3L. This was very similar to the location of the fishery in 2000, although the fishery in 2001 was about a month earlier than in 2000. There was some seasonal variation in the location of the GN<400 catches (Fig. 4), with effort shifting away from the shelf edge after July. Less variation was observed in the GN>400 and otter trawl fisheries (Fig. 5 and 6). Almost half of the catch was taken in July and August (Table 4), due mainly to improved weather conditions and completion of other fisheries (notably snow crab) during this period.

It should be noted that there are some data on Greenland halibut from Science-based logbooks collected in the small boat (<35 feet) cod fishery in Div. 2J3KL. These have not been analyzed 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. By-catches of Greenland halibut in the Canadian shrimp fishery have been described in a separate paper.

Catch-at-age

Details on the catch-at-age for previous years can be found in Bowering and Brodie (2000), and Brodie and Power (2001).

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 2001, sampling data, as collected by observers at sea and by port samplers, were available from Div. 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. The high number of measurements from the otter trawl catch in 3K and 3L is due to the requirement for these large vessels to have 100% observer coverage.

	2J		**3K**		**3L**		**3O**	
Gill net < 400		*155*	6039	*664*	1368	*239*		*128*
Gill net > 400	1115		1552		219		3341	
Otter trawl	2027	*148*	16,200	*323*	11,023	*1162*		
Totals	**3142**	***303***	**23,791**	***987***	**12,610**	***1401***	**3341**	***128***

Age compositions are presented for both gillnet components (GN<400 and GN>400) as well as otter trawl (Table 5). The peak age in the otter trawl and GN <400 sectors was 7 (1994 year-class), while age 11 (1990 year-class) was most abundant in the catches of deepwater gillnets. These peak ages are similar to those seen in the 2000 fishery. Overall, age 7 accounted for 55% of the catch in numbers and 40% of the catch in weight. In 2000, age 7 (1993 year-class) accounted for over two-thirds of the numbers and over half of the catch weight. As was the case in 2000, 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 for Greenland halibut catches in 1998-2000, which was the Divisions-combined, year = 1997 (from Gundersen and Brodie, 1999). With the exception of ages 8, 14, and 17, weights at age in 2001 were higher than those in 2000.

References

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Table 1. Canadian catch of G. halibut, by gear type, from 1960-2001.

	GEAR					
YEAR	GILLNET	LONGLINE	MISC	UNSP	OT	**TOTAL**
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
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
2001	6395	123	14		1833	8365

Table 2. Canadian catch of G. halibut, by Division, from 1960-2001.

	DIV.								
YEAR	2G	2H	2J	3K	3L	3M	3N	3O	**TOTAL**
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
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
2001	63	251	1030	3999	2666		9	347	8365

Table 3. Summary of Canada (NF) catches of G. halibut in 2001 by area and gear.

Div.	**GN <400**	**GN >400**	**Longline**	**Ot trawl**	**Misc**	**Can (N)**	**Can (SF)**	**Can Total**
2GH	67	203	44			314		314
2J	280	519	10	218	3	1025	5	1030
3K	2471	895	1	622	10	3973	26	3999
3L	1190	480	2	993	1	2569	97	2666
3NO	21	269	66			354	2	356
Total	4029	2366	123	1833	14	8235	130	**8365**

Table 4. Breakdown of Canadian catches of G. halibut in 2001 by area, gear, and month.

Div.		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	GN<400 fm							32	25		10			67
2GH	GN>400 fm						37	67	62	14	23			203
	Longline					3		1			28	12		44
	Total					3	37	100	87	14	61	12		314
	GN<400 fm						13	136	110	21				280
	GN>400 fm						219	151	95	46	8			519
2J	Otter Trawl	99								3	82	34		218
	Misc/unk	3				9		1						13
	Total	102				9	232	288	205	70	90	34		1030
	GN<400 fm						144	892	895	496	44			2471
3K	GN>400 fm					31	219	312	256	50	25	2		895
	Otter Trawl	5	10	72	129	184	216			3	3			622
	Misc/unk						1	9	1					11
	Total	5	10	72	129	215	580	1213	1152	549	72	2		3999
	GN<400 fm							188	532	399	70	1		1190
3L	GN>400 fm					45	74	108	167	79	7			480
	Otter Trawl	25	29	89	220	330	298			1	1			993
	Misc/unk					1		1	1					3
	Total	25	29	89	220	376	372	297	700	479	78	1		2666
	GN<400 fm		1						15	5				21
3NO	GN>400 fm	7	34	10		31	58	30	35	28	26	7	3	269
	Longline	4			9	4			9	17	22	1		66
	Total	11	35	10	9	35	58	30	59	50	48	8	3	356
	TOTAL	143	74	171	358	638	1279	1928	2203	1162	349	57	3	**8365**

Table 5. Catch-at-age for the Canadian catch of G. halibut in SA 2 + Div. 3KLMNO in 2001. Catch-at-age in thousands of fish. See text for definition of GN gear types.

		Gear			Mean		
Age	**Otter trawl**	**GN<400**	**GN>400**	**Total**	**Len (cm)**	**Wgt (kg)**	**S.O.P(t)**
4	2	2		**3**	35.4	0.356	1.1
5	32	16	*	**49**	38.0	0.452	22.1
6	418	442	2	**862**	43.4	0.685	590.5
7	1328	2354	11	**3692**	47.5	0.900	3322.8
8	250	791	35	**1076**	51.3	1.149	1236.3
9	31	72	107	**209**	59.4	1.831	382.7
10	11	26	189	**226**	64.6	2.370	535.6
11	7	51	211	**268**	69.0	2.929	785.0
12	2	18	109	**130**	74.1	3.669	477.0
13	*	14	85	**99**	79.1	4.520	447.5
14	*	5	29	**35**	81.6	4.975	174.1
15	*	2	8	**10**	86.6	6.002	60.0
16		*	1	**0.8**	91.6	7.133	5.7
17			*	**0.2**	92.5	7.345	0.8
				6660			8041
* indicates catch of less than 500 fish							Catch=8365

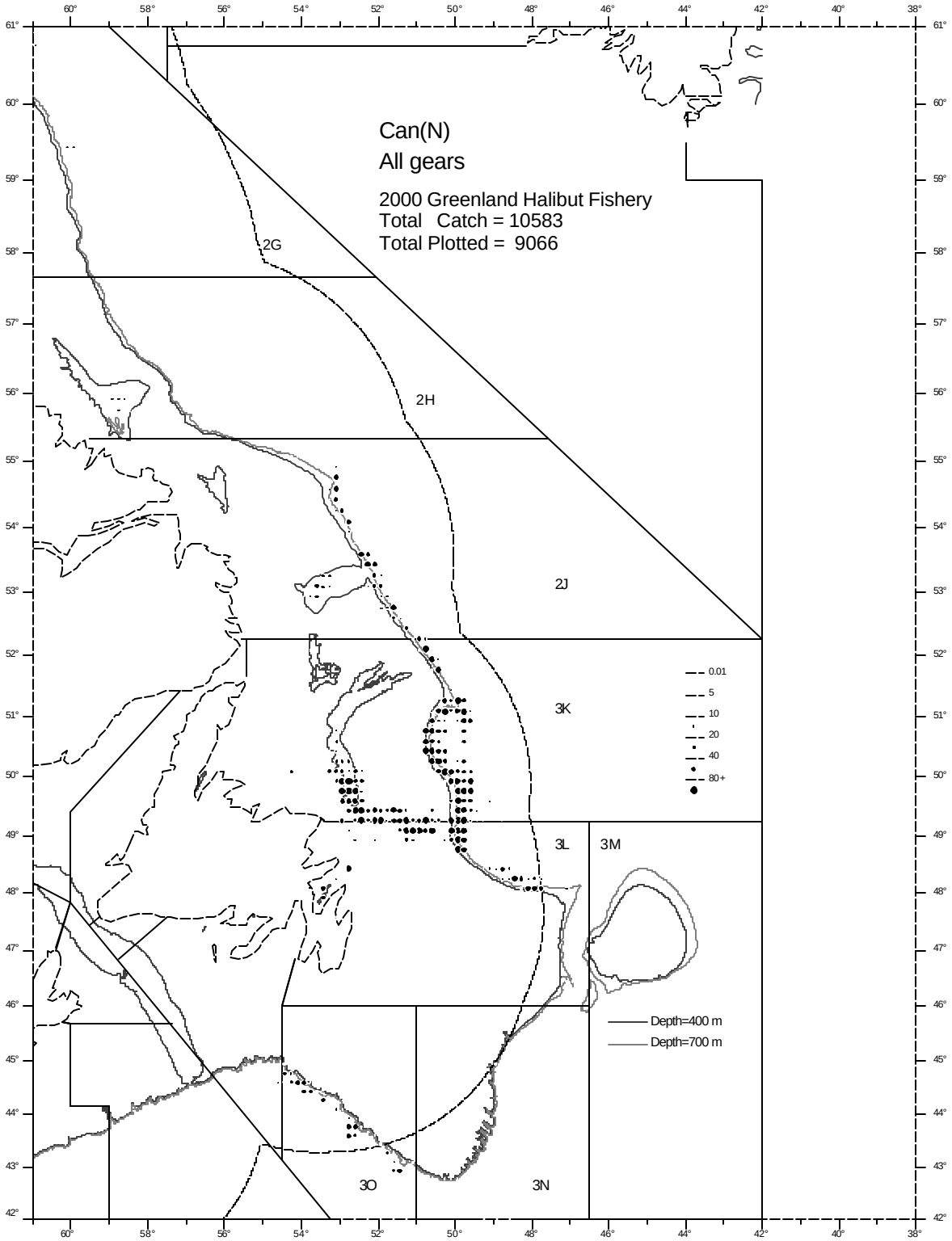

Fig. 1. Distribution of Can(N) Greenland halibut catch (tons) from the 2000 commercial fishery. Represented is catch from directed fisheries and by-catch from other fisheries aggregated by 10minute square for all gears from Div. 2G to Div. 3O where position was recorded on the logbook.

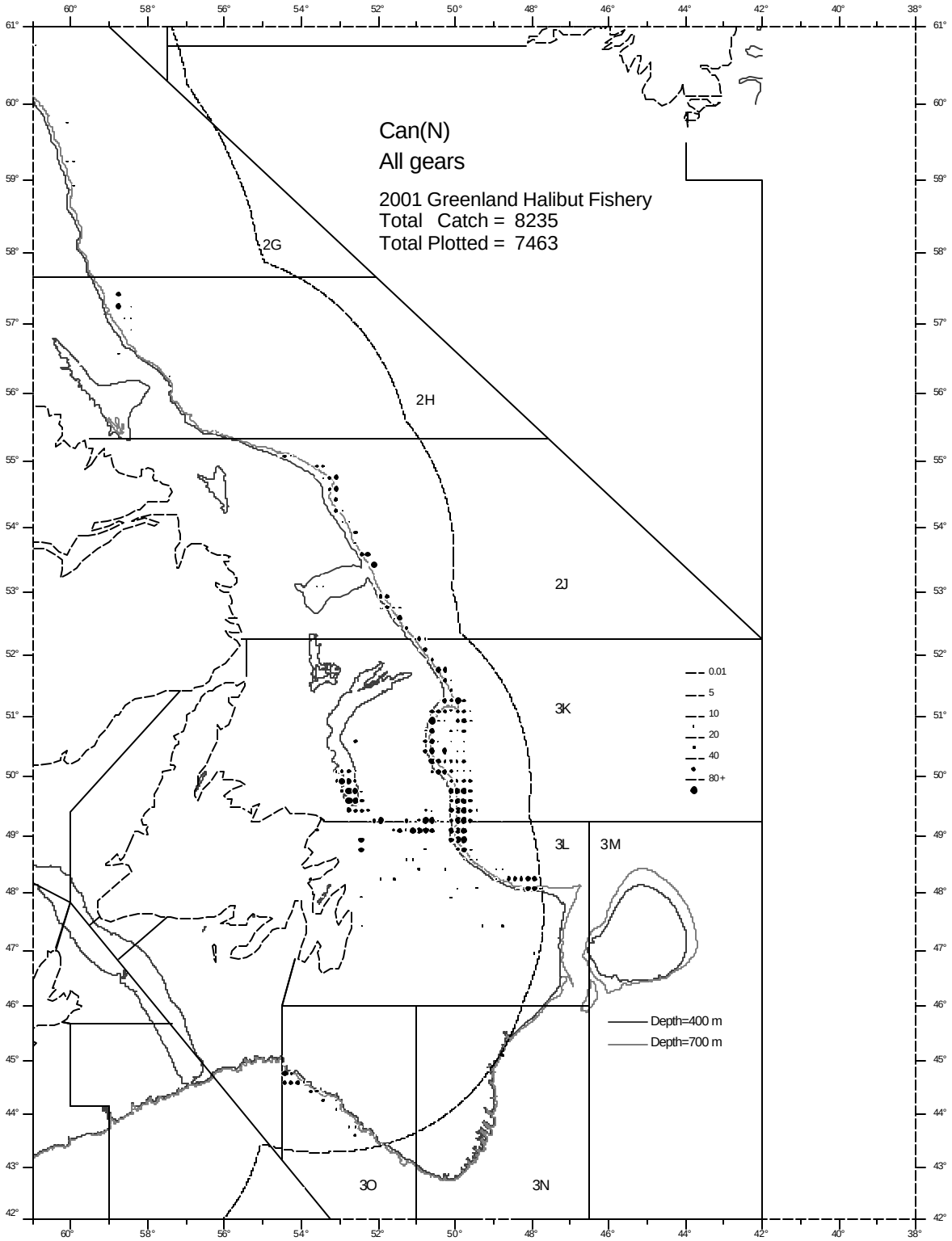

Fig. 2. Distribution of Can(N) Greenland halibut catch (tons) from the 2001 commercial fishery. Represented is catch from directed fisheries and by-catch from other fisheries aggregated by 10minute square for all gears from Div. 2G to Div. 3O where position was recorded on the logbook.

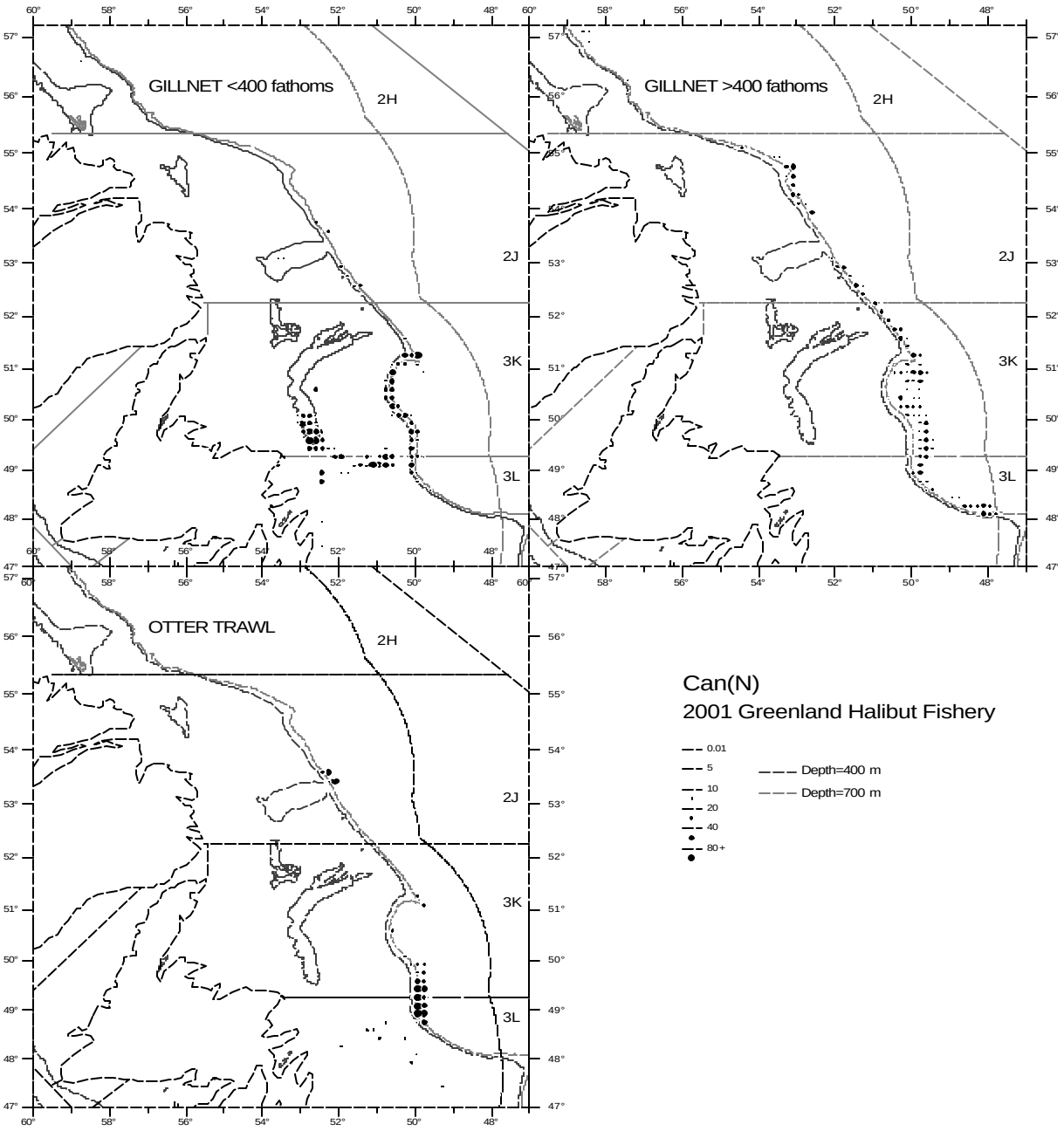

Fig. 3. Distribution of Can(N) Greenland halibut catch (tons) from the 2001 commercial fishery. Represented is GILLNET (<400 fathoms), GILLNET (>400 fathoms) and OTTER TRAWL from directed fisheries and by-catch from other fisheries. The data are aggregated by 10-minute square for Div. 2J3KL where position was recorded on the logbook.

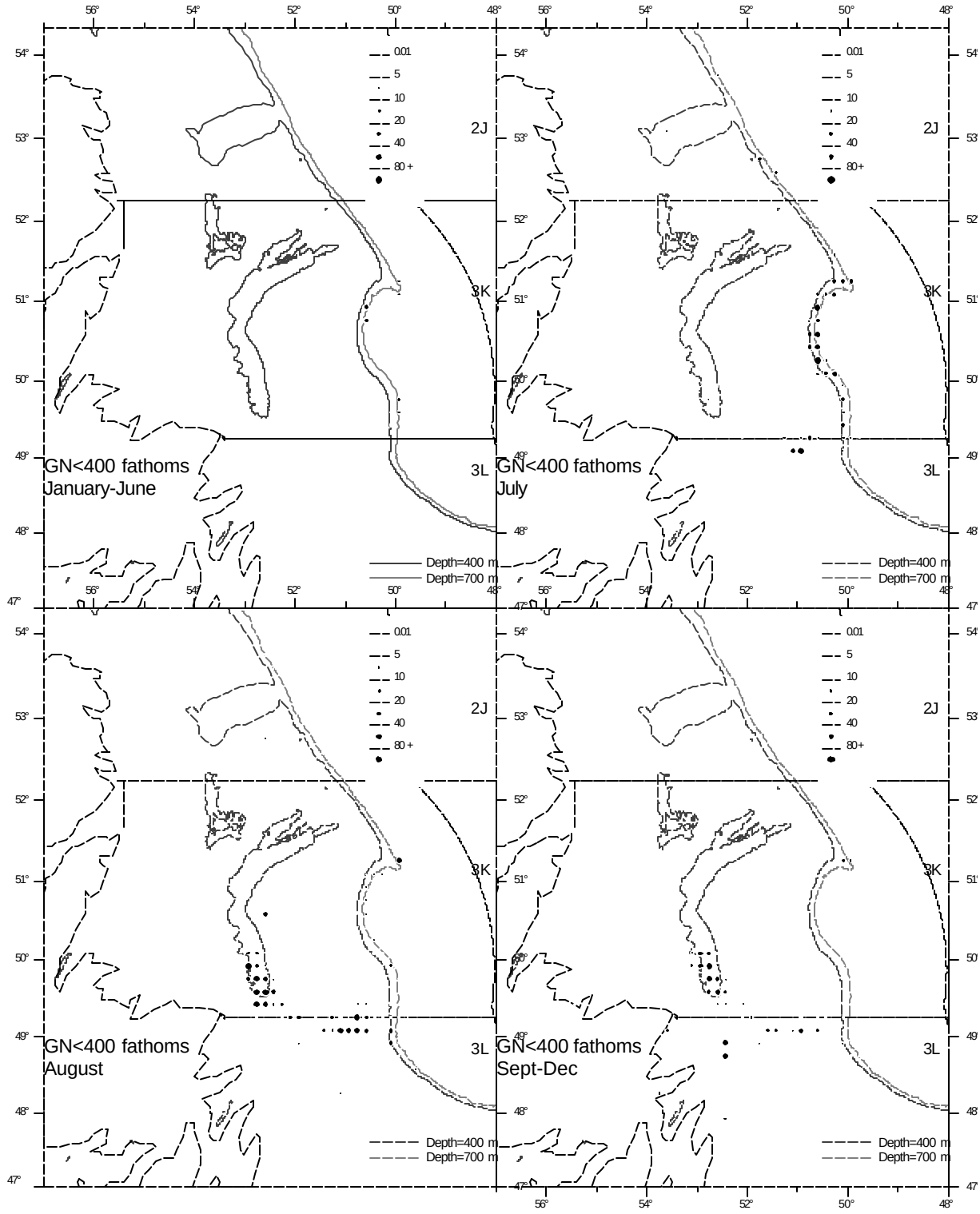

Fig. 4. Distribution of Can(N) Greenland halibut catch (tons) from the 2001 commercial fishery. Represented is GILLNET (<400 fathoms) for various months from directed fisheries and by-catch from other fisheries. The data are aggregated by 10-minute square for Div. 2J3KL where position was recorded on the logbook.

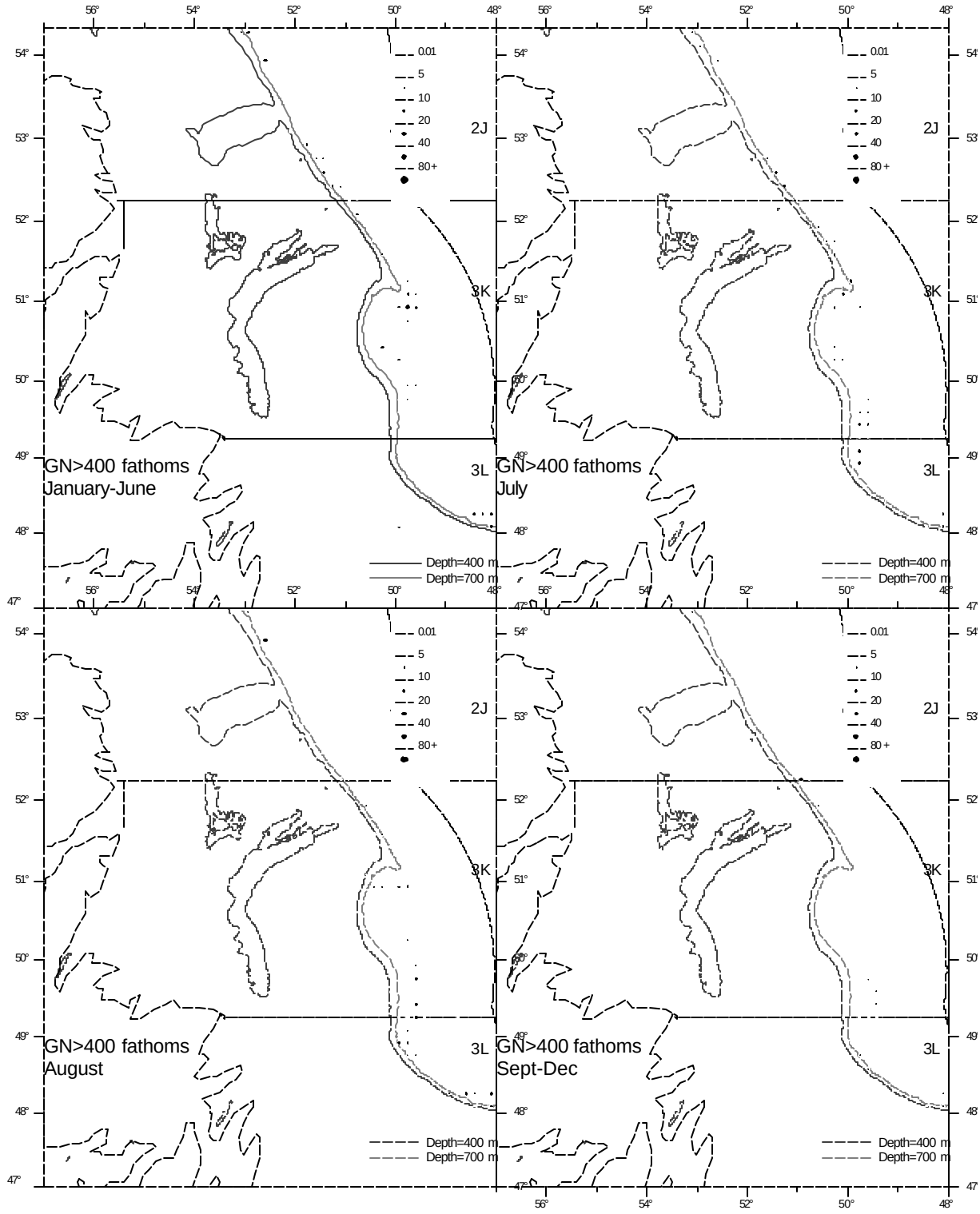

Fig. 5. Distribution of Can(N) Greenland halibut catch (tons) from the 2001 commercial fishery. Represented is GILLNET (>400 fathoms) for various months from directed fisheries and by-catch from other fisheries. The data are aggregated by 10-minute square for Div. 2J3KL where position was recorded on the logbook.

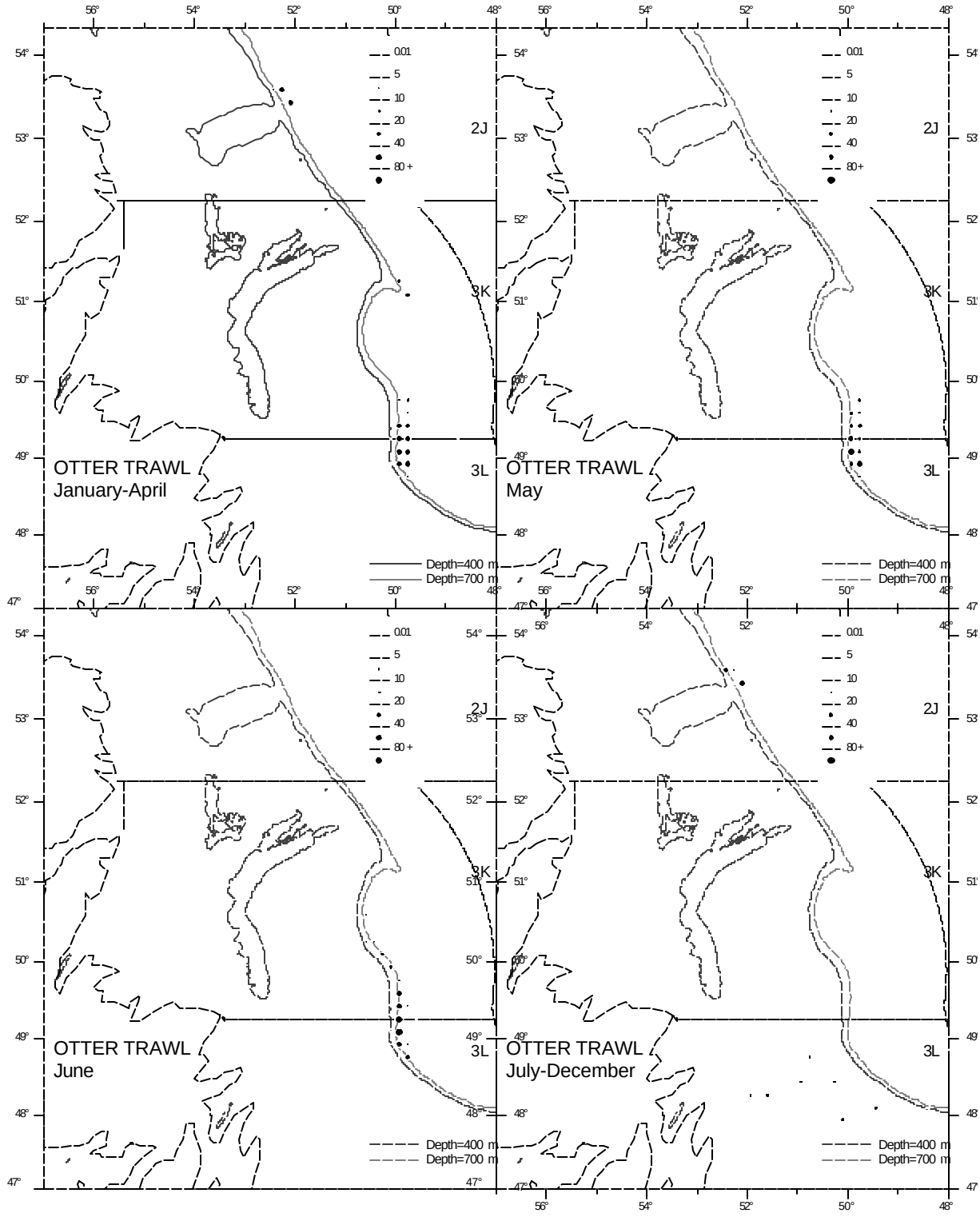

Fig. 6. Distribution of Can(N) Greenland halibut catch (tons) from the 2001 commercial fishery. Represented is OTTER TRAWL catch for various months from directed fisheries and by-catch from other fisheries. The data are aggregated by 10-minute square for Div. 2J3KL where position was recorded on the logbook.