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Data on German catches and effort for Greenland halibut (*Reinhardtius hippoglossoides*), demersal redfish (*Sebastes marinus* and deep sea *S. mentella*), and Atlantic cod (*Gadus morhua*) in ICES Div. Va, Vb, VIa and XIV, 1995-2002

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Abstract

In 2002, the German fleet did not accomplished the Greenland halibut quota off East Greenland and the total catch weighed 2 050 t, almost exclusively caught in Division XIVb. The effort in hours fished of catches comprising Greenland halibut doubled in 1998-2001 as compared to 1997 and decreased by on third in 2002. Since 1999, the CPUE decreased slightly and seem to have stabilised on a lower level with a pronounced seasonal effect of higher catch rates during the second and third quarters. Size compositions of the catch in 2002 revealed a higher proportion of fish >60cm than observed earlier.

In 1999, the German fleet did target redfish (*S. marinus* and deep sea *S. mentella*) in ICES Div. XIVb (East Greenland) for the first time since 1992. In 2002, the German fleet reported a catch of 1 717 t taken within the Greenlandic EEZ and 467 t taken within ICES Div. Va, respectively. The German redfish catch in 2002 off East Greenland is believed to be mainly composed of *S. mentella*. According to the length measurements this catch consisted mainly of juvenile redfish.

After its termination in 1992 there was an experimental fishery for cod off East Greenland during the first quarter in 1998, which yielded 105 tons only. In 1999-2002, the total catch of cod in ICES Div. XIV amounted to only 114 tons.

Introduction

The present paper provides information on catches, effort distribution and CPUE of the German fleet fishing Greenland halibut (*Reinhardtius hippoglossoides* Walbaum), redfish (*Sebastes marinus* and deep sea *S. mentella*), and Atlantic cod (*Gadus morhua*) in ICES Div. Va, Vb, VIa and XIV, 1995-2001. Due to changes in the structure of the official data base, the analyses cover the most recent period 1995-2001 only. The paper also presents quarterly aggregated length and age compositions for Greenland halibut and redfish as derived from biological observations.

Material and Methods

The German fleet components catching Greenland halibut, redfish (*S. marinus* and deep sea *S. mentella*) and cod consisted of freezer trawlers equipped with bottom trawls. For the period 1995-2002, data on commercial catches and effort (hauls and hours fished) and positions were derived from official logbook statistics. There were only data since 1998 for redfish (*S. marinus* and deep sea *S. mentella*) in ICES Div. XIVb due to the absence of the fleet in previous years. The data were aggregated by quarter, year, and ICES divisions. Unstandardized mean CPUE (kg/h) and accompanied standard deviations were calculated for Greenland halibut on a haul by haul basis. Since 1998, all hauls with Greenland halibut CPUE exceeding 100 kg/h were included in the calculation in order to disregard catches with other target species (redfish). The official data basis is unconfirmed by scientific or official observers.

Length and age compositions were determined for Greenland halibut and redfish when biological data were collected by observers. Length was measured with a precision of cm below. Whole otoliths of Greenland halibut were read in reflected light.

Results

The geographical distribution pattern of the German trawl effort catching Greenland halibut is listed in Table 1 for the years 1995-2002 as a quarterly breakdown. Table 1 reveals that around 70 % of the effort was applied to Division XIVb along the continental slope off East Greenland mainly as a directed fishery, whereas the few fishing hours in Division Va and Vb between Iceland and the Faeroes were directed towards redfish and comprised low amounts of by-catches only. In 2002, the German fleet did not accomplished the quota and the total catch weighed 2 019 t (51 % of the quota), almost exclusively caught in Division XIVb. The effort in hours fished of catches comprising Greenland halibut doubled in 1998 as compared to 1997 and remained at that high level until 2001 but decreased significantly in 2002 (6 585 h) also due to the demersal redfish directed fisheries which were taken up again after their termination in 1992. Quarterly breakdowns of CPUE and accompanied standard deviations for Greenland halibut caught by the German fleet in ICES Division XIVb are listed in Table 2 and illustrated in Figure 1. The CPUE revealed a seasonal pattern with highest success during the second and third quarters. Since 1997, the CPUE decreased slightly and seem to have stabilised on a lower level. Biological data were collected during 2 trips in the third quarter in 2002, Table 3 lists the effort and sample weights. Length compositions of the samples are given in Table 4 and illustrated in Figure 2. The German catch in the third quarter of 2002 was composed of higher proportions of fish >60 cm than observed earlier. Otoliths collected in 2002 were sent to the Greenland institute for age reading in autumn. Age compositions of the older samples taken in 1999 and 2000 are given in Table 5.

In 1998, the German fleet did target demersal redfish (*S. marinus* and deep sea *S. mentella*) in ICES Div. XIVb for the first time since 1992. In 1998, the total effort of catches comprising *S. marinus* and deep sea *S. mentella* amounted to 3 500 hours. The majority of this effort was directed towards Greenland halibut and redfish was mainly a by-catch. However, the German fleet reported a catch of 1 408 t taken within the Greenland EEZ and 284 t taken within the Icelandic EEZ, respectively (Tab. 6). In 2002, the total effort of catches comprising redfish increased to decreased to 3 600 hours from more than 5 000 hours in 1999-2001. The catch increased to 1 717 t in 2002 in the Greenland EEZ and 467 tons were taken in the ICES Div. Va. In 2002, biological sampling was conducted on directed redfish catches during 2 trips during the third quarter. Table 7 lists the sample weights while Table 8 lists the length composition for *S. marinus* and *S. mentella*, respectively. The German redfish catch in 2002 off East Greenland is believed to be mainly composed of *S. mentella*. According to the length measurements displayed in Figure 4, this catch consisted mainly of juvenile redfish.

Information about German cod catches in ICES Div. Va, Vb and XIVb is listed in Table 9. After its termination in 1992 there was an experimental fishery for cod off East Greenland (ICES Div. XIVb) during the first quarter in 1998, which yielded 105 tons only. The total catch in 1999-2002 was reported to amount to only 114 tons. Catches in Va and Vb are minor and considered by-catches in fisheries directed towards other species.

Table 1 Greenland halibut catches and effort (hours fished) in ICES Div. V and XIVb by year and quarter of the German fleet, 1995-2002.

Year	Quarter total	Catch (t) Total	Effort (h) Total	Catch (t) Va	Effort (h) Va	Catch (t) Vb	Effort (h) Vb	Catch (t) XIVb	Effort (h) XIVb
1995	1	1	60	0	0	0	0	1	60
1995	2	1	24	0	0	0	0	1	24
1995	3	747	2007	0	0	0	0	747	2007
1995	4	61	1042	2	427	1	275	58	341
1995		810	3133	2	427	1	275	807	2432
1996	1	6	471	0	0	6	471	0	0
1996	2	936	1608	0	0	6	266	930	1342
1996	3	2384	3391	1	90	0	0	2383	3301
1996	4	46	497	3	407	9	19	32	70
1996		3372	5968	4	497	21	756	3346	4713
1997	1	563	974	0	0	0	25	563	949
1997	2	1771	2081	0	0	0	4	1771	2077
1997	3	556	787	0	0	41	130	516	655
1997	4	451	652	0	0	0	0	451	652
1997		3341	4493	0	0	41	160	3300	4333
1998	1	519	1145	0	0	0	0	519	1145
1998	2	1764	3223	0	0	0	0	1764	3223
1998	3	448	1591	7	886	0	0	441	705
1998	4	676	2192	1	287	0	0	675	1905
1998		3407	8151	9	1173	0	0	3398	6978
1999	1	474	1794	0	0	0	0	474	1794
1999	2	948	1785	0	0	1	65	947	1720
1999	3	661	2584	10	868	20	627	631	1090
1999	4	998	3500	3	668	0	42	995	2790
1999		3081	9663	13	1536	21	734	3047	7394
2000	1	469	2016	0	0	0	0	469	2016
2000	2	1574	2657	0	0	0	0	1574	2657
2000	3	998	3798	17	1387	6	367	975	2044
2000	4	230	1399	5	777	0	33	225	589
2000		3271	9870	22	2164	6	400	3243	7306
2001	1	175	359	0	0	0	0	175	359
2001	2	1099	2350	0	0	3	296	1096	2054
2001	3	776	4597	46	2618	4	292	726	1687
2001	4	756	2980	3	660	0	0	753	2320
2001		2806	10286	49	3278	7	588	2750	6420
2002	1	169	693	0	0	0	0	169	693
2002	2	1016	1882	0	0	0	0	1016	1882
2002	3	587	2933	27	1323	0	0	560	1610
2002	4	278	1077	4	586	0	0	274	491
2002		2050	6585	31	1909	0	0	2019	4676

Table 2 Greenland halibut V and XIVb. Unstandardised mean CPUE and accompanied standard deviations by year and quarter of the German fleet in ICES Div. XIVb, 1995-2002. Only hauls with a CPUE ≥100 kg/h were included (97 % of the total Greenland halibut catch).

Year	Quarter	CPUE (kg/h)	Std.Dev. (kg/h)
1995	1		
1995	2		
1995	3	454.6	1078.6
1995	4	281.6	142.1
1996	1		
1996	2	751.3	841.3
1996	3	767.2	451.4
1996	4	456.4	211.3
1997	1	650.4	500.6
1997	2	957.4	682.0
1997	3	760.2	346.2
1997	4	780.6	430.3
1998	1	522.9	280.6
1998	2	621.6	312.9
1998	3	765.1	304.6
1998	4	618.5	472.5
1999	1	317.1	225.0
1999	2	649.0	378.2
1999	3	616.4	257.2
1999	4	462.8	249.9
2000	1	305.7	142
2000	2	608.8	288.9
2000	3	522.9	216.9
2000	4	367.4	193.9
2001	1	498.8	172.4
2001	2	535.7	231.8
2001	3	455.3	314.0
2001	4	433.3	262.4
2002	1	334.6	128.4
2002	2	546.4	242.6
2002	3	408.6	171.9
2002	4	577.0	148.9

Table 3 Greenland halibut V and XIVb. German sampling effort, sample weights, numbers and mean length as illustrated in Figure 2.

Year	Quarter	Greenland halibut			
		Samples (Trips)	Weight (kg)	No. measured	Mean length (cm)
1999	1	1	40906		61.1
1999	2				
1999	3				
1999	4	1	6964		59.8
2000	1	1	56792		60.4
2000	2				
2000	3				
2000	4				
2002	1				
2002	2				
2002	3	2	113914	18172	60.8
2002	4				

Table 4 Greenland halibut V and XIVb. Length frequencies derived from commercial samples as specified in Table 3 and illustrated in Figure 2.

Year	1999	1999	2000	2002
Length(cm)/Quarter	1	4	1	3
30.5	0	0	0	1
31.5	0	0	0	3
32.5	0	0	0	3
33.5	0	0	7	11
34.5	9	0	0	6
35.5	24	0	0	1
36.5	3	0	3	20
37.5	30	0	0	32
38.5	8	0	23	43
39.5	27	0	61	59
40.5	56	6	78	81
41.5	95	6	83	129
42.5	95	3	144	193
43.5	110	3	108	377
44.5	115	20	306	509
45.5	317	6	308	626
46.5	289	23	553	831
47.5	295	50	611	1273
48.5	314	73	750	1676
49.5	404	100	821	1941
50.5	639	82	902	2415
51.5	643	143	988	2057
52.5	632	135	1081	2239
53.5	565	199	1014	2294
54.5	701	208	1275	2400
55.5	804	173	1164	2084
56.5	707	211	1163	1920
57.5	633	149	1008	2150
58.5	702	158	825	2040
59.5	564	161	960	1695
60.5	790	143	818	1596
61.5	796	85	1022	1272
62.5	619	105	1003	1376
63.5	522	143	919	1504
64.5	564	102	1041	1434
65.5	685	82	754	1117
66.5	329	67	705	1072
67.5	233	79	545	1587
68.5	408	53	647	1637
69.5	274	70	630	1386
70.5	417	26	479	1159
71.5	242	44	330	950
72.5	352	23	564	738
73.5	237	47	325	750
74.5	209	23	295	706
75.5	209	15	278	432
76.5	160	23	207	357
77.5	176	0	226	439
78.5	154	18	157	498
79.5	159	18	154	446
80.5	134	18	207	321
81.5	169	6	202	222
82.5	95	12	108	309
83.5	67	15	103	244
84.5	77	20	101	198
85.5	35	9	156	204
86.5	165	9	50	209
87.5	53	6	86	209
88.5	40	3	64	197
89.5	12	3	90	185
90.5	61	6	77	179
91.5	23	0	18	106
92.5	0	0	15	112
93.5	0	0	14	107
94.5	19	6	13	111
95.5	21	3	12	107
96.5	14	0	5	49
97.5	7	3	5	66
98.5	21	0	9	84
99.5	9	0	11	66
100.5	34	0	6	35
101.5	26	3	0	16
102.5	0	0	0	19
103.5	0	0	0	9
104.5	0	0	0	12
105.5	0	0	0	11
106.5	0	0	0	12
107.5	0	0	0	3
108.5	0	0	0	5
109.5	0	3	0	2
110.5	0	0	0	0

Table 5 Greenland halibut V and XIVb. Age composition derived from German commercial samples as specified in Table 3 and illustrated in Figure 2.

Year	1999	2000
Age (years)/Quarter	1	1
0	0	0
1	0	0
2	0	0
3	10	0
4	0	0
5	15	0
6	482	145
7	1268	990
8	1878	3106
9	3083	4934
10	3663	6035
11	3079	5142
12	1680	3053
13	1294	1706
14	635	1245
15	214	322
16	118	0
17	0	0
18	0	0
19	0	0
20	0	0

Table 6 *Sebastes marinus* and deep sea *S. mentella* catches and effort (hours fished) in ICES Div. Va, Vb, VI and XIVb by year and quarter of the German fleet, 1998-2002.

Year		Total		Va		Vb		VI		XIVb	
	Quarter	Catch (t)	Effort (h)	Catch (t)	Effort (h)	Catch (t)	Effort (h)	Catch (t)	Effort (h)	Catch (t)	Effort (h)
1998	1	0	0	0	0	0	0	0	0	0	0
1998	2	290	629	0	0	0	0	0	15	290	614
1998	3	401	1202	226	945	0	0	0	0	175	260
1998	4	1001	1628	58	287	0	0	0	6	943	1335
1998		1693	3459	284	1232	0	0	1	21	1408	2206
1999	1	11	240	0	0	0	0	0	4	11	236
1999	2	139	513	0	0	7	113	0	0	132	400
1999	3	508	2460	284	1162	188	775	0	0	36	523
1999	4	783	1961	145	757	12	82	0	0	625	1123
1999		1441	5174	429	1919	207	970	0	4	804	2282
2000	1	542	872	0	0	0	0	0	0	542	872
2000	2	277	916	0	0	2	105	0	0	275	811
2000	3	521	2277	321	1448	73	401	0	24	127	404
2000	4	196	1249	192	1123	4	33	0	0	0	93
2000		1536	5314	513	2571	79	539	0	24	944	2180
2001	1	0	0	0	0	0	0	0	0	0	0
2001	2	30	497	0	0	29	448	1	49	0	0
2001	3	720	3093	661	2724	58	330	0	0	1	39
2001	4	967	2024	180	934	1	74	0	0	786	1016
2001		1717	5614	841	3658	88	852	1	49	787	1055
2002	1	564	423	0	0	0	0	0	0	564	423
2002	2	734	669	0	0	2	101	0	0	732	568
2002	3	754	1885	337	1371	0	0	0	0	417	514
2002	4	134	612	130	610	0	0	0	0	4	2
2002		2186	3589	467	1981	2	101	0	0	1717	1507

Table 7 *Sebastes marinus* and deep sea *S. mentella* in ICES Div. Va, Vb, VI and XIVb. German sampling effort, sample weights, numbers and mean length as illustrated in Figures 3 and 4, 1999-2002.

Year	Quarter	S. marinus				Deep sea S. mentella			
		Samples (Trips)	Weight (kg)	No.	Length (cm)	Samples (Trips)	Weight (kg)	No.	Length (cm)
1999	1	1	311	212	45.4	1	4512	9224	30.2
1999	2								
1999	3								
1999	4	1	689	276	46.9	1	11234	22122	29.9
2000	1					1	1521	2563	33.2
2000	2								
2000	3								
2000	4								
2002	1								
2002	2								
2002	3	1	19750	25772	39.8	1	8250	40760	24.2
2002	4								

Table 8 *Sebastes marinus* and deep sea *S. mentella*. Length frequencies derived from commercial samples as specified in Table 6 and illustrated in Figures 3 and 4.

	S. marinus			S. marinus			
Year	1999	1999	2002	1999	1999	2000	2002
Length (cm)/Quarter	1	4	3	1	4	1	3
15.5	0	0	0	1	0	0	0
16.5	0	0	0	0	0	0	109
17.5	0	0	0	0	0	0	218
18.5	0	0	0	1	0	0	1090
19.5	0	0	0	1	0	0	2180
20.5	0	0	0	5	0	0	4142
21.5	0	0	0	30	57	0	4833
22.5	0	0	0	36	86	0	4288
23.5	0	0	0	76	224	19	4143
24.5	0	0	0	87	329	15	4823
25.5	0	0	0	272	685	36	4291
26.5	0	0	0	439	1144	23	2962
27.5	0	0	0	798	1605	68	2188
28.5	0	0	37	1403	2704	117	1449
29.5	0	0	59	1542	4132	239	976
30.5	0	0	178	1518	4710	278	843
31.5	1	0	343	1366	3627	394	673
32.5	0	0	725	650	1580	331	624
33.5	1	0	1121	314	693	279	440
34.5	1	0	1230	175	267	198	232
35.5	3	0	1441	115	29	110	122
36.5	1	1	1741	53	12	110	61
37.5	8	6	2226	50	30	77	61
38.5	1	1	2337	45	20	22	12
39.5	11	3	2554	42	20	31	0
40.5	6	8	2134	45	13	26	0
41.5	15	10	1929	21	18	29	0
42.5	7	9	1806	27	32	24	0
43.5	24	32	1396	31	23	16	0
44.5	5	24	1333	25	24	14	0
45.5	30	21	930	22	22	14	0
46.5	39	22	540	23	14	27	0
47.5	14	31	561	9	11	18	0
48.5	7	15	519	2	7	3	0
49.5	4	18	334	0	2	6	0
50.5	4	16	144	0	1	6	0
51.5	1	10	54	0	2	0	0
52.5	2	13	49	0	0	17	0
53.5	0	6	33	0	0	0	0
54.5	9	4	12	0	0	9	0
55.5	9	6	0	0	0	0	0
56.5	0	5	6	0	0	0	0
57.5	0	3	0	0	0	0	0
58.5	1	2	0	0	0	0	0
59.5	1	3	0	0	0	0	0
60.5	0	0	0	0	0	6	0

Table 9 *Gadus morhua* catches and effort (hauls and hours) in ICES Div. Va, Vb, XIVb by year and quarter of the German fleet, 1998-2002.

Year	Quarter total	Catch (t) Total	Effort (h) Total	Catch (t) Va	Effort (h) Va	Catch (t) Vb	Effort (h) Vb	Catch (t) XIVb	Effort (h) XIVb
1998	1	105	208	0	0			105	208
1998	2	2	236	0	0			2	236
1998	3	15	566	6	519			9	47
1998	4	15	390	3	287			12	103
1998		138	1400	9	806			128	594
1999	1	1	25	0	0	0	0	1	25
1999	2	1	50	0	0	0	0	1	50
1999	3	21	908	15	640	4	245	1	24
1999	4	17	1017	6	664	1	36	10	317
1999		40	2000	21	1304	5	281	13	416
2000	1	2	35	0	0	0	0	2	35
2000	2	1	58	0	0	1	58	0	0
2000	3	9	672	7	568	1	90	1	14
2000	4	7	689	7	662	0	27	0	0
2000		19	1454	14	1230	2	175	3	49
2001	1	0	0	0	0	0	0	0	0
2001	2	8	305	0	0	8	291	0	14
2001	3	7	762	7	726	0	36	0	0
2001	4	97	785	4	298	1	48	92	439
2001		112	1852	11	1024	9	375	92	453
2002	1	2	92	0	0	0	0	2	92
2002	2	6	347	0	0	6	347	0	0
2002	3	6	972	3	875	0	0	3	97
2002	4	10	588	9	586	0	0	1	2
2002		24	1999	12	1461	6	347	6	191

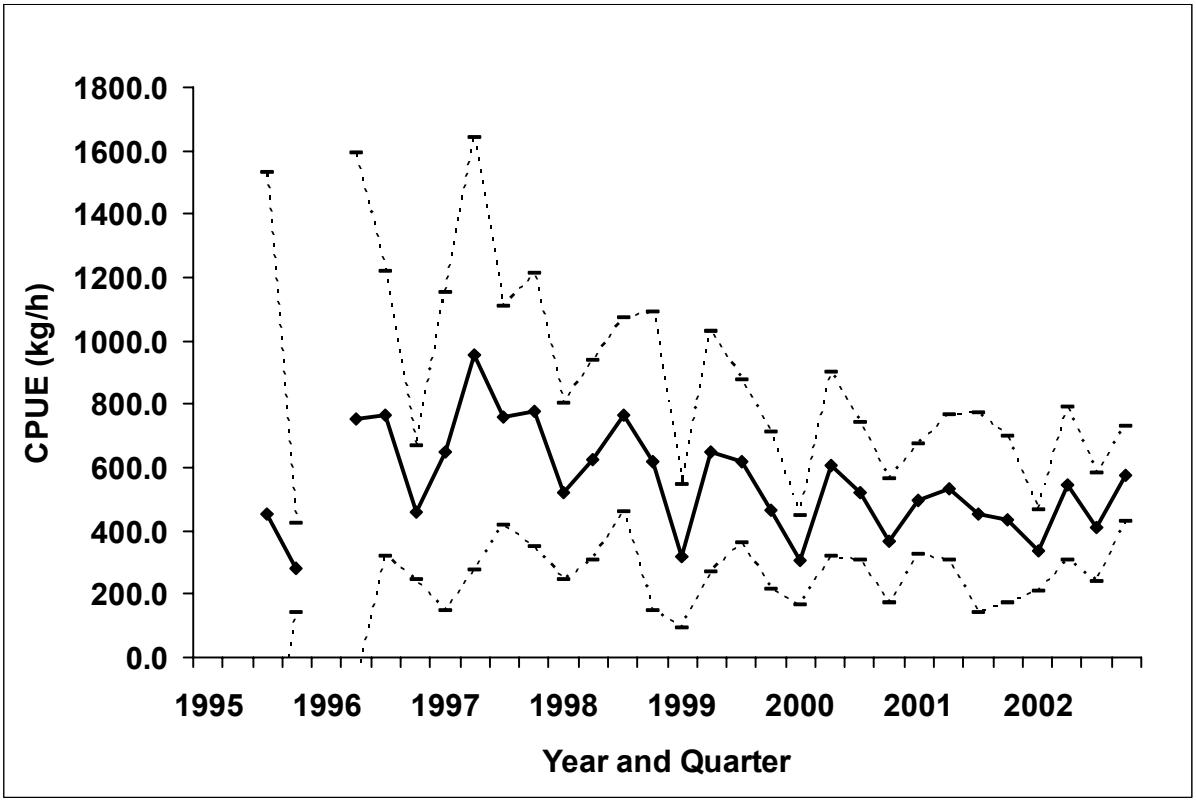

Fig. 1 Greenland halibut XIVb. Unstandardised and standardised mean CPUE (≥ 100 kg/h, vessel effects) of the German fleet by year and quarter, respective values being listed in Table 2.

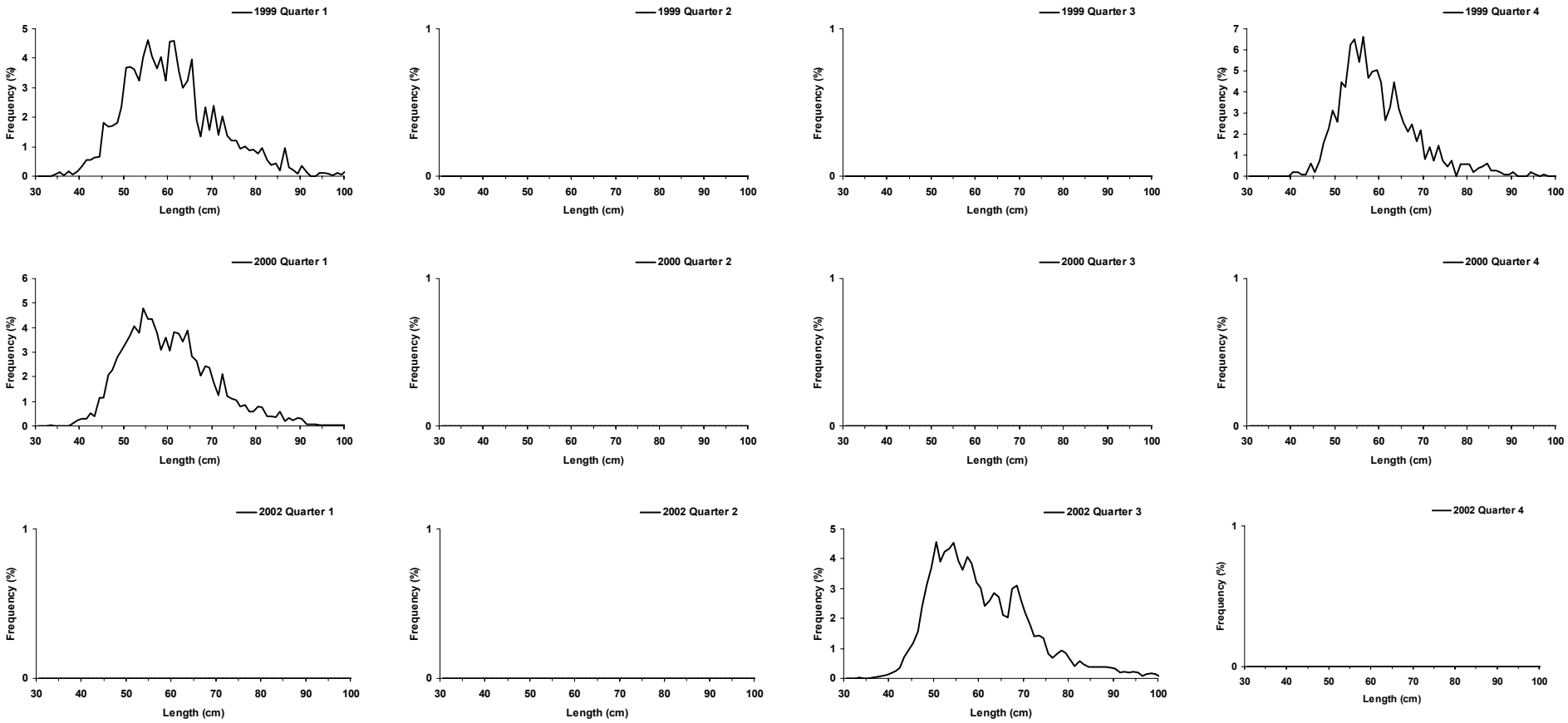

Fig. 2 Greenland halibut in ICES Div. V and XIVb. Length frequencies in 1999-2002 by quarter as specified in Table 4.

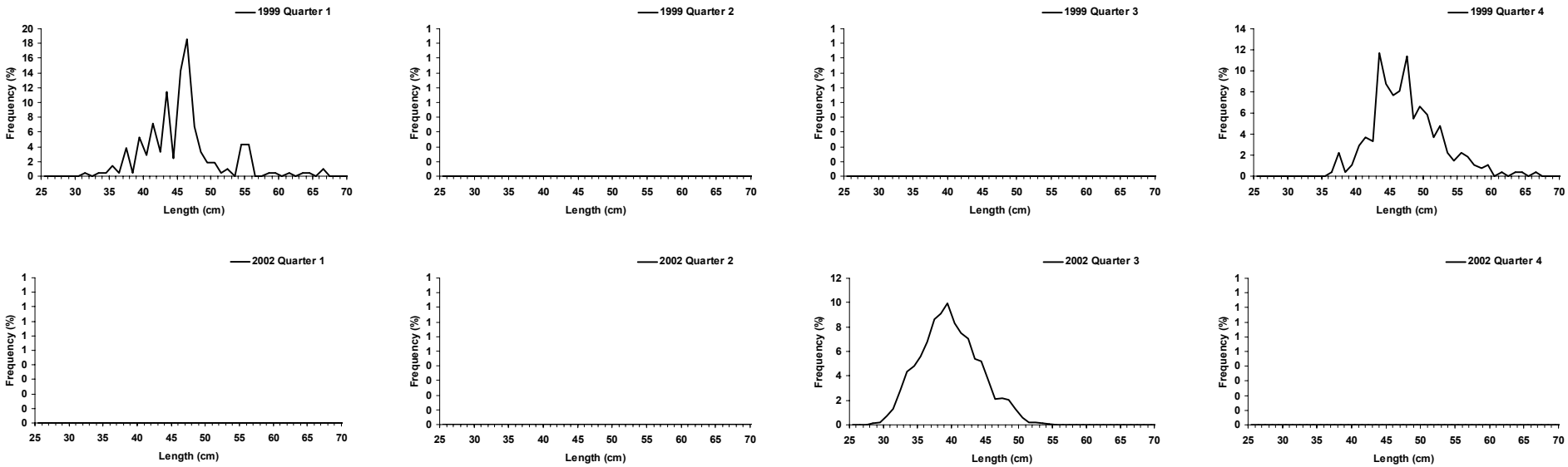

Fig. 3 *S. marinus* catches in ICES Div. XIVb. Length frequencies in 1999-2002 by quarter.

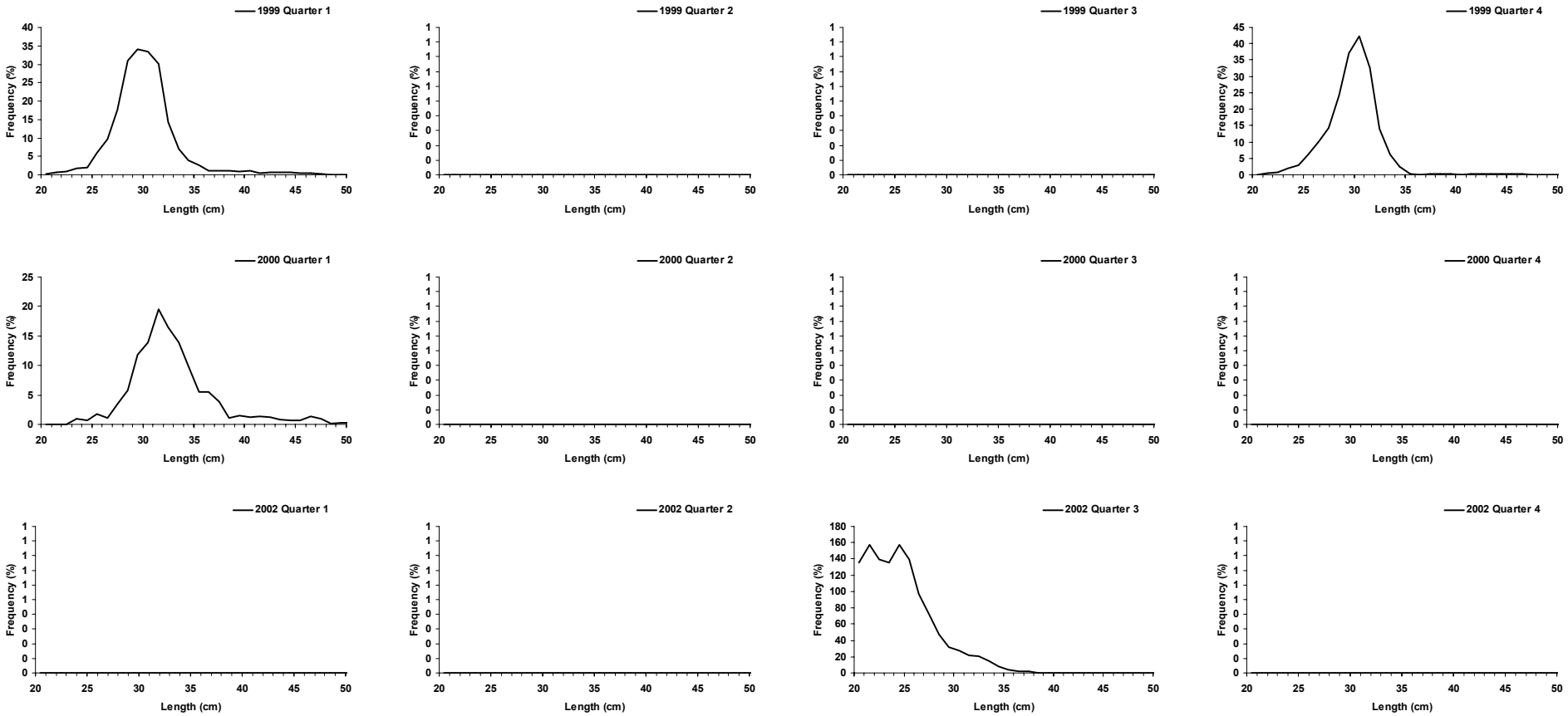

Fig. 4 Deep sea *S. mentella* catches in ICES Div. XIVb. Length frequencies in 1999-2002 by quarter.