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Report on Greenland halibut caught during the 2014 trawl survey in Divisions 0A and 0B

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Abstract

A stratified-random otter trawl survey was conducted in southern Division 0A (0A-South) and Division 0B (0B) in 2014. The 0A-South survey extended to approximately 72° N. The survey took place from September 22 to October 19, 2014. An Alfredo III trawl was used at randomly selected stations between 400 m and 1500 m. Ice and weather conditions did not interfere with the 0A-South portion of the survey but weather and poor bottom conditions were a factor in 0B. There were 83 stations completed in 0A-South (79 planned) and 58 in 0B (92 planned). All of the stations missed in 0B were from the 400-600 m strata so estimates from the deeper strata were not affected by this reduction in sampling. Mean near-bottom temperatures were similar to previous surveys for 0A-South, varying from 1.7 °C to 0.2 °C and declining with depth. Bottom temperatures in 0B were warmer, 2.8 °C to 4.0 °C, with the warmest temperatures at depths 800 m to 1200 m. Greenland halibut were distributed throughout the survey area and were present in all tows. A majority of the fish, both male and female in 0A-South were immature (92%). In 0B 60% of the catch was mature and these were mostly male (54%). The 2014 estimate of biomass for 0A-South was 93,692 t (S.E. 14,642 t) which is within the range of variability of the 2013 estimate and slightly higher than estimates for 1999 to 2004. Abundance was 1.07 $x10^8$ a decline compared to 2012 but within the range of earlier estimates. In 0B biomass and abundance were 64,873 t and 5.4 x 10^7, respectively, both were up slightly from 2013 but below 2011 estimates. The overall length distribution in Div. 0A-South ranged from 6 cm to 78 cm with modes at 18, 33, and 45 cm that may reflect the high abundance of 2011 and 2013 year classes. The abundance of fish 40-60 cm has increased since 2010 while the proportion of fish <45cm has declined from approximately 70% in 2008 to 54% in 2014. In 0B lengths ranged from 6 to 90 cm with a mode at 45 cm, similar to that observed in 2013 and 2011. Length frequencies across most depths were similar to that observed in 2014 with a decrease in abundance since 2001 for lengths <50 cm at depths 1001-1400 m. Overall 18% were less than <45 cm in 0B.

Introduction

A multi-species bottom trawl survey was carried out in the Northwest Atlantic Fisheries Organization Subarea 0 during September 22 to October 19, 2014. The survey covered both southern 0A (0A-South) (to approximately 72° N) as well as Division 0B (0B). An Alfredo III trawl was used at randomly selected stations between 400 m and 1500 m. Deep-water surveys began in 0A-South in 1999 (Treble et al. 2000), and have been completed every second year since 2004 (Treble 2005); most recently in 2012 (Treble 2013). Surveys in 0B have been less frequent with two surveys in 2000 and 2001 and more recently in 2011 and 2013 (Treble 2014).

The objectives were:

1. Collect the data required to establish age structure, estimate population abundance, biomass, and recruitment of Greenland halibut;
2. Collect the data required to establish age structure, estimate population abundance, biomass, and recruitment of shrimp;

3. Record numbers caught and collect length and weight data on all other commercial species caught, to allow calculation of abundance, biomass, and size structure of these species;
4. Record numbers and collect weight data on all non-commercial species caught, to allow calculation of abundance and biomass of these species;
5. Collect additional data and biological samples as desired and as time permits (e.g. lengths for by-catch, maturity information, coral samples, other special requests);
6. Collect temperature data at each fishing station;
7. Collect oceanographic data at pre-determined standard stations.

Materials and Methods

Stratification and Set Selection

A stratification scheme similar to that used by the Greenland Institute of Natural Resources for the Division 1CD survey was developed in 2008 (Table 1, part i and Figure 1) to facilitate comparisons between surveys conducted in Canadian and Greenland waters. The depth bins are slightly different from that used in surveys conducted between 1999 and 2006. The area in 0A-South (to approximately 72° N) between 401 m and 1500 m encompassed by this re-vised stratification scheme is 56,445 km^2, an increase over the 49,834 km^2 in the previous scheme due primarily to the inclusion of deep-water channels that cut across the shelf at several locations along the Baffin Island coast and a slight shift in the line separating 0A-South from 0A-North. In 2014 it was decided to remove stratum B1 (6970 km^2), a portion of the stratified area that falls within a fishery closure that was partially closed to Greenland halibut fishing vessels in 1998 to protect Narwhal over-wintering grounds and fully closed in 2006 to protect deep-water coral habitat. The 0A-South survey scheme now covers 49,475 km^2 (Table 1, part ii).

In Div. 0B the survey area was 68,367 km^2 (Table 2) a decrease from 74,482 km^2 in the previous scheme due to the exclusion of area that falls within a fishing industry voluntary closure intended to protect sponge and coral habitat (Figure 2). Also, during previous surveys it was often difficult to find suitable areas to trawl due to the rough bottom found in this portion of 0B.

Set selection is based on a coverage level of approximately 1 set per 750 km^2. A minimum of two sets were randomly selected from numbered units within each sub-stratum (the depth strata are sub-divided into multiple sub-strata in 0A and parts of 0B) using a buffered random design (Kingsley et al. 2004). If a set cannot be fished due to bad bottom, ice, etc. then the tow is taken in an adjacent unit as close to the missed site within the stratum as feasible given the conditions. When this is not possible then the tow may be re-located to an area of the stratum where there are "holes" in the set coverage and a unit location selected at random from those available in that area.

The 0A-South survey has 79 sets allocated and 0B has 92. It is intended that both these areas will be surveyed annually in order to build an index that can improve the assessment of Greenland Halibut in Subarea 0 and 1A (offshore) + 1B-F.

Vessel and Gear

The surveys were conducted by the RV Pâmiut, a 722 GRT stern trawler measuring 53 m in length. An Alfredo III bottom otter trawl with rock hopper ground gear was used for the deep water survey. Mesh size was 140 mm with a 30 mm mesh liner in the cod end. Trawl doors were Injector International, measuring 7.5 m^2 and weighing 2800 kg. These doors replaced the Greenland Perfect doors (9.25 m^2 and 2420 kg) in 2004. The average net height was 20 cm higher with the new doors but the overall net performance was not significantly different (95% level) (Jørgensen personal communication). More information about the trawl and gear can be found in Jørgensen 1998. A Furuno based system mounted on the head rope measured net height and was used to determine bottom contact and the start/finish of each tow. Scanmar sensors measured the distance between the trawl doors. Wingspread, taken as the distance between the outer bobbins, was calculated as: distance between outer bobbins=10.122 + distance between trawl doors (m) x 0.142. This relationship was based on flume tank measurements of the trawl and rigging (Jørgensen 1998).

Oceanographic Sampling
A Seabird 19© CTD (conductivity, temperature and depth recorder) was mounted on the head-rope and was used to determine temperature, depth and confirm the time spent on the bottom. In the few cases where there was no data from the CTD data from the Furuno trawl eye sensor was used.

A Seabird 19© CTD system equipped with a fluorometer was deployed at 6 stations along the Cape Christian transect line. Readings were taken to the bottom or within the top approx. 700 m of the water column at the deepest stations.

Trawling Procedure
The targeted tow duration was 30 minutes, however, tows down to 15 minutes in length were considered acceptable. Average towing speed was 3.0 knots. Trawling took place throughout a 24 hr period in order to maximize the ships time and complete the necessary tows.

Biological Data Collection and Analysis
Numbers and total weight caught were recorded on a set by set basis for each species. Detailed sampling was carried out on Greenland halibut and shrimp. For other commercial species (e.g. redfish, grenadiers, skates) sexed length measurements were collected. Lengths were measured to the lowest 1 cm total length (0.5 cm pre anal fin length for grenadiers) using a standard meter board. Large catches of either Greenland halibut or shrimp were sub-sampled. Sub-samples of Greenland halibut were comprised of at least 200 fish. Adjustments were made during analysis to estimate total number caught in each case.

Greenland halibut sampling consisted of a visual assessment of maturity for all individuals based on maturity stages described in Riget and Boje 1989. For each sampled fish the whole weight was recorded at sea using an electronic balance. Otoliths for age determination were collected, 10 per 1 cm length group per sex. However, research on age determination methods for Greenland halibut is on-going so the otolith samples were not analyzed.

Various species from the catch were collected or had tissue samples taken for use by other researchers within DFO.

Biomass and Abundance Indices
The swept area method was used in the estimation of biomass and abundance for Greenland halibut: Swept area (km^2) = (wingspread (m) x haul-length)/1,000,000. The haul-length used in the sweptarea calculations was estimated from the start and end positions of the tow. Abundance and biomass were calculated for each set and standardized to 1 km^2:

Abundance (n/km^2)=catch (n)/sweptarea (km^2)
Biomass ($tons/km^2$)=catch (kgs)/swept area (km^2)/1000.

Mean and standard error for abundance and biomass were calculated for each depth strata containing 2 or more sets. An estimate of total abundance and biomass was then calculated for each depth strata (mean x area surveyed (km^2)) as well as for all depth strata combined. Standard error values were also calculated for the overall total.

Abundance at length was also calculated for each depth strata (standardized to km^2 and weighted by tow), and a total abundance at each length (weighted by the area within each depth strata) was calculated (mean number/ km^2 x area surveyed (km^2)). The sum across all lengths and depth categories was calculated and compared to the overall abundance value determined above as a means of confirming the results.

Results and Discussion

The survey in 0A-South was completed with 83 successful tows and all depth strata contained 2 or more sets (Table 2). Four additional tows were taken in several strata at depths between 800 and 1200 m. As a result the survey covered the full area (49,475 km^2) (Table 2). Sets completed in surveys conducted from 1999 to 2006 were assigned to the new strata post-hoc in order to establish consistency with subsequent surveys that used the new depth stratification scheme and any sets that fell within strata B1 (area included in the fishery

closure) were removed from surveys completed prior to 2014 (Table 2). The 1400-1500 m depth strata was poorly covered in 1999, 2001 and 2006 and so the area contained in this strata was removed from the survey area for those years (Table 2).

Weather conditions and rough bottom resulted in a reduction in the number of sets taken in 0B in 2014 (58 sets) compared to surveys in 2011 and 2013 (84 sets) (Table 3). However, all the strata had at least two sets and the strata between 800 m and 1500 m were complete so there was no adjustment made to the survey area (68,367 km^2). In order to compare the most recent surveys to those conducted in 2000 and 2001 the sets for these early surveys were assigned to the new stratification scheme. There were problems completing the 2001 survey (36 of 76 planned tows completed) but these strata had 4-7 sets in them which allowed mean values to be estimated and the strata were included in the survey area (68,367 km^2).

Mean near-bottom temperatures were similar to previous surveys for 0A-South, ranging from 1.7 ^oC to 0.2 ^oC and declining with depth (Table 4, Fig. 3). Bottom temperatures in 0B were warmer, 2.8 ^oC to 4.0 ^oC with the warmest temperatures at depths 800 m to 1200 m (Table 5, Fig. 4).

Catches of most species other than Greenland halibut were small in number and so analysis of these species is not presented here.

Greenland Halibut

Division 0A-South

Greenland halibut were present in all successful tows in 2014 (Fig. 5). The number of fish caught in 0A-South varied from 4-1537 and catch weight from 6-1148 kg (Appendix 1). The catch was comprised of 51% males, 48% females and 1% sex unknown. Both males and females were primarily immature (92% of the catch); 45% male and 47% female. These values for male and female maturities are similar to previous observations in 0A.

The 2014 estimate of biomass was 93,692 t (S.E. 14,642) (Table 6) and the index has been fluctuating with a slight increasing trend since 1999 (Fig. 9). For depths less than 1000 m an increasing trend in biomass has been observed since 2008 while the trend for depths greater than 1000 m has been decreasing (Table 6, Fig. 11a).

The impact of the removal of the 1400-1500 m strata to the overall estimate of Greenland Halibut biomass and abundance in 1999, 2001 and 2006 was considered minor as this stratum does not cover a large area and has contained only 2-3% of the overall biomass in recent years. However, the reduced coverage (only 3 sets) in depths 1200-1400 in the 2006 survey may have led to an under-estimate of mean biomass/ km^2 and the reduced estimate of biomass for the strata that year (6,615 t) compared to estimates in 2004 (17,116 t) and 2008 (28,314 t) (Table 6). Considering both the reduced coverage at depths 1200-1400 m and the absence of coverage at depths 1400-1500 m the overall biomass and abundance is likely under-estimated for 2006 (Fig. 9).

Abundance in 2014 is estimated at 1.07×10^8 (S.E. 1.8×10^7) a decline compared to 2012 but within the range of earlier estimates (Table 7 and Fig. 9). Abundance of fish <40 cm has been declining since 2008 while abundance for 40-60 cm fish has increased since 2010 (Fig. 12).

The length distributions at depths 400 m to 800 m have more than one mode in both 2012 and 2014 (Fig. 13). The first mode varies between 18 and 20 cm with a second mode between 33 and 39 cm and a third mode at 45 cm. The first two modes may reflect the high abundance of 2011 and 2013 year classes. Generally, the number of fish at larger length classes increases with depth. There has been a decrease in abundance and shift to larger fish in the distribution for depths 800 m to 1400 m since 2010.

The overall length distribution in 2014 ranged from 6 cm to 78 cm, a decline from a maximum of 99 cm found in 2008 and 2010 surveys (Table 10). Modes were observed at 18, 33 and 45 cm in 2014. There has been a gradual shift to larger fish since 2008 (Fig. 15). The proportion of fish <45cm has declined from approximately 70% in 2008 to 54% in 2014 (Table 10).

Division 0B

Greenland halibut were present in all successful tows in 2014 (Fig. 7). The number of fish caught varied from 10-276 and catch weight from 14.8 kg to 343.0 kg (Appendix 1). The catch was comprised of 72% males and 28% females. The catch was comprised of 60% mature fish; 54% males but only 6% females. These values for male and female maturities are similar to observations from previous 0B surveys. The 2014 biomass was 64,873 t (S.E. 5,166), an increase over the 2013 estimate (53,109 t) but less than that observed in 2011(80,476 t) (Table 8 and Figure 10). Biomass increased or was stable at depths <1000 m since 2001, with a declining trend at depths 1001-1400 m (Fig. 11b, Table 8).

The 2014 abundance index is estimated at 5.5×10^7 (S.E. 4.1×10^6) (Table 9). This is a small increase compared to 2013 (5.1×10^7) and both 2013 and 2014 are considerably lower than 2011 (7.9×10^7) and earlier estimates (Fig. 10). The abundance of fish <40 cm and 40-60 cm have been declining since 2011 (since 2001 for <40 cm) (Fig. 12).

Overall lengths in 2014 ranged from 6 cm to 90 cm (Table 11, Figure 15) with a mode at 45 cm, similar to that observed in 2013 and 2011. 18% of fish were <45 cm, a decline from 28% in 2011 and 2013 (Table 11). Length frequencies across most depths were similar to that observed in 2014 with a decrease in abundance since 2001 for lengths <50 cm at depths 1001-1400 m (Fig. 14).

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Table 1. Stratification scheme for Division 0A-South; left (i) - full stratification; right (ii) – strata B1 removed.

Stratum	Depth (m)	Area (km2)	Assigned Sets (1/750km2)
A1-4	400-600	2151.56	3
A2-4	400-600	4649.39	6
A3-4	400-600	784.79	2
A4-4	400-600	1921.58	3
B1-4	400-600	936.25	2
B2-4	400-600	2519.44	3
		12963.01	19
A1-5	600-800	794.75	2
A2-5	600-800	2250.41	3
A3-5	600-800	759.93	2
A4-5	600-800	2483.22	3
B1-5	600-800	741.28	2
B2-5	600-800	5107.81	7
		12137.39	19
A1-6	800-1000	603.81	2
A2-6	800-1000	1144.81	2
A3-6	800-1000	1020.40	2
A4-6	800-1000	1375.61	2
B1-6	800-1000	1190.02	2
B2-6	800-1000	2656.17	4
		7990.82	14
A1-7	1000-1200	745.21	2
A2-7	1000-1200	1873.10	2
A3-7	1000-1200	1306.99	2
A4-7	1000-1200	1635.65	2
B1-7	1000-1200	1288.00	2
B2-7	1000-1200	1788.51	2
		8637.46	12
A1-8	1200-1400	812.76	2
A2-8	1200-1400	2151.49	3
A3-8	1200-1400	1145.95	2
A4-8	1200-1400	1071.88	2
B1-8	1200-1400	1778.91	2
B2-8	1200-1400	3329.50	4
		10290.49	15
A1-9	1400-1500	497.50	2
A2-9	1400-1500	1153.19	2
A3-9	1400-1500	683.94	2
A4-9	1400-1500	709.73	2
B1-9	1400-1500	1035.21	2
B2-9	1400-1500	345.99	2
		4425.56	12
Total		56444.73	91

Stratum	Depth (m)	Area (km2)	Assigned Sets (1/750km2)
A1-4	400-600	2152	3
A2-4	400-600	4649	6
A3-4	400-600	785	2
A4-4	400-600	1922	3
B2-4	400-600	2519	3
		12027	17
A1-5	600-800	795	2
A2-5	600-800	2250	3
A3-5	600-800	760	2
A4-5	600-800	2483	3
B2-5	600-800	5108	7
		11396	17
A1-6	800-1000	604	2
A2-6	800-1000	1145	2
A3-6	800-1000	1020	2
A4-6	800-1000	1376	2
B2-6	800-1000	2656	4
		6801	12
A1-7	1000-1200	745	2
A2-7	1000-1200	1873	2
A3-7	1000-1200	1307	2
A4-7	1000-1200	1636	2
B2-7	1000-1200	1789	2
		7349	10
A1-8	1200-1400	813	2
A2-8	1200-1400	2151	3
A3-8	1200-1400	1146	2
A4-8	1200-1400	1072	2
B2-8	1200-1400	3330	4
		8512	13
A1-9	1400-1500	498	2
A2-9	1400-1500	1153	2
A3-9	1400-1500	684	2
A4-9	1400-1500	710	2
B2-9	1400-1500	346	2
		3390	10
Total		49475	79

Table 2. 0A-South set distribution. Depth stratum removed from the survey area due to incomplete set coverage (sets <2) are highlighted.

Stratum	Depth (m)	Area (km2)	1999	2001	2004	2006	2008	2010	2012	2014
A1-4	400-600	2152	4	0	6	4	3	3	3	3
A2-4	400-600	4649	2	3	1	6	6	6	6	4
A3-4	400-600	785	3	0	0	2	2	2	2	2
A4-4	400-600	1922	0	2	0	0	3	3	3	2
B2-4	400-600	2519	2	0	1	2	3	3	2	6
		12027	11	5	8	14	17	17	16	17
A1-5	600-800	795	3	2	1	3	2	2	2	2
A2-5	600-800	2250	0	3	1	3	3	3	3	3
A3-5	600-800	760	1	1	1	2	2	2	2	2
A4-5	600-800	2483	1	1	3	0	1	3	3	3
B2-5	600-800	5108	7	6	5	8	7	7	7	8
		11396	12	13	11	16	15	17	17	18
A1-6	800-1000	604	1	1	1	2	2	2	2	1
A2-6	800-1000	1145	2	0	1	2	2	2	2	2
A3-6	800-1000	1020	3	2	3	1	2	2	2	2
A4-6	800-1000	1376	1	1	2	0	1	2	2	3
B2-6	800-1000	2656	4	3	5	1	4	4	4	6
		6801	11	7	12	6	11	12	12	14
A1-7	1000-1200	745	2	0	1	1	2	2	2	1
A2-7	1000-1200	1873	3	2	2	5	2	2	2	4
A3-7	1000-1200	1307	2	0	4	0	2	2	2	2
A4-7	1000-1200	1636	0	0	0	0	2	2	2	3
B2-7	1000-1200	1789	2	3	3	0	2	2	2	4
		7349	9	5	10	6	10	10	10	14
A1-8	1200-1400	813	2	3	1	0	2	2	2	2
A2-8	1200-1400	2151	3	4	4	3	3	3	3	4
A3-8	1200-1400	1146	2	0	2	0	2	2	2	2
A4-8	1200-1400	1072	1	0	4	0	2	2	2	2
B2-8	1200-1400	3330	2	2	1	0	4	2	2	2
		8512	10	9	12	3	13	11	11	12
A1-9	1400-1500	498	0	0	0	0	2	2	2	2
A2-9	1400-1500	1153	0	0	1	1	2	2	2	2
A3-9	1400-1500	684	0	0	0	0	2	2	2	2
A4-9	1400-1500	710	0	0	0	0	0	2	2	2
B2-9	1400-1500	346	1	0	1	0	2	2	1	0
		3390	1	0	2	1	8	10	9	8
Totals		49475	54	39	55	46	74	77	75	83
Adjusted Survey Area			46085	46085		46085				

Table 3. Stratification scheme for Division 0B and distribution of successful sets.

Strata	Depth (m)	Area (km^2)	Set Design ($1/750km^2$)	2000	2001	2011	2013	2014
D4-1	400-600	17396.93	23	9	7	17	16	6
D4-2	400-600	19276.73	26	15	4	22	24	9
D5-1	600-800	2282.96	3	6	3	3	3	2
D5-2	600-800	8052.15	11	7	3	13	12	12
D6-1	800-1000	8053	11	13	8	11	11	11
D7-1	1000-1200	6586	9	8	6	9	9	9
D8-1	1200-1400	4754	6	3	2	6	6	6
D9-1	1400-1500	1965	3	3	3	3	3	3
Totals		68367	92	64	36	84	84	58

Table 4. Mean temperature and S.E. in ( ) for Division 0A-South.

	Depth Stratum (m)					
Year	401-600	601-800	801-1000	1001-1200	1201-1400	1401-1500
1999						
2001						
2004	1.4 (0.18)	1.1 (0.08)	0.9 (0.04)	0.6 (0.05)	0.1 (0.04)	-0.2 (0.09)
2006	1.1 (0.08)	1.3 (0.07)	1.1 (0.05)	0.9 (0.10)	0.2 (0.07)	0.3 (-)
2008	1.1 (0.11)	1.4 (0.03)	1.3 (0.04)	0.8 (0.05)	0.4 (0.03)	0.1 (0.04)
2010	1.3 (0.09)	1.1 (0.13)	0.9 (0.09)	0.7 (0.07)	0.2 (0.05)	0.0 (0.02)
2012	1.4 (0.14)	1.6 (0.06)	1.1 (0.11)	0.7 (0.07)	0.3 (0.07)	0.0 (0.03)
2014	1.7 (0.17)	1.5 (0.05)	1.3 (0.02)	0.8 (0.08)	0.4 (0.04)	0.2 (0.04)

Table 5. Mean temperature and S.E. in ( ) for Division 0B.

	Depth Stratum (m)					
Year	401-600	601-800	801-1000	1001-1200	1201-1400	1401-1500
2000	2.1 (0.18)	2.6 (0.18)	3.5 (0.04)	3.5 (0.03)	3.3 (0.07)	3.2 (0.03)
2001						
2011						
2013	2.6 (0.15)	3.3 (0.25)	4.1 (0.04)	3.9 (0.02)	3.8 (0.02)	3.8 (0.01)
2014	2.8 (0.19)	3.3 (0.22)	4.0 (0.03)	3.8 (0.036)	3.7 (0.03)	3.6 (0.05)

Table 6. Biomass estimates (tons) of Greenland halibut by depth stratum for Division 0A-South.

Year/Division	Stratum (m)	Survey Area (sq. km)	No. Sets	Mean Biomass (t/sq. km)	Biomass (tons)	SE
1999	401-600	12027	11	0.4653	5596.2	1294.5
0A-South	601-800	11396	12	1.0836	12349.3	4193.0
	801-1000	6801	11	1.5878	10799.0	2185.0
	1001-1200	7349	9	2.6075	19162.2	5303.0
	1201-1400	8512	10	1.4960	12733.7	4665.3
	1401-1500	0	1	0.2171		
	Overall	*46085*	*54*	*1.3158*	*60640.3*	*8597.5*
2001	401-600	12027	5	1.2040	14480.9	8058.1
0A-South	601-800	11396	13	2.1543	24550.6	6533.4
	801-1000	6801	7	3.3261	22620.8	5979.6
	1001-1200	7349	5	2.8395	20867.8	6673.5
	1201-1400	8512	9	0.4667	3972.9	961.5
	1401-1500	0	0			
	Overall	*46085*	*39*	*1.8768*	*86493.0*	*13741.7*
2004	401-600	12027	8	0.6634	7978.9	1423.3
0A-South	601-800	11396	11	1.0001	11397.0	3015.3
	801-1000	6801	12	2.6187	17809.9	5246.2
	1001-1200	7349	10	3.3626	24711.8	4330.1
	1201-1400	8512	12	2.0108	17115.7	7293.1
	1401-1500	3390	2	0.2677	907.7	202.9
	Overall	*49475*	*55*	*1.6154*	*79920.9*	*10517.7*
2006	401-600	12027	14	0.2799	3366.8	438.5
0A-South	601-800	11396	16	0.5487	6253.0	1240.7
	801-1000	6801	6	1.0985	7471.0	2280.6
	1001-1200	7349	7	3.6835	27070.1	8963.9
	1201-1400	8512	3	0.7772	6615.2	2035.2
	1401-1500	0	1	0.2934	0.0	0.0
	Overall	*46085*	*47*	*1.1018*	*50776.1*	*9561.7*
2008	401-600	12027	17	0.4726	5683.9	1273.1
0A-South	601-800	11396	15	0.9048	10311.6	2742.5
	801-1000	6801	11	2.4700	16798.2	2220.5
	1001-1200	7349	10	2.5684	18875.5	2169.9
	1201-1400	8512	13	3.3264	28314.4	7741.4
	1401-1500	3390	8	0.5810	1969.6	384.2
	Overall	*49475*	*74*	*1.6565*	*81953.2*	*8880.2*
2010	401-600	12027	17	0.3039	3655.4	506.9
0A-South	601-800	11396	17	0.8630	9834.8	1233.3
	801-1000	6801	12	2.5394	17270.5	3255.0
	1001-1200	7349	10	1.1382	30411.8	9369.6
	1201-1400	8512	11	1.3338	11353.3	2589.5
	1401-1500	3390	10	0.7237	2453.4	435.5
	Overall	*49475*	*77*	*1.5155*	*74979.2*	*10346.9*
2012	401-600	12027	16	0.9181	11042.2	1827.0
0A-South	601-800	11396	17	3.0851	35158.1	18940.3
	801-1000	6801	12	3.4414	23405.0	5368.2
	1001-1200	7349	10	3.5339	25970.4	9462.5
	1201-1400	8512	11	1.3399	11404.8	1746.7
	1401-1500	3390	9	0.5065	1717.0	508.0
	Overall	*49475*	*75*	*2.1970*	*108697.5*	*21994.1*

2014	401-600	12027	17	1.2551	15095.4	2392.1
0A-South	601-800	11396	18	2.7161	30952.4	10216.4
	801-1000	6801	14	2.9441	20022.7	4290.4
	1001-1200	7349	14	2.3004	16905.4	5120.4
	1201-1400	8512	12	1.0751	9150.9	4639.8
	1401-1500	3390	8	0.4616	1564.9	350.7
	Overall	*49475*	*83*	1.8937	93691.7	14642.3

Table 7. Abundance estimates (000's) of Greenland halibut by depth stratum for Division 0A-South.

Year/Division	Stratum (m)	Survey Area (sq. km)	No. Sets	Mean Abundance (sq. km)	Abundance	SE
1999	401-600	10105	11	1430.7	1.7E+07	3.9E+06
0A-South	601-800	9146	12	2965.3	3.38E+07	1.3E+07
	801-1000	6801	11	3563.2	2.42E+07	4.7E+06
	1001-1200	5713	9	4126.9	3.03E+07	9.6E+06
	1201-1400	8512	10	1370.9	1.2E+07	3.8E+06
	1401-1500	0	1	157.9	0.0E+00	
	Overall	*40277*	*54*	*2543.8*	*1.17E+08*	*1.7E+07*
2001	401-600	6571	5	1874.1	2.3E+07	1.2E+07
0A-South	601-800	11396	13	4547.3	5.18E+07	1.4E+07
	801-1000	5656	7	4100.6	2.79E+07	7.7E+06
	1001-1200	3662	5	3923.9	2.88E+07	1.1E+07
	1201-1400	6294	9	476.5	4.1E+06	9.3E+05
	1401-1500	0	0			
	Overall	*33579*	*39*	*2932.4*	*1.35E+08*	*2.3E+07*
2004	401-600	9320	8	1943.3	2.34E+07	5.7E+06
0A-South	601-800	11396	11	2019.6	2.30E+07	7.6E+06
	801-1000	6801	12	3434.8	2.34E+07	7.5E+06
	1001-1200	5713	10	3481.1	2.56E+07	4.8E+06
	1201-1400	8512	12	1457.0	1.24E+07	5.1E+06
	1401-1500	1498	2	194.8	6.60E+05	1.6E+05
	Overall	*43240*	*55*	*2190.9*	*1.08E+08*	*1.4E+07*
2006	401-600	10105	14	1117.6	1.34E+07	2.9E+06
0A-South	601-800	8913	16	1565.3	1.78E+07	4.3E+06
	801-1000	5425	6	2316.2	1.58E+07	4.3E+06
	1001-1200	2618	7	5478.8	4.03E+07	1.3E+07
	1201-1400	2151	3	748.7	6.37E+06	2.2E+06
	1401-1500	0	1	284.7	0.00E+00	
	Overall	*29212*	*47*	*2032.5*	*9.37E+07*	*1.5E+07*
2008	401-600	12027	17	1322.1	1.59E+07	3.9E+06
0A-South	601-800	11396	15	2082.3	2.37E+07	7.3E+06
	801-1000	6801	11	4416.0	3.00E+07	4.7E+06
	1001-1200	7349	10	3770.5	2.77E+07	4.5E+06
	1201-1400	8512	13	3205.5	2.73E+07	7.6E+06
	1401-1500	2680	8	461.1	1.56E+06	3.2E+05
	Overall	*48765*	*74*	*2551.2*	*1.26E+08*	*1.3E+07*

2010	401-600	12027	17	842.6	1.01E+07	1.5E+06
0A-South	601-800	11396	17	2149.6	2.45E+07	4.2E+06
	801-1000	6801	12	5051.0	3.44E+07	7.8E+06
	1001-1200	7349	10	4687.0	3.44E+07	7.8E+06
	1201-1400	8512	11	1101.4	9.37E+06	2.2E+06
	1401-1500	3390	10	490.0	1.66E+06	2.6E+05
	Overall	*49475*	*77*	*2313.6*	*1.14E+08*	*1.2E+07*
2012	401-600	12027	16	2206.1	2.65E+07	5.2E+06
0A-South	601-800	11396	17	4770.5	5.44E+07	3.3E+07
	801-1000	6801	12	4020.4	2.73E+07	6.2E+06
	1001-1200	7349	10	2911.5	2.14E+07	7.9E+06
	1201-1400	8512	11	968.3	8.24E+06	1.2E+06
	1401-1500	3390	9	330.5	1.12E+06	3.1E+05
	Overall	*49475*	*75*	*2809.5*	*1.39E+08*	*3.0E+07*
20014	401-600	12027	17	1829.9	2.20E+07	3.1E+06
0A-South	601-800	11396	18	3982.1	4.54E+07	1.5E+07
	801-1000	6801	14	3061.2	2.08E+07	4.0E+06
	1001-1200	7349	14	1674.8	1.23E+07	3.4E+06
	1201-1400	8512	12	695.4	5.92E+06	2.8E+06
	1401-1500	3044	8	303.1	1.03E+06	2.3E+05
	Overall	*49129*	*83*	*2172.1*	*1.07E+08*	*1.8E+07*

Table 8. Biomass estimates (tons) of Greenland halibut by depth stratum for Division 0B.

Year	Stratum (m)	Survey Area (sq km)	No. Sets	Mean Biomass (t/sq km)	Biomass (tons)	SE
2000	401-600	36674	24	0.1651	6055.4	781.0
	601-800	10335	14	0.4050	4186.1	844.5
	801-1000	8053	12	1.3077	10530.8	1423.3
	1001-1200	6586	8	2.0696	13630.3	4289.1
	1201-1400	4754	3	3.2346	15377.1	5399.9
	1401-1500	1965	3	1.6140	3171.4	677.4
	Overall	68367	64	0.7745	52951.1	7166.8
2001	401-600	36674	11	0.1959	7183.9	1407.6
	601-800	10335	6	0.9563	9882.9	2202.3
	801-1000	8053	8	1.5881	12789.2	2069.2
	1001-1200	6586	6	2.3532	15497.9	2986.2
	1201-1400	4754	2	2.5514	12129.3	4508.8
	1401-1500	1965	3	2.3709	4658.8	269.2
	Overall	68367	36	0.9090	62142.0	6358.6
2011	401-600	36674	39	0.4202	15411.0	2006.1
	601-800	10335	16	1.5627	16150.2	3718.2
	801-1000	8053	11	2.5065	20184.6	2412.8
	1001-1200	6586	9	2.5280	16649.2	2588.9
	1201-1400	4754	6	1.8127	8617.7	947.7
	1401-1500	1965	3	1.7622	3462.8	139.2
	Overall	68367	84	1.1771	80475.5	5593.9
2013	401-600	36674	40	0.2684	9844.4	1299.6
	601-800	10335	15	0.9668	9992.1	1758.2
	801-1000	8053	11	1.9845	15981.3	1819.4
	1001-1200	6586	9	1.3040	8588.3	1250.3
	1201-1400	4754	6	1.3593	6462.2	1322.3
	1401-1500	1965	3	1.1401	2240.4	712.4
	Overall	68367	84	0.7768	53108.7	3501.4
2014	401-600	36674	15	0.4883	17907.5	3167.8
	601-800	10335	14	1.3139	13578.8	2647.1
	801-1000	8053	11	1.7391	14005.0	1704.9
	1001-1200	6586	9	1.5321	10090.3	1863.1
	1201-1400	4754	6	1.4473	6880.3	1497.6
	1401-1500	1965	3	1.2271	2411.2	1014.3
	Overall	68367	58	0.9489	64873.1	5166.4

Table 9. Abundance estimates (000's) of Greenland halibut by depth stratum for Division 0B.

Year	Stratum (m)	Survey Area (sq km)	No. Sets	Mean Abundance (sq km)	Abundance	SE
2000	401-600	36674	24	461.50	1.7E+07	2.9E+06
	601-800	10335	14	635.70	6.57E+06	1.1E+06
	801-1000	8053	12	1655.30	1.33E+07	2.3E+06
	1001-1200	6586	8	2381.60	1.57E+07	5.4E+06
	1201-1400	4754	3	3609.20	1.7E+07	7.1E+06
	1401-1500	1965	3	1444.50	2.8E+06	7.4E+05
	Overall	66402	64	1060.55	7.251E+07	9.7E+06
2001	401-600	36674	11	427.30	1.57E+07	2.9E+06
	601-800	10335	6	1387.30	1.43E+07	3.1E+06
	801-1000	8053	8	1907.50	1.54E+07	2.5E+06
	1001-1200	6586	6	2594.30	1.71E+07	3.4E+06
	1201-1400	4754	2	2739.30	1.30E+07	5.2E+06
	1401-1500	1965	3	2319.90	4.56E+06	2.7E+05
	Overall	66402	36	1170.69	8.004E+07	7.9E+06
2011	401-600	36674	39	539.30	2.0E+07	2.7E+06
	601-800	10335	16	1659.10	1.7E+07	3.5E+06
	801-1000	8053	11	2221.70	1.8E+07	2.1E+06
	1001-1200	6586	9	2195.80	1.4E+07	2.5E+06
	1201-1400	4754	6	1561.50	7.4E+06	9.7E+05
	1401-1500	1965	3	1393.10	2.7E+06	1.2E+05
	Overall	66402	84	1161.95	7.944E+07	5.6E+06
2013	401-600	36674	40	322.20	1.2E+07	1.5E+06
	601-800	10335	15	997.50	1.0E+07	1.5E+06
	801-1000	8053	11	1759.20	1.4E+07	1.6E+06
	1001-1200	6586	9	1170.50	7.7E+06	1.1E+06
	1201-1400	4754	6	1114.30	5.3E+06	1.1E+06
	1401-1500	1965	3	943.80	1.9E+06	5.2E+05
	Overall	66402	84	751.53	5.115E+07	3.2E+06
2014	401-600	36674	15	440.50	1.6E+07	2.5E+06
	601-800	10335	14	1178.70	1.2E+07	2.2E+06
	801-1000	8053	11	1381.40	1.1E+07	1.3E+06
	1001-1200	6586	9	1232.90	8.1E+06	1.5E+06
	1201-1400	4754	6	1111.00	5.3E+06	1.2E+06
	1401-1500	1965	3	1013.00	2.0E+06	8.8E+05
	Overall	66402	58	802.33	5.485E+07	4.1E+06

Table 10. Length distribution (3cm groups) estimated total number (000's) for Greenland halibut from Division 0A-South surveys (weighted by survey area).

Length Class (3cm)	2001	2004	2008	2010	2012	2014
6				57.33		47.90
9	10.37			55.02		
12		68.84	7.98	41.68	129.92	47.69
15	33.23	1518.49	338.22	318.90	133.06	108.12
18	203.73	864.92	948.97	586.33	5716.74	**1983.34**
21	886.59	2628.28	2181.04	1566.19	**6390.09**	1260.86
24	2741.03	3109.14	2705.01	3591.54	2192.29	2052.50
27	3360.42	7651.27	6438.29	6900.00	4104.70	3573.07
30	6015.98	7035.99	11375.54	11028.02	7101.71	7424.05
33	10966.53	8384.72	**17741.10**	12481.31	10349.48	**11331.40**
36	20222.86	9677.56	16866.34	14359.18	14060.45	9184.42
39	**26004.55**	10378.93	16021.82	**16049.14**	18257.02	9109.91
42	27059.05	12615.43	14424.26	14480.92	**20786.68**	11512.35
45	18203.94	**14014.29**	12563.83	11610.92	18544.02	**14688.48**
48	10859.76	12614.30	9500.49	7296.32	13330.45	13738.92
51	4968.45	8903.17	6181.88	5534.98	8536.28	10374.43
54	1804.66	4347.79	3983.39	3762.84	3980.03	5731.26
57	851.83	2185.69	2469.62	2202.67	2192.90	2594.25
60	513.95	1034.76	1433.01	1147.47	1249.31	1240.36
63	173.03	570.86	520.98	892.67	934.55	721.27
66	107.56	348.53	371.38	313.12	586.13	396.51
69	106.85	119.22	71.00	87.15	203.48	179.83
72	27.86	142.23	26.19	24.30	114.13	123.49
75	0.00	48.35	16.91	27.29	44.35	32.74
78	0.00	58.21	0.00	18.81	32.93	5.95
81	0.00	22.64	0.00		17.00	
84	19.08	7.20	15.43	16.88		
87		27.75	0.00			
90		8.00	0.00		11.67	
93		0.00	9.25			
96		7.20				
99			8.95	12.14		
Total	135141.32	108393.75	126220.86	114463.12	138999.37	107463.11
Total <45 cm	97504.35	63933.57	89048.57	81515.56	89222.14	57635.61
% <45 cm	72.15	58.98	70.55	71.22	64.19	53.63

Table 11. Length distribution (3cm groups) estimated total number (000's) for Greenland Halibut from Division 0B surveys (weighted by survey area).

Length Class (3cm)	2001	2011	2013	2014
6	142.17	14.43	37.43	165.43
9	217.36	0.00	141.25	
12	0.00	1656.86	589.08	28.93
15	46.89	702.79	163.78	25.16
18	240.61	553.50	141.08	873.24
21	740.44	565.23	480.05	279.39
24	1712.31	586.47	923.01	231.10
27	1372.57	629.45	558.87	310.27
30	2415.76	749.75	616.19	916.75
33	3315.37	1422.67	970.07	653.26
36	4476.44	2095.12	1532.73	965.31
39	9689.21	4496.19	2714.79	1769.25
42	15038.27	9178.31	5635.56	3831.81
45	**17875.24**	15831.26	9904.60	9049.60
48	11085.72	**16391.02**	**10743.81**	**12587.09**
51	6013.42	11924.52	7397.35	10990.37
54	2386.96	6098.75	3760.59	5579.92
57	1429.38	2935.70	2004.80	2628.39
60	703.30	1545.91	1119.62	1537.55
63	477.82	828.34	738.92	976.17
66	196.64	459.86	339.83	632.03
69	212.67	271.98	153.90	251.63
72	141.52	118.43	123.65	154.93
75	13.68	142.54	140.67	95.22
78	22.39	53.81	72.13	138.11
81	26.25	61.58	42.46	67.65
84	7.90	29.29	44.76	35.20
87	7.90	30.82	23.08	26.76
90	0.00	64.25	30.17	43.53
93	0.00	0.00	8.78	
96	28.52	0.00		
99	0.00	0.00		
Total	80036.71	79438.83	51153.00	54844.06
Total <45 cm	39407.41	22650.77	14503.88	10049.91
% <45 cm	49.24	28.51	28.35	18.32

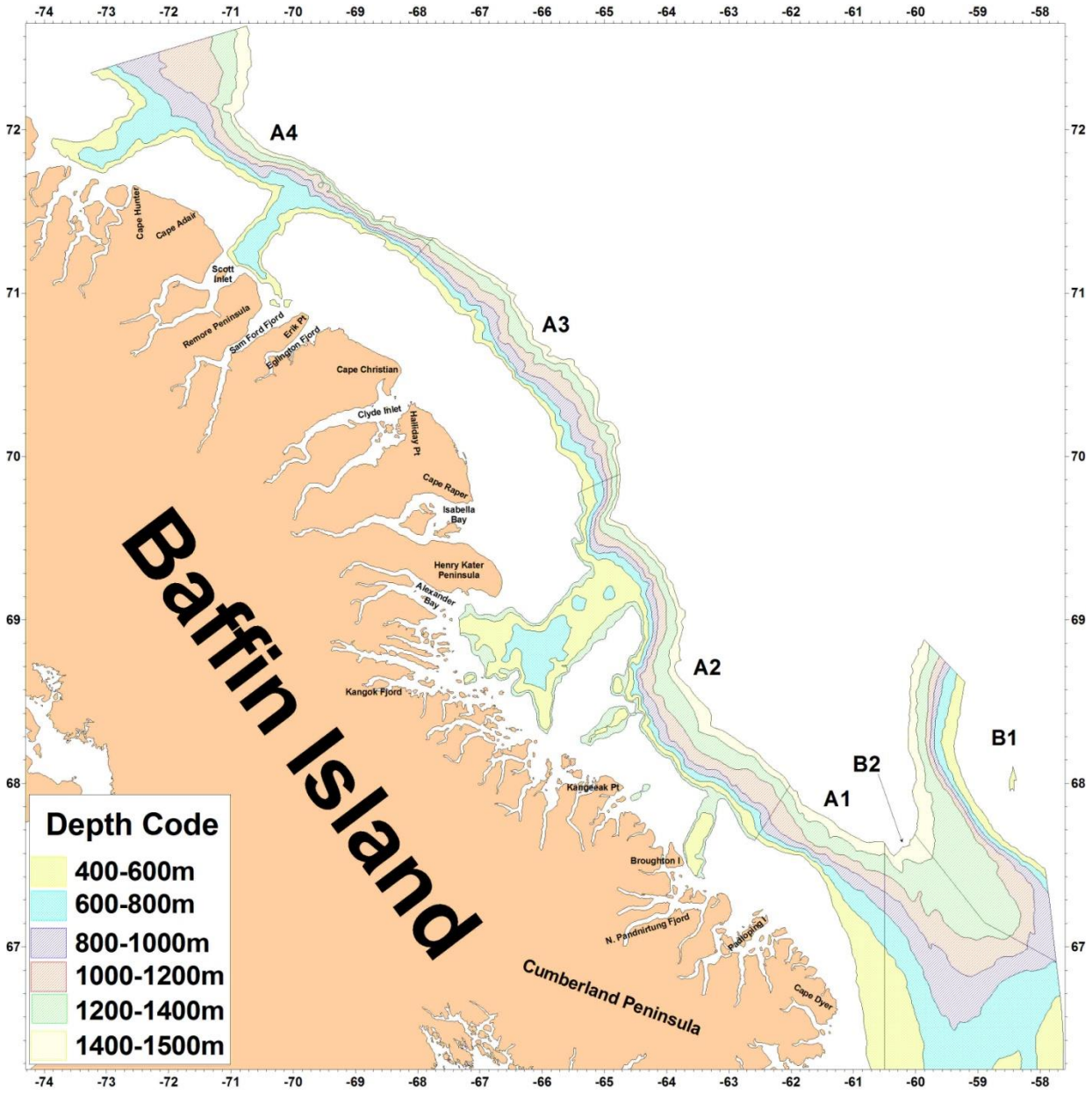


Figure 1. Stratification scheme for Division 0A-South, 66° N to 72° N.

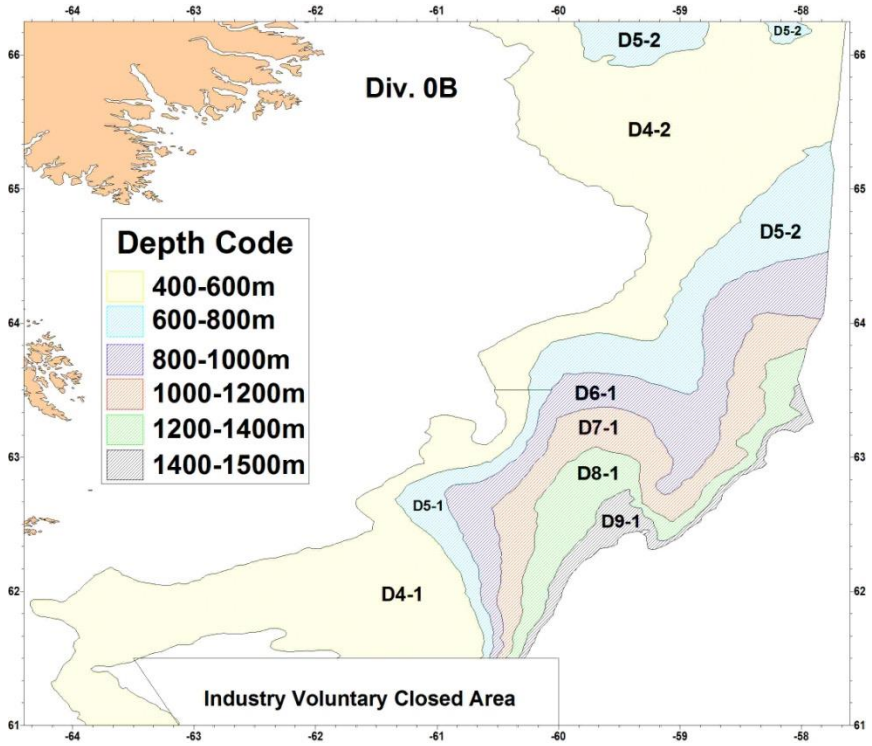


Figure 2. Stratification scheme for Division 0B, 72° N to 76° N.

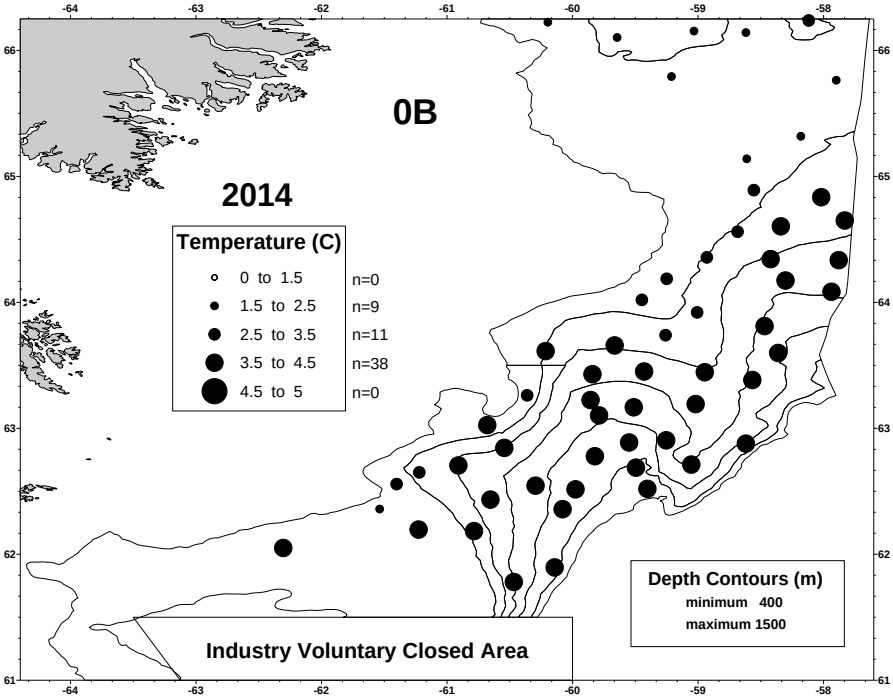


Figure. 3. Bottom temperatures during 2014 survey in Division 0B.

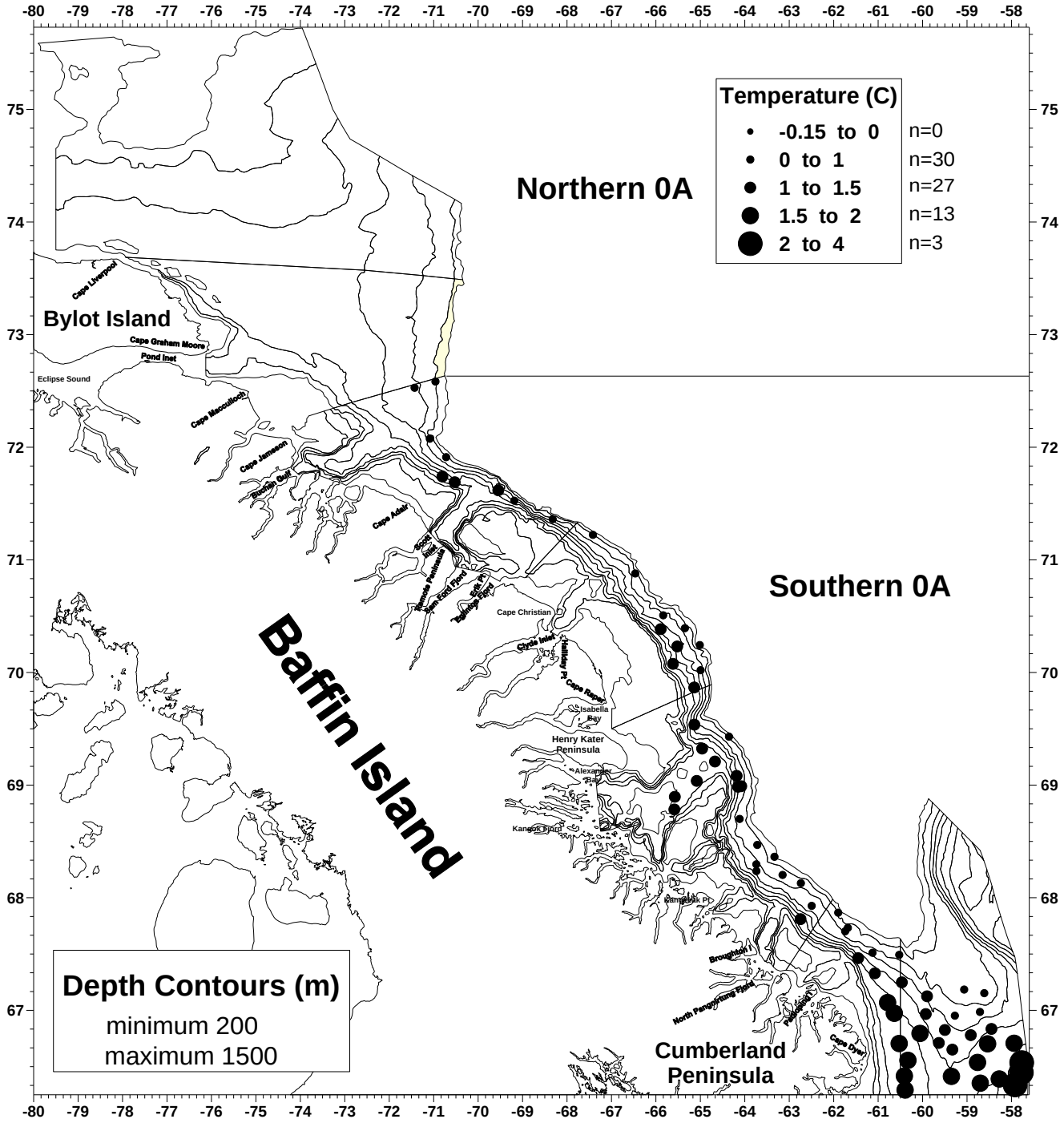


Figure. 4. Bottom temperatures during 2014 survey in Division 0A.

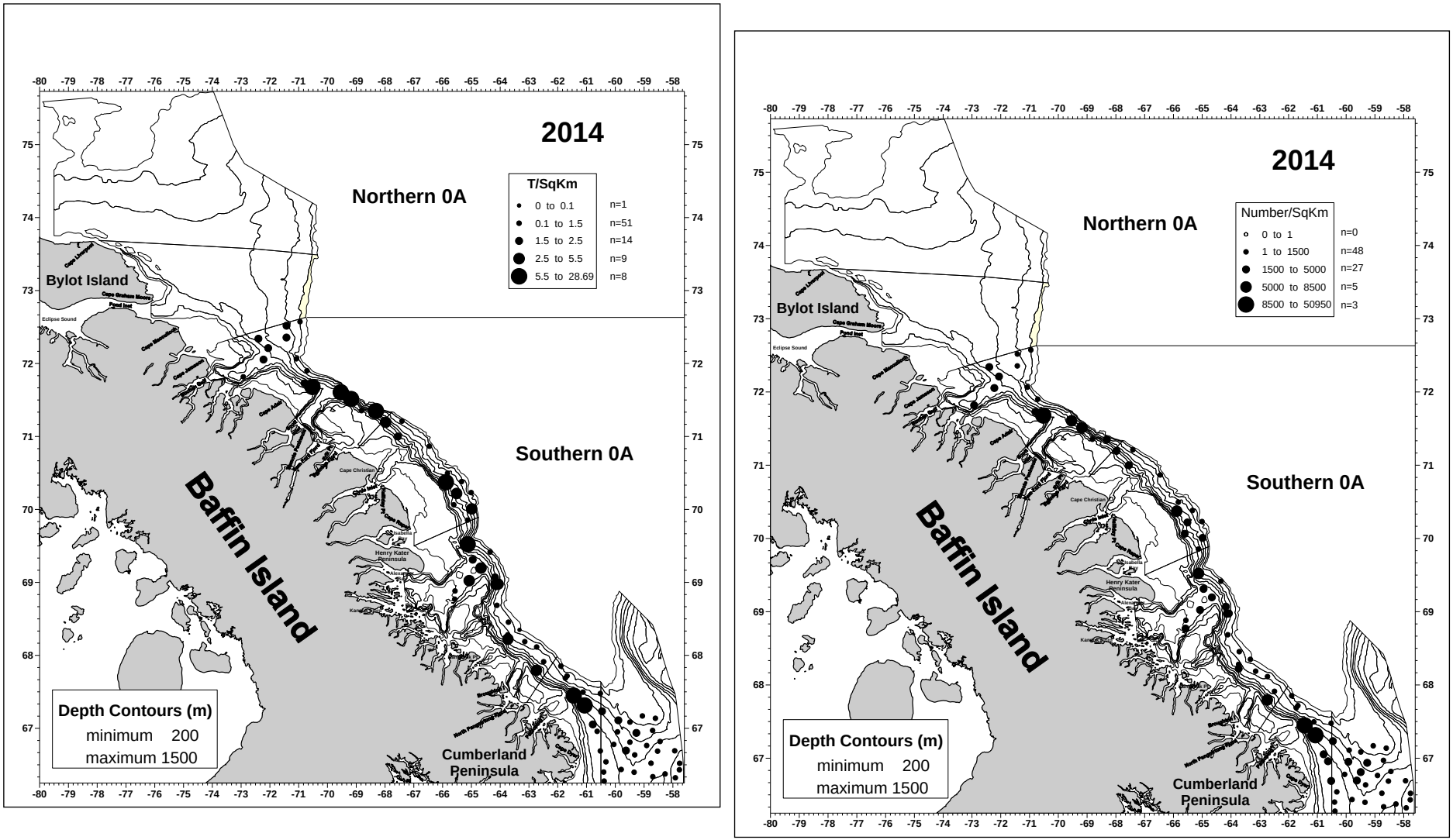


Figure 5. Biomass (left) and abundance (right) distribution for Greenland halibut in Division 0A, 2014.

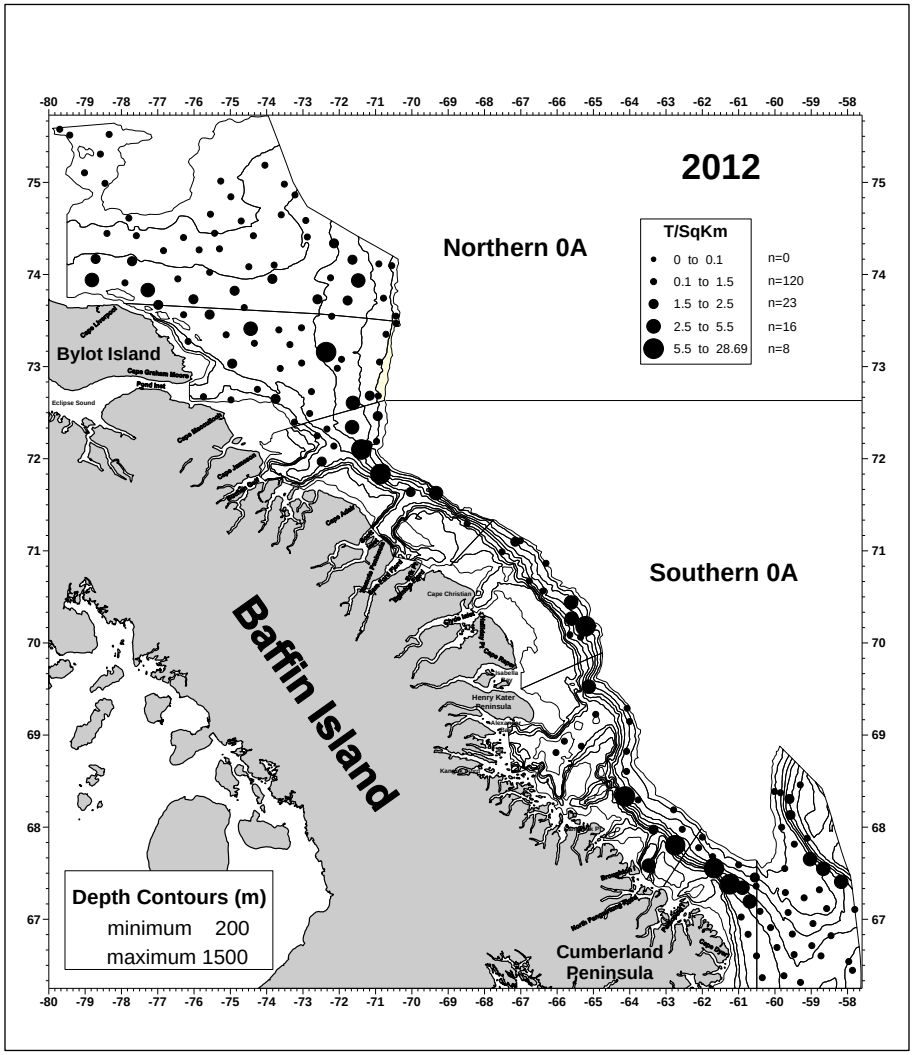


Figure 6. Biomass distribution (t/sq km) for Greenland halibut in Division 0A, 1999 to 2012.

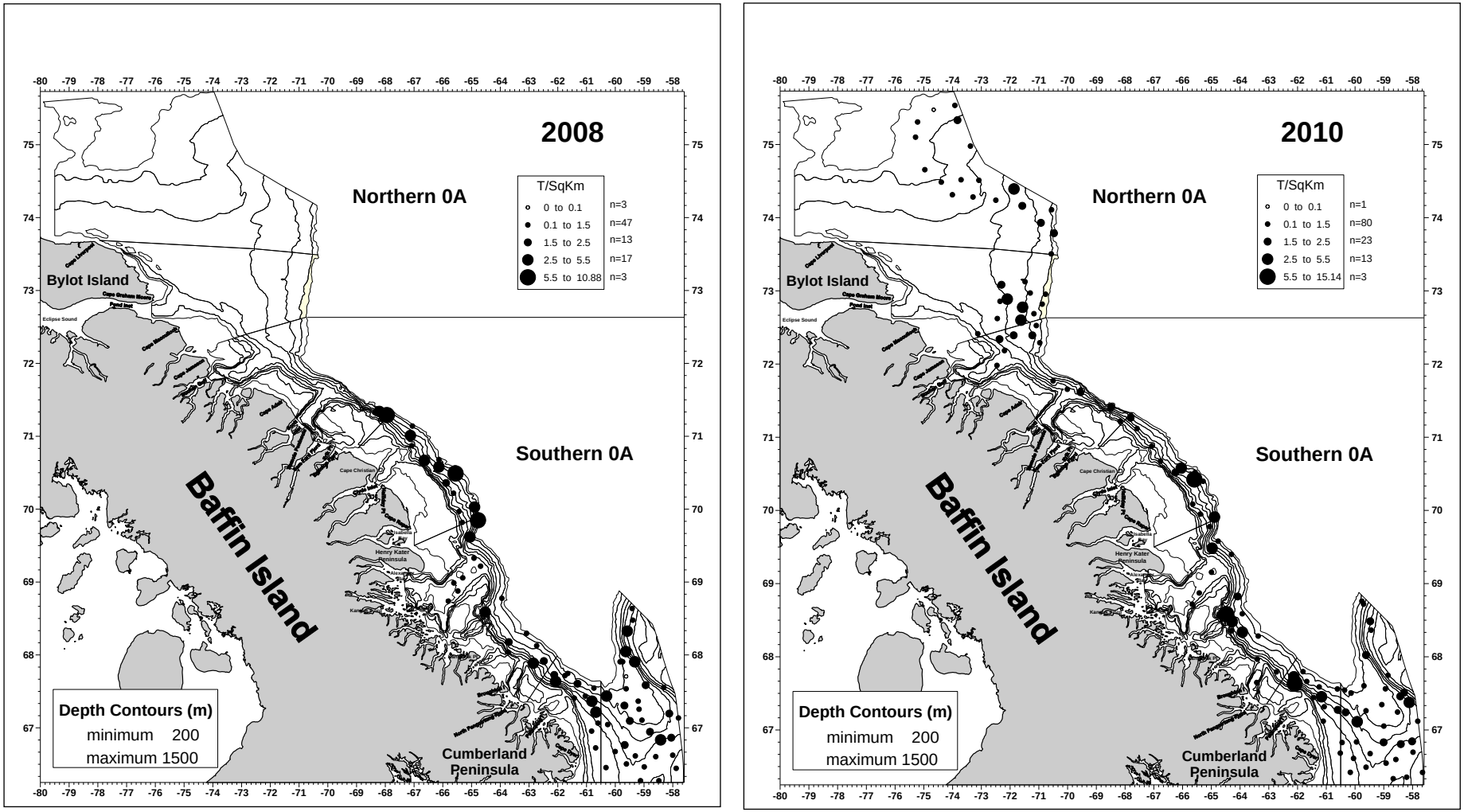
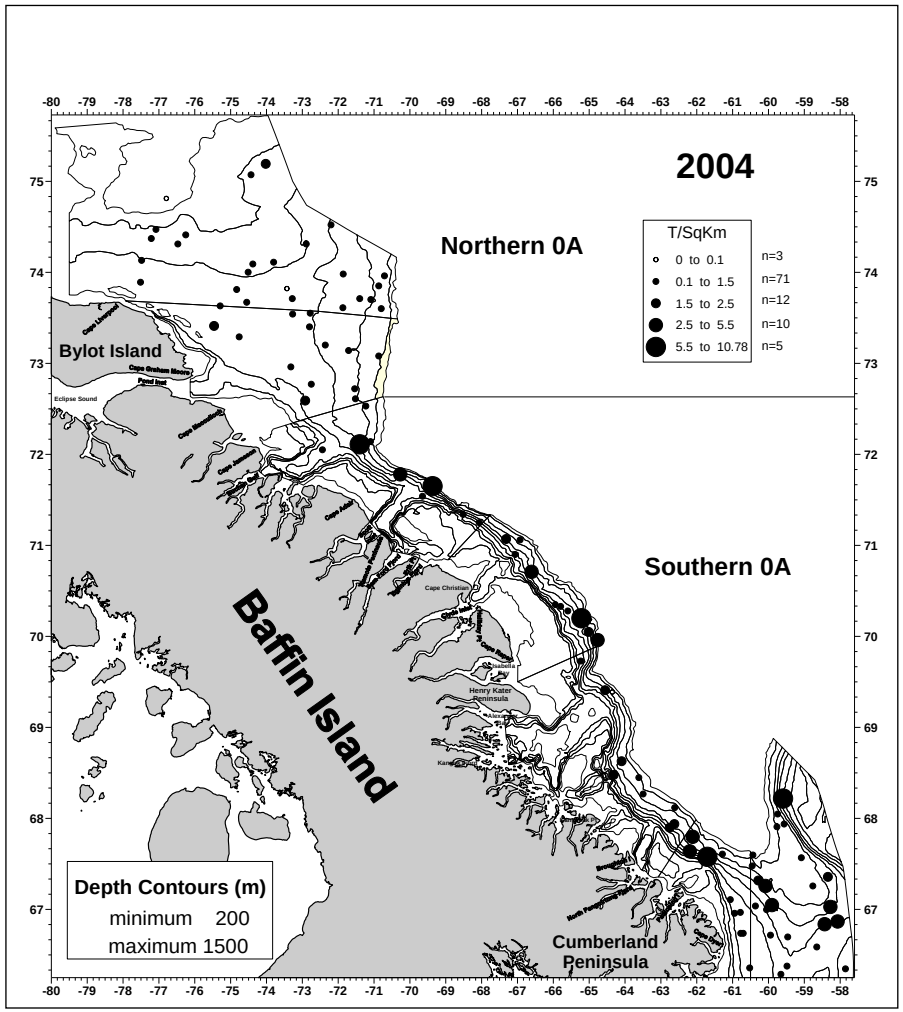


Figure 6 (Con't).



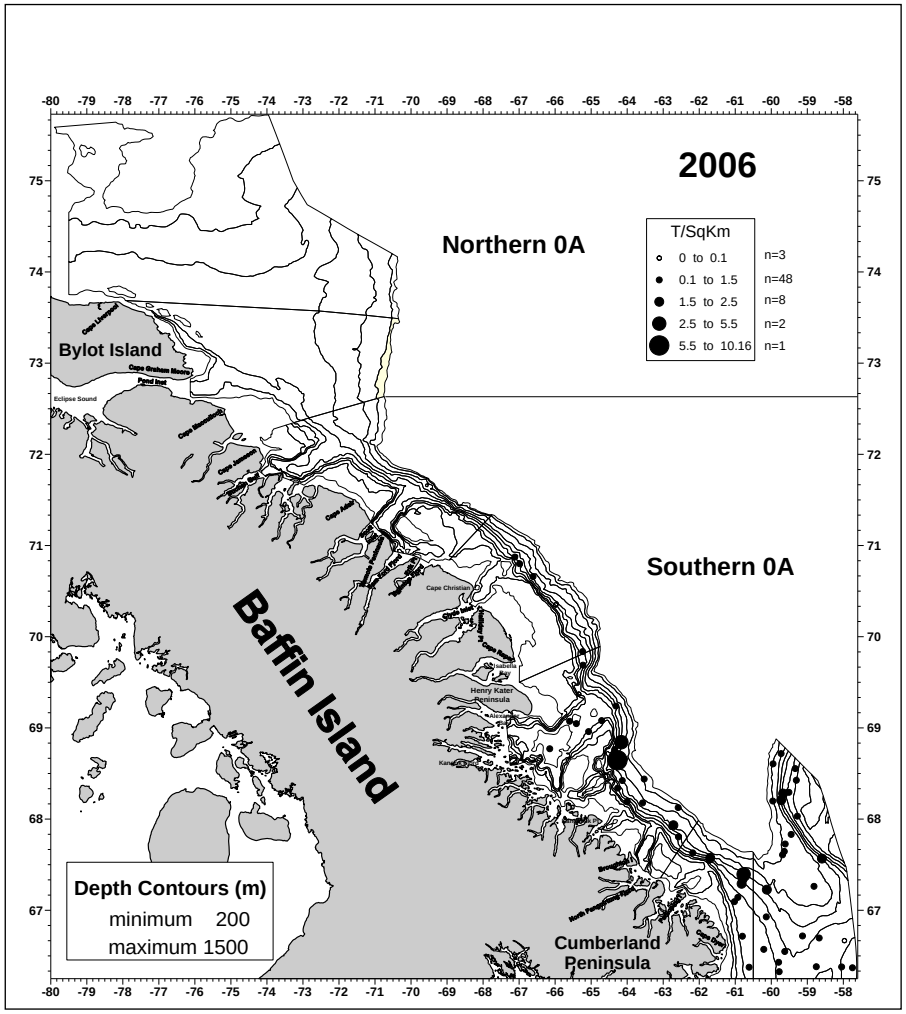


Figure 6 (Con't).

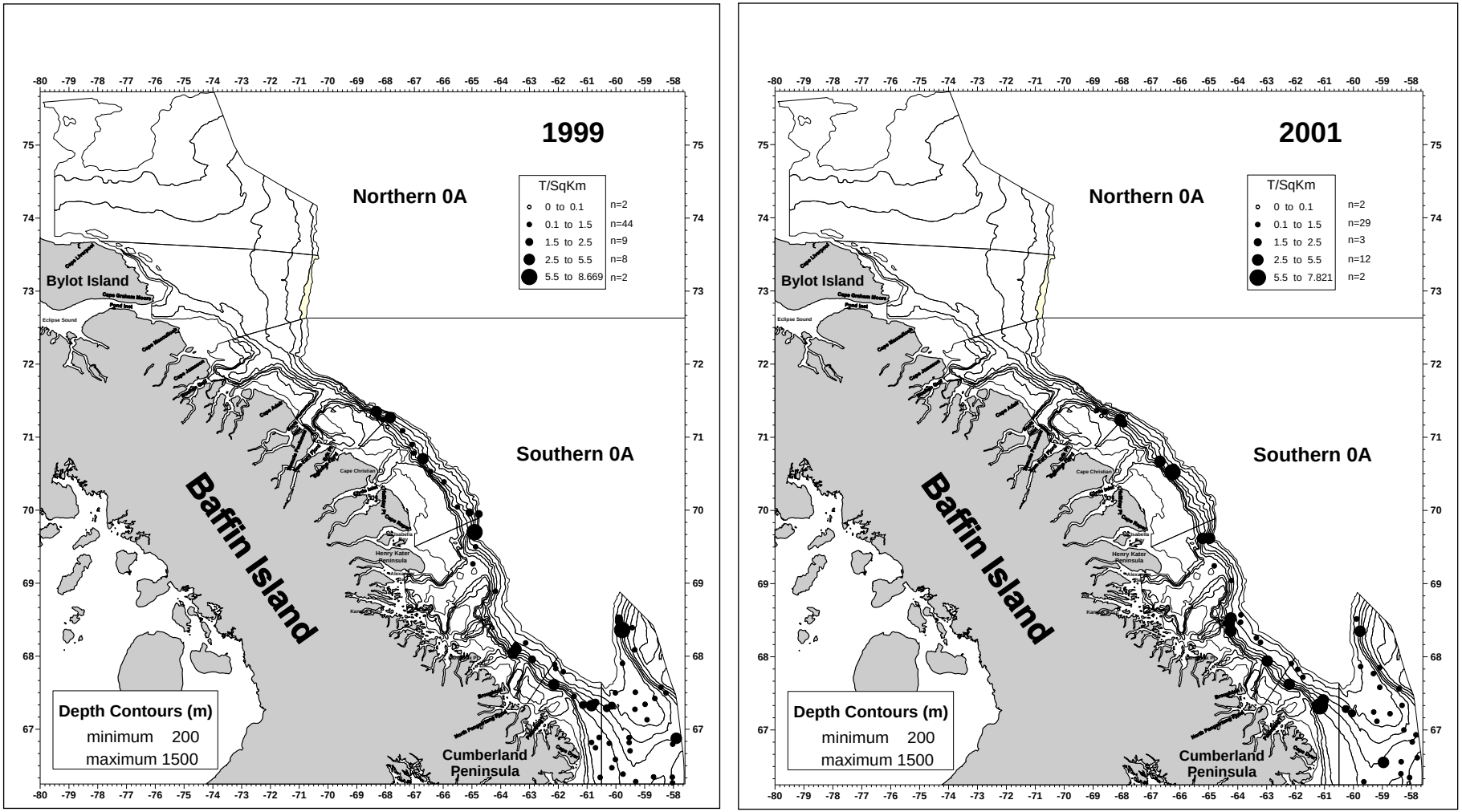


Figure 6 (Con't).

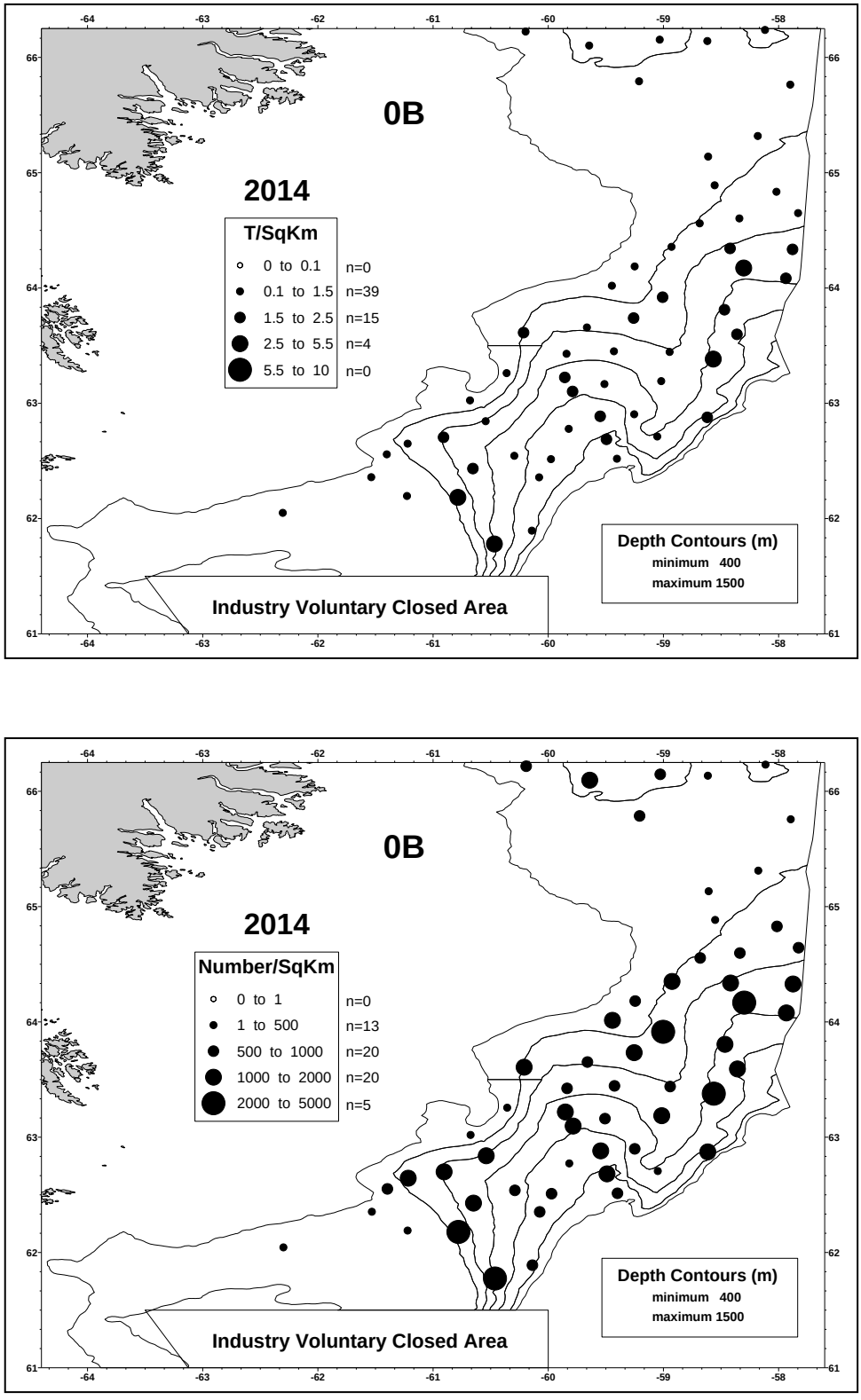


Figure 7. Biomass (top) and abundance (bottom) distribution for Greenland halibut in Division 0B, 2014.

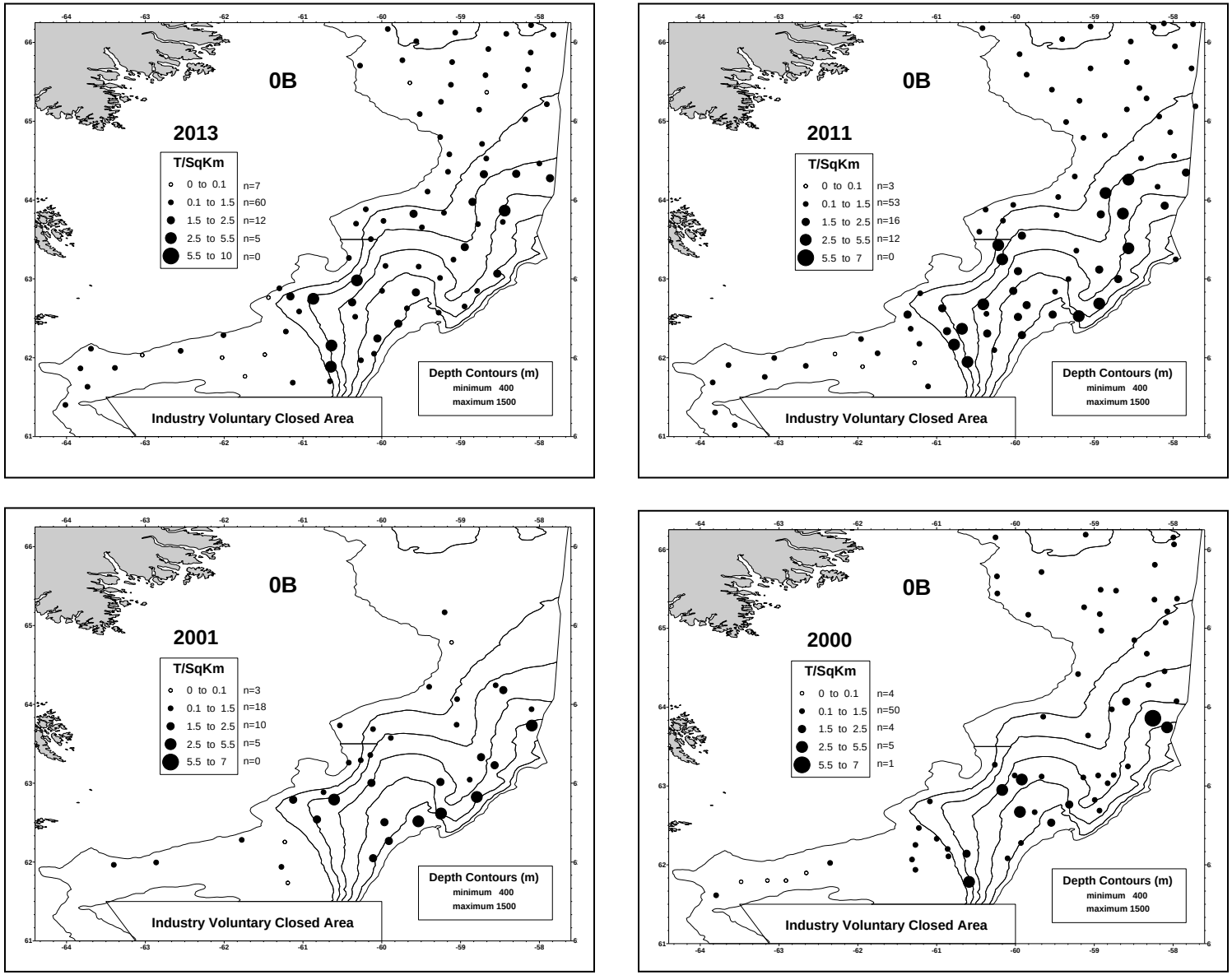
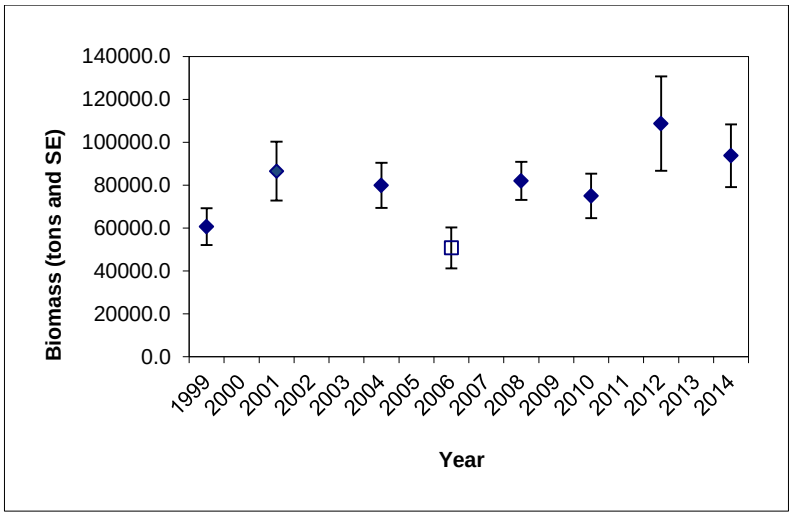


Figure 8. Biomass (kg/km^2) distribution for Greenland halibut in Division 0B, 2000, 2001, 2011 and 2013.



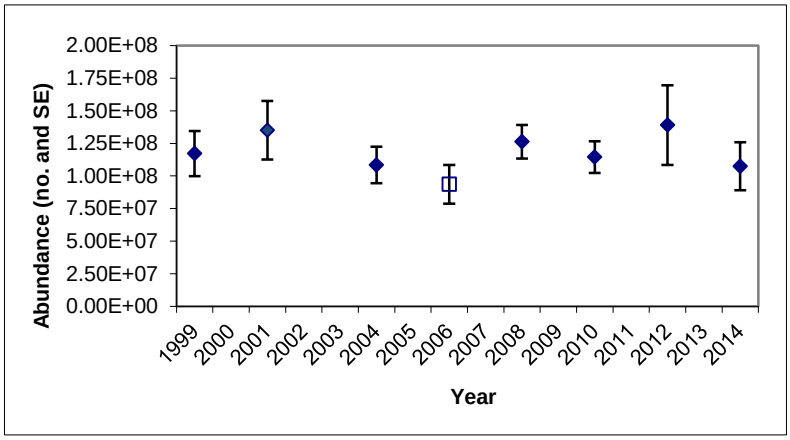


Figure 9. Biomass (top) and abundance (bottom) estimates (with SE) for Greenland halibut in Division 0A-South. The 2006 estimates may be under-estimated due to reduced coverage in the 1200-1500 m depth strata.

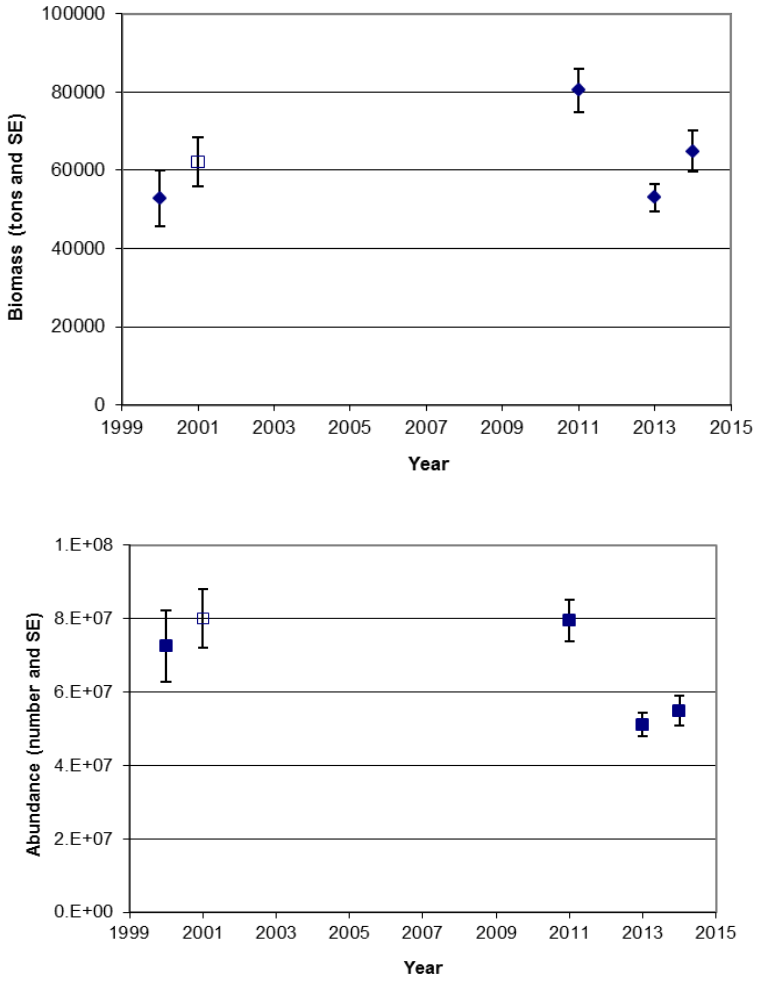


Figure 10. Biomass (top) and abundance (bottom) estimates (with SE and linear trend line) for Greenland halibut in Division 0B. Reduced coverage in 2001particularly in sets <800 m.

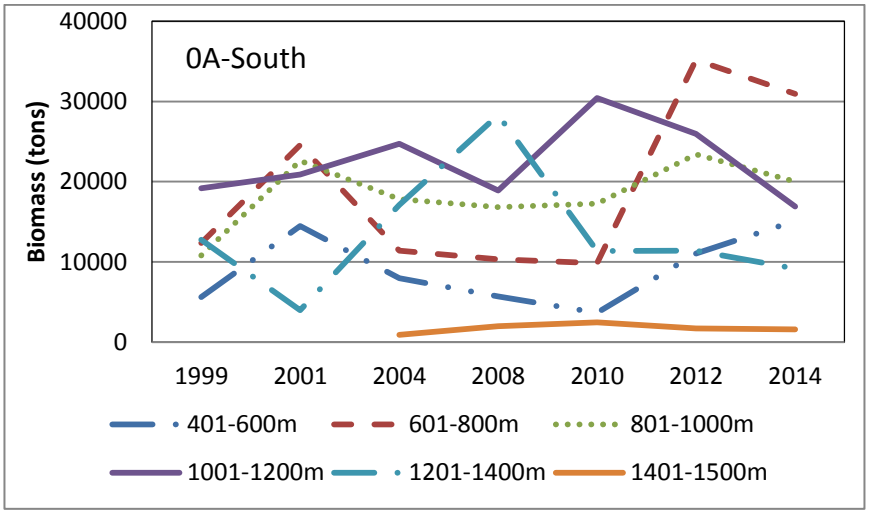


Figure 11a). Biomass trends by depth strata for Division 0A-South.

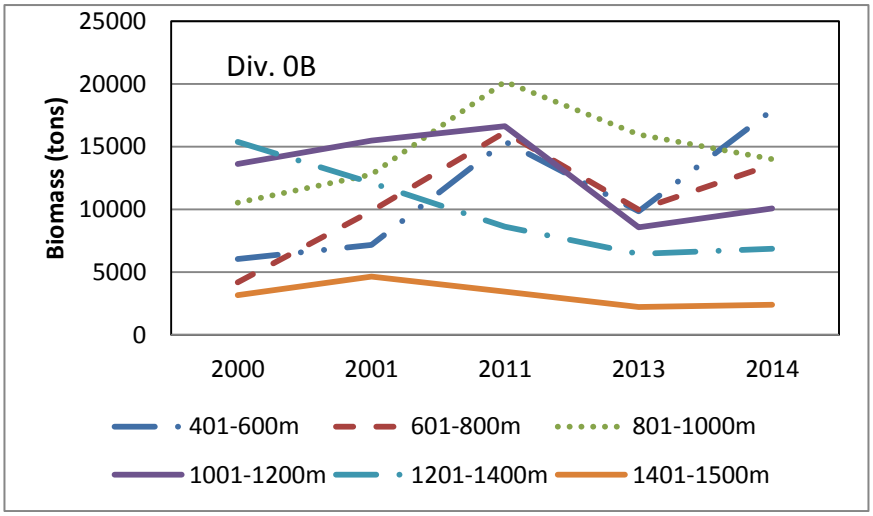
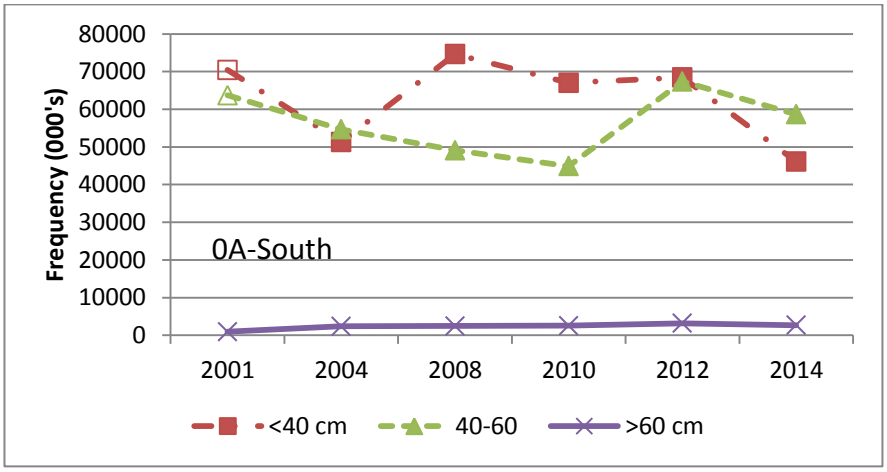


Figure 11b). Biomass trends by depth strata for Division 0B.



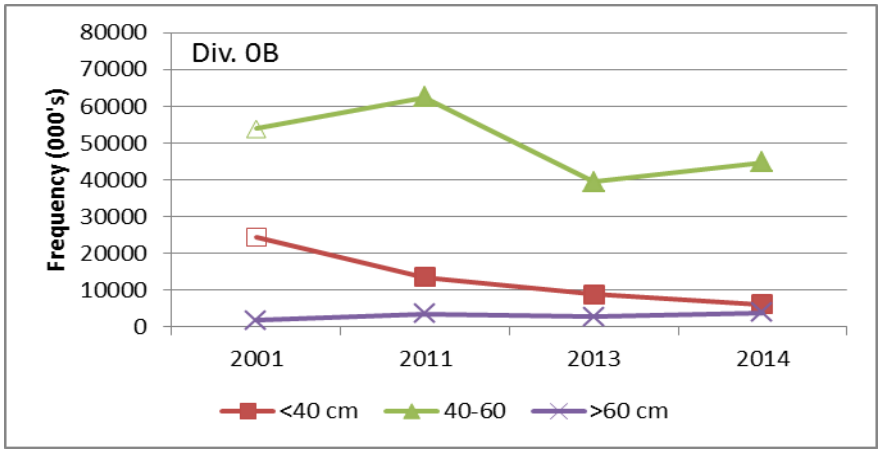


Figure 12. Abundance by size class for Divisions 0A-South (top) and 0B (bottom): <40 cm (recruitment); 40-60 cm (size range for trawl catches); >60 cm (size range for gillnet catches).

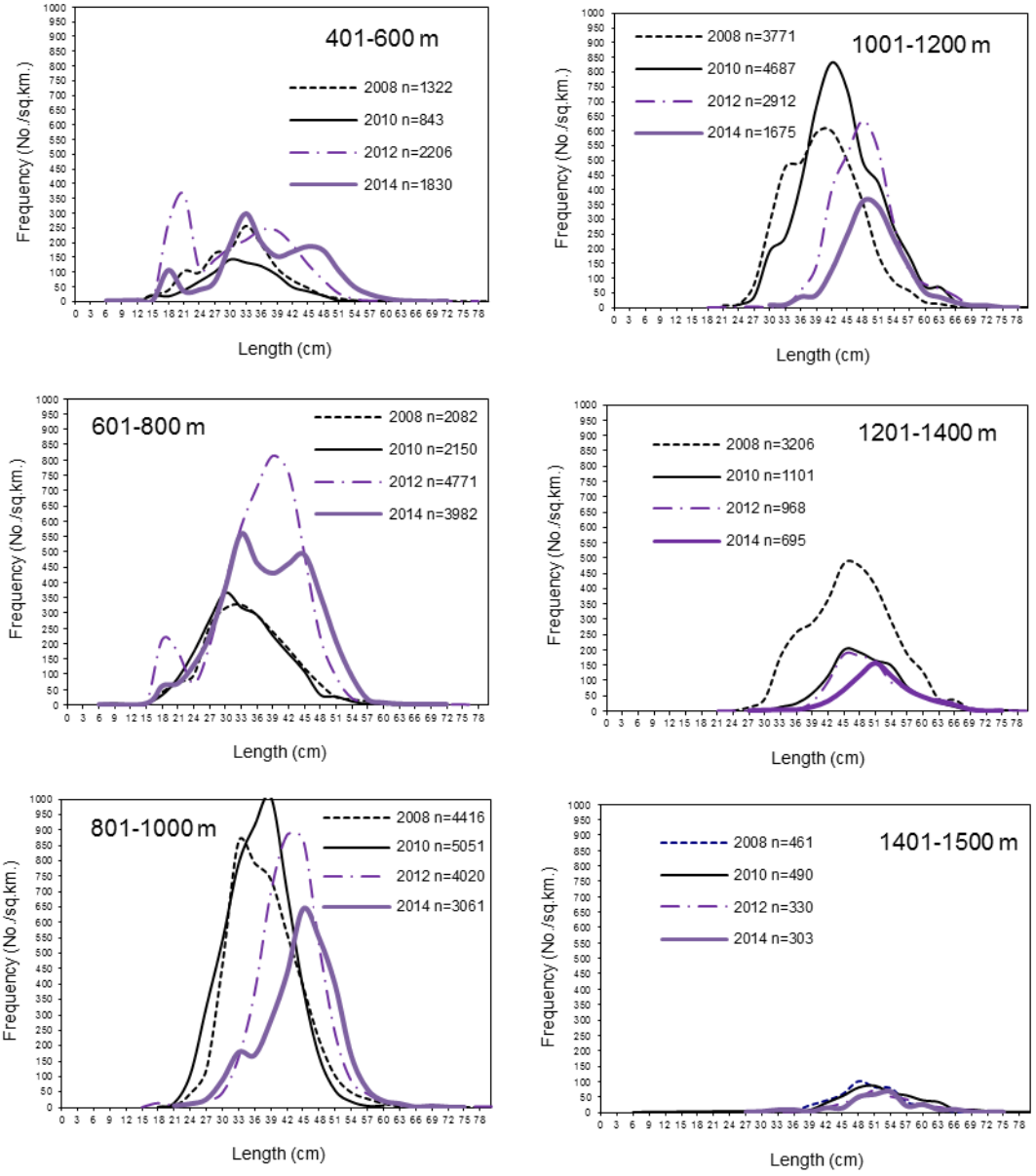


Figure 13. Greenland halibut length distribution by depth for Divisions 0A-South, 2008 to 2014. Note an extremely large catch in the 600-800 m depth strata in 2012 is influencing that frequency.

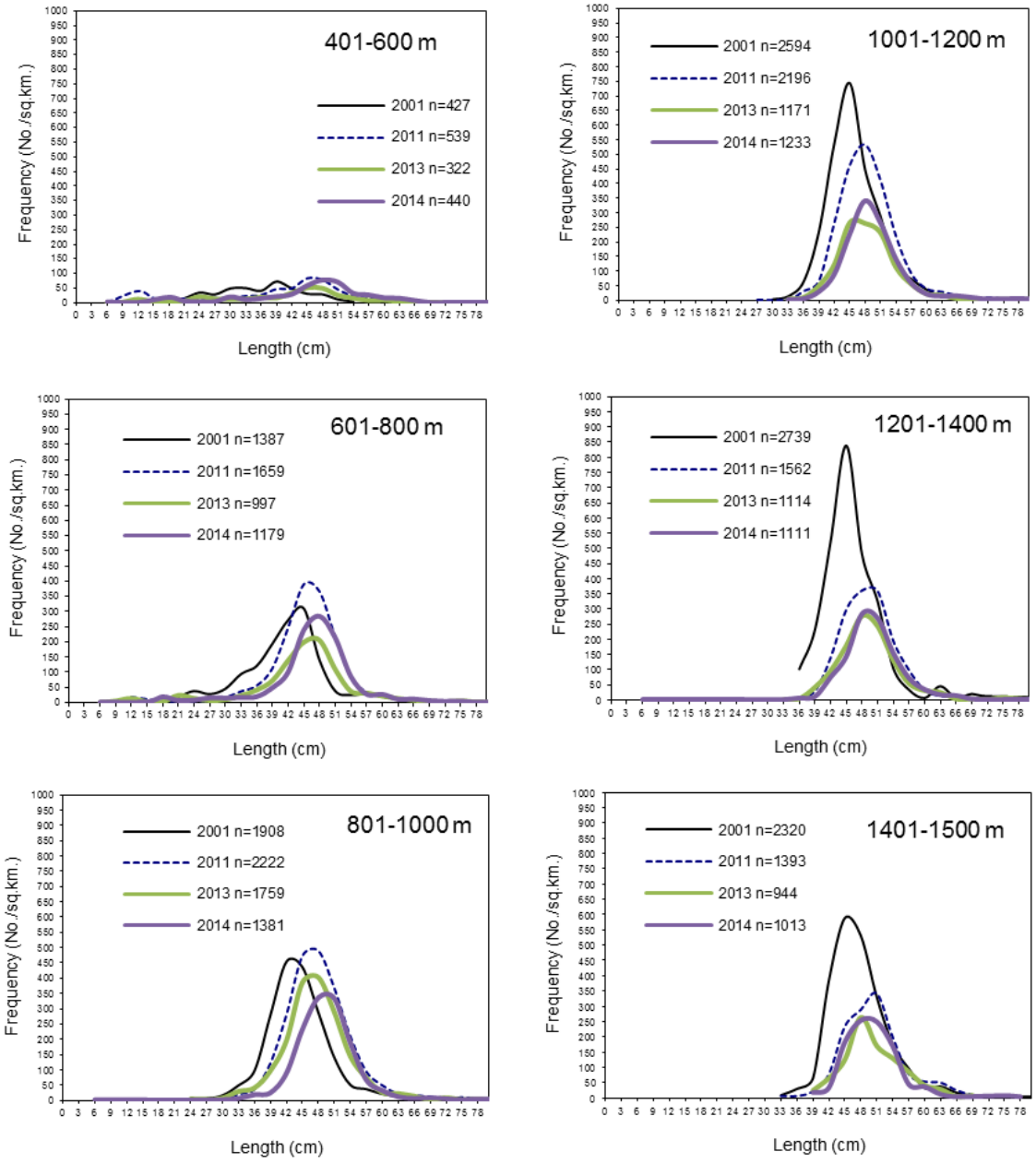


Figure 14. Greenland halibut length distribution by depth for Divisions 0B, 2001, 2011, 2013 and 2014.

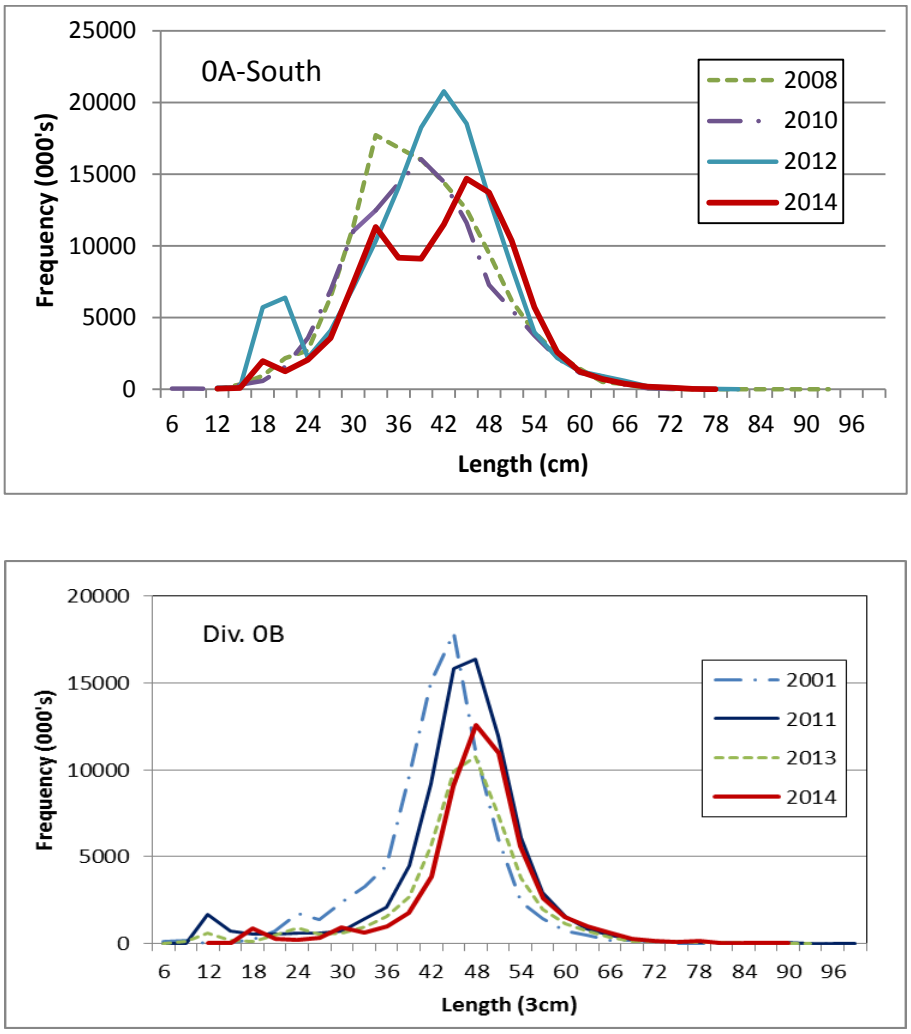


Figure 15. Abundance-at-length for Greenland halibut in Divisions 0A-South (top) and 0B (bottom), weighted by stratum area. Note: 2012 is influenced by very large set from 600-800 m depth strata.

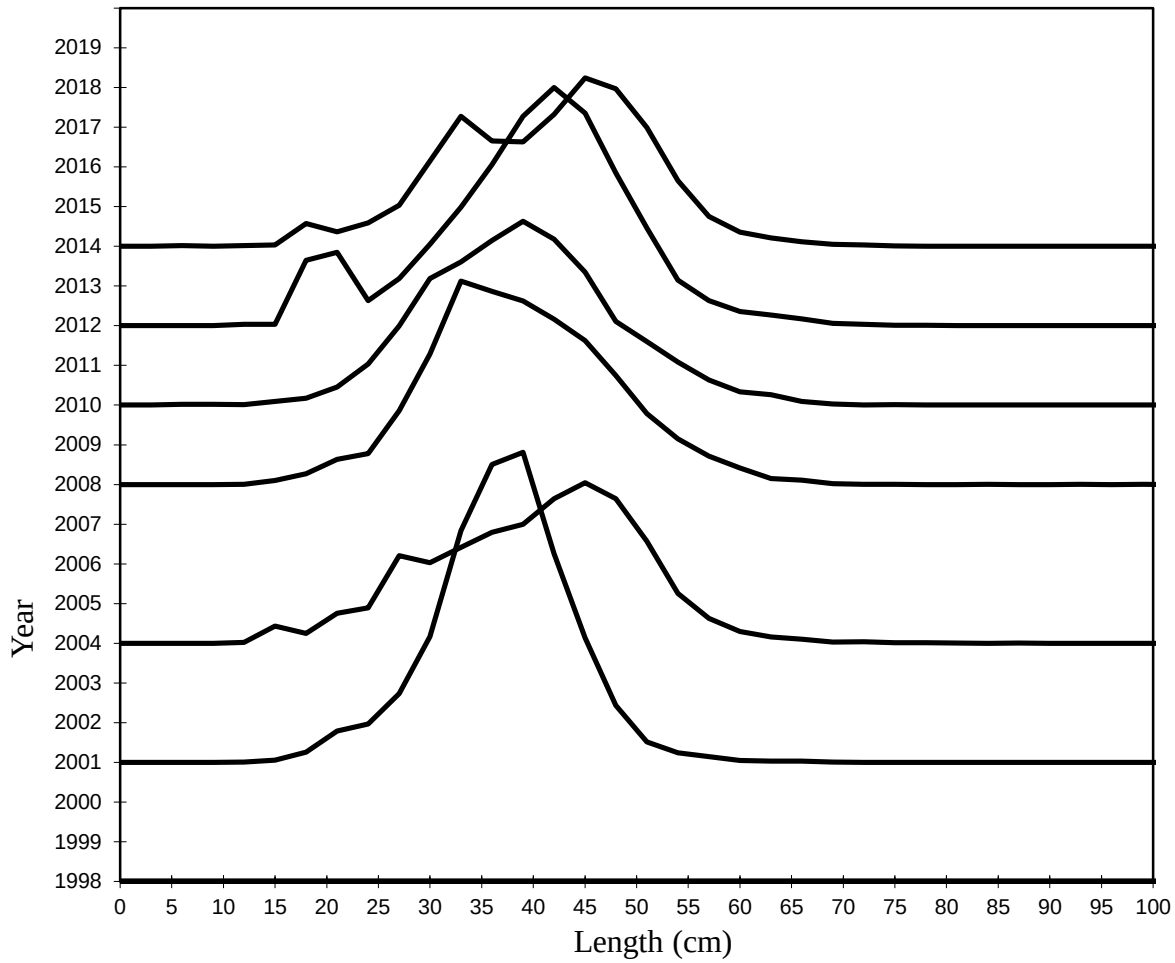


Figure 17. Length frequency distribution for Division 0A-South 2001-2014 (numbers/km^2 weighted by stratum area). Note: Frequency in 2012 is influenced by a very large set in the 600-800 m depth strata.

Appendix 1. Greenland halibut catch weight and numbers (not standardised to kg/km2), temperature, and depth and depth for each set in the 2014 survey of Divisions 0A-South and 0B.

Obs	Division	Set	Meandepth	Sweparea	Temp	Number	Weight (kg)
1	0A	1	1163	0.08747882	.	49	60.75
2	0A	2	1047	0.07606957	1.03	111	114.95
3	0A	3	910	0.08377494	1.37	143	116.85
4	0A	4	664	0.07758454	1.5	49	33.9
5	0A	5	922	0.08293998	1.27	174	163.7
6	0A	7	1377	0.08644899	0.35	31	41.5
7	0A	8	1127	0.09207235	0.96	50	59.35
8	0A	9	1093	0.08628214	0.95	166	225.35
9	0A	10	1192	0.08198769	0.79	68	89.55
10	0A	11	1379	0.08775041	0.18	20	36.3
11	0A	12	1299	0.07940239	0.25	41	55
12	0A	13	1034	0.0828956	1.29	320.768	385.7
13	0A	14	569	0.07829955	1.34	214	206.75
14	0A	15	1457	0.07496422	0	16	21.15
15	0A	16	666	0.08188103	1.2	113	88.9
16	0A	17	1093	0.086194	0.79	158	227.87
17	0A	18	1430	0.08341697	0.04	43	63.62
18	0A	19	1340	0.08612039	0.23	9	19.45
19	0A	20	1141	0.08106705	0.35	36	68.05
20	0A	21	1254	0.0675086	0.25	42.332	78.1
21	0A	22	1452	0.05917715	0.26	29	49.95
22	0A	24	1280	0.05944876	0.59	254	414.9
23	0A	25	1160	0.06186159	0.94	417.508	649.5
24	0A	26	870	0.06405581	1.19	322.284	394.15
25	0A	27	773	0.06799848	1.23	605.544	490.8
26	0A	28	572	0.0781704	1.07	230	157.35
27	0A	29	1425	0.08866651	0.28	38	53.05
28	0A	30	1317	0.09173887	0.32	58	102
29	0A	31	1426	0.08473883	0.08	10	18.2
30	0A	32	1168	0.08568353	0.38	109	182.8
31	0A	34	1158	0.08862118	.	95	161.6
32	0A	35	940	0.08398976	.	162	144.8
33	0A	36	854	0.0904054	.	205	153.4
34	0A	37	759	0.08045277	.	233	138.75
35	0A	38	713	0.0679714	.	113	76.25
36	0A	39	424	0.08773986	.	103	50.65
37	0A	40	684	0.07745997	.	373.749	197
38	0A	41	560	0.06931226	.	217	104.308
39	0A	47	920	0.06917358	1.27	512.952	580.85
40	0A	48	950	0.08627053	1.26	299.136	298.25
41	0A	49	480	0.08479106	1.05	149	92.5
42	0A	50	829	0.08103557	1.29	580.125	476.8
43	0A	51	525	0.07730254	1.16	172	160.4
44	0A	53	494	0.06188477	1.12	144	80.4
45	0A	54	653	0.08203105	1.36	73	64.8
46	0A	55	585	0.07947576	1.34	269	213.45
47	0A	56	657	0.08448216	1.21	275.42	208.15
48	0A	57	916	0.06017828	1.23	286.59	264.15
49	0A	59	1439	0.08895416	0.22	4	6.246
50	0A	60	1301	0.0873242	0.45	8	11.2
51	0A	61	1346	0.07862292	0.28	12	17.3

Obs	Division	Set	Meandepth	Sweparea	Temp	Number	Weight (kg)
52	0A	62	1121	0.08815407	0.58	30	37.95
53	0A	63	742	0.07281604	1.42	490.68	317.95
54	0A	64	1456	0.091096	0.16	43	62.05
55	0A	65	1420	0.06342509	0.31	9	15.2
56	0A	66	1262	0.08356423	0.65	20	24.45
57	0A	67	678	0.07994164	1.39	1537.14	697.6
58	0A	68	741	0.07918354	1.41	1307.07	1147.84
59	0A	69	586	0.06412718	1.53	225	150.4
60	0A	70	579	0.08445685	1.63	152	74.258
61	0A	71	537	0.08497279	1.67	170	105.5
62	0A	73	520	0.07382404	1.75	73	58.85
63	0A	74	478	0.06848615	1.76	78	36.45
64	0A	75	452	0.07853323	1.67	67	52.95
65	0A	78	685	0.08256838	.	33	23.6
66	0A	79	761	0.07870892	1.51	75	57.45
67	0A	80	907	0.08814922	1.37	114	96.9
68	0A	81	852	0.08866192	1.41	162	143.9
69	0A	82	964	0.08255453	1.22	131	106.2
70	0A	83	1097	0.08388776	0.96	126	133.2
71	0A	84	1330	0.08268554	0.41	33	46.3
72	0A	85	1239	0.08847332	0.53	64	56.6
73	0A	86	1109	0.05906326	0.82	62	61.45
74	0A	87	977	0.07721644	1.23	99	98.95
75	0A	88	873	0.07952431	1.45	82	68.15
76	0A	89	760	0.0822961	1.61	80	66.9
77	0A	90	715	0.07185771	1.56	57	48.2
78	0A	91	653	0.06680019	1.54	57	49.25
79	0A	95	627	0.07682251	1.93	30	31.05
80	0A	158	578	0.08425493	3.39	39	33.95
81	0A	160	567	0.07378991	2.51	33	24.9
82	0A	161	585	0.08977316	2.77	21	21.6
83	0A	162	663	0.0560227	1.61	22	15.45
84	0B	76	448	0.07696956	1.59	44	42.9
85	0B	77	664	0.07577289	1.63	132	95.95
86	0B	92	519	0.08580041	1.77	28	21.15
87	0B	94	631	0.05638356	3.07	13	10.55
88	0B	97	957	0.08200243	3.88	147	182.8
89	0B	98	886	0.08447348	3.87	143	183.75
90	0B	99	751	0.08612187	4.11	64	83.5
91	0B	100	701	0.08542738	4.03	66	84.65
92	0B	101	714	0.07985493	3.78	63	63.9
93	0B	103	844	0.08583651	3.96	139	187.785
94	0B	104	971	0.08509372	3.79	221	279.45
95	0B	106	1057	0.08327026	3.7	112	151.6
96	0B	107	1212	0.08245677	3.67	141	181.5
97	0B	108	816	0.08189298	4.07	66	76.482
98	0B	109	934	0.08455804	3.88	94	119.6
99	0B	110	1085	0.07952238	3.83	73	81.2
100	0B	111	1191	0.08900099	3.79	133	162.7
101	0B	112	1092	0.08263953	3.85	99	128.11
102	0B	114	951	0.08123446	3.92	63	80.65
103	0B	115	925	0.08170389	3.96	74	86.55
104	0B	116	1061	0.07931261	3.79	182	215.4
105	0B	117	1207	0.05223748	3.68	96	124.1

Obs	Division	Set	Meandepth	Sweparea	Temp	Number	Weight (kg)
106	0B	119	1027	0.07733426	3.81	32	42.35
107	0B	120	1111	0.08750681	3.86	54	75.5
108	0B	121	1337	0.07796514	3.76	95	130.75
109	0B	122	1366	0.10196044	3.7	25	39.05
110	0B	123	1437	0.08927213	3.72	170	201.7
111	0B	124	1476	0.08422984	3.65	48	60.4
112	0B	125	1332	0.07930375	3.6	67	83.55
113	0B	126	1324	0.08522833	3.59	69	84.65
114	0B	127	1193	0.08908908	3.71	52	54.95
115	0B	128	956	0.08417899	4.06	125	150.7
116	0B	129	754	0.08347221	4.04	276	342.9
117	0B	131	444	0.08275345	3.93	10	14.8
118	0B	133	1064	0.08334276	4.07	186	235.5
119	0B	134	1440	0.10443553	3.54	59	73.6
120	0B	136	483	0.0783484	3.7	12	17.845
121	0B	137	434	0.07907735	2.38	15	16.8
122	0B	138	568	0.07568295	3.45	62	97
123	0B	139	699	0.0864254	3.47	105	125.4
124	0B	140	846	0.0851962	4.08	113	144
125	0B	141	829	0.08306126	4.09	90	114.05
126	0B	142	441	0.07567351	3.79	24	26.1
127	0B	143	536	0.07697409	3.26	26	37.15
128	0B	144	646	0.07973333	3.66	105	122.35
129	0B	145	766	0.08593408	3.93	69	88.844
130	0B	146	649	0.08573421	3.49	116	132.85
131	0B	147	705	0.0842162	3.45	171	191.4
132	0B	148	543	0.08106144	2.7	83	94.3
133	0B	149	514	0.08296282	2.65	52	62.3
134	0B	150	628	0.08518377	3.14	91	98.85
135	0B	151	632	0.05563284	3.05	31	34.8
136	0B	152	561	0.08142913	2.99	35	39.55
137	0B	154	494	0.07391546	2.18	22	22.75
138	0B	155	560	0.08080014	2.31	31	35.25
139	0B	156	550	0.08349637	2.47	25	27.1
140	0B	163	655	0.09573711	1.51	55	42.554
141	0B	164	529	0.0845086	2.13	60	27.35