NOT TO BE CITED WITHOUT PRIOR
REFERENCE TO THE AUTHOR(S)

Northwest Atlantic Fisheries Organization

Serial No. N6187 **NAFO SCR Doc. 13/033REV2**

SCIENTIFIC COUNCIL MEETING – JUNE 2013

Report on Greenland halibut caught during the 2012 trawl survey in NAFO Division 0A

M. A. Treble

Fisheries and Oceans Canada, Freshwater Institute,
501 University Cres., Winnipeg, Manitoba, Canada R3T 2N6

Abstract

A stratified-random otter trawl survey was conducted in Division 0A (Baffin Bay) in 2012. The survey covered both the southern strata (below 73º N) as well as the northern strata (to 75º 35' N). The survey took place from September 29 to October 27, 2012. An Alfredo III trawl was used at randomly selected stations between 400 m and 1500 m. In order to facilitate comparison to previous surveys the survey stations were plotted against the old stratification scheme and the number of stations present in each strata was determined post-hoc. Ice was not a problem in the northern strata which resulted in a much greater survey area compared to previous surveys for this area. There were 82 stations successfully completed in 0A-South and 86 in 0A-North. Mean near-bottom temperatures were similar to previous surveys for 0A-South, varying from 1.9 ºC to 0.2 ºC and declining with depth. Bottom temperatures in 0A-North were cooler, 0.0 ºC to 1.0 ºC, with the warmest temperatures at depths 750 m to 1000 m. Greenland halibut were distributed throughout the survey area and were present in all tows. The 2012 estimate of biomass is 102,486 t. However, one very large set in a depth stratum that comprises 30% of the area covered contributed to this increase. With this set removed the biomass estimate is 86,874 t. Mean biomass per tow is not influenced by the large set to the same extent as total biomass. In 2012 it was 2.07 t/ km^2 (1.76 t/ km^2 with outlier removed). This is similar to previous highs of 2.00 t/ km^2 and 1.94 km^2 in 2001 and 2004, respectively. The overall length distribution ranged from 6 cm to 90 cm with a small mode at 21 cm and a larger one at 42 cm, slightly higher than seen in previous surveys (64% <45 cm (57% with outlier removed). The 2012 estimate of biomass and abundance were 82,669 t (S.E. 6695 t) and 9.4 x 10^7, respectively. This is a significant increase from previous estimates that ranged from 45,877 t to 46,689 t. This increase is due to the increase in survey area due to good weather and little ice in the northern strata. Mean biomass per tow was also higher in 2012, 1.26 t/km^2 compared to 0.85 and 1.18 t/km^2 in 2004 and 2010, respectively. Lengths ranged from 18 to 78 cm with a mode at 45 cm and a smaller mode at 21 cm, similar to that observed for 0A-South; 46% were <45 cm.

Introduction

A multi-species bottom trawl survey was carried out in the North West Atlantic Fisheries Organization (NAFO) Division 0A (Baffin Bay) during September 29 to October 27, 2012. The survey covered both the southern strata (below 72º N) as well as the northern strata which had not been surveyed since 2004. An Alfredo III trawl was used at randomly selected stations between 400 m and 1500 m. Deep-water surveys began in Div. 0A in 1999 (Treble et al. 2000), and have been completed every second year since 2004 (Treble 2005); most recently in 2010 (Treble 2011).

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

Set selection was based on a coverage level of approximately 1 set per 750 km^2 used in previous surveys and allocated proportionally to stratum size using a stratification scheme developed in 2008 (Treble 2009). This change was made in order to match the stratification scheme used in Greenland surveys of Subarea 1 which will facilitate comparisons between surveys conducted in Canadian and Greenland waters in the future. However, it was found to be most efficient to assign the sets from this single survey to the previous stratification scheme rather than assign the sets from the previous surveys to the new scheme. It is important that the stratification scheme is consistent across years and work will be undertaken in the future to standardize all surveys against the new strata.

Sets were randomly selected from numbered units within each stratum. 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. In the 2012 survey 98 sets were selected for 0A-North and 84 sets for 0A-South. There were no sets selected that fell outside the old strata.

Table 1 and 2 list the strata used in the analysis. The stratification schemes are also shown in Fig. 1 and Fig. 2. The total area between 401 m and 1500 m encompassed by the strata in Div. 0A-South (to 72º N) is 49,834 km^2 and in Div. 0A-North (to 75º 35'N) it is 77,634 km^2.

Vessel and Gear

The surveys were conducted by the M/Tr 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 headrope 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 Broughton Island 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. An estimate of total abundance and biomass was then calculated for each depth strata (mean x area surveyed within each depth strata (km^2)) as well as over all depths. Standard error values were also calculated for the overall total.

Abundance at length was 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 within each depth strata (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

A total of 182 stations were assigned to strata in Div. 0A with 168 successfully completed; 82 from Div. 0A-South (Table 3) and 86 from 0A-North (Table 4). As a result the survey covered 49,406 km^2 of a possible 49,834 km^2 in 0A-South. This is the best coverage to date for this survey with previous coverage ranging from 40,475 km^2 in 2001 to 48,442 km^2 in 2010 (Table 6).

Ice conditions were not a factor in Div. 0A-North in 2012, as was the case in the previous two surveys. 2010 was particularly bad with only 39 successful sets due to ice and weather conditions. In 2012, 86 of the 98 sets planned were successful and the survey covered 65821 km^2 of a possible 77634 km^2. Successful sets increased from 8 in 2010 for depths 501-750 m and 751-100 m to 20 and 40, respectively.

Mean near-bottom temperatures were similar to previous surveys for Div. 0A-South, 1.9 ^oC to 0.2 ^oC and declining with depth. Bottom temperatures in 0A-North were cooler, 0.0 ^oC to 1.0 ^oC with the warmest temperatures at depths 750 m to 1000 m (Table 5 and Fig. 3). The majority of tows (97%) were at temperatures less than or equal to 2.0 ^oC (Appendix 1).

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

Greenland Halibut

Greenland halibut were present in all tows; number of fish caught varied from 5-3650 and catch weight from 6.5-2055 kg (Appendix 1). The maximum values come from a single set that was three times the abundance and almost double the weight of the previous high values for this survey. Catch distribution (both biomass and abundance) for 2012 is shown in Figure 4 and distribution of biomass for 1999 to 2010 are shown in Figure 5.

Division 0A-South

The 2012 estimate of biomass is 102,486 t (S.E. 20,187) (Table 6). However, this result is strongly influenced by a very large set (#145) from the 501 m to 750 m depth strata that comprises 30% of the survey area. When this set is removed the estimate drops 15% to 86,874 t (S.E. 12,865). This compares to a previous high of 86,176 in 2004 (Fig. 6). Biomass estimates have increased at depths 500 m to 1000 m in recent years (Table 6, Fig. 9 and 11).

It should be noted that in 2006 there were problems with survey coverage with two important strata missing from depths 1001-1500 m that was a contributing factor to the lower estimate for that year (Treble 2007). There were also stratum missed in 1999, 2001 and 2004 but these were primarily at shallow depths (<750 m) which typically contain smaller fish and less biomass.

Mean biomass per tow is not influenced by the large set to the same extent as total biomass. In 2012 it was 2.07 t/km^2 (1.76 t/km^2 with the large set removed). This compares to previous highs of 2.00 and 1.94 in 2001 and 2004, respectively (Table 6 and Fig. 7). Density was highest (2.7 to 3.0 t/ km^2) between 751 m and 1250 m, similar to levels observed in previous surveys.

Abundance in 2012 is estimated at 1.31 x 10^8 (S.E. 3.05 x 10^7) (Table 7). When set #145 is removed abundance drops to 1.02 x10^8 (S.E. 1.20 x 10^7). This compares to previous high of 1.19 x 10^8 in 1999 and 2001 (Table 7 and Fig. 6).

Mean abundance per tow was 2648 per km^2 (2084 per km^2 with outlier set removed). Previous estimates (excluding 2006) ranged from 2497 to 2933 (Table 7). For depth strata 1001-1250 mean abundance is lower than in previous surveys (Table 7 Fig.8).

Length frequency distributions by depth strata for 2006 to 2012 are given in Figure 11. The number of fish at larger length classes increases with depth. In 2012 the number of fish at approx. 18-20 cm increased at depths 401-750 m, similar to observations in 2006. There was a shift to larger fish at depths 751-1250 m (Fig. 11) and an increase in abundance of 40-60 cm fish (Fig. 10 and 13).

The overall length distribution in 2012 ranged from 6 cm to 90 cm with a small mode at 21 cm and the main mode at 42 cm (slightly higher compared to previous surveys) (Table 10, Fig. 13 and Fig. 15). 64% (57% with outlier removed) of fish were <45 cm, this compares to previous surveys that ranged from 57% to 77% (Table 10).

Note that the 1999 total abundance by length class in Table 7 does not match the overall abundance calculated for 1999 shown in Table 7 but it is reasonably close. The 1999 length frequency data were in a different format so the SAS© programs used in subsequent years for biomass, abundance and length frequency calculations could not be applied. Instead the Excel© spreadsheet program was used and so the difference observed could be due to rounding or errors in performing the Excel calculations.

Division 0A-North

The 2012 estimate of biomass was 82,669 t (S.E. 6695 t) a significant increase from previous estimates that ranged from 45,877 to 46,689 t (Table 8). This increase is due to the increase in survey area due to good weather and little ice in the northern strata. Ice restricted access to a large portion of the 751-1000 m depth during previous surveys.

Mean biomass per tow was also higher in 2012, 1.26 t/km^2 compared to 0.85 to 1.18 t/km^2 in 2004 and 2010, respectively. Mean biomass per tow has varied without any clear trend within depth strata across survey years (Table 8).

Abundance was 9.4 x 10^7 compared to 6.74 x 10^7 (S.E. 8.76 x 10^6) in 2010 and 4.85 x 10^7 (S.E. 9.0 x 10^6) in 2004 (Table 9). Strata within the 751-1000 m depth strata that were missed in previous surveys were completed in 2012.

Mean abundance per tow was 1428 per km^2 in 2012 lower than the 1,698 per km^2 observed in 2010 but higher than 895 per km^2 in 2004 (Table 9). There were no clear trends in mean abundance within depth strata.

The length range of 18 to 78 cm was similar to previous surveys but the distribution had shifted to the right compared to 2010, with a large mode at 45 cm and a smaller one at 21 cm (Table 11 and Fig. 14). The pattern is similar to that seen in 2004, albeit with a greater overall abundance at length. Length increases with depth as expected for Greenland halibut. Peak abundance of 18-24 cm fish occurs at depths 401-750, similar to that observed in Div. 0A-South (Fig. 12). The modal length groups dominate at depth 751-1000 m with an increase in 36-50 cm fish compared to 2010. There is no marked change to the size distribution at depths beyond 1001 (Fig. 12). 46% of fish were <45 cm in 2012 compared to 36% in 2004 and 66% in 2010 (Table 11).

Acknowledgements

This work could not have been conducted without the financial support provided by Fisheries and Oceans Canada, the Nunavut Wildlife Management Board, the Nunavut Exploratory Fishery Fund, Nunavut Tungavik Inc., and the Government of Nunavut and the Federal CanNor Development Agency. Tim Siferd was the Biologist-in-charge on the surveys and was supported by Fisheries and Oceans Canada science staff and Greenland Institute of Natural Resources science staff and ships crew.

References

JØRGENSEN, O. A. 1998. Survey for Greenland halibut in NAFO Division 1C-1D. NAFO SCR Doc. 98/25. Serial No. N3010, 26 pp.

KINGSLEY, M.C.S., KANNEWORFF, P. AND CARLSSON, D.M. 2004. Buffered random sampling: a sequential inhibited spatial point process applied to sampling in trawl survey for northern shrimp *Pandalus borealis* in West Greenland waters. ICES J. Mar. Sci. 61:12-24.

RIGET, F., BOJE, J. 1989. Fishery and some biological aspects of Greenland halibut (*Reinhardtius hippoglossoides*) in West Greenland waters. NAFO Sci. Con. Studies 13:41-52.

TREBLE, M. A. 2002. Analysis of data from the 2001 trawl survey in NAFO Subarea 0. NAFO SCR Doc. 02/46.

TREBLE, M. A. 2005. Analysis of data from the 2004 trawl survey in NAFO Division 0A. NAFO SCR Doc. 05/56.

TREBLE, M. A. 2007. Analysis of data from the 2006 trawl survey in NAFO Division 0A. NAFO SCR Doc. 07/41.

TREBLE, M.A. 2009. Analysis of data from the 2008 trawl surveys in NAFO Division 0A. NAFO SCR Doc. 09/26.

TREBLE, M.A. 2011. Report on Greenland Halibut caught during the trawl survey in NAFO Division 0A. NAFO SCR Doc. 11/017.

TREBLE, M. A., BRODIE, W. B., BOWERING, W. R. and O. A. JORGENSEN. 2000. Analysis of data from a trawl survey in NAFO Division 0A, 1999. NAFO SCR Doc. 00/31, Ser. No. N4260, 19 pp.

Table 1. Stratification scheme for Division 0A-South. Errors made in the original calculation of area within these strata were corrected in 2004. Both the original value and the corrected value are given. A conversion factor of 3.430 was used to calculate square kilometres from square nautical miles.

Stratum	Original Sq. N Miles	Corrected Sq. N Miles	Units	Corrected Sq. Km.	Depth Range (m)
First roughed out by hand in 1986 and corrected in May 2004					
024	457	281	90	963.8	401-500
025	1780	1527	510	5237.6	501-750
030	1099	1004	330	3443.7	751-1000
031	496	832	280	2853.8	1001-1250
032	301	391	130	1341.1	1251-1500
033	184	305	100	1046.2	501-750
034	75	156	50	535.1	401-500
	4,392	**4,496**		**15,421**	
First done in March 1999 and corrected in May 2004					
040	1671	1296	480	4445.3	1251-1500
041	698	546	200	1872.8	1001-1250
042	577	443	160	1519.5	751-1000
043	609	472	170	1619.0	501-750
044	375	289	110	991.3	401-500
045	348	268	100	919.2	501-750
046	370	281	110	963.8	751-1000
047	883	686	250	2353.0	1001-1250
048	843	653	240	2240.0	1251-1500
049	712	547	200	1876.2	1251-1500
050	650	491	190	1684.1	1001-1250
051	574	437	160	1499.0	751-1000
052	635	477	180	1636.1	501-750
053	276	214	80	734.0	401-500
054	852	649	240	2226.1	501-750
055	334	253	100	867.8	401-500
056	200	125	60	428.8	401-500
057	652	416	190	1426.9	501-750
058	350	220	100	754.6	501-750
059	600	377	170	1293.1	751-1000
060	671	422	190	1447.5	1001-1250
061	730	471	210	1615.5	1251-1500
	13,610	**10,033**		**34,413**	
TOTAL		**14,529**		**49,834**	

Table 2. Stratification scheme for Division 0A-North, developed in 2004. A conversion factor of 3.430 was used to calculate square kilometres from square nautical miles.

Stratum	Sq. N Miles	Units	Sq. Km	Depth Range (m)
062	114	40	391.0	401-500
063	569	190	1951.7	501-750
064	1586	530	5440.0	751-1000
065	683	230	2342.7	1001-1250
066	576	190	1975.7	1251-1500
067	674	220	2311.8	501-750
068	1051	350	3604.9	751-1000
069	1602	540	5494.9	751-1000
070	507	170	1739.0	751-1000
071	81	30	277.8	1001-1250
072	1274	420	4369.8	1001-1250
073	421	140	1444.0	1251-1500
	9,138		**31,343**	
074	1429	520	4901.5	751-1000
07 5	53	20	181.8	1001-1250
076	999	360	3426.6	751-1000
077	898	330	3080.1	751-1000
078	732	270	2510.8	1001-1250
079	401	150	1375.4	1250-1500
080	1033	380	3543.2	501-750
081	1224	450	4198.3	501-750
082	968	350	3320.2	501-750
083	583	210	1999.7	751-1000
084	320	120	1097.6	401-500
085	822	300	2819.5	301-400
086	302	110	1035.9	401-500
087	494	180	1694.4	501-750
088	348	130	1193.6	401-500
089	1234	450	4232.6	301-400
090	838	310	2874.3	401-500
091	818	300	2805.7	501-750
	13,496		**46,291**	
TOTAL	**22,634**		**77,634**	

Table 3. Depth stratum areas with the number of planned and successful sets for 0A-South 2012 (based on assignment of stations to old depth strata). Variation in previous coverage (sets planned) is due to corrections made in 2004 to measured area (see Table 1 above).

Depth Stratum (m)	401-500	501-750	751-1000	1001-1250	1251-1500	Total
Area (sq. km)	4521	14866	8719	10211	11518	49835
Sets planned in previous surveys	7 to 12	22 to 28	13 to 16	13 to 20	15 to 20	75 to 90
Sets planned in 2012	7	27	15	13	22	84
Sets completed in 2012	7	26	15	13	21	82

Table 4. Depth stratum areas with the number of planned and successful sets for 0A-North 2012 (based on assignment of stations to old depth strata).

Depth Stratum (m)	301-400	401-500	501-750	751-1000	1001-1250	1251-1500	Total
Area (sq. km)	7052	6592	19825	29687	9683	4795	77634
Sets planned in previous surveys	0 to 8	10 to 11	20 to 25	32 to 40	12 to 13	6 to 11	90 to 98
Sets planned in 2012	1	6	25	43	12	11	98
Sets completed in 2012	1	3	20	40	11	11	86

Table 5. Mean temperature and S.E. in ( ) by depth stratum for NAFO Division 0A.

NAFO		Depth Stratum (m)				
Division 0A		401-500	501-750	751-1000	1001-1250	1251-1500
South-	1999	1.6 (0.50)	1.4 (0.16)	1.0 (0.03)	0.6 (0.05)	0.1 (0.04)
	2001	0.7 (0.10)	1.5 (0.22)	0.9 (0.07)	0.7 (0.05)	0.2 (0.05)
	2004	1.3 (0.21)	1.5 (0.25)	1.0 (0.05)	0.6 (0.05)	0.1 (0.04)
	2006	1.5 (0.34)	1.4 (0.12)	1.3 (0.09)	0.9 (0.08)	0.4 (0.25)
	2008	1.6 (0.39)	1.5 (0.10)	1.3 (0.05)	0.6 (0.05)	0.2 (0.03)
	2010	1.7 (0.55)	1.6 (0.15)	1.1 (0.04)	0.7 (0.05)	0.1 (0.04)
	2012	1.9 (0.50)	1.6 (0.07)	1.3 (0.05)	0.7 (0.03)	0.2 (0.04)
North-	2004	.	0.9 (0.04)	0.6 (0.04)	0.2 (0.04)	0.1 (0.06)
	2010	0.1 (0.08)	1.3 (0.09)	0.8 (0.05)	0.4 (0.05)	0.1 (0.04)
	2012	0.3 (0.04)	0.9 (0.10)	1.0 (0.05)	0.3 (0.07)	0.0 (0.04)

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

Year/Division	Stratum (m)	Survey Area (sq. km)	No. Sets	Mean Biomass (t/sq. km)	Biomass (tons)	SE
1999	401-500	2919	8	0.3914	1142.6	431.2
0A-South	501-750	11213	18	0.8232	9230.7	2825.8
	751-1000	8719	12	1.5764	13744.3	2559.2
	1001-1250	10211	12	2.9763	30391.4	7857.9
	1251-1500	11518	15	1.2373	14251.4	4588.4
	Overall	*44580*	*65*	*1.5424*	*68760.4*	*18262.5*
2001	401-500	429	2	0.3621	155.3	153.5
0A-South	501-750	11213	18	1.8865	21153.1	5107.0
	751-1000	8719	7	3.3261	29000.3	7665.9
	1001-1250	10211	7	2.5958	26505.5	7075.2
	1251-1500	9903	14	0.4228	4187.4	869.4
	Overall	*40475*	*48*	*2.0013*	*81001.6*	*20871.1*
2004	401-500	2823	5	0.6149	1735.9	504.2
0A-South	501-750	11213	13	1.4800	16595.5	6040.8
	751-1000	8719	12	2.0645	18000.8	5948.9
	1001-1250	10211	11	3.2376	33058.8	5589.9
	1251-1500	11518	17	1.4573	16785.4	7273.9
	Overall	*44484*	*58*	*1.9372*	*86176.4*	*12501.6*
2006	401-500	4092	10	0.2868	1173.6	197.4
0A-South	501-750	13439	20	0.3531	4745.9	569.4
	751-1000	8719	12	1.2338	10757.4	2020.4
	1001-1250	8763	8	3.4553	30278.4	9470.3
	1251-1500	9902	12	0.5368	5315.4	1052.3
	Overall	*44915*	*62*	*1.1638*	*52270.8*	*9759.0*
2008	401-500	3787	7	0.3396	1285.9	372.6
0A-South	501-750	13439	25	0.9026	12130.2	2914.6
	751-1000	8719	14	2.3468	20461.4	2719.4
	1001-1250	10211	20	3.0100	30734.7	4059.5
	1251-1500	10177	17	1.2352	12570.2	6256.1
	Overall	*46333*	*83*	*1.6658*	*77182.4*	*8464.5*
2010	401-500	3128	6	0.2715	849.2	142.2
0A-South	501-750	14866	24	0.7765	11543.4	1798.4
	751-1000	8719	16	2.3032	20081.3	3830.5
	1001-1250	10211	15	3.2607	33295.5	9386.9
	1251-1500	11518	20	0.7382	8502.7	1445.2
	Overall	*48442*	*81*	*1.5332*	*74272.1*	*10463.3*
2012	401-500	4092	*7*	0.6432	2632.0	671.8
0A-South	501-750	14866	*26*	2.4262	36067.5	16267.1
	751-1000	8719	*15*	2.7379	23872.0	5626.5
	1001-1250	10211	*13*	3.0117	30752.0	10388.4
	1251-1500	11518	*21*	0.7955	9162.9	1697.9
	Overall	*49406*	*82*	*2.0744*	*102486.4*	*20187.30*

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

Year/Division	Stratum (m)	Survey Area (sq. km)	No. Sets	Mean Abundance (sq. km)	Abundance	SE
1999	401-500	2919	8	1229.90	3.6E+06	1.3E+06
0A-South	501-750	11213	18	2327.80	2.61E+07	8.5E+06
	751-1000	8719	12	3482.70	3.04E+07	5.5E+06
	1001-1250	10211	12	4579.40	4.68E+07	1.3E+07
	1251-1500	11518	15	1045.40	1.2E+07	3.6E+06
	Overall	*44580*	*65*	*2666.22*	*1.19E+08*	*3.2E+07*
2001	401-500	429	2	553.60	2.4E+05	2.3E+05
0A-South	501-750	11213	18	3840.20	4.31E+07	1.0E+07
	751-1000	8719	7	4100.60	3.58E+07	9.9E+06
	1001-1250	10211	7	3456.60	3.53E+07	1.1E+07
	1251-1500	9903	14	439.60	4.4E+06	8.4E+05
	Overall	*40475*	*48*	*2932.65*	*1.19E+08*	*3.3E+07*
2004	401-500	2823	5	1892.90	5.34E+06	2.0E+06
0A-South	501-750	11213	13	2977.10	3.34E+07	1.1E+07
	751-1000	8719	12	3000.40	2.62E+07	9.5E+06
	1001-1250	10211	11	3319.00	3.39E+07	6.2E+06
	1251-1500	11518	17	1066.10	1.23E+07	5.1E+06
	Overall	*44484*	*58*	*2496.53*	*1.11E+08*	*1.7E+07*
2006	401-500	4092	10	1124.92	4.60E+06	1.1E+06
0A-South	501-750	13439	20	1110.16	1.49E+07	2.5E+06
	751-1000	8719	12	2651.23	2.31E+07	4.7E+06
	1001-1250	8763	8	5103.15	4.47E+07	1.4E+07
	1251-1500	9902	12	493.60	4.89E+06	1.0E+06
	Overall	*44915*	*62*	*2053.77*	*9.22E+07*	*1.5E+07*
2008	401-500	3787	7	915.03	3.47E+06	9.2E+05
0A-South	501-750	13439	25	2129.00	2.86E+07	6.5E+06
	751-1000	8719	15	4172.23	3.64E+07	5.5E+06
	1001-1250	10211	19	3735.31	3.81E+07	5.5E+06
	1251-1500	10177	17	945.24	9.62E+06	4.6E+06
	Overall	*46333*	*83*	*2508.26*	*1.16E+08*	*1.1E+07*
2010	401-500	3128	6	861.40	2.69E+06	7.4E+05
0A-South	501-750	14866	24	1864.30	2.77E+07	4.6E+06
	751-1000	8719	16	4221.60	3.68E+07	8.3E+06
	1001-1250	10211	15	3568.30	3.64E+07	8.4E+06
	1251-1500	11518	20	564.40	6.50E+06	1.2E+06
	Overall	*48442*	*81*	*2273.93*	*1.10E+08*	*1.3E+07*
2012	401-500	4092	*7*	1950.10	8.0E+06	2.4E+06
0A-South	501-750	14866	26	4081.10	6.1E+07	2.8E+07
	751-1000	8719	15	3374.00	2.9E+07	6.8E+06
	1001-1250	10211	13	2543.80	2.6E+07	8.7E+06
	1251-1500	11518	21	591.30	6.8E+06	1.3E+06
	Overall	*49406*	*82*	*2648.31*	*1.3E+08*	*3.0E+07*

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

Year/Division	Stratum (m)	Survey Area (sq. km)	No. Sets	Mean Biomass (t/sq. km)	Biomass (tons)	SE
2004	301-400	0	1	.	.	.
0A-North	401-500	0	0	.	.	.
	501-750	12499	7	0.9620	12024.1	2174.1
	751-1000	27687	20	0.9737	26959.3	9091.1
	1001-1250	9223	9	0.4843	4466.4	682.6
	1251-1500	4795	6	0.5061	2426.9	789.8
	Overall	*54204*	*43*	*0.8464*	*45876.8*	*9405.6*
2010	301-400	0	0	.	.	.
0A-North	401-500	2874	4	0.1432	411.6	91.9
	501-750	12276	8	0.7215	8857.3	2678.3
	751-1000	10520	8	0.9989	10508.3	1608.5
	1001-1250	9223	8	2.3517	21689.3	3299.3
	1251-1500	4795	11	1.0892	5222.7	701.5
	Overall	*39688*	*39*	*1.1764*	*46689.2*	*4638.5*
2012	301-400	0	1	.	.	.
0A-North	401-500	2291	3	0.3756	860.5	321.5
	501-750	19825	20	0.5849	11596.3	1397.4
	751-1000	29687	40	1.4729	43725.2	5027.6
	1001-1250	9223	11	2.4933	22996.1	4130.5
	1251-1500	4795	11	0.7281	3491.2	658.5
	Overall	*65821*	*86*	*1.25597*	*82669.3*	*6695.4*

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

Year/Division	Stratum (m)	Survey Area (sq. km)	No. Sets	Mean Abundance (sq. km)	Abundance	SE
2004	301-400	0	1	.	.	.
0A-North	401-500	0	0	.	.	.
	501-750	12499	7	1422.90	1.78E+07	4.2E+06
	751-1000	27687	20	948.80	2.63E+07	7.8E+06
	1001-1250	9223	9	316.10	2.92E+06	5.6E+05
	1251-1500	4795	6	322.60	1.55E+06	5.4E+05
	Overall	*54204*	*43*	*895.08*	*4.85E+07*	*9.0E+06*
2010	301-400	0	0	.	.	.
0A-North	401-500	2874	4	337.2	9.69E+05	2.57E+05
	501-750	12276	8	1845.9	2.27E+07	7.85E+06
	751-1000	10520	8	1764.9	1.86E+07	2.57E+06
	1001-1250	9223	8	2306.7	2.13E+07	2.66E+06
	1251-1500	4795	11	815.2	3.91E+06	5.69E+05
	Overall	*39688*	*39*	*1697.75*	*6.74E+07*	*8.76E+06*
2012	301-400	0	1	.	.	.
0A-North	401-500	2291	3	819.7	1.88E+06	4.05E+05
	501-750	19825	20	1062.2	2.11E+07	2.78E+06
	751-1000	29687	40	1705.7	5.06E+07	5.00E+06
	1001-1250	9223	11	1970.2	1.82E+07	3.75E+06
	1251-1500	4795	11	464.7	2.23E+06	4.29E+05
	Overall	*65821*	*86*	1427.69	9.40E+07	6.86E+06

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

Length Class (3cm)	1999	2001	2004	2006	2008	2010	2012
0							
3							
6	73.24			1.71	22.51	59.50	29.06
9	26.12	7.37		10.10	0.00	62.64	
12	61.25	16.93	25.85	24.23	6.10	44.87	102.84
15	21.04	192.87	**722.75**	463.18	318.90	289.18	126.09
18	322.59	181.54	443.92	1045.42	852.03	528.56	4876.94
21	639.74	766.48	1408.29	**4342.79**	1913.63	1420.04	**5209.41**
24	2902.04	2130.24	1881.05	3895.19	2645.37	3346.70	1926.98
27	8512.53	2464.87	5011.07	5402.58	5381.19	6189.18	3561.77
30	12473.32	4327.51	5605.14	6754.06	9745.80	10041.16	6196.65
33	15944.90	8561.02	8367.77	9331.16	15021.20	11575.09	9866.35
36	16947.77	16223.82	10617.73	13128.30	15193.63	13474.22	13607.12
39	***17014.00***	22102.68	13436.04	***14054.94***	**15541.29**	**15482.20**	17947.18
42	14621.13	***23835.55***	15697.21	12623.59	14147.43	14076.10	**20592.96**
45	10750.97	17459.63	***15979.39***	9052.16	12127.77	11699.58	17487.54
48	6443.78	10695.54	13845.14	6147.75	8814.90	7480.09	12687.50
51	4122.99	5219.18	9238.19	2945.62	5907.88	5665.12	8117.11
54	2247.48	2096.95	4329.14	1826.32	3844.47	3796.59	3720.48
57	1250.56	1189.12	2095.96	655.49	2321.89	2218.88	1796.81
60	704.21	592.81	976.22	141.35	1366.32	1240.09	1127.98
63	471.66	255.27	532.40	91.73	495.99	936.15	817.10
66	242.11	140.19	317.07	77.93	366.03	293.72	582.18
69	117.64	131.90	141.18	30.59	90.54	106.28	167.24
72	127.13	40.87	126.20	24.27	37.18	61.58	115.48
75	9.58	23.95	69.87		20.24	29.22	72.44
78	18.74	6.97	45.72		6.29	6.97	28.93
81	9.43	0.00	42.09		0.00	0.00	60.54
84	0.00	28.34	17.52		13.60	18.84	9.50
87	0.00		33.08		0.00	0.00	0.00
90	0.00		14.26		0.00	0.00	8.27
93	9.29		10.64		6.42	0.00	
96			6.87		0.00	0.00	
99		14.52			6.80	11.24	
missing				175.89			
Total	116085.24	118706.10	111037.79	92246.34	116215.39	110153.76	130842.46
Total <45 cm	89559.68	80810.88	63216.84	71077.24	80789.07	76589.42	84043.35
% <45 cm	77.15	68.08	56.93	77.05	69.52	69.53	64.23
% <=35 cm	35.30	15.71	21.13	33.90	30.90	30.46	24.38

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

Length Class (3cm)	2004	2010	2012
0			
3			
6			
9			
12	27.59		
15	0.00		
18	28.15		1218.08
21	134.18	495.46	**6207.93**
24	415.79	1952.23	2230.20
27	1685.96	3877.30	1921.26
30	2696.23	6778.50	1231.31
33	**2807.35**	7206.02	2695.59
36	2382.81	8016.51	5527.30
39	2556.34	**8302.15**	9091.03
42	4727.47	7755.44	12789.15
45	7958.06	7698.48	**17157.45**
48	**9516.25**	5687.84	15965.21
51	6810.91	4002.09	8520.31
54	3469.21	2263.84	4448.34
57	1589.42	1415.14	2248.24
60	734.08	928.80	1120.13
63	365.44	601.37	864.56
66	288.20	280.94	418.68
69	70.24	60.32	185.40
72	187.24	33.26	67.61
75	37.75	0.00	42.02
78	8.85	24.48	21.88
81	19.18		
84			
87			
90			
93			
96			
99			
Total	48516.71	67380.16	93971.69
Total <45 cm	17461.87	44383.61	42911.86
% <45 cm	35.99	65.87	45.66
% <=35 cm	16.07	30.14	16.50

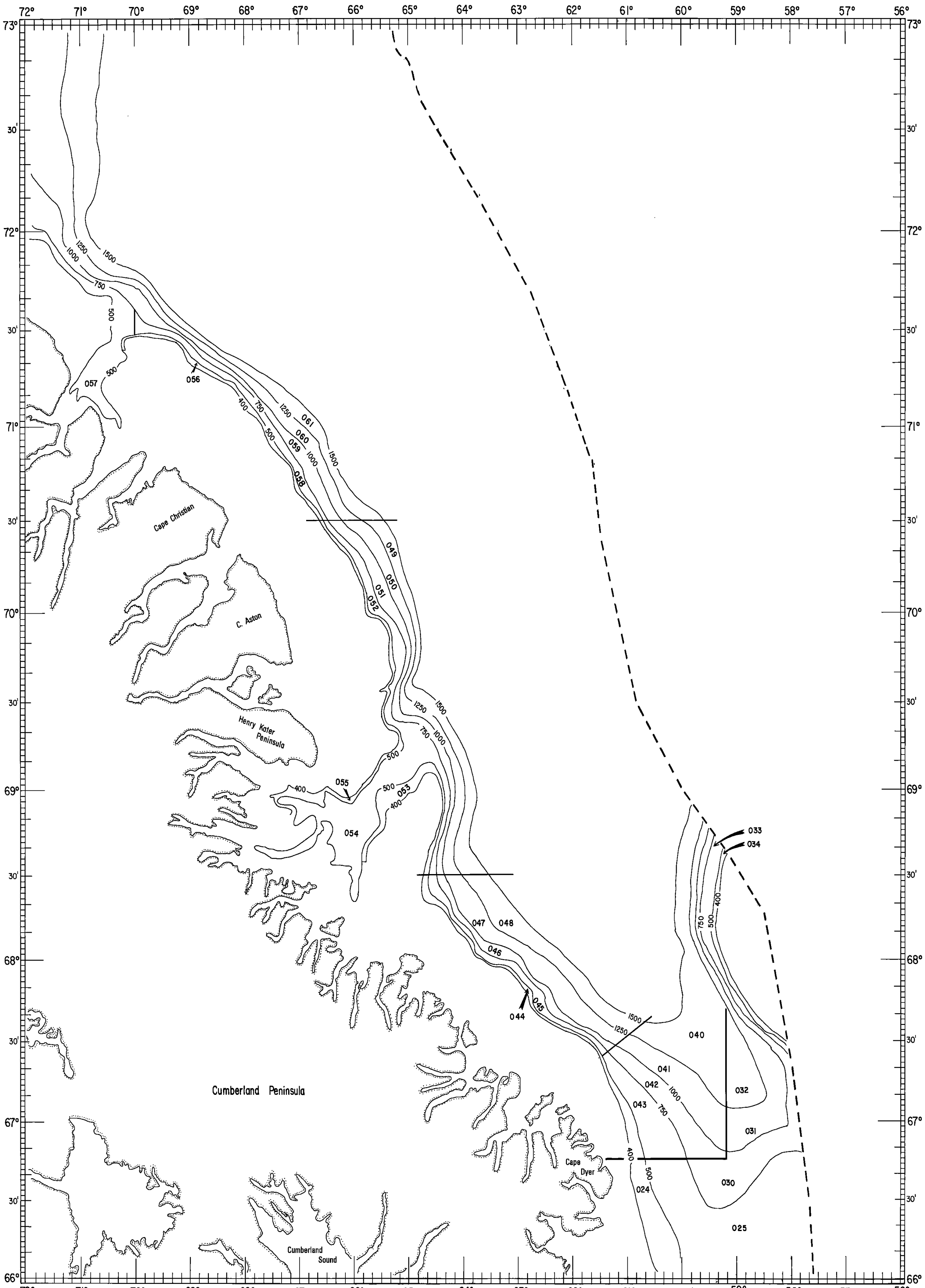


Figure 1. Stratification scheme for North Atlantic Fisheries Organization Division 0A, 66° N to 72° N.

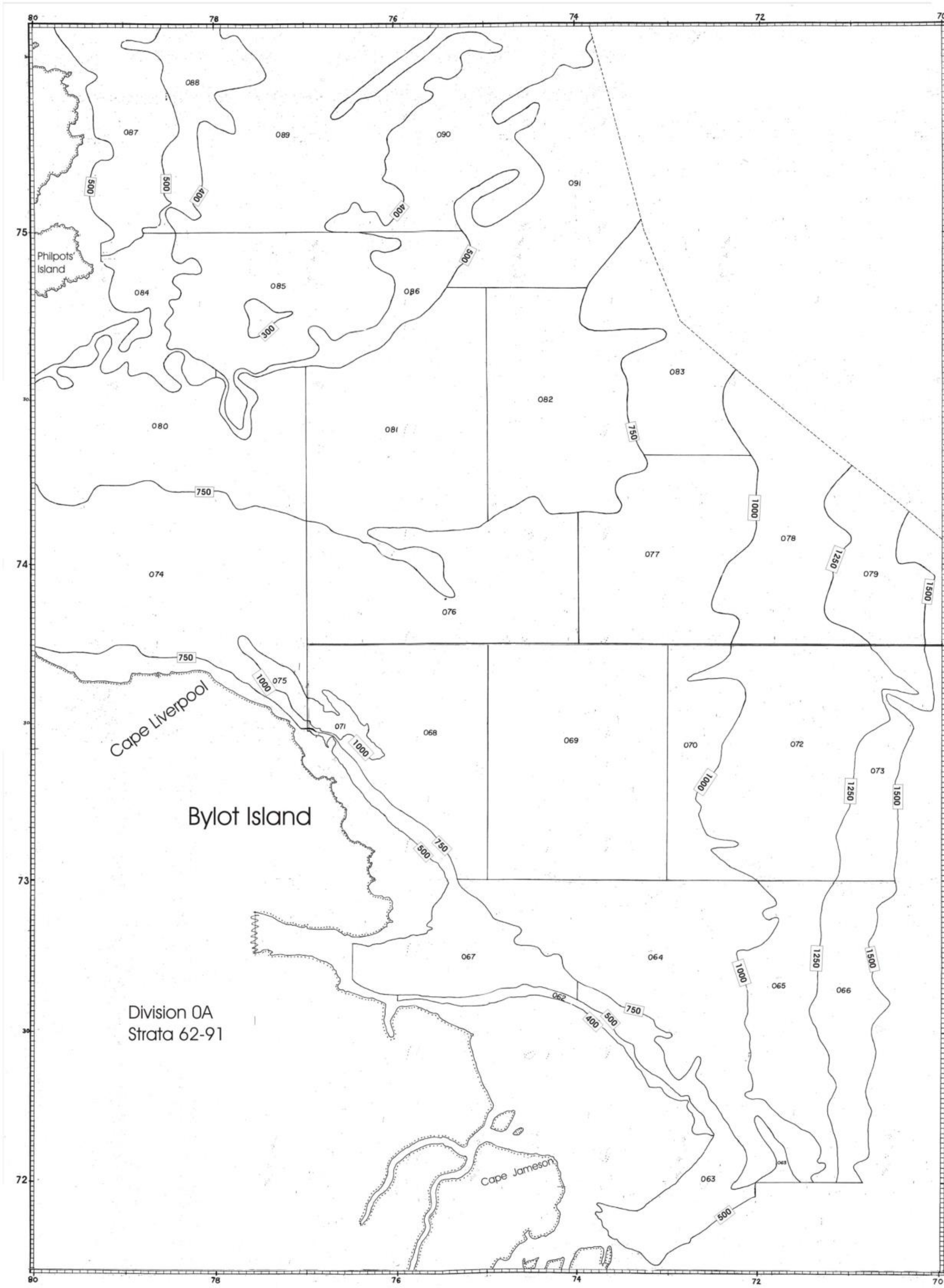


Figure 2. Stratification scheme for North Atlantic Fisheries Organization Division 0A, 72º N to 76º N.

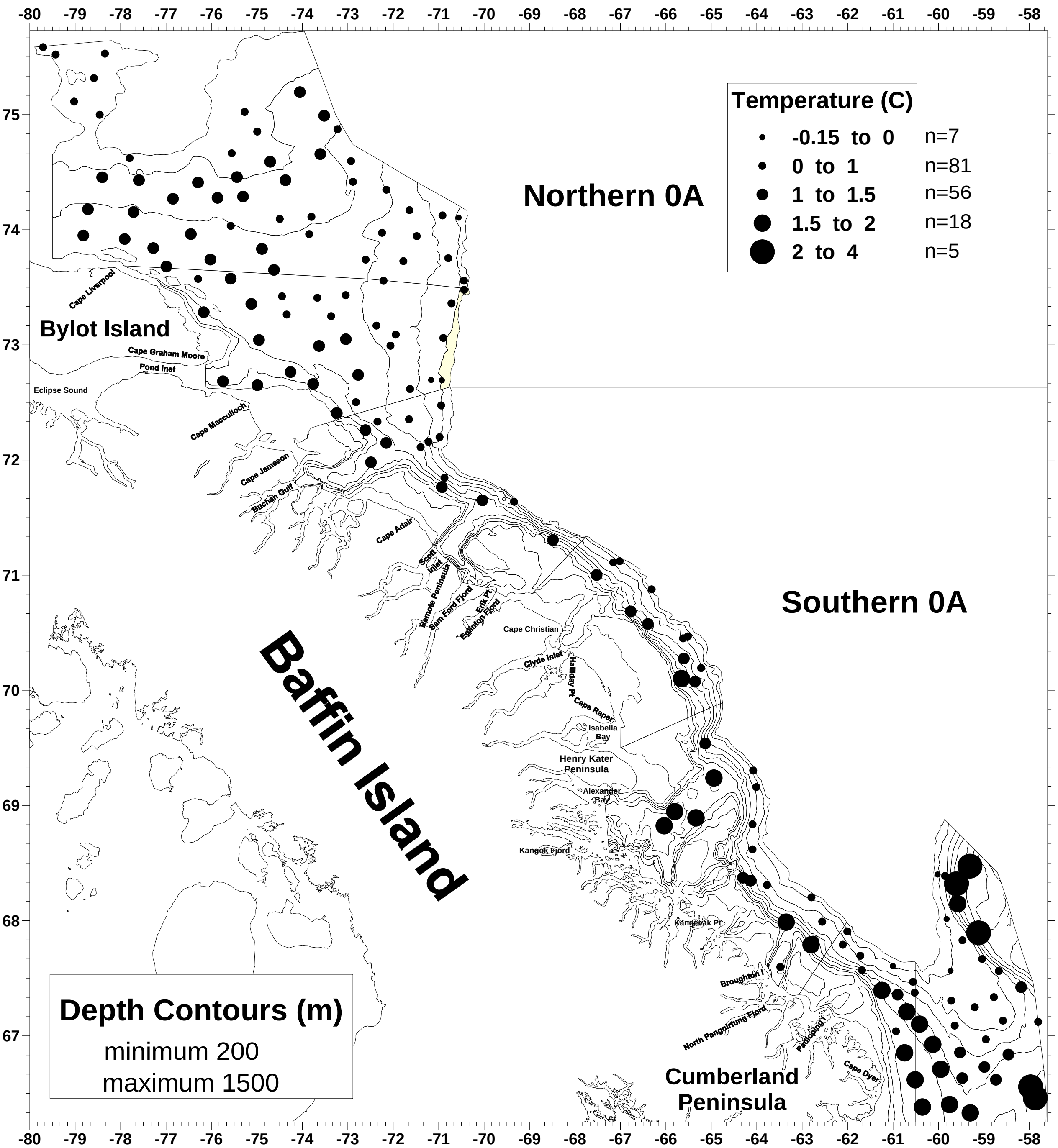
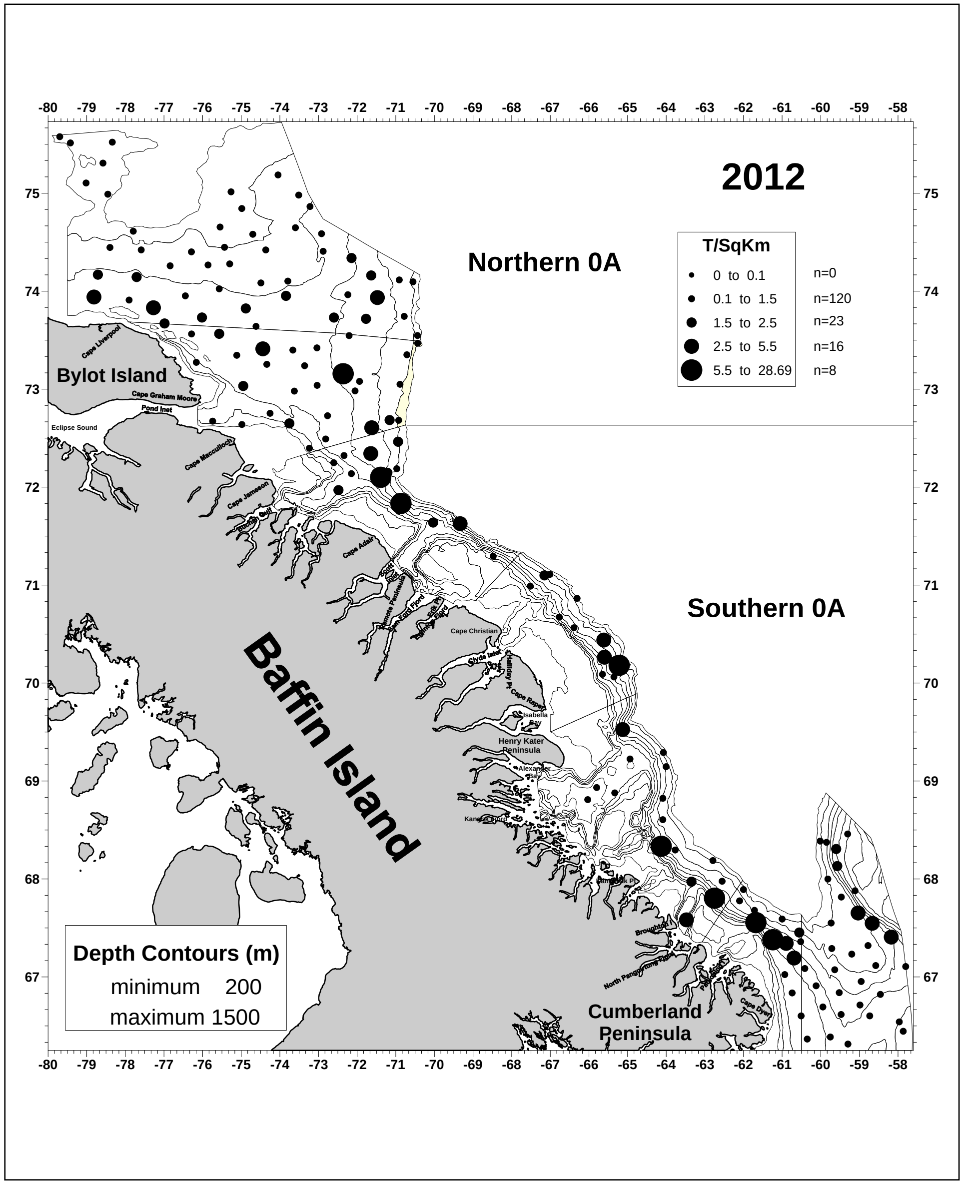


Figure. 3. Bottom temperatures during 2012 survey in Division 0A.



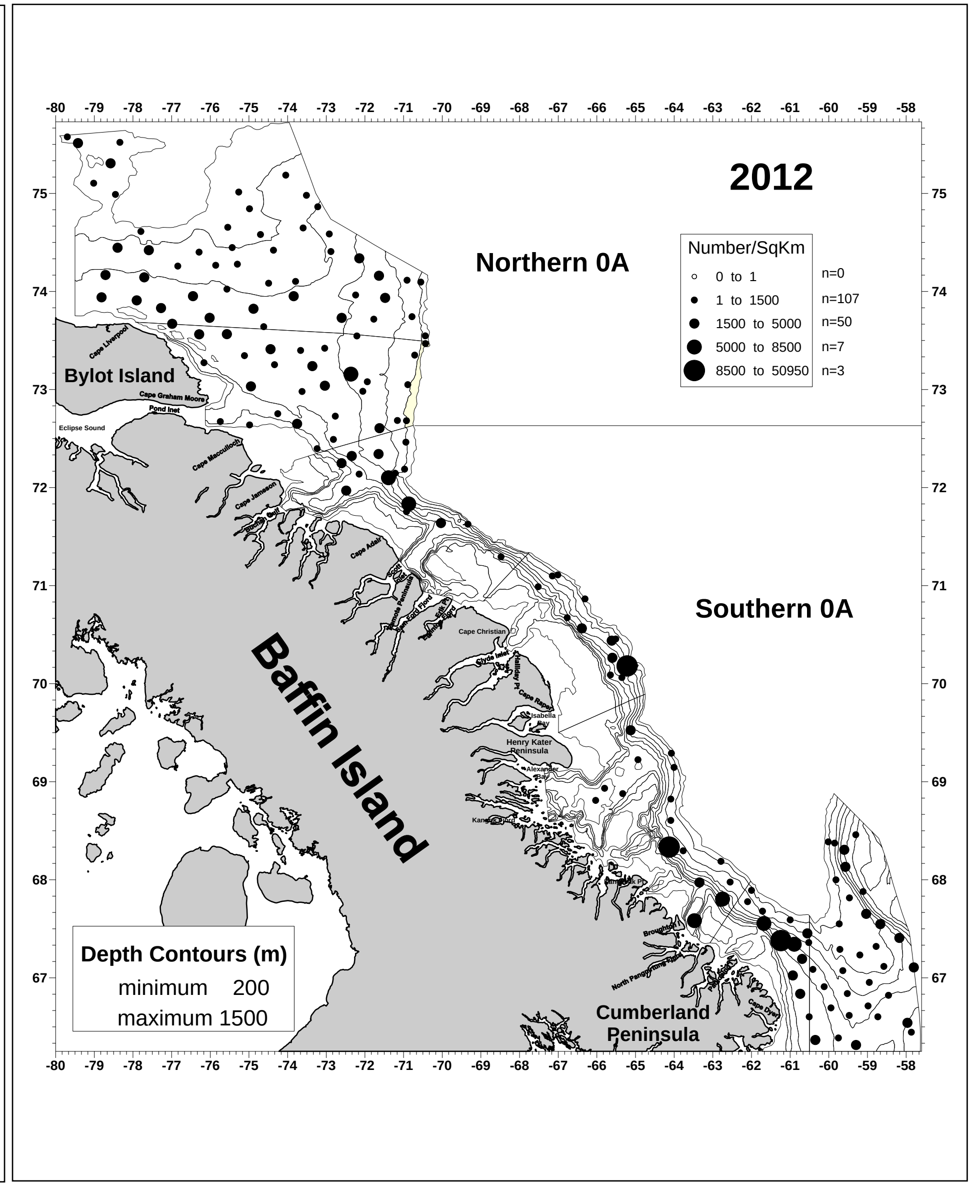


Figure 4. Biomass and abundance distribution for Greenland Halibut in Div. 0A 2012.

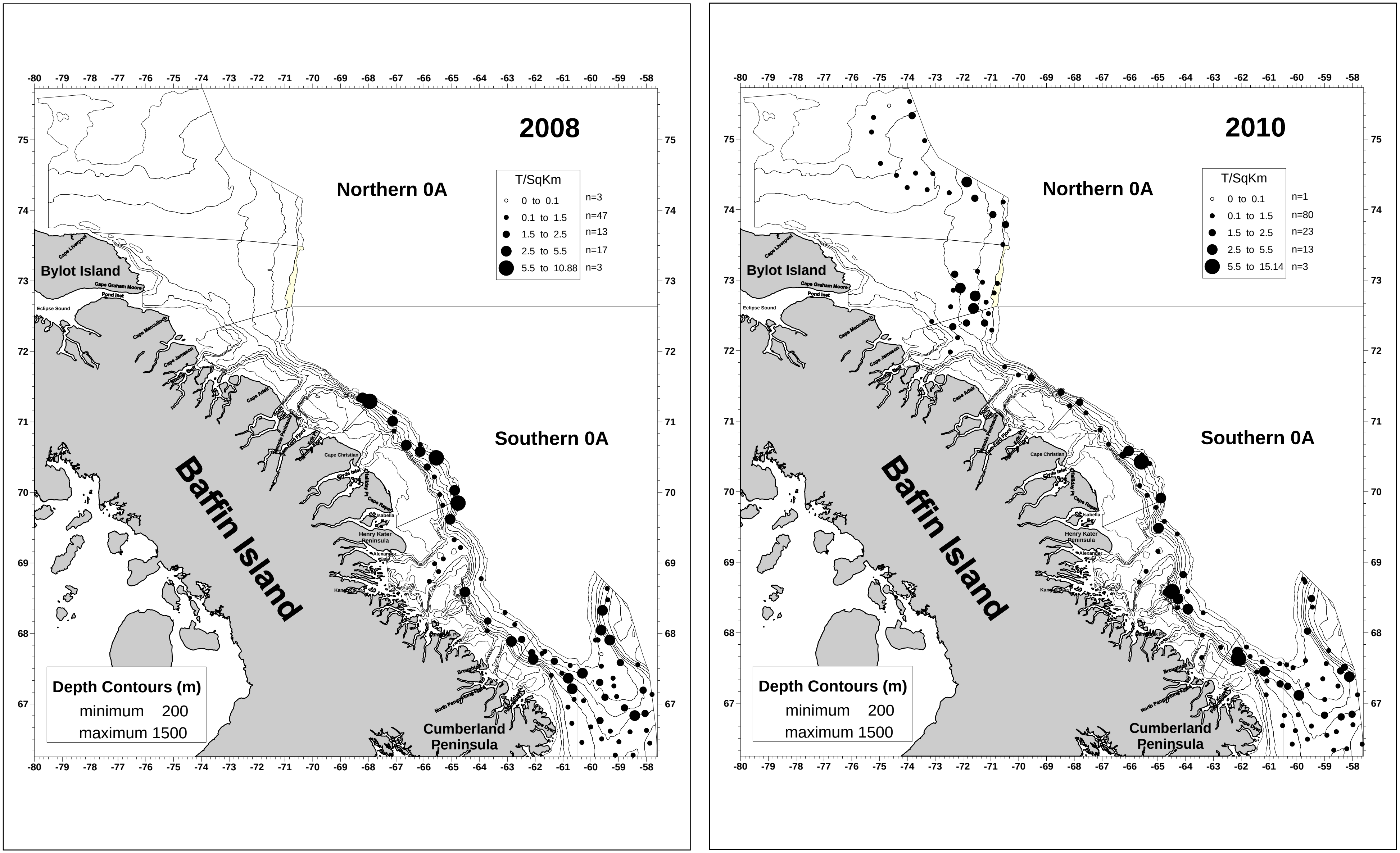
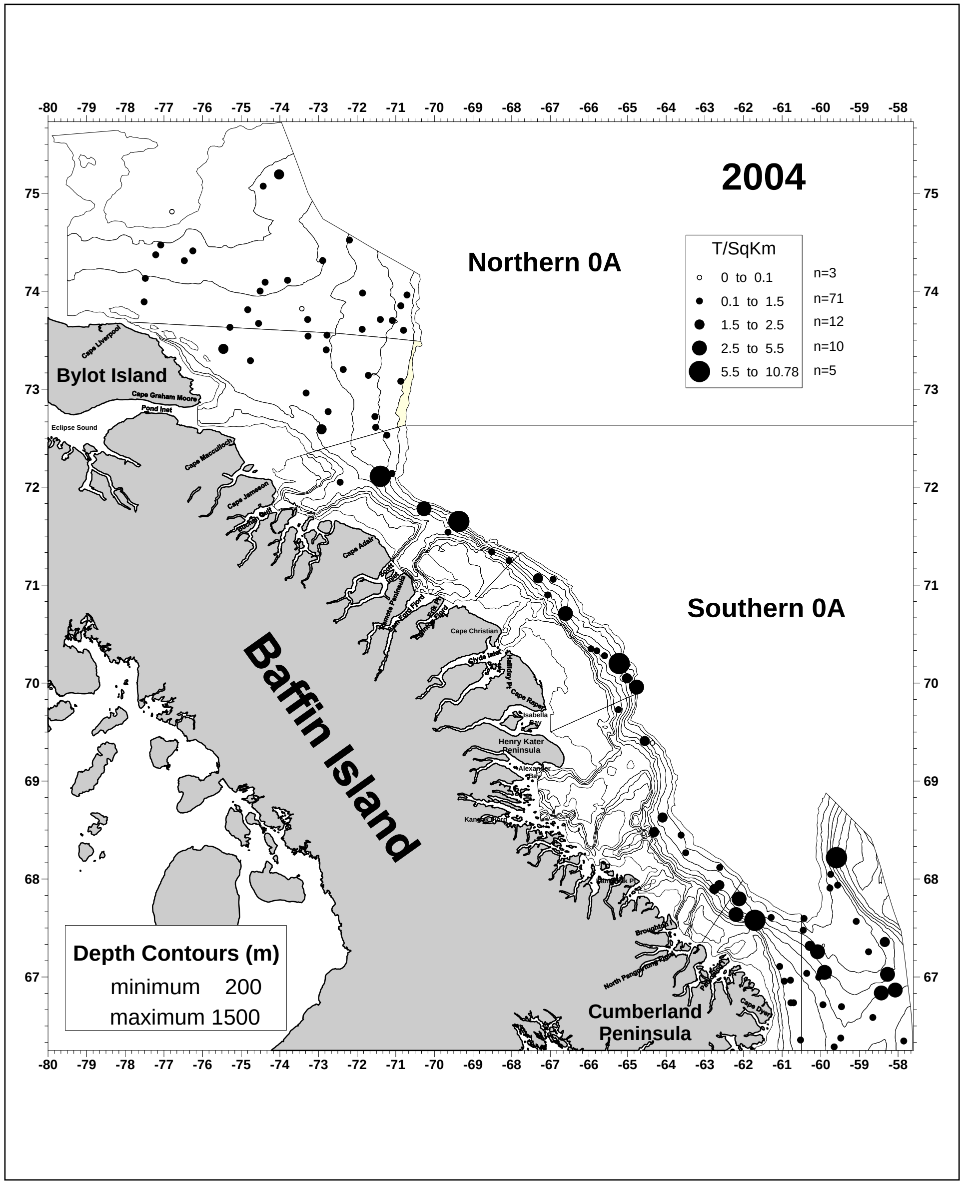


Figure 5. Biomass distribution (t/sq km) for Greenland Halibut in Div. 0A, 1999 to 2010.



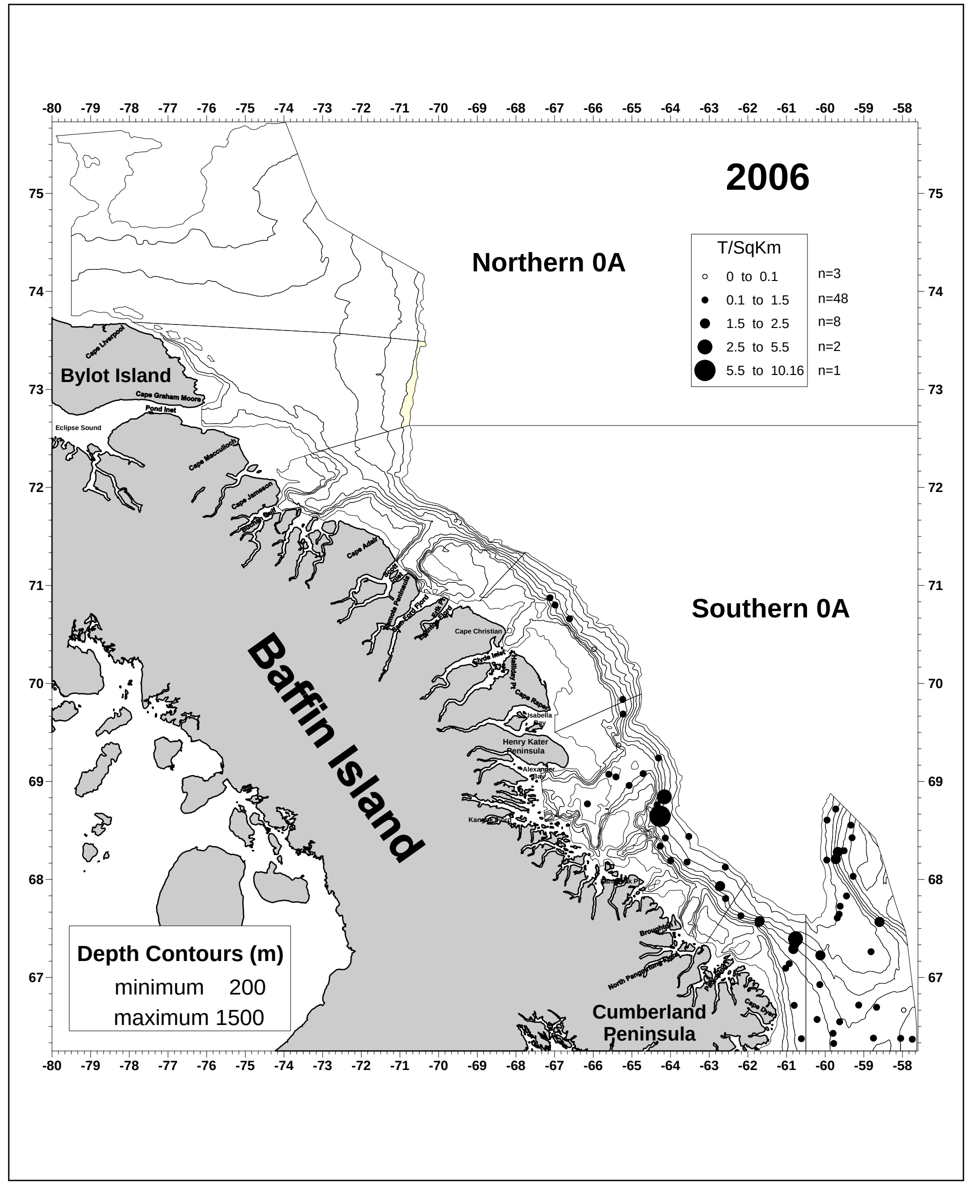
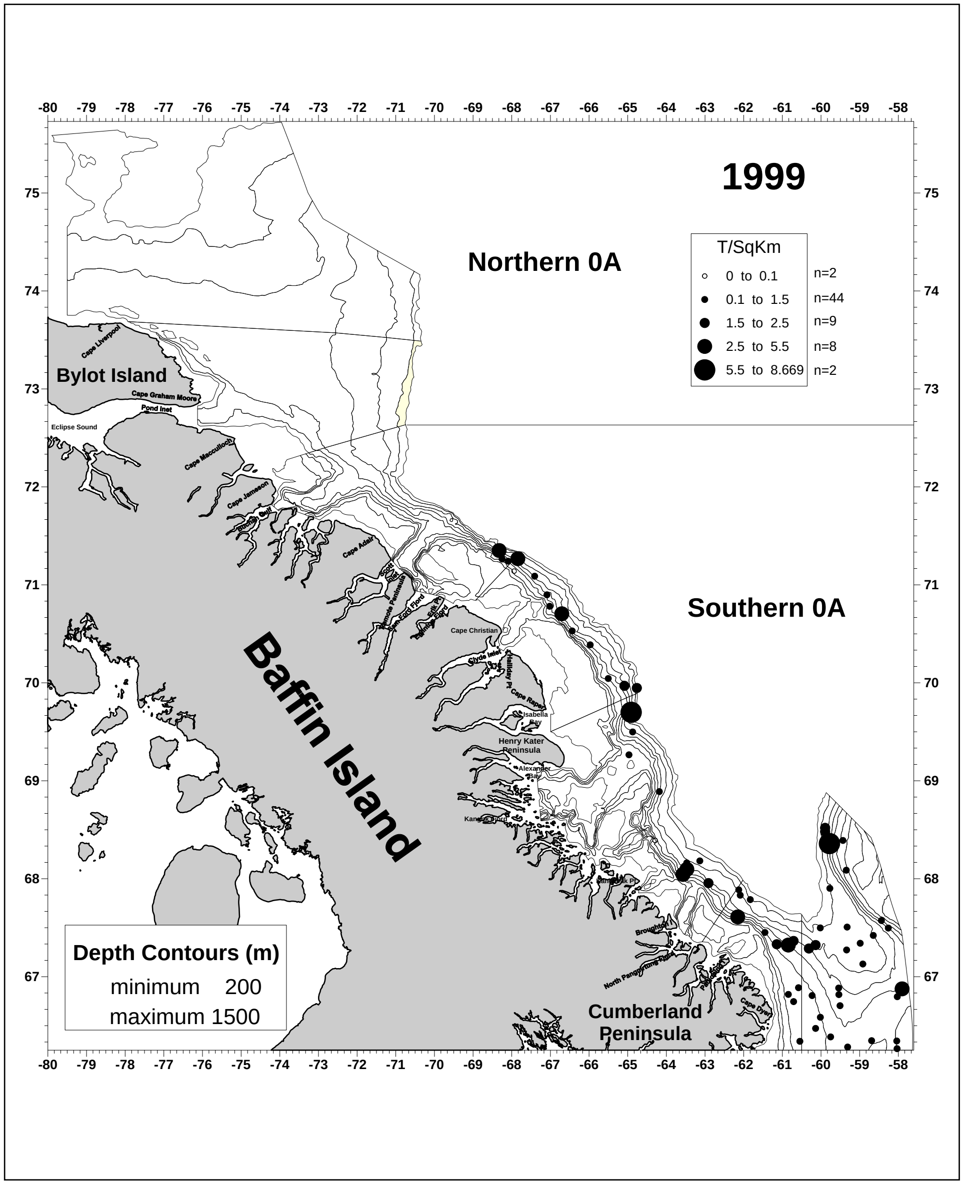


Figure 5 (Con't). Biomass distributions (t/sq km) for Greenland Halibut in Div. 0A, 1999 to 2010.



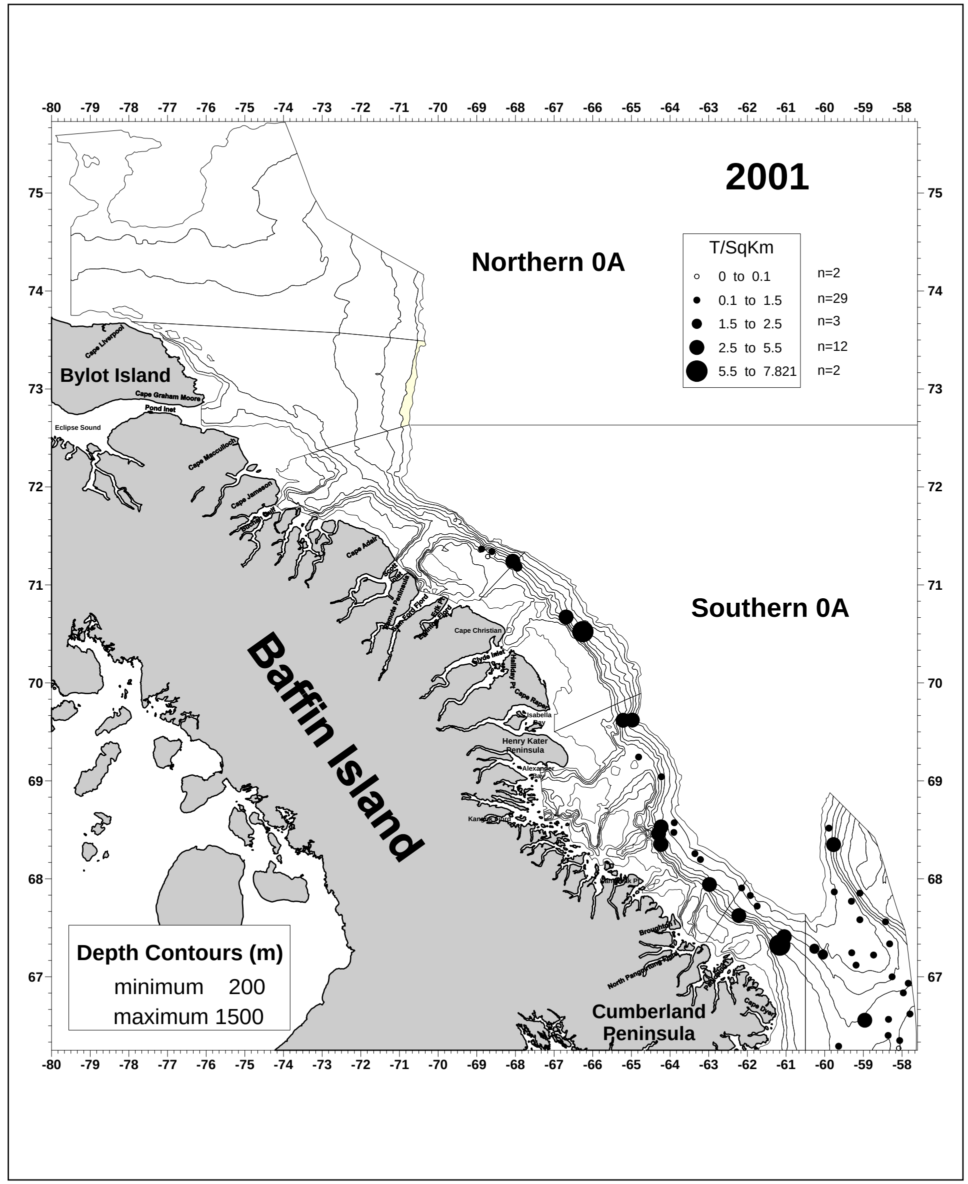
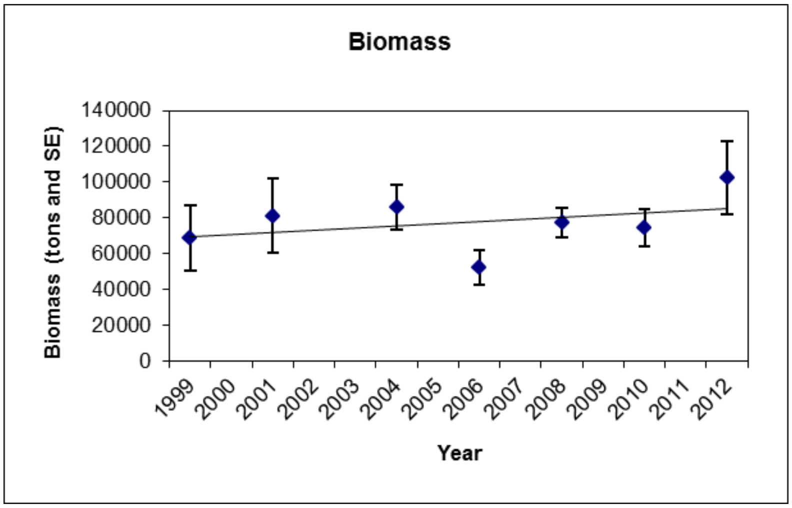


Figure 5 (Con't). Biomass distribution (t/sq km) for Greenland Halibut in Div. 0A, 1999 to 2010.



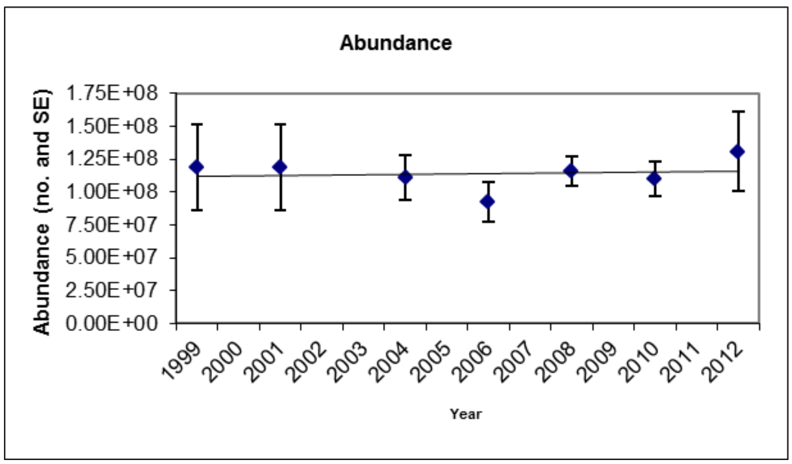


Figure 6. Biomass (top) and abundance (bottom) estimates (with SE and linear trend line) for Greenland halibut in Division 0A-South.

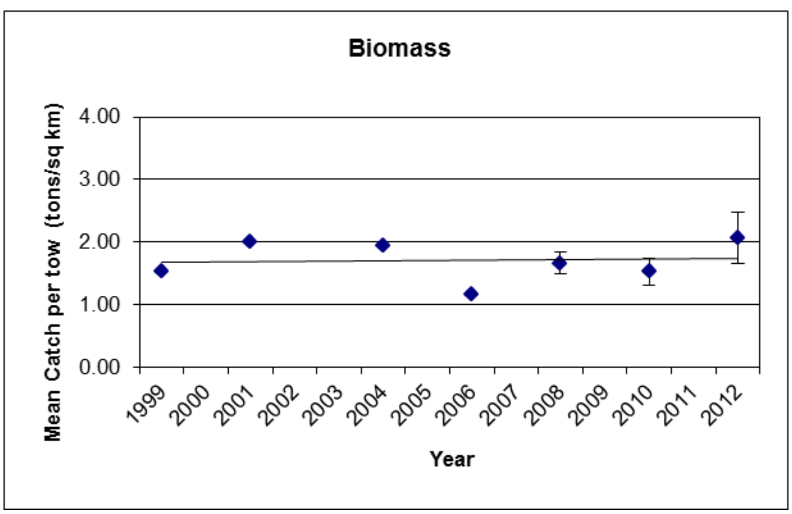


Figure 7. Mean catch per tow (with SE for most recent years and linear trend line) for Greenland halibut in Division 0A-South.

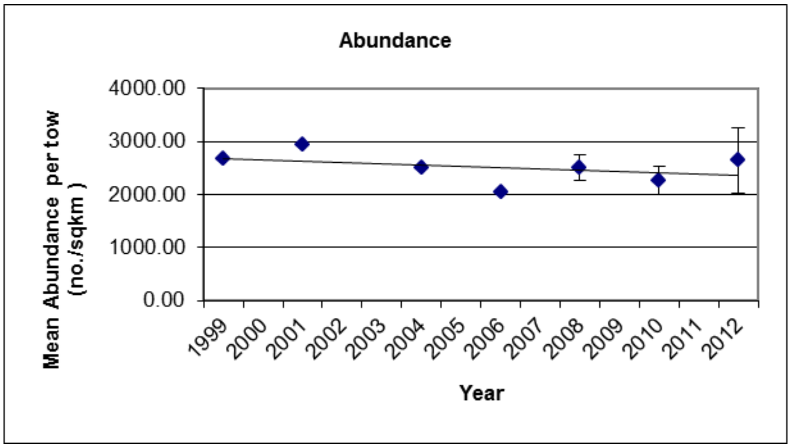


Figure 8. Mean abundance per tow (with SE for most recent years and linear trend line) for Greenland halibut in Division 0A-South.

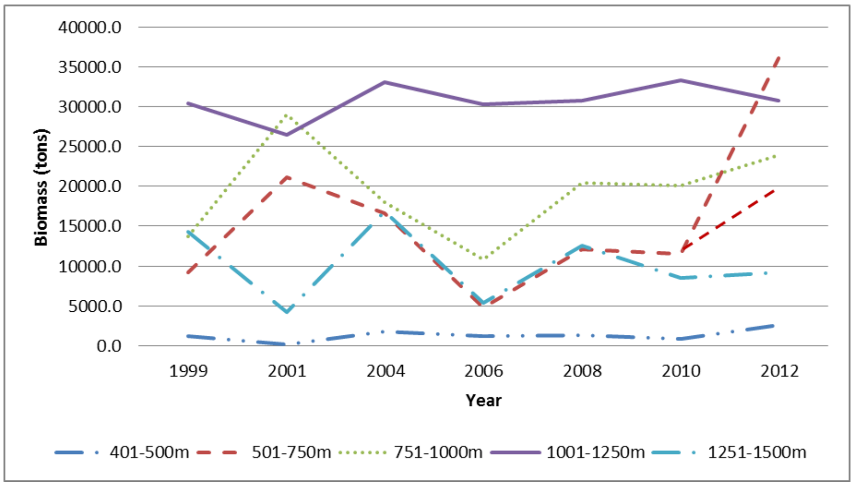


Figure 9. Biomass trends by depth strata for 0A-South. Two estimates are shown for 501-750m depths, one with large set removed.

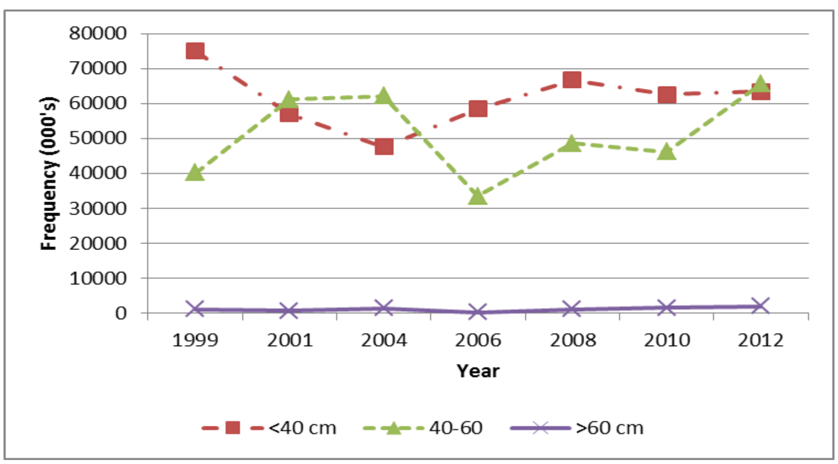


Figure 10. Abundance for size clases: <40 cm (recruitment); 40-60 cm (size range for trawl catches); >60 cm (size range for gillnet catches).

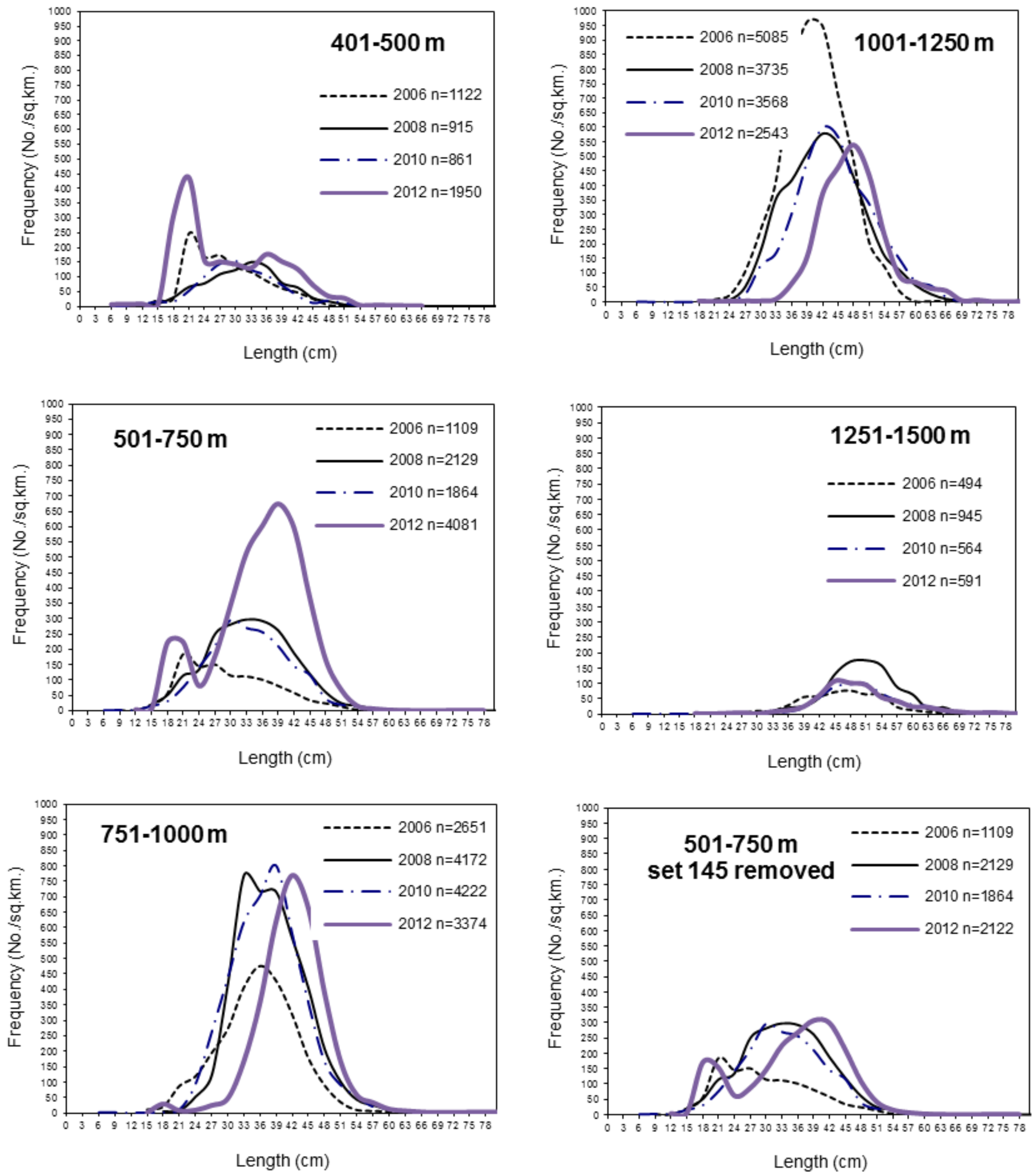


Figure 11. Greenland halibut length distribution, by depth for Division 0A-South, 2006 to 2012. Note inclusion of length frequency for 501-750 m with large set removed (bottom right).

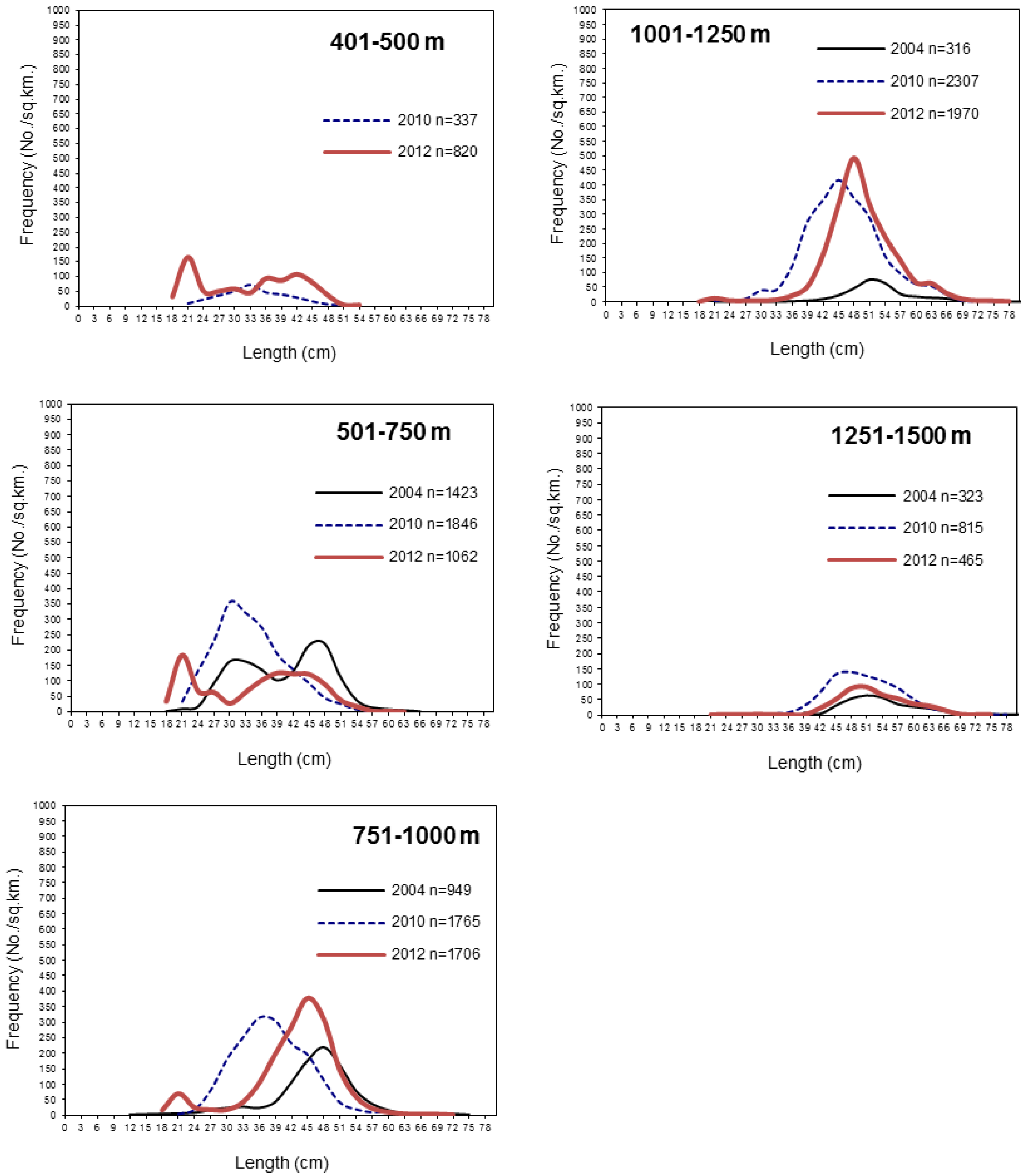


Figure 12. Greenland halibut length distribution, by depth for Division 0A-North, 2004, 2010 and 2012.

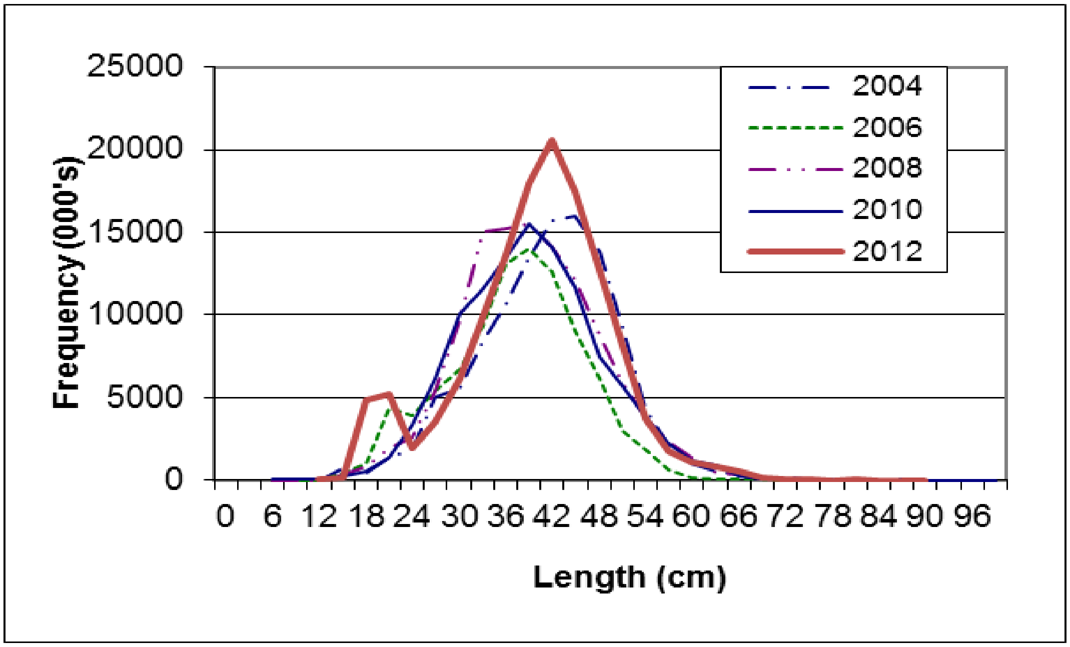


Figure 13. Abundance at length for the Greenland halibut in NAFO Division 0A-South, 2004 to 2012 (weighted by stratum area). Includes data from large set.

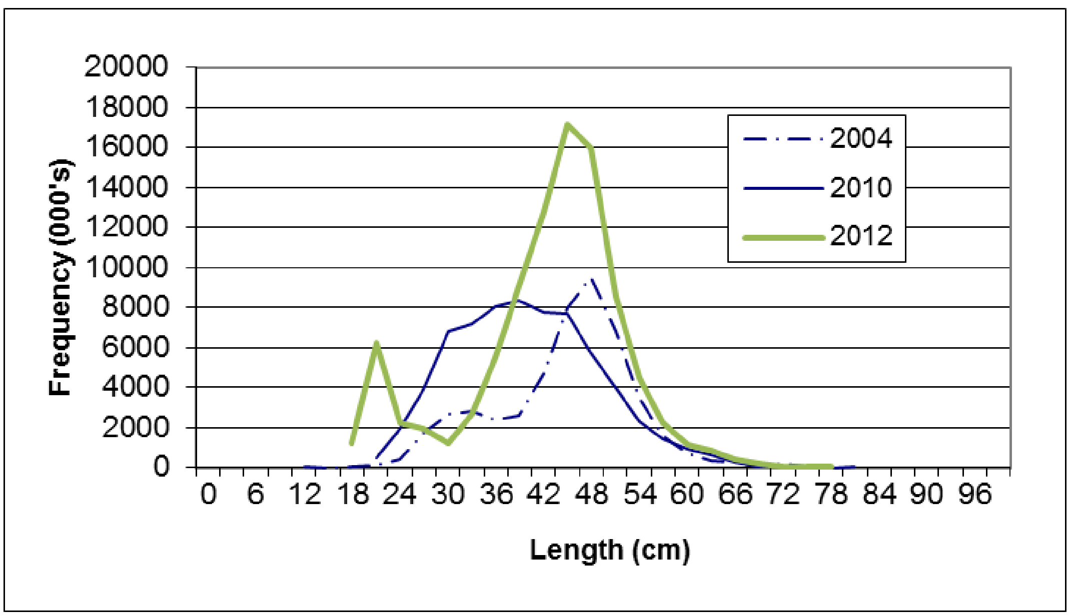


Figure 14. Abundance at length for the Greenland halibut in NAFO Division 0A-North, 2004, 2010 and 2012 (weighted by stratum area).

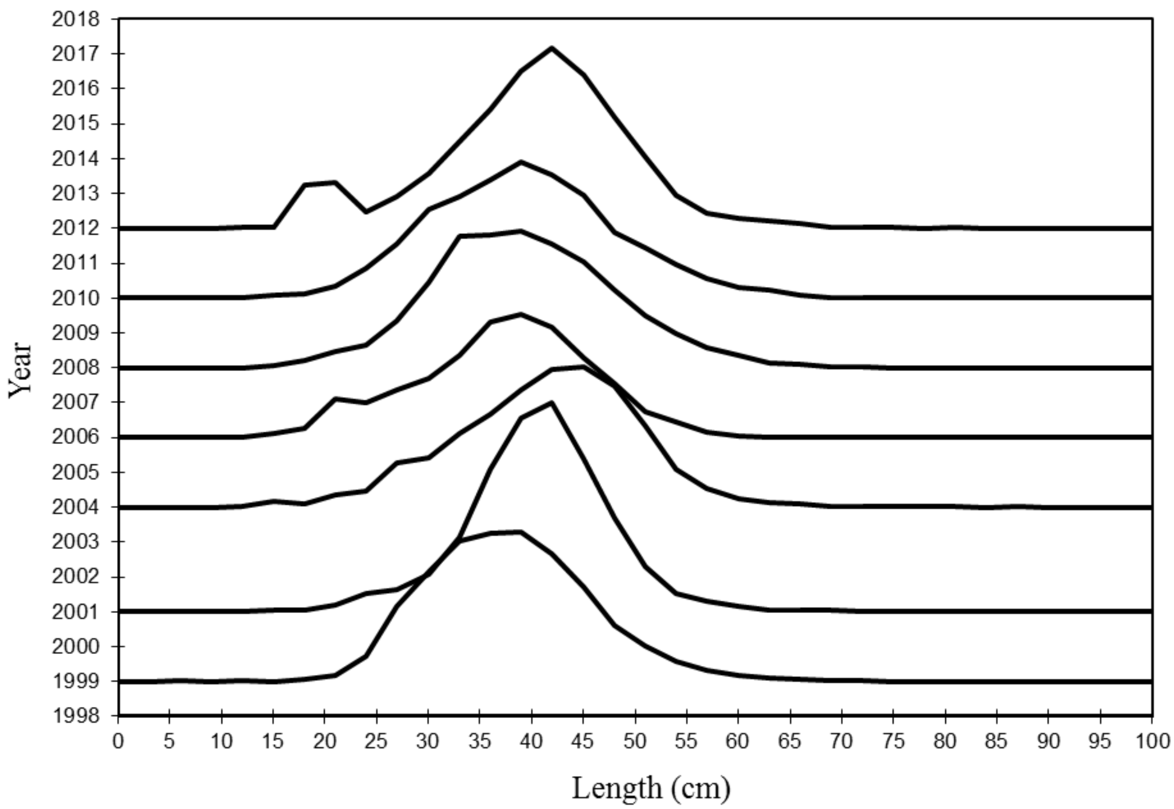


Figure 15. Length frequency distribution for Division 0A-South 1999-2012 (numbers/km^2 weighted by stratum area). Includes data from large set.

Appendix 1. Greenland halibut catch weight and numbers (not standardised to kg/km2), temperature, depth and depth stratum for each set in the 2012 survey of Division 0A.

Trip	Set	Day-Month	Mean Depth (m)	Sweptarea (sq km)	Depth Stratum (m)	Temp (oC)	Greenland Halibut Number	Greenland Halibut Weight (kg)
0A-South	1	29-Sep	740	0.06808	750	1.21	137	106.75
0A-North	2	29-Sep	774	0.06526	1000	1.23	87	65.80
0A-South	3	29-Sep	540	0.07514	750	1.33	153	101.08
0A-North	4	29-Sep	945	0.07149	1000	0.99	108	106.55
0A-North	6	29-Sep	533	0.07002	750	1.17	95	78.60
0A-North	7	30-Sep	863	0.07216	1000	0.97	78	66.40
0A-North	8	30-Sep	857	0.07526	1000	1.06	104	99.05
0A-North	9	30-Sep	782	0.06753	1000	1.33	139	108.25
0A-North	10	30-Sep	788	0.07886	1000	1.37	93	65.40
0A-North	11	30-Sep	553	0.07264	750	1.23	66	31.85
0A-North	12	30-Sep	705	0.05205	750	1.36	33	20.80
0A-North	13	30-Sep	873	0.07053	1000	1.32	160	121.40
0A-North	14	01-Oct	899	0.07640	1000	1.07	64	56.05
0A-North	15	01-Oct	912	0.07278	1000	1.04	115	95.35
0A-North	16	01-Oct	919	0.07224	1000	0.95	127	105.75
0A-North	18	01-Oct	938	0.08095	1000	0.70	79	69.80
0A-North	19	01-Oct	915	0.07343	1000	0.87	95	90.57
0A-North	20	01-Oct	943	0.06839	1000	0.89	69	63.50
0A-North	21	01-Oct	958	0.07902	1000	0.87	205	204.05
0A-North	22	01-Oct	949	0.07460	1000	1.02	67	66.60
0A-North	23	02-Oct	895	0.07212	1000	1.33	45	34.15
0A-North	24	02-Oct	981	0.07251	1000	0.86	111	101.35
0A-North	25	02-Oct	993	0.07399	1000	1.32	177	157.70
0A-North	26	02-Oct	936	0.07019	1000	1.19	251	200.70
0A-North	27	02-Oct	889	0.07005	1000	1.29	115	84.45
0A-North	28	02-Oct	823	0.06901	1000	1.25	292	246.25
0A-North	29	02-Oct	839	0.07306	1000	1.22	154	137.40
0A-North	30	04-Oct	530	0.07940	400	0.51	93	54.90
0A-North	31	04-Oct	532	0.07386	750	0.22	60	16.45
0A-North	32	04-Oct	490	0.06708	500	0.29	43	11.65
0A-North	33	05-Oct	578	0.07069	750	0.31	197	70.60
0A-North	34	05-Oct	578	0.06969	750	0.27	158	31.30
0A-North	35	05-Oct	558	0.07441	750	0.30	76	22.20
0A-North	36	05-Oct	442	0.07329	500	0.35	86	47.30
0A-North	37	05-Oct	442	0.08221	500	0.22	53	25.30
0A-North	38	05-Oct	663	0.07137	750	1.21	125	75.25
0A-North	39	05-Oct	663	0.07236	750	1.26	126	93.50
0A-North	40	05-Oct	830	0.07626	1000	1.28	189	151.51
0A-North	41	06-Oct	683	0.07209	750	1.21	60	54.95
0A-North	42	06-Oct	877	0.06985	1000	1.17	132	87.20
0A-North	43	06-Oct	917	0.07256	1000	1.18	188	142.10
0A-North	44	06-Oct	908	0.07170	1000	1.04	199	154.40

0A-North	46	06-Oct	967	0.07139	1000	1.33	72	54.00
0A-North	47	06-Oct	943	0.07889	1000	1.00	142	136.70
0A-North	48	06-Oct	825	0.07736	1000	0.89	85	68.50
0A-North	49	07-Oct	695	0.06771	750	1.21	65	39.75
0A-North	50	07-Oct	664	0.06964	750	1.28	52	43.65
0A-North	51	07-Oct	539	0.07627	750	0.71	63	25.30
0A-North	52	07-Oct	620	0.07513	750	1.19	57	44.85
0A-North	53	07-Oct	701	0.07378	750	1.17	48	38.95
0A-North	54	07-Oct	785	0.07889	1000	0.82	48	35.10
0A-North	55	07-Oct	837	0.06834	1000	0.86	151	123.10
0A-North	56	07-Oct	778	0.07632	1000	0.83	67	59.65
0A-North	57	08-Oct	641	0.07075	750	1.29	43	31.15
0A-North	58	08-Oct	593	0.06928	750	1.30	19	15.84
0A-North	59	08-Oct	538	0.05970	750	0.61	50	25.15
0A-North	60	08-Oct	517	0.05031	750	0.13	21	10.95
0A-North	62	08-Oct	659	0.07317	750	1.22	77	49.90
0A-North	63	08-Oct	759	0.07580	1000	1.09	50	29.55
0A-North	64	09-Oct	847	0.07266	1000	0.91	43	38.80
0A-North	65	09-Oct	757	0.06818	1000	1.18	52	40.10
0A-North	66	09-Oct	889	0.06821	1000	0.83	40	38.00
0A-North	67	09-Oct	869	0.06329	1000	0.97	68	67.87
0A-North	68	09-Oct	1025	0.06611	1250	0.63	121	137.20
0A-North	69	09-Oct	1084	0.07221	1250	0.49	134	175.75
0A-North	70	09-Oct	1297	0.07469	1500	0.21	44	55.50
0A-North	71	09-Oct	1434	0.05787	1500	-0.06	28	35.85
0A-North	72	09-Oct	1123	0.07383	1250	0.47	151	208.82
0A-North	73	10-Oct	1000	0.07626	1000	0.00	97	96.40
0A-North	74	10-Oct	934	0.07027	1000	0.89	160	130.05
0A-North	75	10-Oct	1098	0.07240	1250	0.52	73	87.70
0A-North	76	10-Oct	1117	0.07489	1250	0.44	90	117.65
0A-North	77	10-Oct	1288	0.07893	1500	0.15	23	38.70
0A-North	78	10-Oct	1435	0.06065	1500	0.05	21	35.79
0A-North	79	10-Oct	1463	0.07044	1500	0.05	22	36.45
0A-North	80	11-Oct	1345	0.05498	1500	0.08	5	6.85
0A-North	81	11-Oct	1372	0.06697	1500	0.00	12	24.83
0A-North	82	11-Oct	1173	0.07299	1250	0.11	34	44.55
0A-North	83	11-Oct	1078	0.07615	1250	0.31	406.112	440.20
0A-North	84	11-Oct	1118	0.08166	1250	0.03	68	101.39
0A-North	85	11-Oct	1142	0.07160	1250	0.14	206	264.55
0A-North	86	11-Oct	1352	0.06731	1500	-0.10	68	103.10
0A-North	87	11-Oct	1439	0.06455	1500	-0.14	26	46.70
0A-North	88	12-Oct	1418	0.06272	1500	0.26	62	101.85
0A-North	90	12-Oct	1107	0.06764	1250	0.11	187	259.20
0A-North	91	12-Oct	1429	0.05516	1500	0.00	23	37.20
0A-North	92	12-Oct	1213	0.07891	1250	0.00	115	169.40
0A-North	93	12-Oct	930	0.06946	1000	0.00	403.01	451.30
0A-South	94	12-Oct	1079	0.07721	1250	0.75	429.4	508.30
0A-South	95	13-Oct	537	0.07444	750	1.31	76	46.55
0A-South	96	13-Oct	689	0.07101	750	1.45	164	115.30
0A-South	97	13-Oct	1306	0.07520	1500	0.49	110	191.65

0A-South	98	13-Oct	527	0.07224	750	1.32	57	36.45
0A-South	99	13-Oct	1298	0.05922	1500	0.12	72	91.65
0A-South	100	13-Oct	1441	0.08683	1500	0.00	12	15.37
0A-South	101	13-Oct	575	0.07348	750	1.36	42	15.85
0A-South	102	14-Oct	1432	0.07783	1500	0.00	15	23.35
0A-South	104	14-Oct	678	0.07024	750	1.42	95	40.65
0A-South	105	14-Oct	895	0.07289	1000	1.42	172	108.95
0A-South	106	14-Oct	1113	0.08242	1250	0.85	291.816	447.50
0A-South	107	14-Oct	1307	0.07740	1500	0.41	52	93.65
0A-South	108	14-Oct	956	0.07567	1000	1.15	354	277.85
0A-South	109	14-Oct	1077	0.07418	1250	0.92	851.208	995.45
0A-South	110	14-Oct	778	0.07054	1000	1.43	86	70.30
0A-South	111	15-Oct	474	0.07063	500	1.53	92	47.00
0A-South	112	15-Oct	838	0.06018	1000	1.42	284	231.95
0A-South	114	15-Oct	557	0.07344	750	1.54	87	61.85
0A-South	115	15-Oct	753	0.07394	1000	1.55	76	50.70
0A-South	116	16-Oct	690	0.05338	750	1.56	40	27.80
0A-South	119	16-Oct	509	0.07007	750	1.50	77	40.75
0A-South	120	16-Oct	1442	0.07092	1500	0.01	20	31.35
0A-South	121	17-Oct	1210	0.06403	1250	0.83	44	52.40
0A-South	122	17-Oct	1367	0.06630	1500	0.11	51	68.25
0A-South	123	17-Oct	1282	0.06214	1500	0.34	81	90.85
0A-South	124	18-Oct	415	0.05909	500	1.21	41	17.35
0A-South	125	18-Oct	914	0.07345	1000	1.43	798.048	585.20
0A-South	126	18-Oct	1160	0.08179	1250	0.77	94	88.50
0A-South	127	18-Oct	1419	0.05184	1500	0.04	6	12.65
0A-South	128	18-Oct	1149	0.06806	1250	0.66	43	50.15
0A-South	129	18-Oct	531	0.06679	750	1.65	205	122.55
0A-South	130	18-Oct	575	0.06793	750	0.99	436.9	170.05
0A-South	131	19-Oct	471	0.07029	500	1.73	302.152	78.50
0A-South	132	19-Oct	738	0.04742	750	1.46	294	389.85
0A-South	133	19-Oct	1443	0.05786	1500	0.02	27	31.45
0A-South	134	19-Oct	1104	0.07592	1250	0.63	95	104.40
0A-South	141	20-Oct	1273	0.07967	1500	0.43	16	32.10
0A-South	142	20-Oct	972	0.07396	1000	0.95	605.514	579.00
0A-South	144	20-Oct	1439	0.06585	1500	-0.04	17	22.65
0A-South	145	20-Oct	738	0.07166	750	1.57	3650.43	2055.20
0A-South	146	20-Oct	886	0.06960	1000	1.29	349.59	315.95
0A-South	147	20-Oct	1302	0.05847	1500	0.41	92	113.00
0A-South	148	20-Oct	1079	0.07611	1250	0.77	83	86.50
0A-South	149	20-Oct	725	0.07917	750	1.63	388.938	256.45
0A-South	151	21-Oct	732	0.06992	750	1.65	102	73.75
0A-South	152	21-Oct	487	0.06553	500	0.00	179	63.30
0A-South	153	21-Oct	530	0.06679	750	1.79	304.368	72.20
0A-South	155	21-Oct	726	0.07630	750	1.55	83	65.09
0A-South	157	21-Oct	511	0.06235	750	1.82	74	51.30
0A-South	158	21-Oct	688	0.07008	750	1.74	46	28.30
0A-South	159	21-Oct	876	0.07990	1000	1.22	96	62.50
0A-South	161	22-Oct	472	0.06767	500	1.81	242	75.90
0A-South	162	22-Oct	695	0.07435	750	1.68	94	65.25

0A-South	164	22-Oct	726	0.07632	750	1.64	119	50.07
0A-South	165	22-Oct	956	0.07341	1000	1.11	107	83.35
0A-South	166	22-Oct	1147	0.09202	1250	0.61	60	61.30
0A-South	167	23-Oct	1363	0.06516	1500	0.09	17	27.90
0A-South	168	23-Oct	1317	0.06115	1500	0.11	25	27.45
0A-South	169	23-Oct	1423	0.06234	1500	-0.03	8	6.50
0A-South	170	23-Oct	720	0.07057	750	1.71	242	130.55
0A-South	173	24-Oct	661	0.07085	750	2.21	235	115.40
0A-South	175	24-Oct	1269	0.05650	1500	0.34	73	80.45
0A-South	176	24-Oct	1412	0.05771	1500	-0.05	12	20.50
0A-South	178	24-Oct	463	0.06893	500	3.89	46	14.40
0A-South	184	25-Oct	487	0.06035	500	3.37	23	7.85
0A-South	186	25-Oct	1180	0.06384	1250	0.64	128	165.30
0A-South	188	25-Oct	1474	0.04339	1500	-0.02	5	9.10
0A-South	190	26-Oct	1315	0.06106	1500	0.22	64	74.00
0A-South	191	26-Oct	1094	0.07512	1250	0.71	75	80.95
0A-South	192	26-Oct	976	0.07625	1000	1.12	87	81.20
0A-South	193	26-Oct	755	0.07634	1000	1.47	65	52.00
0A-South	194	26-Oct	872	0.07233	1000	1.17	94	70.20
0A-South	195	26-Oct	1237	0.07718	1250	0.44	68	59.70
0A-South	196	26-Oct	1275	0.05905	1500	0.18	18	20.10
0A-South	197	26-Oct	1046	0.07309	1250	0.75	229	253.20
0A-South	199	27-Oct	953	0.07400	1000	1.44	362.45	297.31
0A-South	200	27-Oct	874	0.05709	1000	0.91	96	78.70
0A-South	201	27-Oct	635	0.07635	750	2.26	165	60.91
0A-South	202	27-Oct	581	0.04543	750	2.70	34	7.70