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Report on Greenland halibut caught during the 2013 trawl survey in NAFO Division 0B

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

Abstract

A stratified random otter trawl survey covering depths of 400 m to 1500 m was conducted in NAFO Division 0B from September 22 to October 14, 2013. Survey coverage was 1 set per 750 km^2 with a minimum of two tows per stratum, this criteria was met in all strata with 84 of 90 planned tows completed. Greenland halibut (*Reinhardtius hippoglossoides)* were present in all tows with the greatest densities between 751 m and 1000 m. Total estimated biomass and abundance were 57,765 tons and $5.6x10^7$, respectively. Biomass had decreased compared to 2011 and was similar to the 2000 level. Abundance was the lowest in the time series. Biomass and abundance were reduced over all depths. Lengths ranged from 6 cm to 92 cm with a mode at 48 cm and 30% <45 cm, similar to what was observed in 2011 but with lower abundance at most length groups. The catch of other commercially important species was minimal and therefore these data were not included in this report.

Introduction

A stratified random bottom trawl survey was conducted in the North West Atlantic Fisheries Organization (NAFO) Division 0B from September 22 to October 14, 2013. This survey was the 4th conducted using the RV Pâmiut; others took place in 2000 (Treble et al. 2001), 2001 (Treble 2002), and 2011 (Treble 2012). Earlier surveys of 0B were conducted in 1986 (Bowering 1987) and 1990 (Chumakov and Soshin 1991).

The objectives of the 2013 survey 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.

Materials and Methods

Stratification and Set Selection

Table 1 lists the strata (401-1500 m) used for the survey in Div. 0B (Bowering 1987). This stratification scheme is also shown in Fig. 1. The total area between 401 and 1500 meters encompassed by the strata in Div. 0B is 74,483 km^2. Portions of strata 4 (500 m to 750 m) were excluded due to rough bottom and sets were not allocated in an area that is under a shrimp fishing industry closure due to known concentrations of corals and sponges.

Set selection was based on a coverage level of approximately 1 set per 750 km^2. Sets were randomly selected from numbered units within each stratum using a buffered random design (Kingsley et al. 2004). If a set could not be fished due to bad bottom, ice, etc. then the tow was taken in an adjacent unit as close to the missed site within the stratum as feasible given the conditions. When this was not possible then the tow was re-located to an area of the stratum where there were "holes" in the set coverage and a unit location selected at random from those available in that area. Ninety sets were allocated proportionally to stratum size with a minimum of 2 sets per stratum. Table 2 gives the set distribution across depth strata.

Vessel and Gear

The survey was conducted in cooperation with the Greenland Institute of Natural Resources and the vessel was 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. Wingspread was directly measured using Scanmar sensors. If wingspread was missing an average from adjacent tows at similar depths was used.

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. If there was no data from the CTD then data from the Furuno trawl eye sensor was used.

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 kn. Trawling took place throughout a 24 hr period in order to maximize the ships time and complete the necessary tows.

Due to time constraints and for reasons of economy the survey of 0B consisted of tows taken throughout the day and night. Bowering and Parsons (1986) found a catchability effect for young Greenland halibut between day and evening tows. However, the length frequency distribution (Figure 6) shows very few fish below 24.5 cm, therefore, a mix of day and evening hauls is unlikely to have a significant effect on the overall estimation of abundance and biomass.

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 overall 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 strata was calculated and compared to the overall abundance value determined above to confirm the results.

Results and Discussion

Division 0B was fully surveyed in 2013 with a minimum of two tows completed in all strata. Of the 90 stations planned, 84 were completed successfully (Table 2) with stations missed primarily due to bad bottom. In comparison there were problems completing the 2001 survey (36 of 76 planned tows completed) but only 2 shallow strata (24 and 25) were incomplete (i.e. <2 tows) resulting in a reduction of the area surveyed (62,207 km^2). The 2000 survey was completed although at a slightly reduced level of coverage (1 set per 1030 km^2 compared to 750 km^2 in 2011). The current coverage matches levels applied to the Greenland Institute of Natural Resources surveys in 1CD and DFO surveys of Div. 0A since 2004.

In 2013 bottom temperatures ranged from a high of 4.59 ^oC to a low of 1.47 ^oC (Appendix, Figure 7). The majority of tows (88%) had temperatures greater than or equal to 2.0 ^oC. Mean temperatures by depth stratum ranged from 2.6 ^oC for the 401-500 m depth stratum to 4.1 ^oC for the 751-1000 m depth strata (Table 3). Bottom temperatures at depths 751-1500m were in 2011 and 2013 compared to 2000 and 2001.

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 successful tows in 2013. The catch was comprised of 70% males, 28% females and 2% sex unknown. The number of fish caught varied from 3-220 and catch weight from 1.3-235.1 kg (Appendix 1).

The 2013 biomass index is 57,765 t (S.E. 4,418) (Table 4). This is lower than the level observed in 2011 (83,043 t) but comparable to what was estimated in 2000 (57,438 t) (Table 4 and Figure 2). Estimates have decreased across

all depth strata with strata 751-1000 containing the highest biomass. Figure 3 shows biomass distributions across surveys.

Mean biomass per tow or density declined from 1.11 t/km^2 in 2011 to 0.776 in 2013, a level similar to that estimated for 2000 (Table 4). Mean biomass was highest (2.5 t/km^2) between 751 m and 1000 m; between 1251 m and 1500 m mean biomass has decreased from 2.42 t/km^2 in 2000 to 1.46 t/km^2 in 2013.

The 2013 abundance index is estimated at 5.6 x 10^7 (S.E. 4.1 x 10^6) (Table 5, Figure 2). This is a decline compared to 2013 (8.30 x 10^7) and the lowest level in the time series. Abundance declined across all depth strata with strata 751-1000 m containing the highest abundance. Figure 4 shows abundance distributions across surveys.

Mean abundance per tow was 752 fish/km^2, a decrease over 2013 (1115 fish/km^2) and the lowest in the time series (Table 5). Mean abundance was highest (1569 fish/km^2) between 751 m and 1000 m; between 1251 m and 1500 m mean abundance has decreased from 2,526 fish/km^2 in 2000 to 1,198 fish/km^2 in 2013.

Length frequency distributions by depth strata for 2001, 2011 and 2013 are given in Figure 5. Generally there is a broad size distribution of lengths at depths below 750 m and a narrower range above. The size range in 2013 is similar to 2011 at most depths with a decline in overall abundance at length between 750 m and 1250 m.

Overall lengths in 2013 ranged from 6 cm to 92 cm (Table 6, Figure 6). The 2013 and 2011 length distributions are similar in shape with modes at 48 cm and 30% of fish <45 cm, however, the overall abundance was lower in 2013 compared to 2011. The modal lengths for 2000 and 2001 were 42 cm and 45 cm, (Table 6, Figure 6) with 57% and 47% of fish <45 cm in 2000 and 2001, respectively (Table 6).

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Table 1. Division 0B strata and area (Bowering, 1987).

Stratum	Area (km^2)	Units	Depth	# sets planned
3	8972.88	748	401-500	8
4	16021.53	1335	501-750	18
5	7100.1	592	751-1000	11
6	6774.25	564	1001-1250	9
7	5628.63	469	1251-1500	7
10	5371.38	448	401-500	6
11	7926.73	661	501-750	10
12	3234.49	270	751-1000	5
13	1176.49	98	1001-1250	2
24	4970.07	414	401-500	5
25	7305.9	609	501-750	9
Total	74482.45			90

Table 2. Area by depth strata for Division 0B with the number of hauls planned ( ) and conducted for surveys in 2000, 2001, 2011 and 2013.

Depth Stratum (m)		401-500	501-750	751-1000	1001-1250	1251-1500	Total
Area (sq. nm)		5631	9112	3013	2318	1641	21715
Area (sq. km)		19314	31254	10335	7951	5629	74483
Hauls in:	2000	(19) 18	(31) 20	(10) 12	(9) 9	(6) 5	(75) 64
	2001	(19) 9	(32) 8	(10) 8	(9) 7	(6) 4	(76) 36
	2011	(19) 18	(37) 32	(16) 16	(11) 11	(7) 7	(90) 84
	2013	(19) 20	(37) 32	(16) 14	(11) 11	(7) 7	(90) 84

Table 3. Mean temperature, S.E. and number of observations for Division 0B by depth stratum.

	Depth Stratum (m)				
Year	401-500	501-750	751-1000	1001-1250	1251-1500
2000	2.1 (0.20)	2.5 (0.15)	3.5 (0.04)	3.5 (0.03)	3.2 (0.02)
2001	2.6 (0.24)	2.9 (0.15)	3.7 (0.04)	3.5 (0.03)	3.4 (0.00)
2011	2.9 (0.34)	2.9 (0.21)	4.0 (0.03)	3.8 (0.02)	3.7 (0.02)
2013	2.6 (0.19)	2.8 (0.18)	4.1 (0.04)	3.9 (0.02)	3.8 (0.01)

Table 4. Biomass estimates for Greenland halibut by depth stratum for Division 0B.

Year	Stratum (m)	Survey Area (km^2)	No. Sets	Mean Biomass (t/ km^2)	Biomass (tons)	SE
2000	401-500	19314	18	0.1398	2701.4	359.4
	501-750	31254	20	0.3558	11119.7	1915.2
	751-1000	10335	12	1.3077	13515.0	1826.7
	1001-1250	7951	8	2.0700	16455.2	5178.0
	1251-1500	5629	6	2.4243	13646.2	3618.0
	Overall	*74483*	*64*	*0.7712*	*57437.5*	*6858.3*
2001	401-500	14344	9	0.2153	3088.4	630.0
	501-750	23948	8	0.7443	17824.8	5003.8
	751-1000	10335	8	1.5881	16413.3	2655.5
	1001-1250	7951	8	2.5244	20071.3	2870.2
	1251-1500	5629	3	2.0465	11519.6	1348.6
	Overall	*62207*	*36*	*1.1079*	*68917.4*	*6522.5*
2011	401-500	19314	17	0.3217	6213.7	848.8
	501-750	31254	33	0.6775	21176.0	3929.7
	751-1000	10335	16	2.5709	26570.1	3024.8
	1001-1250	7951	11	2.4699	19638.5	2593.1
	1251-1500	5629	7	1.6779	9445.1	535.9
	Overall	*74483*	*84*	*1.1149*	*83043.4*	*5685.4*
2013	401-500	19314	20	0.2091	4038.7	810.6
	501-750	31254	32	0.5742	17945.8	3191.2
	751-1000	10335	14	1.7509	18095.7	2236.2
	1001-1250	7951	11	1.1874	9440.9	1454.0
	1251-1500	5629	7	1.4645	8243.5	1163.7
	Overall	*74483*	*84*	*0.7755*	*57764.6*	*4418.2*

Table 5. Abundance estimates of Greenland halibut by depth stratum for Division 0B.

Year	Stratum (m)	Survey Area (km^2)	No. Sets	Mean Abundance (km^2)	Abundance (000's)	SE
2000	401-500	19314	18	466.20	9.0E+06	2.0E+06
	501-750	31254	20	579.17	1.81E+07	2.6E+06
	751-1000	10335	12	1655.32	1.71E+07	2.9E+06
	1001-1250	7951	8	2381.64	1.89E+07	6.5E+06
	1251-1500	5629	6	2526.86	1.4E+07	4.7E+06
	Overall	*74483*	*64*	*1038.81*	*7.737E+07*	*9.2E+06*
2001	401-500	14344	9	485.20	6.96E+06	1.2E+06
	501-750	23948	8	1082.20	2.59E+07	7.1E+06
	751-1000	10335	8	1907.50	1.97E+07	3.2E+06
	1001-1250	7951	8	2726.40	2.17E+07	3.3E+06
	1251-1500	5629	3	2064.10	1.16E+07	1.4E+06
	Overall	*62207*	*36*	*1380.66*	*8.589E+07*	*8.7E+06*
2011	401-500	19314	17	454.77	8.8E+06	1.7E+06
	501-750	31254	33	789.74	2.5E+07	4.1E+06
	751-1000	10335	16	2388.70	2.5E+07	2.8E+06
	1001-1250	7951	11	2151.08	1.7E+07	2.5E+06
	1251-1500	5629	7	1378.32	7.8E+06	4.4E+05
	Overall	*74483*	*84*	*1114.55*	*8.301E+07*	*5.8E+06*
2013	401-500	19314	20	277.00	5.4E+06	1.0E+06
	501-750	31254	32	615.30	1.9E+07	3.0E+06
	751-1000	10335	14	1569.40	1.6E+07	2.0E+06
	1001-1250	7951	11	1060.60	8.4E+06	1.3E+06
	1251-1500	5629	7	1197.80	6.7E+06	9.5E+05
	Overall	*74483*	*84*	*751.53*	*5.598E+07*	*4.1E+06*

Table 6. Estimated length distribution (3cm groups) in total numbers (000's) and weight (tons) for the Greenland halibut population in Division 0B.

Length Class (3 cm)	2000	2001	2011	2013
0				
3				
6	202.164	67.965	17.433	42.553
9	46.653	103.906		169.393
12	513.184		1824.725	676.284
15	839.756	22.414	816.183	183.888
18	2177.146	199.255	620.797	159.126
21	855.307	612.353	633.493	597.556
24	1430.696	1358.497	664.370	1027.278
27	1648.410	1060.367	707.726	611.462
30	1866.125	1865.648	894.384	677.376
33	2954.698	3243.666	1608.425	1078.007
36	4805.272	4692.739	2321.563	1714.729
39	10170.381	9967.780	4822.473	3004.849
42	14680.183	16973.462	9641.443	6275.420
45	13747.121	20021.648	16529.356	10823.066
48	8724.134	12414.917	16907.868	11750.513
51	4556.455	6401.508	12176.685	7928.973
54	2425.963	2847.439	6184.427	3974.612
57	1337.390	1887.003	2964.766	2162.785
60	559.838	944.613	1579.341	1233.643
63	373.225	506.754	869.389	800.027
66	171.061	252.271	477.853	381.443
69	108.857	177.178	268.238	174.755
72	108.857	152.722	119.126	132.795
75	124.408	17.553	134.525	160.804
78	77.755	25.107	50.099	80.290
81	62.204	23.765	55.432	43.550
84	62.204	11.981	27.971	48.503
87		11.981	28.542	23.186
90	15.551		71.922	30.418
93				8.672
96		22.513		
99				
Total	74645.000	85887.003	83018.555	55975.952
Total <45 cm	42189.976	40168.051	24573.015	16217.918
% <45 cm	56.521	46.768	29.599	28.973
% <35 cm	16.792	9.936	9.380	9.331

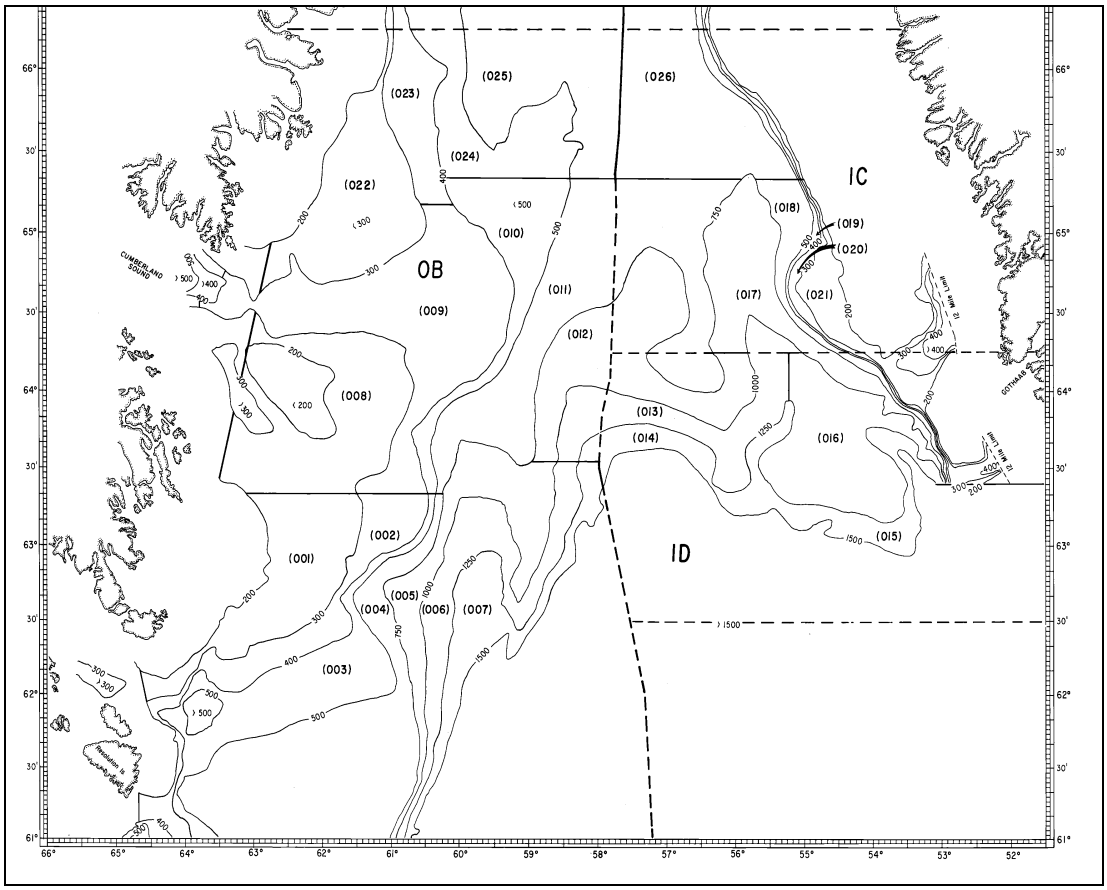
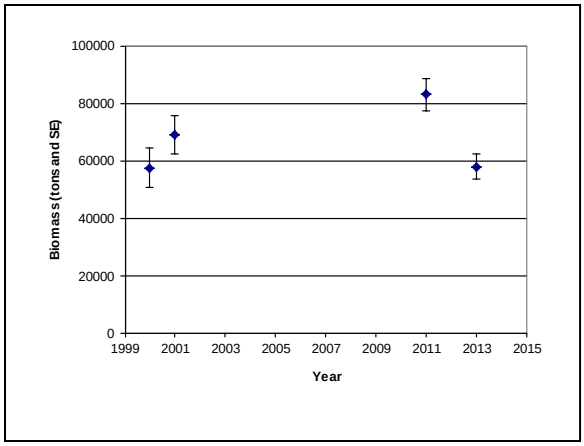


Figure 1. Stratification scheme for Division 0B.



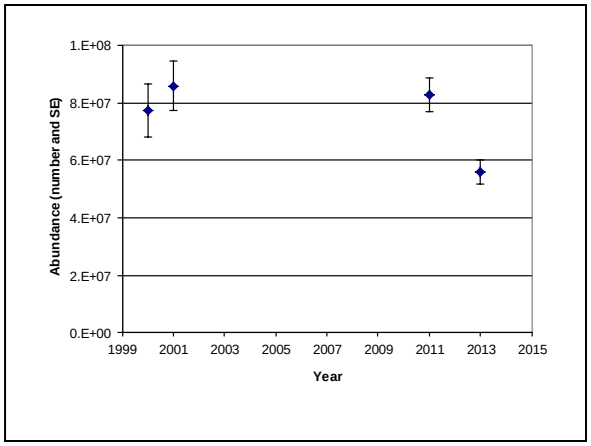


Figure 2. Biomass (left panel) and abundance (right panel) index for Division 0B Greenland halibut.

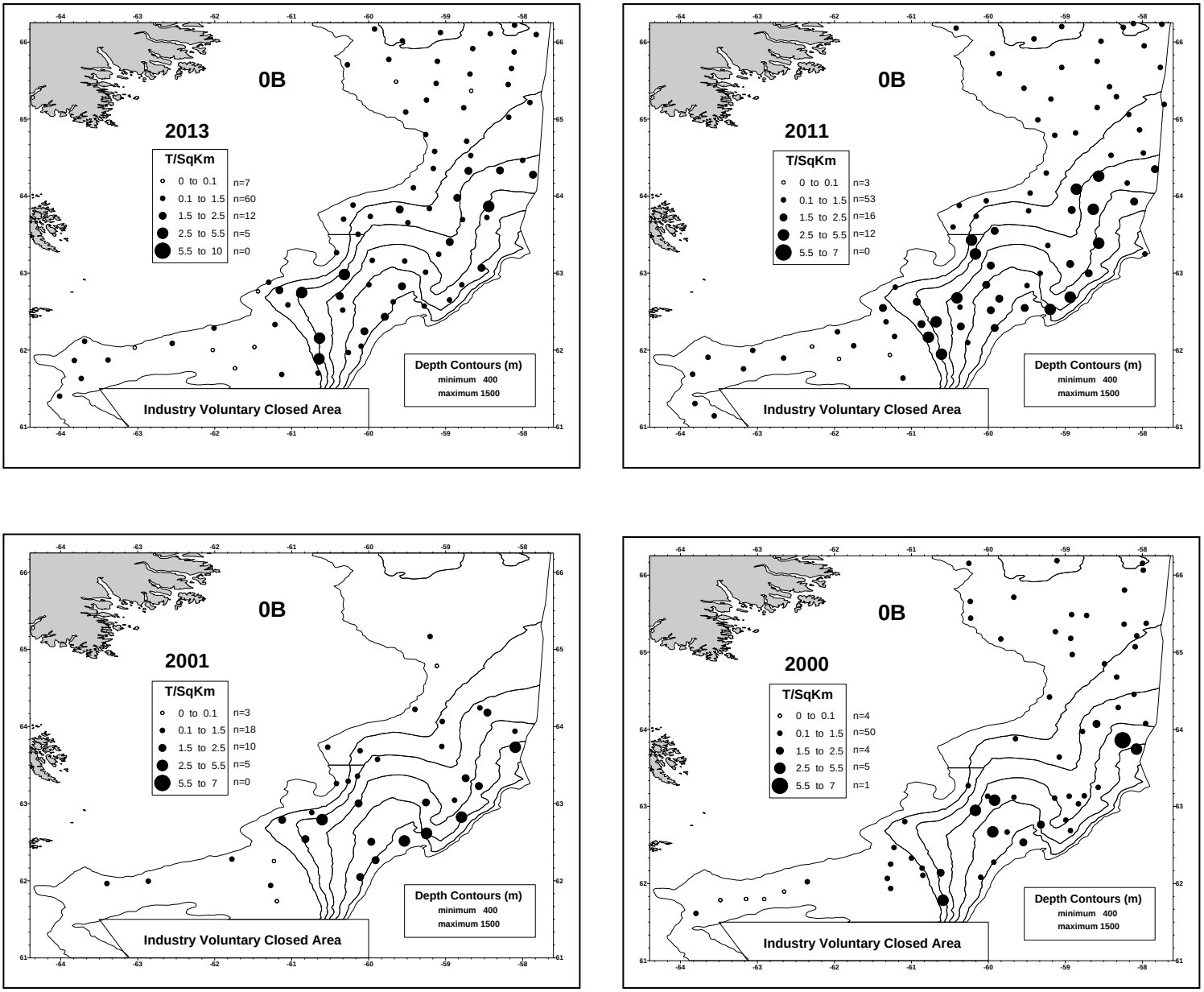
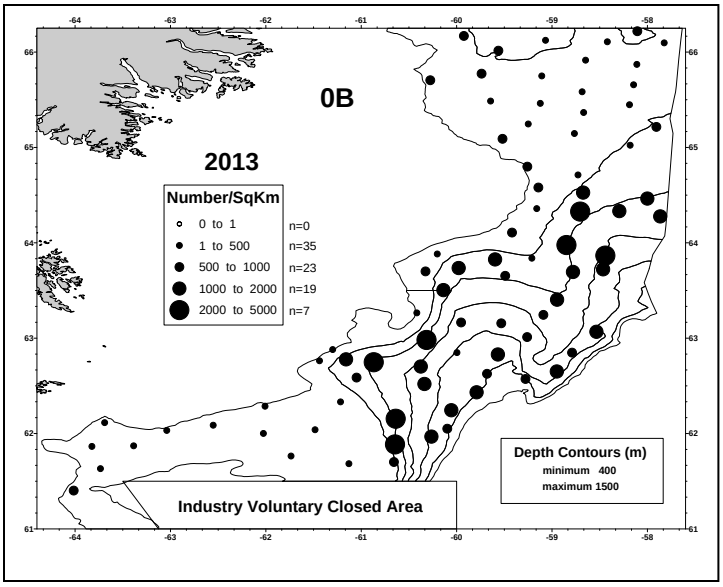
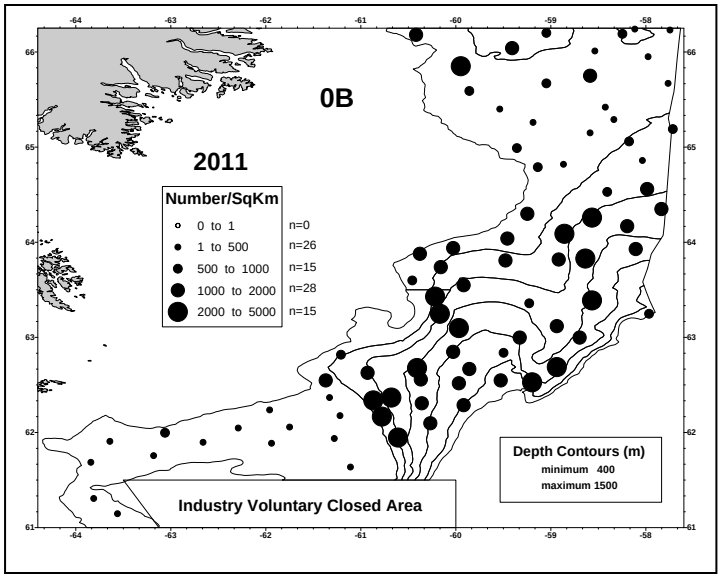
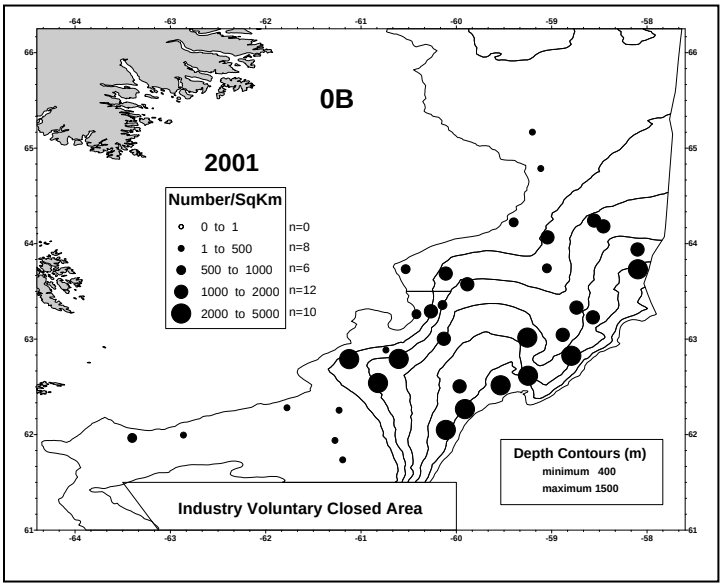


Figure 3. Distribution of Greenland halibut biomass (kg/km^2) in Division 0B 2000, 2001, 2011 and 2013.







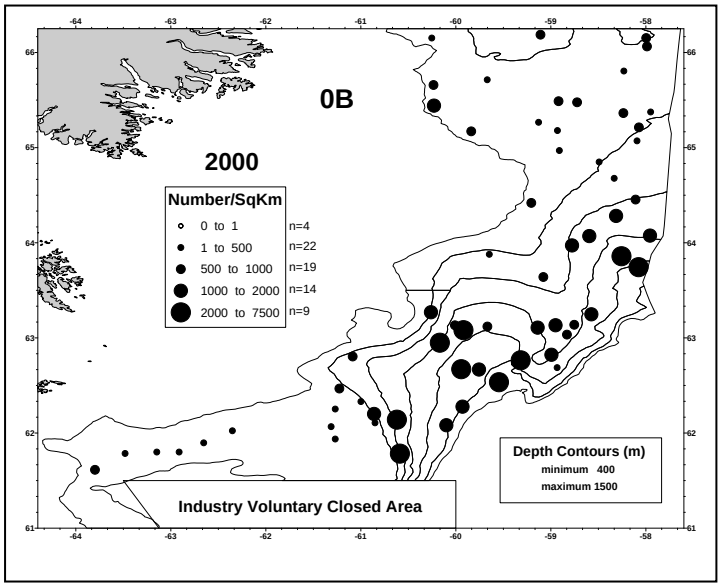


Figure 4. Distribution of Greenland halibut abundance (Number/km^2) in Division 0B 2000, 2001, 2011 and 2013.

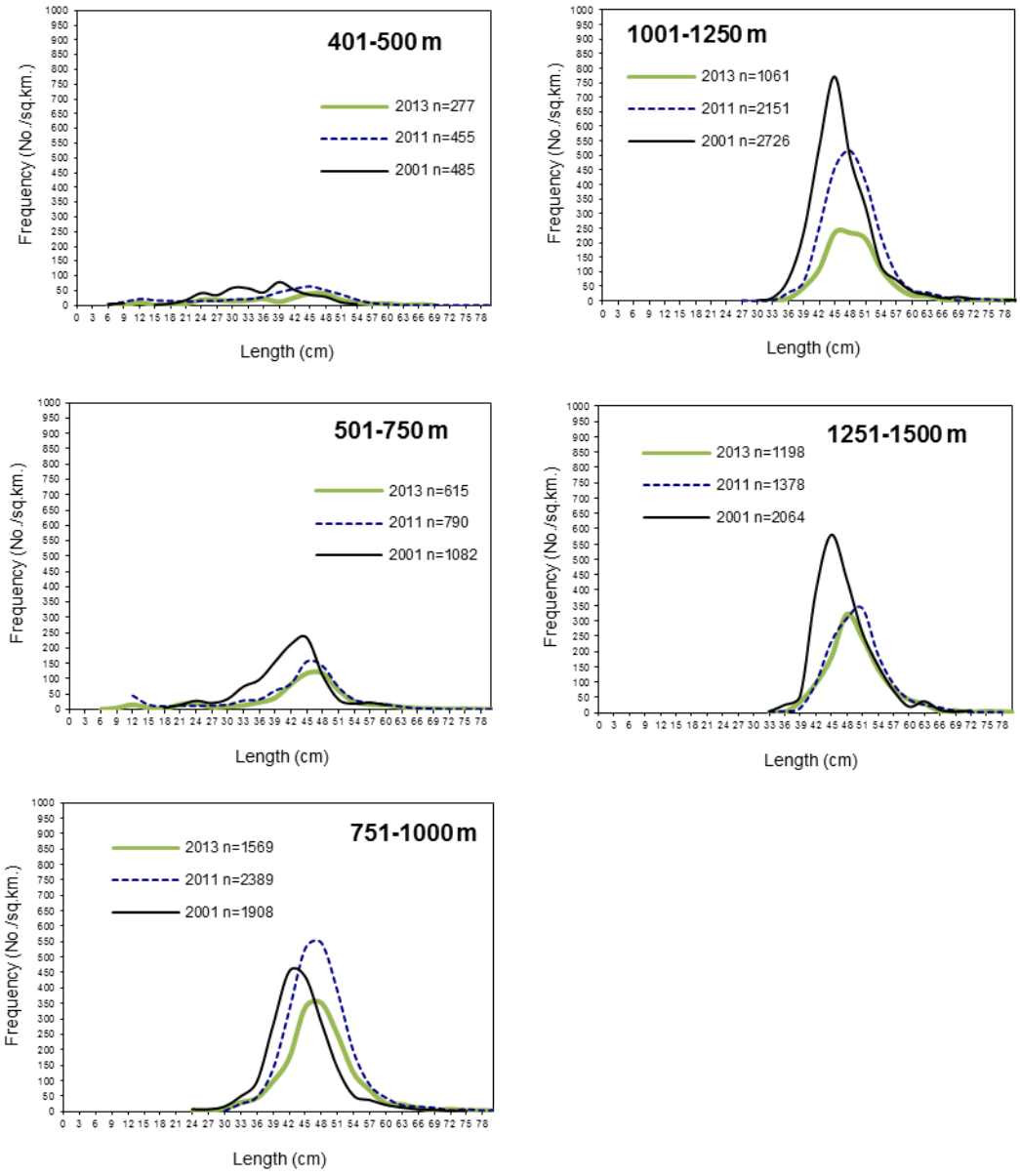


Figure 5. Length distribution (3cm groups) for Greenland halibut in Division 0B, standardized to numbers/km^2 for the 2001, 2011 and 2013 survey's. Sample sizes (n) used in the calculation are also given.

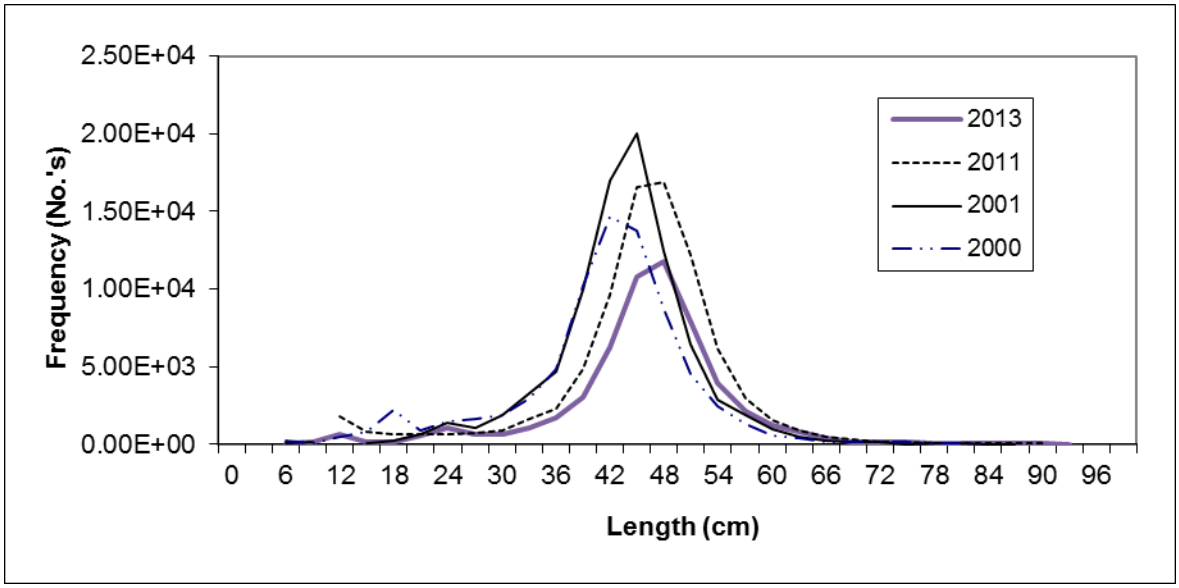


Figure 6. Estimated abundance at length for the Greenland halibut in Division 0B.

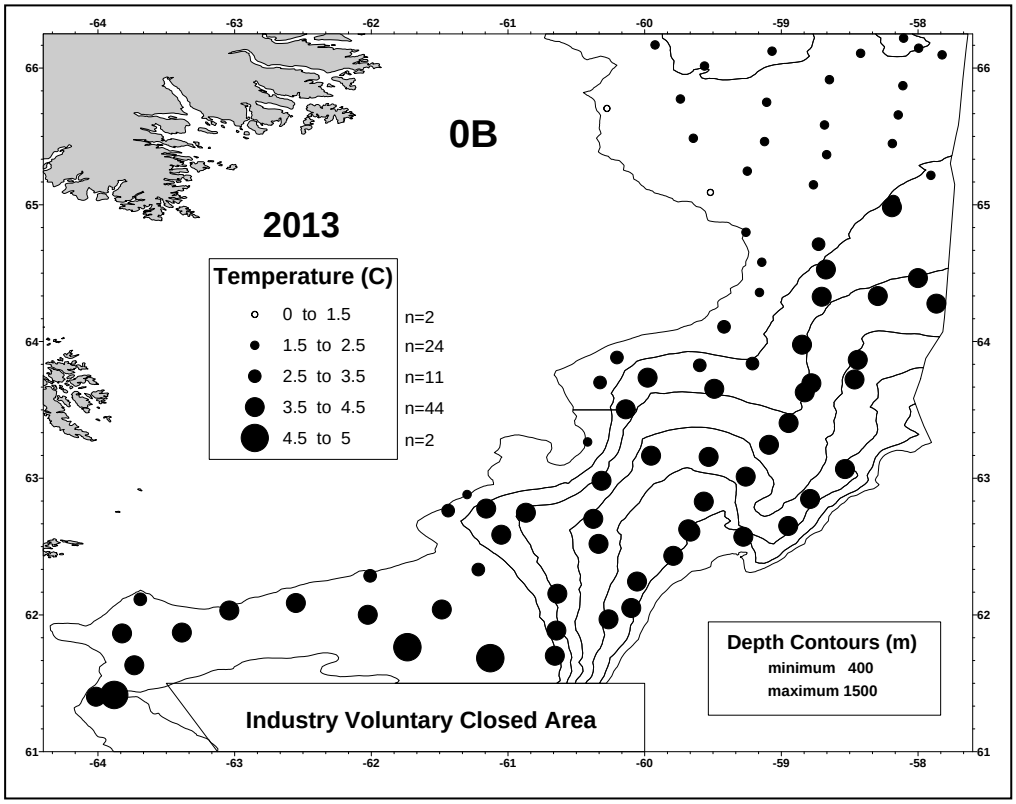


Figure 7. Bottom temperatures for Division 0B in 2013.

Appendix 1. Greenland halibut catch weight and numbers (not standardised to kg/km2), temperature, mean depth, depth stratum and swept area for each set in the 2013 survey of Division 0B.

						Greenland Halibut	
Set	Date	Mean Depth (m)	Swept Area (sq km)	Depth Stratum (m)	Temperature (^{o}C)	Weight (kg)	Number
1	22-Sep-13	891	0.08484	1000	3.84	167	188.55
2	22-Sep-13	826	0.08474	1000	4.25	102	101.25
3	23-Sep-13	870	0.05931	1000	4.26	83	108.00
4	23-Sep-13	750	0.08523	750	4.18	188	202.00
5	23-Sep-13	659	0.08209	750	3.86	108	94.45
6	23-Sep-13	540	0.07954	750	2.55	21	18.60
8	23-Sep-13	644	0.08053	750	2.97	14	11.05
9	23-Sep-13	623	0.08023	750	2.49	69	55.70
10	23-Sep-13	539	0.06457	750	2.05	20	16.70
11	23-Sep-13	538	0.07523	750	1.87	14	17.15
12	24-Sep-13	564	0.05548	750	1.97	7	9.45
13	24-Sep-13	594	0.08100	750	2.01	30	11.15
15	24-Sep-13	630	0.07567	750	1.66	50	11.40
16	24-Sep-13	577	0.08152	750	1.71	21	17.35
17	24-Sep-13	535	0.08100	750	1.74	17	11.85
18	24-Sep-13	504	0.07763	750	1.82	20	22.20
19	24-Sep-13	478	0.08058	500	1.96	6	6.40
20	24-Sep-13	472	0.08385	500	2.09	15	11.30
21	24-Sep-13	449	0.07298	500	1.83	18	9.30
22	25-Sep-13	459	0.08177	500	1.87	15	10.70
23	25-Sep-13	504	0.07883	750	1.78	20	18.75
24	25-Sep-13	657	0.08141	750	1.65	25	30.30
25	25-Sep-13	616	0.07890	750	1.68	61	34.35
26	25-Sep-13	580	0.06338	750	1.66	48	27.17
27	25-Sep-13	435	0.08072	500	1.47	57	37.95
28	25-Sep-13	583	0.06051	750	1.72	51	28.00
29	25-Sep-13	497	0.07932	500	1.8	12	4.50
30	26-Sep-13	435	0.08598	500	1.47	56	27.40
31	26-Sep-13	445	0.07387	500	1.6	38	16.25
32	26-Sep-13	473	0.08111	500	1.99	70	64.95
33	26-Sep-13	514	0.07608	750	2.4	25	22.85
34	26-Sep-13	520	0.08261	750	2.83	74	72.90
35	26-Sep-13	624	0.07604	750	3.26	37	35.50
36	26-Sep-13	756	0.08233	1000	4.23	56	66.90
37	26-Sep-13	644	0.06982	750	3.23	98	105.05
38	26-Sep-13	718	0.07632	750	3.79	114	113.05
39	26-Sep-13	516	0.07680	750	3.1	31	35.85
40	27-Sep-13	559	0.07364	750	3.1	40	43.75
41	27-Sep-13	760	0.07804	1000	4.16	95	89.95
42	27-Sep-13	449	0.05307	500	2.42	12	11.25
43	27-Sep-13	1112	0.08647	1250	4.05	72	79.05

44	27-Sep-13	1244	0.07942	1250	.		13	16.65
45	27-Sep-13	915	0.07964	1000		4.08	210	235.10
46	27-Sep-13	407	0.06818	500		2.41	17	15.35
47	28-Sep-13	462	0.07937	500		2.77	6	4.40
48	28-Sep-13	698	0.08346	750		3.67	148	167.40
49	28-Sep-13	842	0.08148	1000		4.2	220	225.20
50	28-Sep-13	754	0.08294	1000		3.87	60	59.55
51	28-Sep-13	460	0.08139	500		2.94	32	37.35
52	28-Sep-13	494	0.07928	500		4.21	3	4.25
53	28-Sep-13	423	0.07283	500		2.73	15	15.33
54	28-Sep-13	457	0.07521	500		3.8	4	8.35
55	28-Sep-13	436	0.08269	500		3.5	3	1.25
56	29-Sep-13	503	0.06896	750		3.86	6	10.00
57	29-Sep-13	430	0.07928	500		2.65	34	17.85
58	29-Sep-13	586	0.07143	750		3.9	16	17.85
59	29-Sep-13	453	0.05623	500		3.62	12	12.25
61	29-Sep-13	548	0.07732	750		4.45	70	74.85
134	10-Oct-13	454	0.07766	500		3.9	4	4.55
135	10-Oct-13	567	0.07494	750		4.57	4	3.20
136	11-Oct-13	560	0.05646	750		4.59	4	5.80
137	11-Oct-13	648	0.05070	750		4.12	45	53.25
138	11-Oct-13	881	0.07451	1000		4.26	170	203.25
139	11-Oct-13	907	0.08376	1000		4.17	174	214.20
140	11-Oct-13	1314	0.08695	1500		3.79	90	105.04
141	11-Oct-13	1432	0.08263	1500		3.78	60	67.50
142	12-Oct-13	1371	0.08414	1500		3.7	114	142.15
143	12-Oct-13	1100	0.08175	1250		3.91	120	138.83
144	12-Oct-13	1167	0.08235	1250		3.88	94	104.00
145	12-Oct-13	1432	0.08021	1500		3.8	118	149.50
147	13-Oct-13	1427	0.08673	1500		3.78	55	64.15
148	13-Oct-13	1365	0.08491	1500		3.75	105	151.10
149	13-Oct-13	1238	0.08464	1250		3.8	82	94.40
150	13-Oct-13	1165	0.07228	1250		3.88	79	92.85
151	13-Oct-13	1132	0.07361	1250		3.93	64	76.15
152	13-Oct-13	1275	0.05606	1500		3.81	108	120.75
153	13-Oct-13	1071	0.08484	1250		3.88	52	59.70
154	14-Oct-13	1074	0.08335	1250		3.88	73	86.85
155	14-Oct-13	935	0.08491	1000		3.9	56	58.90
156	14-Oct-13	830	0.08235	1000		4.11	107	136.75
158	14-Oct-13	868	0.08557	1000		4.05	89	98.15
159	14-Oct-13	811	0.08298	1000		4.17	173	173.35
160	14-Oct-13	1056	0.08054	1250		3.89	184	212.00
161	14-Oct-13	1097	0.08475	1250		3.82	115	98.65